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TECHNICAL MANUAL

OPERATOR AND MAINTENANCE MANUAL

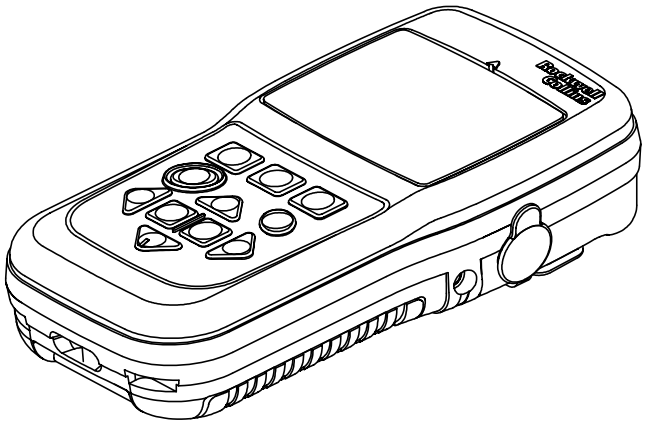
DEFENSE ADVANCED GPS RECEIVER (DAGR) SATELLITE SIGNALS NAVIGATION SET

AN/PSN-13

NSN 5825-01-516-8038

AN/PSN-13A

NSN 5825-01-526-4783



Headquarters, Departments of the Air Force, Army, Marine Corps, and Navy

1 March 2005 **Change 1 1 June 2005**

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INTRODUCTION

1. HOW TO USE THIS MANUAL.

This manual provides operation and maintenance instructions for the Defense Advanced GPS Receiver (DAGR). Throughout this manual, the term DAGR is used when referring to the DAGR unit. Wherever information is unique to an AN/PSN-13 or an AN/PSN-13A DAGR unit, the DAGR nomenclature (AN/PSN-13 or AN/PSN-13A) is given after the information. Also throughout the manual, cross references are made concerning chapters, tables, figures, or paragraphs. All cross references include the chapter number along with applicable table, figure, or paragraph numbers. For example: if a cross reference is Table 9-2, then refer to chapter 9 and table 9-2; if a cross reference is Figure 9–2, then refer to chapter 9 and figure 9-2; if a paragraph cross reference is Paragraph 9.1.3, then refer to chapter 9 and paragraph 9.1.3. Chapter cross references are shown individually as Chapter 2, Chapter 29, etc. This manual contains information arranged as follows in the order shown.

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SAFETY SUMMARY

1. WARNINGS, CAUTIONS, AND NOTES.

1.1. Definitions.

Warnings and cautions are used in this manual to highlight operating or maintenance procedures, practices, and conditions or statements which are considered essential to the protection of personnel (WARNING); or protection of equipment and/or having a mission impact (CAUTION). Warnings and cautions immediately precede the step or procedure to which they apply. Warnings and cautions consist of a heading (WARNING or CAUTION) and a statement of the hazard. Notes are used in this manual to highlight operating or maintenance procedures, practices, conditions or statements which are not essential to protection of personnel or equipment. Notes may precede or follow the step or procedure, depending upon the information to be highlighted. The headings used and their definitions are as follows:

WARNING

Operating procedures or practices which, if not correctly followed, could result in personal injury or loss of life. Electrical precautions are listed under a warning symbol.

CAUTION

Operating procedures or practices which, if not strictly observed, could have an impact on the mission, or result in damage to equipment or destruction of equipment.

NOTE

Highlights operating or maintenance procedures, practices, conditions, or statements which are not essential to protection of personnel or equipment.

1.2. Warnings and Cautions Used.

Warnings and cautions appearing in the text of this manual are repeated here for emphasis.

WARNING

• The DAGR and its accessories are not designed or certified for use in explosive atmospheres as defined in Article 500 of the National Electrical Code 2002 (NEC). Using the DAGR and its accessories in this type of environment may cause personal injury or death.

• If abused, lithium batteries can explode causing severe injury. Be sure to store batteries in original packaging until ready to use and observe polarity during installation. Reverse polarity can cause damage to the battery and DAGR. BE CAREFUL - DO NOT: Short circuit — Try to charge — Store at temperatures above 70 °C (158 °F) — Store with other hazardous materials — Keep near open flame or heat — Throw into fires — Open, crush, puncture, or break — Reverse battery polarity — Store loosely or dump in bins. DO: Dispose of batteries in accordance with local regulations.

• To prevent electrical shock, never open the external 110 V AC power cable adapter and never come in contact with its AC plug during operation.

1.2. Warnings and Cautions Used (cont).

WARNING

• If DAGR power is cycled while using the Fire Support page, calculated position coordinates and elevation of a target are lost unless stored as a waypoint. When the Power-On sequence is complete, the Present Position page is displayed and NOT the Fire Support page. • You must recalculate the target position coordinates after the Power-On sequence is completed. Prior to communicating or using any calculated target position coordinates, always verify page title FIRE SUPPORT appears at the top of the display and position coordinates field title is Calculated Target Position.

• DAGR displays a warning to prevent misuse of the present position as a target position that could cause personal injury or death. After power-on and prior to the DAGR automatically displaying the Present Position page, a warning stating your position is displayed, NOT the target position if the Fire Support page was used or nonvolatile memory was cleared prior to power-on.

• Before using or communicating a Fire Support page or LRF waypoint target position, take appropriate action according to any warning or danger message that is displayed. Then check all data in the Safety Check fields to ensure your present position is a safe distance from the target position relative to the ordinance being used. Failure to do so could result in injury or death.

• Always verify data in the Fire Support page Safety Check fields as a safety check prior to using or communicating a Fire Support page target position. Always maintain a safe slant range between present position and target position to ensure safety of operator and other personnel.

• If any fields on the Fire Support page are blinking, the DAGR did not have a current position fix when the calculation was performed. Calculated field data may be inaccurate and result in injury or death.

• When the Fire Support page calculation is performed and the slant range between DAGR present position and the target position is equal to or less than 100 meters, the DAGR displays a **danger** message that present position and target position are the same. When this message is displayed, immediately obtain a safe slant range to prevent injury or death.

• When the Fire Support page calculation is performed and the slant range between DAGR present position and the target position is equal to or less than the value shown in the User Entered Minimum Safe Slant Range field (but greater than 100 meters), the DAGR displays a **warning** message and displays the slant range from DAGR present position to target position. When this message is displayed, immediately obtain a safe slant range to prevent injury or death.

• A high level of position error may place the safety of personnel and the mission at risk. Before storing Fire Support page calculation values as a waypoint, verify the FOM field and EPE or EHE field indicate acceptable position accuracy to meet mission requirements. Refer to Table 9-1 to determine the FOM amount of position error in meters. An FOM above 3 is considered a high level of position error.

• A high level of position error may place the safety of personnel and the mission at risk. Before storing laser range finder (LRF) values as a waypoint, verify the current DAGR figure of merit (FOM) indicates acceptable position accuracy to meet mission requirements. Refer to the position error field (EPE/EHE/EVE) of either the Present Position page or NAV Displays page to view the current FOM. An FOM above 3 is considered a high level of position error.

• Prior to using a laser range finder with DAGR, ensure present position is current and accurate. When used with a laser range finder, the DAGR must be set to Continuous mode, OR if set to Standby mode, verify the present position fix is current and accurate. DO NOT set the DAGR to auto transition to Standby mode. When DAGR ceases tracking satellites (e.g., placed in Standby mode) and is moved to another location, the last present position fix is no longer current or accurate.

1.2. Warnings and Cautions Used (cont).

WARNING

• After using the Jammer Finder page, the calculated jammer signal source area is **not** to be used as an accurate GPS position (e.g., Fire Support).

• Check all data appearing in the CAS 9-Line page Safety Check fields prior to calling for close air support to ensure safety of operator and other personnel.

• For close air support applications, ensure the DAGR is tracking satellites and has a position fix. If a position fix has not been obtained, the displayed position data blinks between gray and black to notify the operator. Field data may be inaccurate and/or unavailable when the DAGR does not have a position fix.

• Do not use DAGR operator selections to set up or perform Approach navigation. Performing DAGR Approach navigation could result in injury or death through use of an incorrect approach course to the glide path waypoint.

• Due to the type of materials used to construct the DAGR, RA-1 and RA-2, supertropical bleach (STB) or decontamination solution number 2 (DS-2) should not be used during decontamination. Exposure may significantly degrade the material structural integrity, window transparency and/or keypad legibility.

• The helmet antenna cable is designed to disengage at the breakaway connection if the cable is caught on something and the user keeps moving. Do not tamper with or remove the breakaway feature of the helmet antenna cable. The breakaway feature prevents possible injury to the user.

CAUTION

• Do not mix new batteries with old batteries. Do not mix battery types. Do not reverse battery polarity. Use only fresh/new batteries. Replace all primary power batteries at the same time. These precautions are done to ensure proper battery life and proper unit operation.

• If the primary batteries cannot be installed easily, they may be positioned backwards. Check for proper polarity and do not force primary batteries into primary battery pack as this may damage the battery connectors in the battery pack.

• Ensure a good memory battery is installed before removing the primary battery pack to ensure all settings in memory are retained. A good memory battery is indicated by checking the memory battery date on the Battery page, or if the battery is low, a Low Memory Battery message will show on the display.

• Ensure good primary batteries are installed (check battery indicator on display) or external power is applied to unit before replacing the memory battery to ensure all settings in memory are retained.

• If the DAGR is being used for the first time and there are no memory settings to be saved; the memory battery is not important, but still needs to be installed. If the DAGR has memory settings that need saved from previous usage, then ensure a good memory battery is installed (check memory battery date on Battery page) or external power applied to unit before installing or replacing the primary batteries to ensure all settings in memory are retained.

• If all primary and memory power is lost, memory information is lost and DAGR resets to default settings after power-up.

• If the operating temperature range is exceeded while batteries are installed, DAGR memory data can become corrupted and performance degraded.

• If using external DC power, ensure positive (red) lead of external DC power cable is connected to the positive lead of external power source to prevent possible damage to the unit. Internal batteries may remain installed while using external power. The memory battery should always remain installed.

1.2. Warnings and Cautions Used (cont).

CAUTION

• Failure to observe correct polarity when installing the external DC power cable may result in damage to the DAGR. If using an external DC power source, ensure positive (red) lead of the external DC power cable is connected to the positive lead of external power source. The DAGR is protected against accidental reverse connection of external power.

• Installation in host platforms using positive battery grounding is not approved, and may cause abnormal DAGR operation.

• When position data fields blink between black and gray text, the DAGR is not tracking satellites or has not yet acquired present position. Field data may be inaccurate when the DAGR does not have a position fix. Be sure the DAGR has an open view of the sky to acquire the present position. If the position data fields continue to blink, perform the manual initialization procedure.

• If the DAGR is not tracking satellites or has no position fix, the displayed position data blinks between gray and black to notify the operator. Field data may be inaccurate and/or unavailable when the DAGR does not have a position fix.

• Be sure the DAGR has an open view of the sky. Current position is necessary before accurate navigation of waypoints and routes can be accomplished.

• Ensure the DAGR is tracking satellites and has established position before marking a waypoint (display stops blinking or Navigating is displayed on SV Sky View page). When display data fields blink between black and gray text, the DAGR is not tracking satellites or has not yet acquired present position. Field data may be inaccurate and/or unavailable when the DAGR does not have a position fix.

• Prior to a mission, manually enable and orient the internal compass. Failure to do this can result in inaccurate DAGR track data when the DAGR is not moving or is moving below a preset speed value for a specified amount of time.

• When position data cannot be updated using satellite (SV) tracking or upon transition to Standby mode, the DAGR continues to provide the last computed position. Therefore, present position information may be inaccurate until the DAGR has obtained a position fix.

• When in use, field data of the user datum must be accurate to provide accurate position coordinates. User datums are to be input and used only if the DAGR does not already support the required datum. Select the required datum, using the Units page, before using position data on other displays.

• When in use, field data of the user grid must be accurate to provide accurate position coordinates. User grids are to be input and used only if the DAGR does not already support the required grid. Select the required grid, using the Units Page, before using position data on other displays.

• The DAGR can be configured to operate in the Basic function set (contains only one user profile), or the Advanced function set (contains up to ten user defined user profiles). When changing from Basic to Advanced function set, the DAGR defaults to the user profile that was last used in the advanced function set. Ensure the correct user profile is active after switching to the Advanced function set. Changing DAGR settings modifies the configuration of the current user profile being used. Changes to a particular profile that is unfamiliar to the user could possibly put the individual or mission in danger. Refer to Paragraph 12.4 for more information.

• Changing DAGR settings modifies the configuration of the current user profile displayed in the Current User Profile field. Changes to a particular profile that is unfamiliar to the user could possibly put the individual or mission in danger. When changing from Basic to Advanced function set, the DAGR defaults to the last used advanced user profile. Ensure the correct user profile is active after switching to the Advanced function set.

• If the Test Summary page Status field indicates Test Failed, do not use the DAGR. The DAGR is not fully functional and could provide inaccurate data.

• Data Clear Options can destroy mission critical data. DAGR operation can become seriously impaired for a particular mission without this data.

1.2. Warnings and Cautions Used (cont).

CAUTION

• The emergency zeroize function is used in emergencies to protect mission sensitive data. Emergency zeroize destroys mission critical data, maps/images, and CV keys entered into or collected by the DAGR. Failure to emergency zeroize could compromise a mission. Emergency zeroize also sets the DAGR to default settings.

• When the GPS Setup page RAIM Status field displays Faults Found, the position solution may be degraded.

• CV key zeroize destroys CV key data entered into the DAGR. Failure to CV key zeroize could compromise a mission.

• DAGR performance can be degraded when the operator uses the SV Select page to manually deselect satellites or select satellite tracking frequency, code, or acquisition method. When DAGR power is cycled, all operator satellite selections are lost and the DAGR resumes full control of satellite selection.

• If expecting to operate in conditions where tracking satellites is not possible (such as entering a cave), the DAGR should be placed in Standby mode prior to entering these conditions. If done, the DAGR performs a direct Y-code acquisition (if keyed) when set back to a tracking mode in unobscured conditions. If the DAGR is left in a tracking mode for a period of one hour while obscured, the ability to perform direct Y-code reacquisitions may be lost. To correct this, cycle DAGR to Standby mode and back to a tracking mode.

• When attempting to acquire satellites after the signals have been blocked for a period of time (e.g., when exiting a cave), acquisition time may be improved by momentarily cycling the unit to Standby mode and then back to the previous operating mode.

• Accidental jamming may occur when operating the DAGR near a tank or a source of high power electronic emissions, and DAGR communication with satellites could be compromised. Move away from these sources and verify operation.

• L-band radio transmissions may interfere with DAGR operations, and DAGR communication with satellites could be compromised.

• To enable DAGR operation during spoofing, the receiver must be loaded with current crypto keys.

• Only DAGRs loaded with crypto variable keys should be used for combat operations. Without crypto keys, DAGR cannot compensate for selective availability (SA) errors, cannot read encrypted signals, and has no protection against spoofing. Not having crypto keys loaded could result in mission failure.

• When classified waypoints are stored in the DAGR, the DAGR is classified at the same level as the waypoints.

• A high level of position error may place a mission at risk. Verify the figure of merit (FOM) level is sufficient to accomplish the mission. Refer to the position error field (EPE/EHE/EVE) of either the Present Position page or NAV Displays page to view the current FOM. Refer to Table 9-1 to convert FOM into a position error range (in meters). If the FOM is too high, refer to Paragraph 18.4. An FOM of 1 (25 meter accuracy) is best.

• When DAGR present position (000–PRES POS) is used in the Fire Support page From WP field for the target calculation and fields are blinking between black and gray text (From WP, POS To Target Slant Range, Calculated Target Position, and Calculated Target Elevation fields), the DAGR was not tracking satellites or had not yet acquired a current position fix before the calculation. Calculated target coordinates referencing present position may be inaccurate when the DAGR does not use a current position fix for the calculation.

• The operator must use the Fire Support page Stored As WP field to store the calculated target position and elevation as a fire support (FS) waypoint or laser range finder (LRF) waypoint, or the target position will be lost when the DAGR is turned off.

1.2. Warnings and Cautions Used (cont).

CAUTION

• Verify appropriate units of measure, elevation reference, coordinate/grid system, grid resolution, and datum are selected before entering field data for calculation. Verification of this data ensures accurate target data.

• Do not connect the LRF to the DAGR while the DAGR is powered on. This can cause spurious signals resulting in the DAGR rejecting the first LRF shot data.

• Do not select NAV Waypoint MAGVAR type. If NAV Waypoint MAGVAR type is selected, track will be incorrect.

• When the clear maps and images procedure is performed, **all maps and images** loaded into the DAGR are removed. DAGR support of a particular mission can become seriously impaired without the required maps or images.

• The User Profile page Clear Profile procedure deletes user entered information from a selected advanced function set user profile. This procedure should be used only for individual user profiles the operator is familiar with. Clearing a particular profile that is unfamiliar to the user could possibly put the individual or mission in danger.

• The User Profile page Clear All Profiles procedure deletes user entered information in all ten advanced function set user profiles (01 through 10). If the operator does not know the use of all user profiles, this selection should not be used. Instead, the Clear Profile selection should be used only for individual user profiles the operator is familiar with. Clearing a particular profile that is unfamiliar to the user could possibly put the individual or mission in danger.

• User profile information is directly related to selecting a function set. Ensure the correct user profile is active when switching to the advanced function set. Changes to a particular profile that is unfamiliar to the user could possibly put the individual or mission in danger.

• All maps or images previously loaded into the DAGR are erased when maps are installed. Make certain that maps or images required for a mission are not erased.

• Ensure you have write access to a personal computer drive (e.g., desktop or drive C) before starting the installation of the GPS Map Toolkit software into the personal computer. If necessary, contact your system administrator to obtain write access.

• Do not use cleaning solvents stronger than soap and water as they may damage the unit finish and/or the display face.

• Use care not to puncture the breather vent diaphragm when cleaning battery compartments as the puncture may ruin the waterproofness of the unit.

• Do not overtighten screws that secure the memory battery cover.

• When using the cold weather battery pack (CWBP), make sure that any excess length of the CWBP cable is inserted in a vest or pocket and not wrapped around a belt to prevent the cable from snagging on objects.

CHAPTER 1
GENERAL INFORMATION

1.1. GENERAL.

This manual provides operation and maintenance instructions for the Defense Advanced GPS Receiver (DAGR). Throughout the manual, wherever information is unique to an AN/PSN-13 or an AN/PSN-13A DAGR unit, the DAGR nomenclature (AN/PSN-13 or AN/PSN-13A) is given after the information. Also throughout the manual, cross references are made concerning chapters, tables, figures, or paragraphs. All cross references include the chapter number along with applicable table, figure, or paragraph numbers. For example: if a cross reference is Table 9–2, then refer to chapter 9 and table 2; if a cross reference is Figure 9–2, then refer to chapter 9 and figure 2; if a paragraph cross reference is Paragraph 9.1.3, then refer to chapter 9 and paragraph 9.1.3. Chapter cross references are shown individually as Chapter 2, Chapter 29, etc.

- Type of manual. Operation and Maintenance Manual.
- Model number and equipment name. AN/PSN-13 and AN/PSN-13A, also referred to as Defense Advanced GPS Receiver (DAGR).
- Purpose of equipment. The DAGR is a precise positioning service (PPS) GPS handheld receiver providing PVT (position, velocity (ground speed), and time) in a jamming environment; including fast direct-Y acquisition and area navigation functions.

1.2. UNPACKING.

NOTE

When DAGRs are initially issued from Rockwell Collins Customer Owned Property Store (COPS) on a DD Form 1149, they will be shipped with a new memory battery. They may be shipped with the DAGR O&M manual and DAGR Pocket Guide according to the purchase agreement. Primary batteries are not supplied with the DAGR. Install both memory and primary batteries before using DAGR.

There are no special unpacking instructions or action necessary to protect the equipment. Retain empty container for possible return through normal channels. Man-hour requirements and total man-hours required for unpacking the equipment is less than one hour.

1.3. CHECKING UNPACKED EQUIPMENT.

- Check display surface for scratches.
- Check keypad for legible printing of each key label.
- Check data port connectors (J1 and J2), antenna connector (J3), and power connector (J4) for bent or damaged pins.
- Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on an SF 361 Transportation Discrepancy Report, DA Form 2404 Equipment Inspection and Maintenance Worksheet, or DA Form 5988E Equipment Inspection and Maintenance Worksheet.
- Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with applicable service instructions (e.g., electronic instructions, see DA PAM 738–750).
- Check to see whether equipment has been modified.
- The DAGR should be returned to the manufacturer for any repair not covered by this manual.

1.4. PROCESSING UNPACKED EQUIPMENT.

There are no special processing instructions necessary for this equipment.

1.5. MAINTENANCE FORMS, RECORDS, AND REPORTS.

1.5.1. Report of Maintenance and Unsatisfactory Equipment.

Air Force personnel will use AFR 66-1 for maintenance reporting and TO-00-35D54 for unsatisfactory equipment reporting. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750 and DA PAM 738-751, as contained in Maintenance Management Update. Marine Corps maintain forms and procedures as prescribed by TM 4700-15/1. Navy personnel will use forms and procedures as prescribed by OPNAVINST 4790 for Maintenance Reporting, as well as unsatisfactory equipment reporting.

1.5.2. Reporting of Item and Packaging Discrepancies.

Fill out and forward SF 364 (Supply Discrepancy Report (SDR)) as prescribed in AR 735-11-2/DLAR 4140.55/SECNAVINST 4355.18/AFR 400-54/ MCO 4430.3J.

1.5.3. Transportation Discrepancy Report .

Fill out and forward Transportation Discrepancy Report (TDR) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33/AFR 75-18/MCO P4610.19D/DLAR 4500.15.

1.6. REPORTING EQUIPMENT DEFICIENCIES.

1.6.1. Air Force.

Air Force personnel are encouraged to submit a Deficiency Report in accordance with 00-35D-54. Mail the form to: WR-ALC/LSAGS, 380 Richard Ray Blvd., Robins AFB, Georgia 31098-1640.

1.6.2. Army.

If your DAGR needs improvement, let us know. Send us an Equipment Improvement Recommendation (EIR). You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Write it on an SF 368 (Product Quality Deficiency Report). Mail it to: Commander, U.S. Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-LEO-D-CS-CFO, Fort Monmouth, New Jersey 07703-5006 or through the website http://www.aeps.via.army.mil.

1.6.3. Marine Corp.

Submit SF 368, Product Quality Deficiency Report Manual. Mail the form to: Commander, Marine Corps Logistics Base (Code 850), Albany, GA 31704-5000 or email to: mbmatcompqdrstracking@matcom.usmc.mil.

1.6.4. Navy.

Submit SF 368, Product Quality Deficiency Report Manual, in accordance with OPNAVINST 4790.

1.7. REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS.

1.7.1. Air Force.

You can help improve this manual. If you find any mistakes, or if you know of a way to improve the procedures, please let us know. You may submit AFTO Form 22 (Technical order System Publication Improvement Report and Reply) in accordance with TO 00–5–1 via MAJCOM or equivalent to 542 MSUG/GBMUDE, 380 Richard Ray Blvd, Suite 104, Robins AFB, Georgia 31098–160. For recommendations concerning DAGR software updates, safety changes, or to receive a copy of the GPS pathfinder magazine, you may refer to the PM GPS website, http://army-gps.robins.af.mil.

1.7.2. Army.

If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms), direct to: 542 MSUG/GBMUDE, 380 Richard Ray Blvd, Suite 104, Robins AFB, Georgia 31098–160. A reply will be furnished to you. For recommendations concerning DAGR software updates, safety changes, or to receive a copy of the GPS pathfinder magazine, you may refer to the PM GPS website, http://army-gps.robins.af.mil.

1.7.3. Marine Corp.

For recommended changes to technical publications, submit notice of discrepancies or suggested changes on NAVMC 10772 to Commander, Marine Corps Systems Command (LOG/TP), 814 Radford Blvd., Suite 20343, Albany, Georgia 31704-0343 or via the internet at http://www.ala.usmc.mil, select Publications, then Technical Publications. We'll send you a reply.

1.7.4. Navy.

For recommended changes to technical publications, submit NAVSEA Form 4160/1, Technical Manual Deficiency/Evaluation Report (TMDER), to: Commander, Code 310 TMDER Bldg 1388, NAVSURFWARCENDIV NSDSA, 4363 Missile Way, Port Hueneme, CA 93043-4307, or via the internet at http://nsdsa.phdnswc.navy.mil.

1.8. CORROSION PREVENTION AND CONTROL.

Corrosion Prevention and Control (CPC) of Army material is a continuing concern. It is important that any corrosion problems with this item be reported so the problem can be corrected and improvements can be made to prevent the problem in future items. While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials, such as rubber and plastic. Unusual cracking, swelling, or breaking of these materials may be a corrosion problem. If a corrosion problem is identified, it can be reported using SF 368, Product Quality Deficiency Report. Use of key words such as “corrosion”, “rust”, “deterioration”, or “cracking” will ensure that the information is identified as a CPC problem. The form should be submitted to the address specified in DA PAM 738–750, Functional Users Manual for the Army Maintenance Management System (TAMMS).

1.9. OZONE DEPLETING SUBSTANCES.

The continued use of ozone depleting substances (ODS) has been prohibited by Executive Order 12856 of 3 August 1993.

1.10. DESTRUCTION OF ELECTRONIC MATERIEL TO PREVENT ENEMY USE.

Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750–244–2.

1.11. PREPARATION FOR STORAGE OR SHIPMENT.

Prior to storing the DAGR for a period of 30 days or more, or storing the DAGR below -32 °C, remove both the memory battery and primary batteries. Removal of batteries prior to storing DAGR 30 days or more can prevent possible damage from battery chemical leakage. Removal of batteries before storing DAGR below it's -32 °C minimum operating temperature prevents possible memory data corruption from degrading DAGR performance. Removing all batteries returns the DAGR to default settings (refer to Table 6-1). A reusable container should be used for shipping a DAGR whenever possible. Prior to shipping, perform the zeroize procedure (refer to Paragraph 7.3) to the DAGR, if applicable, then remove the primary batteries. Leave the memory battery installed. The memory battery is cleared for air shipments and meets shipping requirements of the following organizations:

- US Department of Transportation (DOT). Reference CFR 49, section 173.206 (f)
- Secretariat of the United Nations. Reference Model Regulations on the Transport of Dangerous Goods, ST/SG/AC.10/1–Revision 11–2000. Also, Manuals of Test and Criteria, ST/SG/AC.10/11–Revision 3–1999
- International Maritime Organization (IMO) and other bodies responsible for land transport
- International Air Transport Association (IATA), Dangerous Good Regulations, 43rd Edition, effective 1 January 2002

1.12. WARRANTY INFORMATION.

1.12.1. General.

The DAGR is warranted for six years. The warranty starts on the date found on DD Form 1149 Requisition and Invoice/Shipping Document. The DAGR warranty sticker can be viewed on the DAGR after removing the battery pack. Report all defects to your supervisor, who will take appropriate action. The DAGR unit should be returned as a whole unit in accordance with local procedures. Use a reusable container for shipping the DAGR and follow preparation for shipment information given in Paragraph 1.11. Package the DAGR to avoid transit damage and ship by a traceable means with a DD 1577–2 unserviceable tag. Do not send DAGRs to Defense Reutilization and Marketing Office (DRMO) or any other agency for disposal, regardless of damage. Without exception, all DAGRs must be returned to the manufacturer for repair or disposal. Use the complete return address to the manufacturer given

as follows and include Department of Defense Activity Address Code (DODDAAC). Do not return accessories. Be sure to include a point of contact with a commercial phone number. Also, provide the following information describing the DAGR at the time of failure: power source and operation mode being used, function being attempted, and if tracking or not tracking satellites.

EZ7415

Rockwell Collins, Inc.

855 35th Street NE

Cedar Rapids, IA 52402–3613

Attention: Service Center M/S 139/141

Mark for: M/F DAGR warranty (or AN/PSN-13 or AN/PSN-13A warranty)

1.12.2. Army Users.

Army users will update Unit Level Logistics System Ground (ULLSG) IAW DA Pam 738-750 to indicate that materiel has been turned over to sustainment maintenance. They will also update the Army Electronic Product Support (AEPS) database for items under warranty, and the supervisor will coordinate with the WARCO IAW AR 700-139, Army Warranty Program to indicate that the equipment has been sent to the contractor with the serial number, transportation control number, and fault.

1.12.3. Navy Users.

Return unserviceable warranted items to the supply system. Requisition replacement items through the supply system.

1.12.4. Other Users.

All other users will use their service policy and procedures to track and report DAGR warranty items.

1.13. NOMENCLATURE CROSS REFERENCE.

DAGR	Defense Advanced GPS Receiver
AN/PSN-13	Defense Advanced GPS Receiver
AN/PSN-13A	Defense Advanced GPS Receiver

1.14. SAFETY, CARE, AND HANDLING.

WARNING

The DAGR and its accessories are not designed or certified for use in explosive atmospheres as defined in Article 500 of the National Electrical Code 2002 (NEC). Using the DAGR and its accessories in this type of environment may cause personal injury or death.

For reporting safety related issues or for additional product support, go online to the U.S. Army GPS Product Manager website: http://army-gps.robins.af.mil/.

1.15. SECURITY MEASURES FOR ELECTRONIC DATA.

Classified mission data may be loaded into the DAGR for operation. If the DAGR is left unprotected, stored, or in any unsecured situation, zeroize the data as applicable. Refer to Paragraph 7.3 for zeroize procedures. Check with the COMSEC custodian when ordering crypto keys.

NOTE

Installing crypto keys does not create a classified DAGR. When classified mission data (e.g., waypoints) is stored, the DAGR is classified at the same level as the classified mission data.

1.16. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

1.16.1. Common Tools and Equipment.

Refer to the Maintenance Allocation Chart (Paragraph 24.2) and Tools and Test Equipment (Paragraph 24.3) of this manual.

1.16.2. Special Tools and Support Equipment.

There are no special tools or support equipment required for this equipment.

1.16.3. Repair Parts.

Repair parts are listed and illustrated in Parts List and Associated Equipment (Chapter 25) of this manual.

1.17. PATHFINDER WEBSITE.

The Pathfinder is an informational newsletter and includes news items of interest to the general user. The Pathfinder can be found online at the PM GPS web page: http://army-gps.robins.af.mil.

1.18. SOFTWARE REPROGRAMMING.

The DAGR is reprogrammable without requiring the unit to be returned to the factory. When reprogramming of the DAGR is in order, the required authorization, instructions, software, and hardware necessary for the task, will be acquired through appropriate channels. Reprogramming instructions will be provided by Time Compliance Technical Order (TCTO) and/or Modification Work Order (MWO). Refer to Chapter 17 for complete reprogramming procedures.

1.19. TIPS FOR EXTENDING PRIMARY BATTERY LIFE.

The following are some helpful tips on extending the life span of the internal primary power batteries. Battery life is affected by operations the user performs, and also how the DAGR is configured. Refer to the Power Saver page (Paragraph 7.5), Auto-On page (Paragraph 7.7), Automark page (Paragraph 7.8), and Light/Contrast page (Paragraph 10.4) for detailed information on configuring the DAGR for power saving capabilities.

- Power on the DAGR only when needed
- At the completion of power up, the DAGR switches to Fix mode of operation when using internal primary battery power, then transitions to Standby mode after a position fix has been obtained. However, the operator can select the power-up operating mode (refer to Paragraph 7.4.2.2).
- Manually place DAGR in Standby mode of operation if tracking satellites is not required or not possible
- During cold weather conditions, prior to use, place DAGR inside your clothing to keep display warm
- Use the auto-off capability of the Power Saver page
- Use the auto-standby capability of the Power Saver page
- Enable the display heater only when needed from the Power Saver page
- Use the auto-on function only when needed from the Auto-On page
- Use the automark function only when needed from the Automark page
- Turn keypad/display lighting off when not needed in the Light/Contrast page

CHAPTER 2
DESCRIPTION AND OPERATION — EQUIPMENT DESCRIPTION AND DATA

2.1. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

2.1.1. Equipment Characteristics.

The DAGR collects and processes the GPS satellite Link One (L1) and Link Two (L2) signals to provide PVT (position, velocity (ground speed), and time) information, as well as position reporting and navigation capabilities. The DAGR is primarily a handheld unit with a built-in integral antenna, but can be installed in a host platform (ground facilities, air, sea, and land vehicles) using an external power source and an external antenna. The DAGR used as a handheld unit can also operate with an external L1/L2 antenna and a source of external power. Refer to Table 2-1 for equipment covered information and the following paragraphs for additional DAGR characteristics information.

Table 2-1. Equipment Covered

Equipment	Description	Collins Part Number
AN/PSN-13, Defense Advanced GPS Receiver (DAGR)	DAGR is a GPS handheld receiver providing PVT (position, velocity (ground speed), and time) in a jamming environment; including fast direct-Y acquisition and area navigation functions. DAGR incorporates code types Coarse/Acquisition (C/A), Precise (P), and Encrypted Y code. The DAGR supports RS-422, RS-232, crypto key loading, ICD-GPS-153, NMEA 0183, RTCM 104, Differential, HAVE QUICK, SINCGARS timefill, One Pulse Per Second In/Out (1PPS In/Out), and 10PPS output. DAGR serial interfaces can be used to remotely control the receiver and monitor receiver solution and status. The DAGR keypad and display allow the user to control receiver operation and monitor receiver solution and status. Includes battery pack and internal antenna with options for external primary power and antenna. Uses software version 984-2461-011 at time of publication.	822–1873–001
AN/PSN-13A, Defense Advanced GPS Receiver (DAGR)	Same as AN/PSN-13 except for the following items. High speed USB port capability using an RS-422/USB converter cable. One additional pulse per second (PPS) output. Uses software version 984-3006-001 at time of publication.	822-1873-002

2.1.2. Equipment Capabilities and Features.

- Signal acquisition using up to 12 channels
- All satellites in view are tracked using 11 channels
- Navigation using up to 10 channels

- L1: Coarse/Acquisition (C/A), Precise (P), and Encrypted P (Y) code capability
- L2: Precise (P), and Encrypted P (Y) code capability
- Accepts differential GPS signals
- One handed operation
- Backlit display and keypad for night operation
- Operates in all weather, day or night
- Produces no signals that can reveal your position
- Automatically tests itself during power up
- Can operate on +9 to +32 volts direct current (V DC) external power
- Can perform area navigation functions, storing up to 999 waypoints
- Stores up to 15 routes with up to 1000 legs for each route
- Resists jamming
- Resists spoofing when crypto keys are installed
- Sealed against dust and water to a depth of 1 meter (3 feet) for 20 minutes
- Interconnects with other electronic systems
- Uses quick disconnect connectors and fasteners to allow easy unit replacement
- Compatible with night vision goggles (NVG) and does not cause blooming
- Uses internal compass to compute track and ground speed when moving at or below 0.5 meters per second.

2.2. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

Refer to Figure 2-1 to identify DAGR physical feature locations. The DAGR utilizes four external connectors and other physical features as follows:

- J1 provides an RS-232 compatible 2–way serial data I/O port (COM Port 3, crypto keyfill, SINCGARS, and pulse per second (PPS))
- J2 provides an RS-232 and RS-422 compatible 2–way serial data I/O port (COM Port 1 and COM Port 2 (data transfer), PPS and HAVE QUICK)
- J3 provides an external antenna input
- J4 provides an external power input
- Integral antenna
- Display
- Keypad
- Primary battery pack
- Memory battery and cover

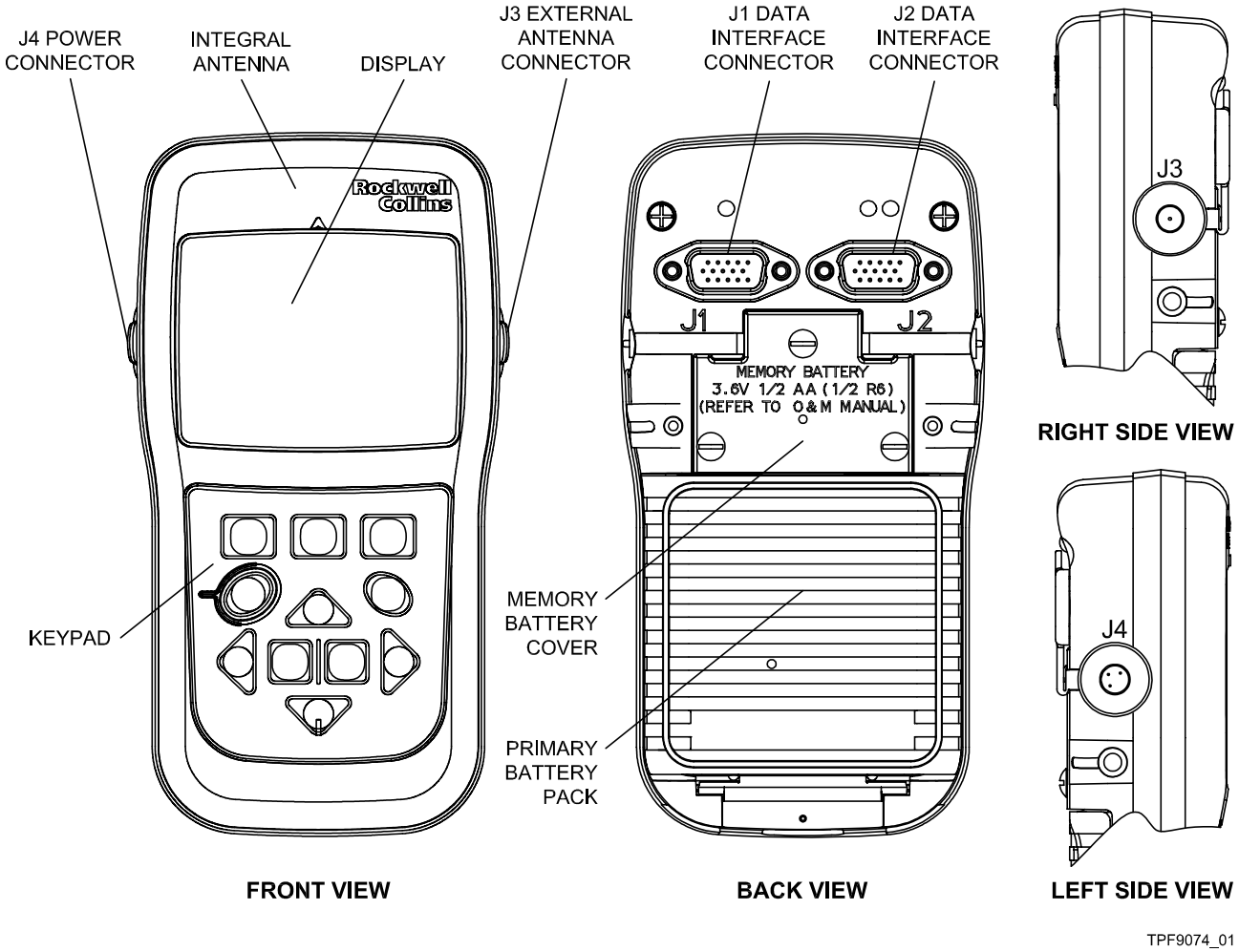

Figure 2-1. DAGR Physical Features

2.3. EQUIPMENT DATA.

2.3.1. Electrical.

- External power: +9 to +32 Volts Direct Current (V DC)
- Primary battery type: AA type commercial, 1.5 volt (refer to common battery types shown in Table 22-1)
- Memory battery type: 3.6 volt, ½ AA type commercial Lithium Thionyl Chloride (refer to common battery types shown in Table 22-1)
- Power consumption: Less than 2 watts typical

2.3.2. Position Accuracy.

- Local area differential GPS (LADGPS): Less than 2.4 meters horizontal (95%)
- Wide area GPS Enhancements (WAGE): Less than 5.1 meters horizontal (95%)
- Precise positioning service (PPS): Less than 11.1 meters horizontal (95%)

2.3.3. Time Accuracy.

- Time mark 1 pulse per second (1pps) error: 52 nanoseconds (ns)
- HAVE QUICK time error: Less than 10 microseconds (95%)
- UTC accuracy: Less than 200 nanoseconds (95%)

2.3.4. Satellite Acquisition Time.

NOTE

If DAGR nonvolatile memory is cleared or lost (e.g., removing all batteries or reprogramming the receiver), the DAGR must track satellites continuously for five minutes obtaining a time figure of merit (TFOM) value of 3 or less; or do two position fixes at least five minutes apart before time to first fix (TTFF) will meet the following TTFF specification. If the operator has not met these conditions, the DAGR will perform a C/A satellite code acquisition.

- Time to first fix: Less than 70 seconds (95%, with almanac)
- Time to subsequent fix: Less than 20 seconds (95%, 15 minutes standby), less than 70 seconds (95%, 1 hour from off)

2.3.5. Dynamics.

- Ground speed (maximum): Less than 250 m/s for full accuracy, less than 1200 m/s tracking
- Acceleration (maximum): Less than 4 g for full accuracy, less than 9 g for tracking

2.3.6. Displayed Data.

- Range units: Feet, miles, meters, kilometers, yards, or nautical miles
- Ground speed units: Miles per hour, kilometers per hour, or knots
- Elevation units: Feet or meters
- Elevation reference: Mean sea level or map datum
- Angular units: Degrees, mils, or streck
- North reference: Magnetic, grid, or true

2.3.7. Data Storage Capacity.

- Waypoints: 999 usable waypoints
- Coordinate systems: 30 predefined and 6 user defined
- Map datums: Greater than 200 predefined and 6 user defined

2.3.8. Physical.

- Height: 161.40 mm (6.35 in)
- Width: 87.90 mm (3.46 in)
- Depth: 40.20 mm (1.58 in)
- Weight (with memory and primary (L91) batteries): 0.50 kg (1.00 lb)

2.3.9. Environmental.

2.3.9.1. Temperature.

- Operating: -32 to +70 °C (-26 to +158 °F)

- Storage (without batteries): -55 to +70 °C (-67 to +158 °F)
- Display heater: When enabled, turns on at -20 °C

NOTE

Remove all batteries before storing the DAGR below it's -32 °C (-26 °F) minimum operating temperature. This prevents possible memory data corruption, which can degrade DAGR performance. Removing all batteries returns the DAGR to default settings (refer to Table 6-1).

2.3.9.2. Altitude.

- Operating: -400 to +9100 m (-1312 to +29 857 ft) Mean Sea Level (maximum rate of change for operation is 100 m (328 ft) per second)
- Storage: -400 to +15 000 m (-1312 to +49 215 ft)

2.3.9.3. Humidity.

- 0 to 100%

CHAPTER 3
DESCRIPTION AND OPERATION — THEORY OF OPERATION

3.1. GLOBAL POSITIONING SYSTEM.

3.1.1. General.

The NAVSTAR Global Positioning System (GPS) is a space-based navigation and timing system. GPS provides highly accurate, continuous, all weather, 3-dimensional (3D) PVT (position, velocity (ground speed), and time). A constellation of satellites transmit spread-spectrum radio frequency (RF) signals for use by navigation sets. Each signal is modulated with a unique code sequence and navigation data message. The code sequence allows the navigation sets to identify each satellite. The navigation data message provides the navigation set information about the operation of each satellite. The navigation sets receive the signals and compute 3D position, ground speed, and time.

3.1.2. NAVSTAR Global Positioning System Structure.

The GPS structure is made up of multiple satellites, a ground control system, and any number of navigation sets (nav sets). The satellites orbit the earth while the ground control acts as a monitor and control center for the satellites. The navigation sets are receivers that can be either installed in a host platform (ships, vehicles, aircraft, etc.) or carried by personnel.

3.1.2.1. Satellites. The GPS satellites provide navigation data to the nav set. The satellites are arranged in six rings that orbit the earth twice a day. This arrangement provides worldwide, continuous coverage. Each satellite broadcasts two spread-spectrum radio frequency (RF) signals. Each signal is modulated with a unique code sequence and a navigation message. The code sequence allows the nav set to identify each satellite. The navigation data message provides the nav set with information about the operation of the satellite.

3.1.2.2. Ground Control System. The ground control system tracks the satellites, checks , and controls satellite orbits, and updates the satellite navigation data message. The ground control system consists of monitor stations and a control center. Monitor stations are unmanned stations located throughout the world. They use special GPS receivers to track each satellite. The tracking information is sent to the control center. The control center uses the tracking information to calculate precise satellite position and satellite clock error for each individual satellite. This data is called ephemeris data. The control center calculates satellite position for all satellites, called almanac data. Once each 24 hours, the control center sends the ephemeris and almanac data to each satellite. This updates the navigation data message broadcast by the satellite.

3.1.2.3. Navigation Sets. The navigation set (nav set) receives and decodes RF signals from the satellites. This decoded information is used to calculate 3D position, 3D speed, and exact time data. The nav set is able to track satellites that are in open view of the sky from the receiver's antenna position, and measures the time it takes for signals to travel from the tracked satellite to the nav set. By multiplying travel time by the speed of light, the nav set determines the exact range to each satellite. By calculating the range to four satellites, an exact 3D position is calculated. The nav set calculates speed by measuring the rate of change of the RF signals.

3.1.3. Receiver Theory of Operation.

The DAGR collects and processes the GPS satellite Link One (L1) and Link Two (L2) signals to provide PVT (position, velocity (ground speed), and time) information, as well as position reporting and navigation capabilities. Theory of operation information in support of fault isolation is not required by the DAGR operator. The DAGR automatically performs self-testing upon power up and the operator can also command self-testing to identify faults of operation. For proper operation, it is important that no obstructions block the line of sight satellite signals from reaching the antenna. Be sure the DAGR antenna has an unobstructed view of the sky. When operating in a secure environment, be sure that valid crypto keys are loaded in the DAGR. This protects the DAGR from intentionally false or spoofed satellite signals.

CHAPTER 4
OPERATOR INSTRUCTIONS — CONTROLS AND INDICATORS

4.1. GENERAL.

This chapter contains information on the description and use of operator controls and indicators.

4.2. DISPLAY WINDOWS.

The DAGR display contains three windows (page, tool bar, and message) as shown in Figure 4-1. The display is divided into two regions for two of the windows (page and tool bar) that are always visible. The third window (message) appears as needed for the display of additional messages, including pop-up information. The display windows cannot be individually selected, only fields included in the windows may be selected. The operator is able to request help text or a menu specific to the currently displayed page when no fields are selected. Display windows provide a status area to the right of the display window title containing a primary battery status indicator and a display/keypad lighting on indicator as shown in Figure 4-2. The primary battery status indicator provides an indication of remaining primary battery life hours remaining. Figure 4-2 indicates one third of battery capacity remains (full battery capacity is indicated by a completely black battery symbol). When primary battery power is low, the indicator alternates with LOW. The display/keypad lighting on indicator is displayed when display/keypad lighting is turned on.

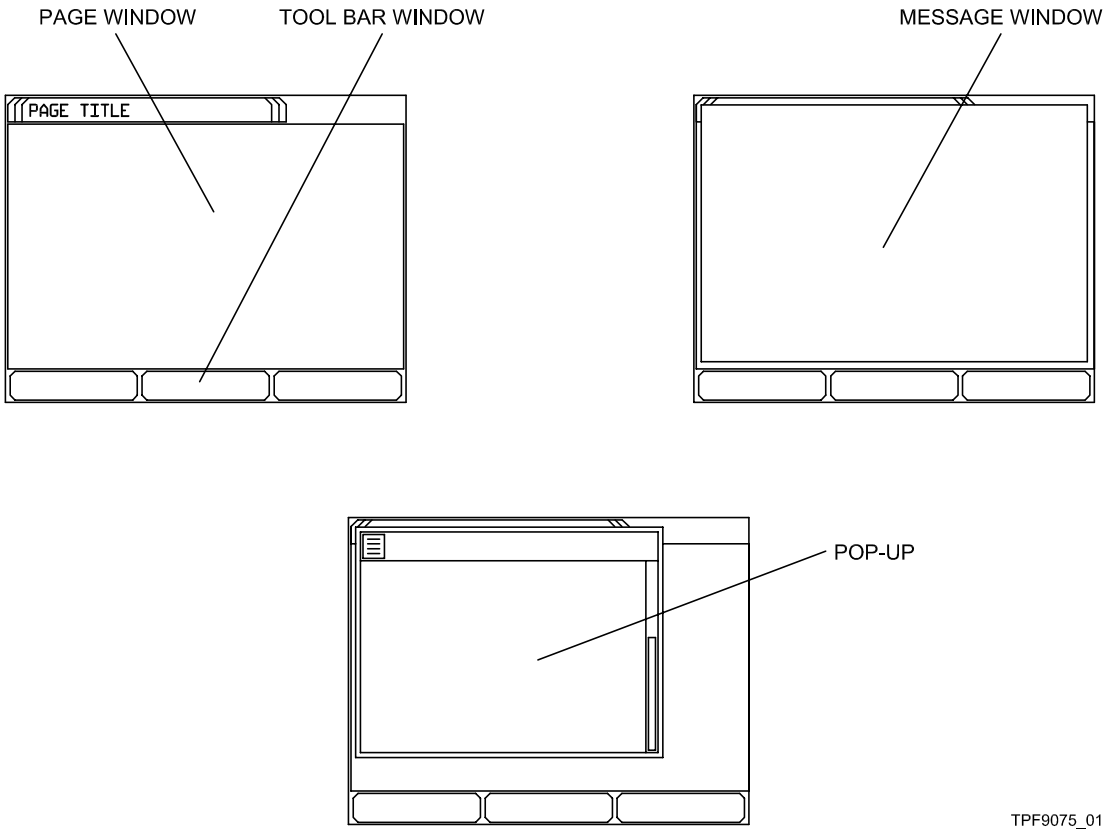

Figure 4-1. Display Windows

Figure 4-2. Primary Battery and Lighting Indicator

4.2.1. Page Window.

The page window is where the majority of display interaction occurs. Information contained in the page window may contain several individual fields pertaining to a page of the DAGR. The fields may contain read only data or data that can be modified. The page of information may consist of multiple horizontal or vertical views, as denoted by scroll bars at the right side or bottom of the page window. The scroll bars are controlled by the cursor control keys (refer to Paragraph 4.3).

4.2.2. Tool Bar Window.

The tool bar window consists of three display regions, and is located at the bottom of the screen. It displays labels for the push and hold keys referred to as function keys (F1, F2, and F3). The function keys are used to change the page being displayed or to perform a single action (e.g., go to the NAV Display page). Refer to Paragraph 4.4 and Paragraph 10.5 for more information.

4.2.3. Message Window.

When conditions warrant operator notification, message windows are used to attract operator attention (e.g., a power down message). Messages are categorized as notes, alerts, cautions, and warnings based on the impact of the message to the operator's mission. The message window is displayed over the page window. The message must be cleared (via operator acknowledgement or self time out) before the page window functionality can be resumed.

4.2.4. Pop-up.

Menu, help, and editor pop-ups are displayed over the page window. The operator initiates a pop-up by pushing the MENU key, or by pushing the ENTER key when a field is selected. The pop-up is cleared by making a selection from the pop-up display, pushing the QUIT key, or using the push and hold function of the POS or WP key. Page window functionality is resumed after removing the pop-up. Pop-ups may include menus, allow editing, or allow access to help text associated with the displayed information.

4.3. KEYPAD OPERATION.

The keypad is used to enter data, access and control various displays, modes, and functions. The keypad keys allow direct access to specific functions or groups of functions. Each key contains two labels except for cursor control keys. The lower key label represents the push and release function. The upper key label represents the push and hold function. Accessing push and hold key functions requires the operator to push and hold the key for a minimum of two seconds. Function keys F1, F2, and F3 (push and hold) can be customized by the user through changes on the tool bar to access various functions (refer to Paragraph 10.5 for more information). The four cursor control keys (Up/Down/Left/Right) allow easy movement through display fields.

- Three function keys (F1 through F3)
- Power and Quit key
- Position and Page key
- Brightness and Menu key (brightness key labeled with an illuminated bulb icon)
- Waypoint and Enter key

4.4. CONTROLS AND INDICATORS.

Refer to Figure 4-3 and Table 4-1 for physical locations and functions of the indicators located on the DAGR display. Refer to Figure 4-4 and Table 4-2 for physical locations and functions of the DAGR keypad controls. The callout number for each item shown in a figure corresponds to the key number shown in the respective table. Some keys on the keypad shown in Figure 4-4 have additional functions when used with another key. These multiple functions and associated keys are explained in Table 4-3.

Table 4-1. Display Indicators

KEY NO	CONTROL/ INDICATOR	FUNCTION
1	LIGHTING STATUS INDICATOR	The lighting status indicator is located in the upper right corner of the display next to the battery status indicator. The indicator resembles a light bulb when the keypad/display lighting is on, and the indicator does not appear when the lighting is off. The lighting indicator shows on all display pages, but may be covered when menus, editors, or messages are showing on the display.
2	PRIMARY BATTERY STATUS INDICATOR	The primary battery status indicator only appears when not using external power and is located in the upper right corner of the display. The indicator resembles a battery and the darkened portion indicates how much primary battery life is remaining. The indicator appears on all display pages, but may be covered when menus or editors are showing on the display.
3	FUNCTION KEY LABELS	Each of the three physical function keys of the keypad (F1, F2, and F3 described in Table 4-2) has an associated function key label shown in the tool bar window of the display. This label shows what the key has been customized to by the user (refer to Paragraph 10.5). The function key actions are activated by pushing and holding the respective physical key positioned on the keypad directly below the tool bar window.

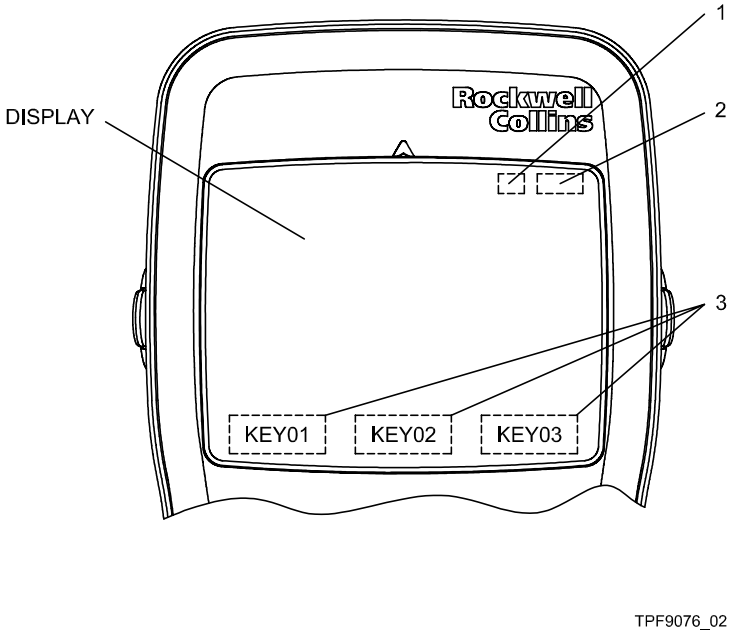

Figure 4-3. Display Indicators

Table 4-2. Keypad Controls

KEY NO	CONTROL/ INDICATOR	FUNCTION
1	F1/IN FUNCTION KEY	Push and hold the F1/IN key to acquire the F1 function key action (F1 function key label is shown in the left side of the tool bar window). Push and release the F1/IN key to initiate a "Zoom In" on the Situational Awareness page or Image Viewer page displays.
2	F2/OUT FUNCTION KEY	Push and hold the F2/OUT key to acquire the F2 function key action (F2 function key label is shown in the center of the tool bar window). Push and release the F2/OUT key to initiate a "Zoom Out" on the Situational Awareness page or Image Viewer page displays.
3	F3/STATUS FUNCTION KEY	Push and hold the F3/STATUS key to acquire the F3 function key action (F3 function key label is shown in the right side of the tool bar window). Push and release the F3/STATUS key to display the current DAGR status on the display.
4	POS/PAGE KEY	Push and hold the POS/PAGE key to access the POS page set and display the Present Position page (with present position coordinates). Push and release the POS/PAGE key to display next page of the page set, or advance to the next display in a series of operational displays.
5	BRIGHT-NESS/MENU KEY	Push and hold the BRIGHTNESS/MENU key to toggle the keypad/display lighting on and off. Push and release the BRIGHTNESS/MENU key to access display menus. Push and release the BRIGHTNESS/MENU key a second time to access the main menu. Once a field has been selected, the BRIGHTNESS/MENU key can also be used to access menus for editing field contents.
6	WP/ENTER KEY	Push and hold the WP/ENTER key to access different waypoint functions. • GOTO a WP • Mark a WP • Create a New WP (not applicable if no unused waypoints exist) • List All WPs Push and release the WP/ENTER key to select items from pop-up menus, highlight a field when no field is currently highlighted, or make choices while using various editors when a field is currently selected. After a field is highlighted, push and release the WP/ENTER key again to access editing capabilities (if applicable).
7, 8, 9, 10	CURSOR CONTROL KEYS	The right (7), down (8), left (9), and up (10) cursor control keys function as follows: Push and release a cursor control key for one scroll (movement) of the cursor from field to field or option to option in the display. Push and hold a cursor control key for an accelerated scroll in the desired direction. Up and down cursor control keys are used to scroll data vertically. Left and right cursor control keys are used to scroll data horizontally.
11	PWR/QUIT KEY	Push and hold the PWR/QUIT key to turn the DAGR off. Push and release the PWR/QUIT key to cancel an operation, display the previous page of a page set, or return to a previous display in a series of operational displays. **NOTE** When the DAGR is off, push and release the PWR/QUIT key to turn the DAGR on.

Table 4-3. Multiple Function Keypad Controls

CONTROL/INDICATOR	FUNCTION
PWR/QUIT KEY and POS/PAGE KEY	Push and release the PWR/QUIT and POS/PAGE keys simultaneously to activate the emergency zeroize function. A confirmation from the user is required before the emergency zeroize action is completed.
BRIGHTNESS/MENU KEY and UP or DOWN CURSOR CONTROL KEY	When keypad/display lighting is on, push and hold the BRIGHTNESS/MENU key and push the respective Up or Down cursor control key simultaneously to adjust lighting brightness level.

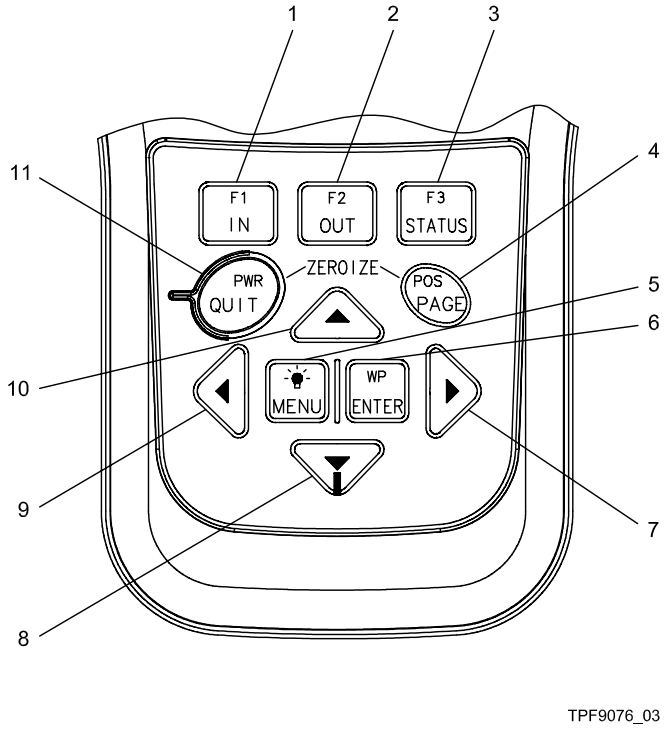

Figure 4-4. Keypad Controls

CHAPTER 5
OPERATOR INSTRUCTIONS — START-UP OPERATION

5.1. GENERAL.

This chapter contains start-up information for the user. If desired, perform a commanded self-test on the unit prior to performing any procedure to ensure a properly operating unit. The commanded self-test provides testing of hardware, display, keypad, and added fault identification. Refer to Paragraph 6.3.3 for information on commanded self-test. When initially powered on, the DAGR performs an automatic self-test of receiver hardware (i.e., clock processor, memory, etc.). Prior to using the DAGR, ensure that a good memory battery is installed, and either primary batteries or external power is connected. A good memory battery is indicated by checking the memory battery date on the Battery page (refer to Paragraph 7.6), or if the battery is low, a low memory battery message will show on the display. Good primary batteries are indicated by the primary battery indicator on the upper right corner of the display.

5.2. PRIMARY BATTERY INSTALLATION.

WARNING

If abused, lithium batteries can explode causing severe injury. Be sure to store batteries in original packaging until ready to use and observe polarity during installation. Reverse polarity can cause damage to the battery and DAGR.

CAUTION

• Do not mix new batteries with old batteries. Do not mix battery types. Do not reverse battery polarity. Use only fresh/new batteries. Install all primary power batteries at the same time. These precautions are done to ensure proper battery life and proper unit operation.

• If the primary batteries cannot be installed easily, they may be positioned backwards. Check for proper polarity and do not force primary batteries into primary battery pack as this may damage the battery connectors in the battery pack.

• If the DAGR is being used for the first time and there are no memory settings to be saved; the memory battery is not important, but still needs to be installed. If the DAGR has memory settings that need to be saved from previous usage, then ensure a good memory battery is installed (check memory battery date on Battery page) or external power applied to unit before installing or replacing the primary batteries to ensure all settings in memory are retained.

• If all primary and memory power is lost, memory information is lost and DAGR resets to default settings after power-up.

NOTE

Refer to Table 22-1 for a list of common battery types and related battery life information. Polarity markings are shown on the battery pack. Rechargeable batteries may be used, but the DAGR does not have a battery charger contained in the unit.

Refer to Figure 5-1.

a. If power to the DAGR is on, push and hold the PWR key to turn off primary power to unit.

b. If applicable, push the ENTER key to acknowledge the auto-on, automark, or display heater messages.

c. Push the ENTER key to acknowledge the power down warning.

d. Hold unit firmly upside down with the battery pack facing up.

e. Push or pull latch located on the battery pack to release battery pack.

f. Lift up on battery pack and remove from unit.

g. If batteries are already installed, pull out on the battery removal strap to remove batteries from the battery pack. Dispose of batteries in accordance with local procedures.

h. Position the battery removal strap into the channel of the battery pack before installing new batteries.

i. Install new batteries and ensure correct polarity installation for each battery (marked on battery pack).

j. Prior to installing the battery pack, inspect the battery pack gasket for damage or dirt. Lubricate (refer to Table 30-1) or replace gasket (refer to Paragraph 22.6.4) if necessary. Ensure battery removal strap is not protruding from the battery pack.

k. To install new battery pack, position tab on battery pack in slot on the DAGR.

l. Close battery pack against DAGR until battery pack is engaged.

m. Push and release the PWR key to turn the DAGR on. Observe the power-on status message and ensure self-test has passed, then push the ENTER key, if required.

n. Push the MENU key twice to access the Main menu.

o. Use the cursor control keys to highlight Receiver Setup, then push the ENTER key. The Receiver Setup submenu is displayed.

p. Use the cursor control keys to highlight Battery, then push the ENTER key. The Battery page is displayed with view one showing on the display.

q. Push the ENTER key to highlight a field.

r. Use the up/down cursor control keys to highlight the Power Batteries Installed field (shown on view two).

s. Push the ENTER key to access the editor for that field.

t. Use the up/down/left/right cursor control keys to change the field information to the date of battery replacement, then push the ENTER key. Display returns to the Battery page.

u. Use the up/down cursor control keys to highlight the Battery Type field (shown on view two).

v. Push the ENTER key to access the editor for that field.

w. Use the cursor control keys to highlight the applicable battery type, then push the ENTER key. Display returns to the Battery page.

x. Use the up/down cursor control keys to highlight the Rechargeable field (shown on view two).

y. Push the ENTER key to access the editor for that field.

z. Use the cursor control keys to highlight the applicable information for the battery type used, then push the ENTER key. Display returns to the Battery page.

aa. Push the MENU key to access the page menu.

ab. Use the cursor control keys to highlight Reset Battery Used, then push the ENTER key. Display returns to the Battery page with the Used field (view one) reset to zero.

ac. Primary battery installation complete. If desired, push and hold the POS key to access the Present Position page, or push the MENU key twice to access the main menu for other DAGR selections.

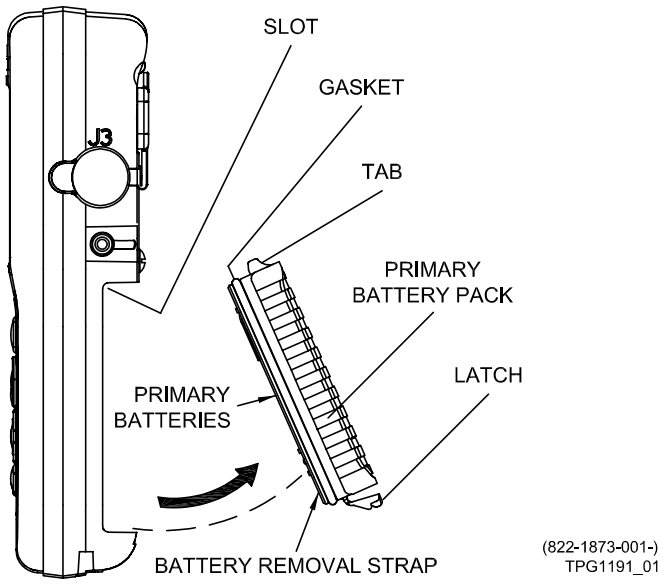

Figure 5-1. Primary Battery Installation

5.3. MEMORY BATTERY INSTALLATION.

CAUTION

• If the DAGR is being used for the first time and there are no memory settings to be saved; the memory battery is not important, but still needs to be installed. If the DAGR has memory settings that need to be saved from previous usage, then ensure good primary batteries are installed (check battery indicator on display) or external power is applied to unit before replacing the memory battery to ensure all settings in memory are retained.

• If all primary and memory power is lost, memory information is lost and DAGR resets to default settings after power-up.

NOTE

Use 3.6 volt, 1/2 AA type lithium battery for the memory battery. Refer to Table 22-1 for a list of common battery types and related battery life information.

Refer to Figure 5-2.

a. If power to the DAGR is on, push and hold the PWR key to turn off primary power to unit.

b. If applicable, push the ENTER key to acknowledge the auto-on, automark, and display heater messages.

c. Push the ENTER key to acknowledge the power down warning.

d. Place unit upside down on non-abrasive surface with the memory battery cover facing up.

e. Use flat tip screw driver to loosen three captive screws securing memory battery cover, then remove cover from unit.

f. Remove the memory battery and dispose of battery in accordance with local procedures.

g. Prior to installing the memory battery cover, inspect the memory battery cover gasket for damage or dirt. Replace gasket if necessary (refer to Paragraph 22.6.5).

h. Install the memory battery.

i. Install memory battery cover and tighten three captive screws. Do not overtighten screws that secure the memory battery cover.

j. Push and release the PWR key to turn the DAGR on. Observe the power-on status message and ensure self-test has passed, then push the ENTER key, if required.

k. Push the MENU key twice to access the Main menu.

l. Use the cursor control keys to highlight Receiver Setup, then push the ENTER key. The Receiver Setup submenu is displayed.

m. Use the cursor control keys to highlight Battery, then push the ENTER key. The Battery page is displayed with view one showing on the display.

n. Push the ENTER key to highlight a field.

o. Use the up/down cursor control keys to highlight the Memory Battery Installed field (shown on view two).

p. Push the ENTER key to access the editor for that field.

q. Use the up/down/left/right cursor control keys to change the field information to the date of battery replacement, then push the ENTER key. Display returns to the Battery page.

r. Memory battery installation complete. If desired, push and hold the POS key to access the Present Position page, or push the MENU key twice to access the main menu for other DAGR selections.

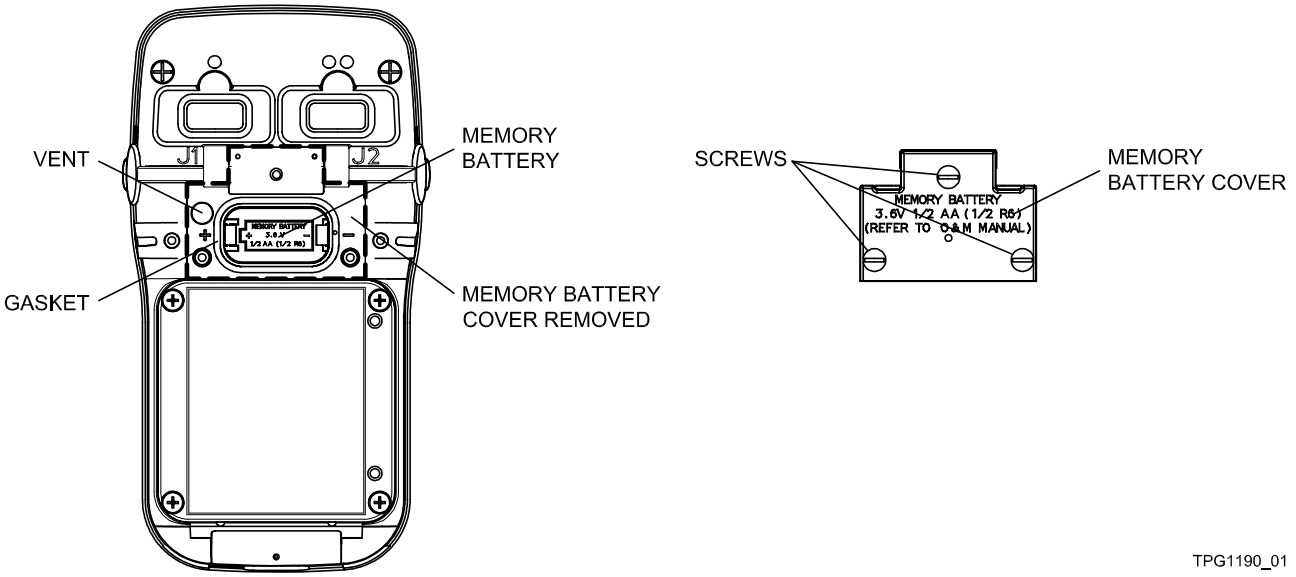

Figure 5-2. Memory Battery Installation

5.4. OPERATING PROCEDURES.

WARNING

If abused, lithium batteries can explode causing severe injury. Be sure to store batteries in original containers until ready to use and observe polarity during installation. Reverse polarity can cause damage to the battery and DAGR.

CAUTION

• Do not mix battery types. Do not mix old batteries with new batteries. Replace all primary power batteries at the same time. Ensure DAGR primary batteries are good (check battery indicator on display) before using unit. The precautions are done to ensure proper battery life and proper unit operation.

• If using external DC power, ensure positive (red) lead of external DC power cable is connected to the positive lead of external power source to prevent possible damage to the unit. Internal batteries may remain installed while using external power. The memory battery should always remain installed.

• When position data fields blink between black and gray text, the DAGR is not tracking satellites or has not yet acquired present position. Field data may be inaccurate when the DAGR does not have a position fix. Be sure the DAGR has an open view of the sky to acquire the present position. If the position data fields continue to blink, perform the manual initialization procedure of this chapter.

• Prior to a mission, manually enable and orient the internal compass. Failure to do this can result in inaccurate DAGR track data when the DAGR is not moving or is moving below a preset speed value for a specified amount of time. Refer to Paragraph 10.3 for additional information.

NOTE

• The DAGR antenna needs a clear field of view to the sky (line of sight) for best satellite visibility. For best reception, the DAGR should be held at a 90 degree angle in relation to the earth's surface.

• When first applying power to the DAGR in weather below –20 °C, the receiver will enable a display heater that may take up to twenty minutes to operate display correctly. During this twenty minute period, allow the display heater to function and do not keep turning the DAGR off and then back on. The operator can enable the display heater to operate when the DAGR is powered off (refer to Paragraph 7.5). This keeps the display heated and allows immediate operation after power-on at temperatures below –20 °C. DAGR notifies the operator the display heater is enabled prior to powering off.

• After power-on, Continuous is the normal operating mode when operating on external power and Fix is the normal operating mode when operating on battery power. After the DAGR obtains a position fix using Fix operating mode, the receiver transitions to Standby mode to conserve battery power. The operator has capability to manually set the power-on operating mode (refer to Paragraph 7.4.2.2 for additional information).

• In the event a warning or other message is displayed while operating the DAGR, follow display instructions.

The following procedures provide DAGR power-on (acquire current position and adjust keypad/display lighting), manual initialization, and power off. The DAGR operates with either primary battery power or external power. The following paragraphs include the operation of both types of primary power. Memory power is supplied from primary power or from the memory battery when primary power is removed.

5.4.1. Power-On.

WARNING

DAGR displays a warning to prevent misuse of the present position as a target position that could cause personal injury or death. After power-on and prior to the DAGR automatically displaying the Present Position page, a warning stating your position is displayed, NOT the target position if the Fire Support page was used or nonvolatile memory was cleared prior to power-on.

Under normal conditions, the DAGR is fully functional following the power-on procedure.

5.4.1.1. Apply Power. Push the PWR key to turn the DAGR on. A display page briefly appears indicating the DAGR software and hardware versions (refer to Figure 5-3).

NOTE

To determine the latest DAGR software version, refer to the Replication, Distribution, Installation, and Training (RDIT) website at http://www.sed.monmouth.army.mil/RDIT or refer to the GPS PLGR/DAGR/GB-GRAM MWO/TCTO and Software website at https://rdit.army.mil/gps.

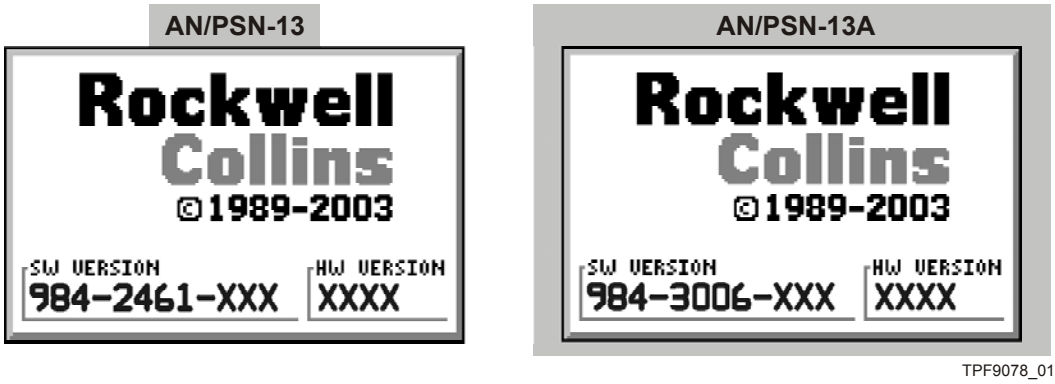

Figure 5-3. Software and Hardware Version Display During Power-On Sequence

5.4.1.2. Power-On Status Message. This display is immediately followed by the power-on status message providing the following information. The display is shown in Figure 5-4, but all messages may not be listed as they are dependent on how the DAGR is configured. When applicable, use the up/down cursor control keys to scroll and view the entire display message.

- **Self Test** — Indicates self-test results as pass (no self-test failures found) or fail (self-test failures detected). The power-on self-test performs an automatic self-test of receiver hardware (SAASM module) and does not require any input from the operator. Always displayed.
- **Battery Used** — Indicates primary battery capacity used (amount of time DAGR has been operated using primary battery, in hours and minutes). Displayed when using internal primary battery power only.
- **Battery Left** — Indicates primary battery capacity remaining (in hours and minutes). Displayed when using internal primary battery power only.
- **Power** — Indicates external power being used. Displayed when using external power only.
- **Days Remaining** — If CVw or BCVm (black CV monthly) key is loaded, indicates days remaining in mission; and also indicates if enough CV keys are loaded for mission duration.
- **Default** — Indicates DAGRs position, time, and date are default values; or if initialization is recommended for the DAGR.

5.4.1.2.1. The Power-On Status message times out in two seconds and the DAGR is ready to use if the following are true. If the Power-On Status message indicates anything different than the following list, the operator is prompted to push the ENTER key to acknowledge; and the DAGR is ready to use if self-test indicates pass. If self-test fails, the operator is prompted to push the ENTER key to acknowledge; but the DAGR is not ready to use.

- Self-test has passed (For self-test failure, refer to Paragraph 12.2 for Test Summary page information.)
- DAGR does not need initialization (If DAGR requires manual initialization, refer to Paragraph 5.4.2).

NOTE

Following power-on, if any of the following conditions exist, a message requiring operator acknowledgment appears.

- No CV or GUV keys are loaded in DAGR (Refer to Paragraph 7.2).
- No CV key for today is loaded in DAGR (Refer to Paragraph 7.2).
- Not enough CV keys are loaded for mission duration (Refer to Paragraph 7.2).
- SV Code is set to Mixed (Refer to Paragraph 7.4.2.4).
- Collecting SV information needed to obtain todays CV (Refer to Paragraph 7.2.2.2).

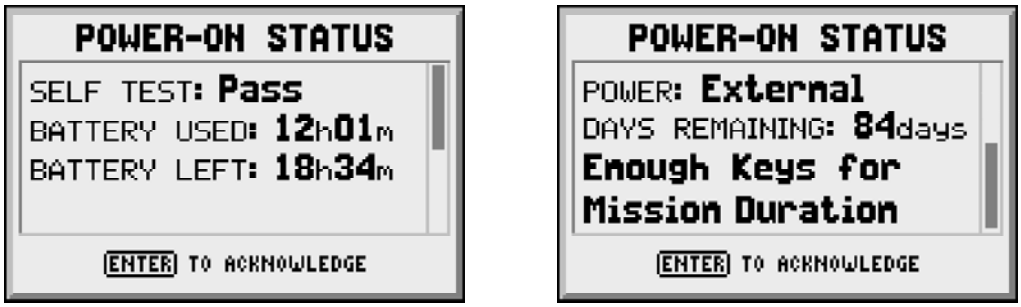

Figure 5-4. Power-On Status

5.4.1.3. Acquire Current Position. After the Power-On Status display times out or is acknowledged, the DAGR displays the SV (Satellite Vehicle) Sky View page with satellite acquisition status appearing at the top. Initially, status is displayed as Acquiring SVs..., followed by Navigating. After DAGR has acquired current position, the unit automatically switches to the Present Position page of the POS page set and displays position coordinates. During satellite acquisition, the PAGE or QUIT keys can be used to access the Present Position page.

NOTE

- If the DAGR has been customized and the SV Sky View page is not included in the POS page set, then the DAGR uses the SV Sky View page of the Satellite submenu page set. While the SV Sky View page is displayed, the operator can push and hold the POS key to manually go to the Present Position page.
- If the DAGR is not tracking satellites, the display will blink and the Present Position page displays the last position recorded by the receiver before being turned off (provided the DAGR has not experienced a total loss of primary and memory power).

5.4.1.3.1. SV Sky View Page. The SV Sky View page shown in Figure 5-5 is part of the POS page set containing commonly used pages. The page displays information on visible and tracked satellites. The current operating status is shown at the top of the display. Numbers inside black circles indicate satellites in use to acquire or maintain current DAGR position. The corresponding number at left side of display provides a bar graph indication of satellite signal strength and code status. The longer the bar, the greater the signal strength. A hollow bar indicates DAGR is tracking the satellite, but has not collected ephemeris data. A black

bar indicates DAGR is tracking satellites and ephemeris data is collected. Ephemeris data is position and clock data unique to an individual satellite. If the DAGR is not able to display satellite information, no bar will appear at the left side of the display. Additional fields and information describing the SV Sky View Page are described in Paragraph 13.2. Additional POS page set information is described in Paragraph 6.2.9.

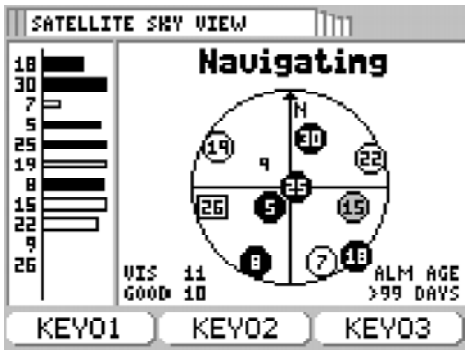

Figure 5-5. SV Sky View Page

5.4.1.3.2. Present Position Page. The Present Position page shown in Figure 5-6 is part of the POS page set containing commonly used pages. This page displays present position coordinates, coordinate and grid system, datum identifier, current operating mode, estimated horizontal error (EHE), figure of merit (FOM), elevation, and elevation reference. Operator can scroll the page to view additional field data. Additional fields and information describing the Present Position Page are described in Paragraph 9.5. Additional POS page set information is described in Paragraph 6.2.9.

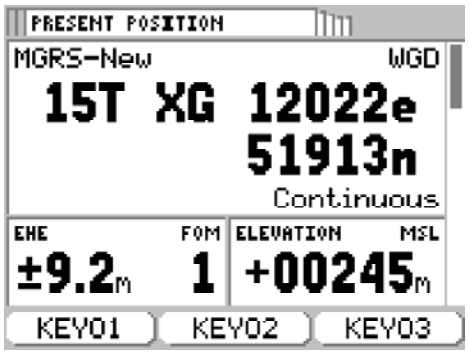

Figure 5-6. Present Position Page

5.4.1.4. Keypad/Display Lighting. As required, push and hold the BRIGHTNESS key to toggle the keypad/display lighting on and off. Adjust the lighting brightness by simultaneously pushing and holding the BRIGHTNESS key and the respective up or down cursor control key. Keypad/display lighting can also be controlled with one hand using the Light/Contrast page and the following procedure. Refer to Paragraph 10.4 for additional Light/Contrast page information.

a. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.

b. Highlight Display Setup, then push the ENTER key.

c. Highlight Light/Contrast, then push the ENTER key. The Light/Contrast page is displayed.

d. From the Light/Contrast page, and no fields selected, push the respective up or down cursor control key.

e. The Display Lighting field percentage value and slider control adjust by one percent for each push of the up or down cursor control key. For larger adjustments, push and hold the up or down cursor control key.

NOTE

This adjustment method is also made by highlighting the Display Lighting field, pushing the ENTER key, then using editing techniques to change the display lighting value.

5.4.2. Manual Initialization.

Manual initialization may be needed when the DAGR has difficulty obtaining current position coordinates, or DAGR datum is mismatched with present position.

CAUTION

When position data fields blink between black and gray text, the DAGR is not tracking satellites or has not yet acquired present position. Field data may be inaccurate when the DAGR does not have a position fix. Be sure the DAGR has an open view of the sky. Current position is necessary before accurate navigation of waypoints and routes can be accomplished.

5.4.2.1. The DAGR is designed to obtain current position and display information by simply turning the receiver on. An indication of when the DAGR has obtained current position is provided by:

- Position data fields of the Present Position page remain solid black text and do not blink.
- Solid horizontal bars on the SV Sky View page indicate satellites being tracked, satellite data is collected, and the SV Visibility field shows Navigating at the top, indicate current position has been collected by DAGR.

5.4.2.2. If the DAGR has been moved between two different geographical locations and is not performing correctly, the DAGR may need some initial manual setup according to the DAGRs current location. The following procedure describes how to initially set up the DAGR Present Position page fields and edit field content when:

- DAGR datum is mismatched with navigation waypoints.
- DAGR datum does not match the geographical map being used.
- DAGR is having difficulty obtaining a position fix.

a. Power DAGR on.
   (1) Push the PWR key.
   (2) Push ENTER key as prompted to acknowledge start up displays.

b. Access Present Position page.
   (1) Push and hold the POS key.
   (2) Verify the Present Position page is displayed.

c. Initial setup
   (1) Select datum.
      (a) From the Present Position page, push the MENU key.
      (b) Highlight Select Datum, then push ENTER key. A Datum list appears.
      (c) Scroll to highlight the datum corresponding to the geographical map being used, then push ENTER key.
      (d) Display returns to the Present Position page with datum change made to upper right corner of top field.
   (2) Select coordinate/grid system.
      (a) From the Present Position page, push the MENU key.
      (b) Highlight Select Coord/Grid, then push ENTER key. A Coordinate/Grid system list appears.
      (c) Using the cursor control keys, scroll to select the coordinate/grid system corresponding to the geographical map being used, then push ENTER key.

(d) Display returns to the Present Position page with coordinate/grid system change made to upper left corner of top field.

(3) Select units of measure or references (as required).

NOTE

As an example, the following steps provide selection of elevation units only.

(a) From the Present Position page, push the ENTER key to highlight a field.

(b) Use the cursor control keys to scroll to the Elevation field, then push the MENU key.

(c) Highlight Select Elev Units, then push the ENTER key.

(d) Choose the appropriate unit of measure, then push the ENTER key.

(e) Display returns to the Present Position page with change made.

(f) As required, repeat procedure for other field units of measure or references.

d. Configure initialization data (position, time, ground speed, and track).

NOTE

• Entering data may not be necessary if a current almanac (satellite position and time data) is available. The DAGR is capable of tracking satellites and acquiring a current almanac in Continuous, Fix, Average, and Time Only operation modes. Observe the SV Sky View page (using following procedure g.) for satellite tracking and almanac information.

• DAGR ground speed must be greater than 0.56 meters per second to initialize track.

(1) From the Present Position page, push the ENTER key, then use cursor control keys to scroll through and view fields as desired. If required, edit field content to configure initialization data for current geographical location.

(2) When desired field is highlighted, push ENTER key. An editor appears.

(3) For list editors, scroll to the desired field content and push ENTER key. For text or numeric editors, refer to procedures in Paragraph 6.2.19 and Paragraph 6.2.20.

(4) Display returns to the Present Position page with changes made to field content. Refer to Paragraph 9.5 for additional Present Position page information.

e. Select Continuous Operating mode.

(1) From the Present Position page, push the MENU key.

(2) Using the cursor control keys, highlight Select Op Mode, then push ENTER key.

(3) Highlight Continuous, then push ENTER key. If a message is displayed instructing the operator to acknowledge initialization is required, push ENTER key.

(4) Display returns to the Present Position page with operating mode change made to lower right corner of top field.

f. Observe Present Position page.

CAUTION

• If expecting to operate in conditions where tracking satellites is not possible (such as entering a cave), the DAGR should be placed in Standby mode prior to entering these conditions. If done, the DAGR performs a direct Y-code acquisition (if keyed) when set back to a tracking mode in unobscured conditions. If the DAGR is left in a tracking mode for a period of one hour while obscured, the ability to perform direct Y-code reacquisitions may be lost. To correct this, cycle DAGR to Standby mode and back to a tracking mode.

• When attempting to acquire satellites after the signals have been blocked for a period of time (e.g., when exiting a cave), acquisition time may be improved by momentarily cycling the unit to Standby mode and then back to the previous operating mode.

(1) If Present Position page is not already displayed, push and hold POS key until Present Position page is obtained. The display position data fields stop blinking when the DAGR has obtained a current position fix (wait approximately one minute). This current position data replaces any position data entered manually.

(2) Refer to Paragraph 9.5 for additional Present Position page information.

(3) DAGR is initialized with information corresponding to the current geographical location.

g. Observe SV Sky View page.

(1) If Present Position page is not already displayed, push and hold POS key until Present Position page is obtained.

(2) Repeatedly push the PAGE key until SV Sky View page is obtained. Satellite acquisition can be monitored from this page.

(3) Refer to Paragraph 13.2 for additional SV Sky View page information.

5.4.3. Select Operating Mode.

The DAGR mode of operation can be selected from the Present Position page menu, GPS Setup page, SV Sky View Page menu, or Receiver Status display menu. Refer to Paragraph 6.2.23 for descriptions of operating modes. The following procedure uses the Present Position page menu.

a. From any display, push and hold the POS key until the Present Position page is displayed.

b. If a field is highlighted, push the QUIT key to unhighlight the field.

c. Push the MENU key.

d. Highlight Select Op Mode, then push the ENTER key.

e. Highlight the desired operating mode, then push the ENTER key.

f. Display returns to the Present Position page displaying the selected operating mode below the present position coordinates.

5.4.4. Power-Off.

The OFF mode can be entered through push and hold of the PWR key or operating mode selection. When the DAGR is commanded to turn off, the receiver displays a 30 second countdown warning prior to turning the unit off. This protection is provided to prevent inadvertently turning off the unit. The DAGR allows the operator to cancel the 30 second countdown (using the QUIT key) and retain power, or override the countdown (using the ENTER key) for an immediate off.

5.4.4.1. The DAGR provides an auto-off timer to conserve power by automatically turning the DAGR off after a period of inactivity. Auto-off timer is controlled from the Receiver Setup submenu, Power Saver page. Refer to Paragraph 7.5 for more information.

5.4.4.2. When in the Off mode, the DAGR maintains crypto keys, waypoints, routes, and setup data providing either primary power, memory power, or external power is available. Perform the following procedure to turn the DAGR off.

a. Push and hold the PWR key. The 30 second power down warning is displayed (refer to Figure 5-7).

NOTE

If Auto-On, Automark, or Off Mode Display Heater functions are enabled, DAGR notifies the operator and requires acknowledgment prior to displaying the 30 second countdown warning.

b. Push the ENTER key to immediately power off the DAGR.

TPG0020_01

Figure 5-7. Power Down Warning

CHAPTER 6
OPERATOR INSTRUCTIONS — FUNDAMENTAL OPERATION

6.1. GENERAL.

This chapter contains fundamental DAGR operation information. Menu structure, accessing pages and fields, editing, initial setup, default settings, and self-test procedures are described. A working knowledge of the information contained in this chapter is required for the operator to perform operations described in the following DAGR submenu chapters.

6.2. FUNDAMENTAL OPERATION.

The following paragraphs provide fundamental information on understanding the menus associated with DAGR displays and how to access and maneuver through them. The DAGR is operated by using a system of menus, submenus, pages, and fields.

6.2.1. Menus.

The DAGR uses the following general menu structure to access and/or edit information. The menu tree of Paragraph 6.2.2 illustrates three of the four menu levels. The main menu consists of the first large bold type indent level of the menu tree. The submenu is the second small bold type indent level. The third indent level shows all available pages for the associated submenu. These pages have accessible related page menus. Pages also consist of fields. Field menus are shown in the keystroke maps provided for each page in the submenu chapters. All selectable fields have a related field menu when accessed.

1. Main Menu — Provides submenu choices.
2. Submenu — Provides page (function) choices.
3. Page Menu — Provides specific functions or editors associated with the page.
4. Field Menu — Provides specific functions or editors associated with the field.

6.2.1.1. With a page displayed or a field highlighted, the corresponding menu may be viewed by pushing the MENU key. Pushing the QUIT key allows the user to back out of the menu and return to the previous display. When a menu selection is highlighted that has an arrow symbol to its right, pushing the right cursor control key or the ENTER key causes the submenu to be displayed.

6.2.1.2. Field and page menu items that are not currently available (e.g., Edit Field) are disabled and appear as light gray text (refer to Figure 6-1). The cursor can be placed on disabled items, but the menu pop-up does not allow selection of disabled items.

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Figure 6-1. Disabled Menu Item

6.2.2. Menu Tree.

The menu tree shown in Figure 6-2 provides a complete listing of the main menu, submenus, and pages. Certain submenu pages are only applicable to the advanced function set and are labeled (Advanced) on the illustration.

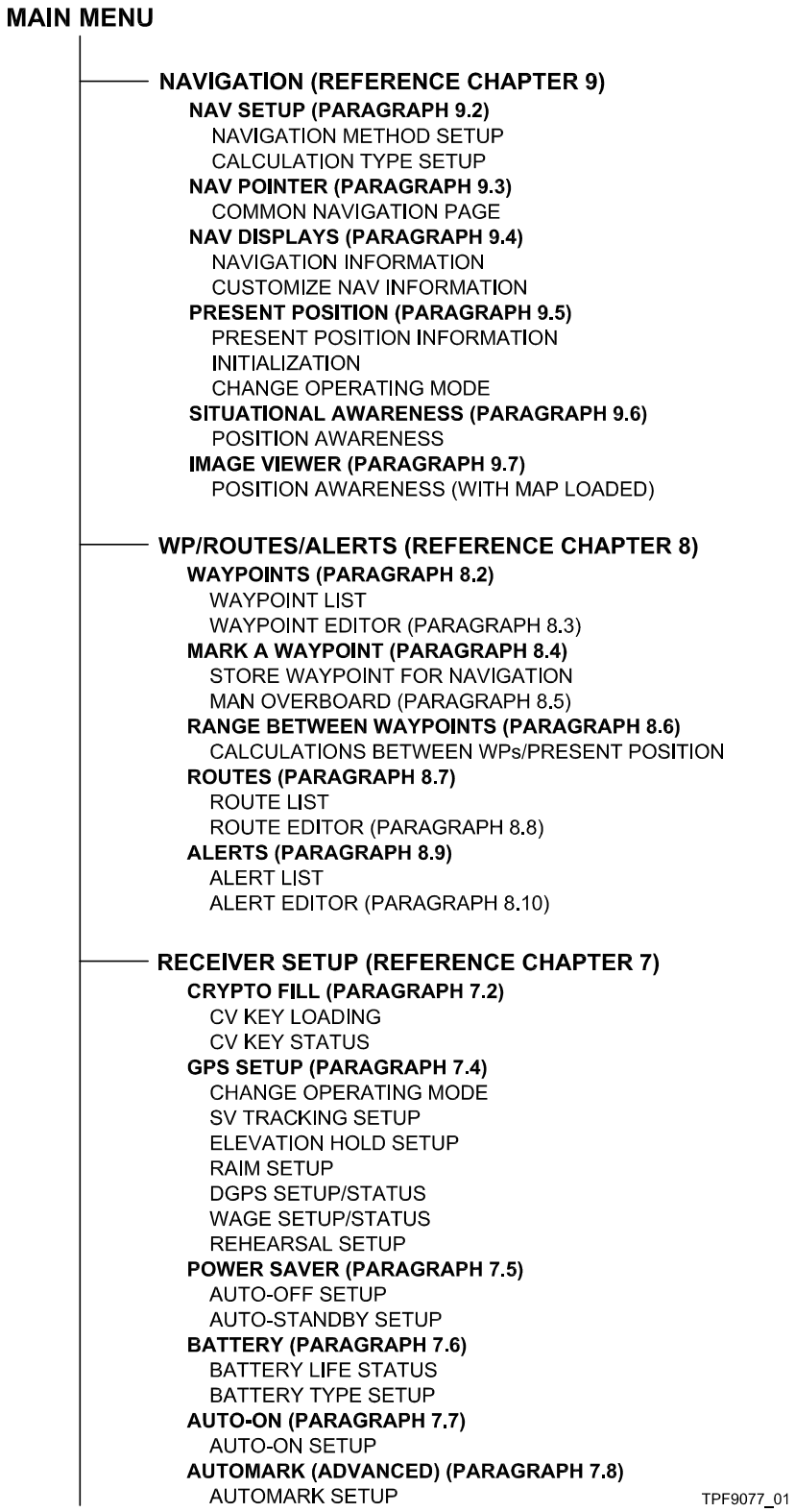

Figure 6-2. Menu Tree (Sheet 1 of 3)

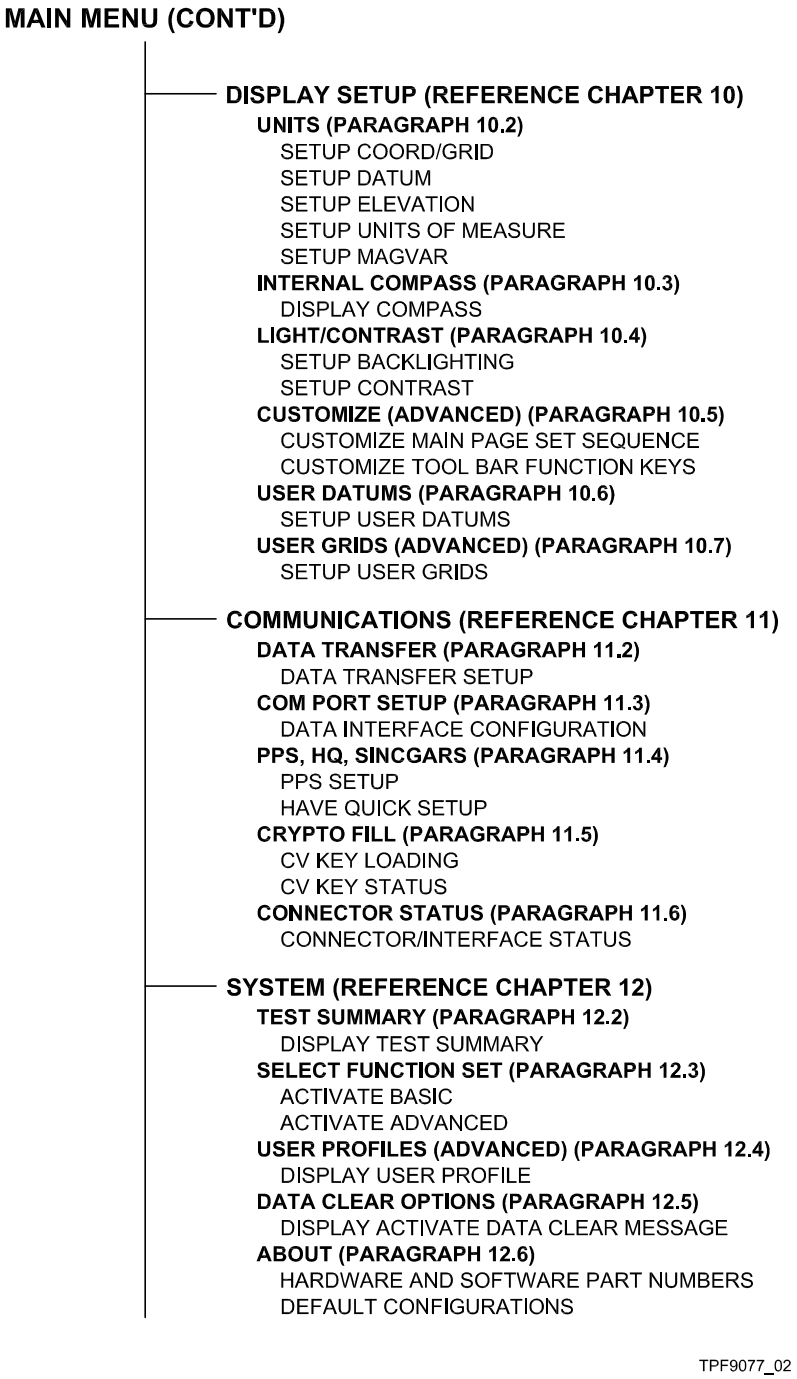

Figure 6-2. Menu Tree (Sheet 2)

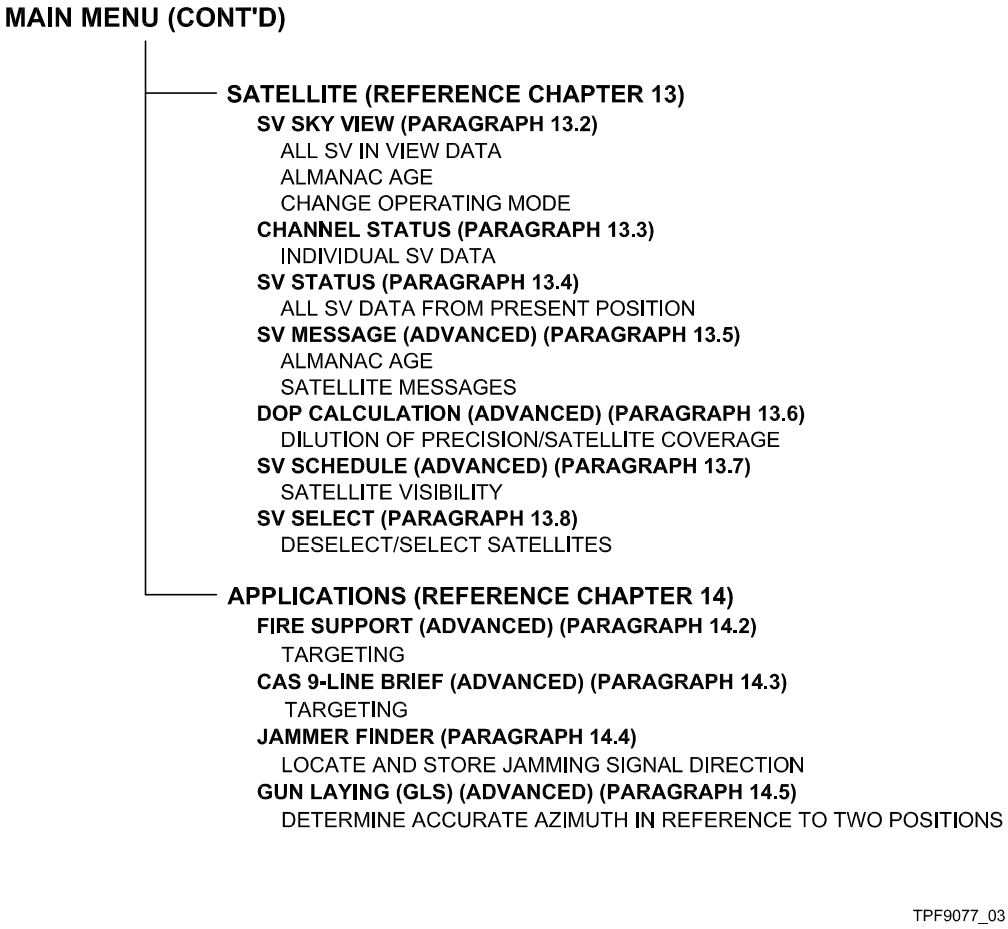

Figure 6-2. Menu Tree (Sheet 3)

6.2.3. Main Menu Access.

The main menu is the DAGR top level menu showing all submenus available and can be accessed using the following methods:

- Following DAGR power-up, and from any display (except a pop-up message), access the main menu by pushing the MENU key twice.
- With a submenu open, the main menu is accessed by pushing the QUIT key.
- With a page menu open, the main menu is accessed by pushing the MENU key.
- With a page field menu open, the main menu is accessed by pushing the MENU key.

6.2.4. Submenu Access.

Submenus are listed within the Main menu and contain individual pages used by DAGR. Access the Main menu, then use the cursor control keys to view the entire list of Submenus.

6.2.5. Page Menu Access.

Page menus are associated with the submenu and are accessed as follows:

NOTE

When a page is displayed, other pages of the submenu page set are accessed by pushing the PAGE or QUIT keys.

a. Access the main menu.

b. Highlight the appropriate submenu using the cursor control keys, then push the ENTER key.

c. Highlight the desired page from a submenu using the cursor control keys, then push the ENTER key.

d. With page displayed, push the MENU key.

6.2.6. Field Menu Access.

Field menus are accessed as follows:

a. Access the desired page.

b. Select the desired field by pushing the ENTER key and use cursor control keys to highlight the desired field.

c. Push the MENU key.

6.2.7. Menu Persistence.

Persistence allows the operator to quickly repeat or return to the same selection or option previously viewed. The DAGR remembers the last selected option from each menu. When that same menu is accessed again, the last selected menu option is highlighted. Persistence is reset to the default options at power-on, after DAGR is zeroized, or after self-test is performed.

6.2.8. Disabled Options.

A menu option or list option is disabled (grayed out on display) if it serves no functional purpose at a given time. Refer to Figure 6-1.

6.2.9. POS Page Set.

The POS page set contains the common pages the operator will use and is shown in Figure 6-3. The POS key is used to access the POS page set. The default POS page set is described as follows, but can be customized as shown in Paragraph 10.5. After accessing the POS page set, the PAGE or QUIT key can be pushed to view all pages of the POS page set.

- **Present Position** — Displays present position coordinates, coordinate and grid system, datum identifier, current operating mode, estimated horizontal error (EHE), figure of merit (FOM), elevation, elevation reference, ground speed, track, estimated time error, time figure of merit, time and date, MAGVAR, magnetic model year, and operator ID. The operator can scroll the page to view additional field data. Refer to Paragraph 9.5 for additional information on the Present Position page.

- **Situational Awareness** — Provides a graphical display (with or without a map) of relationships between present position, track, waypoints, routes, and alerts. DAGR present position is shown at the center of the display. The Situational Awareness page automatically displays a map when a map is loaded and enabled that includes DAGR present position. Only vector maps including present position are displayed. The Situational Awareness page includes a north reference indicator, speed and track, position error data, and a range scale. Refer to Paragraph 9.6 for additional information on the Situational Awareness page.
- **NAV Pointer** — Displays a pointer directing the operator towards the displayed waypoint. Also displays current navigation method, destination waypoint number and name, azimuth, and range fields. Refer to Paragraph 9.3 for additional information on the NAV Pointer page.
- **Image Viewer** — Displays images or raster maps. Raster maps display relationships between current position, landmarks, map objects, and selected waypoints. With a raster map including present position previously loaded and enabled, the Image Viewer page automatically displays the map with DAGR present position shown at the center of the display. The operator uses zoom and pan operations, and waypoint selections to obtain a desired view. When navigating, the Image Viewer page provides the operator with a mapped view of surrounding terrain and potential obstructions (e.g., body of water). Refer to Paragraph 9.7 for additional information on the Image Viewer page.
- **SV Sky View** — Displays status information on tracked satellites (e.g., Navigating). The current operating status is shown at the top of the display. Numbers inside black circles indicate satellites in use to acquire or maintain current DAGR position. The corresponding number at left side of display provides a bar graph indication of satellite signal strength and code status. The longer the bar, the greater the signal strength. A black bar indicates ephemeris data is collected. If the DAGR is not able to display satellite information, no bars appear at the far left side of the display. Refer to Paragraph 13.2 for additional information on the SV Sky View page.

NOTE

The operator can remove the SV Sky View page and Image Viewer page from the POS page set. However, the Present Position, Situational Awareness, and NAV Pointer pages cannot be removed from the POS page set. The operator can add up to seven additional display pages to the non-removable pages of the POS page set for a total of up to ten display pages. Refer to Paragraph 10.5 for procedures on changing the POS page set.

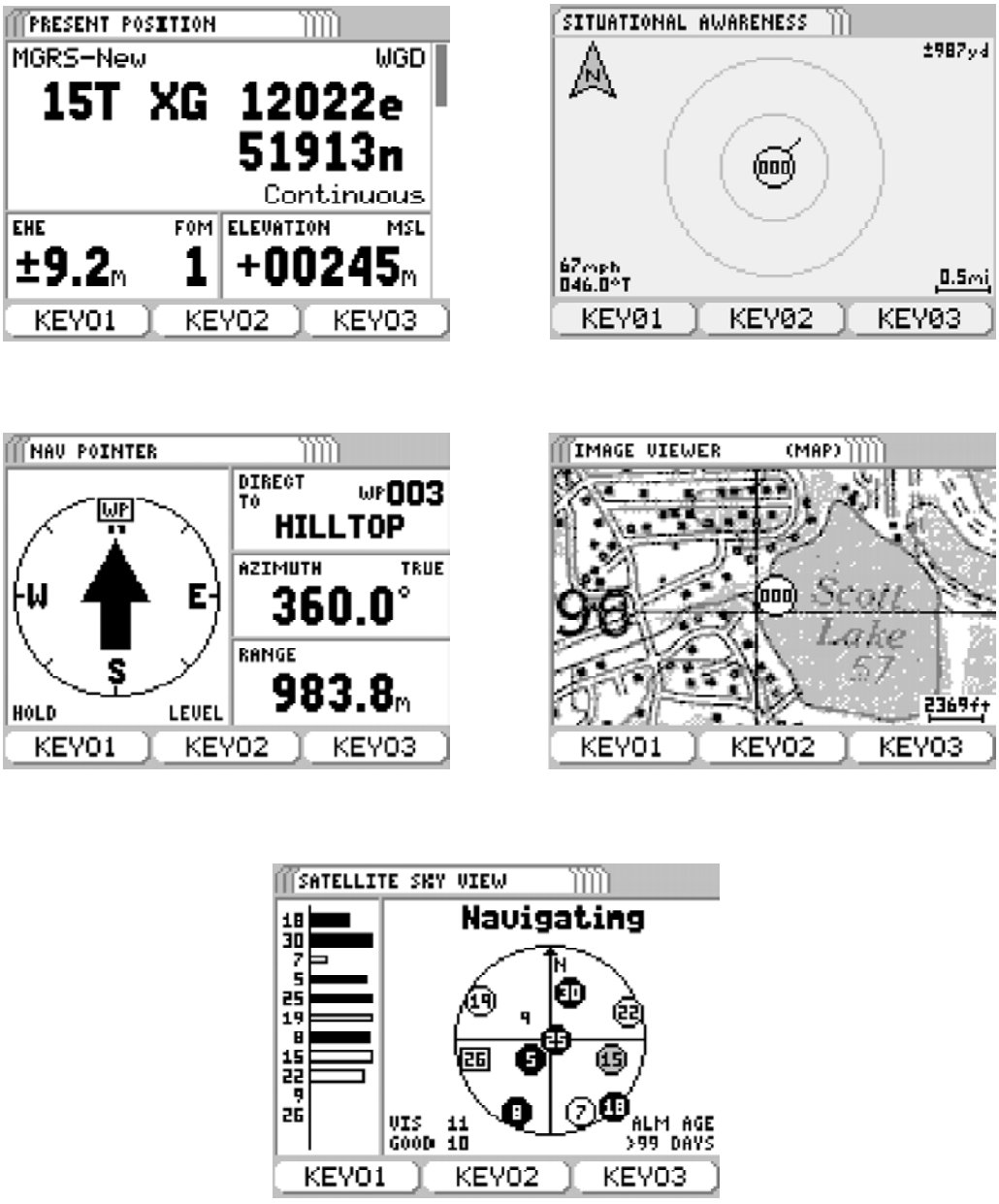

Figure 6-3. POS Page Set

6.2.10. Customized Page Set (Advanced).

The POS page set is customizable using the advanced function set. Pages may be added or removed by the operator. Advanced function set POS page set choices include individual pages from the submenu page sets. Submenu page sets and their individual pages correspond to the submenu pages listed in the menu tree, Figure 6-2. Refer to Paragraph 10.5 for information on customizing the POS page set.

6.2.11. Page Set Tabs.

Each page set page has tabs at the top of the display providing the page name. The pages are stacked so that the top edge of each page tab is visible to represent the number of pages in the page set and their current location. The POS page set tabs have rounded edges and all other page sets have square edged tabs.

6.2.12. Page Set Display Characteristics.

Push and release the QUIT key to move to the previous page of a page set. Push and release the PAGE key to move to the next page of a page set. Page sets wrap from the last page to the first page (or vice versa) when scrolling through the pages. DAGR remembers the last viewed page of the submenu page sets (using persistence). When a submenu page set is selected (e.g., Navigation), the name of the last viewed submenu page is highlighted for the operator to easily reselect. Memory (persistence) of the last viewed pages is not retained after cycling DAGR power.

6.2.13. Messages.

Messages may contain an icon, message text, and a quick key (e.g., ENTER key). Refer to Figure 6-4. The icon presents a visual indication associated with the message; the text shows the user what the action of the message will be; and the quick key provides an immediate execution of the message. Pop-ups on top of messages cascade to show layers of up to two pop-ups (editor and menu, or editor and help). Refer to Chapter 16 for a complete listing and description of DAGR messages. Messages provide operation status, information, and navigation alerts. Messages also include warnings, cautions, and notes described as follows.

Figure 6-4. Message Example

6.2.13.1. Warnings. Warnings are displayed by the DAGR when conditions exist that could result in operator injury, loss of life, or mission failure unless corrective action is taken.

6.2.13.2. Cautions. Cautions are displayed by the DAGR when conditions exist that could result in damage to equipment or compromise mission effectiveness unless corrective action is taken.

6.2.13.3. Notes. Notes are displayed by the DAGR when conditions exist that should be brought to the operators attention.

6.2.14. Highlighting and Selecting Fields.

The operator is able to highlight any field on the page window for field operations such as editing. When no fields are highlighted, pushing the ENTER key highlights the first selectable field on the page window, or the previously selected field (if a previous field selection was made). Once a field is highlighted on a page, the cursor control keys are used to highlight the desired field. Pushing the ENTER key after highlighting the desired field, selects the field and displays the field editor or provides status information. A field can be unhighlighted by pushing the QUIT key. A disabled field can be highlighted, but pushing the ENTER key has no effect and no editing of the value is possible.

6.2.15. Scrolling .

In general, vertical and horizontal scrolling always wraps end-to-end or top-to-bottom (fields, lists, views, etc.). Refer to Figure 6-5 for vertical scrolling only, and to Figure 6-6 for both horizontal and vertical capability. The wrapping mechanism wraps around to the same row or column. If there are more fields than can be displayed at one time (on a page, menu, etc.) a scroll bar is used. The scroll bar appears on either the bottom and/or right side of the page window. Tables and forms do not wrap when scrolling between fields on a particular table or form, although there is a scroll bar present in the scrolling direction. Scrolling is accomplished using the up/down/right/left cursor control keys in the following ways.

- Single step: One line/field is scrolled for each cursor control key push.
- Repeat/Fast: Push and hold of a cursor control key causes repeated scrolling at faster rates.

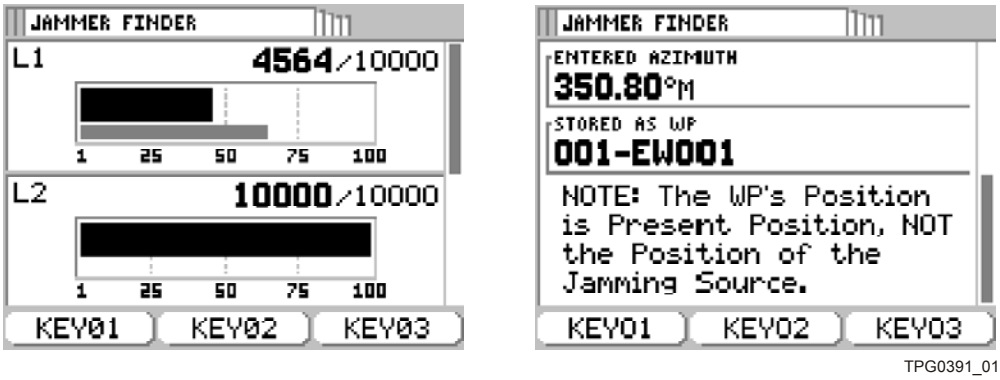

Figure 6-5. Vertical Scrolling Example

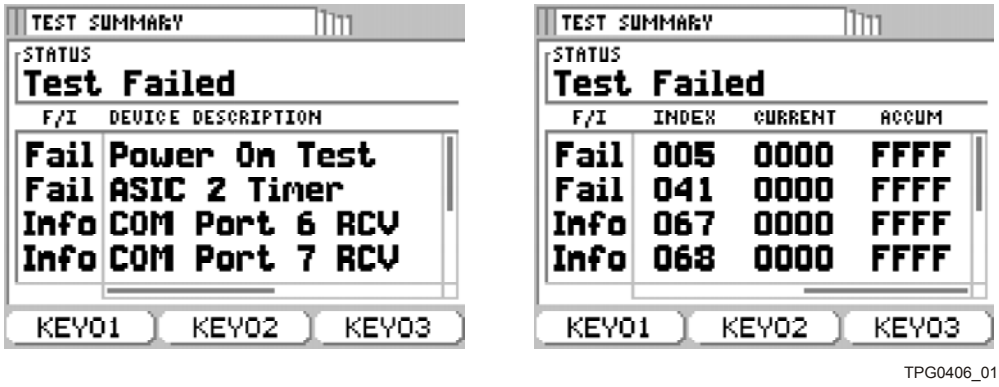

Figure 6-6. Horizontal Scrolling Example

6.2.16. Persistence.

DAGR remembers the last order of selections made when performing an operation. This may include selection of a submenu, page, field, and an item from a menu or editor. When an operation is performed a second time, the same selections become highlighted that were used the first time. The default for a first time selection is the top of a menu or list, and the first field (top left) on the page. Memory (persistence) of the last selection is not retained after cycling DAGR power.

6.2.17. Editing Fields.

Field content of a page is edited by selecting choices from an editor. After a field is highlighted, push the ENTER key to display and use the editor or push the MENU key and then use the Edit Field selection to display and use the editor. Later paragraphs in this chapter provide further editor function and pop-up information.

6.2.18. Editing Field Options From A List.

A list editor is a pop-up containing a list of items the user can choose from without any individual character editing. Refer to Figure 6-7. A list editor item shown inside a box (e.g., Time Only) indicates the item currently appearing in the field. In the following procedure, the operating mode is selected from the Present Position page using a list editor.

a. From any display, push and hold the POS key until the Present Position page is displayed.

b. Push the ENTER key. The top field on the display becomes highlighted (or last field selected).

c. Use the cursor control keys, if required, to highlight the Position field at the top of the page.

d. Push the MENU key.

e. Use the cursor control keys, if required, to highlight Select Op Mode. Push the ENTER key.

f. From the list editor, highlight the desired operating mode, then push the ENTER key.

g. The display returns to the Present Position page displaying the operating mode selection in the lower right corner of the Position field.

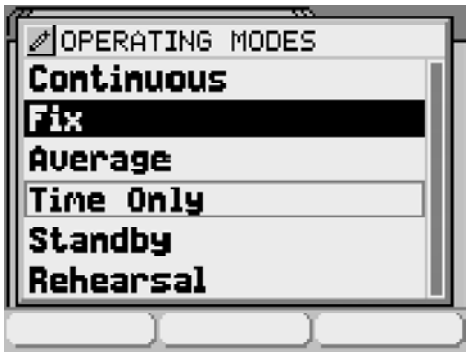

Figure 6-7. List Editor Example

6.2.19. Editing Fields Containing Alphanumeric Characters.

In the following procedure, a text editor is used to edit the Operator ID field of the Present Position page. A text editor is shown in Figure 6-8.

a. From any display, push and hold the POS key until the Present Position page is displayed.

b. Push the ENTER key. The top field on the display becomes highlighted (or last field selected).

c. Use the cursor control keys, if required, to highlight the Operator ID field near the bottom of the page.

d. Push the ENTER key.

e. A pop-up text editor appears containing characters to edit.

f. Use the cursor control keys to highlight the desired character or function in the keyboard portion of the editor. Push the ENTER key to change the highlighted character in the text box of the editor, or to perform the selected function. Refer to the following list for descriptions of the keyboard in the text editor.

- **Arrows ↑, ↓, ←, and →** — Move to the text box field character to be edited by highlighting the appropriate arrow then push the ENTER key. Repeat until the desired field character position is highlighted.
- **Alphanumeric characters** — Highlight desired character in lower portion of editor, then push the ENTER key. The highlighted upper field (text box) character changes to the lower selected character.
- **Insert character** — Highlight Ins Char, then push the ENTER key. A character position is added to the text box. Characters to the right of the inserted character move to the right.
- **Delete character** — Highlight Del Char, then push the ENTER key. The highlighted text box character position is deleted. Characters to the right of the deleted character move to the left.
- **Clear character** — Highlight Clear→, then push the ENTER key. The highlighted text box character and all characters to the right of it are cleared.

g. After editing is complete, highlight Save on the keyboard in the text editor. Push the ENTER key to save changes.

NOTE

The MENU key can also be pushed to obtain multiple editor options (Save & Exit, Exit & No Save, Undo Changes). Highlight the desired option, then push the ENTER key to perform desired operation. Follow any displayed prompts when using the MENU key option.

h. Display returns to the Present Position page displaying the field change made. Push the QUIT key to unhighlight field.

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Figure 6-8. Text Editor Example

6.2.20. Editing Fields Containing Numbers Only.

A number editor is a pop-up containing numeric characters for editing. Refer to Figure 6-9. In the following procedure, a number editor is used to edit the MAGVAR field of the Present Position page.

a. From any display, push and hold the POS key until the Present Position page is displayed.

b. Push the ENTER key. The top field on the display becomes highlighted (or last field selected).

c. Use the cursor control keys, if required, to highlight the MAGVAR field near the bottom of the page.

d. Push the ENTER key.

e. A pop-up number editor appears containing characters to edit.

f. Use the left and right cursor control keys to move the cursor to the character position to be edited. Use the up and down cursor control keys to scroll to the desired character. When done editing, push the ENTER key to save changes and exit.

g. The display returns to the Present Position page displaying the field change made. Push the QUIT key to unhighlight the field.

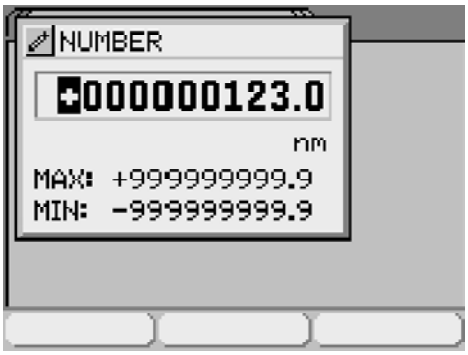

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Figure 6-9. Number Editor Example

6.2.21. Editors.

The DAGR provides a variety of editors for the operator to change or customize page field content. Editors are accessed via the page or field menu. The following figures display the various types of editors titled by their editor type (e.g., Text). Actual DAGR editor titles correspond with the field being edited (e.g., when editing a waypoint name field, the text editor title is Name). The following paragraphs provide information on each type of editor.

6.2.21.1. When there are more items than can be viewed on an editor at one time, the scroll bar position indicates where the currently visible items are. When the scrolling wraps from the bottom to the top, the scroll bar jumps from the bottom of the scroll bar region to the top. Similar wrapping occurs when scrolling from top to bottom, left to right, and right to left.

6.2.21.2. Editor pop-ups wrap when scrolling numbers/characters in a scrolling type editor. Editor pop-ups provide a minimum value when scrolling on one or more digits/characters and the PAGE key is pushed. (i.e., The digit(s) are set to the minimum value; or the character(s) are set to the value associated with the minimum index in the text list.)

6.2.21.3. Editors handle out of range values during editing by using the maximum/minimum values allowed. (e.g., If the operator is editing 123 with a maximum value of 220, and the operator scrolls the hundreds digit to 2, the number value displayed will become 220 rather than 223).

6.2.21.4. List Editor. Refer to Figure 6-10. The list editor utilizes key functions the same as the number editor except the PAGE key is used to scroll down larger lists. The list editor is used when editing operator selectable data (i.e., pick from list). List editors are also used for special lists (e.g., including both waypoint number and name) or additional information of the highlighted item in a display footer (e.g., datum information).

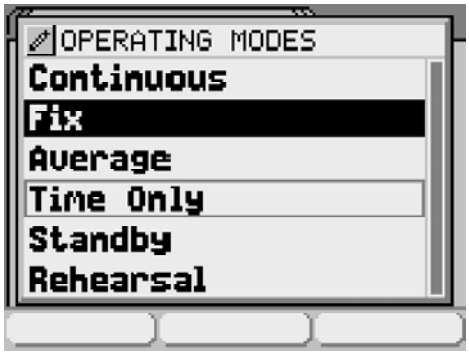

Figure 6-10. List Editor

6.2.21.5. Check List Editor. Refer to Figure 6-11. The check list editor utilizes key functions the same as the number editor except the PAGE key is used to scroll down larger lists. The check list editor is similar to a list editor but allows the operator to select individual or multiple items from a list (e.g., select multiple maps to view their information). A selected item is displayed with a check mark in a box to the left of its name. The left or right cursor control keys are used to select or deselect items from the list. Editor menu selections can also be used to select or deselect all listed items.

Figure 6-11. Check List Editor

6.2.21.6. Text Editor. The text editor is used when editing text and numeric characters. The text editor allows selection of the characters A through Z, 0 through 9, dash (-), slash (/), period (.), and space ( ) to be entered into the text box.

6.2.21.6.1. If the text string being edited is 12 characters long or less, the text editor is displayed with one line of text and a full scroll bar. If the text string being edited is greater than 12 characters long, the text editor is displayed with multiple lines of text (12 characters per line) and a scroll bar (scroll bar is full if only two lines of text are present).

6.2.21.6.2. The text editor is divided into two sections including the text box displaying the text being edited, and the keyboard. The text box is not selectable as a field, only the individual characters. The keyboard displays each character that can be inserted into the text box. The keyboard uses the layout shown in Figure 6-12. Use the up, down, left, and right cursor control keys to move to the desired key. The left and right columns wrap between each other when a scroll key is pushed that would take the selection off the keyboard. The top and bottom rows perform similarly under the same conditions (the text box cannot be selected, and is not considered when wrapping). To select/activate a given key, the ENTER key must be used.

6.2.21.6.3. When a character is selected by pushing the ENTER key, the character overwrites any information already in the text box string at the location of the cursor. After the character is inserted, the cursor moves one character to the right unless the cursor is at the end of the text string.

6.2.21.6.4. The four directional keys on the display keyboard allow for movement of the cursor within the text box in its respective direction. When only one line of editable text is displayed, the up and down directional keys on the display keyboard are disabled. Upon the initial display of the text editor, the key that represents the first character of the editable text string is selected on the keyboard as well as in the text string.

6.2.21.6.5. The four command keys (Clear →, Ins Char, Del Char, and Save) are described as follows. Refer to Figure 6-12.

- **Clear →** — Performs the clear function where the selected character and all characters to the right of the selected character are replaced with the space character.
- **Ins Char** — (Insert Character) Shifts the selected character and all characters following the selected character to the right by one character, and inserts a space character at the selected location. The new space character becomes the selected character and the character at the end of the text string is deleted (last character of the last line of editable text).
- **Del Char** — (Delete Character) Shifts all characters following the selected character to the left by one character, thereby over-writing the selected character, and a space character is inserted at the end of the text string (last character of the last line of editable text). The character replacing the selected character becomes the new selected character.
- **Save** — Saves the changes made to the text string and exits the text editor.

Figure 6-12. Command Keys Reference

6.2.21.6.6. Instead of using the cursor keys to highlight the SAVE command, the MENU key can be pushed to access a list of options (undo changes, save and exit, exit and no save, reset to default, and editor help). These options provide text editor shortcuts to close the text editor, whether the changes need to be undone, saved, or reset.

6.2.21.7. Number Editor. Refer to Figure 6-13. The number editor is used when editing numeric field values (e.g., elevation). The number editor utilizes key functions as follows:

- **Up/Down Cursor Control Keys** — Scroll to desired digit or characters.
- **PAGE key** — Scroll to the first digit or character value.
- **Left/Right Cursor Control keys** — Move the cursor.
- **ENTER key** — Save changes and exit.
- **QUIT key** — Exit without saving changes.

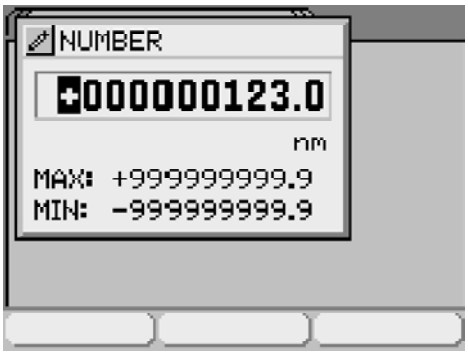

Figure 6-13. Number Editor

6.2.21.8. Distance Editor. Refer to Figure 6-14. The distance editor utilizes key functions the same as the number editor. Units are included and selectable along with the range being edited.

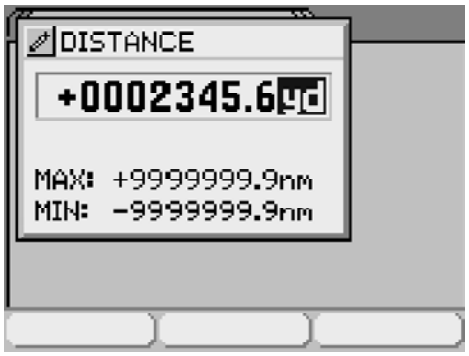

Figure 6-14. Distance Editor

6.2.21.9. Number Range Editor. Refer to Figure 6-15. The number range editor utilizes key functions the same as the number editor.

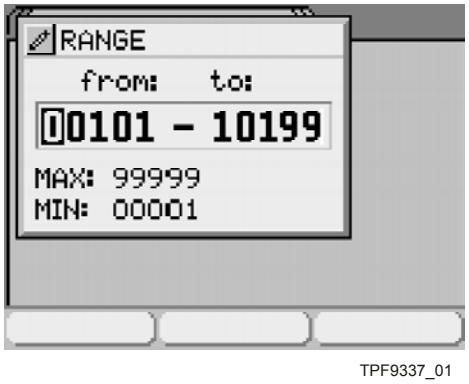

Figure 6-15. Number Range Editor

6.2.21.10. Hexadecimal Number Editor. Refer to Figure 6-16. The hexadecimal number editor is used when editing hexadecimal crypto variables and utilizes key functions the same as the number editor.

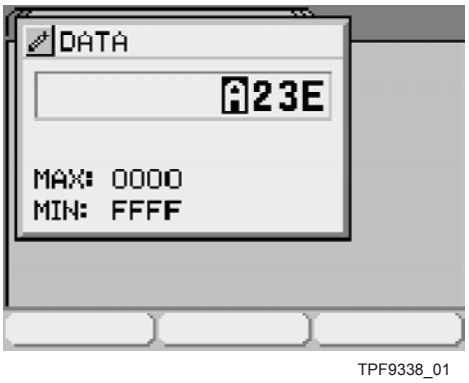

Figure 6-16. Hexadecimal Number Editor

6.2.21.11. Time Editor. Refer to Figure 6-17. The time editor utilizes key functions the same as the number editor.

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Figure 6-17. Time Editor

6.2.21.12. Time Duration Editor. Refer to Figure 6-18. The time duration editor utilizes key functions the same as the number editor.

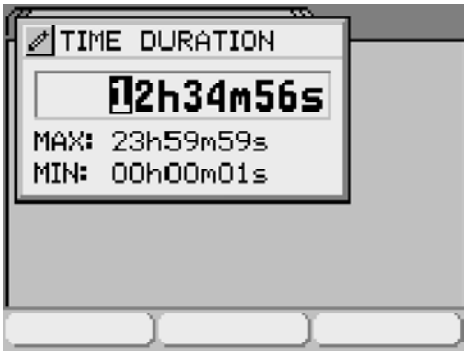

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Figure 6-18. Time Duration Editor

6.2.21.13. Date Editor. Refer to Figure 6-19. The date editor utilizes key functions the same as the number editor but allows the operator to edit the day number as an integer subfield, the month as a scrollable subfield, and the year as a scrollable subfield between Jan 6, 1980 and Dec 31, 2079.

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Figure 6-19. Date Editor

6.2.21.14. Date-Time-Group Editor. Refer to Figure 6-20. The date-time-group editor utilizes key functions the same as the number editor but allows the operator to edit scrollable subfields. The date-time-group is arranged in a DDTTTTLMMMYY format. The letter D represents day; T represents time; L represents local or zulu; M represents month; and Y represents year.

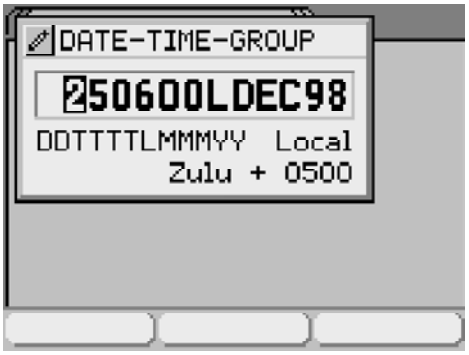

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Figure 6-20. Date-Time-Group Editor

6.2.21.15. Position Editor. Refer to Figure 6-21. The position editor utilizes key functions the same as the number editor and is used when editing position data types. The default value for the selected coordinate system is used when the position provided to the position editor for editing is out of range for the selected position coordinate system and datum. If the operator attempts to save a position that is out of range, a message will be displayed to the operator. The message allows the operator to accept or reject the adjusted position (edits will be lost if the operator rejects the adjusted position). Certain DAGR display pages provide display only position editors that do not provide editing capability.

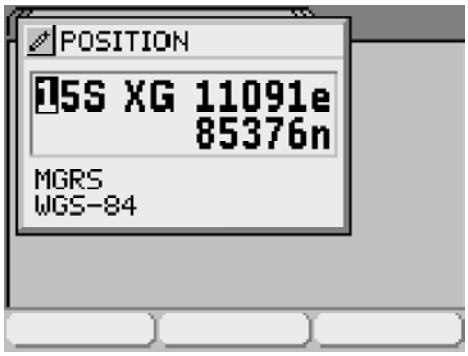

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Figure 6-21. Position Editor

6.2.22. Help.

Help text describes basic keypad and DAGR operations, characteristics, terms, and specific pages or fields. Help text also explains why fields (if any) are disabled.

6.2.22.1. Main help text is selectable under the following topics.

- Tutorial
- Keypad Basics
- Receiver Basics
- Navigation
- Alerts

- Terms-Glossary
- Characteristics

6.2.22.2. Main help text is accessed as follows.

1. With a page displayed, push the MENU key. With Help highlighted, push the ENTER key.
2. With page or editor help text displayed, push the ENTER key for help topics.
3. Highlight the desired topic, then push the ENTER key.
4. Read and scroll help text as desired.
5. Use the QUIT key to back out of the main help text or push the MENU key twice to return to main menu.

6.2.22.3. Page and Field Help. Each page has help text specific to the page. Page help text is accessed by displaying the desired page, pushing the MENU key, then selecting Help. Field help text is accessed by highlighting the desired field, pushing the MENU key, then selecting Help.

6.2.22.4. Editor Help. Editor help text describes how the operator should use the keys to edit the data. With the editor displayed, editor help is accessed by pushing the MENU key, then selecting Editor Help.

6.2.23. Mode of Operation.

The mode of operation is configurable and available after the DAGR is powered up. The mode of operation is configured through the GPS Setup page Operating Mode field, Present Position page menu, SV (Satellite Vehicle) Sky View page menu, or Receiver Status display menu. The Status key can also be used to check current mode of operation information (refer to Paragraph 6.2.24). The GPS Setup page provides operator capability to preset the initial mode of operation following power-on. Continuous is the normal operating mode for external power and Fix is the normal initial operating mode when operating on battery power. After powering on under battery power, the DAGR acquires a position using Fix mode operation then transitions to Standby mode operation to conserve battery power. If errors are encountered during power-on, the DAGR remains in Standby mode. Refer to Paragraph 7.6 for external power type information. Refer to Table 6-1 for information on DAGR parameter and default settings.

- **Continuous** — At the completion of power-on, the DAGR transitions to Continuous mode if the receiver is connected to external power and is configured to operate as if connected to an unlimited power source (e.g., vehicle power), and no self-test failures have been found. When in Continuous mode, the DAGR tracks satellites to produce a continuous PVT (position, velocity (ground speed), and time) solution. This mode requires more power than Fix or Standby modes.
- **Fix** — At the completion of power-on, the DAGR transitions to Fix mode momentarily when the receiver is operating on battery power, or when connected to external power and configured to operate as if connected to a limited power source, and no self-test failures have been found. When in Fix mode, the DAGR tracks satellites to produce a current PVT solution. The DAGR automatically transitions to Standby mode after a position fix has been obtained. This conserves battery power.
- **Average** — Average mode is for survey applications where the DAGR is stationary and must not be moved. Satellite signals are continuously received. This mode is also used to improve performance in very low signal environments, such as under dense foliage; but will not improve performance when the satellite signal is lost, such as being in a cave. The DAGR displays a note to the operator upon entering Average mode indicating that the receiver and external antenna (if applicable) must remain stationary (approximately 2 to 4 hours). The DAGR produces more accurate PVT solutions in this stationary position. The DAGR provides an average position and a counter to show the number of position samples used in calculating the position.
- **Time Only** — Time Only mode is for providing time output only (1-PPS, 10-PPS, SINCGARS, or HAVE QUICK). The DAGR acquires and maintains tracking on one or more satellites to provide the current time. The DAGR displays a note to the operator upon entering Time Only mode indicating that the receiver and external antenna (if applicable) must remain stationary.
- **Standby** — At the completion of power-on, the DAGR transitions to Standby mode if self-test failures have been found. When in Standby mode, the DAGR operates at reduced power and does not acquire and track satellites, but performs all functions that do not require satellites. Therefore, when in Standby mode, do not attempt to use functions requiring present DAGR position. This mode is used while entering pre-mission data to help conserve batteries.
- **Rehearsal** — This mode is used for training or mission preparation purposes only. The DAGR uses operator entered waypoints and route to compute position and ground speed data for the simulated scenario. The DAGR does not track satellites or perform other functions while in Rehearsal mode. This mode is disabled if the rehearsal route is invalid or does not have legs. Refer to GPS Setup page, Paragraph 7.4 for more information.

- **Test** — The DAGR performs a commanded self-test to determine if the unit is operational. The DAGR does not track satellites, determine position, or provide navigation data while in the Test mode.
- **Off** — This mode commands the DAGR to turn off.

6.2.24. Receiver Status.

The DAGR receiver status display is accessed by pushing the STATUS key at any time. Scroll vertically to view all display information. Refer to Figure 6-22. Push the ENTER key to acknowledge and return to the last viewed page. The Receiver Status display provides the following status information:

- **Mode** — Current operating mode.
- **GPS Type** — Current GPS type (PPS, SPS, DGPS, PPS-WAGE, or None).
- **CV Loaded** — Type of loaded CV keys (None, GUV, or CV).
- **POS Error** — Current position error (based upon selected error type) or time since last position fix.
- **Function Set** — Current function set and user profile (Basic, or Adv-## where ## represents the current user profile number).
- **Alerts** — The number of active alerts or None (if no alerts are active).
- **SV Code** — Current satellite code type (default or as set by the operator, Mixed or All Y-Code).
- **Automark (Advanced)** — Current Automark mode (Disabled or Enabled). Always displays automark status when enabled. Displays automark status as disabled only when using the advanced function set.
- **Auto-On** — Current Auto-On mode (Disabled or Enabled).
- **Off Mode Display Heater** — Current Off Mode Display Heater mode (Disabled or Enabled).

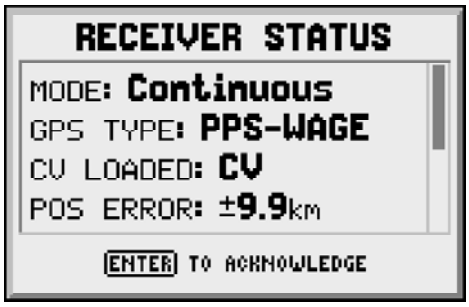

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Figure 6-22. Receiver Status

6.2.24.1. Receiver Status Menu. The Receiver Status menu provides capability to change the content of items listed in the Receiver Status display. While Receiver Status is displayed, push the MENU key to display the Receiver Status menu. While viewing the menu, highlight the desired item, then push the ENTER key. The menu provides selections corresponding to the Receiver Status information as follows:

- **Acknowledge** — Same as pushing ENTER key while Receiver Status is displayed.
- **Select Op Mode** — Provides a list editor of operation mode selections. Corresponds to Receiver Status/Mode.
- **GPS Setup** — Displays the GPS Setup page. Corresponds to Receiver Status/GPS Type.
- **Crypto Fill** — Displays the Crypto Fill page. Corresponds to Receiver Status/CV Loaded.
- **Select Function Set** — Provides a list editor to select Basic or Advanced function set. Corresponds to Receiver Status/Function Set.
- **Alerts** — Displays the Alerts page. Corresponds to Receiver Status/Alerts.
- **Automark (Advanced)** — Displays the Automark page Corresponds to Receiver Status/Automark mode.

- **Auto-On** — Displays the Auto-On page. Corresponds to Receiver Status/Auto-On mode.
- **Power Saver** — Displays the Power Saver page. Corresponds to Receiver Status/Off Mode Display Heater mode.
- **Message Help** — States the current status of the receiver is displayed.

6.3. INITIAL ADJUSTMENTS AND COMMANDED SELF-TEST.

6.3.1. Initial Adjustments.

The DAGR does not require initial adjustments, however, initial receiver setup prior to full operation may be required. Refer to Paragraph 7.4 for DAGR setup procedures. Prior to performing navigation, if changes are required, refer to the following information.

- NAV Method (refer to Paragraph 9.2.2.1)
- Basic/Advanced Function Set (refer to Paragraph 12.3)
- Units of Measure (refer to Paragraph 10.2)
- MAGVAR/North Reference (refer to Paragraph 10.2.2.12)
- Datum/Grid (refer to Paragraph 10.2.2.2)
- Calculation Type (Rhumb Line/Great Circle) (refer to Paragraph 9.2.2.13)

6.3.2. Receiver Setup.

The DAGR includes default settings (refer to Table 6-1), but various parameters may be changed to set the DAGR for individual mission requirements.

CAUTION

The DAGR can be configured to operate in the Basic function set (contains only one user profile), or the Advanced function set (contains up to ten user defined user profiles). When changing from Basic to Advanced function set, the DAGR defaults to the user profile that was last used in the advanced function set. Ensure the correct user profile is active after switching to the Advanced function set. Changing DAGR settings modifies the configuration of the current user profile being used. Changes to a particular profile that is unfamiliar to the user could possibly put the individual or mission in danger. Refer to Paragraph 12.4 for more information.

6.3.2.1. All DAGR functions or operations are included in the advanced function set. The operator may select basic or advanced operation by selecting the basic or advanced function set. The advanced function set includes all basic function operations plus additional operations. Refer to Paragraph 12.3 for information on how to select a function set. Refer to the menu tree in Figure 6-2 to view both basic and advanced function set selections (advanced selections are noted accordingly). Select the desired function set prior to performing DAGR setup.

6.3.2.2. Setting up the receiver is accomplished through selections from various menus and submenus, and then editing individual fields. Refer to the following information setting up the DAGR prior to leaving on a mission.

6.3.2.3. After the DAGR is powered on, push the MENU key twice to access the main menu. The main menu is referred to throughout this manual and is where other menus are obtained. Refer to the menu tree in Figure 6-2 for a complete listing of menu and submenu displays.

6.3.2.4. The following setup parameter references provide configuration information as required.

6.3.2.4.1. GPS Setup (refer to Paragraph 7.4)

- Operating Mode (refer to Paragraph 6.2.23) and Power-On Operating Mode (Basic)
- SV code (Basic)
- Frequency (Basic)
- Elevation Hold (Basic)
- WAGE Mode (Advanced)
- DGPS Mode (Advanced)

6.3.2.4.2. Input/Output Configuration (refer to Paragraph 11.2, Paragraph 11.3, Paragraph 11.4, and refer to Paragraph 20.3.5 for additional COM port information)

- HAVE QUICK
- COM 1/2 PPS (Basic) (AN/PSN-13)
- COM 1 PPS (Basic) (AN/PSN-13A)
- COM 2 PPS (Basic) (AN/PSN-13A)
- COM 3 PPS (Basic)
- COM 1, COM 2, COM 3 Configuration (Advanced)
- Differential Global Positioning System (DGPS) (Advanced)
- Data Transfer (Basic)

6.3.2.4.3. Navigation Configuration (refer to Paragraph 9.2)

- Methods (Basic)

6.3.2.4.4. Waypoints and Routes Configuration (refer to Paragraph 8.2, and Paragraph 8.7)

- Waypoints (Basic)
- Routes (Basic)

6.3.2.4.5. Display Configuration (refer to Paragraph 10.2, Paragraph 10.3, Paragraph 10.4, Paragraph 10.6, Paragraph 10.7)

- Internal Compass (Basic)
- Keypad/Display Lighting Intensity (Basic)
- Display Contrast (Basic)
- Auto-Off Timer (Basic)
- Datum (Basic)
- Coordinate and Grid System (Basic)
- MAGVAR Type (Basic or Advanced)
- Units of Measure (Basic)
- Grid Resolution (Basic)

6.3.2.5. While the DAGR is turned off, configuration settings are retained. However, if all power is lost or emergency zeroize is performed, settings revert to default values. Refer to the Table 6-1 for DAGR default setting values. When using the advanced function set, default settings in Table 6-1 with an asterisk before their parameter name can be customized for each of ten available user profiles (refer to Paragraph 12.4 for additional information). In the table paragraph reference column, the first digit of each paragraph reference lists the chapter number for locating the paragraph.

Table 6-1. DAGR Default Settings

Parameter	Default	Paragraph Reference
Alerts	Off	Paragraph 8.9
* Angle Units	Degrees	Paragraph 10.2.2.11
* Anti-Jam Accessory Mode	Disabled	Paragraph 7.4.2.10
* Auto-Off Mode	On	Paragraph 7.5.2.1
* Auto-Off Timer	5 Minutes	Paragraph 7.5.2.1
Auto-On Mode	Off	Paragraph 7.7.2.1
Auto-On Start Time/Date	Present Time	Paragraph 7.7.2.2
Auto-On Stop Time/Date	Disabled	Paragraph 7.7.2.3
Auto-On Time Interval	15 Minutes	Paragraph 7.7.2.4
Auto Power Transfer	Enabled	Paragraph 7.6.2.10
* Auto Standby Mode	On	Paragraph 7.5.2.2
* Auto Standby Timer	15 Minutes	Paragraph 7.5.2.2
Automark Mode (Advanced)	Off	Paragraph 7.8.2.1
Automark Number of Waypoints to Store	1000 minus starting waypoint	Paragraph 7.8.2.6
Automark Start Waypoint Number	First unused or 001 if all are used.	Paragraph 7.8.2.5
Automark Start Time/Date	Present Time	Paragraph 7.8.2.2
Automark Stop Time/Date	Disabled	Paragraph 7.8.2.3

Table 6-1. DAGR Default Settings - Continued

Parameter	Default	Paragraph Reference
Automark Time Interval	5 Minutes	Paragraph 7.8.2.4
Automark Storage Mode	No Wrap	Paragraph 7.8.2.7
Bullseye Enable	Bullseye Off	Paragraph 9.5.2.13
* Bullseye Resolution	Decimal	Paragraph 9.5.2.13
CAS 9–Line Brief Heading	Computed	Paragraph 14.3
CAS 9–Line Brief Offset	Invalid	Paragraph 14.3
CAS 9–Line Brief Distance	Computed	Paragraph 14.3
CAS 9–Line Brief Target Description	None	Paragraph 14.3
CAS 9–Line Brief Target Location and Elevation	Invalid	Paragraph 14.3
CAS 9–Line Brief Type of Mark	None	Paragraph 14.3
CAS 9–Line Brief Type of Mark Color/Code	None	Paragraph 14.3
CAS 9–Line Brief Location of Friendlies	None	Paragraph 14.3
CAS 9–Line Brief Egress	None	Paragraph 14.3
CAS 9–Line Brief Remarks	None	Paragraph 14.3
CAS 9–Line Brief Time on Target	Invalid	Paragraph 14.3
CAS 9–Line Brief Time to Target	Invalid	Paragraph 14.3
CAS 9–Line Brief Angle Units	Degrees	Paragraph 14.3
CAS 9–Line Brief Distance Units	Nautical	Paragraph 14.3
CAS 9–Line Brief North Reference	Magnetic	Paragraph 14.3
CAS 9–Line Brief Elevation Reference	MSL	Paragraph 14.3
CAS 9–Line Brief Elevation Units	English	Paragraph 14.3
CAS 9–Line Brief Time Reference	Zulu	Paragraph 14.3
* COM Port Setup / Configuration	Standard	Paragraph 11.3
* COM 1/2 PPS Mode (AN/PSN-13)	Off	Paragraph 11.4.2.1
* COM 1/2 PPS Sync (AN/PSN-13)	COM 1 and COM 2	Paragraph 11.4.2.2
* COM 1 PPS Mode (AN/PSN-13A)	Off	Paragraph 11.4.2.3
* COM 2 PPS Mode (AN/PSN-13A)	Off	Paragraph 11.4.2.4
* COM 3 PPS Mode	Off	Paragraph 11.4.2.5
COM 1/2 Redundant	Yes (COM 2 output redundant with COM 1)	Paragraph 11.3.2.3
* Coordinate and Grid System	MGRS-New	Paragraph 10.2.2.1
* Coordinate and Grid Resolution	1 Unit	Paragraph 10.2.2.2
Crypto Variables	None	Paragraph 7.2
Crypto Variable Key Loading Interface	DS-101	Paragraph 7.2.2.1
Crypto Variable Active Cryptonet Code	0001	Paragraph 7.2.2.3

Table 6-1. DAGR Default Settings - Continued

Parameter	Default	Paragraph Reference
Crypto Variable Primary Cryptonet Code	0001	Paragraph 7.2.2.4
* Datum	WGS-84	Paragraph 10.7.2.3
* DGPS Mode (Advanced)	Enabled	Paragraph 7.4.2.14
* Display Brightness and Contrast Levels	50%	Paragraph 10.4
* Elevation Hold Mode (Enabled)	Automatic	Paragraph 7.4.2.5
* Elevation Units	Meters	Paragraph 9.5.2.3
* Elevation Reference	MSL	Paragraph 9.5.2.3
* External Power Source Type	Non-Battery	Paragraph 7.6.2.9
Fire Support Position Error Format	EPE	Paragraph 14.2
* Function Keys	1. Mark 2. Fast Fix 3. Back	Paragraph 10.5
* Function Keys Show/Hide	Show	Paragraph 9.6 and Paragraph 9.7
* Function Set	Basic	Paragraph 12.3
GLS Walk Time (Advanced)	35 Seconds	Paragraph 14.5.2.1
GLS COA/GT (Advanced)	Disabled	Paragraph 14.5.2.2
GLS Angle Offset (Advanced)	Zero	Paragraph 14.5.2.3
GLS Calculation Solution	None	Paragraph 14.5
GLS Measurement (Advanced)	Forward	Paragraph 14.5.2.4
GLS Calculation Type (Advanced)	Single Receiver	Paragraph 14.5.2.6
* Ground Speed Units	Metric (Kph)	Paragraph 10.2.2.9
* HAVE QUICK Mode	Off	Paragraph 11.4.2.6
* Internal Compass	Mode — Disabled Use Below Speed — 0.56 Meters/Second Delay Time — 5 seconds	Paragraph 10.3
* LRF Type	Other	Paragraph 11.3
* MAGVAR Type	Calculated	Paragraph 9.5.2.10
* MAGVAR Units	Degrees	Paragraph 10.2.2.14
* MAGVAR Value (for Local MAGVAR Type only)	0.0 Degrees	Paragraph 9.5.2.10
Maps/Images Setup	All Enabled	Paragraph 9.7
* Mask Angle (Advanced)	5 Degrees	Paragraph 7.4.2.13
* Mask Mode (Advanced)	Disabled	Paragraph 7.4.2.12

Table 6-1. DAGR Default Settings - Continued

Parameter	Default	Paragraph Reference
* NAV Displays Page Fields / Custom	Refer to Table 9-4	Paragraph 9.4
NAV Displays Page Fields / Standard	Refer to Table 9-3	Paragraph 9.4
* Navigation Calculation Type (Advanced)	RL (Rhumb Line)	Paragraph 9.2.2.13
Navigation Displays	Standard	Paragraph 9.2.2.15
Navigation Method	Direct To	Paragraph 9.2.2.1
* NMEA Node ID (Advanced)	2	Paragraph 11.3.2.13
* North Reference	Magnetic	Paragraph 10.2.2.12
* Off Mode Display Heater	Disabled	Paragraph 7.5.2.3
Operator ID	Operator 01	Paragraph 9.5.2.12
POS Page Set (* pages 4 through 10 can be customized)	Page 1: Present Position Page 2: Situational Awareness Page 3: NAV Pointer Page 4: Image Viewer Page 5: SV Sky View	Paragraph 6.2.9
Position	Cedar Rapids, Iowa, USA	Paragraph 9.5
* Position Error Format	EHE	Paragraph 9.5.2.2
* Power-On Operating Mode	Default (DAGR control)	Paragraph 7.4.2.2
Primary Power Battery Rechargeable	No	Paragraph 7.6.2.7
Primary Power Battery Type	Alkaline	Paragraph 7.6.2.6
* RAIM Mode	Enabled	Paragraph 7.4.2.6
* Range Units	Metric	Paragraph 10.2.2.8
Routes	None	Paragraph 8.7
* Route Leg Advance Mode	Off	Paragraph 9.2.2.9

Table 6-1. DAGR Default Settings - Continued

Parameter	Default	Paragraph Reference
Situational Awareness	* Orientation — North-Up * Orientation Offset — 0 Degrees * View Alerts — Enabled Alerts * View Routes — Active Route * View Waypoints (Including Maps) — NAV Waypoint * Range Scale — 10 miles, nautical miles, or kilometers * View Track History — On * Track History Record Mode — Off * Track History Wrap Mode — Wrap * Track History Interval Type — Range * Track History Range Interval — 50 Meters * Track History Time Interval — 5 Minutes Track History Points — None Map Detail — Some Map Setup — All Enabled	Paragraph 9.6
* SV Code	All-Y	Paragraph 7.4.2.4
SV Hold	Disabled	Paragraph 7.4.2.18
SV Select	Receivers Choice	Paragraph 13.8
* Time Reference	Zulu	Paragraph 10.2.2.10
* Track SV Frequency	L1 Primary	Paragraph 7.4.2.3
User Datums	None	Paragraph 10.6
User Grids (Advanced)	None	Paragraph 10.7
User Profile (Advanced)	User Profile 1	Paragraph 12.4
* WAGE Mode (Advanced)	Enabled	Paragraph 7.4.2.16
Waypoints	None	Paragraph 8.2
* Waypoint Alert Enable	Off	Paragraph 9.2.2.4
* When using the advanced function set, this default setting can be customized for each of ten available user profiles. Refer to Paragraph 12.4 for additional information.		

6.3.3. Power-On and Commanded Self-Test.

During power-up, the DAGR performs an automatic self-test of receiver hardware (SAASM module) and does not require any input from the operator. The power-on self-test provides pass or fail status and does not show any individual fault messages. After the DAGR is powered-up, the user may also command the DAGR to perform an operator induced self-test (Test mode). The commanded self-test performs hardware checks, visual display checks, and checks external keypad controls of the DAGR (refer to Figure 6-23

through Figure 6-28). Self-test does not track SVs, determine position, or provide navigation data. Operator confirmation is required to enter the commanded self-test mode, requires operator intervention during the test, and requires approximately four minutes to complete. At the end of any self-test, a Test Summary page can be accessed from the System submenu for a listing of all tests that passed or failed. The Test Summary page menu can also be used to command a self-test. Refer to Paragraph 12.2 for additional Test Summary page information. The DAGR should not be used if a failed self-test is indicated (refer to the troubleshooting procedure in Chapter 19). Perform the following procedure to command a DAGR self-test.

a. Activate commanded DAGR self-test.

(1) From any display (except a message pop-up), push and hold the POS key. The Present Position page is displayed.

(2) From the Present Position page, push the MENU key.

(3) Highlight Select Op Mode, then push the ENTER key.

(4) Scroll to highlight Test, then push the ENTER key.

(5) The DAGR displays the message shown in Figure 6-23, prompting the operator to confirm or cancel entering test mode. Push ENTER key to confirm.

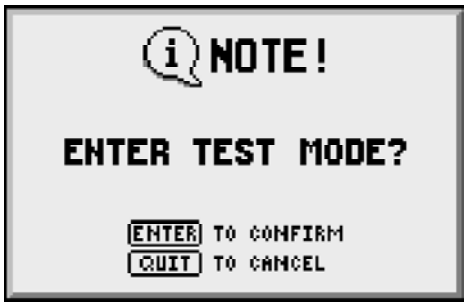

Figure 6-23. Confirmation Message

b. Test In Progress display appears as shown in Figure 6-24 with specific area of testing listed at bottom and a bar graph denoting progress. The DAGR automatically tests the following areas and progresses to the next test when finished.

- RAM
- ROM
- SAASM
- TRACK
- PPS/HQ
- LPTS
- I/O

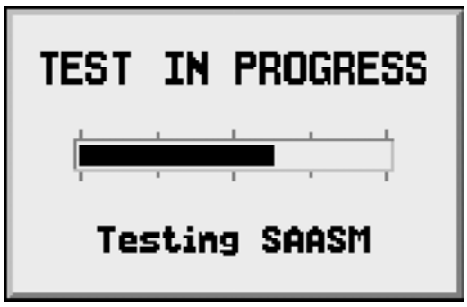

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Figure 6-24. Test In Progress

NOTE

While performing the following keypad test, push and hold the ENTER key to test the ENTER key. Push and release the ENTER key will advance to the next display.

c. After the test-in-progress tests are completed, Keypad Test is displayed as shown in Figure 6-25. Push each key on the keypad, and verify the corresponding key shown on the display toggles between normal and highlighted appearance. Push the ENTER key to continue to the next display.

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Figure 6-25. Keypad Test

d. The Display Light Test display appears, as shown in Figure 6-26, with the brightness adjustment cycling between 0% and 100%. The percentage adjustment is reflected in the light bulb of the display. Verify the display lighting by viewing the DAGR display in a dark area. Push ENTER key to continue.

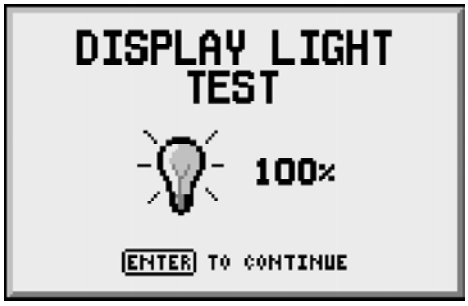

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Figure 6-26. Display Light Test

e. The Contrast Test display appears, as shown in Figure 6-27, with the contrast adjustment cycling between 0% and 100%. The percentage adjustment is reflected in the bar graph of the display. Push ENTER key to continue.

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Figure 6-27. Contrast Test

f. The Display Test Beginning message appears momentarily as shown in Figure 6-28. The display sequences through white, light gray, dark gray, and black shading. When done, the Display Test Completed message appears as shown in Figure 6-28, followed immediately by a Power-On Status display listing self-test results as Pass or Fail. The Test Summary page can be accessed from the System submenu for a listing of tests that passed or failed. Do not use the DAGR if a self-test failure occurs. Refer to Paragraph 1.12 for warranty return information.

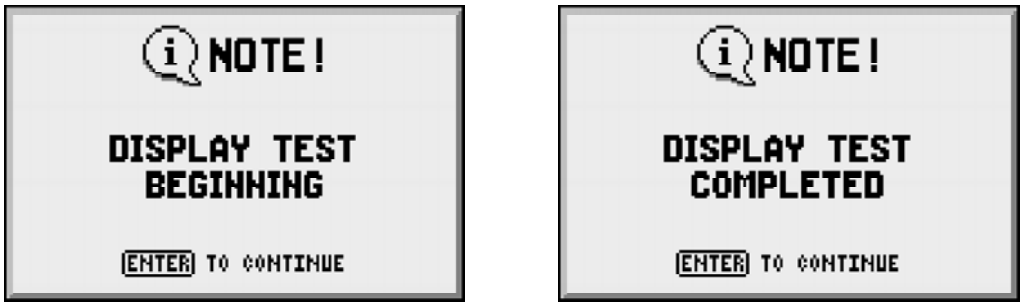

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Figure 6-28. Display Test Beginning

g. If the Power-On Status display does not time out, push the ENTER key to acknowledge. The SV Sky View page is displayed with the DAGR in Standby mode. Self-test is complete.

CHAPTER 7
OPERATOR INSTRUCTIONS — RECEIVER SETUP SUBMENU OPERATION

7.1. RECEIVER SETUP SUBMENU.

This chapter contains Receiver Setup submenu operation information. The Receiver Setup submenu page set provides the following page selections described in this chapter:

- Crypto Fill
- GPS Setup
- Power Saver
- Battery
- Auto-On
- Automark (Advanced)

NOTE

Zeroize is also described in this chapter immediately following the Crypto Fill page, but is not part of the Receiver Setup submenu.

7.2. CRYPTO FILL PAGE.

• Only DAGRs loaded with crypto variable keys should be used for combat operations. Without crypto keys, DAGR cannot compensate for selective availability (SA) errors, cannot read encrypted signals, and has no protection against spoofing. Not having crypto keys loaded could result in mission failure.

• When classified waypoints are stored in the DAGR, the DAGR is classified at the same level as the waypoints.

NOTE

Installing crypto keys does not create a classified DAGR. When classified mission data (e.g., waypoints) is stored, the DAGR is classified at the same level as the classified mission data.

7.2.1. Page Function.

The Crypto Fill page is accessed from the Receiver Setup submenu, or by using the Status key and Receiver Status menu (refer to Paragraph 6.2.24). The Crypto Fill page provides capability to view current status of crypto variable (CV) keys and load new CV keys. CV keys are loaded into the DAGR to provide the best position and time accuracy information, and also increase protection from jamming and spoofing. CV keys are loaded into the DAGR using either the crypto key loading interface or the receiver keypad. Operator entered keys are decimal CV keys (Red) or hexadecimal CV keys (Red and Black). Mission duration is entered for CV types CVw and BCVm (black CV monthly) to let the operator know if enough CVs are loaded to complete the mission. Crypto variable key loading procedures are provided after the page field descriptions. Refer to Figure 7-1 for an example of the Crypto Fill page with a loaded CVw or BCVm key. Use the Status key to check CV keys that are loaded.

7.2.1.1. The Mission Duration and Days Remaining With CVs fields do not appear when loaded with only a GUV key or not loaded with CVw or BCVm keys. Refer to Figure 7-2. The DAGR notifies the operator and requires operator confirmation when not enough CV keys are loaded for remaining days of mission duration.

7.2.1.2. At certain times, the Control Segment of the GPS system causes the satellites to transmit false data to the users called Selective Availability (SA). To compensate for this, the receiver uses crypto keys to correct the false data and provide full accurate performance. Some signals transmitted by the satellites are encrypted to deny certain users the reception of those signals called Anti-Spoofing (A-S). Loading crypto keys allows the DAGR to receive those signals.

Figure 7-1. Crypto Fill Page With CVw or BCVm Key

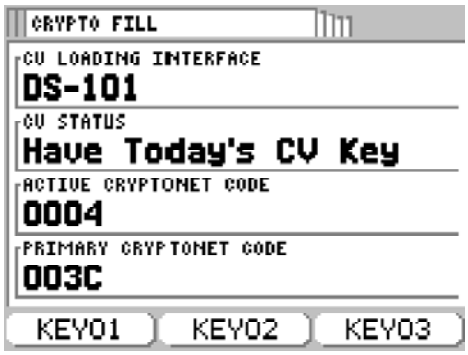


Figure 7-2. Crypto Fill Page Without CVw or BCVm Key

7.2.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 7-3. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

7.2.2.1. CV Loading Interface Field. Displays the CV loading interface as DS-101 or DS-102.

- **DS-101** — Provides CV key loading from an AN/CYZ-10 in RS-232D mode. Also used to load key data processor (KDP) initialization parameters.
- **DS-102** — Provides CV key loading from a KYK-13, KOI-18, or AN/CYZ-10 in DS-102 mode.

7.2.2.2. CV Status Field. Displays the CV status as follows:

- **No CV Keys Loaded** — Indicates no CV keys are loaded.
- **Have Today's CV Key** — Indicates the DAGR has a valid CV loaded for present day.
- **No CV Key for Today** — Indicates the DAGR has a valid CV loaded, but not for present day.

- **Waiting for SV Info** — Indicates the DAGR has a group unique variable (GUV) loaded, but has not collected SV (Satellite Vehicle) data. Leave the receiver in a tracking mode, and wait up to 15 minutes to verify the GUV has been collected.

7.2.2.3. Active Cryptonet Code Field. Displays the cryptonet code currently in use for black key processing. Field data format is XXXX, where X represents a four digit hexadecimal code. During operation, if monthly rollover is about to occur, you must have this month's BCVm and next month's BCVm loaded into the DAGR. If you are a GUV user, you don't need to load any other key into the receiver.

7.2.2.4. Primary Cryptonet Code Field. Displays the cryptonet code installed when the key data processor (KDP) was loaded. Field data format is XXXX, where X represents a four digit hexadecimal code.

7.2.2.5. Mission Duration Field. Displays the quantity of days remaining for the mission (0 to 84 days). This field does not appear when only using a GUV key, or when no CVw or BCVm keys are loaded.

7.2.2.6. Days Remaining With CVs Field. Displays the quantity of remaining days (within a range of 0 to 84 days) CV keys have been loaded into the DAGR. The first day starts with the present day. This field does not appear when only using a GUV key, or when no CVw or BCVm keys are loaded. If there are not enough CV keys loaded for the duration of the mission, DAGR notifies the operator.

7.2.3. How To Use the Crypto Fill Page.

This page contains information used to configure and set up the DAGR for loading of CV keys. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting up data and changing field information. Crypto keys are entered into the DAGR using the keypad, or through connector J1 with external equipment KYK-13, KOI-18, or AN/CYZ-10. The DAGR must be turned on and not in self-test to load crypto keys. The DAGR can be loaded with 2 GUV and 12 CVw (4 CVw equal 1 BCVm). The operator may enter decimal CV keys (Red only) or hexadecimal CV keys (Red and Black).

7.2.3.1. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Receiver Setup, then push the ENTER key.
3. Highlight Crypto Fill, then push the ENTER key. The Crypto Fill page is displayed.

a. Hexadecimal Crypto Key Entry using the Keypad
   (1) From the Crypto Fill page, with or without a field highlighted, push the MENU key.
   (2) Highlight Enter Hex CV, then push the ENTER key.
   (3) Enter eight entries of four hexadecimal characters each.
      (a) Enter four hexadecimal characters, then push the ENTER key. Repeat for the remaining seven entries.
      (b) Once you have advanced to the next entry, you cannot edit a previous entry without re-entering the entire hexadecimal crypto key.
   (4) Acknowledge any DAGR messages and observe the DAGR's CV Status field on the Crypto Fill page.

b. Decimal Crypto Key Entry using the Keypad
   (1) From the Crypto Fill page, with or without a field highlighted, push the MENU key.
   (2) Highlight Enter Decimal CV, then push the ENTER key.
   (3) Enter eight entries of five decimal characters each.
      (a) Enter five decimal characters, then push the ENTER key. Repeat for the remaining seven entries.
      (b) Once you have advanced to the next entry, you cannot edit a previous entry without re-entering the entire decimal crypto key.
   (4) Acknowledge any DAGR messages and observe the DAGR's CV Status field on the Crypto Fill page.

NOTE

GPS Black crypto keys are not interchangeable between cryptonets. Always load the Black Key Algorithm Update (BKAUPD) parameter first.

c. Crypto Key Entry using the KYK-13

(1) Connect the KYK-13 to the J1 connector on the DAGR using the crypto keyfill cable.

(2) From the Crypto Fill page, highlight the CV Loading Interface field. Push the ENTER key.

(3) Highlight DS-102, then push the ENTER key.

(4) Set the KYK-13 selector switch to the position that contains the crypto key.

(5) Set the KYK-13 mode switch to ON.

NOTE

As long as the KYK-13 switch is ON, The KYK-13 repeatedly pulses the crypto key into the DAGR. Each time the crypto key is successfully pulsed to the DAGR, the light on the KYK-13 will flash (for red key only).

(6) Set the KYK-13 mode switch to OFF after at least one KYK-13 flash has been observed (for red key only). Disconnect the KYK-13 and cable from the DAGR.

(7) Acknowledge any DAGR messages and observe the CV Status field on the Crypto Fill page.

NOTE

For each valid and complete red crypto key pulse received from the KYK-13, the DAGR will generate a successful key load message. If the DAGR receives an incomplete pulse, the DAGR generates a warning message (Invalid CV Loaded). Since the KYK-13 repeatedly pulses the crypto key to the DAGR, the user may accidentally interrupt the last crypto key pulse by setting the KYK-13 mode switch to OFF while a key is being sent. In this event, the DAGR will generate a warning message (Invalid CV Loaded) to indicate that a partial key load has been received.

d. Crypto Key Entry using the KOI-18

(1) Connect the KOI-18 to the J1 connector on the DAGR using the crypto keyfill cable.

(2) From the Crypto Fill page, highlight the CV Loading Interface field. Push the ENTER key.

(3) Highlight DS-102, then push the ENTER key.

(4) Pull the paper tape through the KOI-18.

(5) Key is automatically sent to DAGR from KOI-18.

(6) Disconnect the KOI-18 and cable from the DAGR.

(7) Acknowledge any DAGR messages and observe the DAGR's CV Status field on the Crypto Fill page.

e. Red Crypto Key Entry using the AN/CYZ-10

NOTE

The following procedure applies to red keys only.

(1) From the Crypto Fill page, highlight the CV Loading Interface field. Push the ENTER key.

(2) Highlight DS-101, then push the ENTER key.

(3) Connect the crypto keyfill cable to the J1 connector on the DAGR. **Do not** connect the crypto keyfill cable to the AN/CYZ–10 until instructed by this procedure.

NOTE

The following steps refer to the AN/CYZ-10 unless specified otherwise.

(4) Power the AN/CYZ-10 on (if not already powered on). The display shows SOI RADIO SUPERVISOR.

(5) Select RADIO from the display.

(6) Display shows SETUP COMSEC TIME. Select COMSEC from the display.

(7) Display shows VG LD RV AK MK VU. Select LD from the display.

(8) Display shows TEK KEK. Select TEK from the display.

(9) Push the PgDN or PgUP keys, as required, to view the desired key, then push the ENTR key.

NOTE

While performing the following steps, ignore all display instructions relating to an RT.

(10) Display shows QUIT (Key Name/Number) XMT. Select QUIT from the display.

(11) Display shows CONNECT ANCD TO RT (WAIT) (↓). Push the down arrow key (↓).

(12) Display shows PRESS (LOAD) ON RT. Connect the crypto keyfill cable to the AN/CYZ-10. The crypto key is automatically loaded into the DAGR.

(13) Acknowledge any DAGR messages and observe the CV Status field on the Crypto Fill page.

(14) After the key is loaded, disconnect the crypto keyfill cable from the AN/CYZ-10 and the DAGR.

f. Black Crypto Key Entry using the AN/CYZ-10

NOTE

The following procedures apply to black keys only.

(1) Load black crypto key from the KOI-18 into the AN/CYZ-10.

(a) Set AN/CYZ-10 parameters.

1 Connect the AN/CYZ-10 fill cable (part number 02227–0111490 or 0N512424) to the AN/CYZ-10.

2 Power the AN/CYZ-10 on.

3 From the main menu, select APPL, then push the ENTR key.

4 Select the appropriate software version (i.e., version F4.09), then push the ENTR key.

5 Display shows LOADING APPLICATION.

NOTE

If the display shows AUDIT TRAIL IS FULL, push the CLR key, then notify your supervisor of this display after DAGR key loading has been completed.

6 Select UTILITY, then push the ENTR key.

7 Select SETUP, then push the ENTR key.

8 Select PROTOCOL, then push the ENTR key.

9 Select CFD, then push the ENTR key.

10 The fill devices menu is displayed.

11 Select the fill device (i.e., K18), then push the ENTR key.

12 The setup menu is displayed.

13 Push the ABORT key.
14 The main menu is displayed.
15 Select RECV, then push the ENTR key.
16 The connect to station message is displayed.

(b) Load black key algorithm update parameters (BKAUPD) tape into the KOI-18.

NOTE

The following steps refer to the AN/CYZ-10 unless specified otherwise.

1 Connect the AN/CYZ-10 cable to the KOI-18.
2 Put the BKAUPD parameters tape into the KOI-18 (i.e., USKAT 103040).
3 Push the RECV key.
4 LOAD IN PROCESS is displayed.
5 Pull the tape through the KOI-18.
6 DATA RECEIVED is displayed.
7 Push the RECV key.
8 LOAD IN PROCESS is displayed.
9 Pull the tape through the KOI-18 again.
10 ENTER TEXT ID is displayed.
11 Enter the text ID (name) for the key, then push the ENTR key.
12 ENTER SHORT TITLE is displayed.
13 Enter the short title for the key (printed on the key tape).
14 ENTER SEGMENT NUMBER is displayed.
15 Enter the segment number from 1 to 15 (printed on the key tape).
16 ENTER REG NUMBER is displayed.
17 Enter the reg number (printed on the key tape).
18 SELECT CLASSIFICATION is displayed.
19 From the menu, select the classification (i.e., UNCLAS).

(c) Load crypto key variables tape into the KOI-18.

NOTE

The following steps refer to the AN/CYZ-10 unless specified otherwise.

1 Put the crypto key variables tape into the KOI-18.
2 Push the RECV key.
3 LOAD IN PROCESS is displayed.
4 Pull the tape through the KOI-18.
5 DATA RECEIVED is displayed.
6 Push the RECV key.
7 LOAD IN PROCESS is displayed.
8 Pull the tape through the KOI-18 again.

9 ENTER TEXT ID is displayed.

10 Enter a text ID (name) for the key, then push the ENTR key.

11 ENTER SHORT TITLE is displayed.

12 Enter the short title for the key (printed on the key tape).

13 ENTER SEGMENT NUMBER is displayed.

14 Enter the segment number from 1 to 3 (printed on the key tape).

15 ENTER REG NUMBER is displayed.

16 Enter the reg number (printed on the key tape).

17 SELECT CLASSIFICATION is displayed.

18 From the menu, select the classification (i.e., UNCLAS).

(2) Load black crypto key from the AN/CYZ-10 into the DAGR.

NOTE

Procedures for operating the AN/CYZ-10 are written for software application F4.09. Later versions of the application can be used and operate in a similar manner. When in doubt about the application version or operation of the AN/CYZ-10, contact the COMSEC custodian.

(a) Set up the DAGR.

1 Push the PWR key to power the DAGR on, then acknowledge any startup messages as required.

2 Push the MENU key twice to display the main menu.

3 From the main menu, highlight Communications. Push the ENTER key.

4 Highlight Crypto Fill, then push the ENTER key.

5 If the CV Loading Interface field displays DS-101 proceed to step 8. If the field displays DS-102, continue with next step.

6 Push the ENTER twice to display the CV Interface field editor.

7 Highlight DS-101, then push the ENTER key.

8 Connect the crypto keyfill cable to the J1 connector on the DAGR. **Do not** connect the crypto keyfill cable to the AN/CYZ–10 until instructed by these procedures.

(b) Set up the AN/CYZ-10.

1 Push the ON/OFF key to power the AN/CYZ-10 on. Wait for the self-test to be completed.

2 Connect the crypto keyfill cable to the AN/CYZ-10.

3 Use the arrow (→) key to select the latest version of the software application.

NOTE

The configuration of the AN/CYZ-10 can vary depending upon the software application loaded. The application may automatically load upon completion of the AN/CYZ-10 self-test. When uncertain about the operation of the AN/CYZ-10, contact the COMSEC custodian.

4 Select APPL, then push the ENTR key. Wait for the software application to load.

5 Select the appropriate software version, then push the ENTR key.

6 LOADING APPLICATION is displayed.

NOTE

If the display shows AUDIT TRAIL IS FULL, push the CLR key, then notify your supervisor of this display after DAGR key loading has been completed.

7 If LMD is shown in the upper right corner of the display, proceed to step 15. If LMD is not displayed, continue with the next step.

8 Use the arrow (→) key to select UTILITY.

9 Push the ENTR key.

10 Push the ENTR key again to display SETUP.

11 Push the ENTR key again to display PROTOCOL.

12 Use the arrow (→) key to highlight LMD, then push the ENTR key.

13 Push the ABORT key. The display has LMD in the upper right corner.

14 Push the ENTR key for XMIT.

15 Push the ENTR key to select FILL.

(c) Load the BKAUPD parameters key into the DAGR.

NOTE

The following steps refer to the AN/CYZ-10 unless specified otherwise.

1 Push the PgUP or PgDN key to select the BKAUPD parameters key (key name).

NOTE

The key name given may vary depending upon the name assigned when the key was loaded. When in doubt of which key to use, contact the COMSEC officer. The first key selected must be the BKAUPD parameters key (i.e., USKAT 103001).

2 Push the ENTR key. XMT is shown at the lower right corner of the display.

3 Use the arrow (→) key to highlight sEnd.

4 Push the ENTR key or push the SEND key.

5 Push the ENTR key for DIRECT.

6 Push the SEND key or push the ENTR key.

7 The keys being transferred are displayed and the message: 1 MSGS TRANSMITTED.

8 After the BKAUPD parameters key is loaded, use the arrow (→) key to select NEW.

9 Push the ENTR key.

(d) Load the crypto key into the DAGR.

NOTE

The following steps refer to the AN/CYZ-10 unless specified otherwise.

1 Push the PgUP or PgDN keys to select the crypto variables key.

2 Push the ENTR key. XMT is shown at the lower right corner of the display.

3 Use the arrow (→) key to highlight sEnd.

4 Push the ENTR key or push the SEND key.

5 Push the ENTR key for DIRECT.

6 Push the SEND key or push the ENTR key.

7 The keys being transferred are displayed and the message: 1 MSGS TRANSMITTED.

NOTE

• For each valid and completed black crypto key pulse received from the AN/CYZ-10, the DAGR will generate a successful key load message. If the DAGR displays the warning message INVALID CV LOADED, push the ENTER key of the DAGR. The DAGR should then display VALID CV LOADED.

• The BKAUPD parameters and crypto variables are now loaded into the DAGR and they provide mission coverage for less than 28 days. If additional mission coverage is needed, you can load ANOTHER crypto variables segment.

8 When all loading is completed, disconnect the crypto keyfill cable from the AN/CYZ-10 and the DAGR.

9 To power the AN/CYZ-10 off, push the ON/OFF key.

10 To power the DAGR off, push the PWR key.

7.2.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 7-3 shows the keystroke map for the Crypto Fill page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Crypto Fill page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Receiver Setup submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

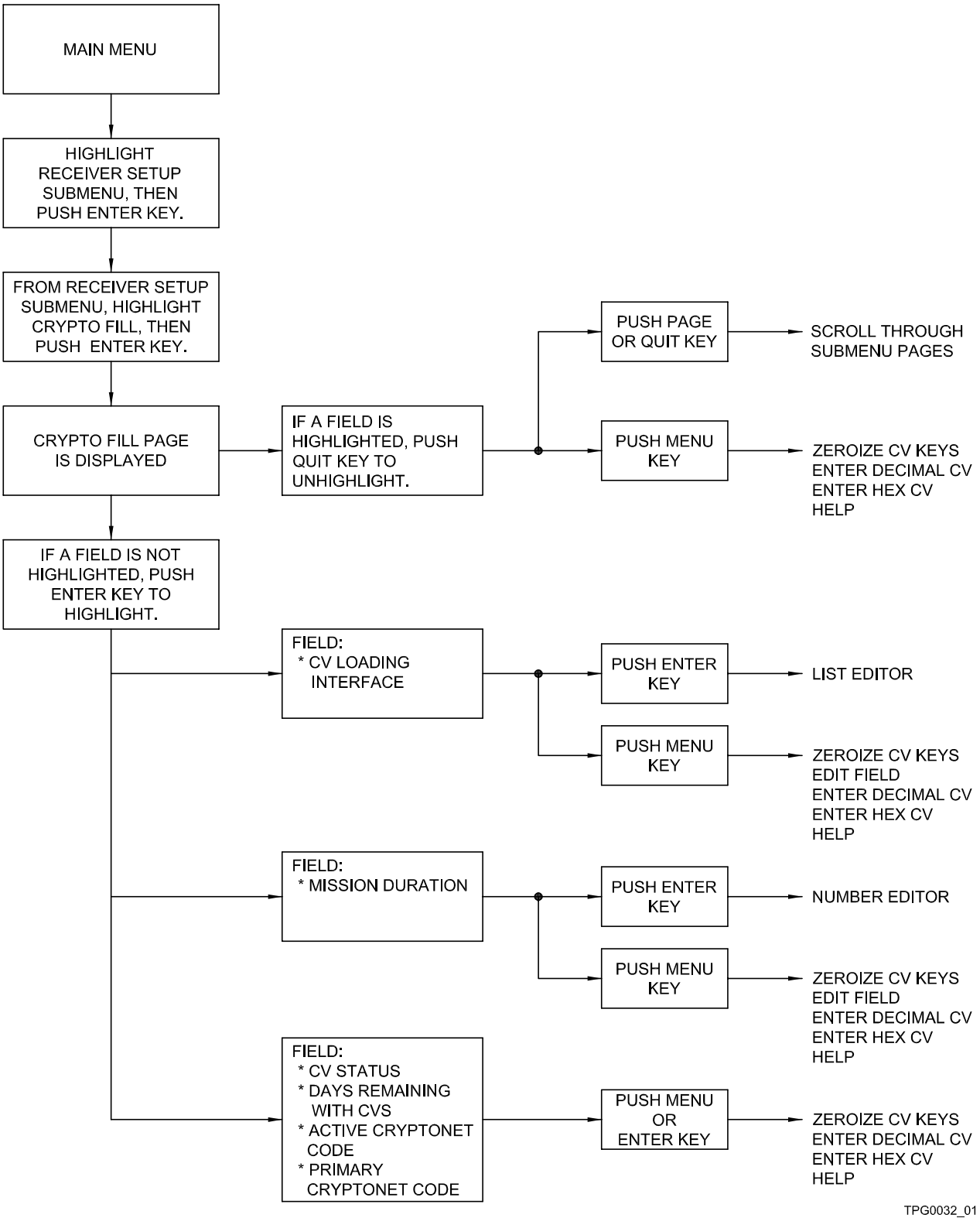


Figure 7-3. Crypto Fill Page Keystroke Map

7.3. ZEROIZE.

7.3.1. Emergency Zeroize.

Emergency zeroize is used to clear data and CV keys.

CAUTION

- The emergency zeroize function is used in emergencies to protect mission sensitive data. Emergency zeroize destroys mission critical data, maps/images, and CV keys entered into or collected by the DAGR. Failure to emergency zeroize could compromise a mission.
- Maps and images may require approximately one minute to ninety minutes to zeroize (as determined by the amount of data).

7.3.1.1. The emergency zeroize function is not accessed from a submenu, and is not directly associated with a submenu or display page. The emergency zeroize function is initiated by simultaneously pushing the QUIT and PAGE keys. Emergency zeroize clears data, maps/images, and CV keys that have been entered into or collected by the DAGR, and defaults to the basic function set with the values defined in Table 6-1. After initiating the emergency zeroize function, the activate emergency zeroize message appears as shown in Figure 7-4. The operator provides confirmation before the emergency zeroize function is performed. All maps and images loaded into the DAGR are zeroized after all other data has been zeroized. Pushing the ENTER key destroys all entered or collected data and CV keys. Pushing the QUIT key cancels the emergency zeroize operation.

TPG0404_01

Figure 7-4. Emergency Zeroize Message

7.3.2. CV Key Zeroize.

CV key zeroize is used to clear CV keys only.

CAUTION

CV key zeroize destroys CV key data entered into the DAGR. Failure to CV key zeroize could compromise a mission.

7.3.2.1. The CV key zeroize function is associated with the Crypto Fill page. The CV key zeroize function is initiated by pushing the MENU key after accessing the Crypto Fill page. CV key zeroize clears only CV keys and mission duration that have been entered into or collected by the DAGR; and keeps other mission critical data (e.g. waypoints). After initiating the CV key zeroize function, the activate CV zeroize message appears as shown in Figure 7-5. The operator provides confirmation before the CV key zeroize function is performed. Pushing the ENTER key destroys CV keys. Pushing the QUIT key cancels the CV key zeroize operation.

Figure 7-5. CV Key Zeroize Message

7.3.3. How To Use The Zeroize Function.

The emergency zeroize function is used in, but not limited to, emergency situations. Emergency zeroize provides a quick way to delete mission critical data and protect sensitive information. The CV key zeroize function is used under more normal conditions to revise CV key information. Refer to the keystroke map when doing the following procedure.

a. Emergency Zeroize

(1) From any display, push the QUIT and PAGE keys simultaneously.

(2) The Activate Emergency Zeroize message is displayed.

(3) Push the ENTER key to confirm and perform the emergency zeroize function.

NOTE

• If the QUIT key is pushed to cancel the emergency zeroize function, the display returns to the last page viewed.

• After the maps/images zeroize has started, DAGR displays an in progress message that states no DAGR functions are available until the zeroize function has been completed.

(4) Push the ENTER key to acknowledge the emergency zeroize passed message. The SV (Satellite Vehicle) Sky View page is displayed.

b. CV Key Zeroize

(1) From any display, push and hold the POS key, the Present Position page is displayed.

(2) Push the MENU key twice to access the main menu.

(3) Highlight Receiver Setup, then push the ENTER key.

(4) Highlight Crypto Fill, then push the ENTER key.

(5) From the Crypto Fill page, with or without a field highlighted, push the MENU key.

(6) Highlight Zeroize CV Keys, then push the ENTER key.

(7) The Activate CV Zeroize message is displayed.

(8) Push the ENTER key to confirm and perform the CV key zeroize function.

NOTE

If the QUIT key is pushed to cancel the CV key zeroize function, the display returns Crypto Fill page.

(9) Push the ENTER key to acknowledge the CV key zeroize passed message. The display returns to the Crypto Fill page.

7.3.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 7-6 shows the keystroke map for the Zeroize function. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The zeroize keystroke map is divided two sections: one for emergency zeroize and one for CV key zeroize.

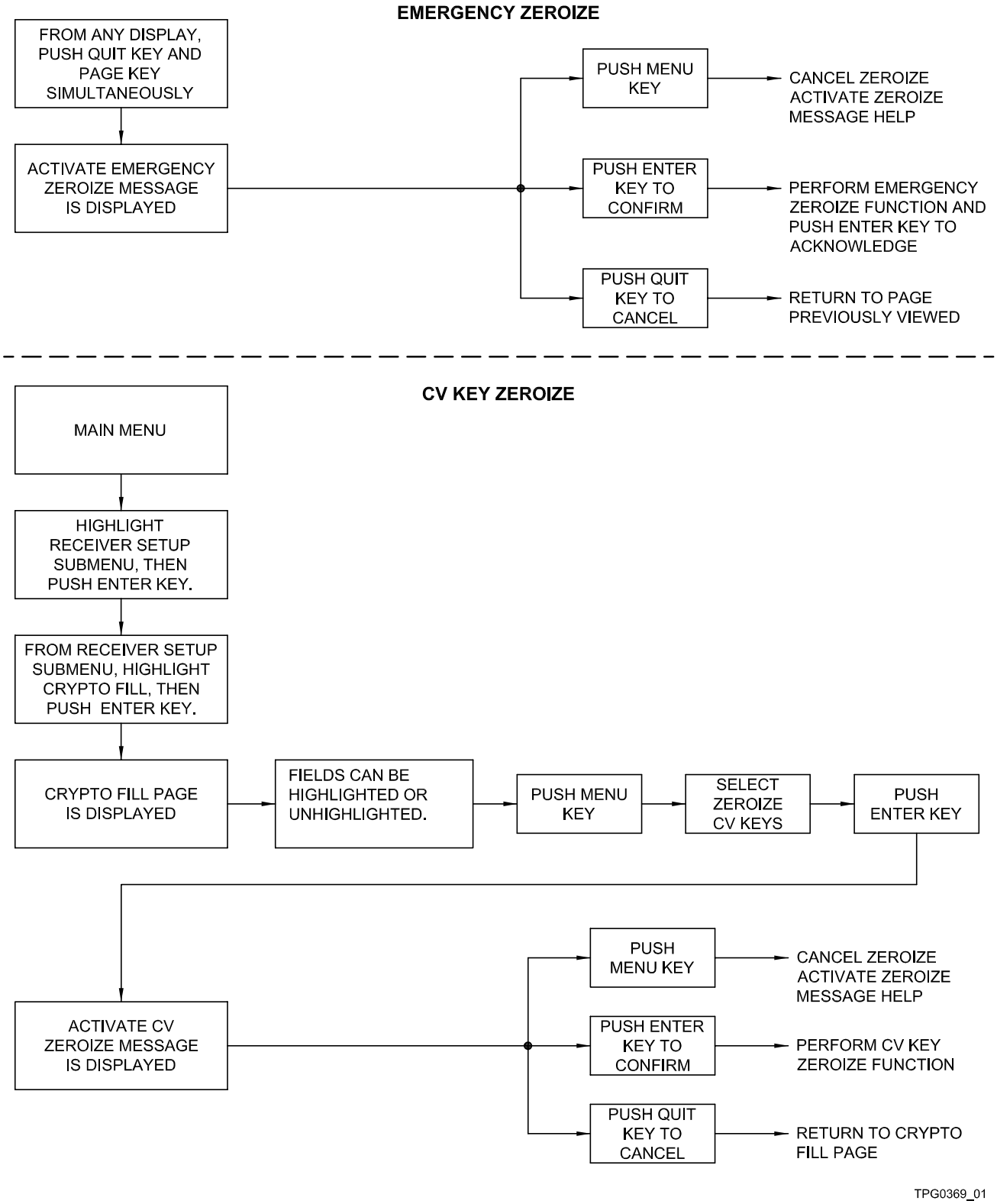


Figure 7-6. Zeroize Keystroke Map

7.4. GPS SETUP PAGE.

7.4.1. Page Function.

The GPS Setup page is accessed from the Receiver Setup submenu, or by using the Status key and Receiver Status menu (refer to Paragraph 6.2.24). The GPS Setup page is used to set the operating mode (operating mode is also changed using the Present Position page menu, SV Sky View page menu; or by using the Status key and Receiver Status menu), view status (also viewed by using the Status key and Receiver Status menu), and configure DAGR features for greatest position accuracy. Figure 7-7 shows the GPS Setup page using the basic function set. Figure 7-8 shows the GPS Setup page using the advanced function set. Page field information includes the following:

- Operating Mode
- Power-On Operating Mode
- Frequency
- SV Code
- Elevation Hold
- Receiver Autonomous Integrity Monitor (RAIM) Mode and Status
- Rehearsal Route and Ground Speed
- Anti-Jam Accessory Mode and Status
- Differential Global Position System (DGPS) Mode and Status (Advanced)
- Wide Area GPS Enhancements (WAGE) Mode and Status (Advanced)
- Mask Mode and Angle (Advanced)
- SV Hold (Advanced)

NOTE

When connected to the DAGR, the Anti-Jam Accessory (AJA) is enabled or disabled by the operator using the Anti-Jam Accessory Mode field. When AJA is enabled and jamming is detected by the DAGR, the AJA provides DAGR increased anti-jam capability. AJA status is provided by the Anti-Jam Accessory Status field.

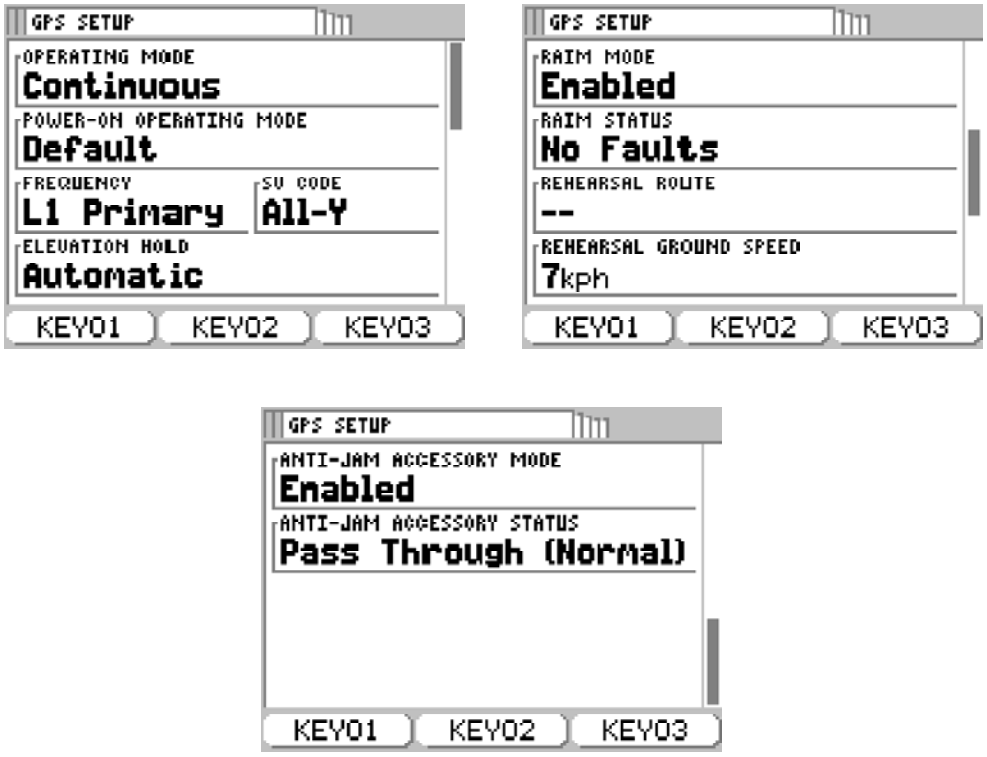


Figure 7-7. GPS Setup Page (Basic)

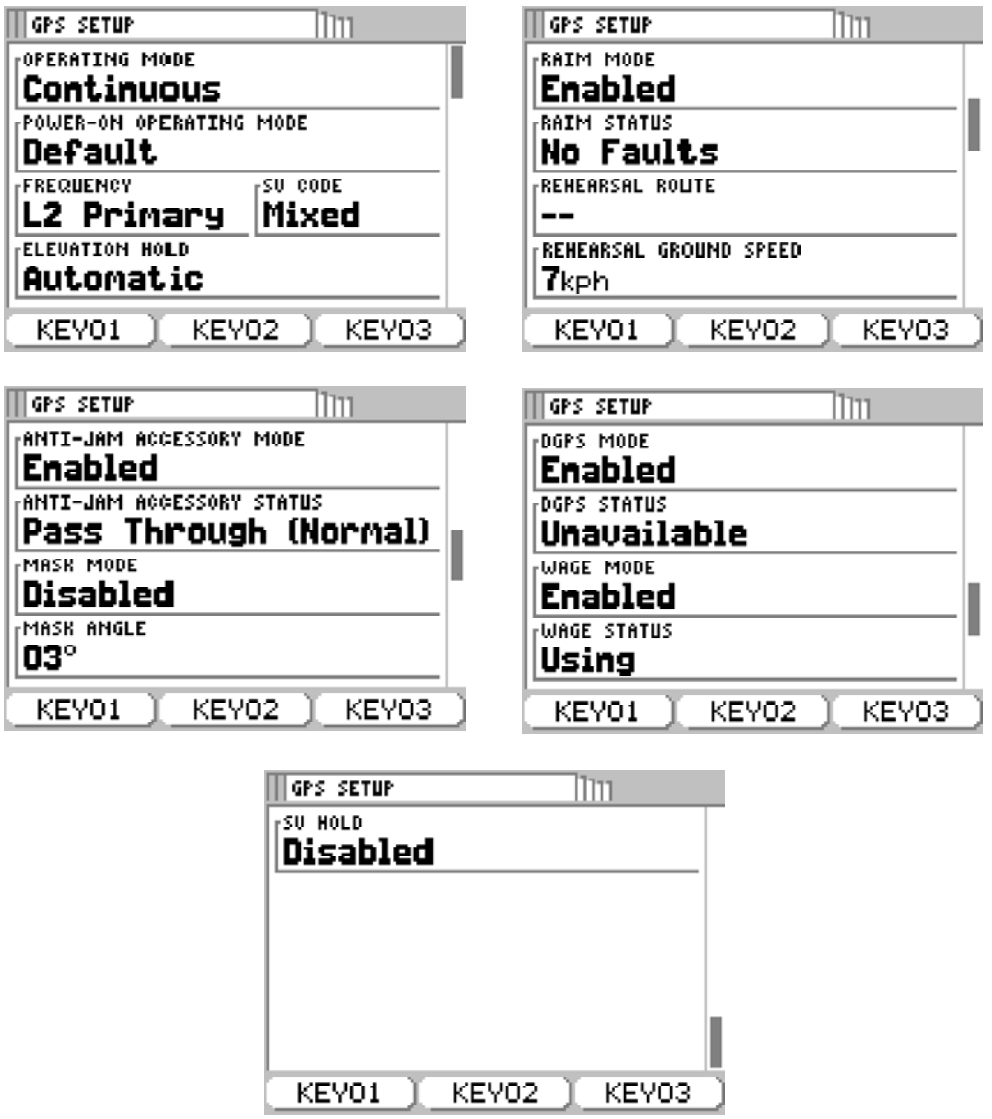


Figure 7-8. GPS Setup Page (Advanced)

7.4.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 7-9. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

7.4.2.1. Operating Mode Field. This field is only applicable after power has been applied, and displays the current DAGR operating mode. The operating mode can be changed by the user after DAGR has been powered-up. Refer to Paragraph 6.2.23 for detailed information on operating modes. Operating mode selections are as follows:

- **Continuous** — Tracks satellites to produce a continuous PVT (position, velocity (ground speed), and time) solution.
- **Fix** — Tracks satellites to produce a single PVT solution.
- **Average** — Tracks satellites to produce an averaged PVT solution. DAGR must remain stationary.
- **Time Only** — Tracks satellites to produce a time only solution.

- **Standby** — Does not track satellites, but performs functions not requiring satellites.
- **Rehearsal** — Does not track satellites, but uses operator entered information to display a simulated scenario. This mode is disabled if the rehearsal route is invalid or does not have legs.
- **Test** — Does not track satellites, but performs internal fault testing.
- **Off** — Commands the DAGR to turn off.

7.4.2.2. Power-On Operating Mode Field. This field is only applicable during power-on, and displays how DAGR selects an operating mode during that time. After power has been applied, the operating mode can be changed using the operating mode field. Refer to Paragraph 6.2.23 for detailed information on operating modes. Power-on display selections are as follows:

- **Default** — The DAGR determines the operating mode based upon the source of DAGR power. When external (unlimited power source) power is used, Continuous operating mode is used. When battery power is used, Fix operating mode is used. Standby operating mode is used if self-test failures occur during power-on.
- **Continuous** — Tracks satellites to produce a continuous PVT solution.
- **Standby** — Does not track satellites, but performs functions not requiring satellites.
- **Fix** — Tracks satellites to produce a single PVT solution.
- **Average** — Tracks satellites to produce an averaged PVT solution. DAGR must remain stationary (two to four hours).
- **Time Only** — Tracks satellites to produce a time only solution.

7.4.2.3. Frequency Field. Displays one of three frequency selections as follows:

- **L1 Primary** — Tracks satellites on L1. Performs atmospheric corrections on L2. When jammed on L1, uses L2.
- **L2 Primary** — Tracks satellites on L2. Performs atmospheric corrections on L1. When jammed on L2, uses L1.
- **L1 Only** — Only tracks satellites on L1. Used with an L1 only antenna.

7.4.2.4. SV Code Field. The Status key can be used to check the status of this field (refer to Paragraph 6.2.24). Displays one of two selections as follows:

- **All-Y** — Restricts the DAGR to only use satellites indicating they are transmitting Y code signals. The receiver tracks a Y-code if fully authorized, or tracks C/A if not fully authorized.
- **Mixed** — Allows the DAGR to only use satellites indicating they are transmitting C/A, P, and Y-code signals. Mixed is used when an insufficient Y-code message is received.

NOTE

Mixed SV code is susceptible to spoofing signals. When crypto keys are loaded, All-Y SV code is not susceptible to spoofing signals (refer to Paragraph 15.3.1 for additional information on spoofing).

7.4.2.5. Elevation Hold Field. Elevation hold is used to improve position accuracy when less than four satellites are available or when poor satellite geometry exists. Vertical movement must be avoided when elevation hold is in use. Refer to Paragraph 9.5.2.3.1 for additional information. The field displays one of the following selections:

- **Automatic** — Selected to have the DAGR automatically use the last known elevation. DAGR uses this setting unless changed by the operator.
- **Manual** — Selected to prevent automatic elevation hold. DAGR prompts the operator to enter an elevation more accurate than the last known elevation.

7.4.2.6. RAIM Mode Field. Displays receiver autonomous integrity monitor (RAIM) mode as enabled or disabled. RAIM is enabled for the receiver to detect faulty SV measurements and exclude them from the position solution.

7.4.2.7. RAIM Status Field.

CAUTION

When the RAIM Status field displays Faults Found, the position solution may be degraded.

This field cannot be edited by the operator. Displays the status of RAIM as:

- **Unavailable** — RAIM is disabled or has not yet reached full capacity to detect the presence of faulty satellite signals. Detection of faulty satellite signals requires a DAGR position fix acquired using at least five satellites with good satellite dilution of precision (DOP) geometry (position of satellites in the sky).
- **No Faults** — RAIM detection is enabled, fully available, and no faults are detected. No faults are detected when a position fix is acquired using consistent signals from five or more satellites. While this status is present, the position fix solution will be no further in error than 200 meters.
- **Faults Found** — RAIM has detected a faulty satellite signal used in computing the position fix, but cannot exclude it from the position solution computation. Before a faulty satellite signal can be excluded from the position solution computation, the DAGR must have a position fix acquired using at least six satellites with good satellite DOP geometry. While this field status is present, the position solution may be degraded.

7.4.2.8. Rehearsal Route Field. Displays the current rehearsal route name. The desired route for a rehearsal scenario is selectable. After the rehearsal route and initial ground speed are selected, the operating mode is changed to Rehearsal to begin the scenario. Refer to Paragraph 6.2.23 for information on Rehearsal mode. Field data format is ##-NNNNNNNNNN, where # represents the route number and N represents the route name.

7.4.2.9. Rehearsal Ground Speed Field. Displays current rehearsal ground speed (in units) indicating how fast the rehearsal scenario will execute. Rehearsal ground speed can be initialized before starting the scenario or changed while running the scenario. Select the appropriate ground speed units before setting rehearsal ground speed. Refer to Paragraph 10.2 for information on selecting speed units. Field data format is XXX, where X represents miles per hour, knots, or kilometers per hour.

7.4.2.10. Anti-Jam Accessory Mode Field. Displays anti-jam accessory (AJA) mode as Disabled or Enabled. When enabled, the anti-jamming capabilities of the AJA can be used.

7.4.2.11. Anti-Jam Accessory Status Field. Displays the current status of the AJA as follows:

- **Not Connected** — Displays when the AJA is not functional due to no connection to DAGR, faulty connection, power problem, or DAGR COM Port 3 set to other than standard configuration settings.
- **Off** — Displays when DAGR is set to a non-tracking operating mode.
- **Pass Through (Normal)** — Displays when the AJA is connected but disabled or when the AJA is enabled while operating in a low jamming or non-jamming environment.
- **Nulling** — Displays when AJA is enabled while operating in a jamming environment.
- **Test in Progress** — Displays during an AJA self-test.
- **Self Test Failed** — Displays if the AJA fails self-test.

7.4.2.12. Mask Mode Field (Advanced). Displays Mask Mode as Enabled or Disabled. When Mask Mode is enabled, the DAGR disregards satellites below the mask angle specified in the Mask Angle field. When Mask Mode is disabled, the DAGR disregards satellites below a 5 degree (default) mask angle.

7.4.2.13. Mask Angle Field (Advanced). Displays the selected mask angle specifying the minimum angle for usable satellites, positive up. Field data format is +/- XX, where X represents degrees.

7.4.2.14. DGPS Mode Field (Advanced). Displays the differential global positioning system (DGPS) mode as Enabled or Disabled. DGPS mode is enabled to use DGPS corrections received over the data interface (if available) to improve position accuracy. The data interface must be set up before differential corrections can be used. Refer to Paragraph 11.3 for data interface information.

7.4.2.15. DGPS Status Field (Advanced). Displays a status of whether the DAGR is using differential information in the GPS solution. Status displays are:

- **Unavailable** — The DAGR is not receiving DGPS inputs.
- **Receiving** — The DAGR is receiving DGPS inputs but is not yet incorporating them into a position solution.
- **Using** — The DAGR is receiving and using DGPS inputs in the position solution.

7.4.2.16. WAGE Mode Field (Advanced). Displays the wide area GPS enhancements (WAGE) mode as Enabled or Disabled. WAGE is enabled to use corrections from the SVs to improve position accuracy. WAGE corrections are available only to authorized users. If both WAGE and DGPS are enabled, and DGPS corrections are being used, WAGE data is not used.

7.4.2.17. WAGE Status Field (Advanced). Displays the WAGE status as Not Using or Using. When status is displayed as Not Using, WAGE corrections are not included in the position solution. When status is displayed as Using, WAGE corrections have been collected and are included in the position solution.

7.4.2.18. SV Hold (Advanced). Displays satellite hold as Enabled or Disabled. When enabled, the DAGR continues to track only those satellites currently being tracked.

7.4.3. How To Use The GPS Setup Page.

The GPS Setup page contains information used to configure and set up the DAGR, plus the option of activating the rehearsal mode of operation. The page includes a pause scenario selection that pauses the rehearsal mode, and also a resume scenario selection (also available on the Present Position page). Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting up data and changing field information.

7.4.3.1. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Receiver Setup, then push the ENTER key.
3. Highlight GPS Setup, then push the ENTER key. The GPS Setup page is displayed.

a. Set Up the GPS Setup page

(1) From the GPS Setup page, push the ENTER key to highlight a field.

(2) Use the cursor control keys to highlight the desired field, then perform one of the following:

(a) To edit field text or numeric content, push the ENTER key. For some fields, field content is chosen from a list and pushing the ENTER key displays the list editor.

(b) To access the field menu list, push the MENU key. Scroll to the desired menu item (e.g., Edit Field), then push the ENTER key.

(3) For list editors, scroll to the desired field content, then push the ENTER key. For text or numeric editors, follow editing procedures found in Paragraph 6.2.19. Refer to Paragraph 6.2.17 through Paragraph 6.2.21 for more editing information.

(4) Display returns to the GPS Setup page with change made to field content.

b. Rehearsal Mode of Operation

NOTE

Before using the Rehearsal mode of operation, a rehearsal route must be defined. Multiple rehearsal routes can be defined. If no rehearsal route is defined, enter waypoints and arrange into a route using normal route creating procedures. The Situational Awareness page is used in the following procedure to view Rehearsal mode of operation. The Situational Awareness page must be set up to provide a desired view of waypoints and/or routes (refer to Paragraph 9.6). Viewing an operator selected route or waypoint requires the Sit (Situational) Awareness field of their related Route/Waypoint Editor page be set to YES (refer to Paragraph 8.3.2.13 and Paragraph 8.8.2.3).

(1) From the GPS Setup page, highlight the Rehearsal Route field, then push the ENTER key.

(2) Highlight the desired rehearsal route to be used, then push the ENTER key.

(3) Highlight the Rehearsal Ground Speed field, then push the ENTER key.

(4) Enter the desired speed to execute the rehearsal mode, then push the ENTER key.

(5) Highlight the Operating Mode field, then push the ENTER key.

(6) Highlight Rehearsal, then push the ENTER key.

(7) To view the rehearsal route from the Situational Awareness page, push and hold the POS key until the Present Position page is displayed. Push the PAGE key to view the Situational Awareness page.

(8) From the Situational Awareness page, set the display view as desired (e.g. set view/routes to operator-selected and view/waypoints to operator-selected). Refer to Paragraph 9.6 for additional Situational Awareness page information.

(9) Rehearsal mode of operation is in progress and is displayed showing the selected view of the Situational Awareness page. The operation begins at the first route leg (at the speed selected) and continues until the end of the rehearsal route is reached or the mode is interrupted by the operator. When the end of the rehearsal route is reached, the DAGR switches to Standby operating mode.

NOTE

• If no route or waypoints appear on the display, adjust the range parameter (lower right corner of display) by using the zoom IN and OUT keys. The operator can zoom in or out on a scale of 50 feet to 800 miles, 50 yards to 800 nautical miles, or 50 meters to 800 kilometers (English, nautical, or metric units).

• Ensure any operator selected rehearsal route and associated waypoints are set to YES in the Sit (Situational) Awareness field (of their route or waypoint editor page). If display is not moving, ensure the mode of operation is set to Rehearsal. Push the MENU key to modify the Situational Awareness page view as desired. The rehearsal speed can be changed (from the GPS Setup page) while Rehearsal mode of operation is in progress.

(10) Rehearsal mode can be interrupted by using the Pause Scenario menu selection from the GPS Setup page or the Present Position page. This stops the display scenario in time, then can be continued by using the Continue Scenario selection from the GPS Setup page. If power is removed from the DAGR while in the Rehearsal mode, the DAGR defaults to normal operation after being powered back on and acquires satellites.

(11) To leave the Rehearsal mode of operation, change the operating mode to desired selection using menu selection from the Present Position page.

c. Pause Scenario

NOTE

Rehearsal mode must be in progress before Pause Scenario can be enabled.

(1) From the GPS Setup or Present Position page, without a field highlighted, push the MENU key.

(2) Highlight Pause Scenario, then push the ENTER key. Rehearsal mode is stopped in time.

(3) To continue Rehearsal mode, push the MENU key again. Highlight Continue Scenario, then push the ENTER key.

(4) Rehearsal mode resumes unless DAGR has automatically transitioned (timed out) to another operating mode. If that occurs, access the GPS Setup page and reselect Rehearsal mode.

d. Anti-Jam Accessory

NOTE

• When using the anti-jam accessory, the AJA unit provides the antenna. The AJA unit must be mounted face up with the round antennas having a clear view of the sky.

• An AJA self-test cannot be performed if the Anti-Jam Accessory Status field displays Not Connected. The Anti-Jam Accessory Mode field setting (Disabled or Enabled) does not affect the AJA self-test.

(1) Equipment Connection (refer to Figure 20-1 for a system interconnect diagram).

(a) Connect J4 of the DAGR to the power source cable, then connect power source cable to external power source (black to negative and red to positive). (Internal primary battery power can also be used.)

(b) Connect J3 of the DAGR to the RA-1 antenna cable, then connect antenna cable to J2 of the anti-jam accessory.

(c) Connect the round plug (P2) of the AJA cable to J1 of the anti-jam accessory.

(d) Connect the rectangular plug (P1) of the AJA cable to J1 of the DAGR.

(e) Connect the two electrical connectors of the AJA cable (black to negative and red to positive battery terminals) to the external DC power source (+12 or +24 VDC).

(2) Anti-Jam Accessory Self-Test

(a) From the GPS Setup page, highlight the Anti-Jam Accessory Status field. Push the MENU key.

(b) Highlight Start AJA Test, then push the ENTER key.

(c) During the AJA self-test, the Anti-Jam Accessory Status field displays Test In Progress.

(d) AJA self-test is completed and status displayed.

1 With AJA self-test passed, the Anti-Jam Accessory Status field returns to status displayed prior to the AJA self-test.

2 With AJA self-test failed, the Anti-Jam Accessory Status field displays Self Test Failed.

7.4.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 7-9 shows the keystroke map for the GPS Setup page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the GPS Setup page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Receiver Setup submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

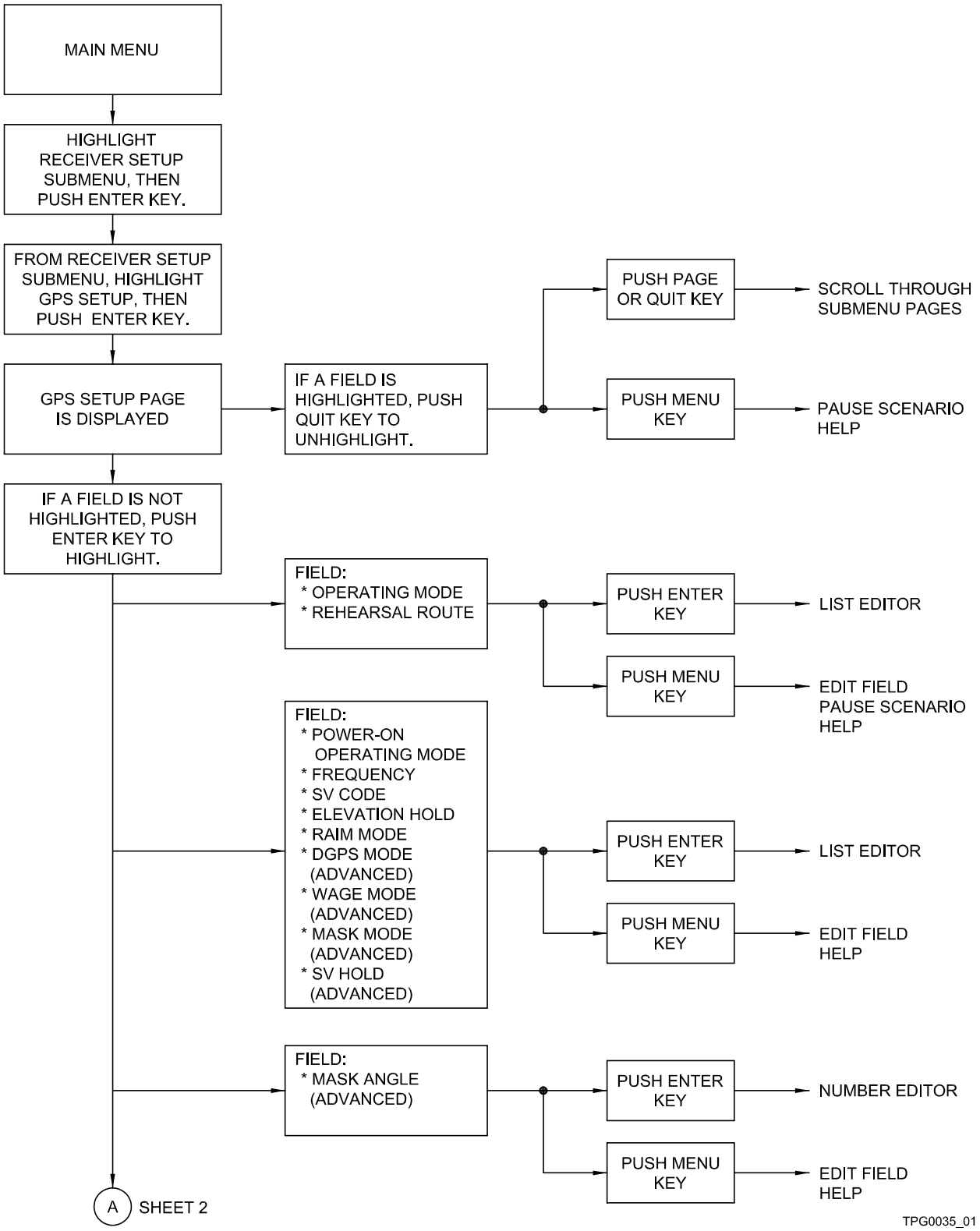


Figure 7-9. GPS Setup Page Keystroke Map (Sheet 1 of 2)

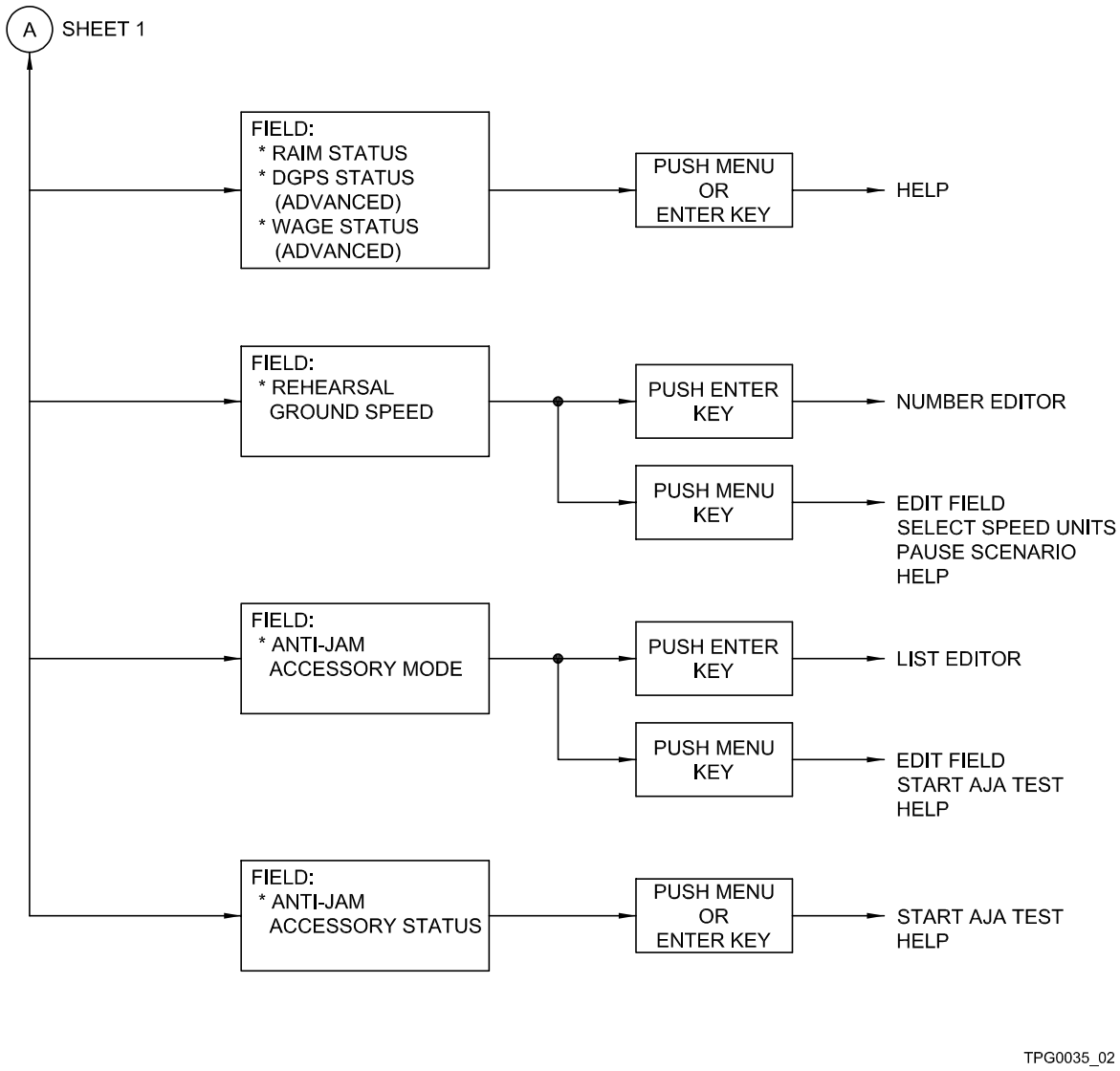


Figure 7-9. GPS Setup Page Keystroke Map (Sheet 2)

7.5. POWER SAVER PAGE.

7.5.1. Page Function.

The Power Saver page is accessed from the Receiver Setup submenu, or by using the Status key and Receiver Status menu (refer to Paragraph 6.2.24). The Power Saver page provides Auto-Off and Auto-Standby modes and timer fields, and an Off Mode Display Heater field as shown in Figure 7-10. The Power Saver page fields are used to conserve battery power. Auto-Off is used to turn the DAGR off when not being used. Auto-Standby is used to transition the DAGR to Standby operating mode when a GPS solution cannot be found.

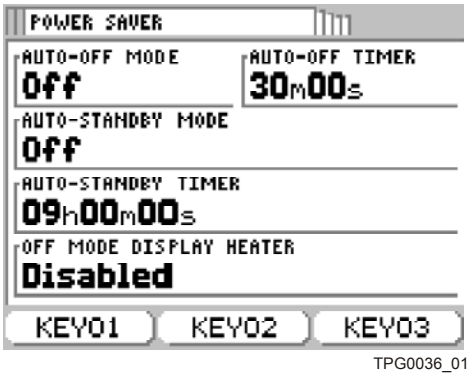


Figure 7-10. Power Saver Page

7.5.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 7-11. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

7.5.2.1. Auto-Off Mode and Timer Fields. The Auto-Off mode field is used to enable or disable the auto-off timer by the operator selecting either On or Off. The Auto-Off Timer field displays a selectable time value within the range of 15 seconds to 30 minutes. The auto-off timer restarts whenever the operator pushes a DAGR key or whenever data is received over a data interface serial port. Auto-Off Timer field data format is MMmSSs, where M represents minutes and S represents seconds. When enabled, the auto-off timer starts under the following conditions:

- Acquisition attempts fail to obtain a PVT solution in any tracking mode
- After a PVT solution is reached (and satellite tracking data is collected in any tracking mode except FIX)
- When Standby operating mode is entered

7.5.2.1.1. The auto-off timer is automatically disabled under the following conditions:

- When the DAGR is operating on external power and the External Power Source Type field of the Battery page displays Non-Battery (refer to Paragraph 7.6)
- During an Auto-On cycle (refer to Paragraph 7.7)
- During an Automark cycle (refer to Paragraph 7.8)

7.5.2.2. Auto-Standby Mode and Timer Fields. The Auto-Standby Mode field is used to enable or disable the auto-standby timer by the operator selecting either On or Off. The Auto-Standby Timer field displays a time value within the range of 5 minutes to 9 hours. When auto-standby is enabled and the DAGR is operating on battery power, the DAGR automatically transitions from a tracking mode to Standby mode when a position solution is not acquired within the time duration set for the auto-standby timer. Auto-Standby Timer field data format is HHhMMmSSs, where H represents hours, M represents minutes and S represents seconds.

NOTE

When operating the DAGR on external power, the External Power Source Type field of the Battery page must be set to battery to enable auto-standby.

7.5.2.3. Off Mode Display Heater Field . The Off Mode Display Heater field is used to enable or disable the display heater while the DAGR is turned off. In cold conditions (below approximately -20 °C) the display heater is used (when enabled) to ensure the display is fully functional when the DAGR is initially powered on. When powering on the DAGR in cold conditions without prior use of the display heater, the DAGR may require up to twenty minutes to warm the display for use. The Status key can be used to check the display heater setting (refer to Paragraph 6.2.24).

- **Enabled** — In cold conditions, the display heater warms the display while the DAGR is powered off, preparing the DAGR display for immediate use.
- **Disabled** — The display heater does not warm the display while the DAGR is powered off. This setting is used to conserve DAGR battery power.

NOTE

• While DAGR is powered on, the display heater is enabled to turn on. The Off Mode Display Heater field has no affect on operation while the DAGR is powered on.

• With the Off Mode Display Heater field set to Enabled, the DAGR requires operator acknowledgement prior to powering down.

7.5.3. How To Use The Power Saver Page.

This page contains information used to configure and set up the DAGR for particular power saver modes to conserve battery power, and also enable the display heater. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting up data and changing field information.

7.5.3.1. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Receiver Setup, then push the ENTER key.
3. Highlight Power Saver, then push the ENTER key. The Power Saver page is displayed.

a. Enable Auto-Off Function

NOTE

If the Auto-Off Mode field displays On, skip to step (3). If the Auto-Off Mode field displays Off, proceed with step (1).

(1) From the Power Saver page, highlight the Auto-Off Mode field. Push the ENTER key.

(2) Highlight On, then push the ENTER key. The display returns to the Power Saver page with the Auto-Off Mode field highlighted including changes made.

(3) From the Power Saver page, highlight the Auto-Off Timer field. Push the ENTER key.

(4) Enter the desired time value (15 seconds up to 30 minutes), then push the ENTER key. The display returns to the Power Saver page with the Auto-Off Timer field highlighted including changes made.

b. Enable Auto-Standby Function

NOTE

If the Auto-Standby Mode field displays On, skip to step (3). If the Auto-Standby Mode field displays Off, proceed with step (1).

(1) From the Power Saver page, highlight the Auto-Standby Mode field. Push the ENTER key.

(2) Highlight On, then push the ENTER key. The display returns to the Power Saver page with the Auto-Standby Mode field highlighted including changes made.

(3) From the Power Saver page, highlight the Auto-Standby Timer field. Push the ENTER key.

(4) Enter the desired time value (5 minutes up to 9 hours), then push the ENTER key. The display returns to the Power Saver page with the Auto-Standby Timer field highlighted including changes made.

c. Enable/Disable Off Mode Display Heater.

(1) From the Power Saver page, highlight the Off Mode Display Heater field. Push the ENTER key.

(2) Highlight Enabled or Disabled, then push the ENTER key. The display returns to the Power Saver page with the Off Mode Display Heater field highlighted including changes made.

7.5.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 7-11 shows the keystroke map for the Power Saver page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Power Saver page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Receiver Setup submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

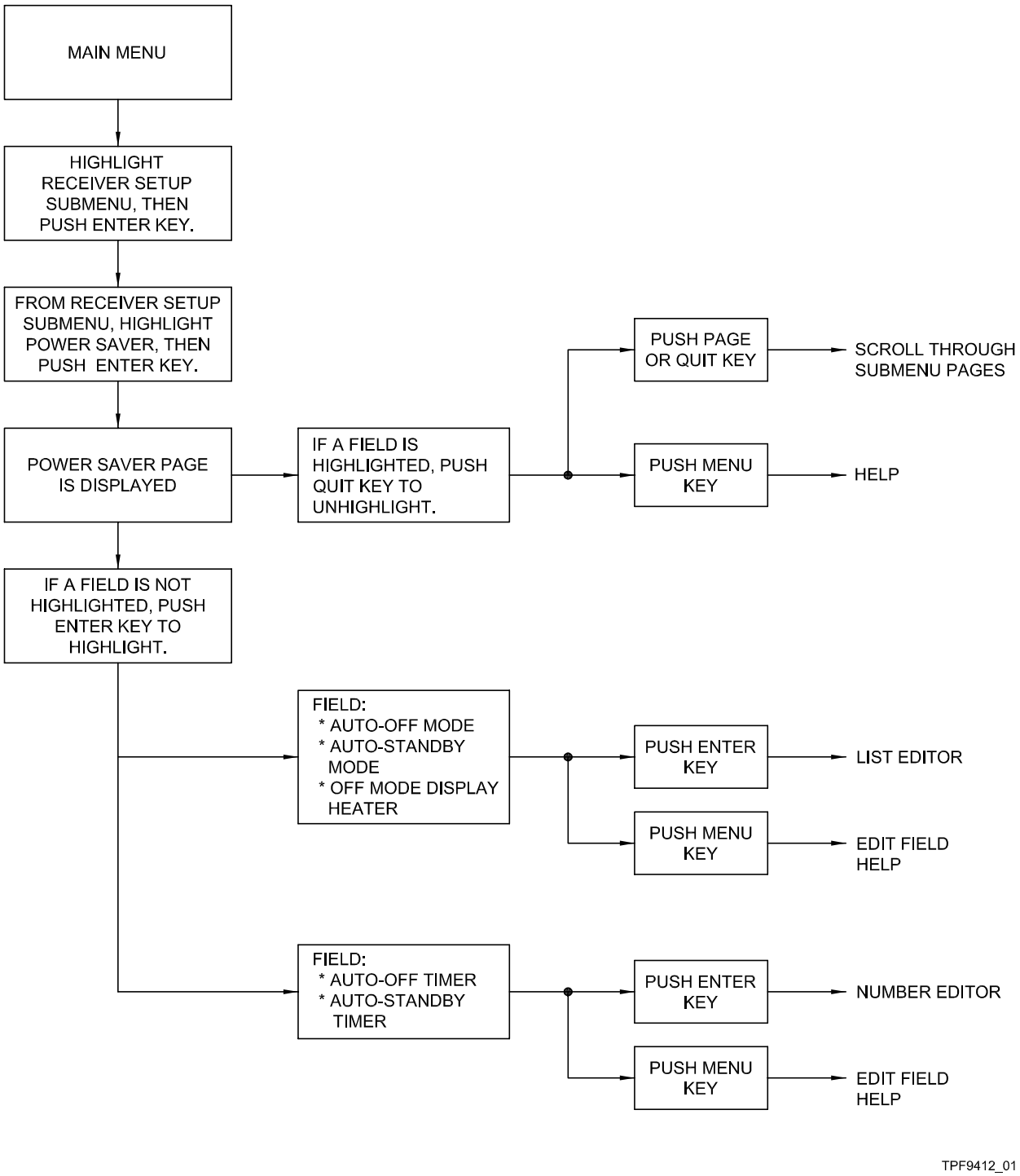


Figure 7-11. Power Saver Page Keystroke Map

7.6. BATTERY PAGE.

CAUTION

Do not mix new batteries with old batteries. Do not mix battery types. Do not reverse battery polarity. Use only fresh/new batteries. Replace all primary power batteries at the same time. These precautions are done to ensure proper battery life and proper unit operation.

7.6.1. Page Function.

The Battery page is accessed from the Receiver Setup submenu. Refer to Figure 7-12. The Battery page is used to record primary battery information, show type of power source, and estimate remaining primary battery life. The page also contains the date when the memory battery was replaced. Vertical scrolling is used to view all fields of the Battery page. Information on battery life during power up and the battery indicator located on the DAGR display is directly related to information on this page. When external power is used for the DAGR, the Power Source field automatically updates, but the External Power Source Type field should be updated by the user (as battery or non-battery). The use of Continuous or Fix modes of operation upon power up and Power Saver page operations (e.g., auto-off) depends on whether or not DAGR is using battery power. Battery life is affected by temperature, operating mode, and type of battery in use. Refer to Table 22-1 for a list of batteries available for the DAGR. **After replacing primary power or memory batteries, the operator performs the following to maintain accurate DAGR battery information:**

Primary Battery

- Update battery installation date
- Update battery type
- Update rechargeable fields
- Reset the battery used time (using Battery Page menu)

Memory Battery

- Update battery installation date

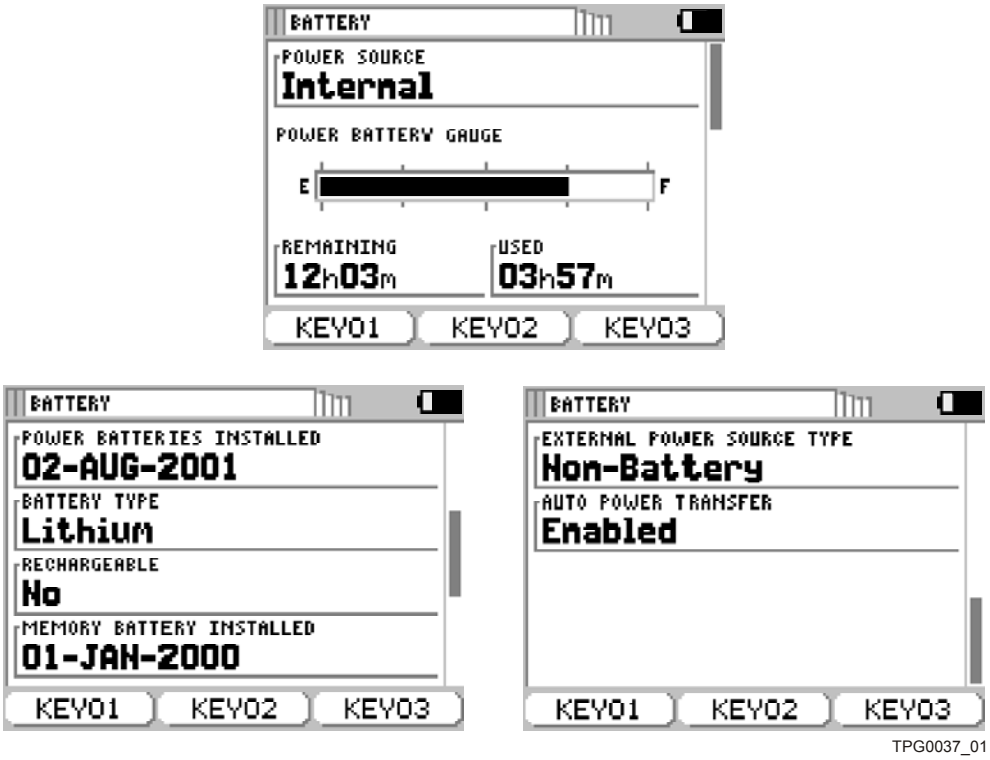


Figure 7-12. Battery Page

7.6.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 7-13. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

7.6.2.1. Power Source Field. The DAGR automatically determines power source and displays it as Internal (internal primary battery power) or External (external AC or DC power). The operator cannot edit this field.

7.6.2.2. Power Battery Gauge Field. Displays the estimated remaining battery life, appearing in a bar graph format. The operator cannot edit this field. This field is directly related to the battery indicator located in the upper right corner of the display and to the Remaining field. Estimated remaining battery life changes according to what operating mode and battery type the DAGR is set to.

7.6.2.3. Remaining Field. Displays the estimated power battery life remaining in hours and minutes. The operator cannot edit this field. This field is directly related to the Power Battery Gauge field bar graph. Estimated remaining battery life changes according to what operating mode and battery type the DAGR is set to. Field data format is HHhMMm, where H represents hours and M represents minutes.

7.6.2.4. Used Field. Displays the amount of time in hours and minutes the DAGR has been operating on internal power batteries. This field is reset by the operator using the Reset Battery Used function from the page or field menu (after replacement of primary batteries). The operator cannot edit this field, except for resetting the information contained in it. This field is not affected by the DAGR operating mode, battery type, or estimated remaining battery life. Field data format is HHhMMm, where H represents hours and M represents minutes.

7.6.2.5. Power Batteries Installed Field. Displays the date the power batteries were installed. This date is input by the operator for information purposes and does not affect battery life calculations. Field data format is DD-MM-YYYY, where D represents day, M represents month, and Y represents year.

7.6.2.6. Battery Type Field. Displays the battery type as input by the operator. Selections are Alkaline, Lithium, or None/Other. Battery type affects battery life calculations.

7.6.2.7. Rechargeable Field. Displays Yes or No as entered by the operator. Yes is entered when rechargeable power batteries are used. The content of this field does not affect battery life calculations.

7.6.2.8. Memory Battery Installed Field. Displays the date the memory battery is installed. This date is input by the operator for information purposes and does not affect battery life calculations. Field data format is DD-MM-YYYY, where D represents day, M represents month, and Y represents year

7.6.2.9. External Power Source Type Field. The Power Source field must show External for this field to be active. Displays Non-Battery or Battery as the external power source type, and is entered by the operator. Battery must be selected to configure the DAGR to use power saving modes (e.g., auto-off).

- **Non-Battery** — Used when connected to an unlimited external power source (e.g., external AC power). Power saving functions are not applicable using this unlimited power source setting.
- **Battery** — Used when connected to external battery power, or when connected to an external limited power source. Allows for power saving functions (e.g., auto-off).

7.6.2.10. Auto Power Transfer Field. Displays Enabled or Disabled as selected by the operator. When enabled, the DAGR automatically transfers itself to internal (battery) power when external power is removed.

7.6.3. How To Use The Battery Page.

This page contains information used to configure and set up the DAGR. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting data and changing field information. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Receiver Setup, then push the ENTER key.
3. Highlight Battery, then push the ENTER key. The Battery page is displayed.

NOTE

The user must enter current information on this page whenever primary or memory batteries are replaced. The user must also update the External Power Source Type field when switching from internal to external (battery or non-battery) power.

a. Reset Primary Battery Life Information
   (1) From the Battery page, with or without a field highlighted, push the MENU key.
   (2) Highlight Reset Battery Used, then push the ENTER key.
   (3) Display returns to the Battery page. The Used field indicates the battery life is reset.
   (4) Highlight the Power Batteries Installed field, then push the ENTER key.
   (5) Input the date primary power batteries were replaced, then push the ENTER key. Display returns to the Battery page.
   (6) Highlight the Battery Type field, then push the ENTER key.
   (7) Highlight the correct battery type, then push the ENTER key. Display returns to the Battery page.
   (8) Highlight the Rechargeable field, then push the ENTER key.
   (9) Highlight Yes or No, based upon battery type, then push the ENTER key. Display returns to the Battery page.
   (10) Push the Quit key to unhighlight the field, then scroll to the top of the page.
b. Reset Memory Battery Life Information

CAUTION

If all primary and memory power is lost, memory information is lost and DAGR resets to default settings after power-up.

(1) From the Battery page, highlight the Memory Battery Installed field, then push the ENTER key.

(2) Input the date when memory battery was replaced, then push the ENTER key.

(3) Display returns to the Battery page. Push the Quit key to unhighlight the field.

NOTE

The only indication the operator gets for a low memory battery is the low memory battery message display and checking the date shown in the Memory Battery Installed field.

c. Set Battery Install Date To Today

(1) From the Battery page, highlight the Power Batteries Installed or the Memory Battery Installed field, then push the MENU key.

(2) Highlight Set To Today, then push the ENTER key.

(3) Display returns to the Battery page with the current date in the highlighted field.

7.6.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 7-13 shows the keystroke map for the Battery page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Battery page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Receiver Setup submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

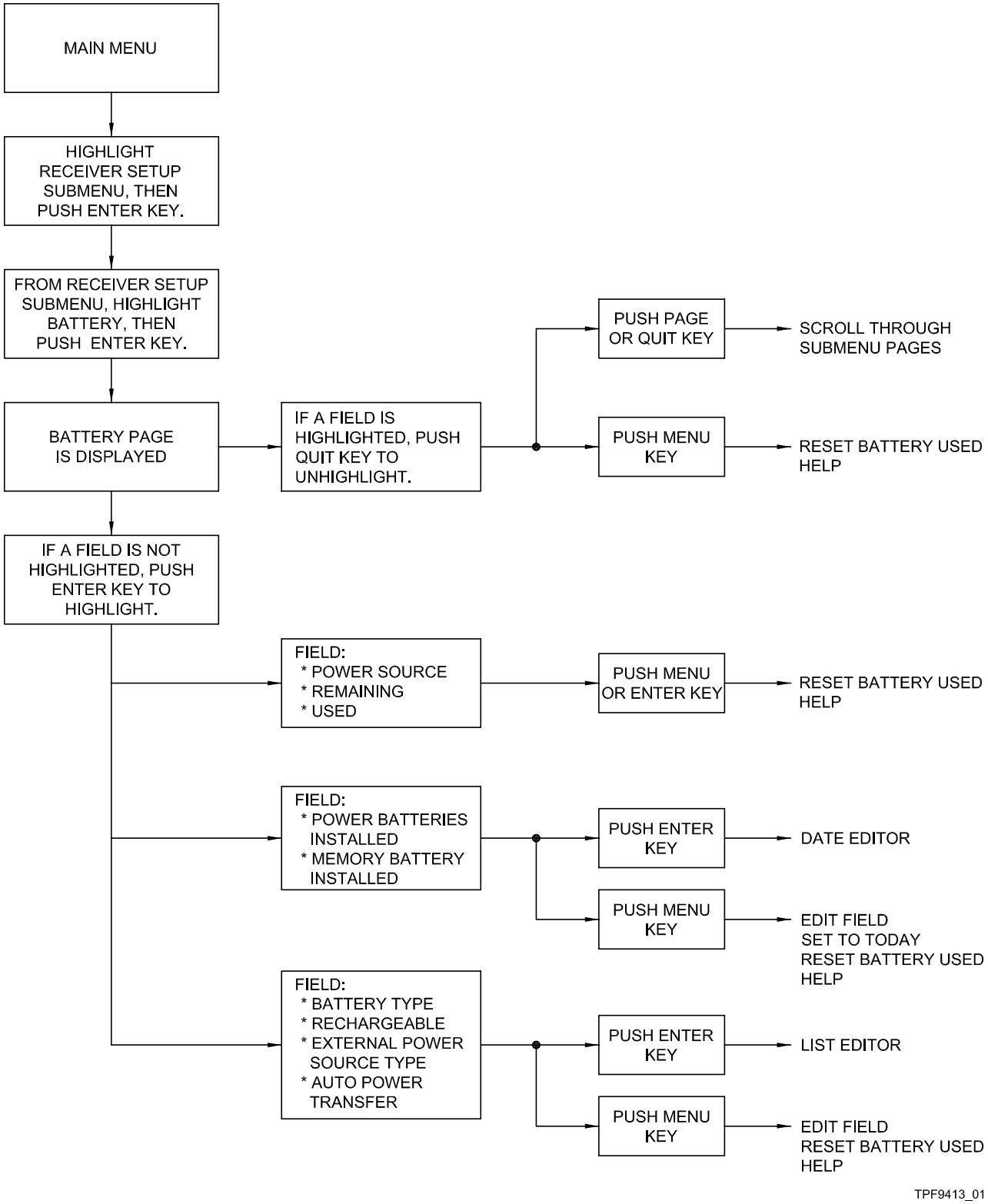


Figure 7-13. Battery Page Keystroke Map

7.7. AUTO-ON PAGE.

7.7.1. Page Function.

The Auto-On page is accessed from the Receiver Setup submenu, or by using the Status key and Receiver Status menu (refer to Paragraph 6.2.24). The Auto-On page is used to automatically power-on the DAGR and maintain data required for fast acquisition, position, and navigation solutions. The DAGR must be placed where it has visibility to the satellites. Off and On modes as well as different start/stop time and date field configurations are shown in Figure 7-14. These are explained in the following paragraphs. The Auto-On page allows the operator to set the Auto-On timer and associated fields. The Status key can be used to check the current Auto-On setting (refer to Paragraph 6.2.24).

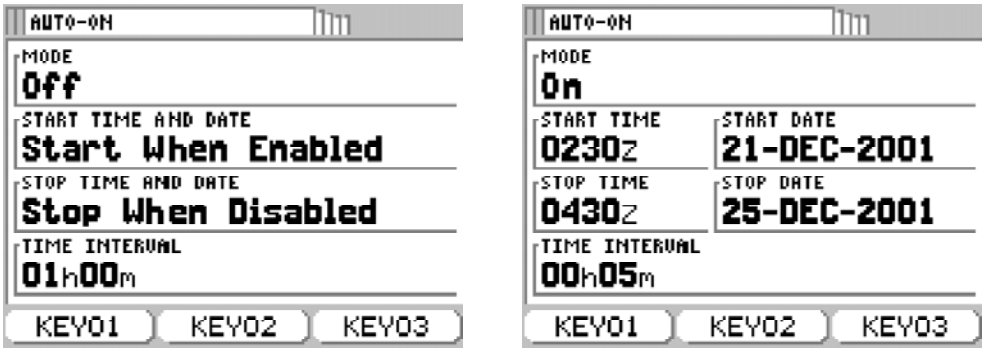


Figure 7-14. Auto-On Page

7.7.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 7-15. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

7.7.2.1. Mode Field. Displays the Auto-On mode as follows:

- **Off** — Disables Auto-On. Must be set to OFF to edit remaining fields.
- **On** — Enables Auto-On to power-on and collect satellite information at the specific time interval set by the user in the Time Interval field. Between the information entered in the Start Time/Date and Stop Time/Date fields, the DAGR powers on and acquires satellite data, then powers down automatically. After reaching an operator entered stop time and date, the Mode field is automatically set to Off.

NOTE

Whenever the Mode field is set to On, the Auto-On function is enabled. The Mode field must first be set to Off before the other fields can be configured.

7.7.2.2. Start Time and Date Field(s). This field is edited to specify when Auto-On function is to start. The two individual start time and start date fields are available only when the single field is edited and a start time and date is entered. Displays one of two configurations:

- Displays one field containing Start When Enabled (as shown left side of Figure 7-14) when selected from the page menu, for starting Auto-On function as soon as mode field is switched from Off.
- Displays two fields containing Start Time and Start Date (as shown right side of Figure 7-14) when operator entered time and date field values specify when to start the Auto-On function. Start Time field data format is HHhMMmZ/L, where H represents hours, M represents minutes, and Z/L represents Zulu or Local. Start Date field data format is DD-MM-YYYY, where D represents day, M represents month, and Y represents year.

7.7.2.3. Stop Time and Date Field(s). This field is edited to specify when Auto-On function is to stop. The two individual stop time and stop date fields are available only when the single field is edited and a stop time and date is entered. Displays one of two configurations:

- Displays one field containing Stop When Disabled (as shown left side of Figure 7-14) when selected from the page menu, or when an entered stop time/date is invalid. Stops the Auto-On function as soon as mode field is set to Off.
- Displays two fields containing Stop Time and Stop Date (as shown right side of Figure 7-14) when operator entered time and date field values specify when to stop the Auto-On function. Stops the Auto-On function when the entered time and date are reached. Stop Time field data format is HHhMMmZ/L, where H represents hours, M represents minutes, and Z/L represents Zulu or Local. Stop Date field data format is DD-MM-YYYY, where D represents day, M represents month, and Y represents year.

7.7.2.4. Time Interval Field. Displays the entered time duration between power-on cycles. Field data format is HHhMMm, where H represents hours and M represents minutes.

7.7.3. How To Use The Auto-On Page.

This page contains information used to configure and set up the DAGR Auto-On function to automatically power-on the DAGR and maintain data requirements for fast acquisition, position, and navigation solutions. The Auto-On function is enabled by the operator after all other function parameters are configured. An example of the Auto-On function is to continually acquire current PVT information without the user having physical contact with the DAGR. Then, when the user is ready to perform tasks, the DAGR is ready with current almanac information. While using the Auto-On function, the DAGR must be tracking satellites.

NOTE

• After Auto-On is enabled, the first Auto-On cycle causes the DAGR to remain powered on for approximately 13 minutes to collect the full navigation message (almanac, ephemeris, and supplemental data), regardless of the age of navigation data already stored in DAGR memory. The 13 minute power on duration is also used whenever the DAGR determines the stored navigation data is more than 3 1/2 hours old, or the stored navigation data will become more than 3 1/2 hours old before the next Auto-On time interval is reached. Auto-On maintains highly current navigation data (less than 3 1/2 hours old) to support optimal DAGR performance. Auto-On powers on the DAGR only at the time intervals specified by the operator. If the operator specifies an Auto-On time interval greater than 3 1/2 hours, the DAGR will collect the full navigation message at each power on interval but the resulting age of navigation data may not be sufficiently current to support optimal DAGR performance.

• After activating the Auto-On function with the DAGR operating on battery power, pushing any DAGR key starts the Power Saver page auto-off timer (refer to Paragraph 7.5.2.1). This may prevent the DAGR from powering off in between Auto-On intervals, resulting in wasted battery power. If DAGR keys must be pushed after activating the Auto-On function, perform one of the following prior to activating Auto-On:

⇒ Set the Power Saver page Auto-Off Mode field to Off.

⇒ Preset the Auto-On page Time Interval field to a time value greater than the Power Saver page Auto-Off Timer field time value.

• If the operator attempts to enable Auto-On while the Automark function is enabled, DAGR prompts the operator to disable Automark prior to enabling Auto-On. Auto-On and Automark functions cannot both be enabled at the same time.

7.7.3.1. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting data and changing field information. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Receiver Setup, then push the ENTER key.
3. Highlight Auto-On, then push the ENTER key. The Auto-On page is displayed.

NOTE

The DAGR must have a continual open view of the sky for the Auto-On function to work properly. If the operator attempts to power down the DAGR while Auto-On is active, the operator is prompted to acknowledge Auto-On is enabled before power down. After the DAGR is powered down, the DAGR automatically starts the power on sequence according to how the Auto-On page is configured.

a. Disable the Auto-On function. This allows all fields to be set up for Auto-On operation.
   (1) From the Auto-On page, highlight Mode field, then push the ENTER key.
   (2) Highlight Off, then push the ENTER key.
   (3) Display returns to the Auto-On page with the Mode field highlighted and changes made.

b. Select Time Zone
   (1) From the Auto-On page, highlight the Start Time and Date or Stop Time and Date fields. Push the MENU key.
   (2) Highlight Select Time Zone, then push the ENTER key.
   (3) Highlight the desired time zone, then push the ENTER key. Returns to the Auto-On page with the time zone reference changed.

c. Set Start of Auto-On Function.

NOTE

The operator has two options for setting the DAGR to start the Auto-On function. One option is starting as soon as the Mode field is switched from Off; the second option is starting at a specific start time and date.

   (1) Start Auto-On when mode is switched from Off.
      (a) From the Auto-On page (with or without a field highlighted), push the MENU key.
      (b) Highlight Start When Enable, then push the ENTER key.
      (c) The Auto-On page displays the Start Time and Date field with Start When Enabled.
   (2) Start Auto-On at specific time and date.
      (a) From the Auto-On page, highlight the Start Time and Date field, or highlight the Start Time field. Push the ENTER key.
      (b) Enter desired start time, then push the ENTER key.
      (c) Highlight the Start Date field, then push the ENTER key.
      (d) Enter desired start date, then push the ENTER key.
      (e) The Auto-On page Start Time and Start Date fields display entered data.

d. Set Stop of Auto-On Function.

NOTE

The operator has two options for setting the DAGR to stop the Auto-On function. One option is stopping as soon as the Mode field is switched to Off; the second option is stopping at a specific stop time and date.

   (1) Stop Auto-On when mode switched to Off.
      (a) From the Auto-On page (with or without a field highlighted), push the MENU key.
      (b) Highlight Stop When Disable, then push the ENTER key.
      (c) The Auto-On page displays the Stop Time and Date field with Stop When Disabled.
   (2) Stop Auto-On at specific time and date.

(a) From the Auto-On page, highlight the Stop Time and Date field, or highlight the Stop Time field. Push the ENTER key.

(b) Enter desired stop time, then push the ENTER key.

(c) Highlight the Stop Date field, then push the ENTER key.

(d) Enter desired stop date, then push the ENTER key.

(e) The Auto-On page Stop Time and Stop Date fields display entered data.

e. Set Time Interval Between Auto-On Functions.

(1) From the Auto-On page, highlight the Time Interval field. Push the ENTER key.

(2) Enter desired time interval, then push the ENTER key.

(3) The Auto-On page Time Interval field displays entered data.

f. Enable Auto-On Function.

(1) From the Auto-On page, highlight the Mode field. Push the ENTER key.

(2) Highlight On, then push the ENTER key.

(3) Auto-On function is now enabled and will start and continue operating as previously set up until disabled. After Auto-On is enabled, only the Mode field content can be changed.

7.7.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 7-15 shows the keystroke map for the Auto-On page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Auto-On page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Receiver Setup submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

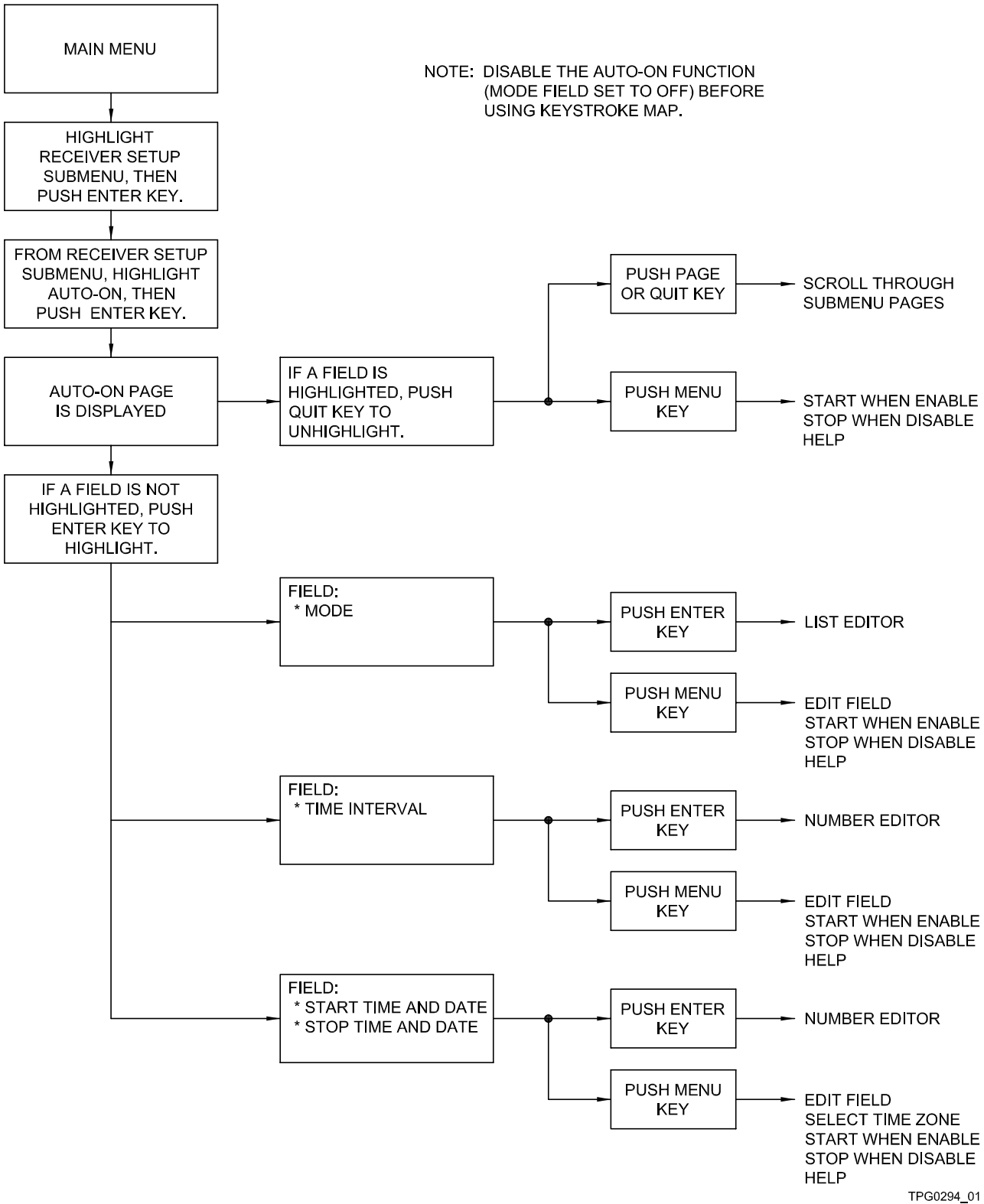


Figure 7-15. Auto-On Page Keystroke Map

7.8. AUTOMARK PAGE (ADVANCED).

7.8.1. Page Function.

The Automark page is accessed from the Receiver Setup submenu, or by using the Status key and Receiver Status menu (refer to Paragraph 6.2.24). The Automark page allows configuration of the DAGR to automatically store a present position fix as a waypoint at selected time intervals. The DAGR powers itself on, as required, to perform the Automark function. The DAGR must maintain visibility to satellites for this function. The Automark function can be enabled by the operator only when using the advanced function set. Once enabled, either the advanced or basic function set may be used, Automark continues to function as set by the operator and the page is accessible. Automark is disabled either manually by the operator or automatically when an entered stop time and date are reached. The Status key can be used to check the current Automark setting (refer to Paragraph 6.2.24). Off and Repeating Marks modes as well as different start/stop time and date field configurations are separately shown in Figure 7-16. These are explained in the following paragraphs.

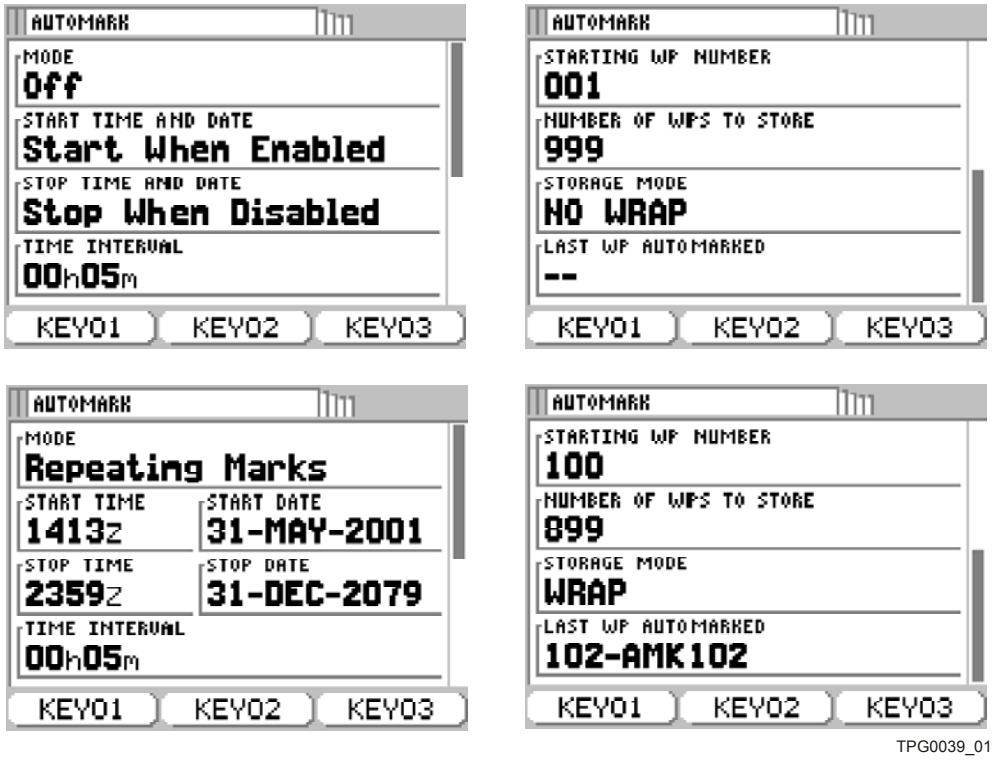


Figure 7-16. Automark Page (Advanced)

7.8.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 7-17. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

7.8.2.1. Mode Field. Displays the Automark mode as:

- **Off** — Automark disabled. Must be set to Off to edit remaining fields.
- **One Mark** — Store one present position fix as a waypoint at the set start time.
- **Repeating Marks** — Store multiple present position fixes as waypoints starting at the preset start time and continuing at specified intervals until the preset stop time. After completing the Automark function, the Mode field is automatically set to Off.

NOTE

• Whenever the Mode field is set to One Mark or Repeating Marks, the Automark function is enabled. The Mode field must first be set to Off before the other fields can be configured.

• The Automark function is enabled by the operator when the advanced function set is in use and can be disabled when using either the advanced or basic function set.

7.8.2.2. Start Time and Date Fields. This field is edited to specify when Automark function is to start. The two individual start time and start date fields are available only when the single field is edited and a start time and date is entered. Displays one of two configurations:

- Displays one field containing Start When Enabled (as shown at top, left side of Figure 7-16) when selected from the page menu. Starts the Automark function as soon as Mode field is switched from Off.
- Displays two fields containing Start Time and Start Date fields (as shown at bottom, left side of Figure 7-16) when time and date field values are entered by the operator. Starts the Automark function when the entered time and date are reached. Start Time field data format is HHhMMmZ/L, where H represents hours, M represents minutes, and Z/L represents Zulu or Local. Start Date field data format is DD-MM-YYYY, where D represents day, M represents month, and Y represents year.

7.8.2.3. Stop Time and Date Fields. This field is edited to specify when Automark function is to stop. The two individual stop time and stop date fields are available only when the single field is edited and a stop time and date is entered. Displays one of two configurations:

- Displays one field containing Stop When Disabled (as shown at top, left side of Figure 7-16) when selected from the page menu, or when an entered stop time and date is invalid. Stops the Automark function as soon as Mode field is set to Off.
- Displays two fields containing Stop Time and Stop Date fields (as shown at bottom, left side of Figure 7-16) when time and date field values are entered by the operator. Stops the Automark function when the entered time and date are reached. Stop Time field data format is HHhMMmZ/L, where H represents hours, M represents minutes, and Z/L represents Zulu or Local. Stop Date field data format is DD-MM-YYYY, where D represents day, M represents month, and Y represents year.

7.8.2.4. Time Interval Field. Displays and allows editing of the time duration between automarking waypoints. Selection range is one minute to twelve hours. Applies to Repeating Marks mode only. Field data format is HHhMMm, where H represents hours and M represents minutes.

7.8.2.5. Starting WP Number Field. Displays and allows selection of the first waypoint number used for automarking. The page and field menu provide the Reset To Start WP selection to return to the starting waypoint for storage of Automark waypoints. Field data format is XXX, where X represents the waypoint number.

7.8.2.6. Number of WPs To Store Field. Displays and allows selection of the maximum number of consecutive waypoints stored as automarked waypoints. The operator uses this field value to limit the number of waypoints stored so that other useful waypoints are not overwritten. Field data format is XXX, where X represents the number of consecutive waypoints.

7.8.2.7. Storage Mode Field. Displays and allows selection of the storage mode as Wrap or No Wrap. Wrap continually overwrites automarked waypoints with new automarked waypoints. No Wrap stores information to all unused automarked waypoints. The page and field menu provide the Clear AMK WPs selection to clear/erase all Automark waypoints.

7.8.2.8. Last WP Automarked Field. Displays the last waypoint to be automarked. The operator cannot edit this field. Field data format is XXX-AMKXXX, where X represents the waypoint number and AMK represents Automark.

7.8.3. How To Use The Automark Page.

This page contains information used to configure and set up the DAGR to automatically store a present position fix as a waypoint. If required, DAGR automatically powers on to perform the Automark. The Automark function is enabled by the operator after all other function parameters are configured. An example of the Automark function is using the function to continually mark waypoints at assigned time intervals without the user having physical contact with the DAGR. The DAGR can be set to only use an assigned number range of waypoints beginning with a certain waypoint number. This enables the user to mark a path without manually marking waypoints. While using the Automark function, the DAGR must be tracking satellites.

NOTE

• After activating the Automark function with the DAGR operating on battery power, pushing any DAGR key starts the Power Saver page auto-off timer (refer to Paragraph 7.5.2.1). This may prevent the DAGR from powering off in between Automark intervals, resulting in wasted battery power. If DAGR keys must be pushed after activating the Automark function, perform one of the following prior to activating Automark:

⇒ Set the Power Saver page Auto-Off Mode field to Off.

⇒ If using Automark in Repeating Marks Mode, preset the Automark page Time Interval field to a time value greater than the Power Saver page Auto-Off Timer field time value.

• If the operator attempts to enable Automark while the Auto-On function is enabled, DAGR prompts the operator to disable Auto-On prior to enabling Automark. Automark and Auto-On functions cannot both be enabled at the same time.

7.8.3.1. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting data and changing field information. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Receiver Setup, then push the ENTER key.
3. Highlight Automark, then push the ENTER key. The Automark page is displayed.

NOTE

• The DAGR must have a continual open view of the sky in order for the Automark function to work properly. The user must ensure that the total time set to acquire waypoints is coordinated with the range being traveled so the entire path traveled is recorded sufficiently.

• If the operator attempts to power down the DAGR while Automark is active, the operator is prompted to acknowledge Automark is enabled before power down. After the DAGR is powered down, the DAGR automatically starts the power on sequence according to how the Automark page is configured.

a. Disable the Automark function. This allows fields to be set up for Automark operation.
   (1) From the Automark page, highlight Mode field, then push the ENTER key.
   (2) Highlight Off, then push the ENTER key.
   (3) Display returns to the Automark page with the Mode field highlighted and changes made.

b. Select Time Zone
   (1) From the Automark page, highlight the Start Time and Date or Stop Time and Date fields. Push the MENU key.
   (2) Highlight Select Time Zone, then push the ENTER key.
   (3) Highlight the desired time zone, then push the ENTER key. Returns to the Automark page with the time zone reference changed.

c. Set Start of Automark Function.

NOTE

The operator has two options for setting the DAGR to start the Automark function. One option is starting as soon as the Mode field is switched from Off; the second option is starting at a specific start time and date.

   (1) Start Automark when mode switched from Off.
      (a) From the Automark page (with or without a field highlighted), push the MENU key.

(b) Highlight Start When Enable, then push the ENTER key.

(c) The Automark page displays the Start Time and Date field with Start When Enabled.

(2) Start Automark at specific time and date.

(a) From the Automark page, highlight the Start Time and Date field, or highlight the Start Time field. Push the ENTER key.

(b) Enter desired start time, then push the ENTER key.

(c) Highlight the Start Date field, then push the ENTER key.

(d) Enter desired start date, then push the ENTER key.

(e) The Automark page Start Time and Start Date fields display entered data.

d. Set Stop of Automark Function.

NOTE

The operator has two options for setting the DAGR to stop the Automark function. One option is stopping as soon as the Mode field is switched to Off; the second option is stopping at a specific stop time and date.

(1) Stop Automark when mode switched to Off.

(a) From the Automark page (with or without a field highlighted), push the MENU key.

(b) Highlight Stop When Disable, then push the ENTER key.

(c) The Automark page displays the Stop Time and Date field with Stop When Disabled.

(2) Stop Automark at specific time and date.

(a) From the Automark page, highlight the Stop Time and Date field, or highlight the Stop Time field. Push the ENTER key.

(b) Enter desired stop time, then push the ENTER key.

(c) Highlight the Stop Date field, then push the ENTER key.

(d) Enter desired stop date, then push the ENTER key.

(e) The Automark page Stop Time and Stop Date fields display entered data.

e. Set Time Interval Between Automark Functions (affects Repeating Marks mode only).

(1) From the Automark page, highlight Time Interval field. Push the ENTER key.

(2) Enter desired time interval, then push the ENTER key.

(3) The Automark page Time Interval field displays entered data.

f. Set Starting Waypoint (WP) Number.

(1) From the Automark page, highlight Starting WP Number field. Push the ENTER key.

(2) A number editor displays the number of the first unused waypoint.

(3) Enter desired starting waypoint number, then push the ENTER key.

(4) The Automark page Starting WP Number field displays entered data.

g. Set Number of Waypoints (WPs) to Store.

(1) From the Automark page, highlight Number of WPs to Store field. Push the ENTER key.

(2) Enter desired number of waypoints, then push the ENTER key.

(3) The Automark page Number of WPs to Store field displays entered data.

h. Set Storage Mode.

(1) From the Automark page, highlight Storage Mode field. Push the ENTER key.

(2) Highlight Wrap or No Wrap, then push the ENTER key.

(3) The Automark page Storage Mode field displays entered data.

i. Enable Automark Function.

(1) From the Automark page, highlight the Mode field. Push the ENTER key.

(2) Highlight desired mode of operation (One Mark or Repeating Marks), then push the ENTER key.

(3) Automark function is now enabled and will start and continue as previously set up until disabled. The Last WP Automarked field can be viewed to monitor Automark progress. After Automark is enabled, only the Mode field content can be changed.

j. Reset to Start Waypoint.

NOTE

Resets automarking to start at the waypoint specified in the Starting WP Number field. The Automark function must first be disabled (refer to step a.).

(1) From the Automark page, with or without a field highlighted, push the MENU key.

(2) Highlight Reset to Start WP, then push the ENTER key. Verify the Last WP Automarked field is reset to double dashes.

(3) When Automark function is re-enabled (refer to step h.), the Starting WP Number field waypoint is the first to be automarked. If any waypoints were previously automarked within the range set by the starting waypoint and the number of waypoints to store, the operator is prompted to confirm before any waypoints are overwritten.

k. Clear Range of Waypoints.

NOTE

Clears range of waypoints starting with the Starting WP Number field waypoint through the number of waypoints specified in the Number of WPs to Store field. The Automark function must first be disabled (refer to step a.).

(1) From the Automark page, with or without a field highlighted, push the MENU key.

(2) Highlight Clear Range of Waypoints, then push the ENTER key. Operator is prompted to confirm before clearing waypoints. Verify Last WP Automarked field is reset to double dashes.

(3) When Automark function is re-enabled (refer to step h.), the Starting WP Number field waypoint is the first to be automarked.

7.8.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 7-17 shows the keystroke map for the Automark page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Automark page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Receiver Setup submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

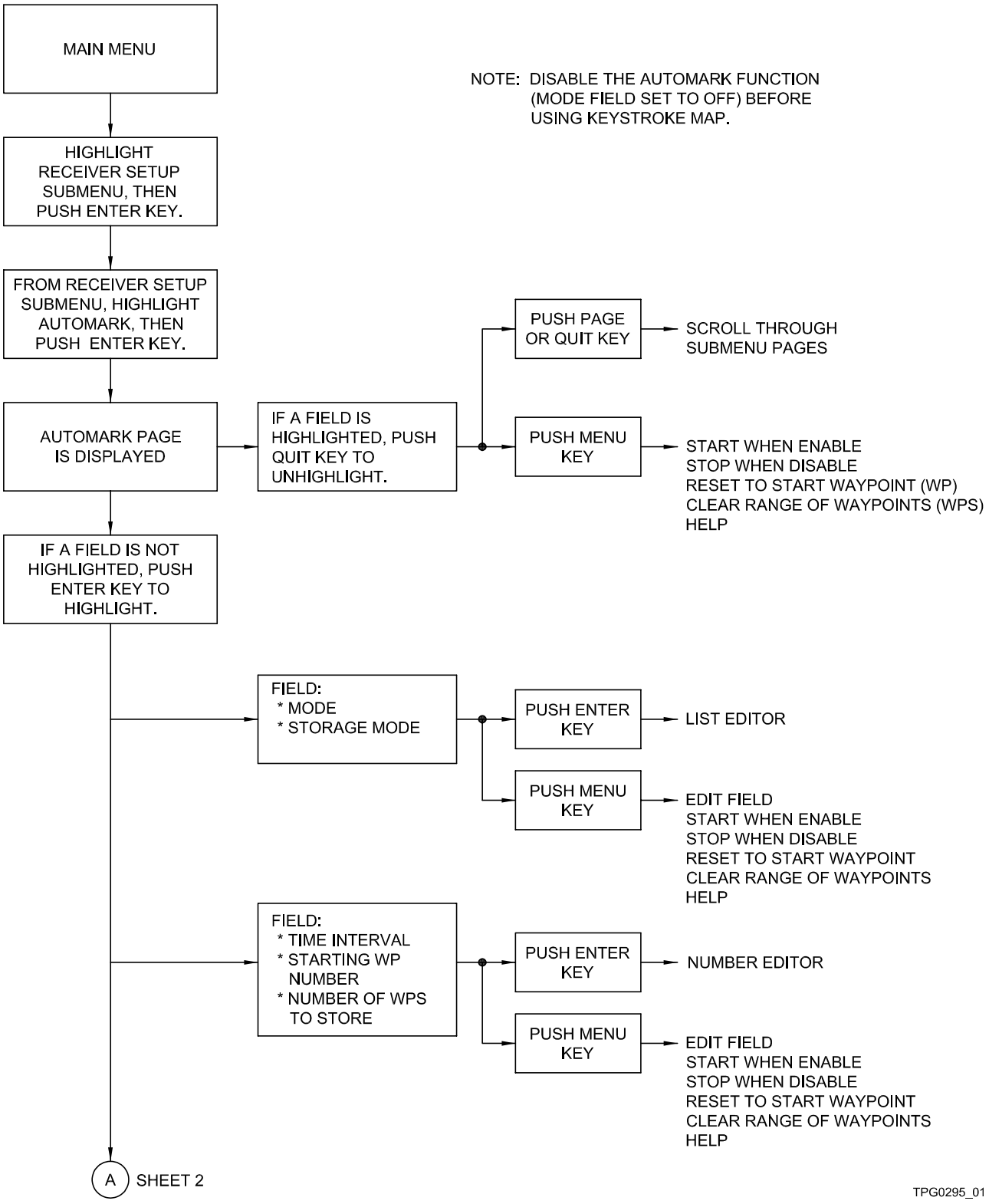


Figure 7-17. Automark Page Keystroke Map (Sheet 1 of 2)

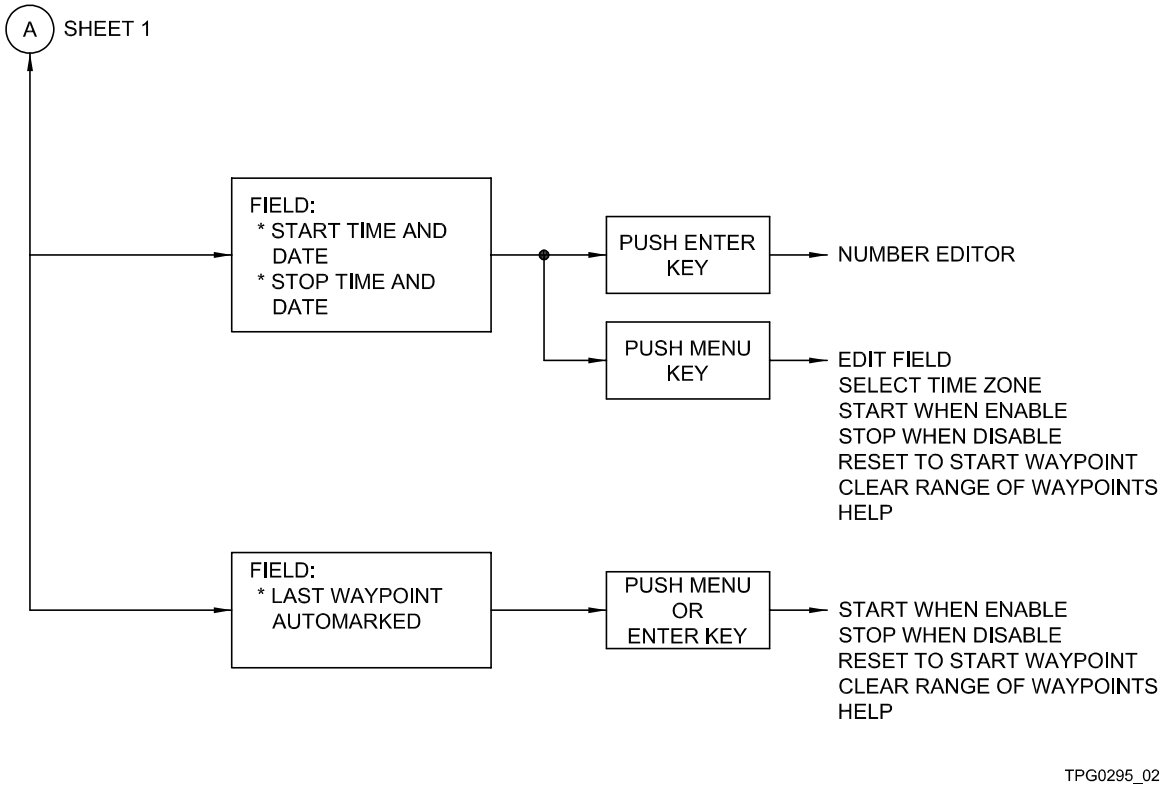


Figure 7-17. Automark Page Keystroke Map (Sheet 2)

CHAPTER 8
OPERATOR INSTRUCTIONS — WAYPOINT/ROUTE/ALERTS SUBMENU OPERATION

8.1. WP/ROUTE/ALERTS SUBMENU.

This chapter contains WP/Routes/Alerts submenu operation information. The WP/Routes/Alerts submenu page set provides the following page selections described in this chapter:

- Waypoints
- Mark A Waypoint
- Range Between Waypoints
- Routes
- Alerts

8.2. WAYPOINTS PAGE.

8.2.1. Page Function.

The Waypoints page is accessed from the WP/Routes/Alerts submenu or by using the WP key. The Waypoints page provides a table that lists all DAGR waypoints. Capabilities are provided to create new waypoints, edit waypoints (using Waypoint Editor page), clear waypoints, copy waypoints, or view only desired waypoints (search, sort, and filter). These operations are described in the following paragraphs. The Waypoint Editor page is accessed from the Waypoints page. Vertical and horizontal scrolling are used to view all waypoints and table columns. The Waypoint page using the basic function set is shown in Figure 8-1. The Waypoint page using the advanced function set is shown in Figure 8-2.

Figure 8-1. Waypoint Page (Basic)

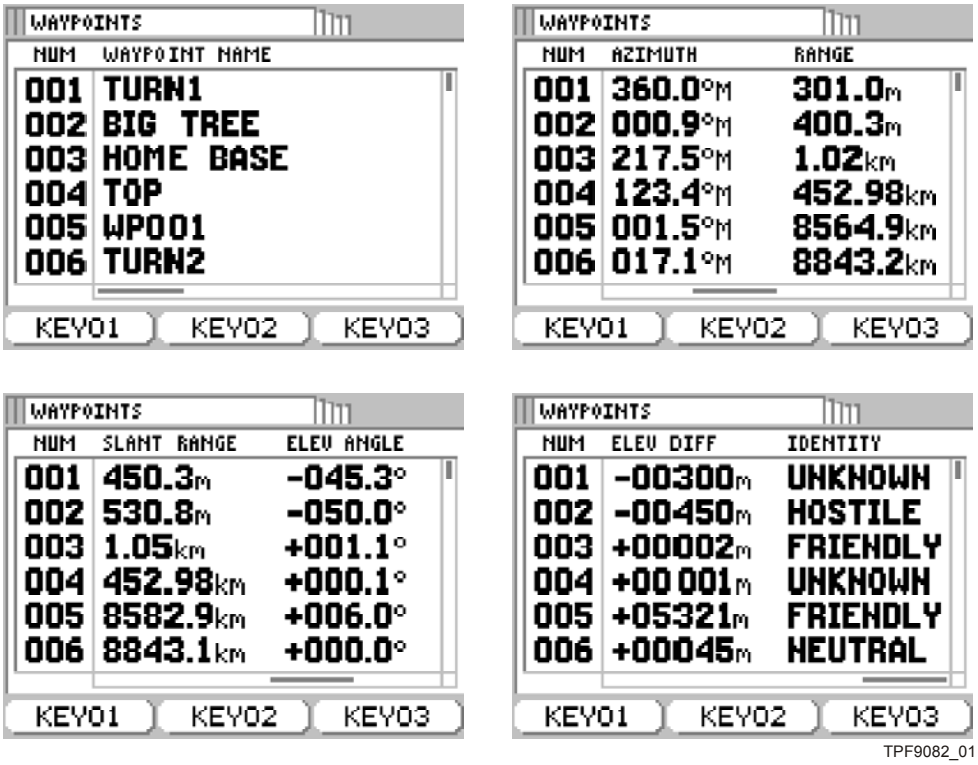


Figure 8-2. Waypoint Page (Advanced)

8.2.2. Page Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 8-3. Vertical and horizontal scrolling is used to view all page information. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

8.2.2.1. Waypoint List Table. The waypoint list table includes the following information for each waypoint. The table rows wrap from the last row to the first row (or vice versa) when vertically scrolling through the table.

- **NUM** — Displays the waypoint number (001 through 999).
- **Waypoint Name** — Displays the waypoint name of up to ten characters.
- **Azimuth** — Displays azimuth calculated from present position or selected waypoint. Data format is XXX.X (X represents degrees) or XXXX (X represents mils or strecks) in reference to north reference (True, Magnetic, or Grid).
- **Range** — Displays range calculated from present position or selected waypoint. Data format is XXXX.XX or XXXX.X, where X represents miles, nautical miles, kilometers, feet, yards, or meters.
- **Identity** — Displays identity type selection as Unknown, Friendly, Hostile, or Neutral. Each type has an associated symbol used with the Situational Awareness page. Refer to Paragraph 9.6.2.2 for more information.
- **Slant Range (Advanced)** — Displays slant range calculated from present position or selected waypoint. Data format is XXXX.XX or XXXX.X, where X represents miles, nautical miles, kilometers, feet, yards, or meters.
- **Elev Angle (Advanced)** — Displays elevation angle calculated from present position or selected waypoint. Data format is +/- XXX.X (X represents degrees) or XXXX (X represents mils or strecks).
- **Elev Diff (Advanced)** — Displays elevation difference calculated from present position or selected waypoint. Data format is +/- XXXXX, where X represents feet or meters.

8.2.2.2. Waypoints Page Functions. Waypoints page menu functions are described in the following list. Refer to Paragraph 8.2.3 on how to use the waypoints page.

- **Create/New** — Provides a list editor of unused waypoints (numbers). After selecting a new waypoint number, the Waypoint Editor page is used to set up the waypoint. Refer to Paragraph 8.3 for additional information.
- **Edit Waypoint (WP)** — Displays the Waypoint Editor page for editing the selected waypoint. Refer to Paragraph 8.3 for additional information.
- **Copy** — Copies a selected waypoint's data. This data can then be pasted into another waypoint or a range of waypoints. Operator confirmation is required prior to the DAGR overwriting any existing waypoints.
- **Clear** — Clears a waypoint, a range of waypoints, or all waypoints. Operator confirmation is required prior to the DAGR clearing any waypoints.
- **Units** — Provides an editor to select range, angle, north reference, or elevation (Advanced) units.
- **Navigate To Waypoint** — Displays the NAV Pointer page. Refer to Paragraph 9.3 for additional information.
- **Search** — Searches and displays waypoints by a name or remark (up to ten characters each).
- **Sort** — Sorts and displays the entire list of waypoints in ascending alphanumeric order by name, number, range from present position, range from selected waypoint, or identity. When the waypoint list is sorted by range from selected waypoint, (WP) appears in the range data table column titles.
- **Filter** — Displays a filtered list of waypoints. Filter choices are All Used WPs, All Unused WPs, Within Range (specified by operator), and Unfilter (display all waypoints). When the waypoint list is filtered, (FILTERED) appears in the page title. If an unused row with double dashes is highlighted and the ENTER key is pushed, the Create/New list editor (previously described) appears.
- **Waypoint Summary** — Displays the waypoint quantities used and unused.

8.2.3. How To Use The Waypoints Page.

This page contains information for creating and editing waypoints used for navigation. Waypoints can be created from the Waypoints page or by using functions of the WP key. These methods are described in the following procedures. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting up data and changing field information.

8.2.3.1. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedures c. through m., acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight WP/Route/Alerts, then push the ENTER key.
3. Highlight Waypoints, then push the ENTER key. The Waypoints page is displayed.

NOTE

The Waypoints page can also be acquired from any display by pushing and holding the WP key, highlighting List All WPs, then pushing the ENTER key.

a. Mark A Present Position Waypoint Using the WP Key (refer to Paragraph 8.4)

(1) From any display, push and hold the WP key. Waypoint function choices are displayed.

(2) Scroll to MARK a WP, then push the ENTER key.

(3) The MARK PRESENT POSITION message is displayed.

NOTE

Pushing the MENU key while displaying the mark present position message accesses the mark menu for additional operator selections. Included in these selections is the ability to select the waypoint being marked; edit the waypoint name, remark, or identity; store the marked waypoint (same as pushing ENTER key); cancel the mark function (same as pushing QUIT key); or create a man overboard waypoint.

(4) Push the ENTER key to mark position in first unused waypoint. Push the QUIT key to cancel mark operation.

(5) After the waypoint is marked, a waypoint stored message is briefly displayed. Display returns to the previous viewed page.

(6) If desired, access the Waypoint Editor page and revise waypoint data (e.g. waypoint name, units of measure, waypoint identity). Perform the following procedure to access the Waypoint Editor page.

(a) Push and hold the WP key.

(b) Highlight List All WPs, then push the ENTER key. The Waypoints page is displayed.

(c) Highlight the desired waypoint, then push the ENTER key.

(d) The Waypoint Editor page is displayed. Edit fields as desired using standard editing procedures.

(7) As desired, move to another position and repeat procedure to mark another waypoint.

b. Create a New Waypoint Using the WP Key

(1) From any display, push and hold the WP key. Waypoint function choices are displayed.

(2) Highlight Create New WP, then push the ENTER key.

(3) The Waypoint Editor page automatically displays the first unused waypoint with current (if tracking satellites) or last position information. Revise information as necessary. Refer to Paragraph 8.3 for Waypoint Editor page information.

(4) Push the MENU key.

(5) Multiple options are provided. Highlight the desired option, then push the ENTER key.

- **Save and Exit** — Briefly displays waypoint stored message. Display returns to the Waypoints page with the new waypoint information saved and highlighted.
- **Exit and No Save** — Display returns to the Waypoints page without saving the waypoint.
- **Edit Field** — Displays a field editor for the highlighted field.
- **Undo Changes** — Clears any changes made and display returns to the Waypoints Editor page for editing.
- **Help** — Displays help text for the highlighted field.

c. Create a New Waypoint Using the Waypoints Page

(1) From the Waypoints page, push the MENU key.

(2) Highlight Create/New, then push the ENTER key. An editor lists all unused waypoints with the first unused waypoint highlighted.

(3) Highlight the desired unused waypoint to use, then push the ENTER key.

(4) The Waypoint Editor page displays the chosen waypoint with current (if tracking satellites) or last position information. Revise information as necessary. Refer to Paragraph 8.3 for Waypoint Editor page information.

(5) Push the MENU key.

(6) Multiple options are provided. Highlight the desired option, then push the ENTER key.

- **Save and Exit** — Briefly displays waypoint stored message. Display returns to the Waypoints page with the new waypoint information saved and highlighted.
- **Exit and No Save** — Display returns to the Waypoints page without saving the waypoint.
- **Edit Field** — Displays a field editor for the highlighted field.
- **Undo Changes** — Clears any changes made and display returns to the Waypoints Editor page for editing.

- **Help** — Displays help text for the highlighted field.

d. Edit a Waypoint

(1) From the Waypoints page, highlight the desired waypoint for editing, then push the ENTER key.

(2) The Waypoint Editor page displays the operator selected waypoint.

(3) Edit waypoint information using standard editing techniques. Refer to Paragraph 8.3 for Waypoint Editor page information.

e. Copy a Waypoint

(1) From the Waypoints page, highlight the desired waypoint to copy **from**, then push the MENU key.

(2) Highlight Copy, then push the ENTER key.

(3) Highlight To WP, then push the ENTER key.

(4) Highlight the desired waypoint position to copy **to**, then push the ENTER key. If copying to an unused waypoint, a storage confirmation message is briefly displayed. If copying to a used waypoint, the operator is prompted for confirmation to overwrite, and a storage confirmation message is briefly displayed.

(5) The DAGR returns to the Waypoints page, highlighting the waypoint copied from.

(6) Scroll to the copied to waypoint and verify the waypoint name is COPYXXX, where X represents the copied to waypoint number.

(7) Use the Edit a Waypoint procedure (d.) to change waypoint name or other fields if desired.

f. Copy To a Range of Waypoints

(1) From the Waypoints page, highlight the desired waypoint to copy **from**, then push the MENU key.

(2) Highlight Copy, then push the ENTER key.

(3) Highlight To Range of WPs, then push the ENTER key.

(4) Enter the desired waypoint range (from/to) to copy **to**, then push the ENTER key. If copying to an unused waypoint, a storage confirmation message is briefly displayed. If copying to a used waypoint, the operator is prompted for confirmation to overwrite, and a storage confirmation message is briefly displayed.

(5) The DAGR returns to the Waypoints page, highlighting the waypoint that was copied **from**.

(6) Scroll to the copied **to** range of waypoints and verify the waypoint names are COPYXXX, where X represents the copied to waypoint number.

(7) Use the Edit a Waypoint procedure (d.) to change waypoint name or other fields if desired.

g. Copy and Paste a Waypoint

(1) From the Waypoints page, highlight the desired waypoint to copy **from**, then push the MENU key.

(2) Highlight Copy, then push the ENTER key.

(3) Highlight Copy WP, then push the ENTER key. The waypoint is now stored in the DAGR clipboard and ready to paste to other waypoints as desired. The display returns to the Waypoints page.

(4) Scroll to desired waypoint to paste information into.

(5) Push the MENU key. Highlight Copy, then push the ENTER key.

(6) Highlight Paste WP, then push the ENTER key.

(7) If pasting to an unused waypoint, a storage confirmation message is briefly displayed. If pasting to a used waypoint, the operator is prompted for confirmation to overwrite, and a storage confirmation message is briefly displayed.

(8) The DAGR returns to the Waypoints page, highlighting the waypoint pasted **to**.

(9) Verify the waypoint pasted to name is COPYXXX, where X represents the waypoint number pasted to.

(10) Use the Edit a Waypoint procedure (d.) to change waypoint name or other fields if desired.

(11) Repeat steps (4) through (10) of this procedure for pasting the copied waypoint to additional waypoints.

h. Clear Waypoints

(1) From the Waypoints page, highlight the desired waypoint to clear and push the MENU key. If clearing more than one waypoint, highlighting a waypoint in this step is optional.

(2) Highlight Clear, then push the ENTER key.

(3) Multiple options for clearing waypoints are provided. Perform the desired option as follows:

- **Clear WP** — After highlighting Clear WP, push the ENTER key. The operator is prompted for confirmation to clear the waypoint.
- **Clear Range** — After highlighting Clear Range, push the ENTER key. Then enter the clear waypoint from/to number range. Push the ENTER key. The operator is prompted for confirmation to clear the waypoints.
- **Clear All** — After highlighting Clear All, push the ENTER key. The operator is prompted for confirmation to clear all waypoints.

(4) The DAGR returns to the Waypoints page.

(5) View the page to verify cleared waypoints are no longer listed.

i. Edit Units of Waypoints

(1) From the Waypoints page, push the MENU key.

(2) Highlight Units, then push the ENTER key.

(3) Multiple waypoint data unit options are provided. Perform the desired option as follows:

- **Select Range Units** — After highlighting Select Range Units, push the ENTER key. Highlight desired choice, then push the ENTER key.
- **Select Angle Units** — After highlighting Select Angle Units, push the ENTER key. Highlight desired choice, then push the ENTER key.
- **Select North Ref** — After highlighting Select North Ref, push the ENTER key. Highlight desired choice, then push the ENTER key.
- **Select Elev Units** — After highlighting Select Elev Units, push the ENTER key. Highlight desired choice, then push the ENTER key.

(4) The DAGR returns to the Waypoints page.

j. Navigation To a Waypoint

(1) From the Waypoints page, highlight the desired waypoint for navigation, then push the MENU key.

(2) Highlight Navigate to WP, then push the ENTER key.

(3) The NAV Pointer page displays the operator selected waypoint using Direct To (waypoint) navigation method. The Pointer field arrow points the azimuth to the destination waypoint. Refer to Paragraph 9.3 for NAV Pointer page information.

k. Search Waypoints

NOTE

• When performing a search, ensure there are no waypoints highlighted in the list before starting. This ensures the search starts at the beginning of the list.

• When entering a string of characters for a search, ensure they are exact.

(1) From the Waypoints page, push the MENU key.

(2) Highlight Search, then push the ENTER key.

(3) Multiple options for searching waypoints are provided. Perform the desired option as follows:

- **Name** — After highlighting Name, push the ENTER key. Enter a string of characters associated with the Name field of the waypoint, then highlight SAVE in the text editor, then push the ENTER key (or use menu shortcut). The display briefly advises the DAGR is working on the search.
- **Remark** — After highlighting Remark, push the ENTER key. Enter a string of characters associated with the Remark field of the waypoint, then highlight SAVE in the text editor, then push the ENTER key (or use menu shortcut).
- **Next WP** — Enabled only when a name or remark search option is repeated.
- **Previous WP** — Enabled only when a name or remark search option is repeated.

(4) The DAGR returns to the Waypoints page with a highlighted waypoint matching the search string. If no waypoints match the search string, the operator is prompted for confirmation and the DAGR returns to the Waypoints page.

(5) To view the next waypoint matching the search string, repeat steps (1) and (2), highlight Next WP, then push the ENTER key.

(6) To view the previous waypoint matching the search string, repeat steps (1) and (2), highlight Previous WP, then push the ENTER key.

(7) The DAGR returns to the Waypoints page with a highlighted waypoint matching the search string. If no waypoints match the search string, the operator is prompted for confirmation and the DAGR returns to the Waypoints page.

l. Sort Waypoints

(1) From the Waypoints page, push the MENU key.

(2) Highlight Sort and push the ENTER key.

(3) Multiple options for sorting waypoints are provided. Perform the desired option as follows:

- **Name** — After highlighting Name, push the ENTER key. The entire list of waypoints is sorted in alphabetical order by name.
- **Number** — After highlighting Number, push the ENTER key. The entire list of waypoints is sorted numerically by their number.
- **Range from POS** — After highlighting Range from POS, push the ENTER key. The entire list of waypoints is sorted in ascending order by range from DAGRs current present position.
- **Range from WP** — After highlighting Range from WP, push the ENTER key. Highlight the desired reference waypoint, then push the ENTER key. The display briefly advises the DAGR is working. The entire list of waypoints is sorted in ascending order by range from the referenced waypoint, with the referenced waypoint shown at the top of the list. All Waypoints page column titles include (WP).
- **Identity** — After highlighting Identity, push the ENTER key. The display briefly advises the operator the DAGR is working. The entire list of waypoints is sorted first by waypoint identity (Friendly, Hostile, Neutral, and Unknown) and secondly by waypoint number.

(4) The DAGR returns to the Waypoints page with waypoints sorted as previously described per method chosen.

m. Filter Waypoints

(1) From the Waypoints page, push the MENU key.

(2) Highlight Filter, then push the ENTER key.

(3) Multiple options for filtering waypoints are provided. Perform the desired option as follows:

- **All Used WPs** — After highlighting All Used WPs, push the ENTER key. Only used waypoints are displayed.
- **All Unused WPs** — After highlighting All Unused WPs, push the ENTER key. Only unused waypoints are displayed.
- **Within Range** — After highlighting Within Range, push the ENTER key. Enter the desired range value, then push the ENTER key. The display briefly advises the DAGR is working. Only waypoints within the specified range (of zero to range value entered) are displayed.
- **Unfilter** — After highlighting Unfilter, push the ENTER key. Waypoints are displayed in ascending order with filtering removed, and the text (FILTERED) is removed from the Waypoints page title.

(4) The DAGR returns to the Waypoints page with waypoints filtered by the method chosen. The Waypoints page title includes the text (FILTERED) unless the Unfilter method was performed.

n. Waypoint Summary

(1) From the Waypoints page, push the MENU key.

(2) Highlight WP Summary, then push the ENTER key.

(3) The waypoint summary displays the quantity of waypoints used and unused. Push the ENTER key to acknowledge.

(4) The DAGR returns to the Waypoints page.

8.2.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 8-3 shows the keystroke map for the Waypoints page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Waypoints page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the WP/Route/Alerts submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

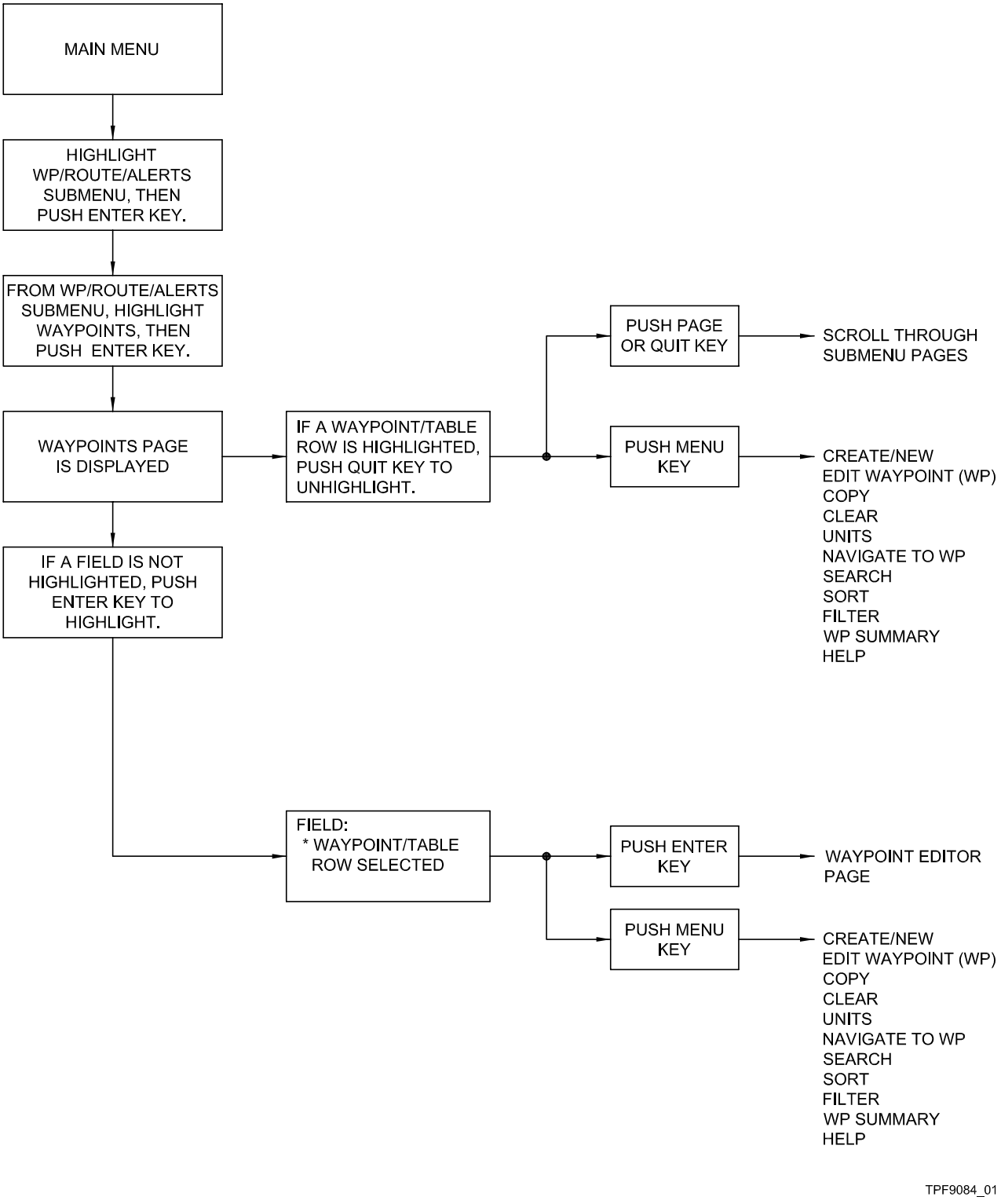


Figure 8-3. Waypoints Page Keystroke Map

8.3. WAYPOINT EDITOR PAGE.

8.3.1. Page Function.

The Waypoint Editor page is accessed using the Waypoints page or by using the WP key, but is not accessed from a submenu. The Waypoint Editor page is used for viewing and editing waypoint data listed in the Waypoints page. When the Waypoint Editor page is accessed, a page field is always highlighted for cursor control key scrolling to the desired field. Select appropriate units for fields, as applicable, before using page field data. Refer to the keystroke map in Figure 8-6 for additional information on selecting units. Page fields are described in the following paragraphs. The Waypoint Editor page is shown in Figure 8-4 using the basic function set. The Waypoint Editor page is shown in Figure 8-5 using the advanced function set. When using the advanced function set, additional fields are provided as described in the following paragraphs.

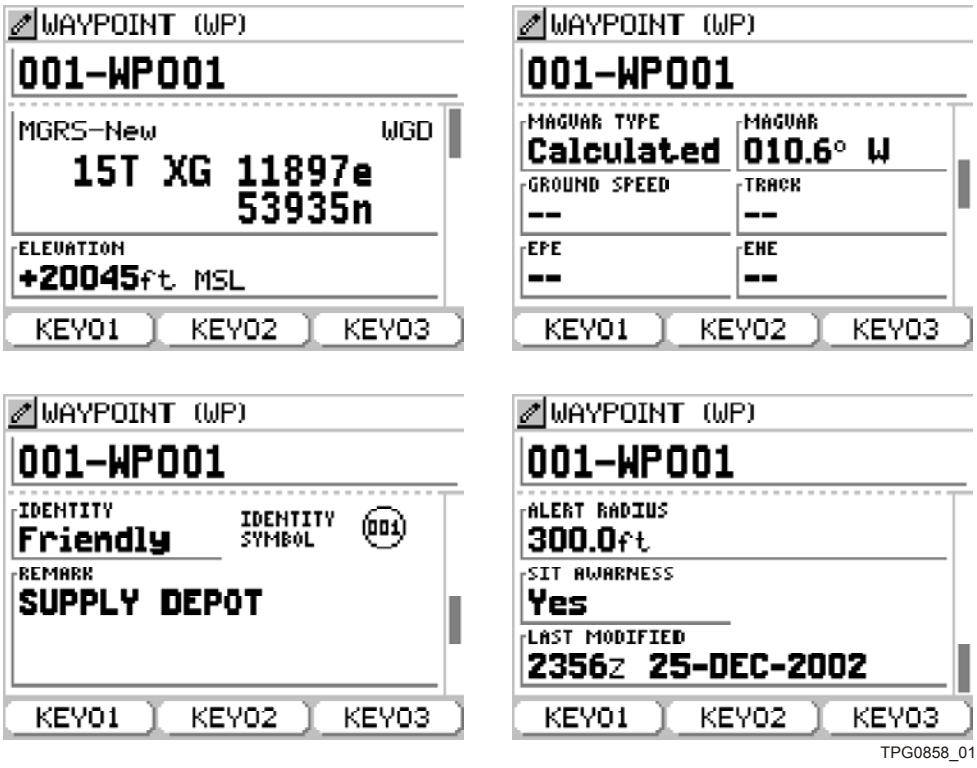


Figure 8-4. Waypoint Editor Page (Basic)

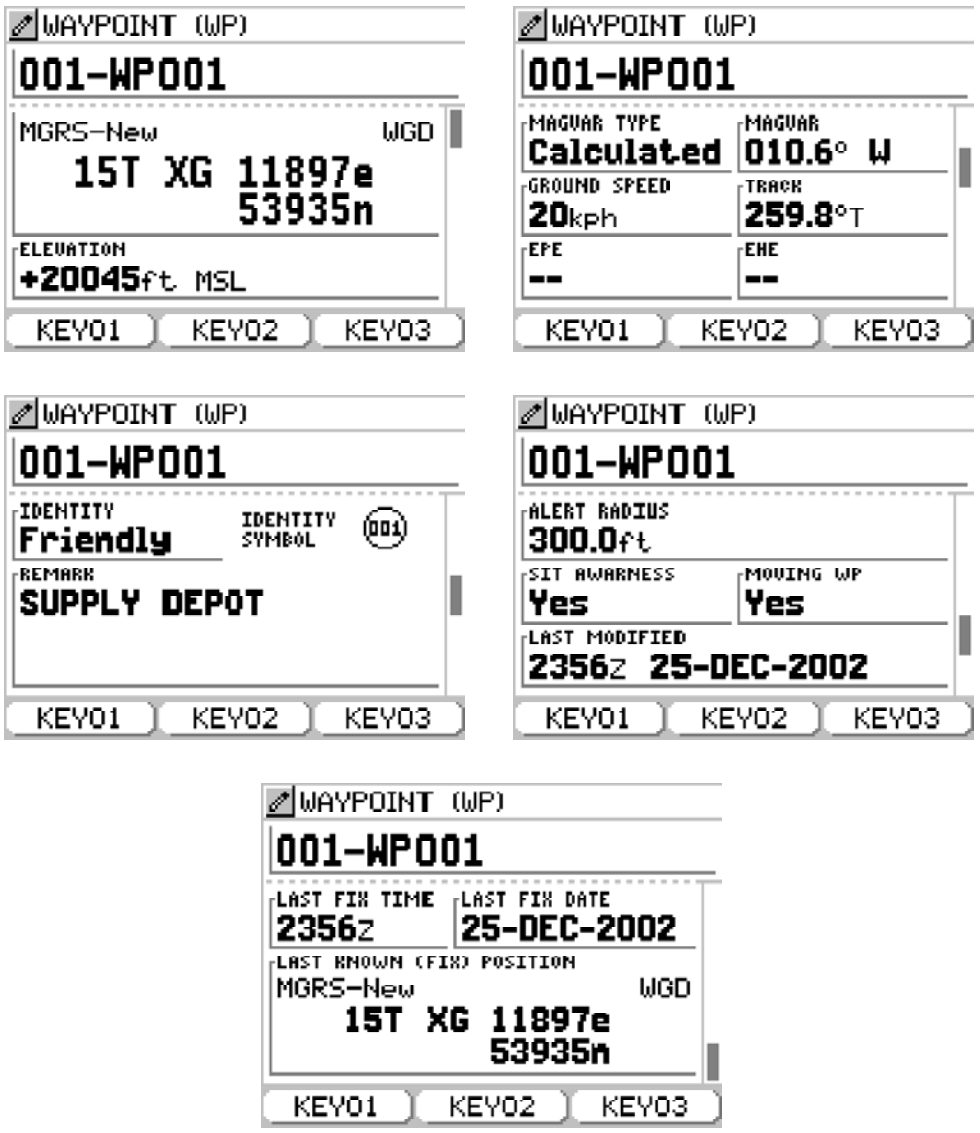


Figure 8-5. Waypoint Editor Page (Advanced)

8.3.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 8-6. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. If double dashes are displayed, information is not defined or is invalid. The following information describes the various fields contained in this page.

8.3.2.1. Waypoint Number and Name Field. Displays the waypoint number and name. Only the waypoint name is editable using up to ten characters. Field data format is XXX-NNNNNNNNNN, where X represents the waypoint number and N represents the name.

8.3.2.2. Position Field. Ensure the appropriate datum coordinate/grid system, and grid resolution are selected before using or editing position coordinates. For moving waypoints, position coordinates are computed using last known position (fix), last fix time, ground speed, and track. Use the following references for additional information.

- **Coordinate/grid system** — Appears in the upper left corner. Refer to Paragraph 10.2.2.1 for additional information. Refer to Paragraph 10.2.2.2 for grid resolution information.
- **Datum ID** — Appears in the upper right corner. Refer to Paragraph 10.2.2.4 for additional information.
- **Position coordinates** — Refer to Paragraph 6.2.21.15 for editor information.

For moving waypoints (advanced function set), the position coordinates are computed using last known position (fix), last fix time, ground speed, and track.

8.3.2.3. Elevation Field. The elevation field provides the waypoint elevation or vertical range from the surface of the earth measured from mean sea level (MSL) or datum (DTM). Field data format is +/- XXXXX, where X represents feet or meters.

8.3.2.4. MAGVAR Type Field. Displays the selected waypoint MAGVAR (magnetic variation) source as follows.

- **Calculated** — MAGVAR value is calculated using the World Magnetic Model (WMM).
- **Local** — An operator entered MAGVAR value is used.
- **None** — No MAGVAR value is available.

8.3.2.5. MAGVAR Field. Displays the waypoint magnetic variation (MAGVAR) value. The waypoint MAGVAR value (determined by the MAGVAR Type field) is used in calculations between the waypoint being edited and another waypoint or DAGR present position. If the MAGVAR Type field is set to Calculated, the MAGVAR field value is the calculated World Magnetic Model value at the time the waypoint was stored. The MAGVAR Type field must be set to Local before a MAGVAR value can be entered and then used by the operator. If the MAGVAR Type field is set to None, only double dashes appear in the MAGVAR field. Before using a value from this field, appropriate units and MAGVAR Type must be selected. Refer to Paragraph 10.2 for units information.

8.3.2.6. Ground Speed Field. Displays the ground speed as horizontal speed relative to the earth's surface. Zero (0) is displayed when speed is unknown or when moving too slow. Field data format is XXX, where X represents miles per hour, knots, or kilometers per hour.

8.3.2.7. Track Field. The track field provides the ground track or actual path on the earth's surface measured clockwise from the selected north reference (True, Magnetic, or Grid). Select appropriate units, as applicable, before editing track. Field data format is XXX.X (X represents degrees) or XXXX (X represents mils or strecks).

8.3.2.8. Estimated Position Error Field. Displays the estimated position error (EPE) as a ± value. EPE is valid only when the waypoint is created from a position fix. The operator selects units but cannot edit the field value. EPE field data format is N.N, NN, or NNN, where N represents miles, nautical miles, kilometers, feet, yards, or meters. Position data (horizontal and vertical) is estimated to be accurate to within the ± value.

8.3.2.9. Estimated Horizontal Error Field. Displays the estimated horizontal error (EHE) as a ± value. EHE is valid only when the waypoint is created from a position fix. The operator selects units but cannot edit the field value. EHE field data format is N.N, NN, or NNN, where N represents miles, nautical miles, kilometers, feet, yards, or meters. Position data (horizontal) is estimated to be accurate to within the ± value.

8.3.2.10. Identity Field. Displays the identity type of a waypoint as Unknown, Friendly, Hostile, or Neutral. Each identity type has an associated symbol used with the Situational Awareness page and Image Viewer page. The identity symbol is shown at the right side of the field. Refer to Paragraph 9.6.2.2 for more information.

8.3.2.11. Remark Field. Displays information describing the waypoint (up to forty characters for all 999 waypoints).

8.3.2.12. Alert Radius Field. Displays the waypoint alert radius value. During navigation, this value defines the range from a waypoint the DAGR must reach to recognize waypoint arrival. The NAV Setup page (refer to Paragraph 9.2) is used to enable a waypoint alert for waypoint arrival.

8.3.2.13. Sit (Situational) Awareness Field. Displays Yes or No. When Yes is selected, the waypoint appears on the Situational Awareness page (refer to Paragraph 9.6) if the page view is configured for operator selected waypoints. When No is selected, the waypoint does not appear on the Situational Awareness page as an operator selected waypoint.

8.3.2.14. Moving Waypoints Field (Advanced). Displays Yes or No. When Yes is selected, the waypoint is a moving waypoint. When No is selected, the waypoint is not a moving waypoint. The operator can assign up to five moving waypoints. The position of a moving waypoint is based upon its last fix position, fix time, ground speed, and track.

8.3.2.15. Last Modified Field. Displays the last time and date the waypoint was modified. The operator cannot edit this field. Field time data format is HHMMZ/L, where H represents hours, M represents minutes, and Z/L represents Zulu or Local. Field date data format is DD-MMM-YYYY, where D represents days, M represents months, and Y represents years.

8.3.2.16. Last Fix Time Field (Advanced). This field is available for moving waypoints only. Displays the time of the last waypoint position fix. This time is automatically updated when the last fix position is modified or can be edited by the operator. This data is used with the last known position fix, ground speed, and track to compute the current moving waypoint position. Field time data format is HHMMZ/L, where H represents hours, M represents minutes, and Z/L represents Zulu or Local.

8.3.2.17. Last Fix Date Field (Advanced). This field is available for moving waypoints only. Displays the date of the last waypoint position fix. This date is automatically updated when the last fix position is modified or can be edited by the operator. This data is used with the last known position fix, ground speed, and track to compute the current moving waypoint position. Field date data format is DD-MMM-YYYY, where D represents days, M represents months, and Y represents years.

8.3.2.18. Last Known (Fix) Position Field (Advanced). This field is available for moving waypoints only. Displays the last known waypoint position fix. This data can be edited by the operator. Last known position fix, fix time, ground speed, and track are used to compute the current moving waypoint position. Ensure the appropriate datum, coordinate/grid system, and grid resolution are selected before using or editing position coordinates. Use the following references for additional information.

- **Coordinate/grid system** — Appears in the upper left corner. Refer to Paragraph 10.2.2.1 for additional information. Refer to Paragraph 10.2.2.2 for grid resolution information.
- **Datum ID** — Appears in the upper right corner. Refer to Paragraph 10.2.2.4 for additional information.
- **Position coordinates** — Refer to Paragraph 6.2.21.15 for editor information.

8.3.3. How To Use The Waypoint Editor Page.

This page contains information for editing waypoints used for navigation. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting up data and changing field information. When a text editor is used, the menu key can be pushed to access a list of options (undo changes, save and exit, exit and no save, reset to default, and editor help). These options provide text editor shortcuts and pertain to the immediate function being performed (e.g., using a text editor).

8.3.3.1. The keystroke map is structured using the WP key to access the Waypoint Editor page. Prior to performing the following procedure(s), acquire the Waypoints page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight WP/Route/Alerts, then push the ENTER key.
3. Highlight Waypoints, then push the ENTER key. The Waypoints page is displayed.

a. Create a New Waypoint From User Input

(1) From the Waypoints page, push the MENU key. Highlight Create/New, then push the ENTER key. An editor lists all unused waypoints with the first unused waypoint highlighted. Highlight the desired unused waypoint, then push the ENTER key.

(2) The Waypoint Editor page displays the operator selected waypoint with current position information (if tracking satellites) or last known position.

(3) As required, individually highlight each of the page fields and revise with user information according to the following steps.

NOTE

Some fields are for status of information only, or cannot be edited by the operator.

(a) Push the ENTER key to revise information other than units of measure. This is done using a text editor, number editor, or choosing items from a list editor.

(b) Push the MENU key to revise units of measure/reference information of a field, if applicable. For example: If changing units for the Elevation field, perform the following steps.

1 Highlight the Elevation field, then push the MENU key.

2 Highlight Select Elevation Units, then push the ENTER key.

3 Highlight the desired elevation units, then push the ENTER key.

4 The page displays the highlighted field with the units of measure changed to the choice made.

5 As applicable, change other units of measure/references for other fields.

NOTE

Multiple fields may have the same or different units of measure choices. Fields with the same units of measure (e.g., two individual fields measured in metric numbers) will both be changed at the same time no matter what field is selected.

(4) After completing and reviewing all field content changes (with any field highlighted), push the MENU key. Highlight the desired selection from the following list, then push the ENTER key.

- **Save and Exit** — Briefly displays waypoint stored message. Display returns to the Waypoints page with the new waypoint information saved and highlighted.
- **Exit and No Save** — Display returns to the Waypoints page without saving the waypoint.
- **Edit Field** — Displays a field editor for the highlighted field.
- **Undo Changes** — Clears any changes made and display returns to the Waypoints Editor page for editing.
- **Help** — Displays help text for the highlighted field.

b. Edit a Waypoint

(1) From the Waypoints page, highlight the desired waypoint for editing, then push the ENTER key.

(2) The Waypoint Editor page displays the operator selected waypoint.

(3) As required, individually highlight each of the page fields and revise with user information according to the following steps.

NOTE

Some fields are for status information only or cannot be edited by the operator.

(a) Push the ENTER key to revise information other than units of measure. This is done using a text editor, number editor, or choosing items from a list editor.

(b) Push the MENU key to revise units of measure/reference information of a field, if applicable. For example: If changing units for the Elevation field, do the following steps.

1 Highlight the Elevation field, then push the MENU key.

2 Highlight Select Elevation Units, then push the ENTER key.

3 Highlight the desired elevation units, then push the ENTER key.

4 The page displays the highlighted field with the units of measure changed to the choice made.

5 As applicable, change other units of measure/references for other fields.

NOTE

Multiple fields may have the same or different units of measure choices. Fields with the same units of measure (e.g., two individual fields measured in metric numbers) will both be changed at the same time no matter what field is selected.

(4) After completing and reviewing all field content changes (with any field highlighted), push the MENU key. Highlight the desired selection from the following list, then push the ENTER key.

- **Save and Exit** — Briefly displays waypoint stored message. Display returns to the Waypoints page with the new waypoint information saved and highlighted.
- **Exit and No Save** — Display returns to the Waypoints page without saving the waypoint.
- **Edit Field** — Displays a field editor for the highlighted field.
- **Undo Changes** — Clears any changes made and display returns to the Waypoints Editor page for editing.
- **Help** — Displays help text for the highlighted field.

8.3.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 8-6 shows the keystroke map for the Waypoint Editor page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the WP/Route/Alerts submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

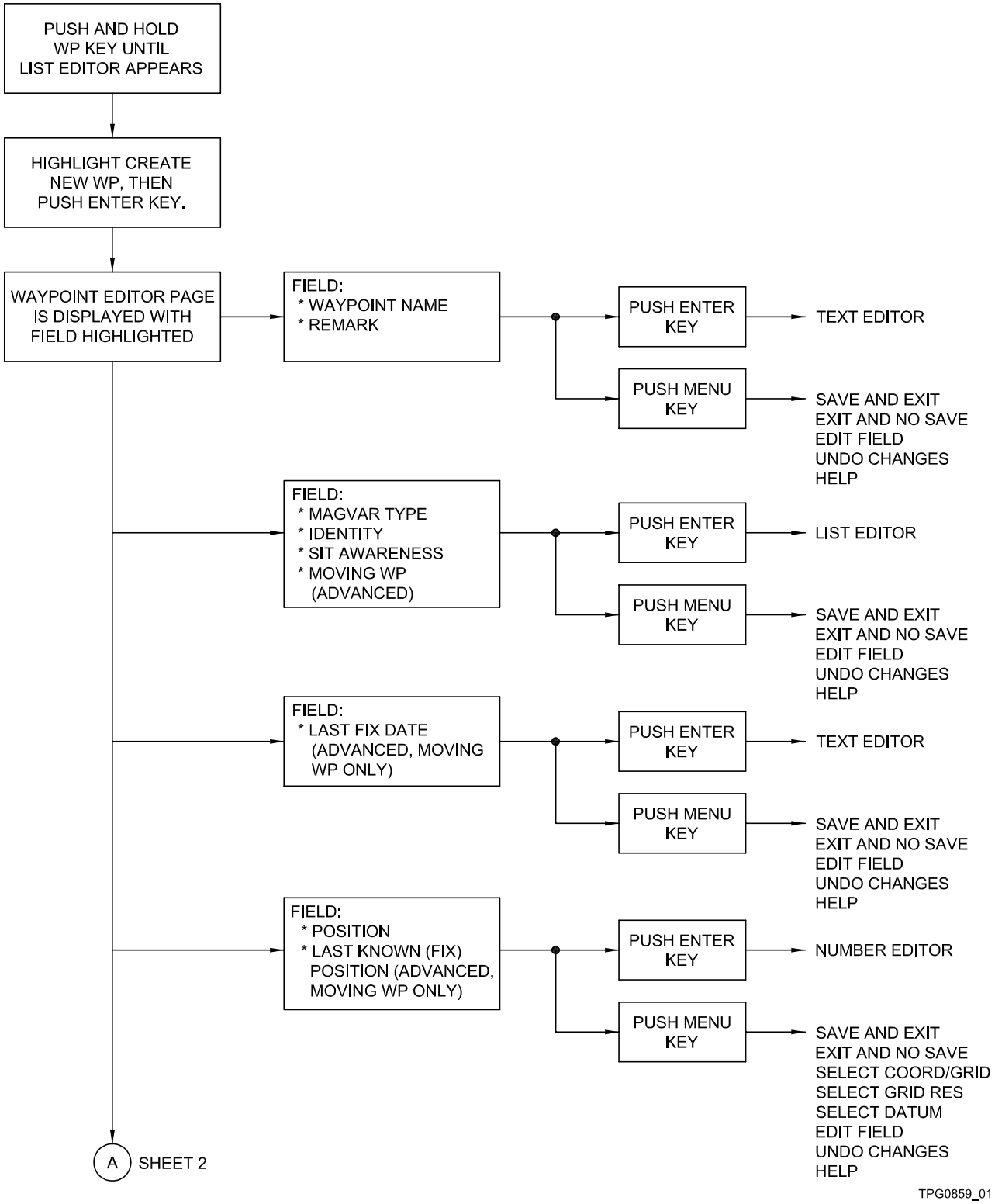


Figure 8-6. Waypoint Editor Page Keystroke Map (Sheet 1 of 3)

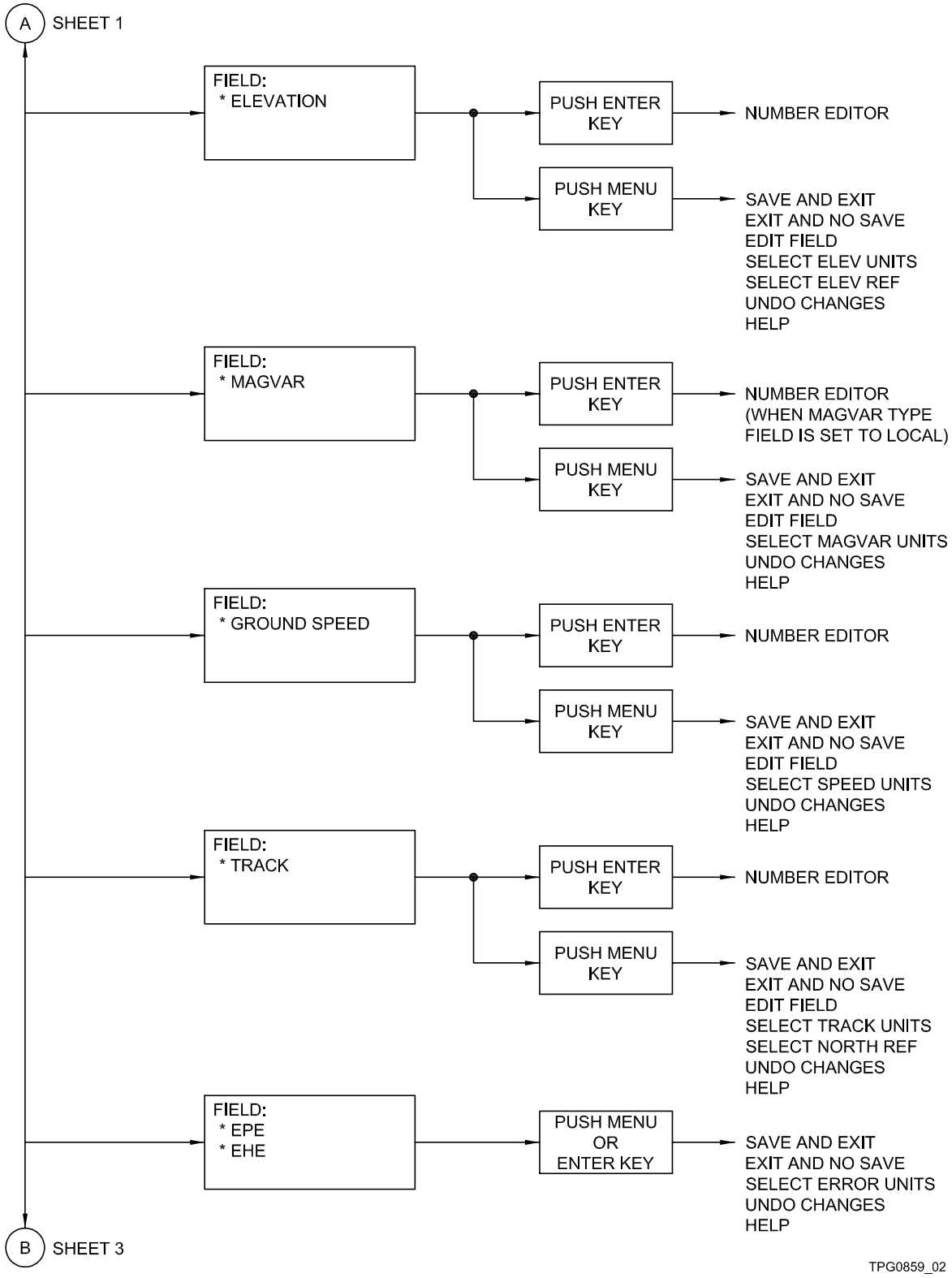


Figure 8-6. Waypoint Editor Page Keystroke Map (Sheet 2)

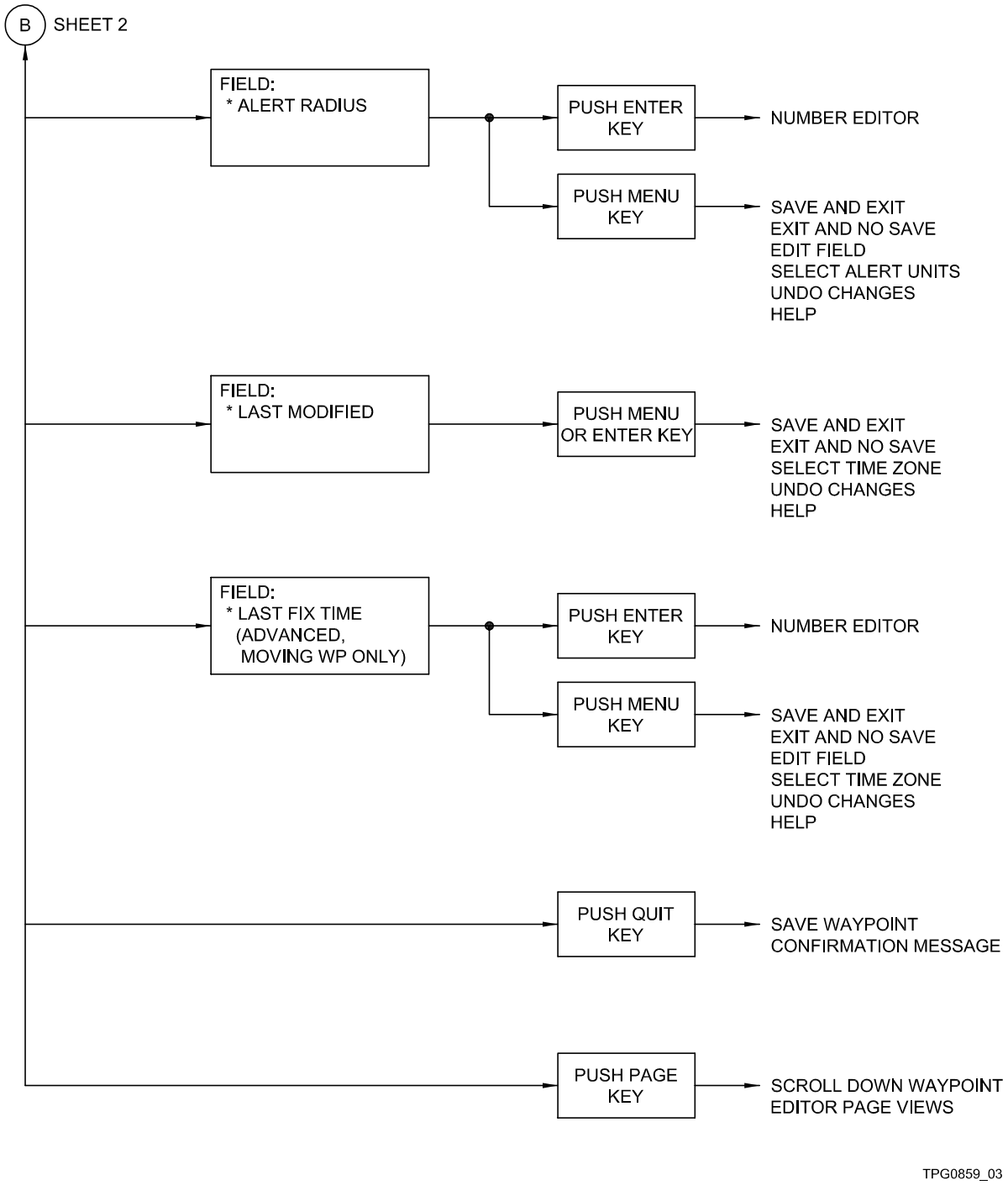


Figure 8-6. Waypoint Editor Page Keystroke Map (Sheet 3)

8.4. MARK A WAYPOINT.

CAUTION

Ensure the DAGR is tracking satellites and has established position before marking a current position waypoint (display stops blinking or Navigating is displayed on SV (Satellite Vehicle) Sky View page). When display data fields blink between black and gray text, the DAGR is not tracking satellites or has not yet acquired present position. Field data may be inaccurate and/or unavailable when the DAGR does not have a position fix.

8.4.1. Mark A Waypoint Function Description.

The Mark a WP operation is accessed through the push and hold function of the F1 function key (default Mark on toolbar), the push and hold function of the WP key, or from the WP/Routes/Alerts submenu. The mark a waypoint function stores current position coordinates (or last position if not tracking satellites), elevation, and datum into the waypoint database at the next available or selected waypoint number. These stored position coordinates remain the same unless edited by the operator. This capability is used to rapidly store position coordinates of specific events and locations.

8.4.1.1. The Mark a WP function is designed for use while the DAGR is actively tracking satellites, and will store current position data. The Mark a WP function can also be used while not tracking satellites, but will store position data that DAGR collected before satellite tracking capability was lost. The waypoint that the current position is to be stored in can be edited (name , remark or identity) using menu selections. When a waypoint is marked, the waypoint name changes to correspond with the waypoint number (e.g., If WP = 003, is marked, then name = MK003). If operator entered waypoint data is to overwrite or modify a current waypoint, the DAGR prompts the operator for confirmation prior to storing operator entered data. The mark a waypoint function message is shown in Figure 8-7. When storing the next available (unused) waypoint, the display shows To Store WP. When overwriting a selected waypoint, the display shows To Overwrite WP. The Man Overboard page is accessed using the mark a waypoint function message.

Figure 8-7. Mark A Waypoint

8.4.2. How To Use The Mark A Waypoint Function.

This function contains information used in creating current position waypoints only, and includes the option to set a man overboard waypoint (refer to Paragraph 8.5). Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting up data and changing field information. When a text editor is used, the menu key can be pushed to access a list of options (undo changes, save and exit, exit and no save, reset to default, and editor help). These options provide text editor shortcuts and pertain to the immediate function being performed (e.g., using a text editor). The keystroke map is structured using the WP key or the F1 function key (default Mark on toolbar), and not accessing from the Main Menu.

a. Mark a Waypoint

(1) Access the Mark a Waypoint function using one of the following three methods.

(a) From any display (except a message pop-up), push and hold the F1 function key (default Mark on toolbar).

(b) From any display (except a message pop-up), push and hold the WP key. Waypoint function choices are displayed. Highlight MARK a WP, then push the ENTER key.

(c) From any display (except a message pop-up), push the MENU key twice to access the Main menu. Highlight WP/Routes/Alerts from the main menu, then push ENTER. From the WP/Routes/Alerts submenu, Highlight Mark a WP, then push the ENTER key.

(2) The Mark Present Position message is displayed with choices to store or cancel the mark operation. Pushing the MENU key while displaying the Mark Present Position message accesses the mark menu for additional operator choices. After being selected, they operate as follows:

- **Man Overboard** — The present position is stored as a man overboard (MOB) waypoint and the MOB page is displayed. This menu selection functions the same as pushing and holding the WP key from the Mark Present Position message. Refer to Paragraph 8.5 for more information.
- **Select WP** — Displays a list of all waypoints with the first unused waypoint highlighted. Highlight the waypoint to be marked, then push the ENTER key. The Mark Present Position message is displayed.
- **Edit WP Name** — Displays a waypoint name text editor. After editing the name, highlight Save, then push the ENTER key. The Mark Present Position message is displayed.
- **Edit WP Remark** — Displays a waypoint remark text editor. After editing the remark, highlight Save, then push the ENTER key. The Mark Present Position message is displayed.
- **Select Identity** — Displays a waypoint identity list editor. After highlighting the desired identity type, push the ENTER key. The Mark Present Position message is displayed.
- **Store WP** — Performs mark a waypoint function same as pushing the ENTER key with the Mark Present Position message displayed.
- **Cancel Mark** — Cancels mark a waypoint function same as pushing the QUIT key with the Mark Present Position message displayed.
- **Message Help** — Displays help text.

(3) Push the ENTER key to store (or overwrite if applicable) the marked waypoint. The operator is prompted to confirm before any waypoints are overwritten. Push the QUIT key to cancel mark operation.

(4) After the waypoint is marked, a waypoint stored message is briefly displayed. Display returns to the previously viewed page.

(5) If desired, access the Waypoint Editor page and revise waypoint data (e.g. waypoint name, units of measure, waypoint identity).

(6) As desired, move to another position and mark another waypoint. Up to 999 waypoints can be stored.

b. Mark a Man Overboard Waypoint (refer to Paragraph 8.5 for more information)

(1) Access the Mark a Waypoint function using one of the following three methods.

(a) From any display (except a message pop-up), push and hold the F1 function key (default Mark on toolbar).

(b) From any display (except a message pop-up), push and hold the WP key. Waypoint function choices are displayed. Highlight MARK a WP, then push the ENTER key.

(c) From any display (except a message pop-up), push the MENU key twice to access the Main menu. Highlight WP/Routes/Alerts from the main menu, then push ENTER. From the WP/Routes/Alerts submenu, Highlight Mark a WP, then push the ENTER key.

(2) The Mark Present Position message is displayed.

(3) Push the right cursor control key. The present position is stored as a man overboard (MOB) waypoint and a waypoint stored message is briefly displayed. The stored waypoint includes the prefix MOB.

(4) The Man Overboard page is automatically displayed, and provides data for navigation back to the MOB waypoint.

8.4.3. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 8-8 shows the keystroke map for the mark a waypoint function. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information.

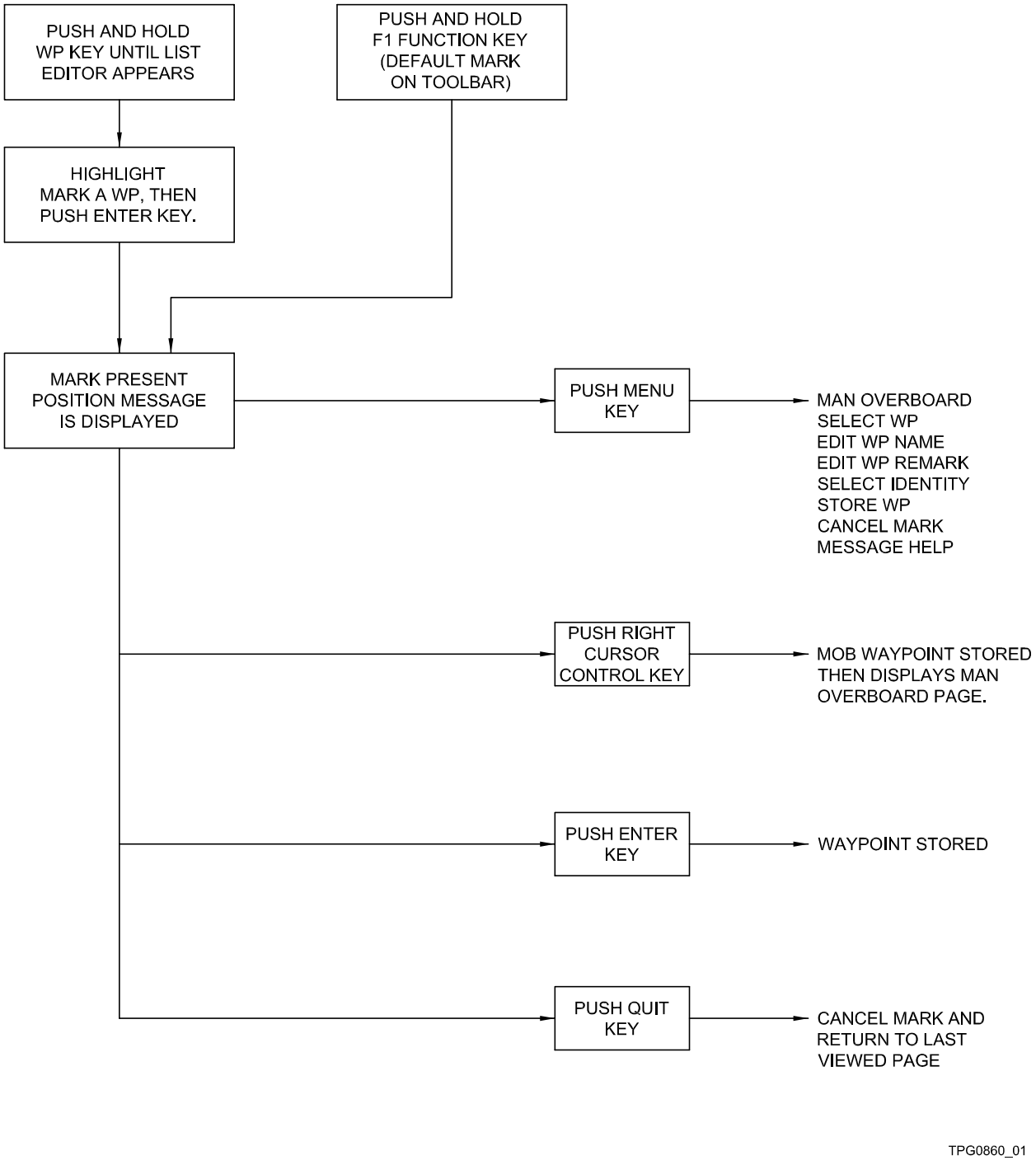


Figure 8-8. Mark A Waypoint Keystroke Map

8.5. MAN OVERBOARD PAGE.

CAUTION

Ensure the DAGR is tracking satellites and has established position before marking a current position waypoint (display stops blinking or Navigating is displayed on the SV Sky View page). When display data fields blink between black and gray text, the DAGR is not tracking satellites or has not yet acquired present position. Field data may be inaccurate and/or unavailable when the DAGR does not have a position fix.

8.5.1. Page Function.

The Man Overboard page is accessed from the Mark Present Position message using the right cursor control key. Refer to Figure 8-9. The Man Overboard page is typically used in retrieving personnel that have fallen from a moving vehicle, or to return to an item of interest observed in flight. Navigation pointer, azimuth, and range data fields are used for navigation back to a man overboard waypoint. After one or more MOB waypoints are created, the Man Overboard page continually displays data for the last MOB waypoint created.

NOTE

To the right of the page title, DATUM appears when the current datum is not WGS-84. GC appears when the navigation calculation method is Great Circle (versus Rhumb Line). Refer to Paragraph 10.2 for field units information as required.

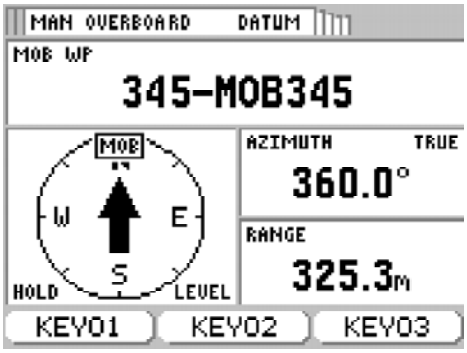


Figure 8-9. Man Overboard Page

8.5.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 8-10. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

8.5.2.1. MOB Waypoint Field. Displays the number and name of the man overboard (MOB) waypoint. Range, Azimuth and Pointer field data are in reference to this waypoint. MOB is applied as a prefix to the waypoint name. Field data format is XXX-MOBNNNNNNN, where X represents the waypoint number and N represents the waypoint name (default is MOB followed by waypoint number). If the waypoint is invalid, double dashes appear in the field instead of the waypoint number and name.

8.5.2.2. Pointer Field. Displays the current ground track to the man overboard waypoint. The compass dial rotates so the top of the dial indicates the current ground track. The arrow points the azimuth of the current navigation waypoint as shown. If the DAGR is moving too slow to compute track, and the internal compass is disabled, the last known track is used. If the DAGR is moving too slow to compute track for a specified amount of time, and the internal compass is enabled, the internal compass activates to provide track. Refer to Paragraph 10.3 for additional internal compass information. The bottom of the field displays HOLD LEVEL when

the internal compass is in use. The appropriate north reference and MAGVAR type (if applicable) must be selected before using the pointer. Refer to Paragraph 10.2 for additional information. If the waypoint is invalid, no arrow appears.

8.5.2.3. Range Field. Displays the range from the current DAGR position to the man overboard waypoint excluding elevation differences. Field data format is XXXX.XX or XXXX.X, where X represents miles, nautical miles, kilometers, feet, yards, or meters. If the waypoint is invalid, double dashes appear in the field.

8.5.2.4. Azimuth Field. Provides the azimuth from the DAGR current position to the man overboard waypoint as measured clockwise from the selected north reference (True, Magnetic, or Grid). Field data format is XXX.X (X represents degrees) or XXXX (X represents mils or strecks). If the waypoint is invalid, double dashes appear in the field.

8.5.3. How To Use The Man Overboard Page.

The Man Overboard page contains navigation information using the Direct To navigation method described in the following procedure. The Man Overboard waypoints are set using the WP key from any page. The keystroke map is structured using the WP key and not accessing from the Main Menu. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting up data and changing field information. The following procedures assume:

- The DAGR is tracking satellites and has acquired present position. (refer toParagraph 5.4.2).
- The internal compass has been enabled and oriented (refer to Paragraph 9.3.3 and Paragraph 9.3.4).

a. Set Up Units/References

(1) Prior to performing navigation, view the page fields to determine if changes to units of measure or references used in the fields are required (metric or decimal, mils or degrees, true or magnetic, etc.).

(2) When field unit or reference changes are required, highlight the desired field, then push the MENU key.

(3) Highlight the desired type of units or reference to change (e.g., Select Range Units), then push the ENTER key.

(4) Highlight the desired selection, then push the ENTER key.

(5) The page displays all associated field information with the change made.

(6) If required, repeat the procedure for the remaining selections.

b. Mark a Man Overboard Waypoint

(1) Access the Mark a Waypoint function using one of the following three methods.

(a) From any display (except a message pop-up), push and hold the F1 function key (default Mark on toolbar).

(b) From any display (except a message pop-up), push and hold the WP key. Waypoint function choices are displayed. Highlight MARK a WP, then push the ENTER key.

(c) From any display (except a message pop-up), push the MENU key twice to access the Main menu. Highlight WP/Routes/Alerts from the main menu, then push ENTER. From the WP/Routes/Alerts submenu, Highlight Mark a WP, then push the ENTER key.

(2) The Mark Present Position message is displayed.

NOTE

Pushing the MENU key will also access the man overboard function from the Mark Present Position message.

(3) Push the right cursor control key. The present position is stored as a man overboard (MOB) waypoint and a waypoint stored message is briefly displayed. The stored waypoint includes the prefix MOB.

(4) The Man Overboard page is automatically displayed and provides data for navigation back to the MOB waypoint.

NOTE

The Man Overboard page is exited using the POS key or toolbar function keys.

c. Man Overboard Navigation

CAUTION

Prior to a mission, manually enable and orient the internal compass. Failure to do this can result in inaccurate DAGR track data when the DAGR is not moving or is moving slowly. For more information, refer to the Internal Compass page, Paragraph 10.3.

(1) With the Man Overboard page displaying the MOB waypoint, azimuth, and range data, travel the azimuth pointed by the Pointer field arrow. The compass dial rotates so the top of the dial indicates the current ground track.

(2) If the DAGR internal compass is active, Hold Level appears at the bottom of the Pointer field. The internal compass activates when moving below a preset speed for a preset amount of time (refer to the Internal Compass page Paragraph 10.3).

(3) While moving towards the destination waypoint, the Range field value steadily decreases and the Azimuth field value changes.

(4) Upon arrival at the MOB waypoint, the DAGR does not prompt the operator for confirmation.

NOTE

The Man Overboard page is exited using the POS key or toolbar function keys.

8.5.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 8-10 shows the keystroke map for the Man Overboard page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts with pushing and holding the WP key. When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

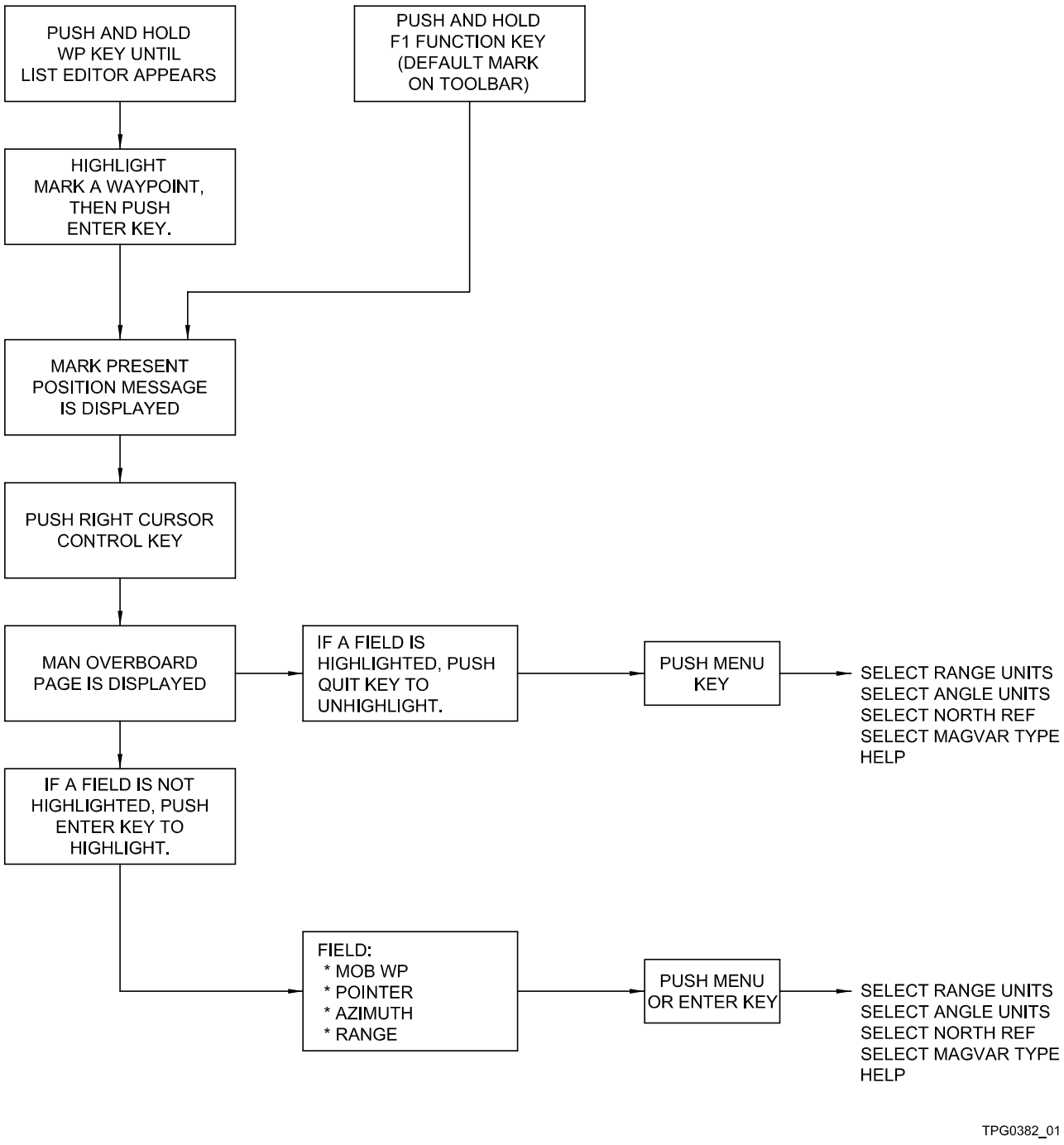


Figure 8-10. Man Overboard Page Keystroke Map

8.6. RANGE BETWEEN WAYPOINTS PAGE.

CAUTION

If the DAGR is not tracking satellites or has no position fix, the displayed position data blinks between gray and black to notify the operator. Field data may be inaccurate and/or unavailable when the DAGR does not have a position fix.

8.6.1. Page Function.

The Range Between Waypoints page is accessed from the WP/Routes/Alerts submenu. The Range Between Waypoints page calculates and displays parameter differences between any two stored waypoints or between present position and a waypoint. The points used are defined in the From WP and To WP fields in reference to north reference (True, Magnetic, or Grid). The two waypoints selected and calculation data are not saved if the DAGR is turned off. Select appropriate units and calculation type (Advanced) before using calculated values (refer to Figure 8-13). Fields display double dashes if data is invalid or undefined. The operator edits only the From WP and To WP fields. The page shown in the Figure 8-11 is using the basic function set. The page shown in Figure 8-12 is using the advanced function set. When using the advanced function set, additional fields are provided as described in the following paragraphs. All fields are viewed using vertical scrolling.

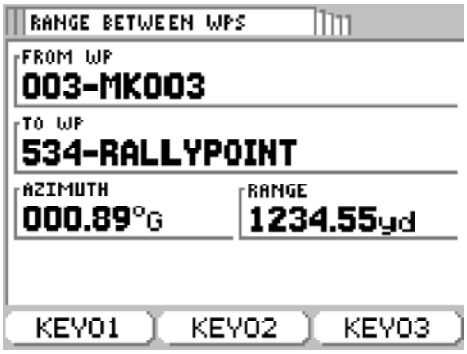


Figure 8-11. Range Between Waypoints Page (Basic)

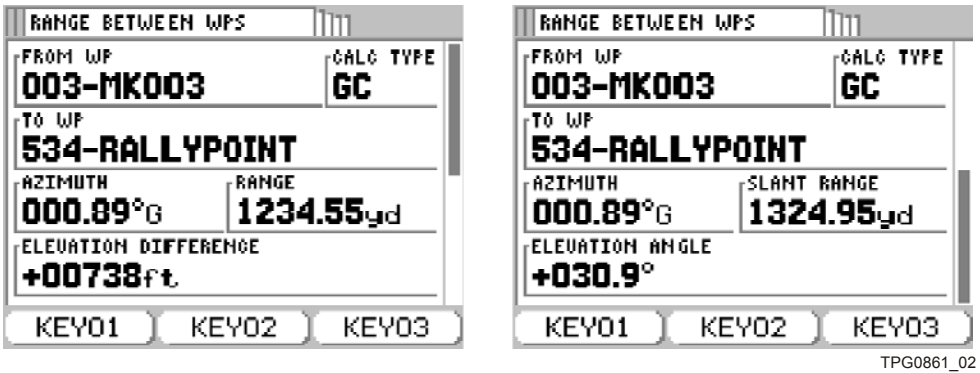


Figure 8-12. Range Between Waypoints Page (Advanced)

8.6.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 8-13. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

NOTE

Azimuth, range, and elevation data displayed in the page fields is based on the selected calculation type of the Calc Type field (Advanced).

8.6.2.1. From WP Field. Displays the starting (source) waypoint for the calculation. Present position (000) is displayed until edited by the operator. Field data format is XXX-NNNNNNNNNN, where X represents the waypoint number (001 to 999) and N represents the waypoint name (up to ten characters).

8.6.2.2. To WP Field. Displays the ending (destination) waypoint for the calculation. The first used waypoint is displayed until edited by the operator. Field data format is XXX-NNNNNNNNNN, where X represents the waypoint number (001 to 999) and N represents the waypoint name (up to ten characters).

8.6.2.3. Azimuth Field. Displays the azimuth from the From WP to the To WP as measured clockwise from the selected north reference (True (T), Magnetic (M), or Grid (G)). North is referenced as 360 degrees, 6400 mils, or 6300 strecks. Field data format is XXX.XX (X represents degrees) or XXXX.X (X represents mils or strecks).

8.6.2.4. Range Field. Displays the range from the From WP to the To WP. The operator cannot edit this field other than to select units and north reference. Field data format is XXXX.XX or XXXX.X, where X represents miles, nautical miles, kilometers, feet, yards, or meters.

8.6.2.5. Calc Type Field (Advanced). Displays the method (Rhumb Line (default) or Great Circle) used for calculating navigation information.

- **Rhumb Line (RL)** — Produces constant compass directions and allows lines of latitude to be used as paths.
- **Great Circle (GC)** — Produces the shortest range between the waypoints, but the compass direction of travel may change due to the curvature of the earth.

8.6.2.6. Elevation Difference Field (Advanced). Displays the difference between the elevation of the From WP and the elevation of the To WP (positive up). Field data format is +/- XXXXX, where X represents feet or meters.

8.6.2.7. Slant Range Field (Advanced). Displays the range from the From WP to the To WP including elevation differences. Field data format is XXXX.XX, where X represents miles, nautical miles, kilometers, feet, yards, or meters.

8.6.2.8. Elevation Angle Field (Advanced). Displays the elevation angle from the From WP to the To WP. Field data format is +/- XXX.XX (X represents degrees) or XXXX.X (X represents mils or strecks).

8.6.3. How To Use The Range Between Waypoints Page.

This page contains information used to calculate information between two waypoints stored in the DAGR. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting up data and changing field information. Before acquiring data between two waypoints, units information should be established according to use preference. The units information is established on a page basis with or without a field highlighted. Select appropriate units before entering field data for calculation.

8.6.3.1. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight WP/Route/Alerts, then push the ENTER key.
3. Highlight Range Between Waypoints, then push the ENTER key. The Range Between Waypoints page is displayed.

a. Set Up Units/References

(1) Prior to entering waypoints for calculation, view the page fields to determine if changes to units of measure or references used in the fields are required (metric or decimal, mils or degrees, true or magnetic, etc.).

(2) To change field units or references (with or without any fields selected), push the MENU key.

(3) Highlight the desired type of units or reference to change (e.g., Select Range Units), then push the ENTER key.

(4) Highlight the desired selection, then push the ENTER key.

(5) The page displays all associated field information with the change made.

(6) If required, repeat the procedure for the remaining selections.

(7) If required, select calculation type (Advanced).

(a) Highlight the Calc Type field, then push the ENTER key.

(b) Highlight the desired selection, then push the ENTER key. The page displays the Calc Type field with the change made.

b. Enter Waypoints and Calculate Data

(1) Unless altered by the operator, the From WP field displays 000-Pres Pos (DAGR present position). If the From WP is to remain 000, skip to step (4). If the From WP field is to be changed, highlight the From WP field, then push the ENTER key.

(2) Highlight the desired waypoint, then push the ENTER key.

(3) The page displays the From WP field with the change made.

(4) Highlight the To WP field, then push the ENTER key.

(5) Highlight the desired waypoint, then push the ENTER key.

(6) The page displays the To WP field with the change made.

(7) The DAGR calculates and displays the selected waypoints data in the remaining fields.

8.6.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 8-13 shows the keystroke map for the Waypoints page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Range Between Waypoints page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the WP/Route/Alerts submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

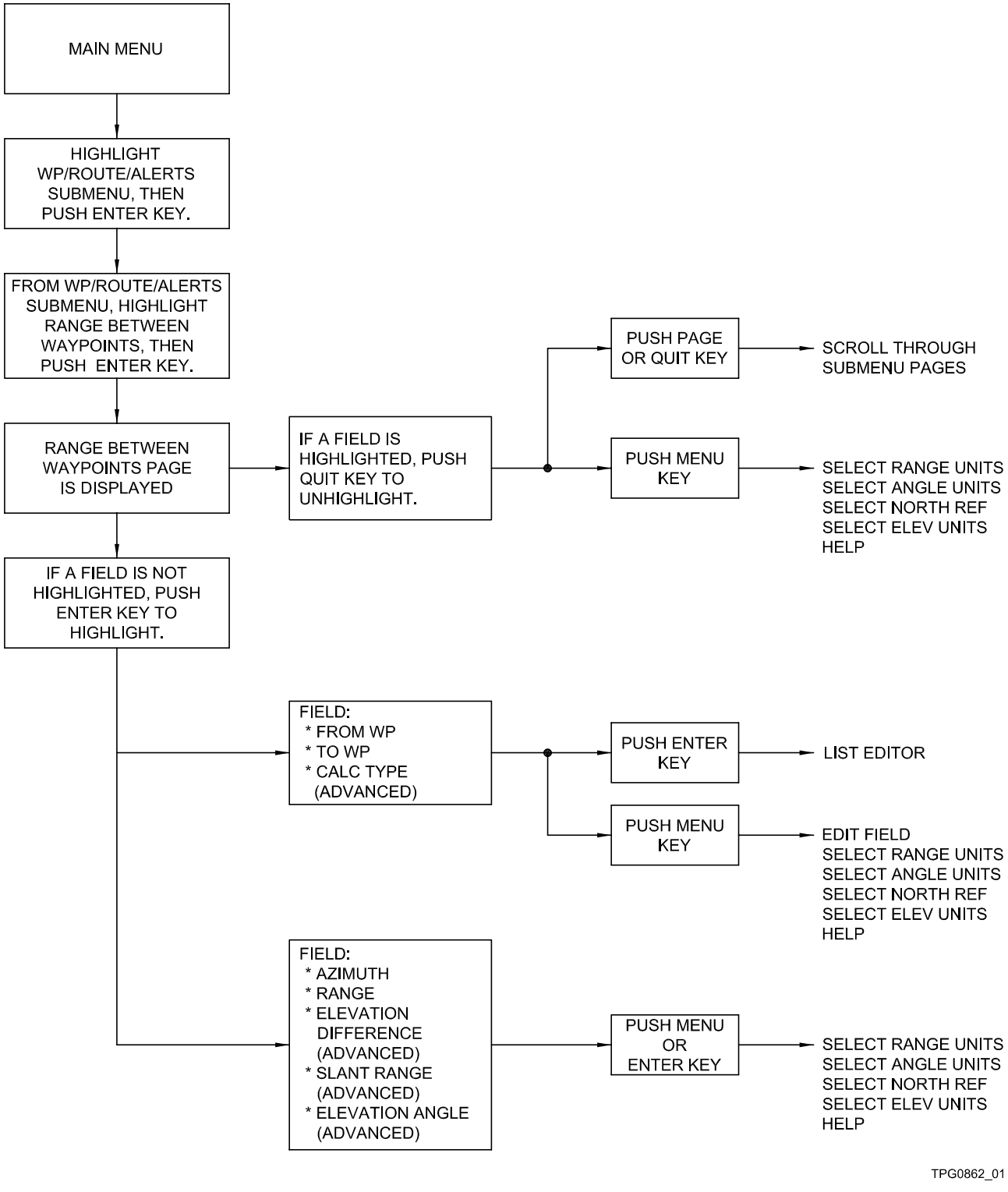


Figure 8-13. Range Between Waypoints Keystroke Map

8.7. ROUTES PAGE.

8.7.1. Page Function.

The Routes page is accessed from the WP/Routes/Alerts submenu. The Routes page provides a table that lists all routes stored in DAGR. Capabilities are provided to create new routes, edit routes (using Route Editor page) clear routes, copy routes, and calculate route length. These operations are described in the following paragraphs. The Route Editor page is accessed from the Routes page. Vertical scrolling is used to view all routes. If a route is undefined or invalid, double dashes appear in the route name and legs columns of the table. The table rows wrap from the last row to the first row (or vice versa) when scrolling through the table. The Routes page is shown in Figure 8-14. The route list includes the following information for each route:

- **NUM** — Displays the route number (01 through 15).
- **Route Name** — Displays the route name of up to ten characters.
- **Legs** — Displays the number of route legs (1 to 1000). This quantity matches the number of waypoints in a route.

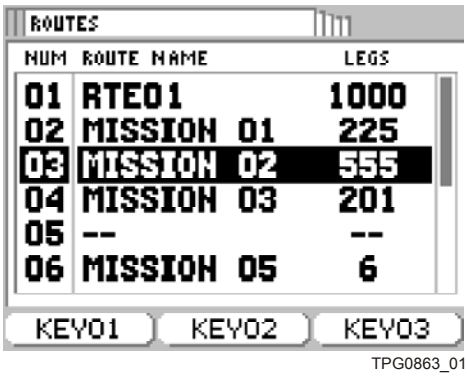


Figure 8-14. Routes Page

8.7.2. Page Descriptions.

Routes page menu functions are described in the following list. Refer to Paragraph 8.7.3 on how to use the Routes page.

- **Create** — Provides a list editor with choices for creating a route. A route can be created using the Route Editor page (refer to Paragraph 8.8). Routes can also be created from a range of waypoints, all marked waypoints, all automarked waypoints, or all marked and automarked waypoints.
- **Edit Route** — Displays the Route Editor page for editing the selected route. Refer to Paragraph 8.8 for additional information.
- **Copy/Clear** — Provides copy and clear route functions. Copies a route to another route. Clears a route, a range of routes, or all routes. Operator confirmation is required prior to the DAGR overwriting or clearing any existing route.
- **Calculate Length** — Calculates the sum length of all route legs.
- **Navigate Route** — Displays the NAV Pointer page. Refer to Paragraph 9.3 for additional information.
- **Help** — Displays help text.

8.7.3. How To Use The Routes Page.

This page contains information used in creating a leg of a route (range from one waypoint to an ending waypoint, and defined by the ending waypoint), creating entire routes, editing, and using routes used for navigation. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting up data and changing field information.

8.7.3.1. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.

2. Highlight WP/Route/Alerts, then push the ENTER key.
3. Highlight Routes, then push the ENTER key. The Routes page is displayed.

a. Create a New Route Using the Route Editor Page. Refer to Paragraph 8.8.3, procedure a., Create a New Route.

b. Create a New Route Using a Range of Waypoints, Marked Waypoints, or Automarked Waypoints

(1) From the Routes page, highlight the desired new route number, or if the highlighted route is not changed, the first unused route number will be automatically be used. Push the MENU key.

(2) Highlight Create, then push the ENTER key.

(3) Multiple options for creating routes from waypoints are provided. Highlight the desired option, then push the ENTER key, then perform the selected option as follows.

- **Create/New** — Not applicable to this procedure. Refer to procedure a.
- **From Range** — Highlight the first waypoint for the range and push the ENTER key. Highlight the last waypoint for the range and push the ENTER key. Briefly displays a message the DAGR is working.
- **From All MK WPs** — Briefly displays a message the DAGR is working while creating a route from all marked waypoints. The route is displayed with waypoints shown in ascending order based on the date and time the waypoint was created.
- **From All AMK WPs** — Briefly displays a message the DAGR is working while creating a route from all automarked waypoints. The route is displayed with waypoints shown in ascending order based on the date and time the waypoint was created.
- **From MK and AMK** — Briefly displays a message the DAGR is working while creating a route from all marked and automarked waypoints. The route is displayed with waypoints shown in ascending order based on the date and time the waypoint was created.

(4) The Route Editor page displays the new route.

(5) After the route is created, with any field highlighted, push the MENU key. Highlight the desired selection from the following list, then push the ENTER key.

- **Save and Exit** — Briefly displays route stored message. Display returns to the Routes page with the new route information highlighted.
- **Exit and No Save** — Display returns to the Routes page without saving the route.
- **Maximize/Minimize Table** — Display returns to the Routes page with the route table maximized (displaying five routes at once) or minimized (displaying three routes at once).
- **Edit Field** — Displays a field editor for the highlighted field.
- **Undo Changes** — Clears any changes made and display returns to the Route Editor page for editing.
- **Help** — Displays help text for the highlighted field.

(6) Repeat procedure, as required, to create multiple routes using the various options.

(7) To edit the route, refer to the following Edit a Route procedure.

c. Edit a Route

(1) From the Routes page, highlight the desired route for editing. Push the ENTER key.

(2) The Route Editor page displays the operator selected route. The fields of the Route Editor page are used to edit the route. Refer to Paragraph 8.8 for Route Editor page information.

d. Copy and Paste a Route

(1) From the Routes page, highlight the desired route to copy **from**. Push the MENU key.

(2) Highlight Copy/Clear, then push the ENTER key.

(3) Highlight Copy Route, then push the ENTER key. The route is now stored in the DAGR clipboard and ready to paste to other routes as desired. The display returns to the Routes page.

(4) Highlight the desired route to paste **to**.

(5) Push the MENU key.

(6) Highlight Copy/Clear, then push the ENTER key.

(7) Highlight Paste Route, then push the ENTER key.

(8) If pasting to an unused route, a storage confirmation message is briefly displayed. If pasting to a used route, the operator is prompted for confirmation to overwrite and a storage confirmation message is briefly displayed.

(9) The DAGR returns to the Routes page, highlighting the route pasted **to**.

(10) Verify the route pasted to name is RTEXX, where X represents the route number pasted **to**.

(11) Use the Route Editor page (refer to Paragraph 8.8) to change the route name or other fields if desired.

(12) Repeat steps (4) through (11) of this procedure for pasting the copied route to additional routes.

e. Clear Routes

(1) From the Routes page, highlight a desired route to clear if clearing a single route. If clearing a range of routes, highlighting a route is not necessary. Push the MENU key.

(2) Highlight Copy/Clear, then push the ENTER key.

(3) Multiple options for clearing routes are provided. Highlight the desired option, then push the ENTER key, then perform the selected option as follows.

- **Clear Route** — The operator is prompted for confirmation to clear the route.
- **Clear Range** — Enter the route from/to number range, then push the ENTER key. The operator is prompted for confirmation to clear the routes.
- **Clear All** — The operator is prompted for confirmation to clear all routes.

(4) The DAGR returns to the Routes page.

(5) View the page to verify cleared routes are no longer listed.

f. Calculate Route Length

(1) From the Routes page, highlight a desired route to calculate length. Push the MENU key.

(2) Highlight Calculate Length, then push the ENTER key.

(3) The route length is displayed. Push the ENTER key to acknowledge.

(4) DAGR returns to the Routes page.

g. Route Navigation

(1) From the Routes page, highlight the desired route for navigation, then push the MENU key.

(2) Highlight Navigate Route, then push the ENTER key.

(3) The NAV Pointer page displays the operator selected route using Route navigation method. The Pointer field arrow points the azimuth to the first route leg ending waypoint. Refer to Paragraph 9.3 for NAV Pointer page information.

8.7.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 8-15 shows the keystroke map for the Routes page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Routes page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the WP/Route/Alerts submenu.

- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

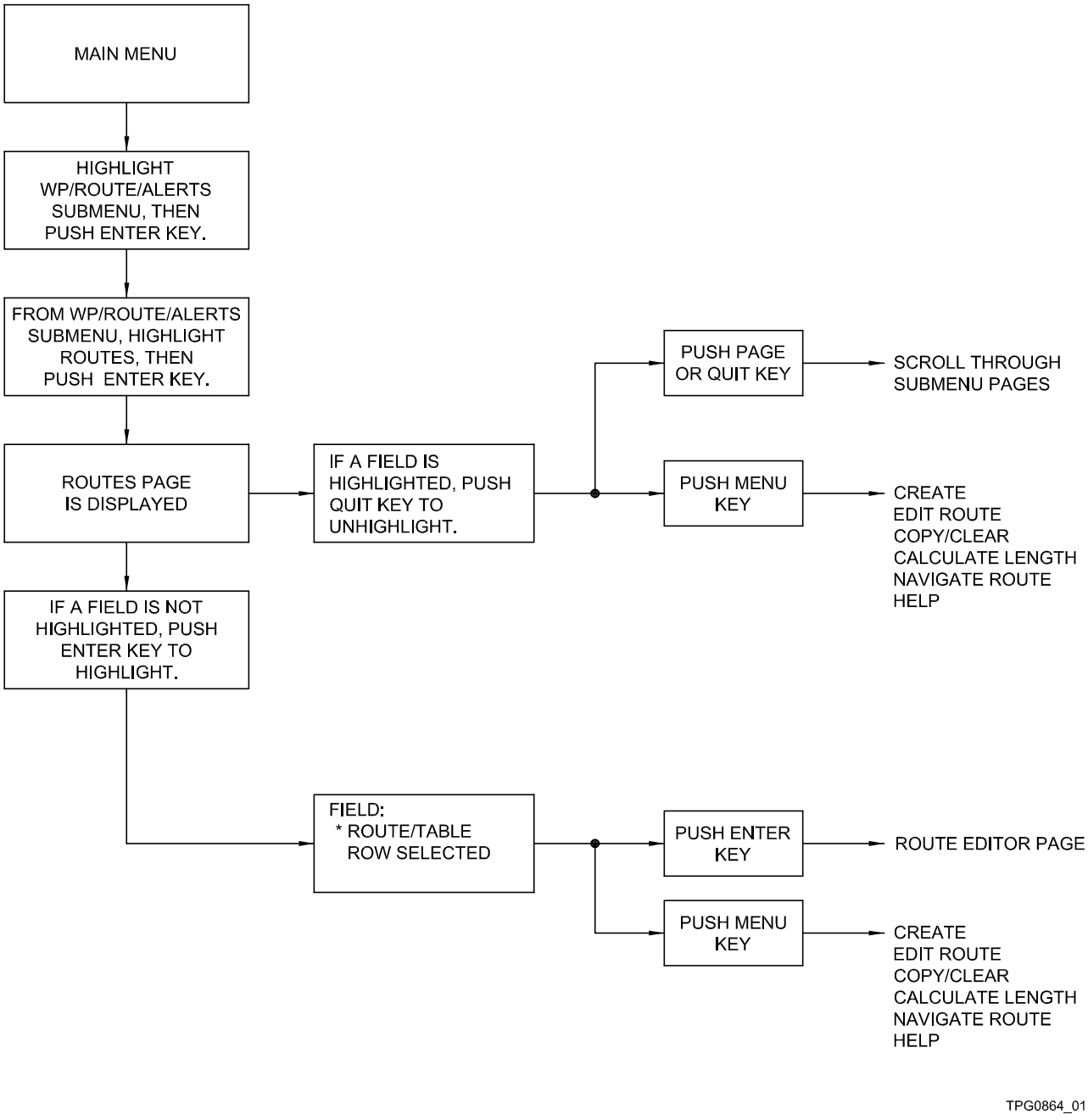


Figure 8-15. Routes Page Keystroke Map

8.8. ROUTE EDITOR PAGE.

8.8.1. Page Function.

The Route Editor page is accessed using the Routes page and is not accessed from a submenu. The Route Editor page is used in constructing new routes or editing existing routes. When the Route Editor page is initially accessed, the number and name field is highlighted for scrolling to the desired content. Select appropriate units for fields, as applicable, before using page field data. Refer to the keystroke map in Figure 8-18 and Paragraph 10.2 for additional information on selecting units. Page fields and route table are described in the following paragraphs. The route table can be minimized or maximized to allow desired viewing of route leg information. The Route Editor page is shown in Figure 8-16 with the table minimized. The Route Editor page is shown in Figure 8-17 with the table maximized. When maximized, the Alert Radius and Sit (Situational) Awareness fields do not appear.

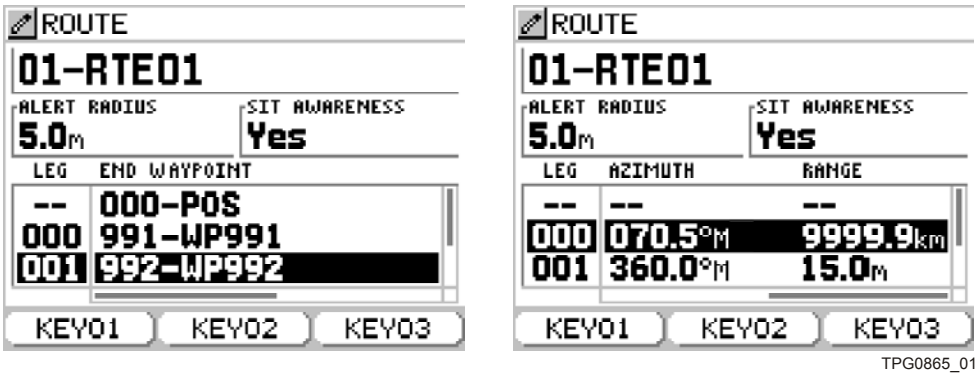


Figure 8-16. Route Editor Page, Minimized Table

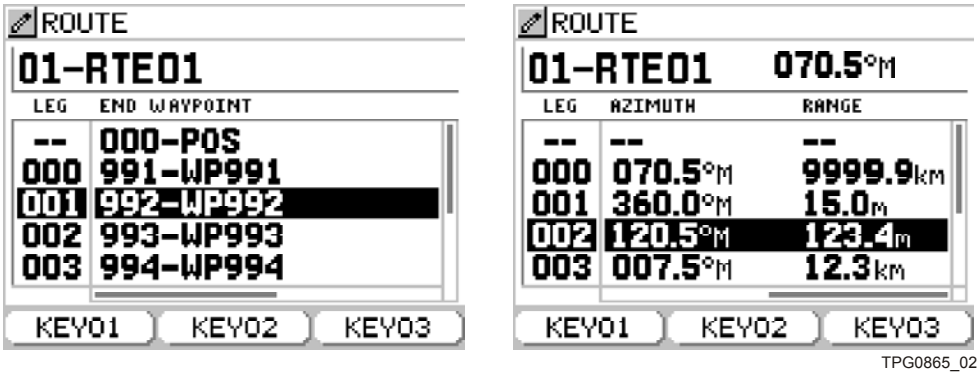


Figure 8-17. Route Editor Page, Maximized Table

8.8.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 8-18. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

8.8.2.1. Route Number and Name Field. Displays the route number and name of up to fifteen routes. Only the route name is editable using up to ten characters. Field data format is XX-NNNNNNNNNN, where X represents the route number (01 to 15) and N represents the route name.

8.8.2.2. Alert Radius Field. Displays the route leg end point alert radius value. This value defines the radius around the ending waypoint of a route leg. During navigation, when the DAGR reaches the radius, it recognizes the end of a route leg is near. The NAV Setup page (refer to Paragraph 9.2.2.9) is used to select the route leg advance mode.

8.8.2.3. Sit (Situational) Awareness Field. Displays Yes or No. When Yes is selected, the route appears on the Situational Awareness page if the page view is configured for operator selected routes (refer to Paragraph 9.6). When No is selected, the route does not appear on the Situational Awareness page as an operator selected route.

8.8.2.4. Route Leg Table. Displays individual route leg information for up to 1000 legs. The top row of the Route Leg Table has end waypoint 000–POS (representing present position) and leg – –. View all table data using vertical and horizontal scrolling. Undefined rows have double dashes appearing in place of data. When the route displayed is currently being used for navigation, the current navigation route leg number is displayed inside a box. Table columns provide information as follows:

- **Leg** — Displays the leg number of 000 up to 999. Consists of the range from the leg starting point (present position or prior end waypoint) to an end waypoint, and defined by the end waypoint.
- **End Waypoint** — Displays the waypoint number and name ending the route leg. Data format is XXX-NNNNNNNNNN, where X represents the waypoint number, and N represents the waypoint name of up to ten characters.
- **Azimuth** — Displays the azimuth from the leg starting point to the end waypoint as measured clockwise from the selected north reference (True, Magnetic, or Grid). North is referenced as 360 degrees, 6400 mils, or 6300 strecks. Data format is XXX.X (X represents degrees) or XXXX (X represents mils or strecks).
- **Range** — Displays the range (or length) of the leg. Data format is XXXX.XX or XXXX.X, where X represents miles, nautical miles, kilometers, feet, yards, or meters.

8.8.3. How To Use The Route Editor Page.

This page contains information used to configure and set up routes used for navigation. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting up data and changing field information. When a text editor is used, the menu key can be pushed to access a list of options (undo changes, save and exit, exit and no save, reset to default, and editor help). These options provide text editor shortcuts and pertain to the immediate function being performed (e.g., using a text editor). If while using the following procedures the user decides not to complete the operation or move to another page, the QUIT key can be pushed repeatedly to back out of the route operation. A confirmation message will be displayed to save and exit, or exit and not save the route. If using the QUIT function, the user must note that if the route is saved, it may not be complete.

8.8.3.1. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight WP/Route/Alerts, then push the ENTER key.
3. Highlight Routes , then push the ENTER key. The Routes page is displayed.

a. Create a New Route

(1) From the Routes page, highlight the desired new route number, or if the highlighted route is not changed, the first unused route number will be automatically be used. Push the MENU key.

(2) Highlight Create, then push the ENTER key.

(3) Highlight Create/New, then push the ENTER key.

(4) The Route Editor page displays the first unused route if no route number was previously selected or the operator selected route.

(5) Scroll down the page to the route leg table and highlight the first row containing all double dashes (unused leg). Then push the ENTER key.

NOTE

The top row of the route leg table always has end waypoint 000–POS representing present position.

(6) Highlight the desired ending waypoint for the leg of the route, then push the ENTER key. The Route Editor displays the route leg with the selected end waypoint.

(7) Repeat steps (5) and (6) of this procedure, as required, to create all desired route legs.

(8) After creating all route legs, push the MENU key.

(9) Multiple options are provided. Highlight the desired option, then push the ENTER key.

- **Save and Exit** — Briefly displays route stored message. Display returns to the Routes page with the new route information highlighted.
- **Exit and No Save** — Display returns to the Routes page without saving the route.
- **Maximize/Minimize Table** — Display returns to the Routes page with the route table maximized (displaying five route legs at once) or minimized (displaying three route legs at once).
- **Insert WP After** — From the Select WP editor, highlight the desired waypoint, then push the ENTER key. The Route Editor page highlights a new leg (inserted after the original highlighted leg) created from the entered waypoint.
- **Swap With Next** — The Route Editor displays the highlighted route leg swapped with the one that was next (disabled if the highlighted route leg is the last leg).
- **Remove WP** — The Route Editor page displays with the highlighted leg removed.
- **Edit Field** — Displays an editor for the highlighted field (leg).
- **Undo Changes** — Clears any changes made and display returns to the Route Editor page for editing.
- **Help** — Displays help text for the highlighted field.

b. Edit a Route

(1) From the Routes page, highlight the desired route for editing. Push the ENTER key.

(2) The Route Editor page displays the operator selected route.

(3) View the Route Name field, Alert Radius field, and Situational Awareness field to verify correct field content. Edit if necessary using the following steps.

(a) Highlight the desired field, then push the ENTER key.

(b) Use the displayed editor to edit field content.

(c) If no other changes are to be made to the route information, skip to step (6).

(4) View the Azimuth and Range columns of the route leg table to determine if changes to units of measure used in the columns are required (metric or decimal, mils or degrees, true or magnetic, etc.). Revise if necessary according to the following steps.

(a) Highlight a route leg of the route leg table. Scroll to view the Azimuth and Range columns, then push the MENU key.

(b) Highlight the desired option for changing a particular set of units of measure, then push the ENTER key.

- Select Range Units
- Select Angle Units
- Select North Ref

(c) Each option provides a list of choices. Highlight the desired choice, then push the ENTER key.

(d) The Route Editor page displays Azimuth and Range column information with the changes made.

NOTE

If choosing Select Range Units, the choices are Metric, English, or Nautical. This unit selection will also change the information in the Alert Radius field.

(e) If required, repeat the procedure for the remaining two units of measure selections.

(5) View the Alert Radius field and verify the proper units of measure are in use. Revise if necessary using the following steps.

(a) Highlight the Alert Radius field, then push the MENU key.

(b) Highlight Select Alert Units, then push the ENTER key.

(c) Highlight the desired choice, then push the ENTER key.

(d) The Route Editor page displays the Alert Radius field highlighted with the changes made.

NOTE

If choosing Select Range Units, the choices are Metric, English, or Nautical. This unit selection will also change the information in the Range column of the route leg table.

(6) When editing the construction of route legs, multiple options are available. From the Route Editor page, highlight the desired route leg while viewing the End Waypoint column, then push the MENU key. Highlight the desired option to perform, push the ENTER key, and proceed as described.

- **Save and Exit** — Briefly displays route stored message. Display returns to the Routes page with the new route information highlighted.
- **Exit and No Save** — Display returns to the Routes page without saving the route.
- **Maximize/Minimize Table** — Display returns to the Routes page with the route table maximized (displaying five route legs at once) or minimized (displaying three route legs at once).
- **Insert WP After** — From the Select WP editor, highlight the desired waypoint, then push the ENTER key. The Route Editor page highlights a new leg (inserted after the original highlighted leg) created from the entered waypoint.
- **Swap With Next** — The Route Editor displays the highlighted route leg swapped with the one that was next (disabled if the highlighted route leg is the last leg).
- **Remove WP** — The Route Editor page displays with the highlighted leg removed.
- **Edit Field** — Displays an editor for the highlighted field (leg).
- **Undo Changes** — Clears any changes made and display returns to the Route Editor page for editing.
- **Help** — Displays help text for the highlighted field.

NOTE

A leg end waypoint can be replaced by highlighting the leg end waypoint to be replaced, push the ENTER key, highlight the replacement end waypoint, then push the ENTER key.

c. Show Current Route Leg During Navigation

NOTE

The Show Current Leg selection is available only while using route navigation and the current navigation route is displayed on the Route Editor page.

(1) Access the Route Editor page, highlight any route leg in the route leg table.

(2) Push the MENU key.

(3) Highlight Show Current Leg, then push the ENTER key.

(4) The current navigation route leg is moved to the first row of the route leg table for viewing.

8.8.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 8-18 shows the keystroke map for the Route Editor page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Route Editor page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the WP/Route/Alerts submenu.

- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

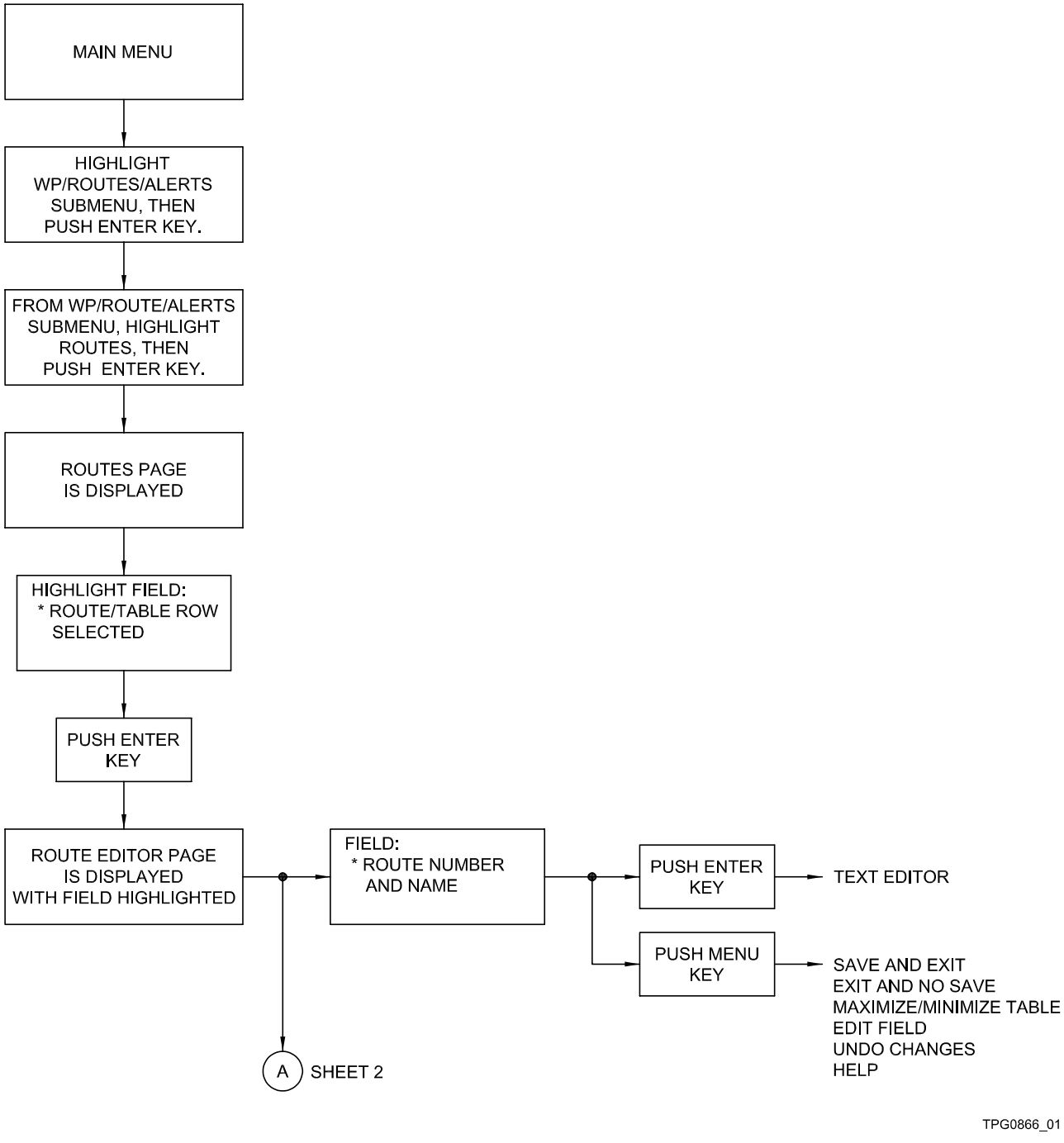


Figure 8-18. Route Editor Page Keystroke Map (Sheet 1 of 2)

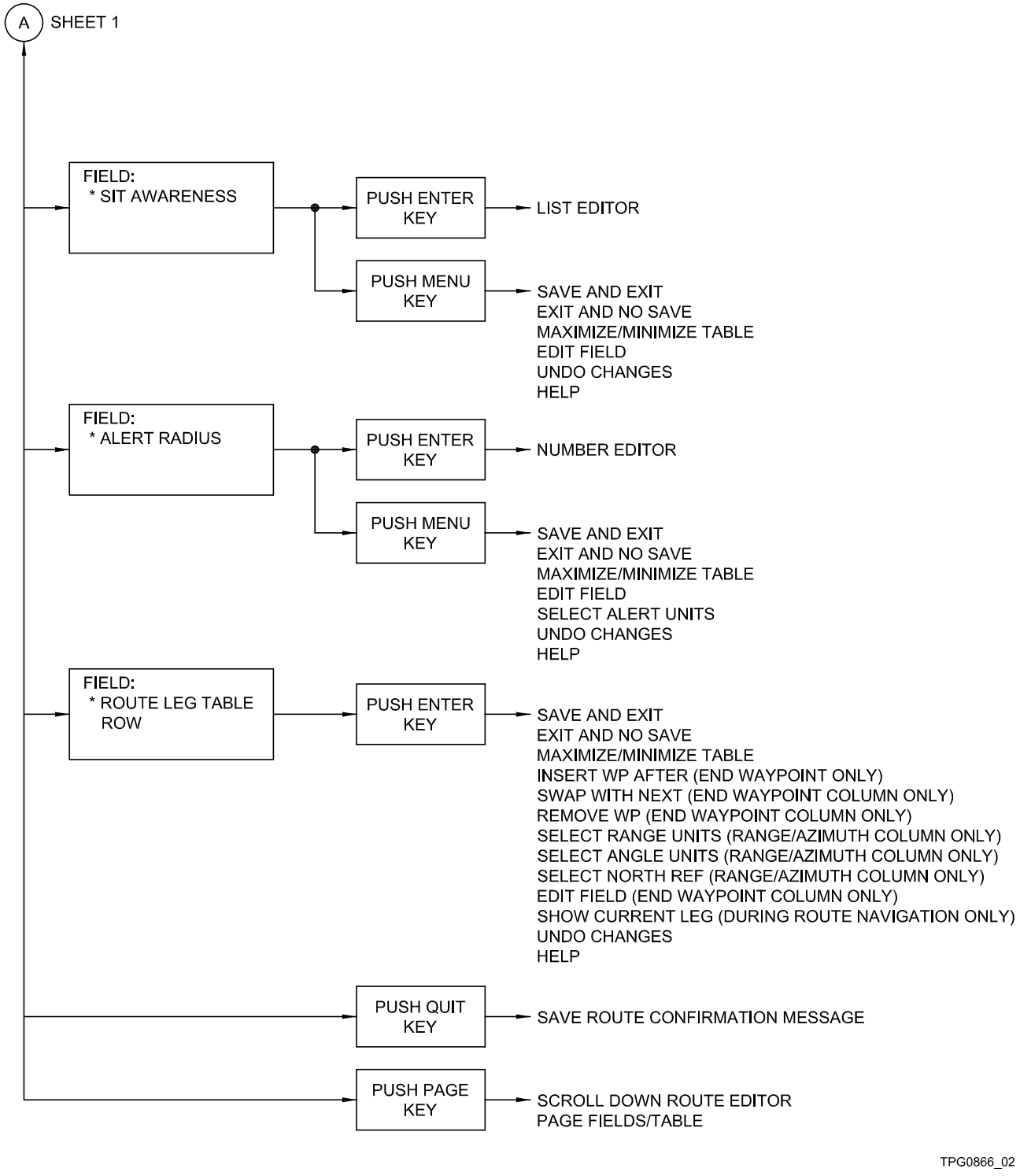


Figure 8-18. Route Editor Page Keystroke Map (Sheet 2)

8.9. ALERTS PAGE.

8.9.1. Page Function.

The Alerts page is accessed from the WP/Routes/Alerts submenu, or by using the Status key and Receiver Status menu (refer to Paragraph 6.2.24). The Alerts page provides a table showing all DAGR alerts. Capabilities are provided to create new alerts, edit existing alerts (using Alert Editor page), clear alerts, copy alerts, and enable/disable alerts. These operations are described in the following paragraphs. The Alert Editor page is accessed from the Alerts page. Vertical and horizontal scrolling are used to view all alerts and table columns. If alert data is undefined or invalid, double dashes appear in the table columns. The Alerts page is shown in Figure 8-19. Use the Status key to view the Receiver Status display and check alert status or access the Alerts page (refer to Paragraph 6.2.24).

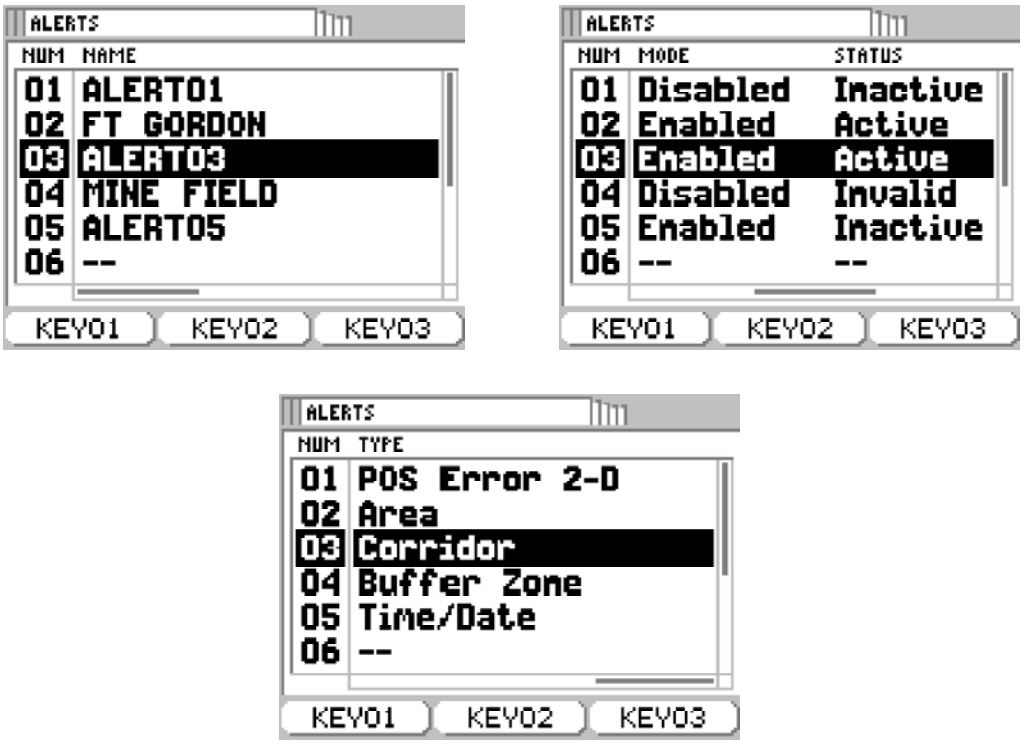


Figure 8-19. Alerts Page

8.9.1.1. The alert list table includes the following information for each alert. The table rows wrap from the last row to the first row (or vice versa) when vertically scrolling through the table.

- **NUM** — Displays the alert number (01 through 33).
- **Name** — Displays the alert name of up to ten characters.
- **Mode** — Displays the alert mode as Enabled (on) or Disabled (off). Only two area alerts can be enabled at the same time. The alert must be properly configured before enabling is possible.
- **Status** — Displays the alert status as Active, Inactive, or Invalid. An active alert indicates the alert is configured correctly, and the DAGR is currently within the parameters specified by the alert. An inactive alert indicates the alert is configured correctly, but the DAGR is not currently within the parameters specified by the alert. An invalid alert needs additional editing to be properly configured before the alert is usable.
- **Type** — Displays the alert type as Anchor, Area, Boundary Line, Buffer Zone, Corridor, Hazard, Phase Line, POS Error 1–D (Advanced), POS Error 2–D, POS Error 3–D (Advanced), or Time/Date. Refer to Paragraph 8.10.2 for more information.

8.9.1.2. Alerts page menu functions are described in the following list.

- **Create/New**— Displays the Alert Editor page to set up a new alert. Refer to Paragraph 8.10 for additional information.
- **Edit Alert**— Displays the Alert Editor page to edit the selected alert. Refer to Paragraph 8.10 for additional information.
- **Copy/Clear**— Allows copying a selected alert's data into a storage clipboard. This data can then be pasted into another alert. Operator confirmation is required prior to overwriting any existing alerts. Allows clearing (removal) of an alert, a range of alerts, or all alerts. Operator confirmation is required prior to clearing any alerts.
- **Enable or Disable Alert**— Individually enables or disables an alert.
- **Enable All**— Enables all alerts.
- **Disable All**— Disables all alerts.

8.9.1.3. When an alert is triggered, the DAGR displays an alert message notifying the operator of the type of alert and the alert number and name. Refer to the example alert display in Figure 8-20. The operator can push the ENTER key to acknowledge the displayed alert and take appropriate action, or push the MENU key for further options. When selected, the alert display menu options function as follows:

- **Toggle Remark** — Displays opposite view (1 or 2) of time alert message (time alert only).
- **View Alert** — Displays Alert Editor page with current alert data.
- **Acknowledge** — Same as pushing ENTER key with alert displayed.
- **Message Help** — Displays help text.

Figure 8-20. Alert Example

8.9.1.4. An alert message prompts the operator to acknowledge. When acknowledged, the alert message disappears. When an alert message is not acknowledged and the DAGR remains in the area that triggered the alert, the alert message remains displayed. When an alert message is not acknowledged and the DAGR is moved out of the area that triggered the alert, the alert message automatically clears. If the DAGR then re-enters that area, the alert is again triggered and the alert message redisplayed.

8.9.2. How To Use The Alerts Page.

This page contains information used in creating, editing, and using alerts. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting up data and changing field information. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight WP/Route/Alerts, then push the ENTER key.
3. Highlight Alerts, then push the ENTER key. The Alerts page is displayed.

a. Create a New Alert Using the Alerts Page

(1) From the Alerts page, highlight the desired new alert number, or if the highlighted alert is not changed, the first unused alert number will be automatically be used.

(2) Push the MENU key.

(3) Highlight Create/New, then push the ENTER key.

(4) The Alert Editor page displays the first unused alert (up to 33 alerts can be created) if no alert was previously selected or the operator selected alert. Revise information as necessary using standard editing techniques. Refer to Paragraph 8.10 for Alert Editor page information and a complete edit procedure.

(5) Push the MENU key.

(6) Multiple options are provided. Highlight the desired option, then push the ENTER key.

- **Save and Exit** — Briefly displays alert stored message. Display returns to the Alerts page with the new alert information saved and highlighted.
- **Exit and No Save** — Display returns to the Alerts page without saving the alert.
- **Edit Field** — Displays a field editor for the highlighted field.
- **Undo Changes** — Clears any changes made and display returns to the Alert Editor page for editing.
- **Help** — Displays help text for the highlighted field.

b. Edit an Alert

(1) From the Alerts page, highlight the desired alert for editing, then push the ENTER key.

(2) The Alert Editor page displays the operator selected alert.

(3) Revise alert information using standard editing techniques. Refer to Paragraph 8.10 for Alert Editor page information and a complete edit procedure.

(4) When editing is complete, push the MENU key.

(5) Multiple options are provided. Highlight the desired option, then push the ENTER key.

- **Save and Exit** — Briefly displays alert stored message. Display returns to the Alerts page with the new alert information saved and highlighted.
- **Exit and No Save** — Display returns to the Alerts page without saving the alert.
- **Edit Field** — Displays a field editor for the highlighted field.
- **Undo Changes** — Clears any changes made and display returns to the Alert Editor page for editing.
- **Help** — Displays help text for the highlighted field.

c. Copy and Paste an Alert

(1) From the Alerts page, highlight the desired alert to copy **from**, then push the MENU key.

(2) Highlight Copy/Clear, then push the ENTER key.

(3) Highlight Copy Alert, then push the ENTER key.

(4) Highlight the desired alert position to copy **to**, then push the MENU key.

(5) Highlight Copy/Clear, then push the ENTER key.

(6) Highlight Paste Alert, then push the ENTER key. If copying to an unused alert, a storage confirmation message is briefly displayed. If copying to a used alert, the operator is prompted for confirmation to overwrite, and a storage confirmation message is briefly displayed.

(7) The DAGR returns to the Alerts page, highlighting the alert copied **to**. The alert copied **to** has the same information as the alert copied **from** until information is edited.

(8) Use the Edit an Alert procedure (b.) to change alert name or other field information if desired.

d. Clear Alerts

(1) From the Alerts page, highlight the desired alert to clear, then push the MENU key. If clearing more than one alert, highlighting an alert in this step is optional.

(2) Highlight Copy/Clear, then push the ENTER key.

(3) Multiple options for clearing alerts are provided. Highlight the desired option, then push the ENTER key.

- **Clear Alert** — The operator is prompted for confirmation to clear the alert.
- **Clear Range** — Enter the clear alert from/to number range. Push the ENTER key. The operator is prompted for confirmation to clear the alerts.
- **Clear All** — The operator is prompted for confirmation to clear all 33 alerts.

(4) The DAGR returns to the Alerts page.

(5) View the page to verify cleared alerts are no longer listed.

e. Enable or Disable An Individual Alert

NOTE

Alerts must be defined before they can be enabled.

(1) From the Alerts page, highlight the desired alert to enable or disable, then push the MENU key.

(2) Highlight Enable Alert or Disable Alert, then push the ENTER key.

(3) The DAGR returns to the Alerts page with the individual alert changed accordingly.

f. Enable All or Disable All Alerts

NOTE

Alerts must be defined before they can be enabled.

(1) From the Alerts page, push the MENU key.

(2) Highlight Enable All or Disable All, then push the ENTER key.

(3) The DAGR returns to the Alerts page with all applicable alerts changed accordingly.

8.9.3. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 8-21 shows the keystroke map for the Alerts page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Alerts page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the WP/Route/Alerts submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

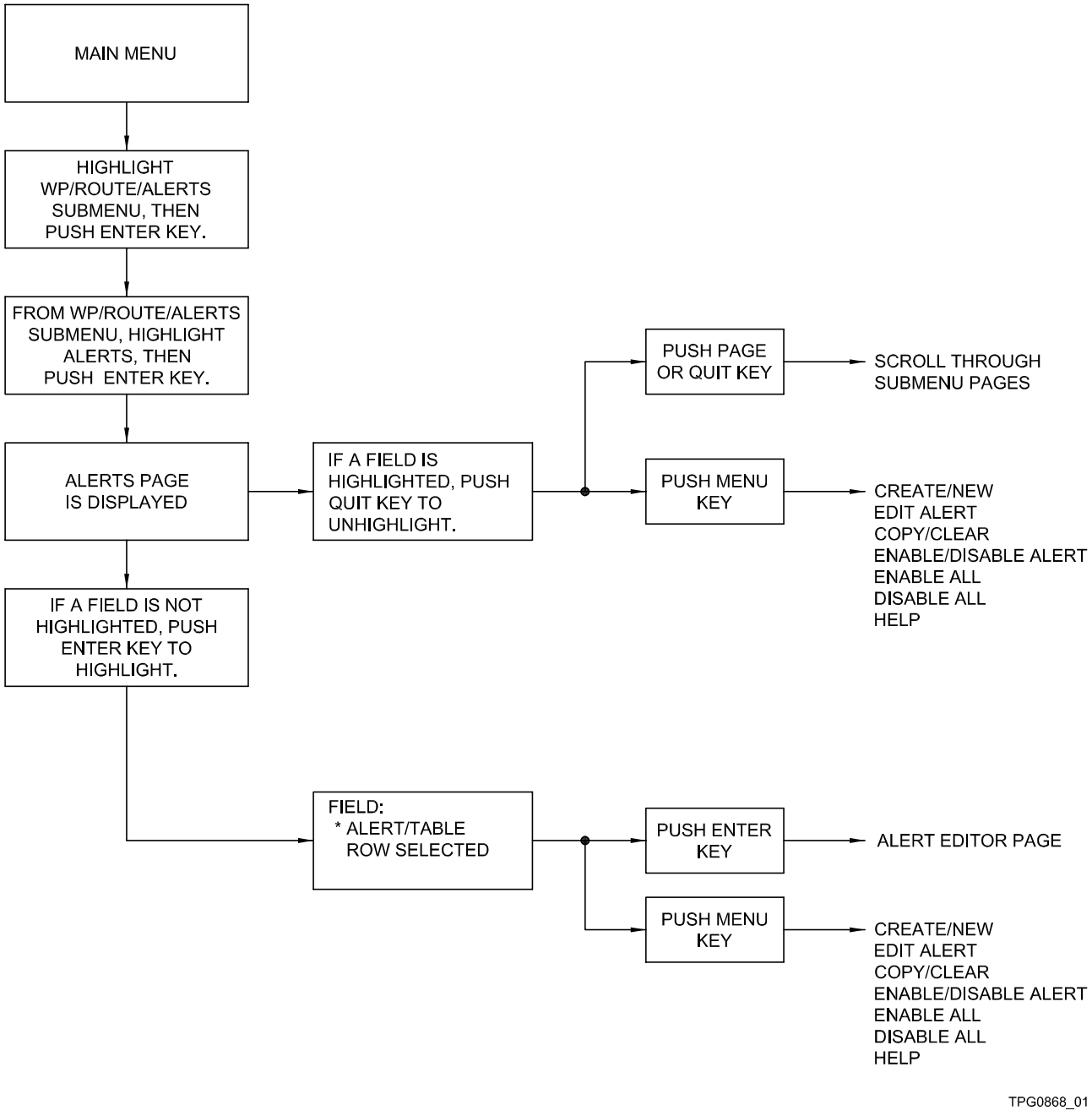


Figure 8-21. Alerts Page Keystroke Map

8.10. ALERT EDITOR PAGE.

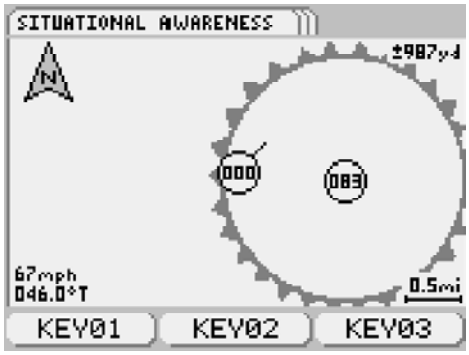
8.10.1. Page Function.

The Alert Editor page is accessed using the Alerts page and is not accessed from a submenu. The Alert Editor page is used for viewing and editing data listed in the Alerts page and other alert field data. When the Alert Editor page is accessed, a page field is always highlighted for cursor control key scrolling to the desired field. Select appropriate units for fields, as applicable, before using page field data. Refer to the keystroke map in Figure 8-34 and Paragraph 10.2 for additional information on selecting units. When field content is undefined, double dashes appear. Alert types and page fields are described in the following paragraphs.

8.10.2. Alert Types.

Refer to Figure 8-22 through Figure 8-33 to view Situational Awareness page alert examples and Alert Editor page displays of all types of alerts used with DAGR. Spikes displayed as part of the alert perimeter represent the dangerous side or area of an alert.

8.10.2.1. Anchor Alert. An anchor alert is a circular area defined by an operator entered radial range from a waypoint. Typically used when the operator is to stay near a ship anchor point, within a unit boundary, or within a hover area. The alert activates when outside the defined radius. When outside the radius, the operator uses the azimuth, range, and pointer (arrow points to point of exit) fields to enter the anchor alert area at the point of exit. In Figure 8-22, the Situational Awareness page displays the DAGR present position (waypoint 000) inside an anchor alert radius (anchor alert waypoint 083). The Alert Editor page with an anchor alert is shown in Figure 8-23.



TPG0005_01

Figure 8-22. Anchor Alert Example

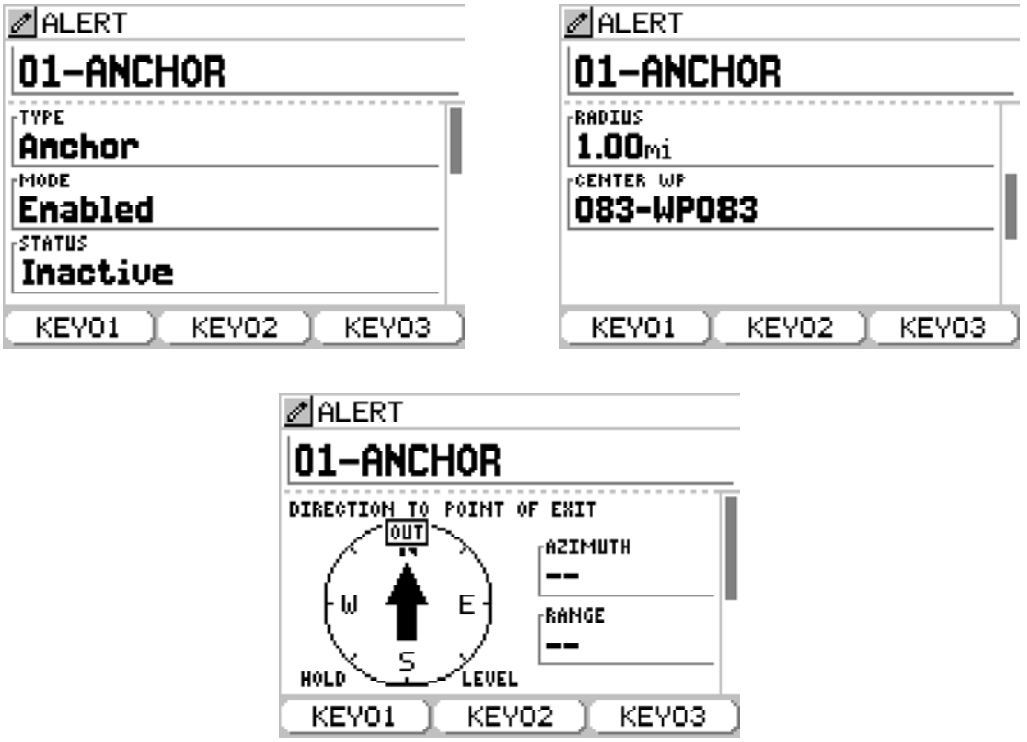


Figure 8-23. Alert Editor Page with Anchor Alert

8.10.2.2. Hazard Alert. A hazard alert is a circular area defined by an operator entered radial range from a waypoint. Typically used to avoid threats and prevent the operator from entering an area. The alert activates when inside the defined radius. When inside the radius, the operator uses the azimuth, range, and pointer (arrow points to point of entry) fields to exit the hazard alert area at the point of entry. In Figure 8-24, the Situational Awareness page displays the DAGR present position (waypoint 000) inside the dangerous area of a hazard alert radius (hazard alert waypoint 030). The Alert Editor page display for a hazard alert is the same as for an anchor alert (refer to Figure 8-23) except the hazard alert pointer field refers to the point of entry instead of point of exit.

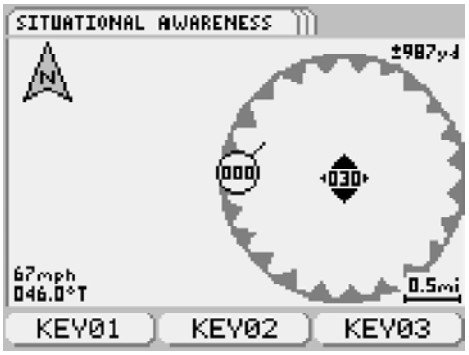


Figure 8-24. Hazard Alert Example

8.10.2.3. Area Alert. An area alert is a polygon shaped area constructed from three to fifteen operator selected waypoints. Area alerts are used to prevent an operator from entering or exiting an area from any direction. The operator selects either entry to activate the alert or exit to activate the alert. In Figure 8-25, the Situational Awareness page displays the DAGR present position (waypoint

000) inside the dangerous area of an area alert area (made using four waypoints 030, 031, 032, and 033). The Alert Editor page with an area alert is shown in Figure 8-26.

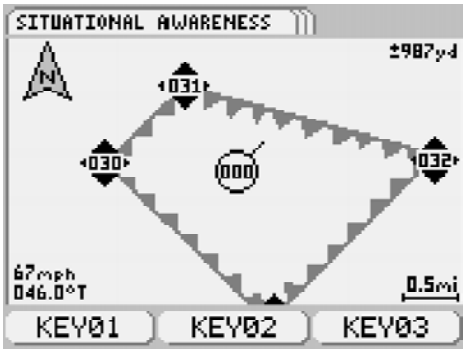


Figure 8-25. Area Alert Example

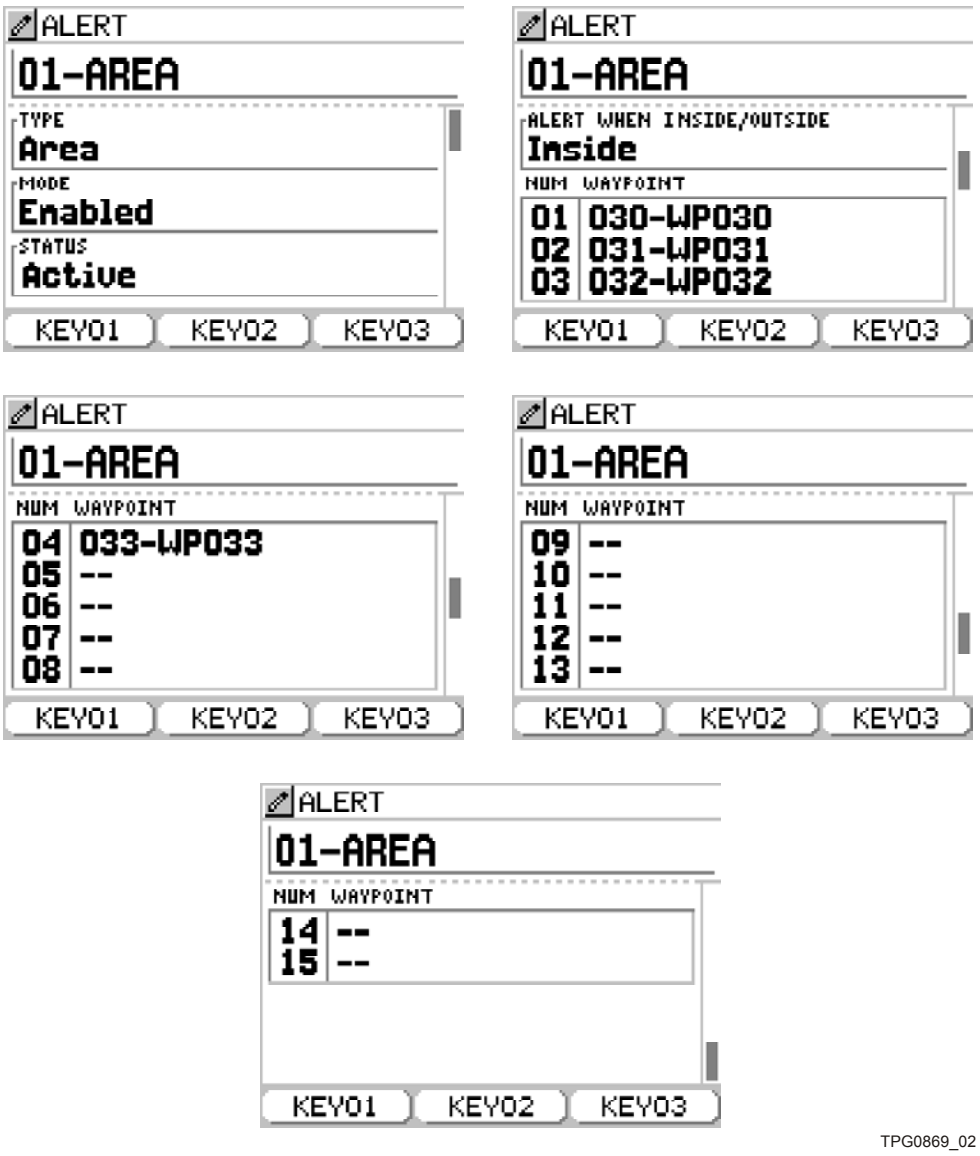


Figure 8-26. Alert Editor Page with Area Alert

8.10.2.4. Boundary Line Alert / Phase Line Alert. Although boundary line and phase line alerts are set up similarly, they have entirely different purposes. A boundary line should not be crossed, while a phase line is used to indicate completion of a mission phase. A boundary line or phase line alert is a line between two operator selected waypoints. These alerts are used to inform the operator of arrival at a line. In Figure 8-27, the Situational Awareness page displays the DAGR present position (waypoint 000) approaching a boundary line or phase line alert (made using waypoints 083 and 084). The Alert Editor page with a phase line alert is shown in Figure 8-28.

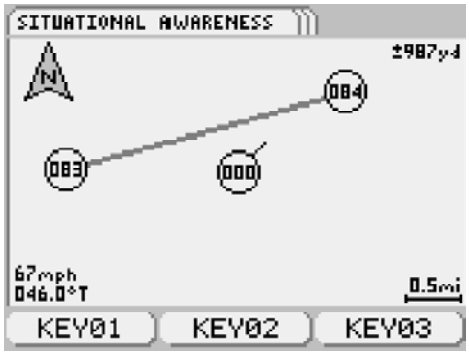


Figure 8-27. Boundary/Phase Line Alert Example

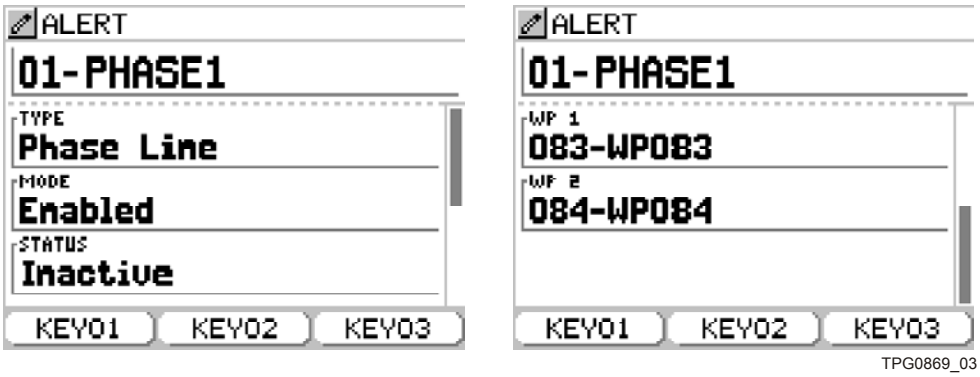


Figure 8-28. Alert Editor Page with Phase Line Alert

8.10.2.5. Buffer Zone Alert. A buffer zone alert is a rectangular area defined by two operator selected waypoints as end points. The operator defines the width of the buffer zone by inputting a range applied to both sides of the line interconnecting the waypoints. These alerts are used to prevent an operator from entering an area (usually from a specific direction), such as a national border, contaminated area, unsafe waters, or Air Defense Identification Zone. When inside the buffer zone, the operator uses the azimuth, range, and pointer (arrow points to point of entry) fields to exit the buffer area at the point of entry. When using the advanced function set, the buffer zone can be calculated using either Rhumb Line (RL) or Great Circle (GC). In Figure 8-29, the Situational Awareness page displays the DAGR present position (waypoint 000) inside the dangerous area of a buffer zone (made using waypoints 030 and 035). The Alert Editor page with a buffer zone alert is shown in Figure 8-30.

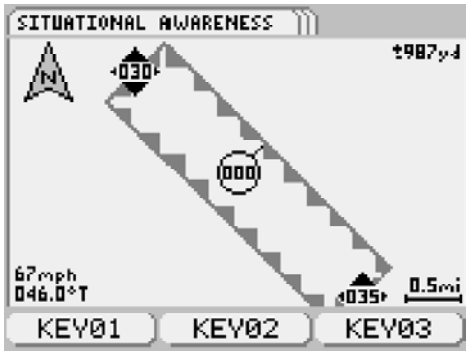


Figure 8-29. Buffer Alert Example

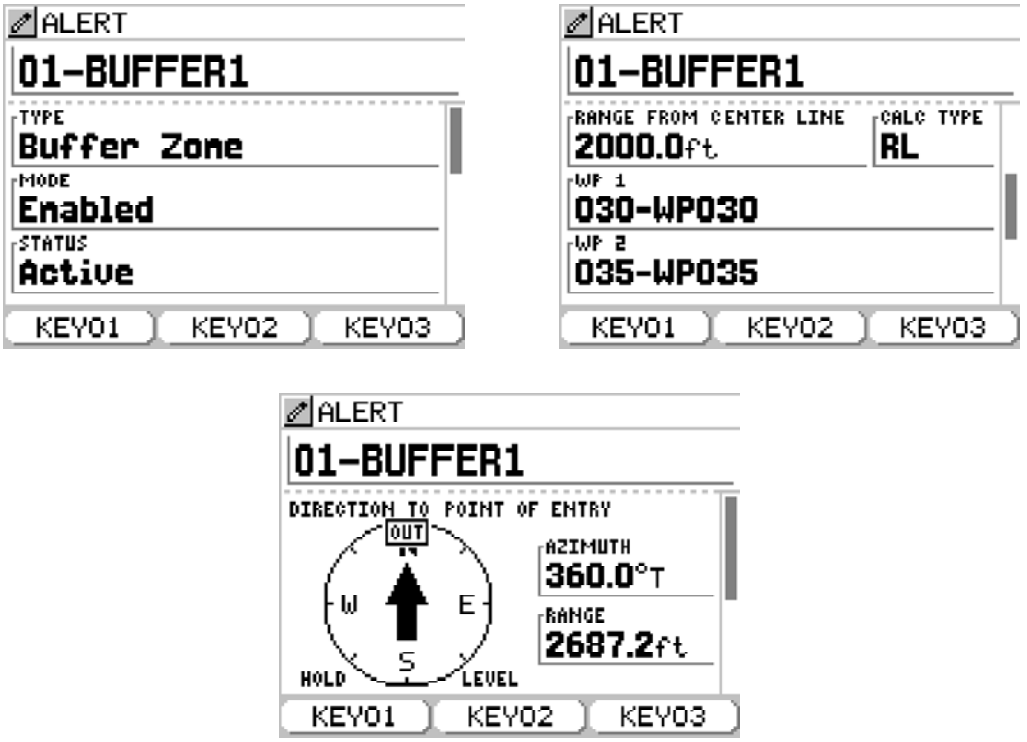


Figure 8-30. Alert Editor Page with Buffer Zone Alert

8.10.2.6. Corridor Alert. A corridor alert is a rectangular area defined by two operator selected waypoints as end points. The operator defines the width of the corridor by inputting a range applied to both sides of the line interconnecting the waypoints. These alerts are used to prevent an operator from exiting a safe area (e.g., a narrow channel, or aircraft positive identification lanes). When outside the corridor, the operator uses the azimuth, range, and pointer (arrow points to point of exit) fields to enter the corridor at the point of exit. The Alert Editor page with a corridor alert is the same as for the buffer zone alert except the pointer points to Direction To Point of Exit (instead of Direction To Point of Entry). When using the advanced function set, the corridor can be calculated using either Rhumb Line (RL) or Great Circle (GC). In the Figure 8-31, the Situational Awareness page displays the DAGR present position (waypoint 000) inside a corridor (made using waypoints 083 and 085).

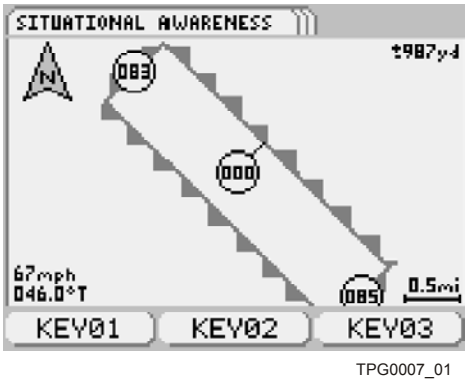


Figure 8-31. Corridor Alert

8.10.2.7. Position Error Alert. A position error alert can be set up as follows:

- **1–D POS (Advanced)** — One dimensional. Generates an alert when an operator entered estimated vertical error (EVE) threshold is met or exceeded.
- **2–D POS** — Two dimensional. Generates an alert when an operator entered estimated horizontal error (EHE) threshold is met or exceeded.
- **3–D POS (Advanced)** — Three dimensional. Generates an alert when an operator entered estimated position error (EPE) radial range threshold is met or exceeded. The Alert Editor page with a position error alert is shown in Figure 8-32.

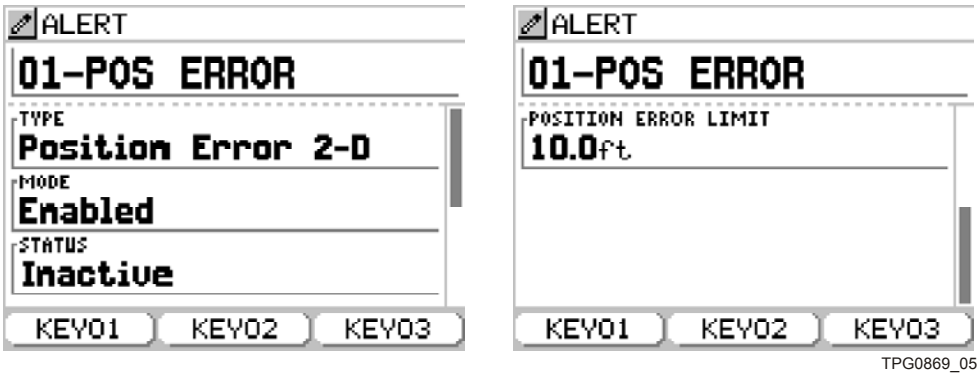


Figure 8-32. Alert Editor Page with Position Error Alert

8.10.2.8. Time/Date Alert. Allows the operator to enter Date-Time-Group (DTG) alerts including a remark for each alert of up to forty characters. The DTG alert activates when the date and time are reached or exceeded. The Alert Editor page with a time/date alert is shown in Figure 8-33.

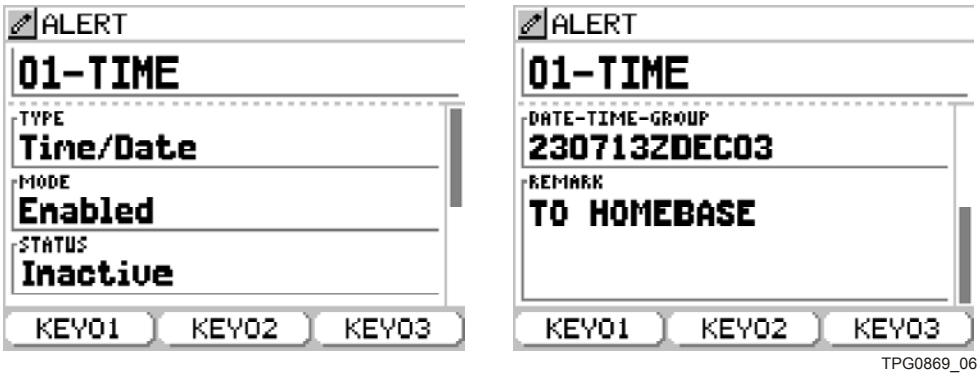


Figure 8-33. Alert Editor Page with Time Alert

8.10.3. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 8-34. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

8.10.3.1. Number and Name Field. Displays the alert number and name. Only the alert name is editable using up to ten characters. Field data format is XX-NNNNNNNNNN, where X represents the alert number (01 through 33) and N represents the alert name of up to ten characters.

8.10.3.2. Type Field. Displays one of the alert types listed as follows. Refer to Paragraph 8.10.2 for descriptions of each alert type.

- Anchor
- Area
- Boundary Line
- Buffer Zone
- Corridor
- Hazard
- Phase Line
- Position Error 1–D (Advanced)
- Position Error 2–D
- Position Error 3–D (Advanced)
- Time/Date

8.10.3.3. Mode Field. Displays the alert mode as Enabled or Disabled. In order to function, alerts must be set up with valid data and be enabled.

NOTE

Only two area alerts can be enabled at the same time.

8.10.3.4. Status Field. Displays one of the following alert statuses. The operator cannot edit this field.

- **Alert Not Valid** — The alert needs to be configured before it can be enabled.
- **Inactive** — The conditions specified for the alert have not been met.
- **Active** — The conditions specified for the alert have been met.

8.10.3.5. Radius Field. Displays the radius value from a center waypoint defining an anchor or hazard alert area. Field data format is XXXX.XX or XXXX.X, where X represents miles, nautical miles, kilometers, feet, yards, or meters.

8.10.3.6. Center WP Field. Displays the waypoint defining the center (position) of an anchor or hazard alert area. Field data format is XXX-NNNNNNNNN, where X represents the waypoint number (001 through 999) and N represents the waypoint name of up to ten characters.

8.10.3.7. Pointer Field.

CAUTION

If the DAGR is not tracking satellites or has no position fix, the displayed position data blinks between gray and black to notify the operator. Field data may be inaccurate and/or unavailable when the DAGR does not have a position fix.

Displays the current ground track and azimuth to the point of alert entry or exit (applicable to anchor, hazard, buffer zone, and corridor alerts). The compass dial rotates so the top of the dial indicates the current ground track. The arrow points in the direction of the entry/exit point (corresponding to labeling at top of field: Direction To Point of Entry or Direction to Point of Exit). If the DAGR is moving too slow to compute track, the last known track is used and the internal compass is activated (if enabled). The bottom of the field displays HOLD LEVEL when the internal compass is in use (refer to Paragraph 10.3 for additional internal compass information).

8.10.3.8. Azimuth Field. Displays the azimuth to the point of entry/exit of the alert area (applicable to anchor, hazard, buffer zone, and corridor alerts). This field is used to navigate back to the point of entry/exit and cannot be edited by the operator. Field data format is XXX.X (X represents degrees) or XXXX (X represents mils or strecks) in reference to north reference (True, Magnetic, or Grid).

8.10.3.9. Range Field. Displays the range to the point of entry/exit of the alert area (applicable to anchor, hazard, buffer zone, and corridor alerts). This field is used to navigate back to the point of entry/exit and cannot be edited by the operator. Field data format is XXXX.XX or XXXX.X, where X represents miles, nautical miles, kilometers, feet, yards, or meters.

8.10.3.10. Alert When Inside/Outside Field. Displays the selected alert activation parameter as Inside or Outside (applicable to area alerts). When Inside is displayed, the alert activates when the DAGR present position is inside the defined alert area. When Outside is displayed, the alert activates when the DAGR present position is outside the defined alert area.

8.10.3.11. Waypoint Table. Displays the waypoints defining the perimeter of an area alert. Each area alert must be defined by at least three waypoints, and up to fifteen may be used. The NUM column provides the numbering of area alert waypoints (01 through 15). The Waypoint column provides selected waypoints numbers and names. Waypoint column data format is XXX-NNNNNNNNNN, where X represents a waypoint number (001 to 999), and N represents a waypoint name of up to ten characters.

NOTE

- The alert is considered invalid if waypoints are near the north or south poles, or span more than 170° of longitude.
- Do not create overlapping area alerts.

8.10.3.12. Range From Center Line Field. Displays the range from the center line (created by WP 1 and WP 2 fields) to the outside border of a buffer zone or corridor alert. Field data format is XXXX.XX or XXXX.X, where X represents miles, nautical miles, kilometers, feet, yards, or meters.

8.10.3.13. WP 1 Field. Displays the first waypoint to be used for an alert (applicable to buffer zone, corridor, boundary line, and phase line alerts). Field data format is XXX-NNNNNNNNNN, where X represents the waypoint number (001 to 999), and N represents the waypoint name of up to ten characters.

8.10.3.14. WP 2 Field. Displays the second waypoint to be used for an alert (applicable to buffer zone, corridor, boundary line, and phase line alerts). Field data format is XXX-NNNNNNNNNN, where X represents the waypoint number (001 to 999), and N represents the waypoint name of up to ten characters.

8.10.3.15. Calc Type Field. Displays the method used for calculating the alert condition for buffer or corridor alerts. When using the basic function set, the method is Rhumb Line (RL). When using the advanced function set, the method is either Rhumb Line (RL) or Great Circle (GC). RL allows the alert to be set up along lines of latitude. GC allows the alert to be set up along the shortest path due to the curvature of the earth.

8.10.3.16. Position Error Limit Field. Displays the maximum range error allowed before triggering a position error alert. Field data format is XXXX.XX or XXXX.X, where X represents miles, nautical miles, kilometers, feet, yards, or meters.

8.10.3.17. Date-Time-Group Field. Displays the time and date selected for a time alert. Field data format is DDTTTTL/ZMMMYY format, where D represents day; T represents time; L/Z represents local or zulu; M represents month; and Y represents year.

8.10.3.18. Remark Field. Displays a remark providing information about a time alert. Remarks can consist of up to forty characters.

8.10.4. How To Use The Alert Editor Page.

This page contains information used in creating, editing, and using alerts. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting up data and changing field information. When a text editor is used, the menu key can be pushed to access a list of options (undo changes, save and exit, exit and no save, reset to default, and editor help). These options provide text editor shortcuts and pertain to the immediate function being performed (e.g., using a text editor).

8.10.4.1. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight WP/Route/Alerts, then push the ENTER key.
3. Highlight Alerts, then push the ENTER key. The Alerts page is displayed.

a. Create a New Alert From User Input

(1) From the Alerts page, highlight the desired new alert number, or if the highlighted alert is not changed, the first unused alert number will be automatically be used.

(2) Push the MENU key.

(3) Highlight Create/New, then push the ENTER key.

(4) The Alert Editor page displays the first unused alert (up to 33 alerts can be created) if no alert was previously selected or the operator selected alert.

(5) As required, individually highlight each of the page fields and revise with user information according to the following steps.

NOTE

Some fields are for status of information only, or cannot be edited by the operator.

(a) Push the ENTER key to revise field information other than units of measure or references. This is done using either a text editor, number editor, or a list editor.

(b) Push the MENU key to revise units of measure or reference information of a field, if applicable. For example: If changing units for the Range field, perform the following steps.

1 Highlight the Range field, then push the MENU key.

2 Highlight Select Range Units, then push the ENTER key.

3 Highlight the desired range units, then push the ENTER key.

4 The page displays the highlighted field with the units of measure changed to the choice made.

5 Revise other field units of measure/references as applicable.

NOTE

Multiple fields may have the same or different units of measure choices. Fields with the same units of measure (e.g., two individual fields measured in metric numbers) will both be changed at the same time no matter what field is selected.

(6) After completing and reviewing all field content changes (with any field highlighted), push the MENU key. Highlight the desired selection from the following list, then push the ENTER key.

- **Save and Exit** — Briefly displays alert stored message. Display returns to the Alerts page with the new alert information saved and highlighted.
- **Exit and No Save** — Display returns to the Alerts page without saving the alert.
- **Edit Field** — Displays a field editor for the highlighted field.
- **Undo Changes** — Clears any changes made and display returns to the Alert Editor page for editing.
- **Help** — Displays help text for the highlighted field.

b. Edit an Alert

(1) From the Alerts page, highlight the desired alert for editing, then push the ENTER key.

(2) The Alert Editor page displays the operator selected alert.

(3) As required, individually highlight each of the page fields and revise with user information according to the following steps.

NOTE

Some fields are for status of information only and cannot be edited by the operator.

(a) Push the ENTER key to revise field information other than units of measure. This is done using either a text editor, number editor, or a list editor.

(b) Push the MENU key to revise units of measure or reference information of a field, if applicable. For example: If changing units for the Range field, perform the following steps.

1 Highlight the Range field, then push the MENU key.

2 Highlight Select Range Units, then push the ENTER key.

3 Highlight the desired range units, then push the ENTER key.

4 The page displays the highlighted field with the units of measure changed to the choice made.

5 Revise other field units of measure/references as applicable.

NOTE

Multiple fields may have the same or different units of measure choices. Fields with the same units of measure (e.g., two individual fields measured in metric numbers) will both be changed at the same time no matter what field is selected.

(4) After completing and reviewing all field content changes (with any field highlighted), push the MENU key. Highlight the desired selection from the following list, then push the ENTER key.

- **Save and Exit** — Briefly displays alert stored message. Display returns to the Alerts page with the new alert information saved and highlighted.
- **Exit and No Save** — Display returns to the Alerts page without saving the alert.
- **Edit Field** — Displays a field editor for the highlighted field.
- **Undo Changes** — Clears any changes made and display returns to the Alert Editor page for editing.
- **Help** — Displays help text for the highlighted field.

8.10.5. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 8-34 shows the keystroke map for the Alert Editor page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Alert Editor page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the WP/Route/Alerts submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

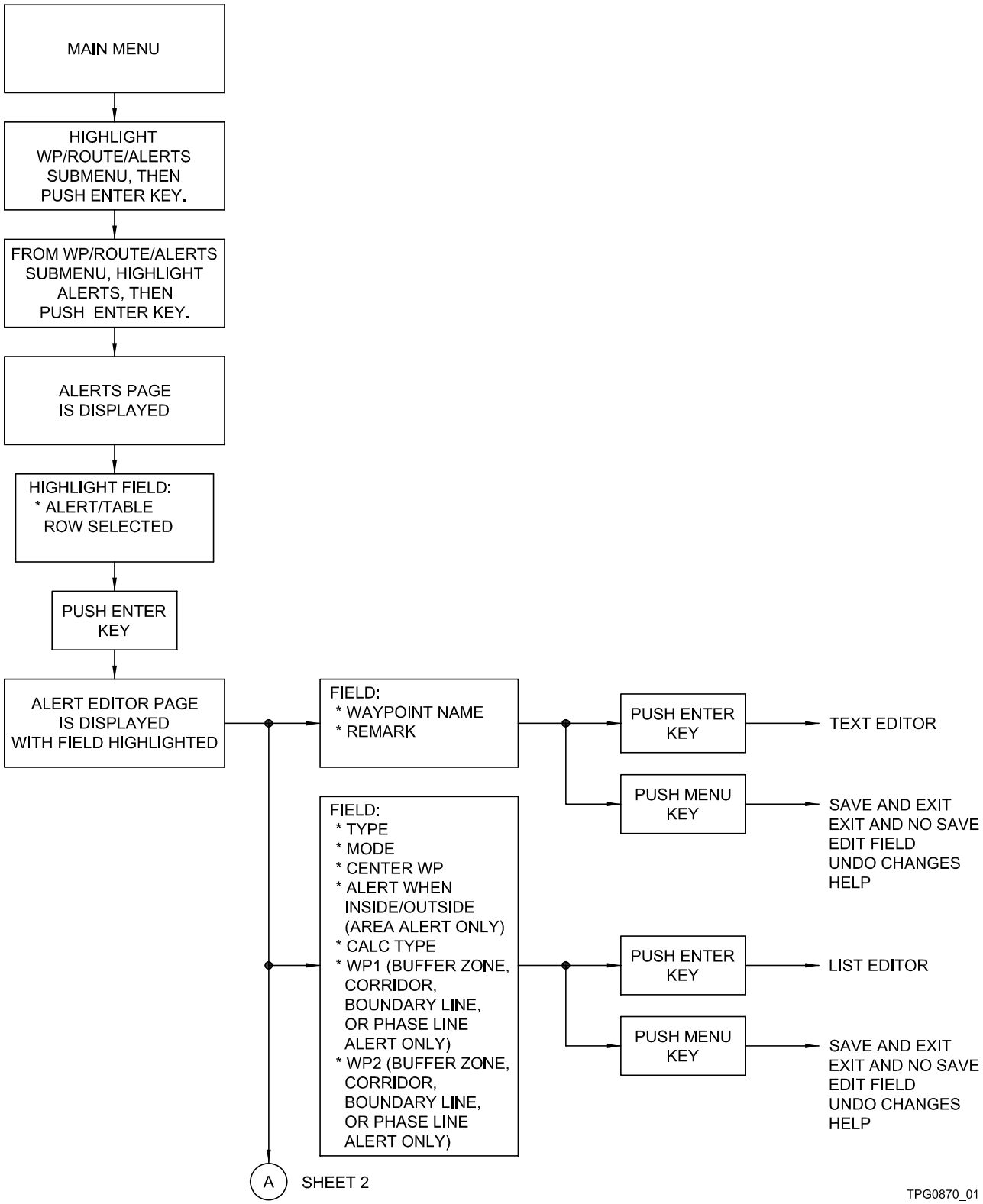


Figure 8-34. Alert Editor Page Keystroke Map (Sheet 1 of 2)

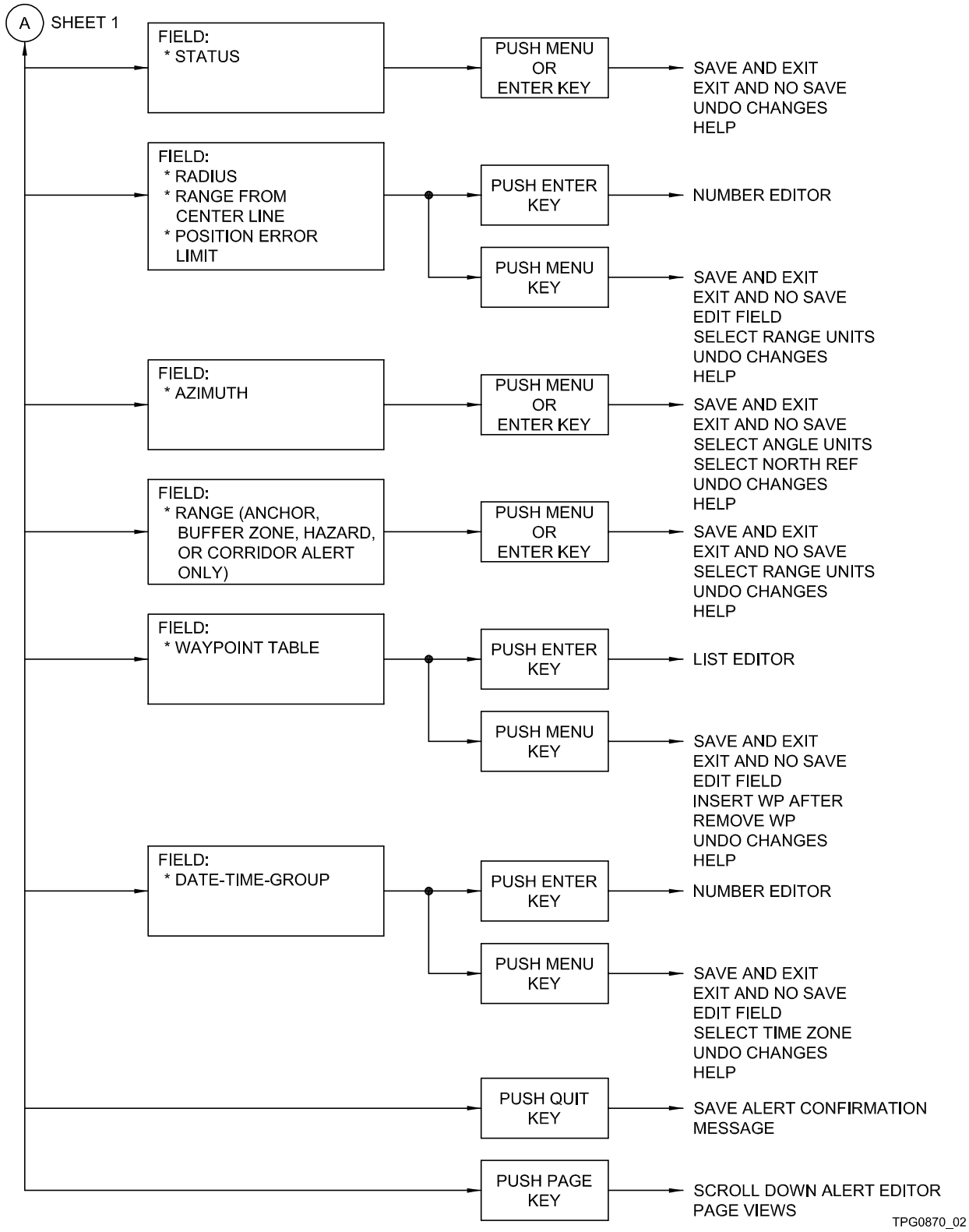


Figure 8-34. Alert Editor Page Keystroke Map (Sheet 2)

CHAPTER 9
OPERATOR INSTRUCTIONS — NAVIGATION SUBMENU OPERATION

9.1. NAVIGATION SUBMENU.

This chapter contains Navigation submenu operation information. The Navigation submenu page set provides the following page selections described in this chapter:

- NAV Setup
- NAV Pointer
- NAV Displays
- Present Position
- Situational Awareness
- Image Viewer

NOTE

• Without any waypoints stored, the DAGR is unable to perform any navigation functions or establish routes, but PVT (position, velocity (ground speed), and time) data is still available if tracking satellites.

• After accessing pages included in the POS page set (NAV Pointer page, Present Position page, Situational Awareness page, or Image Viewer page (optional)), pushing the Page or Quit key scrolls through the POS page set and not the Navigation submenu page set.

9.2. NAV SETUP PAGE.

9.2.1. Page Function.

The NAV Setup page is accessed from the Navigation submenu. The NAV (Navigation) Setup page displays and allows selection of the current navigation (NAV) method and associated fields. The chosen navigation method determines which associated fields are displayed. Menu and editor selections are used to select the desired navigation method and configure the items associated with the navigation method. The six navigation method selections are described in the following paragraphs.

NOTE

When using the advanced function set with a navigation method other than None, the following fields are included on the NAV Setup page:

• **Calc Type (calculation type)** — Appears on all NAV Setup page views (using vertical scrolling) in the upper right corner of the display. When using the basic function set, calculation type is Rhumb Line (RL).

• **MAGVAR Type** — Appears on the last NAV Setup page view (using vertical scrolling).

• **Navigation Displays** — Appears on the last NAV Setup page view (using vertical scrolling).

9.2.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 9-12. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

9.2.2.1. Navigation Method Field. Displays the current navigation method being used. Six navigation method selections are available as follows.

9.2.2.1.1. None. No navigation functions are performed by the DAGR. Refer to Figure 9-1.

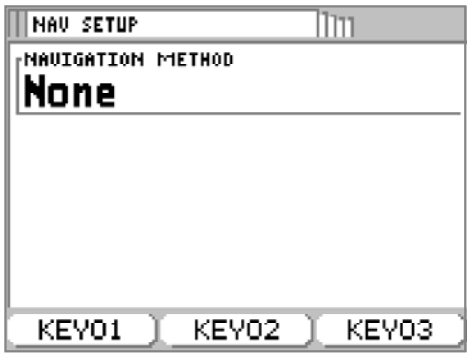


Figure 9-1. None Navigation Method

9.2.2.1.2. Direct To. Navigate from present position directly to the selected destination waypoint. Waypoint alert mode can be configured on or off. Refer to Figure 9-2 and Figure 9-3.

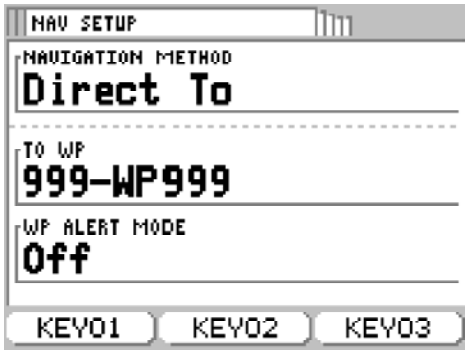


Figure 9-2. Direct To Navigation Method (Basic)

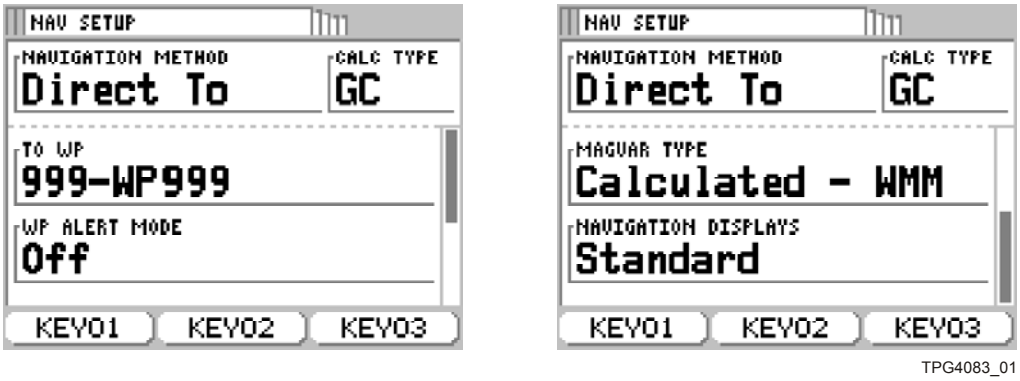


Figure 9-3. Direct To Navigation Method (Advanced)

9.2.2.1.3. Course To. Navigate from present position along the operator entered course (field editable) to the selected destination waypoint. Waypoint alert mode can be configured on or off. Refer to Figure 9-4 and Figure 9-5.

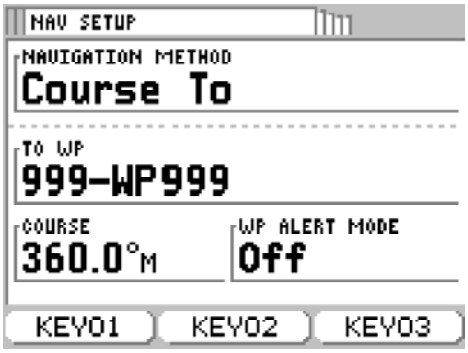


Figure 9-4. Course To Navigation Method (Basic)

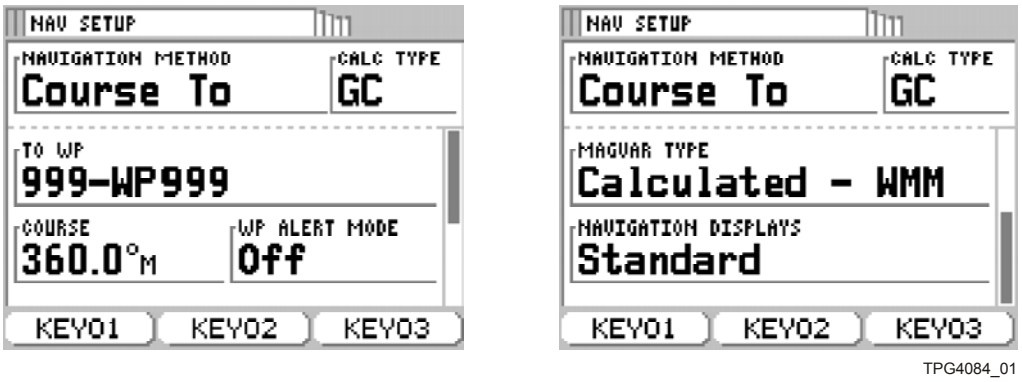


Figure 9-5. Course To Navigation Method (Advanced)

9.2.2.1.4. Course From. Navigate from current location along the operator entered course (field editable) from the selected waypoint. Refer to Figure 9-6 and Figure 9-7.

Figure 9-6. Course From Navigation Method (Basic)

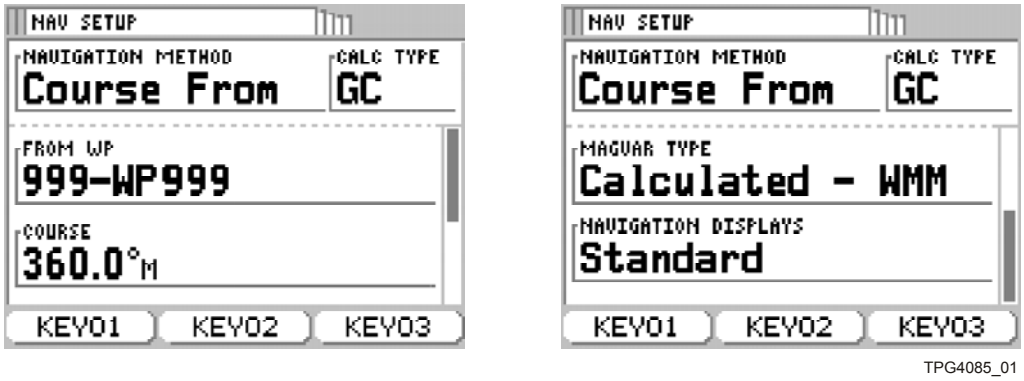


Figure 9-7. Course From Navigation Method (Advanced)

9.2.2.1.5. Route. Navigate (route legs) from one waypoint in the selected route to the next waypoint in the route. The azimuth between the waypoints in the route is used as the desired course. The operator can navigate from first to last waypoint or last to first waypoint and reverse course anywhere along the route. The operator can change the leg route number and configure the route leg advance mode. Vertical scrolling is provided to view all fields. Refer to Figure 9-8 and Figure 9-9.

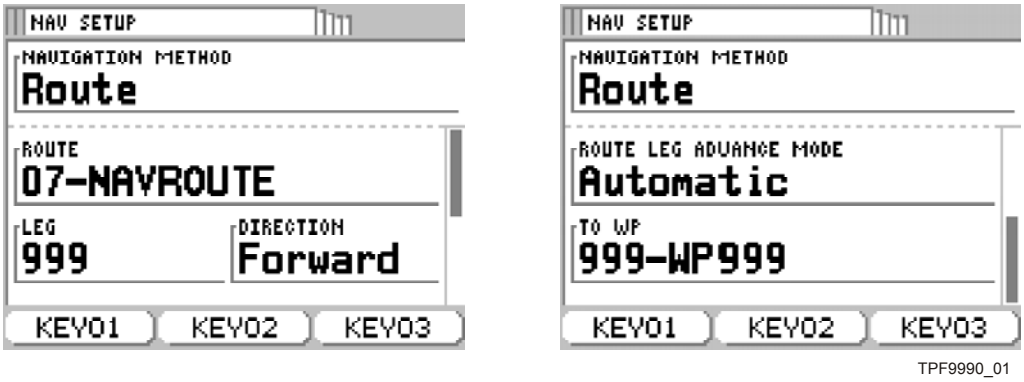


Figure 9-8. Route Navigation Method (Basic)

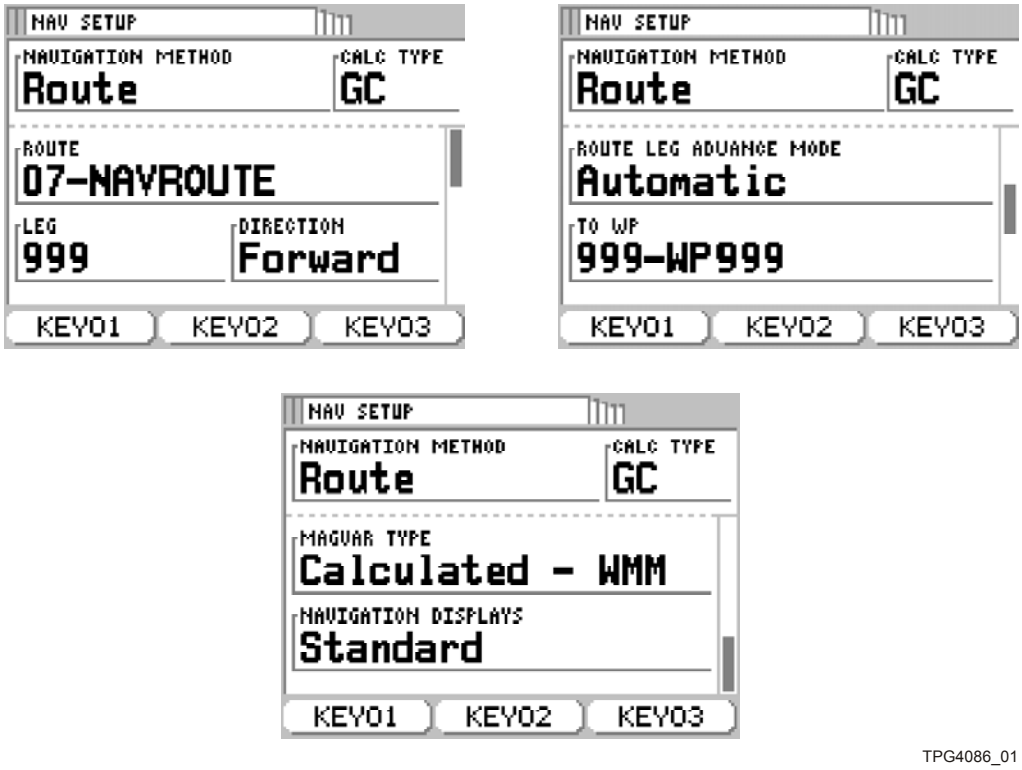


Figure 9-9. Route Navigation Method (Advanced)

9.2.2.1.6. Approach.

WARNING

Do not use DAGR operator selections to set up or perform Approach navigation. Performing DAGR Approach navigation could result in injury or death through use of an incorrect approach course to the glide path waypoint.

Navigate along an entered course and glide path angle (GPA) to the glide path waypoint (GPWP). Typically used in approaching remote airfields during low visibility conditions. Azimuth, cross track error, and 2D steering data are computed, and then maintained after passing over the glide path waypoint, based upon the approach extension field value. A vertical scroll bar is provided to view all fields. Refer to Figure 9-10 and Figure 9-11.

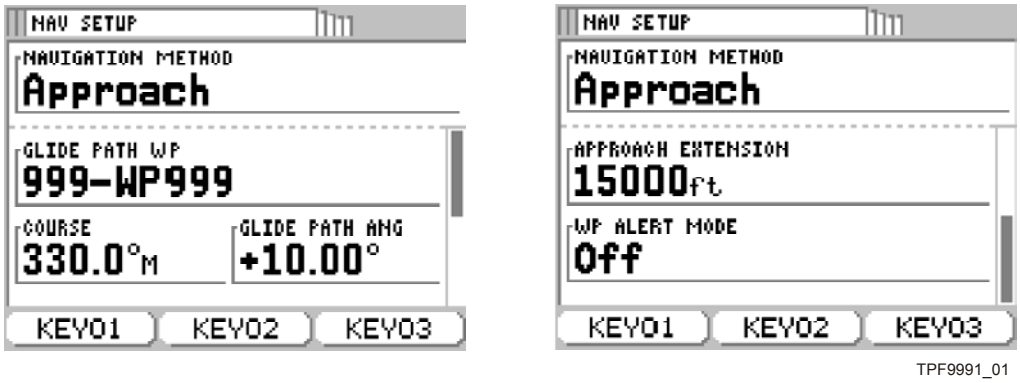


Figure 9-10. Approach Navigation Method (Basic)

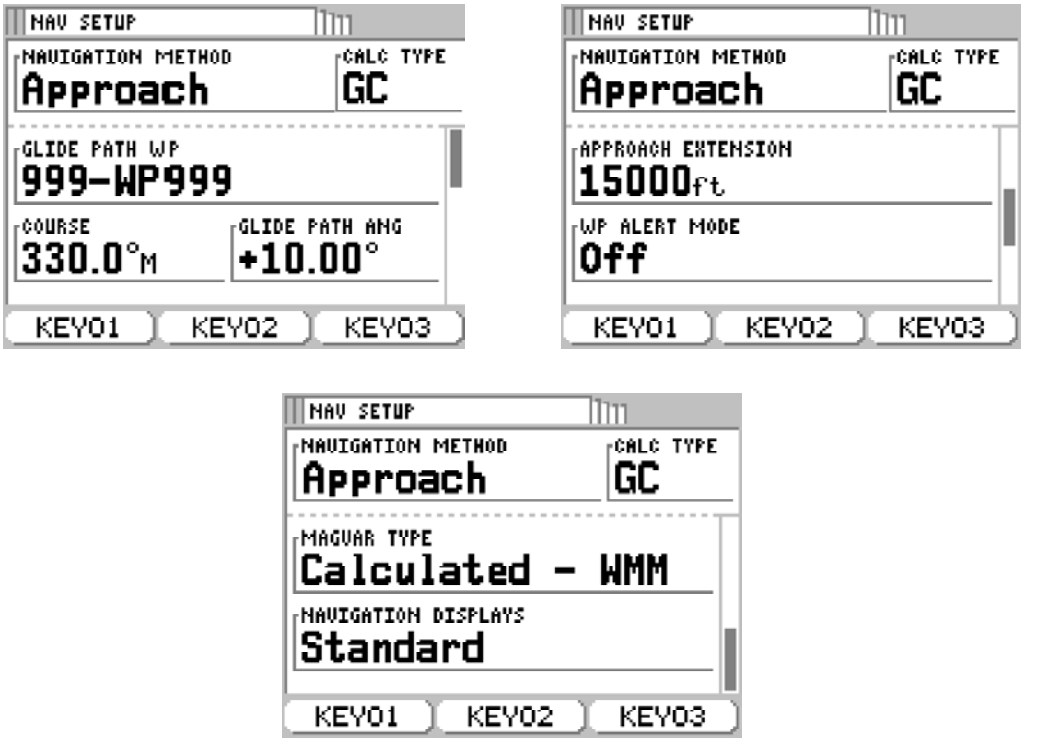


Figure 9-11. Approach Navigation Method (Advanced)

9.2.2.2. To WP Field. The To Waypoint field displays and configures the number (001 to 999) and name (up to ten characters) of the waypoint being navigated to. The waypoint can be selected while in Direct To or Course To navigation. If using Route navigation, the end (destination) waypoint for the route leg is displayed and cannot be changed. If the waypoint is undefined or invalid, text is replaced with double dashes. Field data format is ###-NNNNNNNNNN, where # represents the waypoint number and N represents the waypoint name.

9.2.2.3. From WP Field. The From Waypoint field displays and configures the number (001 to 999) and name (up to ten characters) of the waypoint being navigated from. The waypoint can be selected while in Course From navigation. If the waypoint is undefined or invalid, text is replaced with double dashes. Field data format is ###-NNNNNNNNNN, where # represents the waypoint number and N represents the waypoint name.

9.2.2.4. WP Alert Mode Field. Displays the waypoint alert mode as Off or On. When turned on, an alert occurs when the DAGR enters within a predefined range radius of a waypoint (refer to Paragraph 8.3.2.12 for setting predefined range radius value). If using Course To, Route, or Approach navigation, the alert also occurs when passing by the waypoint.

9.2.2.5. Course Field. Displays the navigation course to or from a selected waypoint. Appropriate units and north reference must be selected before entering a course (using field menu options as shown in Figure 9-12). Refer to Paragraph 10.2 for additional information. Field data format is XXXX in mils or strecks, or XXX.X in degrees, where # represents the numeric course value.

9.2.2.6. Route Field. Displays the navigation route number (01 to 15) and name (up to ten characters) of the route being used for route navigation. If the route number is undefined or invalid, text is replaced with double dashes. Field data format is ##-NNNNNNNNNN, where # represents the route number and N represents the route name.

9.2.2.7. Leg Field. Displays the navigation route leg number (000 up to 999). Depending on the route direction, leg number 000 navigates to the first (forward) or last (reverse) waypoint in the route. If the route leg is undefined or invalid, text is replaced with double dashes. Field data format is ###, where # represents the leg number. This field works along with the Route Leg Advance Mode field.

9.2.2.8. Direction Field. Displays the direction of route navigation as Forward or Reverse.

9.2.2.9. Route Leg Advance Mode Field. Displays the selected mode as Off, Automatic, Manual, or WP Alert and is defined as follows. This field works along with the Leg field.

- **Off** — No alert is displayed when the end of the route leg is reached and no leg advance occurs.
- **Automatic** — An alert is displayed and the DAGR automatically advances to the next leg with no request for operator confirmation.
- **Manual** — An alert is displayed and operator confirmation is required before advancing to the next route leg.
- **WP Alert** — An alert is displayed when a waypoint alert radius is reached.

9.2.2.10. Glide Path WP Field. Displays the number (001 to 999) and name (up to ten characters) of the waypoint being used for approach navigation. If the waypoint is undefined or invalid, text is replaced with double dashes. Field data format is ###-NNNNNNNNNN, where # represents the waypoint number and N represents the waypoint name.

9.2.2.11. Glide Path Ang Field. Displays the approach navigation glide path angle (e.g., +30.00°). The selectable angle is referenced from the glide path waypoint. Field data format is +/- XX.XX; where positive is up, negative is down, and X represents the angle in degrees.

9.2.2.12. Approach Extension Field. Displays the approach navigation extension (horizontal range beyond the glide path waypoint) from 1000 to 15000 feet. This extension allows azimuth, 2D steering, and cross track elements to maintain constant forward navigation information when passing over the glide path waypoint. Vertical (3D) steering continues to guide to the glide path waypoint. Field data format is XXXXXft, where X represents the range in feet.

9.2.2.13. Calc Type Field (Advanced). Displays the method (Rhumb Line or Great Circle) used for calculating navigation information. The Calc Type field appears on all NAV Setup page displays when using advanced function set.

- **Rhumb Line (RL)** — Produces constant compass directions and allows lines of latitude to be used as paths.
- **Great Circle (GC)** — Produces the shortest path to the navigation waypoint, but the compass direction of travel changes due to the curvature of the earth.

9.2.2.14. MAGVAR Type Field (Advanced).

CAUTION

Do not select NAV Waypoint MAGVAR type. If NAV Waypoint MAGVAR type is selected, track will be incorrect.

Displays the selected MAGVAR type used for displaying azimuth or track as follows.

- **Calculated-WMM** — MAGVAR value is calculated using the World Magnetic Model (WMM). The current model year is displayed in the upper right corner.
- **Local** — An operator entered MAGVAR value is used.
- **NAV Waypoint** — The MAGVAR value of the navigation waypoint is used.

9.2.2.15. Navigation Displays Field (Advanced). Displays Standard or Custom. Standard is selected to enable viewing the standard (default) NAV Displays pages for the current navigation method. Custom is selected to customize or enable viewing of the custom NAV Displays pages. Refer to Paragraph 9.4 for NAV Displays page information.

9.2.3. How To Use The NAV Setup Page.

The NAV Setup page contains information used to configure the navigation method used by DAGR. To perform navigation, refer to one of the following pages of this chapter: NAV Displays (refer to Paragraph 9.4), or NAV Pointer (refer to Paragraph 9.3). Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting up data and changing field information. In the following procedures, the Calc Type field is set only as required when using the advanced function set.

9.2.3.1. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Navigation, then push the ENTER key.
3. Highlight NAV Setup, then push the ENTER key. The NAV Setup page is displayed.

a. Configure Direct To navigation

(1) From the NAV Setup page, set the Navigation Method field to Direct To.

(a) Highlight Navigation Method field, then push the ENTER key.

(b) Highlight Direct To, then push the ENTER key.

(2) Set the Calc Type field (Advanced) to GC for great circle or RL for rhumb line calculation.

(a) Highlight Calc Type field, then push the ENTER key.

(b) Highlight desired selection, then push the ENTER key.

(3) Set the To WP field to the waypoint being navigated to.

(a) Highlight To WP field, then push the ENTER key.

(b) Highlight desired selection, then push the ENTER key.

(4) Set the WP Alert Mode field to On or Off. When on, the DAGR visually alerts the operator upon waypoint arrival. When off, the DAGR does not alert the operator upon waypoint arrival.

(a) Highlight WP Alert Mode field, then push the ENTER key.

(b) Highlight desired selection, then push the ENTER key.

Do not select NAV Waypoint MAGVAR type. If NAV Waypoint MAGVAR type is selected, track will be incorrect.

(5) Set the MAGVAR Type field (Advanced) to Calculated-WMM, Local, or NAV Waypoint.

(a) Highlight MAGVAR Type field, then push the ENTER key.

(b) Highlight desired selection, then push the ENTER key.

(6) Set the Navigation Displays field (Advanced) to Standard or Custom.

(a) Highlight Navigation Displays field, then push the ENTER key.

(b) Highlight desired selection, then push the ENTER key.

b. Configure Course To navigation

NOTE

The course set for this navigation method may or may not go directly to the selected waypoint. The actual course entered may intersect with the waypoint, or pass by the waypoint without actually reaching it.

(1) From the NAV Setup page, set the Navigation Method field to Course To.

(a) Highlight Navigation Method field, then push the ENTER key.

(b) Highlight Course To, then push the ENTER key.

(2) Set the Calc Type field (Advanced) to GC for great circle or RL for rhumb line calculation.

(a) Highlight Calc Type field, then push the ENTER key.

(b) Highlight desired selection, then push the ENTER key.

(3) Set the To WP field to the waypoint being navigated to.

(a) Highlight To WP field, then push the ENTER key.

(b) Highlight desired selection, then push the ENTER key.

(4) Set up units used for the Course field (if required).

(a) Highlight the Course field, then push the MENU key.

(b) Highlight the desired type of units to change (e.g., Select Angle Units), then push the ENTER key.

(c) Highlight the desired selection, then push the ENTER key.

(d) The page displays all associated field information with the change made.

(5) Set the Course field for the desired course to the waypoint being navigated to.

(a) Highlight Course field, then push the ENTER key.

(b) Enter the desired course, then push the ENTER key.

(6) Set the WP Alert Mode field to On or Off. When on, the DAGR visually alerts the operator upon waypoint arrival or passing by the waypoint. When off, the DAGR does not alert the operator upon waypoint arrival or passing by the waypoint.

(a) Highlight WP Alert Mode field, then push the ENTER key.

(b) Highlight desired selection, then push the ENTER key.

Do not select NAV Waypoint MAGVAR type. If NAV Waypoint MAGVAR type is selected, track will be incorrect.

(7) Set the MAGVAR Type field (Advanced) to Calculated-WMM, Local, or NAV Waypoint.

(a) Highlight MAGVAR Type field, then push the ENTER key.

(b) Highlight desired selection, then push the ENTER key.

(8) Set the Navigation Displays field (Advanced) to Standard or Custom.

(a) Highlight Navigation Displays field, then push the ENTER key.

(b) Highlight desired selection, then push the ENTER key.

c. Configure Course From navigation

(1) From the NAV Setup page, set the Navigation Method field to Course From.

(a) Highlight Navigation Method field, then push the ENTER key.

(b) Highlight Course From, then push the ENTER key.

(2) Set the Calc Type field (Advanced) to GC for great circle or RL for rhumb line calculation.

(a) Highlight Calc Type field, then push the ENTER key.

(b) Highlight desired selection, then push the ENTER key.

(3) Set the From WP field to the waypoint being navigated from.

(a) Highlight From WP field, then push the ENTER key.

(b) Highlight desired selection, then push the ENTER key.

(4) Set up units used for the Course field (if required).

(a) Highlight the Course field, then push the MENU key.

(b) Highlight the desired type of units to change (e.g., Select Angle Units), then push the ENTER key.

(c) Highlight the desired selection, then push the ENTER key.

(d) The page displays all associated field information with the change made.

(5) Set the Course field to the desired course away from the waypoint being navigated from.

(a) Highlight Course field, then push the ENTER key.

(b) Enter the desired course, then push the ENTER key.

CAUTION

Do not select NAV Waypoint MAGVAR type. If NAV Waypoint MAGVAR type is selected, track will be incorrect.

(6) Set the MAGVAR Type field (Advanced) to Calculated-WMM, Local, or NAV Waypoint.

(a) Highlight MAGVAR Type field, then push the ENTER key.

(b) Highlight desired selection, then push the ENTER key.

(7) Set the Navigation Displays field (Advanced) to Standard or Custom.

(a) Highlight Navigation Displays field, then push the ENTER key.

(b) Highlight desired selection, then push the ENTER key.

d. Configure Route navigation

(1) From the NAV Setup page, set the Navigation Method field to Route.

(a) Highlight Navigation Method field, then push the ENTER key.

(b) Highlight Route, then push the ENTER key.

(2) Set the Calc Type field (Advanced) to GC for great circle or RL for rhumb line calculation.

(a) Highlight Calc Type field, then push the ENTER key.

(b) Highlight desired selection, then push the ENTER key.

(3) Set the Route field to the desired navigation route number/name.

(a) Highlight Route field, then push the ENTER key.

(b) Highlight desired selection, then push the ENTER key.

(4) Set the Leg field to the desired starting navigation leg of the route. Entry 000 navigates to the first (forward direction) or last (reverse direction) waypoint in the route. This field is dependent on the Route Leg Advance Mode field setting.

(a) Highlight Leg field, then push the ENTER key.

(b) Enter desired selection, then push the ENTER key.

(5) Set the Direction field to Forward or Reverse for desired direction of navigation through the route legs.

(a) Highlight Direction field, then push the ENTER key.

(b) Highlight desired selection, then push the ENTER key.

(6) Set the Route Leg Advance Mode field to Off, Automatic, Manual, or WP Alert (refer to Paragraph 9.2.2.9 for more information). The setting of this field governs how the Leg field operates.

(a) Highlight Route Leg Advance Mode field, then push the ENTER key.

(b) Highlight desired selection, then push the ENTER key.

(7) The To WP field displays the end waypoint for the route leg and cannot be edited by the operator.

CAUTION

Do not select NAV Waypoint MAGVAR type. If NAV Waypoint MAGVAR type is selected, track will be incorrect.

(8) Set the MAGVAR Type field (Advanced) to Calculated-WMM, Local, or NAV Waypoint.

(a) Highlight MAGVAR Type field, then push the ENTER key.

(b) Highlight desired selection, then push the ENTER key.

(9) Set the Navigation Displays field (Advanced) to Standard or Custom.

(a) Highlight Navigation Displays field, then push the ENTER key.

(b) Highlight desired selection, then push the ENTER key.

e. Configure Approach navigation (Advanced)

WARNING

Do not use DAGR operator selections to set up or perform Approach navigation. Performing DAGR Approach navigation could result in injury or death through use of an incorrect approach course to the glide path waypoint.

9.2.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 9-12 shows the keystroke map for the NAV Setup page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The Show Blank Pages or Hide Blank Pages menu selections only appear when using the advanced function set and only apply to the NAV Displays page. The keystroke map starts at the main menu and proceeds to selections available using the NAV Setup page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Navigation submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

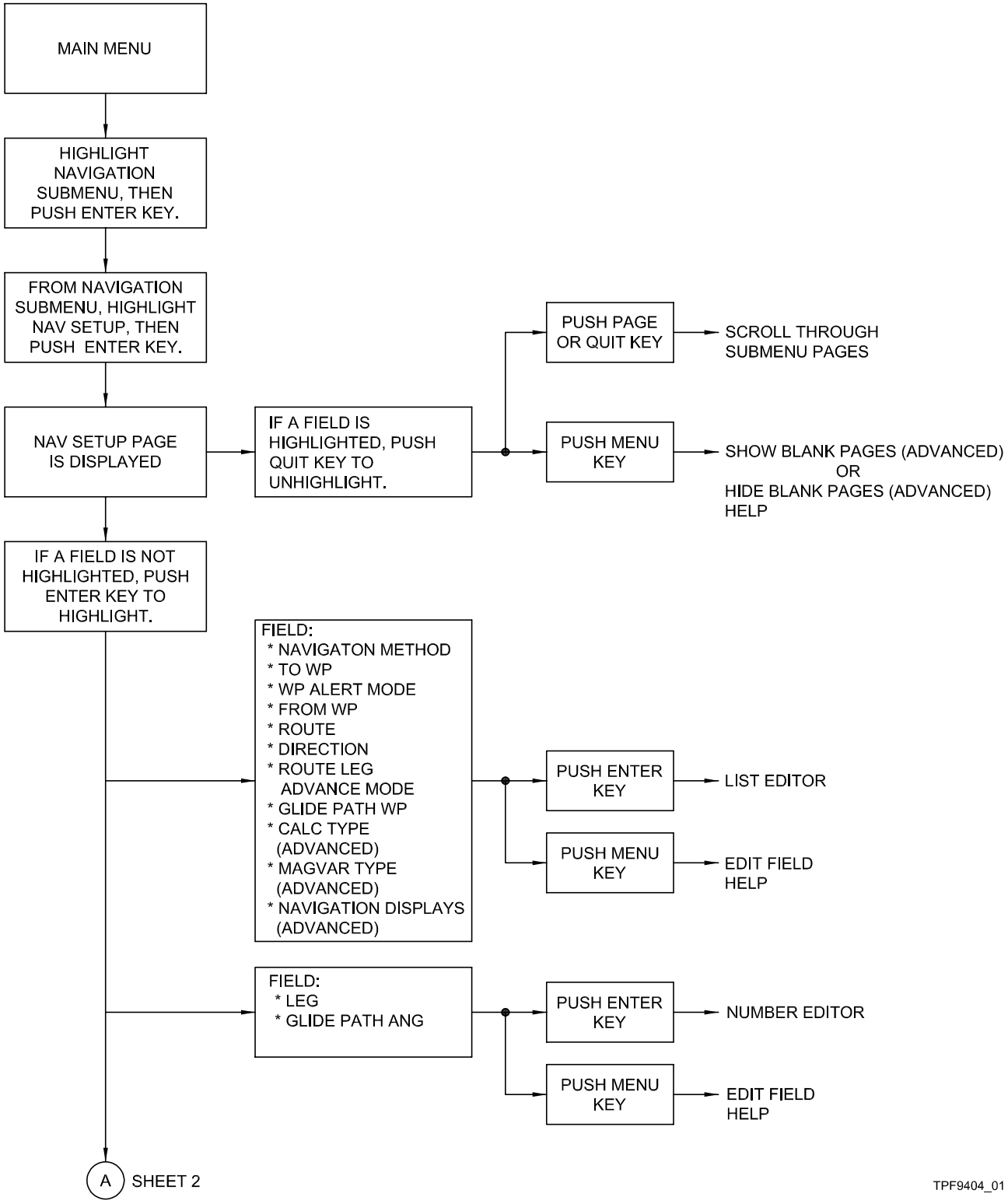


Figure 9-12. NAV Setup Page Keystroke Map (Sheet 1 of 2)

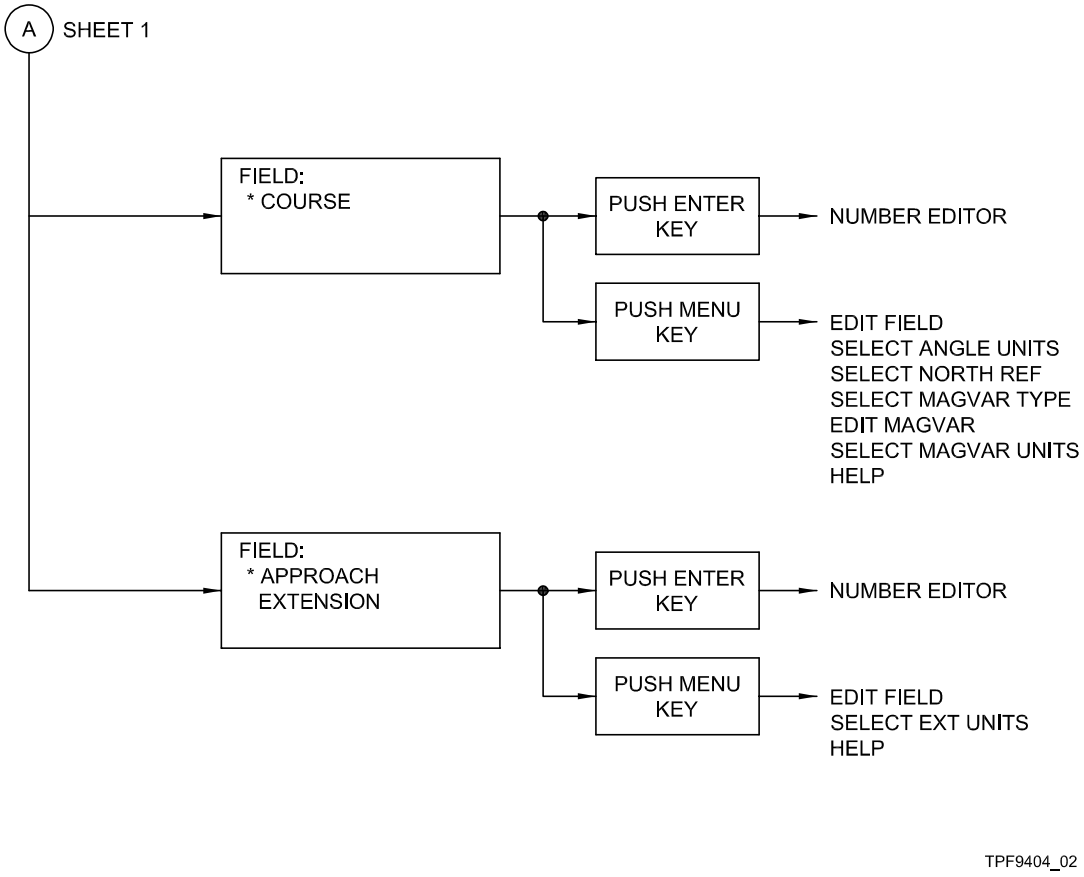


Figure 9-12. NAV Setup Page Keystroke Map (Sheet 2)

9.3. NAV POINTER PAGE.

CAUTION

• If the DAGR is not tracking satellites or has no position fix, the displayed position data blinks between gray and black to notify the operator. Field data may be inaccurate and/or unavailable when the DAGR does not have a position fix.

• Prior to a mission, manually enable and orient the internal compass. Failure to do this can result in inaccurate DAGR track data when the DAGR is not moving or is moving slowly. For more information, refer to the Internal Compass page, Paragraph 10.3.

• A high level of position error may place a mission at risk. Verify the figure of merit (FOM) level is sufficient to accomplish the mission. Refer to the position error field (EPE/EHE/EVE) of either the Present Position page or NAV Displays page to view the current FOM. Refer to Table 9-1 to convert FOM into a position error range (in meters). If the FOM is too high, refer to Paragraph 18.4.

9.3.1. Page Function.

The NAV (Navigation) Pointer page is accessed from the Navigation submenu, Waypoint GOTO navigation (refer to Paragraph 9.3.5), Waypoints page menu (refer to Paragraph 8.2), Routes page menu (refer to Paragraph 8.7), or accessed from the POS page set (refer to Paragraph 6.2.9). The NAV Pointer page provides the most commonly used navigation information. The page fields include the selected navigation method, waypoint (number and name), pointer, azimuth, and range field (as shown in Figure 9-13). These fields also appear on NAV Displays pages. The NAV Pointer page cannot be customized for different fields (as can be done for the NAV Displays page). When using the advanced function set and WGS-84 datum is not being used, DATUM appears with the page title. GC appears with the page title if great circle navigation is being used.

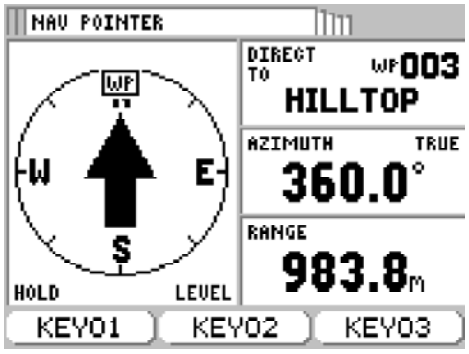


Figure 9-13. NAV Pointer Page

9.3.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 9-14. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

9.3.2.1. Navigation Method and Waypoint Field. Displays the active navigation method and the waypoint being used to compute navigation data. The navigation method and waypoint are selected using the NAV Setup page. Navigation methods are NONE, DIRECT TO, COURSE TO, COURSE FROM, ROUTE, and APPROACH. Refer to Paragraph 9.2.2.1 for more information on navigation methods. Waypoint field data format is ###-NNNNNNNNNN, where # represents the waypoint number and N represents the waypoint name.

9.3.2.2. Azimuth Field. Provides the azimuth from the DAGR current position to the current navigation waypoint as measured clockwise from the selected north reference (True, Magnetic, or Grid). North is referenced as 360 degrees, 6400 mils, or 6300 strecks. Field data format is XXX.X (X represents degrees) or XXXX (X represents mils or strecks).

9.3.2.3. Navigation Pointer Field. Displays the current ground track and azimuth to the current navigation waypoint. The compass dial rotates so the top of the dial indicates the current ground track. The arrow points the azimuth to the current navigation waypoint (shown as WP in a box). If the DAGR is tracking satellites while moving too slow to compute track, and the internal compass is disabled, the pointer ring blinks and the last known track is used. If the DAGR is moving too slow to compute track for a specified amount of time, and the internal compass is enabled, the internal compass activates to provide track. Prior to the internal compass activating, the Navigation Pointer field blinks for a specified amount of time. Refer to Paragraph 10.3 for additional internal compass information. The bottom of the field displays HOLD LEVEL when the internal compass is in use instructing the operator to hold the DAGR horizontally level. The appropriate north reference and MAGVAR type (if applicable) must be selected before using the pointer (refer to Paragraph 10.2 for additional information).

9.3.2.4. Range Field. Displays the range from the current DAGR position to the current navigation waypoint excluding elevation differences. Field data format is XXXX.XX or XXXX.X, where X represents miles, nautical miles, kilometers, feet, yards, or meters.

9.3.3. How To Enable The Internal Compass.

Prior to a mission, enable the internal compass using this procedure, then perform the following orientation procedure. Refer to Paragraph 10.3 for more information.

a. Access the NAV Pointer page.

b. Push the MENU key to acquire the page menu.

c. Highlight Enable Compass, then push the ENTER key. (When Disable Compass is displayed the compass is already enabled.)

d. The DAGR activates the internal compass as required without further operator action.

9.3.4. How To Orient The Internal Compass.

Prior to a mission, enable the internal compass using the prior procedure, then orient the internal compass using this procedure. Refer to Paragraph 10.3 for more information.

a. Place the DAGR face up, on a flat level surface.

b. Access the NAV Pointer page, then push the MENU key to acquire the page menu.

c. Highlight Calibrate Compass, then push the ENTER key.

d. Slowly rotate the DAGR clockwise until the DAGR indicates calibration is complete. The display advises the operator to maintain or alter current rotation speed. Pushing the QUIT key cancels the orientation.

e. The operator acknowledges completion of orientation or allows the acknowledgment display to time out. The display returns to the NAV Pointer page.

9.3.5. How To Use The NAV Pointer Page.

The NAV Pointer page contains information needed to navigate using the five navigation methods described in the NAV Setup page. The NAV Setup page must be configured for the chosen navigation method described in each the following navigation procedures. Units of measure should also be configured before performing navigation. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting up data and changing field information. The navigation procedures assume:

- The DAGR is tracking satellites and has acquired present position. (refer to Paragraph 5.4.2).
- The internal compass has been enabled and oriented (refer to Paragraph 9.3.3 and Paragraph 9.3.4).
- Required waypoints, routes, and alerts used for mission navigation have been established.

9.3.5.1. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.

2. Highlight Navigation, then push the ENTER key.
3. Highlight NAV Pointer, then push the ENTER key. The NAV Pointer page is displayed.

a. Set Up Units/References

(1) Access the NAV Pointer page. Prior to performing navigation, view the page fields to determine if changes to units of measure or references used in the fields are required (metric or decimal, mils or degrees, true or magnetic, etc.).

(2) When field units of measure or reference changes are required, highlight the desired field, then push the MENU key.

(3) Highlight the desired type of units to change (e.g., Select Range Units), then push the ENTER key.

(4) Highlight the desired selection, then push the ENTER key.

(5) The page displays all associated field information with the change made.

(6) If required, repeat the procedure for the remaining selections.

b. Waypoint GOTO navigation

NOTE

When Waypoint GOTO navigation is activated, the navigation method automatically updates to Direct To.

(1) From any display, push and hold the WP key. Waypoint function choices are displayed.

(2) Scroll to GOTO a WP and push the ENTER key.

NOTE

• If no waypoints are defined, the DAGR displays "No Waypoints Defined". When waypoints are defined, the DAGR displays "Working…" until the sorted list of waypoints is displayed.

• The waypoint list can be sorted multiple ways. For more waypoint selection sorting options, push the MENU key. Refer to Paragraph 8.2 for additional waypoint sorting information.

(3) Scroll through the waypoint list, highlight the desired destination waypoint, then push the ENTER key.

(4) The DAGR automatically displays the NAV Pointer page (part of the POS page set). The top of the rotating compass dial indicates the current ground track.

(5) The display arrow points the azimuth to the destination waypoint. Move in the direction the arrow is pointing to navigate to the destination waypoint.

c. Direct To Navigation

(1) Configure the NAV Setup page (refer to Paragraph 9.2 for more information).

(a) Access the NAV Setup page.

(b) Set the Navigation Method field to Direct To.

Do not select NAV Waypoint MAGVAR type. If NAV Waypoint MAGVAR type is selected, track will be incorrect.

(c) When using the advanced function set, set up the following fields as required:

- **Calc Type field** — Set to GC for great circle or RL for rhumb line calculation.
- **MAGVAR Type field** — Set the MAGVAR type to Calculated-WMM, Local, or NAV Waypoint.
- **Navigation Displays field** — Select Standard or Custom before viewing NAV Displays pages.

(d) Set the To WP field to the waypoint being navigated to.

(e) Set the WP Alert Mode field to On or Off. When on, the DAGR visually alerts the operator upon waypoint arrival. When off, the DAGR does not alert the operator upon waypoint arrival.

(2) Navigate.

(a) Access the NAV Pointer page, then travel the azimuth pointed by the Pointer field arrow. The compass dial rotates so the top of the dial indicates the current ground track.

(b) If the DAGR internal compass is active, Hold Level appears at the bottom of the Pointer field. The internal compass activates when moving below a preset speed for a preset amount of time (refer to the Internal Compass page Paragraph 10.3).

(c) While moving towards the destination waypoint, the Range field value steadily decreases and the Azimuth field value changes.

(d) The DAGR recognizes it has reached the waypoint when it reaches a radius from the waypoint (default is 5 meters) set in the Alert Radius field of the Waypoint Editor page (refer to Paragraph 8.3.2.12). The operator must confirm waypoint arrival only if the WP Alert Mode field of the NAV Setup page was previously set to On.

d. Course To Navigation

NOTE

The course set for this navigation method may or may not go directly to the selected waypoint. The actual course entered may intersect with the waypoint, or pass by the waypoint without actually reaching it.

(1) Configure the NAV Setup page (refer to Paragraph 9.2 for more information).

(a) Access the NAV Setup page.

(b) Set the Navigation Method field to Course To.

Do not select NAV Waypoint MAGVAR type. If NAV Waypoint MAGVAR type is selected, track will be incorrect.

(c) When using the advanced function set, set up the following fields as required:

- **Calc Type field** — Set to GC for great circle or RL for rhumb line calculation.
- **MAGVAR Type field** — Set the MAGVAR type to Calculated-WMM, Local, or NAV Waypoint.
- **Navigation Displays field** — Select Standard or Custom before viewing NAV Displays pages.

(d) Set the To WP field to the waypoint being navigated to.

(e) Set up units for the Course field, if required.

(f) Set the Course field to the desired course to the waypoint being navigated to.

(g) Set the WP Alert Mode field to On or Off. When on, the DAGR visually alerts the operator upon waypoint arrival or passing by the waypoint. When off, the DAGR does not alert the operator upon waypoint arrival or passing by the waypoint.

(2) Navigate.

(a) Access the NAV Pointer page, then travel according to the course previously set in the Course field of the NAV Setup page. With the DAGR held in front of the operator, the Pointer field arrow points the azimuth of the selected waypoint. The compass dial rotates so the top of the dial indicates the current ground track.

(b) If the DAGR internal compass is active, Hold Level appears at the bottom of the Pointer field. The internal compass activates when moving below a preset speed for a preset amount of time (refer to the Internal Compass page Paragraph 10.3).

(c) While traveling the course towards the selected waypoint, the Range field value steadily decreases and the Azimuth field value changes.

(d) The DAGR recognizes when it has reached or passed by the waypoint. The operator must confirm waypoint arrival or passing by the waypoint only if the WP Alert Mode field of the NAV Setup page was previously set to On.

e. Course From Navigation

(1) Configure the NAV Setup page (refer to Paragraph 9.2 for more information).

(a) Access the NAV Setup page.

(b) Set the Navigation Method field to Course From.

CAUTION

Do not select NAV Waypoint MAGVAR type. If NAV Waypoint MAGVAR type is selected, track will be incorrect.

(c) When using the advanced function set, set up the following fields as required:

- **Calc Type field** — Set to GC for great circle or RL for rhumb line calculation.
- **MAGVAR Type field** — Set the MAGVAR type to Calculated-WMM, Local, or NAV Waypoint.
- **Navigation Displays field** — Select Standard or Custom before viewing NAV Displays pages.

(d) Set the From WP field to the waypoint being navigated from.

(e) Set up units for the Course field, if required.

(f) Set the Course field to the desired course away from the waypoint being navigated from.

(2) Navigate.

(a) Access the NAV Pointer page, then travel the course from the waypoint previously set in the Course field of the NAV Setup page. The Pointer field arrow points the azimuth to the waypoint entered in the From WP field of the NAV Setup page. With the DAGR held in front of the operator, the compass dial rotates so the top of the dial indicates the current ground track, the Pointer field arrow should continue to point directly at the waypoint entered in the From WP field.

(b) If the DAGR internal compass is active, Hold Level appears at the bottom of the Pointer field. The internal compass activates when moving below a preset speed for a preset amount of time (refer to the Internal Compass page Paragraph 10.3).

(c) While moving away from the waypoint, the Range field value steadily increases and the Azimuth field value changes.

f. Route Navigation

NOTE

The Route navigation method can also be accessed using the Routes page (refer to Paragraph 8.7).

(1) Configure the NAV Setup page (refer to Paragraph 9.2 for more information).

(a) Access the NAV Setup page.

(b) Set the Navigation Method field to Route.

CAUTION

Do not select NAV Waypoint MAGVAR type. If NAV Waypoint MAGVAR type is selected, track will be incorrect.

(c) When using the advanced function set, set up the following fields as required:

- **Calc Type field** — Set to GC for great circle or RL for rhumb line calculation.
- **MAGVAR Type field** — Set the MAGVAR type to Calculated-WMM, Local, or NAV Waypoint.
- **Navigation Displays field** — Select Standard or Custom before viewing NAV Displays pages.

(d) Set the Route field to the desired navigation route number/name.

(e) Set the Leg field to the desired starting navigation leg of the route. Entry 000 navigates to the first (forward direction) or last (reverse direction) waypoint in the route. This field is dependent on the Route Leg Advance Mode field setting.

(f) Set the Direction field to Forward or Reverse for desired direction of navigation through the route legs.

(g) Set Route Leg Advance Mode field to Off, Automatic, Manual, or WP Alert (refer to Paragraph 9.2.2.9 for more information). The setting of this field governs how the Leg field operates.

(h) The To WP field cannot be edited by the operator and displays the end waypoint for the route leg.

(2) Navigate.

(a) Access the NAV Pointer page, then travel the azimuth pointed by the Pointer field arrow.

(b) If the DAGR internal compass is active, Hold Level appears at the bottom of the Pointer field. The internal compass activates when moving below a preset speed for a preset amount of time (refer to the Internal Compass page Paragraph 10.3).

(c) While traveling towards the leg ending waypoint, the Range field value steadily decreases and the Azimuth field value changes.

(d) The DAGR recognizes it has reached the end of a route leg when it reaches a radius from the ending waypoint (default is 5 meters) set in the Alert Radius field of the Route Editor page (refer to Paragraph 8.8). The operator is notified and/or must confirm a route leg advance to the next leg depending upon the setting of the Route Leg Advance Mode field of the NAV Setup page.

(e) Repeat prior steps as required for each leg of the route.

(f) At any time during route navigation, the operator can reverse the direction of travel on the route by changing the setting of the Direction field of the NAV Setup page.

(g) When the end of the route is reached, the leg no longer advances.

g. Approach Navigation

WARNING

Do not use DAGR operator selections to set up or perform Approach navigation. Performing DAGR Approach navigation could result in injury or death through use of an incorrect approach course to the glide path waypoint.

9.3.6. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 9-14 shows the keystroke map for the NAV Pointer page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the NAV Pointer page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the POS page set.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

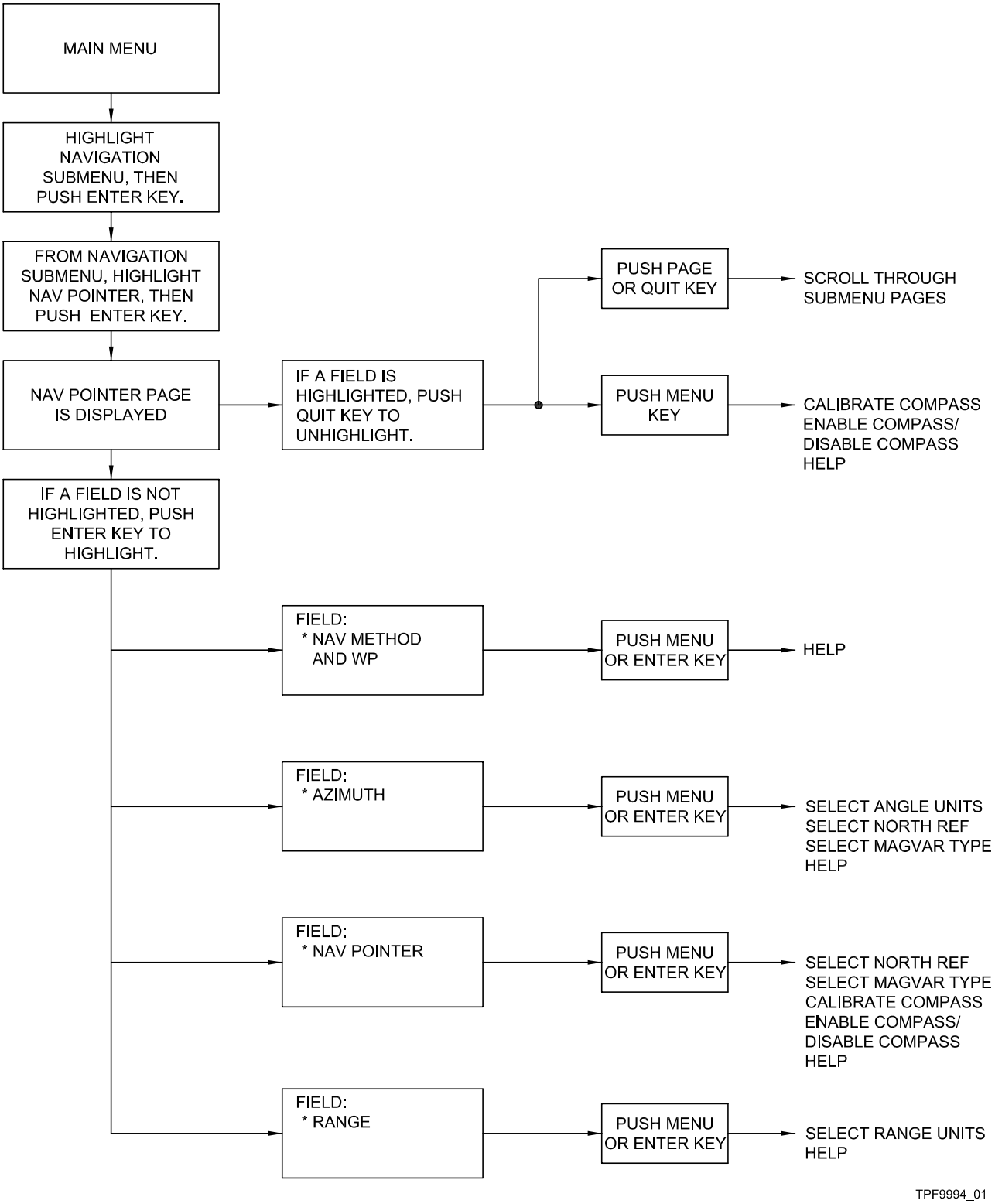


Figure 9-14. NAV Pointer Page Keystroke Map

9.4. NAV DISPLAYS PAGE.

CAUTION

• If the DAGR is not tracking satellites or has no position fix, the displayed position data blinks between gray and black to notify the operator. Field data may be inaccurate and/or unavailable when the DAGR does not have a position fix.

• Prior to a mission, manually enable and orient the internal compass. Failure to do this can result in inaccurate DAGR track data when the DAGR is not moving or is moving slowly. For more information, refer to the Internal Compass page, Paragraph 10.3.

• A high level of position error may place a mission at risk. Verify the figure of merit (FOM) level is sufficient to accomplish the mission. Refer to the position error field (EPE/EHE/EVE) of either the Present Position page or NAV Displays page to view the current FOM. Refer to Table 9-1 to convert FOM into a position error range (in meters). If the FOM is too high, refer to Paragraph 18.4.

9.4.1. Page Function.

The NAV (Navigation) Displays page is accessed from the Navigation submenu. All DAGR fields used for navigation are accessible from the NAV Displays pages. Up to four display pages of navigation field information are available. When using the advanced function set, the operator can choose between standard or custom NAV Displays pages by using the Navigation Displays field of the NAV Setup page. Refer to Paragraph 9.2.2.15 for NAV Setup page Navigation Displays field information.

9.4.1.1. When the Navigation Displays field of the NAV Setup page is set to Standard (using the advanced function set) or the DAGR is using the basic function set, the NAV Displays page displays standard fields for the current navigation method (e.g., Direct To). Each navigation method has its own standard (default) NAV Displays page fields as listed in Table 9-3 and shown in Figure 9-16 through Figure 9-19.

9.4.1.2. When using the advanced function set and the Navigation Displays field of the NAV Setup page is set to Custom, the fields assigned to the four NAV Displays pages can be customized by the user to meet mission requirements. These customized pages may include some blank fields and/or blank pages. Blank pages can be hidden or shown using the customize process. Refer to Paragraph 9.4.7 for information on customizing fields.

9.4.2. NAV Displays Page Fields.

A left to right field numbering system, as shown in Figure 9-15, is used as a standard convention to reference field locations throughout the following navigation display field figures. There are cases when one large field of a display occupies more than just one field. For example, one field of the display may occupy both fields 1 and 2 as shown in Figure 9-22, or occupy both fields 1 and 3 as shown in Figure 9-20. Actual display field locations and some field sizes can be customized by the operator while using the advanced function set (refer to Table 9-5). Examples of available larger size version fields are shown in Figure 9-23. These larger fields offer advantages during poor visibility conditions (e.g., heavy vibration while riding in a vehicle). Double dashes appear in place of field data when data is invalid or not applicable.

9.4.2.1. The page number appears in the page title. DATUM appears with the page title when WGS-84 datum is not being used. The DAGR can use one to four pages of display fields. When using the Advanced function set:

- Field menu selection Customize Field is used to select fields appearing on pages when the Navigation Displays field of the NAV Setup page is set to Custom.
- Up to four NAV Displays pages can be customized.
- Larger sized versions of most of the fields are operator selectable. These larger versions require two field spaces. Refer to Table 9-5 for a listing of available larger version fields.
- Blank NAV Displays pages can be shown or hidden as selected by the operator.
- GC appears with the page title when great circle navigation is being used.

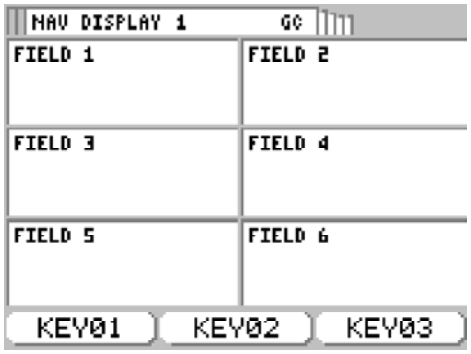


Figure 9-15. NAV Displays Page Format

9.4.3. Field Descriptions.

Appropriate field data units are selected using the page menu. Figure 9-16 through Figure 9-19 display the standard navigation display pages and their fields for each navigation method (using the basic function set or the advanced function set with standard navigation displays). Figure 9-20 through Figure 9-22 display additional page fields the operator can add to the custom navigation display pages (using the advanced function set with custom navigation displays). Select page/field information by using keystrokes shown on the keystroke map in Figure 9-24. The PAGE and QUIT keys are used to view all page fields by advancing through the NAV Displays pages (including NAV Setup page). Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

9.4.3.1. Track Field.

CAUTION

Do not select NAV Waypoint MAGVAR type. If NAV Waypoint MAGVAR type is selected, track will be incorrect.

Refer to Figure 9-16, field 1 of NAV Display page 1. The Track field provides the ground track or actual path on the earth's surface measured clockwise from the selected north reference. North reference selections are True, Grid, or magnetic (Mag-Calc, Mag-WP, or Mag-LCL). A magnetic north reference is based upon the current DAGR MAGVAR type (Calculated, Navigation Waypoint, or Local). The field displays an arrow pointing towards north as shown. If the DAGR ground speed is too slow to compute a current track, the last known track is used or the internal compass is used (when enabled). When the internal compass is active, the displayed track field label alternates with HOLD LEVEL, instructing the operator to hold the DAGR horizontally level. Refer to Paragraph 10.3 for information on the internal compass. Field data format is XXX.X (X represents degrees) or XXXX (X represents mils or strecks).

9.4.3.2. Ground Speed Field. Refer to Figure 9-16, field 2 of NAV Display page 1 . The Ground Speed field provides the DAGR current ground speed. If ground speed is unknown or the DAGR is moving too slow, zero (0) is displayed. Field data format is XXX, where X represents miles per hour, knots, or kilometers per hour.

9.4.3.3. Azimuth Field.

CAUTION

Do not select NAV Waypoint MAGVAR type. If NAV Waypoint MAGVAR type is selected, track will be incorrect.

Refer to Figure 9-16, field 3 of NAV Display page 1. The Azimuth field provides the azimuth from the DAGR current position to the current navigation waypoint as measured clockwise from the selected north reference. North reference selections are True, Grid, or magnetic (Mag-Calc, Mag-WP, or Mag-LCL). A magnetic north reference is based upon the current DAGR MAGVAR type

(Calculated, Navigation Waypoint, or Local). North is referenced as 360 degrees, 6400 mils, or 6300 strecks. Field data format is XXX.X (X represents degrees) or XXXX (X represents mils or strecks).

9.4.3.4. Range Field. Refer to Figure 9-16, field 4 of NAV Display page 1. The Range field provides the range from the current position to the current navigation waypoint excluding elevation differences. Field data format is XXXX.XX or XXXX.X, where X represents miles, nautical miles, kilometers, feet, yards, or meters.

9.4.3.5. Steering 2D Field. Refer to Figure 9-16, field 5 of NAV Display page 1. The Steering 2D field indicates the horizontal steering direction to turn to align track with azimuth to the navigation waypoint. When off course, direction arrows (left and right) and a value (degrees, mils. or strecks) appear. When on course, the on course indicator (♦♦♦♦♦) appears. The DAGR ground speed must be greater than zero before this data can be computed. Field data format is a direction arrow followed by XXX (X represents degrees) or XXXX (X represents mils or strecks).

9.4.3.6. Time-To-Go 2D Field. Refer to Figure 9-16, field 6 of NAV Display page 1. The Time-To-Go 2D field displays the estimated time required to reach the navigation waypoint if the same ground speed is maintained directly toward the waypoint, excluding elevation differences. Ground speed must be greater than zero before this data can be computed. Field data format is HHhMMmSSs, HHhMMm, MMmSSs, or SSSs, where H represents hours, M represents minutes, and S represents seconds.

9.4.3.7. Estimated Horizontal Error and Figure of Merit Field. Refer to Figure 9-16, field 1 of NAV Display page 2. This field displays the estimated horizontal error (EHE) as a ± value. EHE field data format is N.N, NN, or NNN, where N represents miles, nautical miles, kilometers, feet, yards, or meters. Horizontal position data is estimated to be accurate to within the ± value. Overall position error is displayed as figure of merit (FOM) numbers 1 though 9, where 1 is the best. Refer to Table 9-1.

9.4.3.7.1. Time-since-fix is displayed when the DAGR is not able to compute position data using satellites (SV). It is displayed as NN, where N represents seconds-since-fix (ssf), minutes-since-fix (msf), hours-since-fix (hsf), or days-since-fix (dsf). Scenario time (ST) is displayed when Rehearsal mode is active. The seconds into the scenario are also displayed.

9.4.3.8. Slant Range Field. Refer to Figure 9-16, field 4 of NAV Display page 2. The Slant Range field provides the range from the current position to the current navigation waypoint including elevation differences. Field data format is XXXX.XX or XXXX.X, where X represents miles, nautical miles, kilometers, feet, yards, or meters.

9.4.3.9. Elevation Angle Field. Refer to Figure 9-16, field 5 of NAV Display page 2. The Elevation Angle field provides the angle from DAGR current position to the navigation waypoint (positive up). Field data format is +/- XXX.X (X represents degrees) or XXXX (X represents mils or strecks).

9.4.3.10. Elevation Difference Field. Refer to Figure 9-16, field 6 of NAV Display page 2. The Elevation Difference field provides the difference between the elevation of the DAGR and the elevation of the navigation waypoint (positive up). The elevation difference is valid if the navigation waypoint and it's elevation are valid. Field data format is +/- XXXXX, where X represents feet or meters.

9.4.3.11. Cross Track Error Field. Refer to Figure 9-17, field 6 of NAV Display page 1. The Cross Track Error (XTE) field provides the range, left or right, of the intended course. L and R designate left and right, respectively, next to the range measurement. When the DAGR is on course, the XTE direction, value and units are replaced with the on course indicator (♦♦♦♦♦). XTE is not valid when using Direct To navigation because the intended course is not known. Field data format is L (or) R XXXX.XX or L (or) R XXXX.X, where L represents left, R represents right, and X represents miles, nautical miles, kilometers, feet, yards, or meters.

9.4.3.12. Minimum Miss Distance 2D Field. Refer to Figure 9-17, field 3 of NAV Display page 2. The Minimum Miss Distance 2D (MMD 2D) field provides the closest range the DAGR will get to the current navigation waypoint if it has not already been passed and the same track is maintained excluding elevation differences. The DAGR ground speed must be greater than zero before this data can be computed. Field data format is XXXX.XX or XXXX.X, where X represents miles, nautical miles, kilometers, feet, yards, or meters.

9.4.3.13. Glide Path Angle Field (Advanced). Refer to Figure 9-19, field 1 of NAV Display page 3. The Glide Path Angle field contains the entered approach angle measured positive up from the glide path waypoint. The horizon is zero degrees. When using route navigation with valid waypoint elevations, the glide path angle is calculated. Field data format is +/- XX.XX, where X represents degrees.

9.4.3.14. Glide Path Deviation Field (Advanced). Refer to Figure 9-19, field 2 of NAV Display page 3. The Glide Path Deviation field provides the angle between desired glide path angle and the current angle. LO indicates the current angle is below the desired angle. HI indicates the current angle is above the desired angle. Glide path deviation is valid if the glide path angle is valid, the glide path waypoint and its elevation are valid, and a greater than zero three dimensional speed can be derived from the PVT solution. Field data format is HI/LO XX.XX, where X represents degrees.

9.4.3.15. Minimum Miss Distance 3D Field (Advanced). Refer to Figure 9-19, field 4 of NAV Display page 3. The Minimum Miss Distance 3D (MMD 3D) field provides the closest vertical range the DAGR will get to the current navigation waypoint if it has not already been passed and the same vertical speed is maintained. The DAGR ground speed or vertical speed must be greater than zero before this data can be computed. Field data format is XXXX.XX or XXXX.X, where X represents miles, nautical miles, kilometers, feet, yards, or meters.

9.4.3.16. Steering 3D Field (Advanced). Refer to Figure 9-19, field 5 of NAV Display page 3. The Steering 3D field indicates the vertical steering direction to turn to proceed towards the current navigation waypoint. When off course, direction arrows (up and down) and a value (degrees, mils. or strecks) appear. When on course, the on course indicator (♦♦♦♦♦) appears. 3D (vertical) steering is valid if the navigation waypoint and its elevation are valid and a greater than zero ground speed or vertical speed can be derived from the PVT solution. Field data format is a direction arrow followed by XX (X represents degrees) or XXXX (X represents mils or strecks).

9.4.3.17. Time-To-Go 3D Field (Advanced). Refer to Figure 9-19, field 6 of NAV Display page 3. The Time-To-Go 3D field displays the estimated time required to reach the navigation waypoint's elevation if current ground speed and vertical speed are maintained. Ground speed or vertical speed must be greater than zero before this data can be computed. Field data format is HHh-MMmSSs, HHhMMm, MMmSSs, or SSSs, where H represents hours, M represents minutes, and S represents seconds.

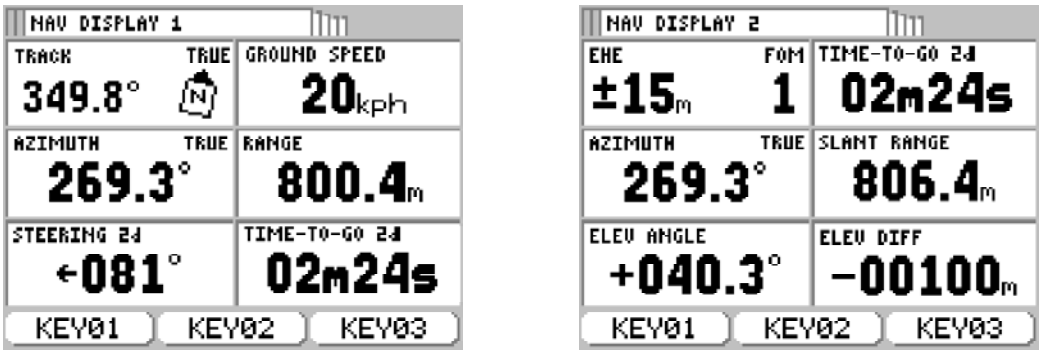


Figure 9-16. Direct To Navigation, Standard Fields

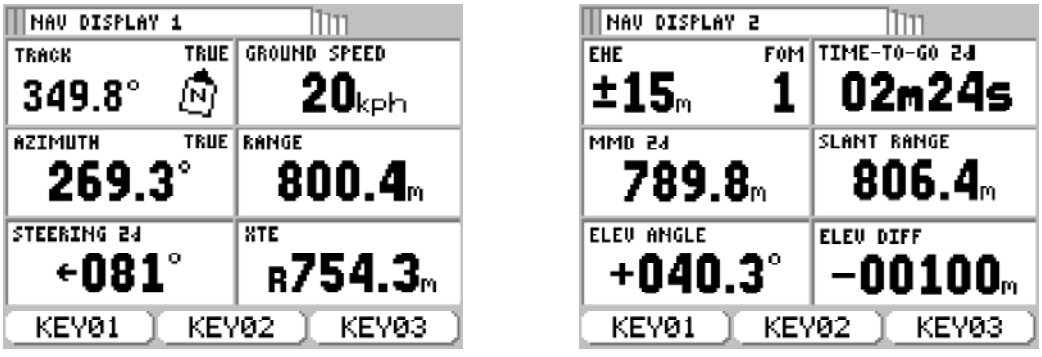


Figure 9-17. Course To and Route Navigation, Standard Fields

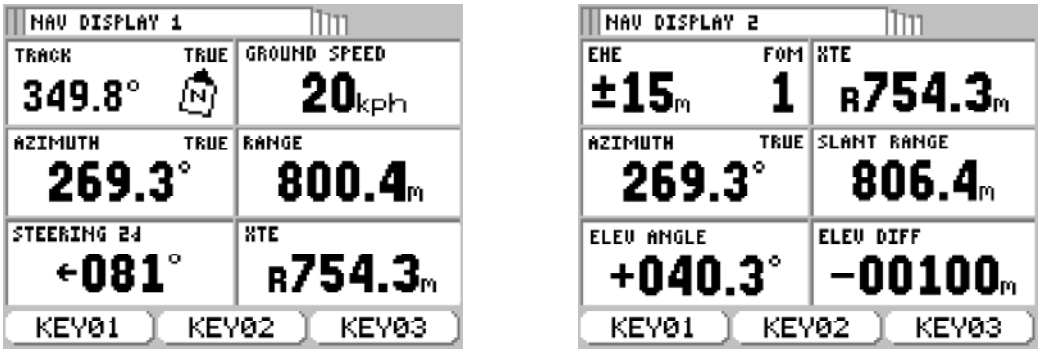


Figure 9-18. Course From Navigation, Standard Fields

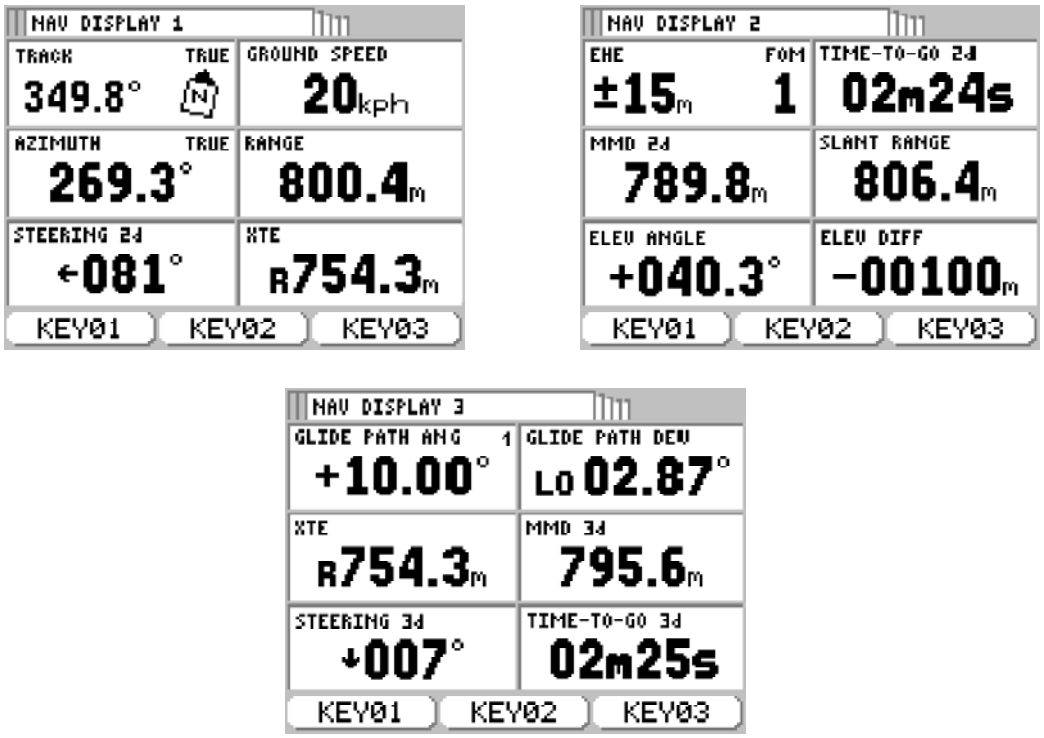


Figure 9-19. Approach Navigation, Standard Fields

9.4.4. Additional Fields.

The following paragraphs describe additional fields available for the custom NAV Displays pages (customized by the operator).

9.4.4.1. Pointer/Azimuth Field. Refer to fields 1 and 3 of Figure 9-20. Displays the current ground track and azimuth to the current navigation waypoint. The compass dial rotates so the top of the dial indicates the current ground track. The arrow indicates the azimuth to the current navigation waypoint (shown as WP in a box). If the DAGR is moving too slow to compute track, and the internal compass is disabled, the last known track is used. If the DAGR is moving too slow to compute track for a specified amount of time, and the internal compass is enabled, the internal compass activates to provide track. Refer to Paragraph 10.3 for additional internal compass information. The bottom of the field displays HOLD LEVEL when the internal compass is in use advising the

operator to hold the DAGR horizontally level. The appropriate north reference and MAGVAR type (if applicable) must be selected before using the pointer (refer to Paragraph 10.2 for additional units information).

9.4.4.2. Estimated Position Error and Figure of Merit Field. Refer to field 2 of Figure 9-20. This field displays the estimated position error (EPE) as a ± value. EPE field data format is N.N, NN, or NNN, where N represents miles, nautical miles, kilometers, feet, yards, or meters. Position data (horizontal and vertical) is estimated to be accurate to within the ± value. Position error is displayed as figure of merit (FOM) numbers 1 though 9, where 1 is the best. Refer to Table 9-1. Time-since-fix is displayed when the DAGR is not able to compute position data using satellites (SV). It is displayed as NN, where N represents seconds-since-fix (ssf), minutes-since-fix (msf), hours-since-fix (hsf), or days-since-fix (dsf). Scenario time (ST) is displayed when Rehearsal mode is active. The seconds into the scenario are also displayed.

Table 9-1. Figure of Merit

FOM INTEGER	EPE IN METERS, 1 SIGMA
1	EPE ≤ 25
2	25 ≤ EPE ≤ 50
3	50 ≤ EPE ≤ 75
4	75 ≤ EPE ≤ 100
5	100 ≤ EPE ≤ 200
6	200 ≤ EPE ≤ 500
7	500 ≤ EPE ≤ 1000
8	1000 ≤ EPE ≤ 5000
9	5000 ≤ EPE

9.4.4.3. Estimated Time Error and Time Figure of Merit Field. Refer to field 4 of Figure 9-20. This field displays estimated time error (ETE) as a ± value. ETE field data format is ± NNN, where N represents nanoseconds (ns), microseconds (µs), or milliseconds (ms). The time data is estimated to be accurate to within the ± value. Time error is also displayed as time figure of merit (TFOM) numbers 1 though 9, where 1 is the best. Refer to Table 9-2.

Table 9-2. Time Figure of Merit

TFOM INTEGER	ETE
1	ETE ≤ 1 nsec
2	1 nsec ≤ ETE ≤ 10 nsec
3	10 nsec ≤ ETE ≤ 100 nsec
4	100 nsec ≤ ETE ≤ 1 µsec
5	1 µsec ≤ ETE ≤ 10 µsec
6	10 µsec ≤ ETE ≤ 100 µsec
7	100 µsec ≤ ETE ≤ 1 msec
8	1 msec ≤ ETE ≤ 10 msec
9	10 msec ≤ ETE

9.4.4.4. Estimated Vertical Error and Figure of Merit Field. Refer to field 6 of Figure 9-20. This field displays the estimated vertical error (EVE) as a ± value. EVE field data format is N.N, NN, or NNN, where N represents miles, nautical miles, kilometers,

feet, yards, or meters. Vertical position data is estimated to be accurate to within the ± value. Overall position error is displayed as figure of merit (FOM) numbers 1 though 9, where 1 is the best. Refer to Table 9-1. Time-since-fix is displayed when the DAGR is not able to compute position data using satellites (SV). It is displayed as NN, where N represents seconds-since-fix (ssf), minutes-since-fix (msf), hours-since-fix (hsf), or days-since-fix (dsf). Scenario time (ST) is displayed when rehearsal mode is active. The seconds into the scenario are also displayed.

9.4.4.5. Navigation Method Field. Refer to field 5 of Figure 9-20. The Navigation Method field displays the active navigation method. The navigation method is selected using the NAV Setup page. Navigation methods are None, Direct To, Course To, Course From, Route, and Approach. Refer to Paragraph 9.2.2.1 for more information on navigation methods.

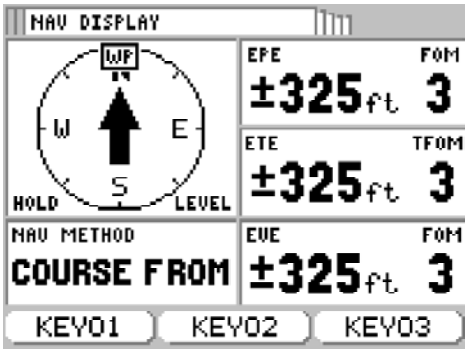


Figure 9-20. NAV Displays Page, Additional Fields (example one)

9.4.4.6. Position and Mode Field. Refer to fields 1 through 4 of Figure 9-21. This field displays the DAGR current position and operating mode. Ensure the appropriate datum coordinate/grid system, and grid resolution are selected before using or editing position coordinates. Use the following references for additional information.

- **Coordinate/grid system** — Appears in the upper left corner. Refer to Paragraph 10.2.2.1 for additional information. Refer to Paragraph 10.2.2.2 for grid resolution information.
- **Datum ID** — Appears in the upper right corner. Refer to Paragraph 10.2.2.4 for additional information.
- **Position coordinates** — Appear above the current operating mode. Refer to Paragraph 6.2.21.15 for editor information.
- **Current operating mode** — Appears below position coordinates. Refer to Paragraph 6.2.23 for additional operating mode information.

9.4.4.7. Elevation Field. Refer to field 5 of Figure 9-21. The Elevation field provides the DAGR's current elevation or vertical range from the surface of the earth measured from mean sea level (MSL) or datum (DTM). Field data format is +/- XXXXX, where X represents feet or meters.

9.4.4.8. Navigation Method and Waypoint Field. Refer to field 6 of Figure 9-21. This field displays the active navigation method and the waypoint (number and name) being used to compute navigation data. The navigation method and waypoint is selected using the NAV Setup page. Navigation methods are None, Direct To, Course To, Course From, Route, and Approach. Refer to Paragraph 9.2.2.1 for more information on navigation methods. Waypoint field data format is ###-NNNNNNNNNN, where # represents the waypoint number and N represents the waypoint name.

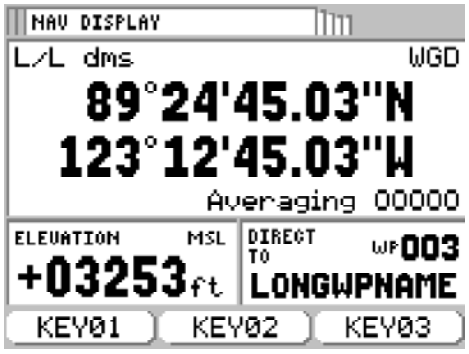


Figure 9-21. NAV Displays Page, Additional Fields (example two)

9.4.4.9. User Profile Field. Refer to Figure 9-22, field 1 and 2 of NAV Display page 1. The User Profile field provides the number and name of the active user profile. Refer to Paragraph 12.4 for additional user profile information. Field data format is XX-NNNNNNNNNN, where X represents the user profile number and N represents the user profile name.

9.4.4.10. Navigation Route Field. Refer to Figure 9-22, field 3 of NAV Display page 1. The Navigation Route field provides the route number, route leg, and route name being used for route navigation. Field data format is ##, LLL, NNNNNNNNNN, where # represents the route number, L represents the leg number, and N represents the route name.

9.4.4.11. Rate of Progress Field. Refer to Figure 9-22, field 4 of NAV Display page 1. The Rate Of Progress field displays the average rate of travel along the current navigation route leg. It is computed as the range traveled along the current route leg divided by the time since the current leg was activated. This field will only display a value when using route navigation on route leg 1 or higher. Field data format is NNN, where N represents miles per hour, knots, kilometers per hour, feet per minute, yards per minute, or meters per minute.

9.4.4.12. Time and Date Field. Refer to Figure 9-22, field 6 of NAV Display page 1. This field displays the DAGR's current time and date. Select the appropriate time zone before using time or date. Refer to Table 10-2 for time zone information. Refer to Paragraph 6.2.21.11 and Paragraph 6.2.21.13 for editor information. Field time data format is HHMM:SSZ/L, where H represents hours, M represents minutes, S represents seconds, and Z/L represents Zulu or Local. Field date data format is DD-MMM-YYYY, where D represents day, M represents month, and Y represents year.

9.4.4.13. Next Waypoint Field. Refer to Figure 9-22, field 1 and 2 of NAV Display page 2. The Next Waypoint field provides the waypoint number and name being used to compute and display navigation data. Field data format is ###-NNNNNNNNNN, where # represents the waypoint number and N represents the waypoint name.

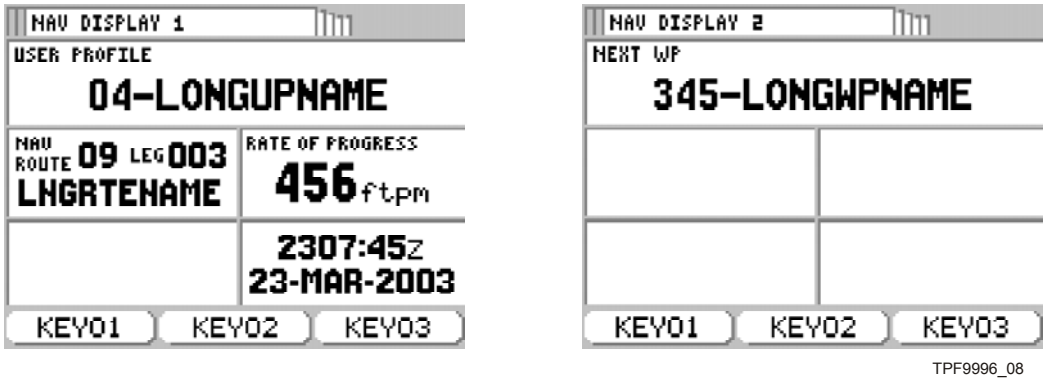


Figure 9-22. NAV Displays Page, Additional Fields (example three)

9.4.5. Standard NAV Displays Page Fields.

Refer to Table 9-3 for a listing of the standard navigation display pages and their field content for each navigation method (using the basic function set or the advanced function set with standard navigation displays). The standard navigation display pages and their field content are shown in Figure 9-16 through Figure 9-19.

Table 9-3. Standard NAV Displays Page Fields

NAV Method / Page Number	Field 1	Field 2	Field 3	Field 4	Field 5	Field 6
Direct To						
Page 1	Track	Ground Speed	Azimuth	Range	Steering 2D	Time-To-Go 2D
Page 2	EHE and FOM	Time-To-Go 2D	Azimuth	Slant Range	Elevation Angle	Elevation Difference
Pages 3 and 4 not used or displayed.						
Course To & Route						
Page 1	Track	Ground Speed	Azimuth	Range	Steering 2D	XTE
Page 2	EHE and FOM	Time-To-Go 2D	MMD 2D	Slant Range	Elevation Angle	Elevation Difference
Pages 3 and 4 not used or displayed.						
Course From						
Page 1	Track	Ground Speed	Azimuth	Range	Steering 2D	XTE
Page 2	EHE and FOM	XTE	Azimuth	Slant Range	Elevation Angle	Elevation Difference
Pages 3 and 4 not used or displayed.						
Approach						
Page 1	Track	Ground Speed	Azimuth	Range	Steering 2D	XTE
Page 2	EHE and FOM	Time-To-Go 2D	MMD 2D	Slant Range	Elevation Angle	Elevation Difference
Page 3	Glide Path Angle	Glide Path Deviation	XTE	MMD 3D	Steering 3D	Time-To-Go 3D
Page 4 not used or displayed.						
None *						

Table 9-3. Standard NAV Displays Page Fields - Continued

NAV Method / Page Number	Field 1	Field 2	Field 3	Field 4	Field 5	Field 6
Pages 1 through 4 not used or displayed.						
* The None navigation method is not displayed by the NAV Displays page when using the basic function set or the advanced function set with standard navigation displays. Under these conditions, if the operator selects the NAV Displays page from the Navigation submenu (while using the None navigation method), the DAGR displays the NAV Setup page instead of the NAV Displays page.						

9.4.6. Custom NAV Displays Page Default Fields.

The advanced function set provides capability to customize fields appearing on each page (refer to Paragraph 9.4.7). The NAV Displays page displays the default fields listed in Table 9-4 under all of the following conditions.

- DAGR using advanced function set.
- Navigation Displays field of the NAV Setup page set to Custom.
- NAV Displays pages not customized.

Table 9-4. Custom NAV Displays Page Default Fields

Page Number	Field Position Number	Field Name
1	1, 2	Next WP
1	3	Azimuth
1	4	Range
1	5	Ground Speed
1	6	Track
2	1	NAV Method/WP
2	2	EHE and FOM
2	3	XTE
2	4	Steering 2D
2	5	Time–To–Go 2D
2	6	MMD 2D
3	1	NAV Method/WP
3	2	NAV Route
3	3	Elevation Angle
3	4	Elevation Difference
3	5	Rate of Progress
3	6	Slant Range

Table 9-4. Custom NAV Displays Page Default Fields - Continued

Page Number	Field Position Number	Field Name
4	1	NAV Method/WP
4	2	Time–To–Go 3D
4	3	Glide Path Angle
4	4	MMD 3D
4	5	Glide Path Deviation
4	6	Steering 3D

9.4.7. Customize NAV Displays Page Fields.

When the Navigation Displays field of the NAV Setup page is set to Custom, and the DAGR is using the advanced function set, the operator can choose and customize the displayed NAV Displays page fields. After any NAV Displays page field is selected, pushing the MENU or ENTER key provides a Customize Field choice to be used in selecting the fields appearing in the NAV Display pages. Refer to Table 9-5 to view customize field selections. Refer to Figure 9-23 for examples of large size version fields. Refer to the keystroke map in Figure 9-24 for more information on key usage with the NAV Displays page.

NOTE

When the None navigation method is in use, the custom NAV Displays page fields are displayed for the purpose of customizing the fields, however, the fields will not display navigation data.

Table 9-5. Customize NAV Displays Page Field Selections

Field List	
Azimuth *	Next WP
Blank	Pointer/Azimuth *
Elevation	Position and Mode
Elevation Angle *	Range *
Elevation Diff *	Rate of Progress *
EHE and FOM	Slant Range *
EPE and FOM	Ground Speed *
ETE and TFOM	Steering 2D *
EVE and FOM	Steering 3D *
Glide Path Angle *	Time and Date
Glide Path Dev *	Time-To-Go 2D *
MMD 2D *	Time-To-Go 3D *
MMD 3D *	Track *
NAV Method	User Profile
NAV Method/WP	XTE *

Table 9-5. Customize NAV Displays Page Field Selections - Continued

Field List	
NAV Route	
* Large size version of field also selectable. The DAGR customize field list displays the large size version fields with a + after the field name (e.g., Range+).	
NOTE List items are disabled if they cannot fit in the field position (e.g., the Position and Mode field is too large to fit into field positions 2, 4, 5 and 6).	

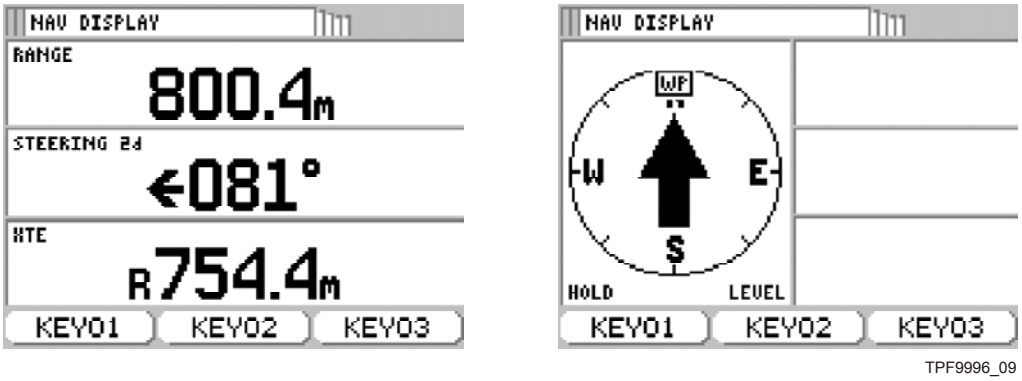


Figure 9-23. Large Size Version Fields (Advanced)

9.4.8. How To Use The NAV Displays Page.

This page contains detailed navigation information used along with the five navigation methods described in the NAV Setup page (Paragraph 9.2) and navigation information described in the NAV Pointer page (Paragraph 9.3). The actual number of NAV Displays pages cannot be changed; only the field information contained in the pages can be customized. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting up data and changing field information. The following navigation procedures utilize standard page fields as shown in Figure 9-16 through Figure 9-19. The NAV Setup page must be configured for the chosen navigation method described in each the following navigation procedures. Units of measure should also be configured before performing navigation. The navigation procedures assume:

- The DAGR is tracking satellites and has acquired present position (refer to Paragraph 5.4.2).
- The internal compass has been enabled and oriented (refer to Paragraph 9.3.3 and Paragraph 9.3.4).
- Required waypoints, routes, and alerts used for mission navigation have been established.

9.4.8.1. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Navigation, then push the ENTER key.
3. Highlight NAV Displays, then push the ENTER key. The NAV Displays page is displayed.

a. Set Up Units/References

(1) Access the NAV Displays page. Prior to performing navigation, view the page fields to determine if changes to units of measure or references used in the fields are required (metric or decimal, mils or degrees, true or magnetic, etc.).

(2) When field units of measure or reference changes are required, highlight the desired field, then push the MENU key.

(3) Highlight the desired type of units/reference to change (e.g., Select Range Units), then push the ENTER key.

(4) Highlight the desired selection, then push the ENTER key.

(5) The page displays all associated field information with the change made.

(6) If required, repeat the procedure for the remaining selections.

b. Customize The NAV Displays Pages (Advanced)

(1) The NAV Displays pages are customized one field at a time.

(2) Set the DAGR to use the advanced function set. Refer to Paragraph 12.3.2 for additional information.

(3) Set the NAV Setup page Navigation Displays Field to Custom. Refer to Paragraph 9.2.2.15 for additional information.

(4) Access the NAV Displays page.

(5) Push the PAGE key as required to display the desired NAV Displays page to be customized.

(6) Push the ENTER key to highlight a page field.

(7) Scroll to highlight the page field being customized, then push the ENTER key.

(8) Highlight Customize Field, then push the ENTER key.

NOTE

When a large size version field is chosen for customizing the page, adjacent fields are overwritten without requesting operator confirmation. If the field is reduced back to normal field size, the overwritten field will reappear.

(9) Highlight the desired field choice (refer to Table 9-5), then push the ENTER key. The field is customized without requesting operator confirmation. The display returns to the NAV Displays page displaying the customized field.

(10) Repeat steps (5) through (9) until all page fields are customized as desired.

(11) Using the page menu, select either Show Blank Pages or Hide Blank Pages as desired.

c. Direct To Navigation (Using standard NAV Displays pages.)

(1) Configure the NAV Setup page (refer to Paragraph 9.2 for more information).

(a) Access the NAV Setup page.

(b) Set the Navigation Method field to Direct To.

CAUTION

Do not select NAV Waypoint MAGVAR type. If NAV Waypoint MAGVAR type is selected, track will be incorrect.

(c) When using the advanced function set, set up the following fields as required:

- **Calc Type field** — Set to GC for great circle or RL for rhumb line calculation.
- **MAGVAR Type field** — Set the MAGVAR type to Calculated-WMM, Local, or NAV Waypoint.
- **Navigation Displays field** — Select Standard before viewing NAV Displays pages.

(d) Set the To WP field to the waypoint being navigated to.

(e) Set the WP Alert Mode field to On or Off. When on, the DAGR visually alerts the operator upon waypoint arrival. When off, the DAGR does not alert the operator upon waypoint arrival.

(2) Navigate.

(a) Access the NAV Displays page, then while moving, use the Steering 2D field (NAV Displays page 1) directional arrow and angular value to align track with azimuth for navigation to the selected waypoint.

(b) When off course, the left and right directional arrows and angular value appear. When on course, the on course indicator (♦♦♦♦♦) appears, and the Track field and Azimuth field (NAV Displays page 1) values match. Travel in the direction the arrow is pointing to get back on course.

(c) When the DAGR internal compass is active, the Track field (NAV Displays page 1) label alternates between Track and Hold Level. The internal compass activates when moving below a preset ground speed for a preset amount of time (refer to the Internal Compass page Paragraph 10.3).

(d) While traveling towards the destination waypoint, the Range field (NAV Displays page 1) value steadily decreases and the Azimuth field (NAV Displays page 1) value changes.

(e) As required, use other NAV Displays page fields during navigation. Other fields useful in Direct To navigation are:

- Ground Speed
- Time-To-Go 2D
- Elevation Angle
- Elevation Difference
- Slant Range
- EHE and FOM

(f) The DAGR recognizes it has reached the waypoint when it reaches a radius from the waypoint (default is 5 meters) set in the Alert Radius field of the Waypoint Editor page (refer to Paragraph 8.3.2.12). The operator must confirm waypoint arrival only if the WP Alert Mode field of the NAV Setup page was previously set to On.

d. Course To Navigation (Using standard NAV Displays pages.)

NOTE

The course set for this navigation method may or may not go directly to the selected waypoint. The actual course entered may intersect with the waypoint, or pass by the waypoint without actually reaching it.

(1) Configure the NAV Setup page (refer to Paragraph 9.2 for more information).

(a) Access the NAV Setup page.

(b) Set the Navigation Method field to Course To.

Do not select NAV Waypoint MAGVAR type. If NAV Waypoint MAGVAR type is selected, track will be incorrect.

(c) When using the advanced function set, set up the following fields as required:

- **Calc Type field** — Set to GC for great circle or RL for rhumb line calculation.
- **MAGVAR Type field** — Set the MAGVAR type to Calculated-WMM, Local, or NAV Waypoint.
- **Navigation Displays field** — Select Standard before viewing NAV Displays pages.

(d) Set the To WP field to the waypoint being navigated to.

(e) Set up units for the Course field, if required.

(f) Set the Course field to the desired course to the waypoint being navigated to.

(g) Set the WP Alert Mode field to On or Off. When on, the DAGR visually alerts the operator upon waypoint arrival or passing by the waypoint. When off, the DAGR does not alert the operator upon waypoint arrival or passing by the waypoint.

(2) Navigate.

(a) Access the NAV Displays page, then point the DAGR so the Track field (NAV Displays page 1) value matches the value entered into the NAV Setup page Course field. The DAGR indicates the track to be navigated.

(b) When the DAGR internal compass is active, the Track field (NAV Displays page 1) label alternates between Track and Hold Level. The internal compass activates when moving below a preset ground speed for a preset amount of time (refer to the Internal Compass page Paragraph 10.3).

(c) While traveling the course towards the selected waypoint:

- Use the XTE field (NAV Displays page 1) to identify any necessary track corrections required to maintain desired course. For example: If an R shows in this field, move the distance shown in the field in a left direction to get back on course.
- Verify the Track field (NAV Displays page 1) matches the course entered into the NAV Setup page Course field.
- The value in the Range field (NAV Displays page 1) steadily decreases.

NOTE

The Steering 2D (NAV Displays page 1), and Azimuth (NAV Displays page 1) fields provide navigation information **to the waypoint** entered in the NAV Setup page, **not the course** entered in the NAV Setup page.

(d) As required, use other NAV Displays page fields during navigation. Other fields useful in Course To navigation are:

- Ground Speed
- Time-To-Go 2D
- MMD 2D
- Elevation Angle
- Elevation Difference
- Slant Range
- EHE and FOM

(e) The DAGR recognizes it has reached or passed by the waypoint. The operator must confirm waypoint arrival or passing by the waypoint only if the WP Alert Mode field of the NAV Setup page was previously set to On.

e. Course From Navigation (Using standard NAV Displays pages.)

(1) Configure the NAV Setup page (refer to Paragraph 9.2 for more information).

(a) Access the NAV Setup page.

(b) Set the Navigation Method field to Course From.

Do not select NAV Waypoint MAGVAR type. If NAV Waypoint MAGVAR type is selected, track will be incorrect.

(c) When using the advanced function set, set up the following fields as required:

- **Calc Type field** — Set to GC for great circle or RL for rhumb line calculation.
- **MAGVAR Type field** — Set the MAGVAR type to Calculated-WMM, Local, or NAV Waypoint.

- **Navigation Displays field** — Select Standard before viewing NAV Displays pages.

(d) Set the From WP field to the waypoint being navigated from.

(e) Set up units for the Course field, if required.

(f) Set the Course field to the desired course away from the waypoint being navigated from.

(2) Navigate.

(a) Access the NAV Displays page, then point the DAGR so the Track field (NAV Displays page 1) value matches the value entered into the NAV Setup page Course field. The DAGR indicates the track to be navigated.

(b) When the DAGR internal compass is active, the Track field (NAV Displays page 1) label alternates between Track and Hold Level. The internal compass activates when moving below a preset ground speed for a preset amount of time (refer to the Internal Compass page Paragraph 10.3).

(c) While traveling the course away from the selected waypoint:

- Use the XTE field (NAV Displays page 1) to identify any necessary track corrections required to maintain desired course. For example: If an R shows in this field, move the distance shown in the field in a left direction to get back on course.
- Verify the Track field (NAV Displays page 1) matches the course entered into the NAV Setup page Course field.
- The value in the Range field (NAV Displays page 1) steadily increases.

NOTE

The Steering 2D (NAV Displays page 1) and Azimuth (NAV Displays page 1) fields provide navigation information **to the waypoint** entered in the NAV Setup page, **not the course** entered in the NAV Setup page.

(d) As required, use other NAV Displays page fields during navigation. Other fields useful in Course From navigation are:

- Ground Speed
- Elevation Angle
- Elevation Difference
- Slant Range
- EHE and FOM

f. Route Navigation (Using standard NAV Displays pages.)

(1) Configure the NAV Setup page (refer to Paragraph 9.2 for more information).

(a) Access the NAV Setup page.

(b) Set the Navigation Method field to Route.

Do not select NAV Waypoint MAGVAR type. If NAV Waypoint MAGVAR type is selected, track will be incorrect.

(c) When using the advanced function set, set up the following fields as required:

- **Calc Type field** — Set to GC for great circle or RL for rhumb line calculation.
- **MAGVAR Type field** — Set the MAGVAR type to Calculated-WMM, Local, or NAV Waypoint.
- **Navigation Displays field** — Select Standard before viewing NAV Displays pages.

(d) Set the Route field to the desired navigation route number/name.

(e) Set the Leg field to the desired navigation leg of the route. Entry 000 navigates to the first (forward direction) or last (reverse direction) waypoint in the route. This field is dependent on the Route Leg Advance Mode field setting.

(f) Set the Direction field to Forward or Reverse for desired direction of navigation through the route legs.

(g) Set Route Leg Advance Mode to Off, Automatic, Manual, or WP Alert (refer to Paragraph 9.2.2.9 for more information). The setting of this field governs how the Leg field operates.

(h) The To WP field cannot be edited by the operator and displays the end waypoint for the route leg.

(2) Navigate.

(a) Access the NAV Displays page, then while moving, use the Steering 2D field (NAV Displays page 1) directional arrow and angular value to align track with azimuth for navigation to the leg ending waypoint.

(b) When off course, the left and right directional arrows and angular value appear. When on course, the on course indicator (♦♦♦♦♦) appears, and the Track field and Azimuth field (NAV Displays page 1) values match. Travel in the direction the arrow is pointing to get back on course.

(c) When the DAGR internal compass is active, the Track field (NAV Displays page 1) label alternates between Track and Hold Level. The internal compass activates when moving below a preset ground speed for a preset amount of time (refer to the Internal Compass page Paragraph 10.3).

(d) While traveling towards the leg ending waypoint, the Range field (NAV Displays page 1) value steadily decreases and the Azimuth field (NAV Displays page 1) value changes.

(e) The DAGR recognizes it has reached the end of a route leg when it reaches a radius from the ending waypoint (default is 5 meters) set in the Alert Radius field of the Route Editor page (refer to Paragraph 8.8). The operator is notified and/or must confirm a route leg advance to the next leg depending upon the setting of the Route Leg Advance Mode field of the NAV Setup page.

(f) Repeat prior steps as required for each leg of the route.

(g) At any time during route navigation, the operator can reverse the direction of travel on the route by changing the setting of the Direction field of the NAV Setup page.

(h) As required, use other NAV Displays page fields during navigation. Other fields useful in Route navigation are:

- XTE
- Ground Speed
- Time-To-Go 2D
- MMD 2D
- Elevation Angle
- Elevation Difference
- Slant Range
- EHE and FOM

(i) When the end of the route is reached, the leg no longer advances.

g. Approach Navigation (Advanced) (Using standard NAV Displays pages.)

WARNING

Do not use DAGR operator selections to set up or perform Approach navigation. Performing DAGR Approach navigation could result in injury or death through use of an incorrect approach course to the glide path waypoint.

9.4.9. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 9-24 shows the keystroke map for the NAV Displays page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the NAV Displays page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Navigation submenu
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

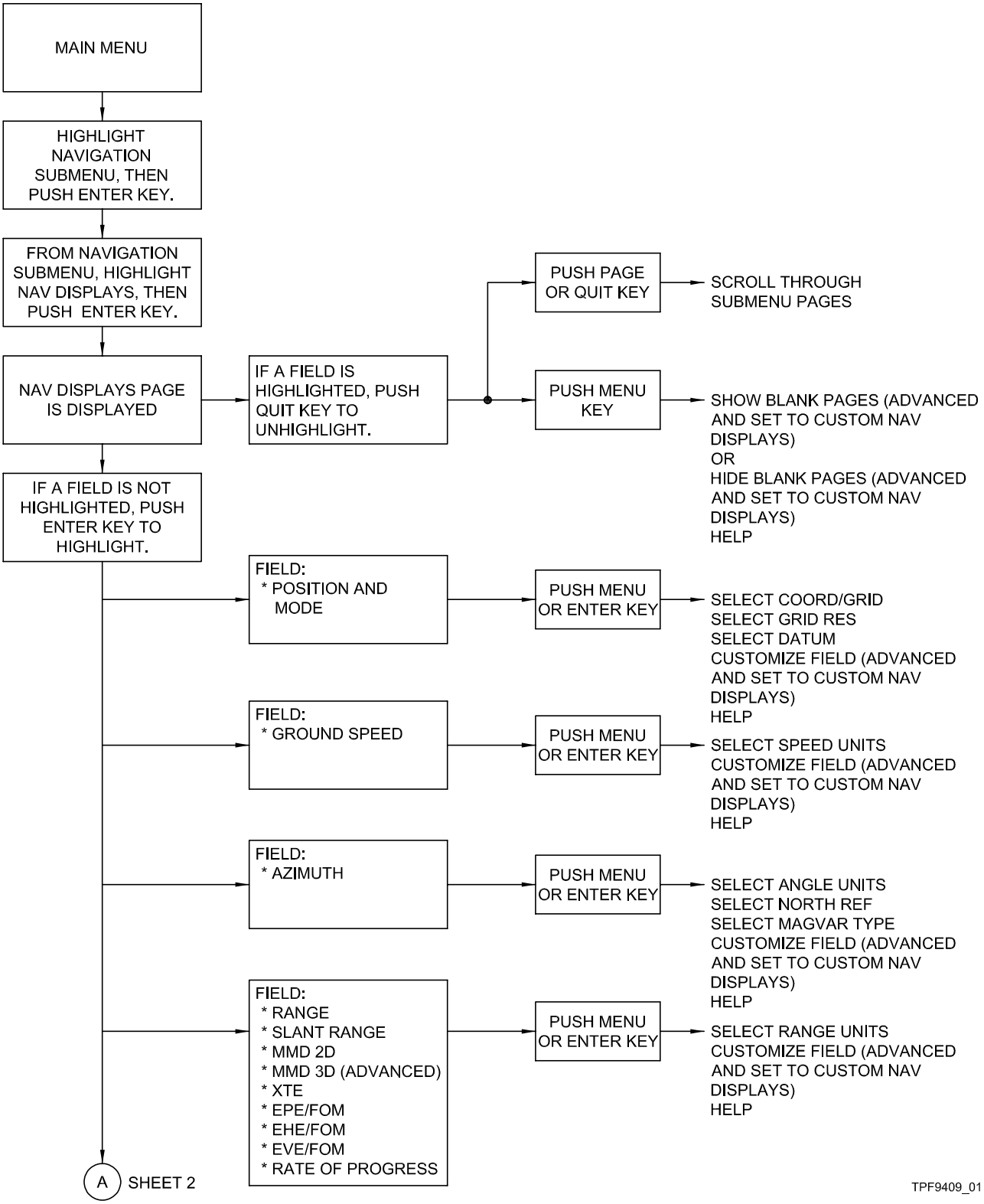


Figure 9-24. NAV Displays Page Keystroke Map (Sheet 1 of 2)

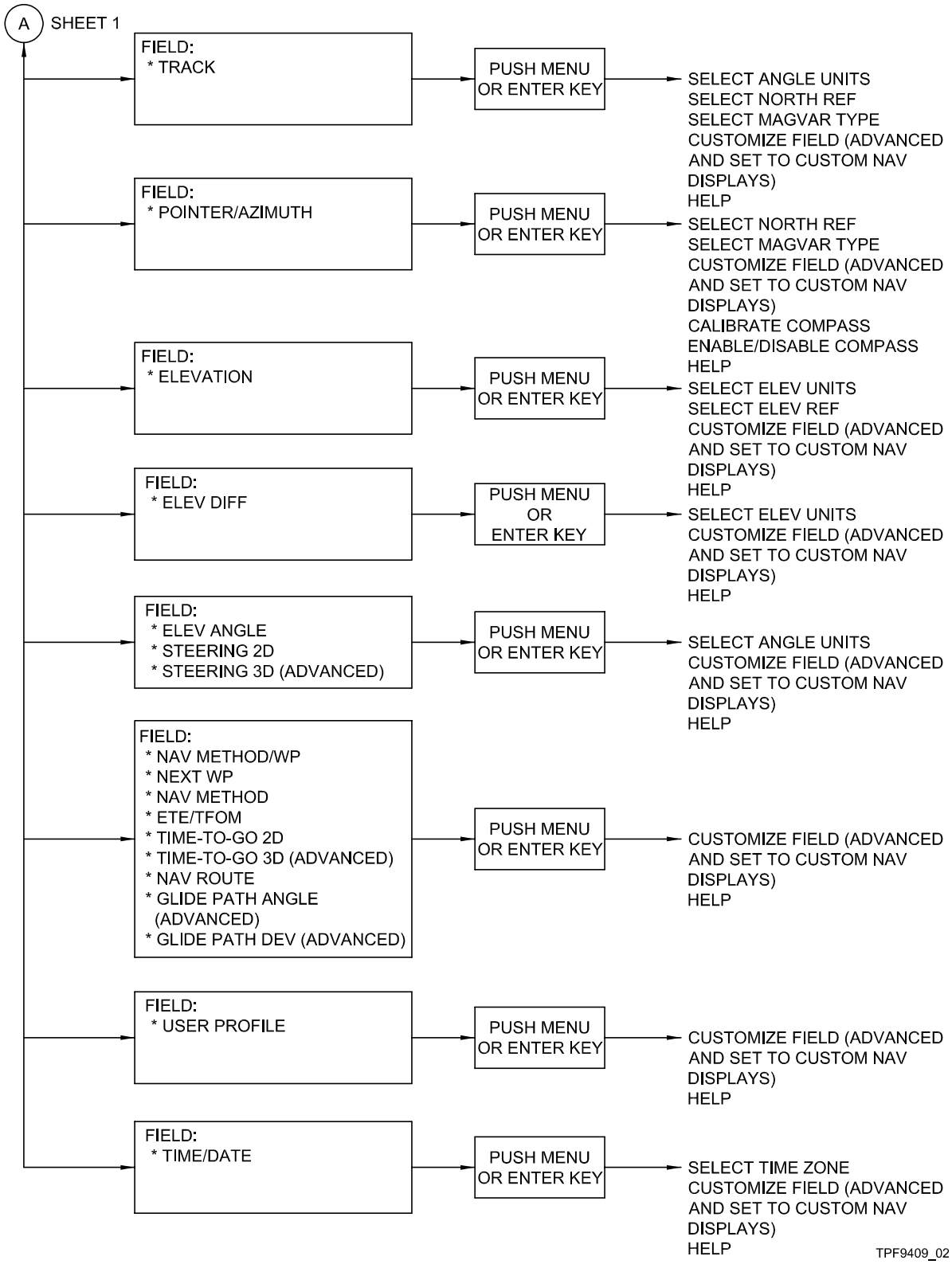


Figure 9-24. NAV Displays Page Keystroke Map (Sheet 2)

9.5. PRESENT POSITION PAGE.

WARNING

DAGR displays a warning to prevent misuse of the present position as a target position that could cause personal injury or death. After power-on and prior to the DAGR automatically displaying the Present Position page, a warning stating your position is displayed, NOT the target position if the Fire Support page was used or nonvolatile memory was cleared prior to power-on.

CAUTION

• If the DAGR is not tracking satellites or has no position fix, the displayed position data blinks between gray and black to notify the operator. Field data may be inaccurate and/or unavailable when the DAGR does not have a position fix.

• When position data cannot be updated using satellite (SV) tracking or upon transition to Standby mode, the DAGR continues to provide the last computed position. Current position field data may be inaccurate and/or unavailable.

• A high level of position error may place a mission at risk. Verify the figure of merit (FOM) level is sufficient to accomplish the mission. Refer to the position error field (EPE/EHE/EVE) of either the Present Position page or NAV Displays page to view the current FOM. Refer to Table 9-1 to convert FOM into a position error range (in meters). If the FOM is too high, refer to Paragraph 18.4.

9.5.1. Page Function.

The Present Position page is accessed from the Navigation submenu or from the POS page set (refer to Paragraph 6.2.9). Whenever the Present Position page is accessed from the Navigation submenu or by using the POS key, present position coordinates are displayed. Select appropriate units for fields, as applicable, before using page field data. Refer to Chapter 10 for additional information on units. The page and field menus provide editing of the operating mode, datum, coordinate/grid reference, grid resolution, and other information as shown in the keystroke map of Paragraph 9.5.4. The current operating mode is changed using the Present Position page menu, SV (Satellite Vehicle) Sky View page menu, or the GPS Setup page field. Use the Status key and the Receiver Status menu to check or change the current operating mode of operation (refer to Paragraph 6.2.24). Refer to Paragraph 6.2.23 for additional information on operating mode. The Present Position page provides the following information regarding DAGR position:

- Horizontal coordinates
- Coordinate and grid system
- Elevation and elevation reference
- Datum identifier
- Current date and time
- Ground speed
- Track
- North reference indicator
- Current operating mode

9.5.1.1. Under normal conditions, the DAGR initializes itself upon power-up (refer to Paragraph 5.4.2). The Present Position page allows the operator to view or initialize PVT data when needed (position, time, track, ground speed, and elevation can be initialized). Elevation can be manually entered when in elevation hold mode.

9.5.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 9-29. Vertical scrolling is used to view all page fields as shown in Figure 9-25 through Figure 9-28. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

9.5.2.1. Position Field. The position field displays the coordinate/grid system, datum, position coordinates, and current operating mode. Ensure the appropriate datum coordinate/grid system, and grid resolution are selected before using or editing position coordinates.

- **Coordinate/grid system** — Appears in the upper left corner. Refer to Paragraph 10.2.2.1 for additional information. Refer to Paragraph 10.2.2.2 for grid resolution information.
- **Datum ID** — Appears in the upper right corner. Refer to Paragraph 10.2.2.4 for additional information.
- **Position coordinates** — Appear center of field. Refer to Paragraph 6.2.21.15 for editor information.
- **Current operating mode** — Appears below position coordinates. Refer to Paragraph 6.2.23 for additional operating mode information.

9.5.2.2. Position Error (EPE/EHE/EVE and FOM) Field. Displays one of three options of the field menu list: estimated position error (EPE), estimated horizontal error (EHE), or estimated vertical error (EVE) for the displayed position. Error is displayed as a ± value. Displayed position and navigation data is accurate to within the ± value. Position error field data format is N.N, NN, or NNN, where N represents miles, nautical miles, kilometers, feet, yards, or meters. Figure of merit (FOM) for the current position is also displayed. FOM ranges from 1 to 9, with a value of 1 being the best. Time-since-last-fix is displayed when DAGR is unable to compute position data from satellites. It is displayed as NN, where N represents seconds-since-fix (ssf), minutes-since-fix (msf), hours-since-fix (hsf), or days-since-fix (dsf). Scenario time (ST) is displayed as seconds into scenario when rehearsal mode is active. The Status key can also be used to check position error (refer to Paragraph 6.2.24).

9.5.2.3. Elevation Field. Elevation is displayed as the vertical range from the surface of the earth as measured from the elevation reference. The elevation reference mean sea level (MSL) or datum (DTM) is displayed in the upper right corner. When elevation hold is activated, the displayed elevation field label alternates with HELD. Field data format is +/- XXXXX, where X represents feet or meters (positive up). Refer to Figure 9-25.

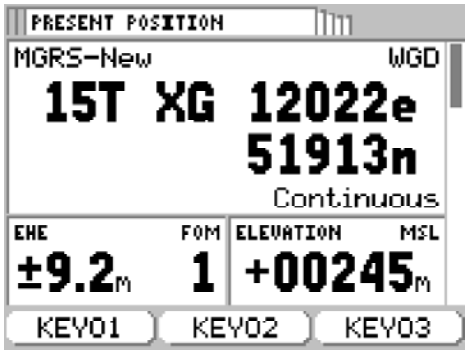


Figure 9-25. Present Position Page, View 1

9.5.2.3.1. Elevation Hold. Elevation hold mode is used to increase accuracy when the DAGR is not tracking enough satellites to determine a three dimensional position solution. Under these conditions, fixing or holding elevation allows the DAGR to provide a 2D-position solution. When elevation hold mode is active, the Elevation field label alternates with Held. Elevation hold mode is turned on and off and configured using the elevation field menu. Two elevation hold modes are as follows:

- **AUTOMATIC** — The DAGR uses the last computed elevation (user can override) and automatically enables or disables elevation hold. This mode is used where elevation does not vary.

- **MANUAL** — Elevation hold is not enabled unless the user enters a known elevation. This mode is used where elevation varies. When manual elevation hold mode is in use and the DAGR detects the need for elevation hold, the DAGR prompts the operator to make a choice to use elevation hold. Pushing the ENTER key confirms elevation hold is chosen at the displayed elevation. Pushing the MENU key provides a menu with additional choices.

NOTE

When elevation hold mode is in use, vertical movement should be minimized to enhance accuracy.

9.5.2.3.1.1. The following scenarios are examples of when the DAGR would enter elevation hold.

- When available satellites have decreased to three satellites, the PVT solution can be improved by utilizing the present elevation from the position display.
- When using four or more satellites in conditions of poor satellite geometry, the PVT solution can be improved by utilizing the present elevation from the position display.

9.5.2.4. Ground Speed Field. Displays the ground speed as horizontal speed relative to the earth's surface. Zero (0) is displayed when speed is unknown or when moving too slow. Field data format is XXX, where X represents miles per hour, knots, or kilometers per hour.

9.5.2.5. Track Field. The track field provides the ground track or actual path on the earth's surface measured clockwise from the selected north reference.

- True
- Magnetic
- Grid

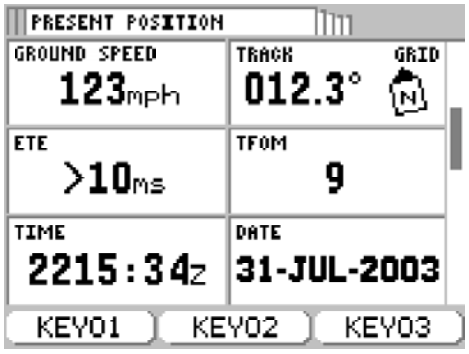
9.5.2.5.1. The field displays an arrow (labeled with an N) pointing towards north as shown in Figure 9-26. If the DAGR ground speed is too slow to compute a current track, the last known track is used or the internal compass is used (when enabled). When the internal compass is enabled, the displayed track field label alternates with HOLD LEVEL, instructing the operator to hold the DAGR horizontally level. Refer to Paragraph 10.3 for information on the internal compass. Field data format is XXX.X (X represents degrees) or XXXX (X represents mils or strecks).

9.5.2.6. ETE Field. Displays estimated time error (ETE) for the time and date as a ± value. The time and date is accurate to within the ± value. Field data format is ± NNN, where N represents nanoseconds (ns), microseconds (μs), or milliseconds (ms). The operator cannot edit this field.

9.5.2.7. TFOM Field. Displays the time figure merit (TFOM) ranging from 1 to 9, with a value of 1 being the best. The operator cannot edit this field.

9.5.2.8. Time Field. Displays current DAGR time. Select appropriate time zone before using displayed time. Refer to Paragraph 6.2.21.11 and Table 10-2 for time editing and time zone information. Field data format is HHMM:SSZ/L, where H represents hours, M represents minutes, S represents seconds, and Z/L represents Zulu or Local.

9.5.2.9. Date Field. Displays current DAGR date. Select appropriate time zone before using displayed date. Refer to Paragraph 6.2.21.13 for editor information. Field data format is DD-MMM-YYYY, where D represents day, M represents month, and Y represents year. Refer to Figure 9-26.



TPF9997_03

Figure 9-26. Present Position Page, View 2

9.5.2.10. MAGVAR Type Field.

CAUTION

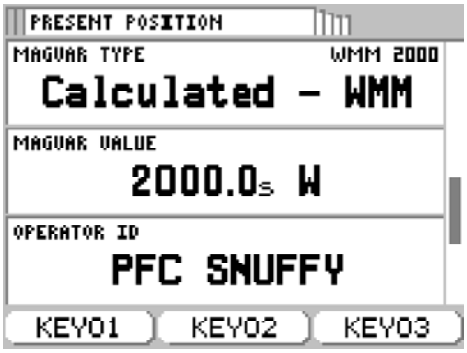
Do not select NAV Waypoint MAGVAR type. If NAV Waypoint MAGVAR type is selected, track will be incorrect.

Displays the selected MAGVAR type used for displaying azimuth or track as follows.

- **Calculated-WMM** — MAGVAR value is calculated using the World Magnetic Model (WMM). The current model year is displayed in the upper right corner.
- **Local** — An operator entered MAGVAR value is used.
- **NAV Waypoint (Advanced)** — The MAGVAR value of the navigation waypoint is used.

9.5.2.11. MAGVAR Value. Displays the MAGVAR value used (as determined by the MAGVAR Type field) when displaying azimuth or track. The MAGVAR Type field must be set to Local before a MAGVAR value can be entered and then used by the operator. Before using a value from this field, appropriate units and MAGVAR Type must be selected. Refer to Paragraph 10.2 for units information.

9.5.2.12. Operator ID Field. Displays the self identifying, 10 character operator ID value. Up to eleven operator IDs can be input and stored. Any changes made to the field content or stored operator IDs will also change the COM Port Setup page Operator Identifier field. Refer to Figure 9-27.



TPF9997_04

Figure 9-27. Present Position Page, View 3

9.5.2.13. Bullseye Table. Bullseye waypoints are used for rapid maneuvering operations where the DAGR operator does not have time to reference a map (paper or electronic) to determine an exact DAGR position in relation to a waypoint. The bullseye table provides azimuth and range data referenced from the bullseye waypoint position to the DAGR present position.

Example: The DAGR displays an azimuth of 270 degrees with a range of 10 miles for the bullseye waypoint. The DAGR operator radios in data as "Bullseye 270 at 10". The personnel receiving this radio transmission then knows the DAGR is 10 miles due west from the bullseye waypoint. Prior to a mission, a single DAGR bullseye waypoint reference would be selected and set as active in the bullseye table (inside a gray rectangle).

9.5.2.13.1. After activating Bullseye On from the page menu, the bullseye table displays up to five selectable bullseye waypoints from the bottom view of the Present Position page. Bullseye waypoints are selected by table row. The active bullseye waypoint row is inside a gray rectangle, as shown. The operator scrolls horizontally through the table to view the following bullseye waypoint data:

- Bullseye number (01–05)
- Waypoint number
- Waypoint name
- Azimuth
- Range

NOTE

• Azimuth and range values are from the bullseye waypoint to the present DAGR position. These values appear in decimal or whole number format dependent upon the selected bullseye grid resolution (refer to the keystroke map in Figure 9-29). Figure 9-28 displays values using decimal format bullseye grid resolution.

• Whether set as active or inactive, all waypoints listed in the bullseye table display their calculated azimuth and range values with respect to DAGR present position.

• The DAGR notifies the operator if any datum mismatches exist with the bullseye waypoint.

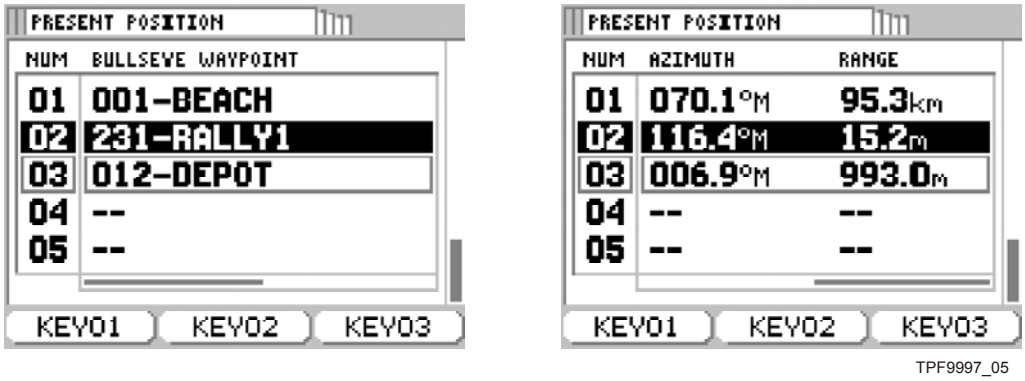


Figure 9-28. Present Position Bullseye Table

9.5.3. How To Use The Present Position Page.

This page contains information associated with the present position of the DAGR. The Present Position page is also used in the initialization process of the DAGR when needed (e.g. moving from geographical location to another). Refer to Paragraph 5.4.2 for more information on initialization. This page also includes a pause scenario selection associated with the rehearsal mode of operation. The rehearsal mode is activated and set up from the GPS Setup page. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting up data and changing field information. When a

text editor is used, the menu key can be pushed to access a list of options (undo changes, save and exit, exit and no save, reset to default, and editor help). These options provide text editor shortcuts and pertain to the immediate function being performed (e.g., using a text editor).

9.5.3.1. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Navigation, then push the ENTER key.
3. Highlight Present Position, then push the ENTER key. The Present Position page is displayed.

a. Set Up Units/References

(1) Prior to using field information, view the page fields to determine if changes to units of measure or references used in the fields are required (metric or decimal, mils or degrees, true or magnetic, etc.).

(2) When field unit or reference changes are required, highlight the desired field, then push the MENU key.

(3) Highlight the desired type of units or reference to change (e.g., Select Range Units), then push the ENTER key.

(4) Highlight the desired selection, then push the ENTER key.

(5) The page displays all associated field information with the change made.

(6) If required, repeat the procedure for the remaining selections.

b. Select Operating Mode

(1) With the Present Position page displayed and no field highlighted, push the MENU key.

(2) Highlight Select Op Mode, then push the ENTER key.

(3) Highlight the desired operating mode, then push the ENTER key.

(4) Display returns to the Present Position page displaying the selected operation mode below the present position coordinates.

c. Turn Elevation Hold On and Off / Automatic Hold Mode

(1) With the Present Position page displayed, push the ENTER key to highlight a field.

(2) Highlight the Elevation field, then push the MENU key.

(3) Highlight Select Hold Mode, then push the ENTER key.

(4) Highlight Automatic, then push the ENTER key.

(5) The DAGR uses the last computed elevation (or an operator entered elevation) and automatically turns elevation hold on or off. When elevation hold is on, the Elevation field label alternates with Held.

d. Turn Elevation Hold On and Off / Manual Hold Mode (When DAGR has no position fix.)

(1) With the Present Position page displayed, push the ENTER key to highlight a field.

(2) Highlight the Elevation field, then push the MENU key.

(3) Highlight the Select Hold Mode choice, then push the ENTER key.

(4) Highlight Manual, then push the ENTER key.

(5) Highlight the Elevation field, then push the ENTER key.

(6) Using the editor, enter a known elevation. Then push the ENTER key.

(7) Push the QUIT key to unhighlight the Elevation field.

(8) When the DAGR detects a need for elevation hold, the operator is prompted to select elevation hold.

NOTE

Manual elevation hold mode is turned off by selecting Elev Hold Off from the Elevation field menu, or by selecting automatic elevation hold mode (refer to prior procedure c.).

e. Operator ID

(1) With the Present Position page displayed, push the ENTER key to highlight a field.

(2) Scroll to the page view containing the Operator ID field.

(3) Highlight the Operator ID field, then push the MENU key.

(4) Highlight Selected Operator ID (provides a list of preexisting operator ID names) or highlight Edit Field (provides a text editor to change name), then push the ENTER key.

(5) Choose desired Operator ID name, then push the ENTER key; or use the text editor to change Operator ID name, then save changes.

(6) Display returns to the Present Position page with changes made.

f. Use the Bullseye Table

(1) With the Present Position page displayed and no fields highlighted, push the MENU key.

(2) If Bullseye On is displayed, scroll to it and push the ENTER key, then proceed to the next step. If Bullseye Off is displayed, proceed to the next step.

(3) Scroll down the Present Position page to view the bullseye waypoint table.

(4) If the desired bullseye waypoint is not shown or not highlighted, scroll to the desired bullseye waypoint number (01 to 05). If not already highlighted, push the ENTER key. If the desired bullseye waypoint is shown, but inactive (not inside of a box), proceed to step (7). If the desired bullseye waypoint is active (inside a box), proceed to step (11).

(5) Push the ENTER key, scroll to the desired waypoint needed, then push the ENTER key.

NOTE

If the desired waypoint needed is not shown in the waypoint list and needs to be added, refer to Paragraph 8.2 before proceeding.

(6) The display returns to the bullseye waypoint table with information using the chosen waypoint inserted in the bullseye table.

(7) With the desired bullseye waypoint highlighted, push the MENU key.

(8) Highlight Set As Active, then push the ENTER key.

(9) The display returns to the bullseye table.

(10) Push the QUIT key to exit the bullseye selection function.

(11) The selected, active bullseye waypoint row/data is inside a box. Use the data to determine azimuth and range from the active bullseye waypoint to the present DAGR position.

(12) Bullseye waypoints and information can be cleared or edited by highlighting the bullseye waypoint (01 through 05), then pushing the MENU key and selecting the desired edit procedure.

g. Pause Scenario

NOTE

Rehearsal mode must be in progress before Pause Scenario can be enabled.

(1) From the GPS Setup or Present Position page, without a field highlighted, push the MENU key.

(2) Highlight Pause Scenario, then push the ENTER key. Rehearsal mode is stopped in time.

(3) To continue Rehearsal mode, push the MENU key again. Highlight Continue Scenario, then push the ENTER key.

(4) Rehearsal mode resumes unless DAGR has automatically transitioned (timed out) to another operating mode. If that occurs, access the GPS Setup page and reselect Rehearsal mode.

9.5.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 9-29 shows the keystroke map for the Present Position page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Present Position page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the POS page set.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

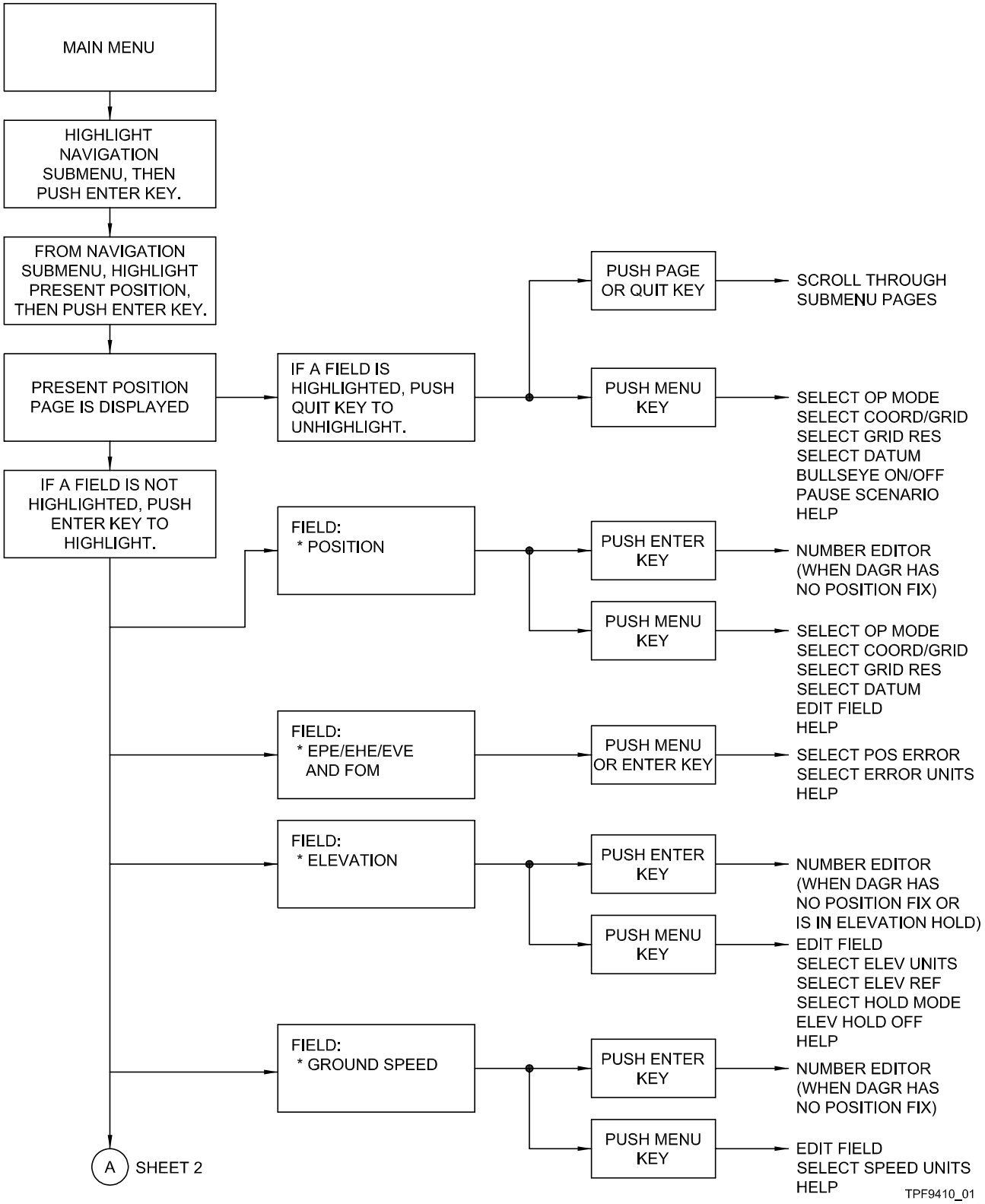


Figure 9-29. Present Position Page Keystroke Map (Sheet 1 of 3)

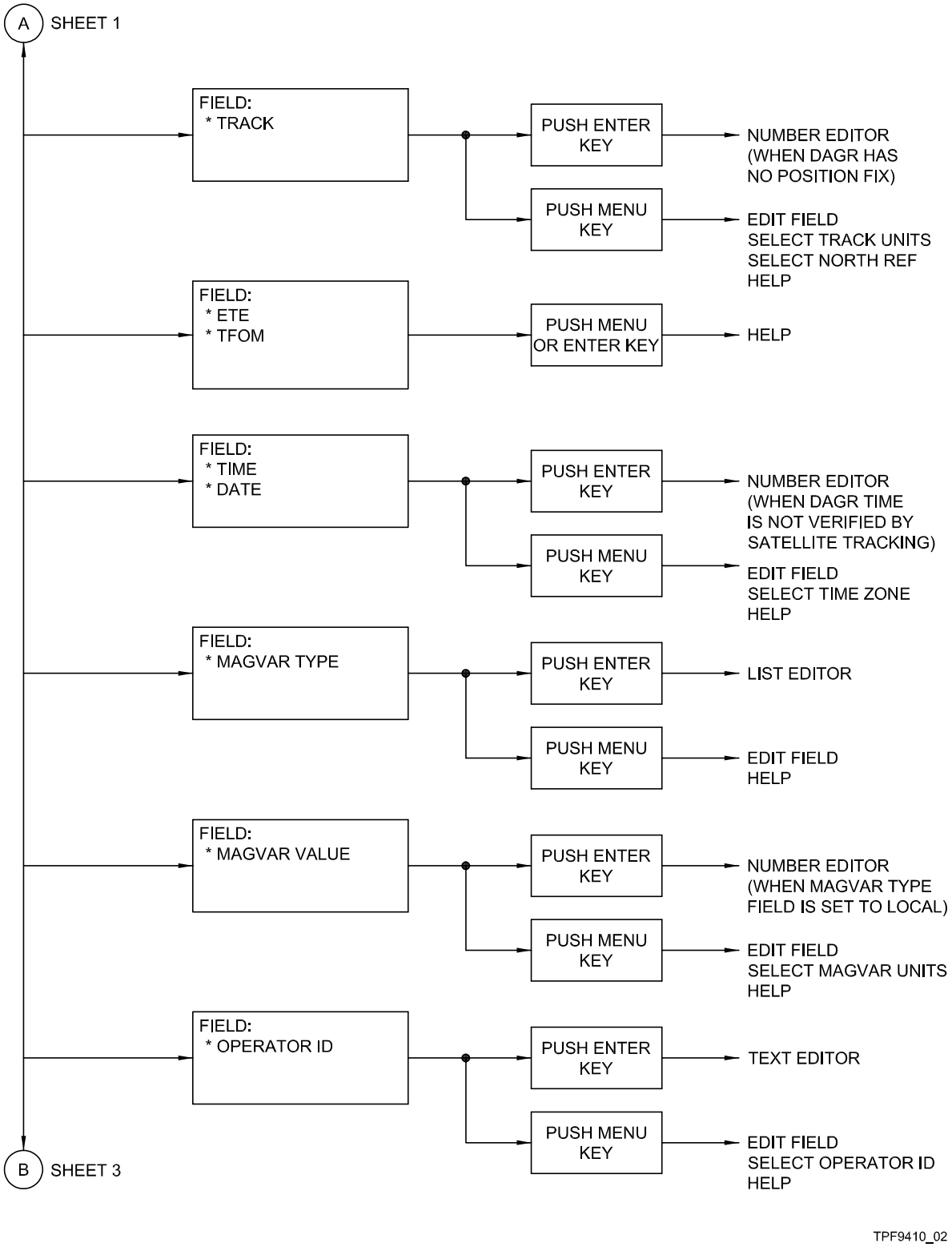


Figure 9-29. Present Position Page Keystroke Map (Sheet 2)

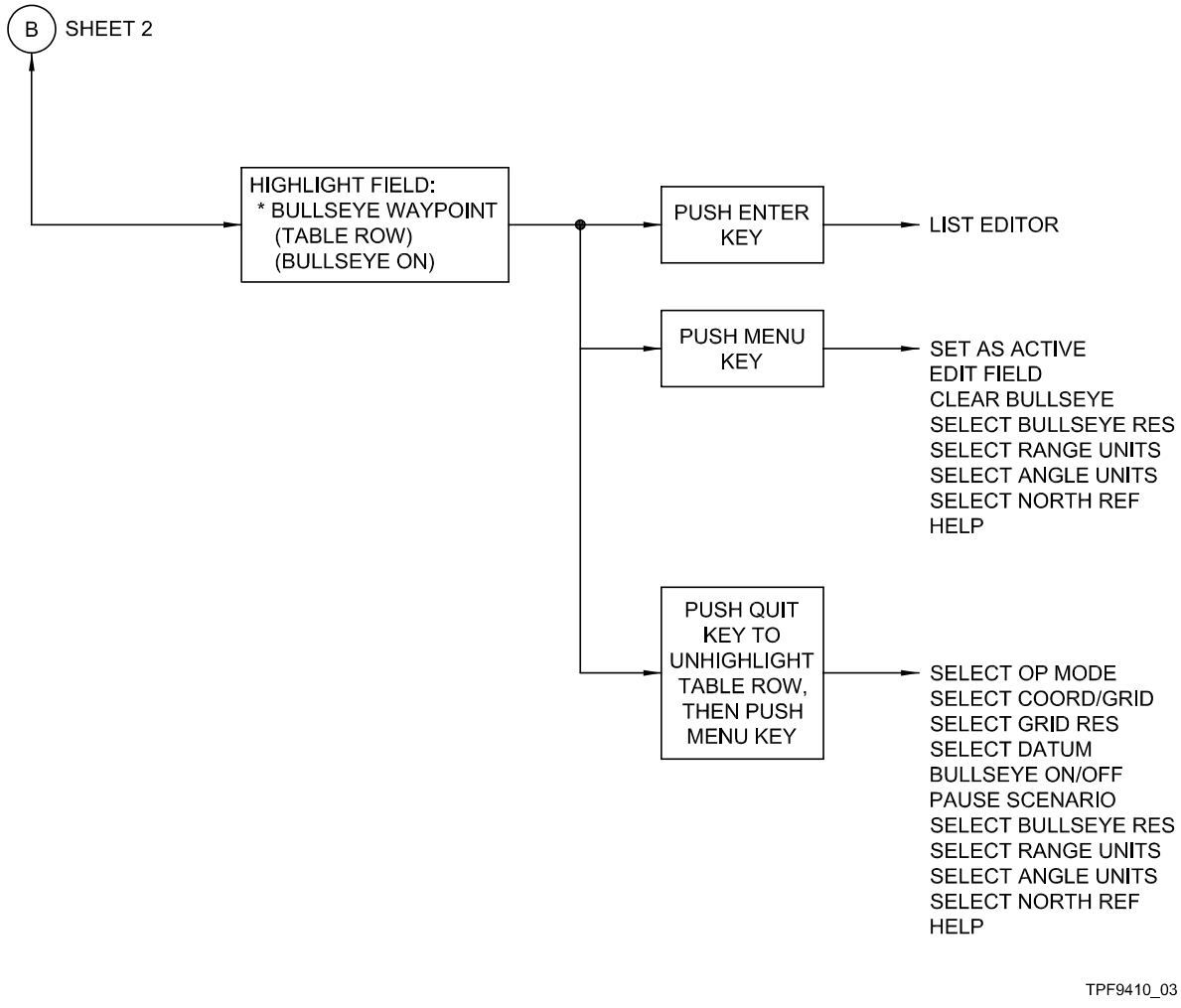


Figure 9-29. Present Position Page Keystroke Map (Sheet 3)

9.6. SITUATIONAL AWARENESS PAGE.

CAUTION

• If the DAGR is not tracking satellites or has no position fix, the displayed position data blinks between gray and black to notify the operator. Field data may be inaccurate and/or unavailable when the DAGR does not have a position fix.

• Prior to a mission, manually enable and orient the internal compass. Failure to do this can result in inaccurate DAGR track data when the DAGR is not moving or is moving slowly. For more information, refer to the Internal Compass page, Paragraph 10.3.

• A high level of position error may place a mission at risk. Verify the figure of merit (FOM) level is sufficient to accomplish the mission. Refer to the position error field (EPE/EHE/EVE) of either the Present Position page or NAV Displays page to view the current FOM. The Situational Awareness page may also display FOM in the upper right corner (if so configured). Refer to Table 9-1 to convert FOM into a position error range (in meters). If the FOM is too high, refer to Paragraph 18.4.

9.6.1. Page Function.

The Situational Awareness page is accessed from the Navigation submenu or from the POS page set (refer to Paragraph 6.2.9). The Situational Awareness page provides a graphical display of relationships between current position, track history, landmarks or map objects (when using a map), waypoints, routes, and alerts. Refer to Chapter 8 for more information on waypoints, routes, and alerts. Before a map can be displayed by the Situational Awareness page, a map including present position must be loaded into the DAGR and must be enabled. The operator can enable or disable maps, select view orientation, select view content (waypoints, routes, and alerts), edit displayed waypoints, measure between selected points, and track history (refer to Paragraph 9.6.3). The operator can hide the toolbar function keys to gain additional display area.

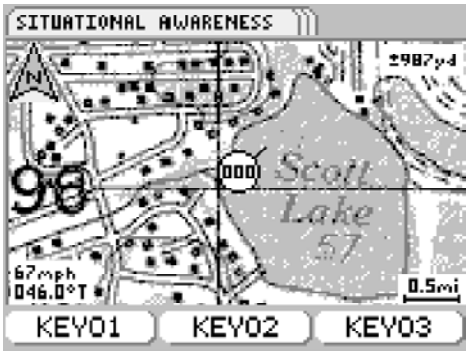
NOTE

The Situational Awareness page and Image Viewer page can both display maps, however, they do not display the same maps. The Situational Awareness page displays vector maps and the Image Viewer page displays raster maps. Refer to Chapter 17 for map installation information.

9.6.1.1. The present position symbol (waypoint 000 inside a circle) is at the center of the display with a track indicator staff as shown in Figure 9-30, unless the cursor is active and panning is in use. Ground speed and track are displayed in the lower left corner. If the DAGR internal compass is being used, displayed track text alternates with the instruction to HOLD LEVEL (refer to Paragraph 10.3 for additional internal compass information). Range scale is displayed in the lower right corner. When a vector map is not loaded in the DAGR, two circles about the center of the display are used to estimate range. Refer to Figure 9-31. North reference indicator is displayed in the upper left corner and always points to True North.

9.6.1.2. Position error (EHE, EPE, EVE, or FOM) is displayed as a ± value in the upper right corner (except FOM is displayed as a value of 1 to 9, with 1 being the best). The position error type is selectable and the displayed value is the estimated ± range of accuracy. Depending upon operator selections, time-since-fix or rehearsal mode scenario time may also be displayed. If time-since-fix is displayed, it alternates with the position error data. The operator can set the display view orientation as follows:

- **North-Up** — Top of the display is North.
- **Track-Up** — Top of the display is current track.
- **Course-Up** — Top of the display is current navigation course (if defined, otherwise defaults to current track).
- **Operator Entered** — Top of display is operator entered value.



TPF9999_01

Figure 9-30. Situational Awareness Page

TPG9056_01

Figure 9-31. Situational Awareness Page Without a Map Loaded

9.6.1.3. If the DAGR present position is the North or South Pole, the present position symbol is replaced with an N or S, respectively, with arrows around them indicating all directions are opposite the indicated pole. Route legs and alerts within 500 meters of the North or South Pole (symbols shown enlarged in Figure 9-32) may not be correctly displayed. Polar regions may cause display or map symbols to move, appear, or disappear. A polar region includes any position above 85 degrees latitude. The operator must acknowledge a DAGR message whenever entering or leaving a polar region. Polar regions are displayed as a crosshatch pattern as shown in Figure 9-33.

TPG0002_01

Figure 9-32. North and South Pole Symbols

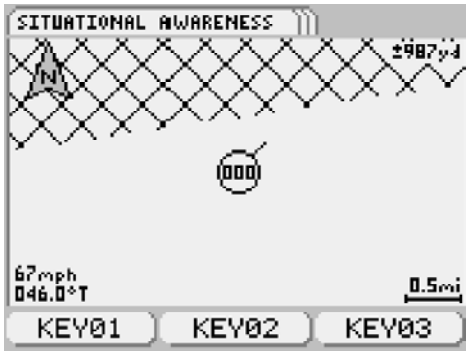


Figure 9-33. Polar Region

9.6.2. Page Symbols and Characteristics.

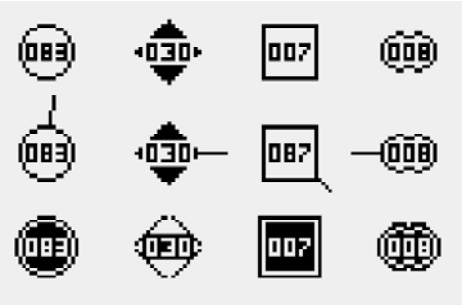
The Situational Awareness page provides a graphical display (with or without a map) of waypoints, routes, alerts, and track history. Page characteristics include zoom range scale, panning/scrolling, and measuring range between points.

9.6.2.1. Maps. Maps displayed by the Situational Awareness page provide a graphical map display of relationships between current position, landmarks, map objects, and selected waypoints or other items used in navigation. Refer to Chapter 8 for more information on waypoints, routes, and alerts. The Situational Awareness page automatically displays a map when a map is enabled that includes DAGR present position. The operator can enable or disable maps for viewing. The Situational Awareness page is used without a map when no maps are loaded, no maps include present position, or the maps are disabled by the operator. The operator uses zoom and pan operations, and menu selections to obtain a desired map view. When navigating, a map provides the operator with a view of surrounding terrain and potential obstructions (e.g., body of water). General map information is as follows:

- The present position symbol (waypoint 000 inside a circle) is at the center of the display (unless the operator is panning the display).
- A scale value (controlled by zoom in/out function) is displayed in the lower right corner of the page.
- Features displayed by a map (e.g., cities, roads, etc.) and their level of detail are determined by the map loaded into the DAGR, a level of detail operator menu selection, and the selected range scale (zoom).
- No map is displayed above 80 degrees latitude.
- Measurements between any two points on the map can be performed by the operator.
- If the operator disables a map, that map will not be displayed.
- A cursor is used for panning and other operations.

9.6.2.2. Waypoints. Figure 9-34 illustrates how waypoint symbols may be shown in the Situational Awareness page and is not an actual DAGR display. Waypoint numbers are provided in the center of the shape and a direction indicator staff is attached to the symbol, if applicable. Highlighted symbols (shown bottom row) denote selected waypoints. The operator can select which waypoints to display and can create waypoints from page menu selections. Operator selectable waypoint view options are none, navigation, operator-selected, navigation and operator-selected, or all. Refer to Paragraph 8.2 for additional waypoint information. Waypoints are shown as shapes to denote their identity (left to right in Figure 9-34) as follows:

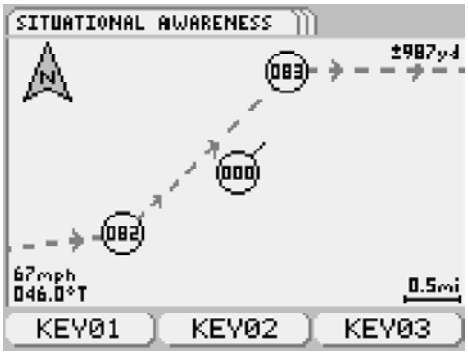
- **Friendly** — Circle
- **Hostile** — Diamond
- **Neutral** — Square
- **Unknown** — Cloud



TPG1193_01

Figure 9-34. Waypoint Symbols

9.6.2.3. Routes. Routes are shown as dashed lines with arrows indicating route direction waypoint to waypoint (legs of the route). Refer to Figure 9-35. The display of waypoints used to define the route are based upon the selected waypoint view option. The operator can select which routes are displayed. Operator selectable route view options are none, active (in route navigation), operator-selected, active and operator-selected, or all. Refer to Paragraph 8.7 for additional routes information.

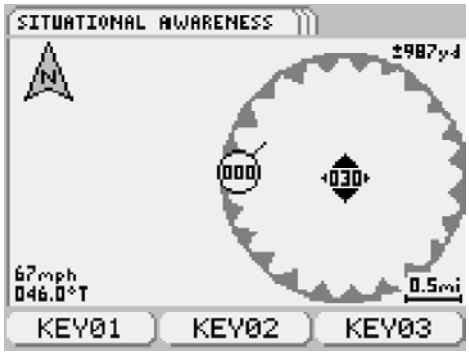


TPG0001_01

Figure 9-35. Routes

9.6.2.4. Alerts. Waypoints are used to define alerts. Alerts are displayed as selected by the operator (none, enabled, or all) using shapes to denote the alert type. Spikes displayed as part of the alert perimeter represent the dangerous side or area of an alert. Refer to Paragraph 8.9 for additional alerts information. Use the Status key and the Receiver Status menu to check alerts and their status (refer to Paragraph 6.2.24).

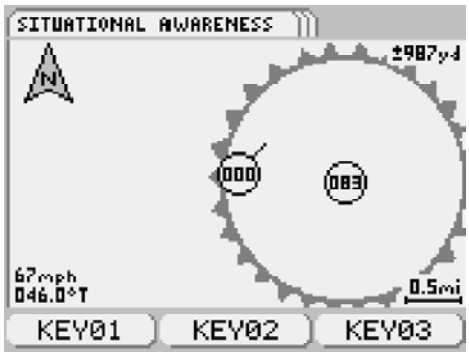
9.6.2.4.1. A hazard alert is a circular area defined by an operator entered radial range from a waypoint. A hazard alert is shown in Figure 9-36 with the Situational Awareness page displaying the DAGR present position (waypoint 000) inside the dangerous area of a hazard alert radius (hazard alert waypoint 030).



TPG0004_01

Figure 9-36. Hazard Alert

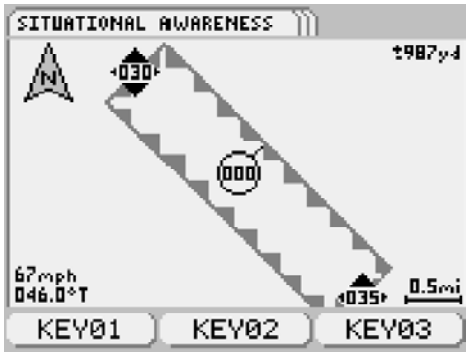
9.6.2.4.2. An anchor alert is a circular area defined by an operator entered radial range from a waypoint. An anchor alert is shown in Figure 9-37 with the Situational Awareness page displaying the DAGR present position (waypoint 000) inside an anchor alert radius (anchor alert waypoint 030).



TPG0005_01

Figure 9-37. Anchor Alert

9.6.2.4.3. A buffer zone alert is a rectangular area defined by two operator selected waypoints as end points. The operator defines the width of the buffer zone by inputting a range applied to both sides of the line interconnecting the waypoints. A buffer alert is shown in Figure 9-38 with the Situational Awareness page displaying the DAGR present position (waypoint 000) inside the dangerous area of a buffer zone (made using waypoints 030 and 035).



TPG0006_01

Figure 9-38. Buffer Alert

9.6.2.4.4. A corridor alert is a rectangular area defined by two operator selected waypoints as end points. The operator defines the width of the corridor by inputting a range applied to both sides of the line interconnecting the waypoints. A corridor alert is shown in Figure 9-39 with the Situational Awareness page displaying the DAGR present position (waypoint 000) inside a corridor (made using waypoints 083 and 085).

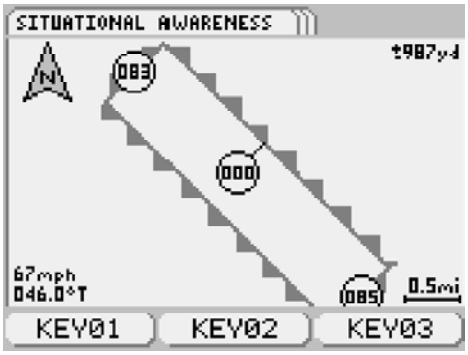


Figure 9-39. Corridor Alert

9.6.2.4.5. A boundary line or phase line alert is a line between two operator selected waypoints. Although boundary line and phase line alerts are set up similarly, they have entirely different purposes. A boundary line should not be crossed, while a phase line is used to indicate completion of a mission phase. A boundary line / phase line alert is shown in Figure 9-40 with the Situational Awareness page displaying the DAGR present position (waypoint 000) approaching a boundary line or phase line alert (made using waypoints 083 and 084).

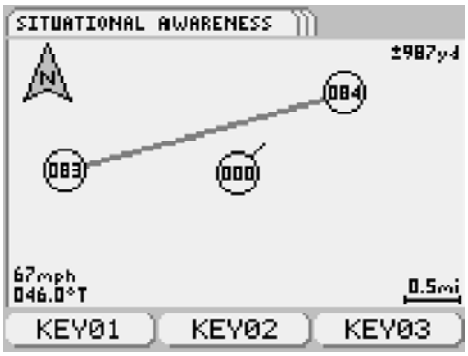


Figure 9-40. Boundary Line/Phase Line Alert

9.6.2.4.6. An area alert is a polygon shaped area constructed from three to fifteen operator selected waypoints. An area alert is shown in Figure 9-41 with the Situational Awareness page displaying the DAGR present position (waypoint 000) inside the dangerous area of an area alert (made using four waypoints 030, 031, 032, and 033).

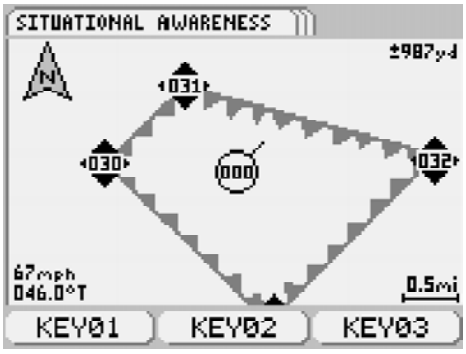


Figure 9-41. Area Alert

9.6.2.4.7. When an alert is triggered, the DAGR displays an alert message notifying the operator of the type of alert and the alert number and name. Refer to the example alert display in Figure 9-42. The operator can push the ENTER key to acknowledge the displayed alert and take appropriate action, or push the MENU key for further options. When selected, the alert display menu options function as follows:

- **Toggle Remark** — Displays opposite view (1 or 2) of time alert message (time alert only).
- **View Alert** — Displays Alert Editor page with current alert data.
- **Acknowledge** — Same as pushing ENTER key with alert displayed.
- **Message Help** — Displays help text.

Figure 9-42. Alert Example

9.6.2.5. Track History. Track history is used to plot previous positions. Track history points are shown as dots in Figure 9-43. Up to 250 tracking history points can be saved. Once all 250 points are used, they may be set to wrap (overwrite) themselves, or not. The track history points may be copied to waypoints and used to create a route. Operator confirmation is required prior to overwriting any waypoints. When copying waypoints, the DAGR uses the next unused waypoint, operator selected waypoint(s) or waypoint 001 if all are used. The operator can select the following track history options:

- **Recording Mode** — On or off. Start or stop recording track history points.
- **Wrap Mode** — Wrap or no wrap. When all track history points are used, begin overwriting (wrap) any existing track history points.
- **Interval Type** — Time or range. A track history point is recorded at intervals of time or range.
- **Edit Time Interval** — Hours, minutes, and seconds from 1 second to 9 hours when time interval is selected.
- **Edit Range Interval** — 10 meters to 99999 meters when range interval is selected.
- **Clear Track History** — Clears all recorded track history points.

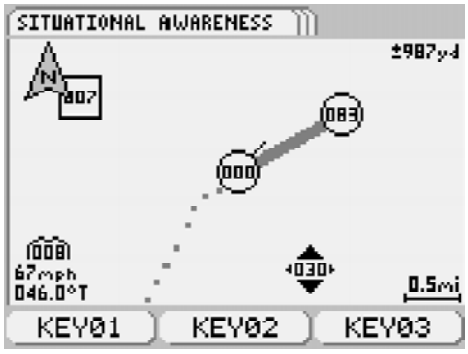


Figure 9-43. Track History

9.6.2.6. Zoom/Range Scale. The operator can zoom in or out using the IN or OUT keys on a scale of 50 feet to 800 miles, 50 yards to 800 nautical miles, or 50 meters to 800 kilometers (English, nautical, or metric units). Range scale is shown in the lower right hand corner of the display. When a vector map is not loaded in the DAGR, two circles about the center of the display are used to estimate range. The inner circle is one (1x) scale from the display center. The outer circle is two (2x) scales from the display center.

9.6.2.6.1. OVERZOOM is displayed alternating with the range scale when the DAGR ground speed is too fast for the selected range scale. OVERZOOM is also displayed when the page range scale is zoomed in too close (e.g., 50 meters, 50 yards, or 50 to 100 feet) to maintain accurate spacing between objects. The operator may zoom out until OVERZOOM is no longer displayed. When zooming in or out with the cursor displayed, the display centers upon the cursor. When a waypoint is selected, the display centers upon the waypoint and the cursor moves to the center of the display. When present position cannot be maintained at the center of the display, Working is displayed at the top of the page. Refer to Figure 9-44.

Figure 9-44. Situational Awareness Page Working Display

9.6.2.7. Panning/Cursor. The operator uses the cursor control keys to pan (move) the display in any direction and move the cursor to any point. A cursor appears when panning in any direction or by pushing the ENTER key. All of a map can be viewed through panning. Before panning is performed, the center of the display (with or without a map) is DAGR present position (waypoint 000). After panning to the edge of the display, the present position is no longer at the center of the display and any zoom in or zoom out functions reference the cursor, not the present position. Panning is deactivated by pushing the QUIT key or leaving the Situational Awareness page. When panning is deactivated, the cursor is removed, and present position is at the center of the display.

9.6.2.8. Measurement Information Box. The operator can perform measurements between any two points on the display including DAGR present position, waypoints, and any other point using the cursor.

9.6.2.8.1. When the operator pushes a cursor control key or the ENTER key, the cursor appears at the center of the display along with a measurement information box covering the toolbar function keys at the bottom of the display. The top of the information box is labeled Cursor and it provides azimuth and range measurement data from the DAGR present position to the cursor position on

the map. Whenever the cursor is moved, the measurement data is automatically updated. When the cursor is not located at DAGR present position, a dashed measurement line appears between the cursor and present position. The measurement data blinks if the DAGR is not tracking satellites or does not have a current position fix. The cursor and the measurement information box are removed if the QUIT key is pushed, or automatically removed when the operator leaves and returns to the Situational Awareness page.

9.6.2.8.2. When the cursor is placed on a waypoint symbol, the waypoint becomes highlighted and is selected. When the waypoint is selected, a second box (next to the waypoint symbol) appears for five seconds showing the waypoint identity, number, and name. The top of the measurement information box shows the selected waypoint identity (unknown, friendly, hostile, or neutral), number, and name. The azimuth and range data from present position to the selected waypoint is also displayed. Elevation angle and slant range data can be added to the box using a menu selection. Refer to Figure 9-45. The operator can set the measurement starting (reference) point to a point other than present position and restart the measurement as many times as desired.

Figure 9-45. Waypoint Selected

9.6.2.8.3. Other items used in navigation (in addition to waypoints) can be selected by the cursor and used for measurements. The following is a list of these items and their information that is displayed when they are selected. This data is displayed in the measurement information box (along with measurement data) and in a second box next to the cursor that appears for only five seconds after the item is selected.

- **Route** — Displays the route number and name.
- **Alert** — Displays the alert type, number, and name.
- **Track History Point** — Displays Track History Point.
- **North Pole** — Displays North Pole.
- **South Pole** — Displays South Pole.
- **Polar Region** — Displays Polar Region
- **Navigation Line** — Displays Navigation Line.
- **Map Feature** — Displays the generic name of the map feature (e.g., road), and the specific name (e.g., Highway 61) if included with the current map.

9.6.2.9. Page Menu Selections. The Situational Awareness page menu provides the selections listed as follows. Refer to Paragraph 9.6.3 for related procedures and additional information.

- **Select Orientation** — Provides operator selections for determining the reference used for the top of the display (north, track, course, or an operator entered value).
- **Maps**

  Setup — Provides a listing of all loaded map names. The operator can disable or enable any listed map. Only enabled maps are displayed by the Situational Awareness page.

Detail Setting — Provides operator detail selections for determining which map features (i.e., cities, airports, and roads, etc.) are displayed for each range scale (zoom) setting.

Show Information — Provides a listing of all loaded map names. When the operator selects a map (or maps) from the listing, the map information (loaded with the map) is displayed. This information includes map name, identification, date, ellipsoid, horizontal datum, vertical datum, MAGVAR, MAGVAR date, and MAGVAR angular rate of change.

- **View** — Provides operator selections for viewing waypoints, alerts, routes, and track history, selecting range, speed, and track units of measure, selecting north reference, selecting position error, hiding or showing the toolbar , and hiding or showing elevation angle and slant range measurement data.
- **Show/Edit** — Provides operator selections to edit waypoint position, name, remark, identity, access the Waypoint Editor page, or create a waypoint.
- **Track History** — Provides operator selections to set track history record mode, wrap mode, interval type, interval, clear history, and copy track history points to waypoints.
- **Restart Measurement Here** — Provides operator capability to perform measurements between any two points on the display without using present position.
- **Help** — Provides operator help text.

9.6.3. How To Use The Situational Awareness Page.

This page provides a graphical display (with or without a map) of relationships between present position, track, waypoints, routes, and alerts. Includes a north reference indicator, ground speed and track, position error data, and a range scale. This page provides a means of viewing information that's been previously set up in the DAGR. The display is set up by performing the following select display view procedure to show one or a combination of waypoints, routes, alerts, navigation, or other items. If a particular item does not appear on the display, change the range scale by zooming in or out. The page also includes a cursor (in the shape of an arrow), but does not show on the display until the cursor control keys are used to move it. An example of using the Situational Awareness page for direct to navigation is provided in the last procedure for this page. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting up data and changing field information.

9.6.3.1. The Situational Awareness page supports map types vector map (VMap) and urban vector map (UV Map). The quantity of maps loaded into the DAGR is limited by factors such as map file sizes and DAGR memory capacity. Refer to Chapter 17 for map installation procedures.

9.6.3.2. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Navigation, then push the ENTER key.
3. Highlight Situation Awareness, then push the ENTER key. The Situational Awareness page is displayed.

a. Set Up Units/References

   (1) Prior to using display data, view the page to determine if changes to units of measure or references used in the display are required (metric or decimal, mils or degrees, true or magnetic, etc.).

   (2) When unit or reference changes are required, push the MENU key.

   (3) Highlight View, then push the ENTER key.

   (4) Highlight the desired type of units, north reference, or position error to change (listed as follows), then push the ENTER key. Other options are displayed not applicable to selecting units/references (e.g., View WPs)

   - Select Range Units
   - Select Speed Units
   - Select Track Units
   - Select North Ref

- Select Pos Error

(5) Highlight the desired selection, then push the ENTER key.

(6) The page displays all associated information with the change made.

(7) If required, repeat the procedure for the remaining selections.

b. Select display orientation.

(1) From the Situational Awareness page, push the MENU key.

(2) Highlight Select Orientation, then push the ENTER key.

(3) Highlight the desired orientation selection (listed as follows), then push the ENTER key.

- **North Up** — Displays North at the top of the display.
- **Track Up** — Displays the current track at the top of the display.
- **Course Up** — Displays current navigation course at top of display. If a navigation course is not defined (from the NAV Setup page), displays current track.
- **Operator-Entered** — Displays a number editor. Enter a desired azimuth (0.1° to 360.0°) to be at the top of the display. Then push the ENTER key.

(4) The Situational Awareness page is displayed using the selected orientation.

c. Map setup and information.

(1) Enable or disable map display capability.

(a) From the Situational Awareness page, push the MENU key.

(b) Highlight Maps, then push the ENTER key.

(c) Highlight Setup, then push the ENTER key.

(d) Enable or disable map(s) using one of the following steps.

NOTE

Only maps with a check mark displayed to the left of their map name are enabled.

1 To enable or disable an individual map, highlight the desired map selection, then push the left or right cursor control key to enable or disable the selected map.

2 To enable or disable all maps, push the MENU key. Highlight Select All (to enable all maps) or Deselect All (to disable all maps). Then push the ENTER key. The display returns to the map list showing all maps enabled or disabled.

(e) Push the ENTER key. The display returns to the Situational Awareness page with the map(s) enabled or disabled.

(2) Select map detail setting.

(a) From the Situational Awareness page, push the MENU key.

(b) Highlight Maps, then push the ENTER key.

(c) Highlight Detail Setting, then push the ENTER key.

(d) Highlight the desired detail selection (listed as follows), then push the ENTER key.

- **Most** — Provides the most amount of map detail for each range scale setting.
- **More** — Provides an intermediate level of map detail including the detail provided by the Some, Less, and Least settings.
- **Some** — Provides an intermediate level of map detail including the detail provided by the Less and Least settings.
- **Less** — Provides an intermediate level of map detail including the detail provided by the Least setting.

- **Least** — Provides the least amount of map detail for each range scale setting.

(e) The display returns to the Situational Awareness page with the selected level of map detail.

(3) Show map information.

(a) From the Situational Awareness page, push the MENU key.

(b) Highlight Maps, then push the ENTER key.

(c) Highlight Show Information, then push the ENTER key.

(d) Select map(s) using one of the following steps.

NOTE

Only maps with a check mark displayed to the left of their map name are selected to show information.

1 To select an individual map, highlight the desired map, then push the left or right cursor control key.

2 To select all maps, push the MENU key. Highlight Select All, then push the ENTER key. The display returns to the map list showing all maps selected.

(e) Push the ENTER key.

(f) Map information is displayed. Use the cursor control keys to view all information.

(g) Push the QUIT key to remove the map information display.

d. Select display view.

(1) Select waypoints to view.

(a) From the Situational Awareness page, push the MENU key.

(b) Highlight View, then push the ENTER key.

(c) Highlight View WPs, then push the ENTER key.

(d) Highlight the desired waypoint view selection (listed as follows), then push the ENTER key.

- **None** — Displays no waypoints.
- **Navigation** — Displays waypoints being used for navigation.
- **Operator-Selected** — Displays waypoints the operator preselected for viewing on the Situational Awareness page. Individual waypoints are preselected for viewing using the Waypoint Editor page (refer to Paragraph 8.3).
- **NAV and Selected** — Displays both waypoints being used for navigation and operator selected waypoints.
- **All** — Displays all waypoints.

NOTE

• For viewing operator-selected waypoints, the Sit (Situational) Awareness field on the Waypoint Editor page must be set to Yes.

• If desired view is not obtained, verify correct range scale is in use.

(e) The Situational Awareness page is displayed with the selected view.

(2) Select alerts to view.

(a) From the Situational Awareness page, push the MENU key.

(b) Highlight View, then push the ENTER key.

(c) Highlight View Alerts, then push the ENTER key.

(d) Highlight the desired alert view selection (listed as follows), then push the ENTER key.

- **None** — Displays no alerts.
- **Enabled** — Displays enabled alerts. Alerts are enabled using the Alerts page (refer to Paragraph 8.9).
- **All** — Displays all alerts (enabled or disabled).

(e) The Situational Awareness page is displayed with the selected view.

(3) Select routes to view.

(a) From the Situational Awareness page, push the MENU key.

(b) Highlight View, then push the ENTER key.

(c) Highlight View Routes, then push the ENTER key.

(d) Highlight the desired route view selection (listed as follows), then push the ENTER key.

- **None** — Displays no routes.
- **Active** — Displays active routes being used for navigation.
- **Operator-Selected** — Displays routes the operator preselected for viewing on the Situational Awareness page. Individual routes are preselected for viewing using the Route Editor page (refer to Paragraph 8.8).
- **Active & Selected** — Displays both routes being used for navigation and operator selected routes.
- **All** — Displays all routes.

NOTE

For viewing operator-selected routes, the Sit (Situational) Awareness field on the Route Editor page must be set to Yes.

(e) The Situational Awareness page is displayed with the selected view.

(4) Select track history to view.

(a) From the Situational Awareness page, push the MENU key.

(b) Highlight View, then push the ENTER key.

(c) Highlight View Track History, then push the ENTER key.

(d) Highlight the desired track history view selection (listed as follows), then push the ENTER key.

- **None** — Displays no track history.
- **All** — Displays track history as described in Paragraph 9.6.2.5. Additional track history options are available using the page menu Track History option (refer to the following procedure g.).

(e) The Situational Awareness page is displayed with the selected view.

(5) Show or hide the toolbar function keys.

(a) From the Situational Awareness page, push the MENU key.

(b) Highlight View, then push the ENTER key.

(c) Highlight Show Toolbar or Hide Toolbar, as desired, then push the ENTER key.

NOTE

The Show Toolbar or Hide Toolbar menu choice is disabled when the measurement information box is displayed by the Situational Awareness page.

(d) The display returns to the Situational Awareness page with the toolbar either shown or hidden as previously selected.

NOTE

The show or hide toolbar selection affects both the Situational Awareness page and the Image Viewer page. The toolbar is shown or hidden, as previously selected, when viewing either of these pages and is not affected by cycling DAGR power.

e. Edit or create a waypoint.

NOTE

Present position waypoint 000 cannot be edited.

(1) Edit waypoint position.

(a) From the Situational Awareness page, move the cursor (using cursor control keys) and highlight the desired waypoint to edit.

(b) Push the MENU key.

(c) Highlight Show/Edit, then push the ENTER key.

(d) Highlight Position, then push the ENTER key.

(e) Edit waypoint position coordinates, then push the ENTER key.

(f) If the waypoint is being used for navigation, an alert, or a route, the operator is prompted to confirm overwriting the waypoint before the display will return to the Situational Awareness page.

(g) Display returns to the Situational Awareness page showing the waypoint with changes made.

(2) Edit waypoint name.

(a) From the Situational Awareness page, move the cursor (using cursor control keys) and highlight the desired waypoint to edit.

(b) Push the MENU key.

(c) Highlight Show/Edit, then push the ENTER key.

(d) Highlight Name, then push the ENTER key.

(e) Edit name as desired, then push the MENU key.

(f) Highlight Save & Exit, then push the ENTER key.

(g) Waypoint Stored message is displayed and will automatically time out.

(h) The display returns to the Situational Awareness page with the waypoint highlighted.

(3) Edit waypoint remark.

(a) From the Situational Awareness page, move the cursor (using cursor control keys) and highlight the desired waypoint to edit.

(b) Push the MENU key.

(c) Highlight Show/Edit, then push the ENTER key.

(d) Highlight Remark, then push the ENTER key.

(e) Edit remark as desired, then push the MENU key.

(f) Highlight Save & Exit, then push the ENTER key.

(g) Waypoint Stored message is displayed and will automatically time out.

(h) The display returns to the Situational Awareness page with the waypoint highlighted.

(4) Edit waypoint identity.

(a) From the Situational Awareness page, move the cursor (using cursor control keys) and highlight the desired waypoint to edit.

(b) Push the MENU key.

(c) Highlight Show/Edit, then push the ENTER key.

(d) Highlight Identity, then push the ENTER key.

(e) Highlight the desired identity, then push the ENTER key.

(f) Waypoint Stored message is displayed and will automatically time out.

(g) The display returns to the Situational Awareness page with the waypoint highlighted.

(5) Edit waypoint using the Waypoint Editor page.

(a) From the Situational Awareness page, move the cursor (using cursor control keys) and highlight the desired waypoint to edit.

(b) Push the MENU key.

(c) Highlight Show/Edit, then push the ENTER key.

(d) Highlight Edit WP, then push the ENTER key.

(e) The Waypoint Editor page is displayed.

(f) When editing is performed, the operator is prompted to confirm overwriting the waypoint.

(g) Revise waypoint information as necessary. Refer to Paragraph 8.3 for information on using the Waypoint Editor page.

(h) Push the MENU key, highlight Save & Exit, then push the ENTER key.

(i) Waypoint Stored message is displayed and will automatically time out.

(j) The display returns to the Waypoints page with the revised waypoint highlighted.

(k) Push and hold the POS key until the Present Position page is displayed. Push the PAGE key to return to the Situational Awareness page.

(6) Create a waypoint at a selected location.

(a) With the Situational Awareness page displayed, move the cursor (using cursor control keys) to a location desired to create a waypoint.

(b) Push the MENU key.

(c) Highlight Show/Edit, then push the ENTER key.

(d) Highlight Create WP Here, then push the ENTER key.

(e) A scrollable list displays all waypoints with the first unused waypoint highlighted.

(f) Highlight the desired waypoint, then push the ENTER key. If an existing waypoint is selected, the operator is prompted to confirm before the waypoint is overwritten. A waypoint stored message briefly displays.

(g) The display returns to the Situational Awareness page with the new waypoint highlighted.

NOTE

The Situational Awareness page view must be set to view all waypoints (refer to select waypoints to view procedure).

f. Perform measurement function.

(1) Start measurement function.

(a) From the Situational Awareness page, use cursor control keys to place the cursor at the desired point to measure range from present position. A dashed line interconnects the measurement points.

(b) At the bottom of the page, a measurement information box covers the toolbar. A second box also appears for five seconds next to the selected item with identification information. Refer to Paragraph 9.6.2.8 for additional information on the measurement information box and selecting navigational items.

NOTE

The measurement information box provides azimuth, range, elevation angle (ELA) (optional), and slant range (SR) (optional) data referencing present position (starting point) to cursor (selected point). When a navigational item (e.g., waypoint, route, etc.) or map feature is not selected by the cursor, the top line of the measurement box is labeled Cursor. When a navigational item or map feature is selected, the top line of the measurement box provides the item identification information.

(c) Perform the following steps to add or remove the optional ELA and SR data.

1 Push the MENU key.

2 Highlight View, then push the ENTER key.

3 Highlight either Show ELA and SR or Hide ELA and SR, then push the ENTER key.

4 The display returns to the Situational Awareness page with ELA and SR measurement box data added or removed, as selected.

NOTE

If you return to the measurement function after cycling DAGR power, ELA and SR data is automatically removed from the measurement box.

(d) Move the cursor as desired to measure other points from present position. The measurement box automatically updates measurement data.

(e) Push the QUIT key to exit the measurement function and remove the measurement box and cursor.

(f) After leaving the measurement function, the default range scale is displayed and present position is at the center of the display.

(2) Restart measurement function.

NOTE

The operator uses this function to restart the measurement using a selected starting point other than present position. The measurement function must already be in process before restarting is possible.

(a) With the Situational Awareness page displayed and a measurement function previously started, move the cursor to the desired new starting point (dashed line remains connected to previous starting point), then push the MENU key.

(b) Highlight Restart Meas Here, then push the ENTER key.

(c) The dashed line is removed. The cursor position is the new starting point, and the information in the measurement box is reset.

(d) Move the cursor to the desired point or waypoint to measure range to (dashed line connects from new starting point) and the information in the measurement box updates automatically.

(e) Move the cursor as desired to measure other points from the starting point. The measurement box automatically updates measurement data.

(f) Repeat this procedure for any amount of starting points needed.

(g) Push the QUIT key to exit the measurement function and remove the cursor and measurement box.

(h) After leaving the measurement function, the default range scale is displayed and present position is at the center of the display.

NOTE

If the operator leaves the measurement function, but does not leave the Situational Awareness page, and then again starts the measurement function, the last used starting point is automatically referenced.

g. Track history.

(1) Select record mode.

(a) From the Situational Awareness page, push the MENU key.

(b) Highlight Track History, then push the ENTER key.

(c) Highlight Select Record Mode, then push the ENTER key.

(d) Highlight the desired selection (listed as follows), then push the ENTER key.

- **Off** — Track history points are not recorded.
- **On** — Track history points are recorded.

(e) The display returns to the Situational Awareness page with changes made.

(2) Select wrap mode.

(a) From the Situational Awareness page, push the MENU key.

(b) Highlight Track History, then push the ENTER key.

(c) Highlight Select Wrap Mode, then push the ENTER key.

(d) Highlight the desired selection (listed as follows), then push the ENTER key.

- **No Wrap** — Does not overwrite track history points after all 250 points have been used.
- **Wrap** — Begins overwriting track history points after all 250 points have been used.

(e) The display returns to the Situational Awareness page with changes made.

(3) Select interval type.

(a) From the Situational Awareness page, push the MENU key.

(b) Highlight Track History, then push the ENTER key.

(c) Highlight Select Interval Type, then push the ENTER key.

(d) Highlight the desired selection (listed as follows), then push the ENTER key.

- **Time** — Records track history points based upon a set time interval (e.g., one track history point recorded every minute).
- **Range** — Records track history points based upon a set range interval (e.g., one track history point recorded every 50 meters).

(e) The display returns to the Situational Awareness page with changes made.

(4) Edit interval.

(a) From the Situational Awareness page, push the MENU key.

(b) Highlight Track History, then push the ENTER key.

(c) Highlight Edit Interval, then push the ENTER key.

(d) Using the editor, enter the desired time or range interval (listed as follows), then push the ENTER key. The selected interval type procedure determines whether a time or range editor appears.

- **Time Interval** — Enter the desired time interval between recording of track history points (1 second up to 9 hours).
- **Range Interval** — Enter the desired range interval between recording of track history points (10 meters up to 99999 meters).

(e) The display returns to the Situational Awareness page with changes applicable to future track history points only. Previously recorded points will not be changed unless overwritten when in wrap mode.

(5) Clear History.

(a) From the Situational Awareness page, push the MENU key.

(b) Highlight Track History, then push the ENTER key.

(c) Highlight Clear History, then push the ENTER key.

(d) The display returns to the Situational Awareness page with all track history points cleared.

(6) Copy all to WP.

(a) From the Situational Awareness page, push the MENU key.

(b) Highlight Track History, then push the ENTER key.

(c) Highlight Copy All To WP, then push the ENTER key.

(d) A scrollable list displays all waypoints with the first unused waypoint highlighted.

(e) Highlight the desired waypoint, then push the ENTER key. If an existing waypoint is selected, the operator is prompted to confirm before the waypoint is overwritten. A waypoint stored message briefly displays.

- The waypoint selected in this step is the starting waypoint for storage of multiple track history points and they will be stored in consecutive order. The highest waypoint number storing a track history point, contains the last recorded track history point.
- Track history points are stored as COPYXXX waypoints, where COPY is the name prefix and X represents the waypoint number.
- The waypoints are displayed on the Situational Awareness page using the cloud shape (identity type unknown).

(f) The display returns to the Situational Awareness page with changes made.

h. Example setup for viewing of direct to navigation.

NOTE

For viewing waypoints, the Sit (Situational) Awareness field on the Waypoint Editor page must be set to Yes.

(1) Access the NAV Setup page, then set Direct To as the navigation method and select the navigation waypoint.

(2) From the Situational Awareness page menu, select View, then select View WPs, then select Navigation.

(3) Display returns to the Situational Awareness page.

(4) Present position is shown on the display in relationship to the selected waypoint. Zoom in or out if necessary.

(5) If alerts are needed in addition to the selected waypoint, perform the previous select alerts to view procedure.

i. Clear maps and images.

When the clear maps and images procedure is performed, **all maps and images** loaded into the DAGR are removed. DAGR support of a particular mission can become seriously impaired without the required maps or images.

(1) From any display (except a message pop-up), push the MENU key twice to display the Main Menu.

(2) Highlight System, then push the ENTER key.

(3) Highlight Data Clear Options, then push the ENTER key.

(4) From the clear data message display, use the cursor control keys to scroll to Maps/Images.

(5) Push the ENTER key to confirm and perform the clear data function.

NOTE

- If the QUIT key is pushed to cancel the clear data function, the display returns to the last page viewed.
- After the maps/images clear data function has started, DAGR displays an in progress message that states no DAGR functions are available until the clear data function has been completed.

(6) Push the ENTER key to acknowledge the clear data passed message. The display returns to the POS page set.

9.6.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 9-46 shows the keystroke map for the Situational Awareness page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Situational Awareness page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the POS page set.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

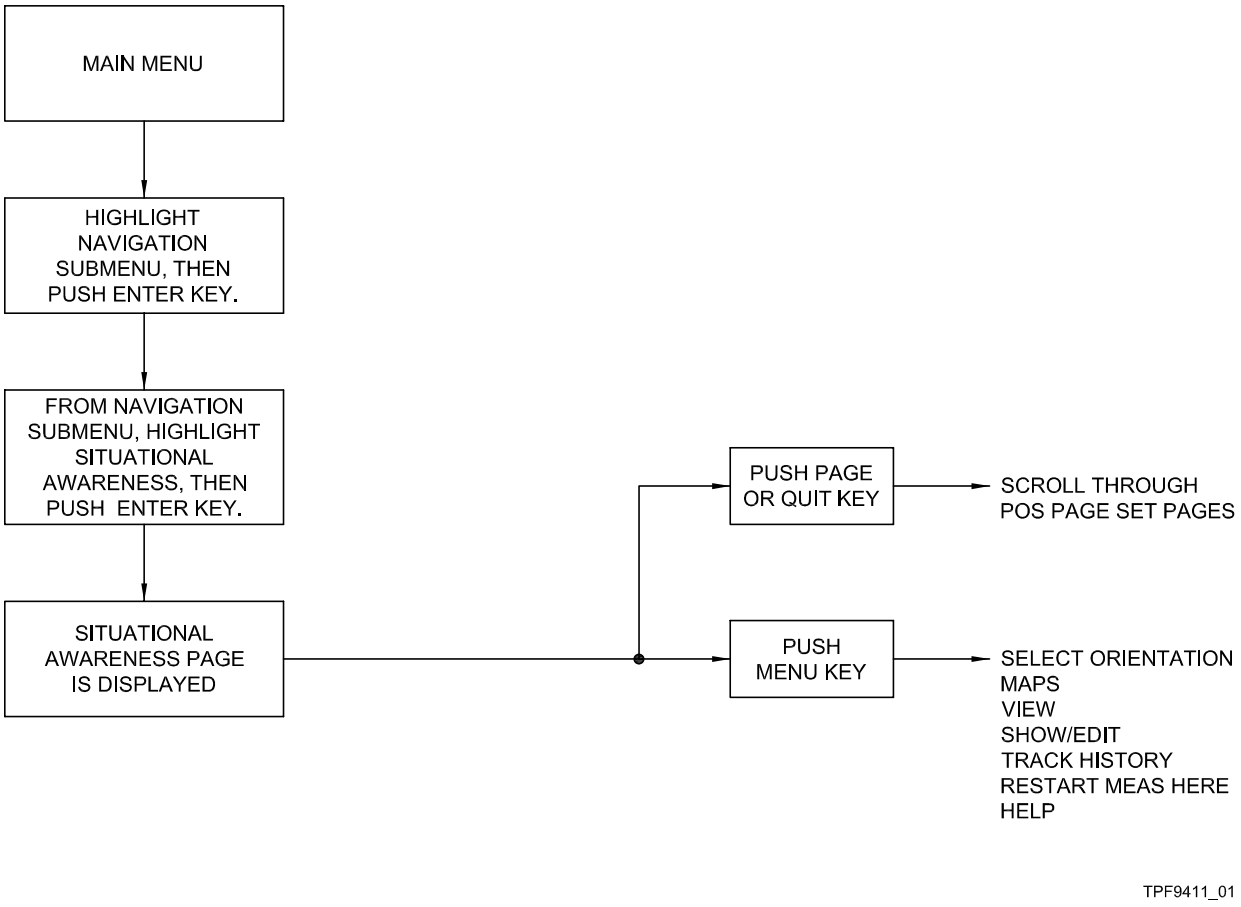


Figure 9-46. Situational Awareness Page Keystroke Map

9.7. IMAGE VIEWER PAGE.

CAUTION

- If the DAGR is not tracking satellites or has no position fix, the displayed position data blinks between gray and black to notify the operator. Field data may be inaccurate and/or unavailable when the DAGR does not have a position fix.
- Prior to a mission, manually enable and orient the internal compass. Failure to do this can result in inaccurate DAGR track data when the DAGR is not moving or is moving slowly. For more information, refer to the Internal Compass page, Paragraph 10.3.
- A high level of position error may place a mission at risk. Verify the figure of merit (FOM) level is sufficient to accomplish the mission. Refer to the position error field (EPE/EHE/EVE) of either the Present Position page or NAV Displays page to view the current FOM. Refer to Table 9-1 to convert FOM into a position error range (in meters). If the FOM is too high, refer to Paragraph 18.4.

9.7.1. Page Function.

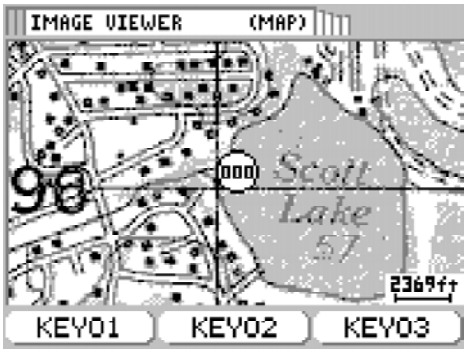
The Image Viewer page is accessed from the Navigation submenu or from the POS page set (refer to). The Image Viewer page provides map displays, image displays, and functions described in the following paragraphs. After maps or images are loaded into the DAGR, they can be displayed as selected by the operator. When displaying maps or images, the page title includes (Map) or (Image), respectively. The operator can hide the toolbar window function keys to gain additional map or image display area.

NOTE

The Image Viewer page and Situational Awareness page can both display maps, however, they do not display the same maps. The Situational Awareness page displays vector maps and the Image Viewer page displays raster maps. Refer to Chapter 17 for map installation information.

9.7.1.1. Maps. Maps displayed on the Image Viewer page provide a graphical map display of relationships between current position, landmarks, map objects, and selected waypoints. Refer to for more information on waypoints. When first accessed, the Image Viewer page automatically displays a map with the DAGR present position shown at the center of the display. If no loaded maps include present position or the maps have been disabled by the operator, the Image Viewer page automatically displays No Map Loaded/Enabled For This Position. The operator uses zoom and pan operations, and waypoint selections to obtain a desired view. When navigating, the Image Viewer page can provide the operator with a mapped view of surrounding terrain and potential obstructions (e.g., body of water). Refer to Figure 9-47. General map information is as follows:

- Maps are always oriented with the top of the map appearing at the top of the display.
- When displayed, the present position symbol (waypoint 000 inside a circle) is at the center of the display as shown in Figure 9-47 (unless the operator is panning the display).
- A selectable scale value (dependent upon the map in use) is displayed in the lower right corner of the page.
- If no Image Viewer page maps are loaded into the DAGR, the page displays No Maps Are Loaded.
- When a map is displayed that does not cover present position, the center of the map is automatically displayed at the center of the display.
- No map is displayed above 80 degrees latitude.
- If the DAGR hardware version does not support maps, the Image Viewer page displays This Version Of The Hardware Does Not Support Maps.
- Measurements between points on the map can be performed by the operator.
- If the operator disables a map, that map cannot be used to display present position.
- A cursor is used for panning and other operations.

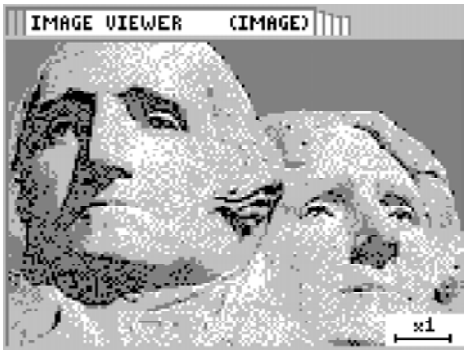


TPG1192_01

Figure 9-47. Image Viewer Page With Map and Toolbar

9.7.1.2. Images. Images provide a display of photographs or other non-map images. When an image is selected for viewing, the center of the image automatically appears at the center of the display. The operator uses zoom and pan functions to obtain the desired view. Unlike maps, a present position fix cannot be viewed from an image. Refer to Figure 9-48. General image information is as follows:

- The image is always oriented with the top of the image appearing at the top of the display.
- A selectable scale value is displayed in the lower right corner of the page.
- A cursor is used for panning.



TPG8774_01

Figure 9-48. Image Viewer Page With Image and Without Toolbar

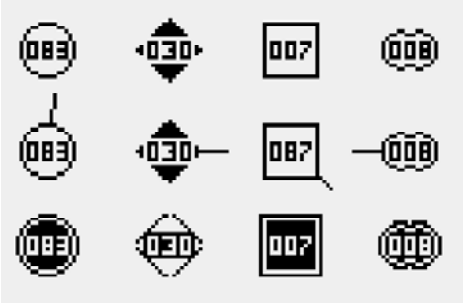
9.7.2. Page Symbols and Characteristics.

The Image Viewer page provides a graphical display of waypoints, map objects, or images. Page characteristics include zoom scale, panning, and map and image functions.

9.7.2.1. Waypoints. Figure 9-49 illustrates how waypoint symbols may be shown in the Image Viewer page and is not an actual DAGR display. Waypoint numbers are provided in the center of the shape and a direction indicator staff is attached to the symbol, if applicable. Highlighted symbols (shown bottom row) denote selected waypoints. The operator can select which waypoints to display and can create waypoints from page menu selections. Operator selectable waypoint view options are none, navigation, operator-selected, navigation and operator-selected, or all. Refer to Paragraph 8.2 for additional waypoint information. Waypoints are shown as shapes to denote their identity (left to right in Figure 9-49) as follows:

- **Friendly** — Circle
- **Hostile** — Diamond

- **Neutral** — Square
- **Unknown** — Cloud

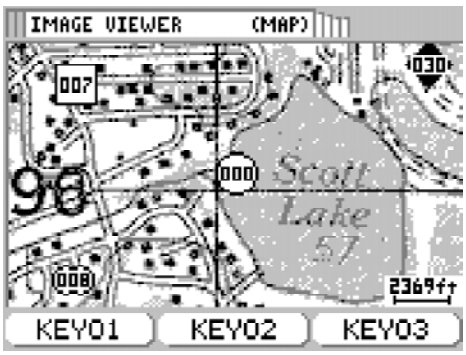


TPG1193_01

Figure 9-49. Waypoint Symbols

9.7.2.2. Figure 9-50 illustrates the Image Viewer page displayed with waypoints (waypoint 000 (present position), 007, 030, and 008). Present position is always displayed as waypoint 000. The operator can select which waypoints to display from the Image Viewer page menu (refer to the keystroke map in Figure 9-54). Operator selectable waypoint view options are:

- **None** — Only present position (waypoint 000) is displayed.
- **Navigation** — Displays waypoints being used for navigation inside the map coverage area as determined by the NAV Setup page From WP or To WP fields (refer to Paragraph 9.2 for more NAV Setup page information).
- **Operator-Selected** — Displays waypoints inside the map coverage area that have been selected by the operator for viewing. Waypoints desired for viewing must have the Sit (Situational) Awareness field of the Waypoint Editor page set to Yes (refer to Paragraph 8.3 for more Waypoint Editor page information).
- **Navigation and Selected** — Displays both navigation and operator-selected waypoints (as previously described).
- **All** — Displays all waypoints inside the map coverage area.



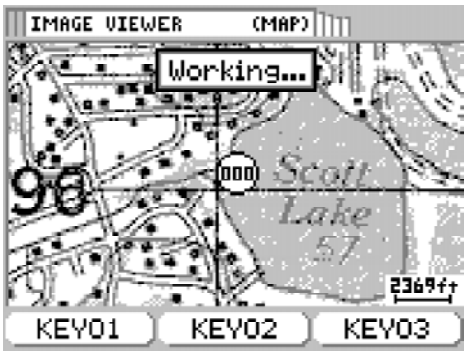
TPG1194_01

Figure 9-50. Image Viewer Page With Waypoints

9.7.2.3. Zoom/Scale. The operator can zoom in or zoom out using the IN or OUT key to display the map or image with a desired scale. Scale is adjusted through push and release of the IN or OUT keys. The zoom functions are performed in reference to the center of the display. The center of the display is one of the following: present position (map only), center of the map or image (map with no present position), a cursor (map or image), or a selected waypoint (map only). Prior to the operator using zoom in or zoom out functions, the map or image is displayed with a default (x 1) scale. If the operator leaves the Image Viewer page and then returns, the scale automatically returns to the default scale. The zoom in and out functions operate as follows:

- **IN key** — When pushed, the display is changed to a lower scale (three levels of zoom in function) (i.e. images get larger).
- **OUT key** — When pushed, the display is changed to a greater scale (four levels of zoom out function) (i.e. images get smaller).

9.7.2.3.1. Overzoom can occur when zooming in and the DAGR present position cannot be kept centered on the display. Overzoom also occurs when ground speed is too high for the selected scale. When this happens, the scale in the lower right corner alternates with Overzoom until the operator zooms out or pans the display until the present position can be centered. As the display is zoomed in or out, a scale value in the lower right corner of the display is updated to the new scale value. When present position cannot be maintained at the center of the display (due to zooming, not panning), or DAGR is preparing to display a new map, Working is displayed at the top of the page. Refer to Figure 9-51.



TPG1195_01

Figure 9-51. Image Viewer Page Working Display

9.7.2.4. Panning/Cursor. The operator uses the cursor control keys to pan (move) the display in any direction to any point of the map or image. A cursor appears when panning in any direction or by pushing the ENTER key. The entire map or image can be viewed through panning. Before panning is performed, the center of the display is either DAGR present position (waypoint 000) on a map or the center of an image or map (without present position). After panning to the edge of the display, the present position (when applicable) is no longer at the center of the display and any zoom in or zoom out functions reference the cursor, not the present position. Panning is deactivated by pushing the QUIT key or leaving the Image Viewer page. When panning is deactivated, the cursor is removed, and the display returns to the display shown prior to panning. If panning or movement of the DAGR to a new position causes the display to reach the boundary of map coverage, one of the following occurs:

- The DAGR automatically displays another map (if loaded) starting where the original map ends. If required, the scale automatically adjusts to display the other map with a different scale, and the DAGR displays Map Scale Changed.
- If no bordering map is loaded, the DAGR displays No Map Loaded/Enabled For This Position as shown in Figure 9-52.

Panning can also be performed by selecting a specific map using the Image Viewer page menu (refer to the keystroke map in Figure 9-54).

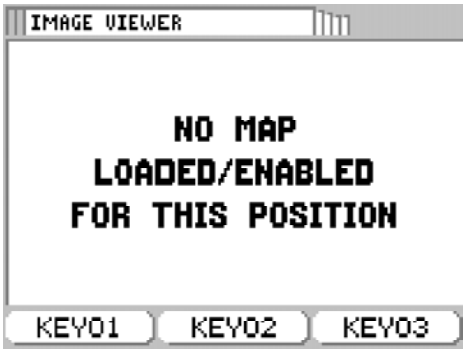


Figure 9-52. No Map Loaded or Enabled

9.7.2.5. Map Measurement Information Box. The operator can perform measurements between any two points on a map including DAGR present position, waypoints, and any other point using the cursor.

9.7.2.5.1. When a map is displayed and the operator pushes a cursor control key or the ENTER key, the cursor appears at the center of the display along with a measurement information box covering the toolbar function keys at the bottom of the display. The top of the information box is labeled Cursor and it provides azimuth and range measurement data from the DAGR present position to the cursor position on the map. Whenever the cursor is moved, the measurement data is automatically updated. When the cursor is not located at DAGR present position, a dashed measurement line appears between the cursor and present position. The measurement data blinks if the DAGR is not tracking satellites or does not have a current position fix. The cursor and the measurement information box are automatically removed if the operator leaves and returns to the Image Viewer page.

9.7.2.5.2. When the cursor is placed on a waypoint symbol, the waypoint becomes highlighted and is selected. When the waypoint is selected, a second box (next to the waypoint symbol) appears for five seconds showing the waypoint identity, number, and name. Refer to Figure 9-53. The top of the measurement information box shows the selected waypoint identity (unknown, friendly, hostile, or neutral), number, and name. The azimuth and range data from present position to the selected waypoint is also displayed. Elevation angle and slant range data can be added to the box using a menu selection. The operator can set the measurement starting (reference) point to a point other than present position and restart the measurement as many times as desired.

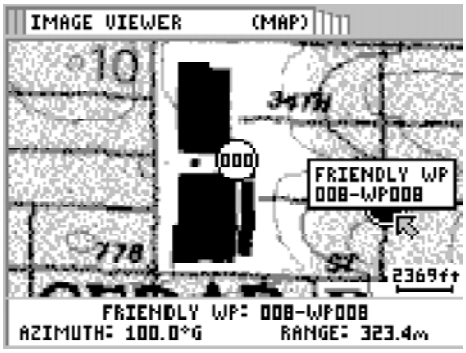


Figure 9-53. Map Waypoint Selected

9.7.2.6. Page Menu Selections. The Image Viewer page menu provides the selections listed as follows. Refer to Paragraph 9.7.3 for related procedures and additional information.

- **Center on Position** — Displays a map (if loaded) with DAGR present position at the center of the display.
- **Maps**

Select Map — Provides a listing of all loaded map names that the operator can select to view. When a map is selected that includes present position, the present position appears at the center of the display. If the selected map does not include present position, the center of the map appears at the center of the display.

Show Information — Provides a listing of all loaded map names. When the operator selects a map (or maps) from the listing, the map information (loaded with the map) is displayed. This information includes map name, identification, date, ellipsoid, horizontal datum, vertical datum, MAGVAR, MAGVAR date, and MAGVAR angular rate of change.

Setup — Provides a listing of all loaded map names. The operator can disable or enable any listed map. Only enabled maps are automatically displayed.

- **Images**

Select Image — Provides a listing of all loaded image names that the operator can select to view. When an image is selected, the center of the image appears at the center of the display.

Show Information — Provides a listing of all loaded image names. When the operator selects an image (or images) from the image listing, the image information (loaded with the image) is displayed.

- **View** — Provides operator selections for viewing waypoints, selecting range and angle units of measure, selecting north reference, hiding or showing the toolbar, and hiding or showing elevation angle and slant range measurement data.
- **Show/Edit** — Provides operator selections to edit waypoint position, name, remark, identity, access the Waypoint Editor page, or create a waypoint.
- **Restart Measurement Here** — Provides operator capability to perform measurements between any two points on the map with or without using present position.
- **Help** — Provides operator help text.

9.7.3. How To Use The Image Viewer Page.

The Image Viewer page provides raster map displays for viewing present position, map objects, and selected waypoints. The Image Viewer page also provides photographs or other non-map images. With a map loaded that includes present position, the Image Viewer page automatically displays the map with DAGR present position shown at the center of the display. The operator uses zooming and panning operations, and waypoint selections to obtain a desired view. Refer to the keystroke map, and use the associated editing practices found in Chapter 6 for setting up data and changing information.

NOTE

Maps used by the DAGR are created using C/JMTK Toolkit software and GPS Map Toolkit software described in Chapter 17.

9.7.3.1. The Image Viewer page supports raster map types controlled image base (CIB) and compressed arc digitized raster graphics (CADRG) (MIL-C-89038) in WGS-84 coordinates (true north up). The quantity of maps loaded into the DAGR is limited by factors such as map file sizes and DAGR memory capacity. Refer to Chapter 17 for map installation procedures.

9.7.3.2. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the Image Viewer page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Navigation, then push the ENTER key.
3. Highlight Image Viewer , then push the ENTER key. The Image Viewer page is displayed.

a. Set Up Units/References

NOTE

A map must be selected and displayed before units or references can be set up.

(1) Prior to using display data, view the page to determine if changes to units of measure or references used in the display are required (metric or decimal, mils or degrees, true or magnetic, etc.).

(2) When unit or reference changes are required, push the MENU key.

(3) Highlight View, then push the ENTER key.

(4) Highlight the desired type of units or north reference (listed as follows), then push the ENTER key. Other options are displayed not applicable to selecting units/references (e.g., View WPs).

- Select Range Units
- Select Angle Units
- Select North Ref

(5) Highlight the desired selection, then push the ENTER key.

(6) The page displays all associated information with the change made.

(7) If required, repeat the procedure for the remaining selections.

b. Display map with present position at center of display.

(1) From the Image Viewer page, push the MENU key.

(2) Highlight Center On POS, the push the ENTER key.

(3) The Image View page displays one of the following:

(a) Present position at center of display.

(b) No Map Loaded/Enabled For This Position if the DAGR does not have a map loaded and enabled that includes present position.

c. Select map.

(1) From the Image Viewer page, push the MENU key.

(2) Highlight Maps, then push the ENTER key.

(3) Highlight Select Map, then push the ENTER key.

(4) Highlight the desired map selection, then push the ENTER key.

(5) The Image Viewer page displays the selected map.

d. Select image.

(1) From the Image Viewer page, push the MENU key.

(2) Highlight Images, then push the ENTER key.

(3) Highlight Select Image, then push the ENTER key.

(4) Highlight the desired image selection, then push the ENTER key.

(5) The Image Viewer page displays the selected map.

e. Show map information.

(1) From the Image Viewer page, push the MENU key.

(2) Highlight Maps, then push the ENTER key.

(3) Highlight Show Information, then push the ENTER key.

(4) Select map(s) using one of the following steps.

NOTE

Only maps with a check mark displayed to the left of their map name are selected to show information.

(a) To select an individual map, highlight the desired map, then push the left or right cursor control key.

(b) To select all maps, push the MENU key. Highlight Select All, then push the ENTER key. The display returns to the map list showing all maps selected.

(5) Push the ENTER key.

(6) Map information is displayed. Use the cursor control keys to view all information.

(7) Push the QUIT key to remove the map information display.

f. Show image information.

(1) From the Image Viewer page, push the MENU key.

(2) Highlight Images, then push the ENTER key.

(3) Highlight Show Information, then push the ENTER key.

(4) Select image(s) using one of the following steps.

NOTE

Only images with a check mark displayed to the left of their image name are selected to show information.

(a) To select an individual image, highlight the desired map, then push the left or right cursor control key.

(b) To select all images, push the MENU key. Highlight Select All, then push the ENTER key. The display returns to the image list showing all maps selected.

(5) Push the ENTER key.

(6) Image information is displayed. Use the cursor control keys to view all information.

(7) Push the QUIT key to remove the image information display.

g. Enable or disable map capability to automatically display present position.

(1) From the Image Viewer page, push the MENU key.

(2) Highlight Maps, then push the ENTER key.

(3) Highlight Setup, then push the ENTER key.

(4) Enable or disable map(s) using one of the following steps.

NOTE

Only maps with a check mark displayed to the left of their map name are enabled.

(a) To enable or disable an individual map, highlight the desired map selection, then push the left or right cursor control key to enable or disable the selected map.

(b) To enable or disable all maps, push the MENU key. Highlight Select All (to enable all maps) or Deselect All (to disable all maps). Then push the ENTER key. The display returns to the map list showing all maps enabled or disabled.

(5) Push the ENTER key. The display returns to the Image Viewer page with the map(s) enabled or disabled.

h. Select waypoints to view.

(1) From the Image Viewer page, with the desired map displayed, push the MENU key.

(2) Highlight View, then push the ENTER key.

(3) Highlight View WPs, then push the ENTER key.

(4) Highlight the desired view waypoint selection (listed as follows), then push the ENTER key.

- **None** — Displays no waypoints.
- **Navigation** — Displays waypoints being used for navigation.

- **Operator-Selected** — Displays waypoints the operator preselected for viewing on the Image Viewer page. Individual waypoints are preselected for viewing using the Waypoint Editor page (refer to Paragraph 8.3).
- **NAV and Selected** — Displays both waypoints being used for navigation and operator selected waypoints.
- **All** — Displays all waypoints.

(5) The display returns to the Image Viewer page with the selected waypoint view.

i. Show or hide the toolbar window function keys.

(1) From the Image Viewer page, push the MENU key.

(2) Highlight View, then push the ENTER key.

(3) Highlight Show Toolbar or Hide Toolbar, as desired, then push the ENTER key.

NOTE

The Show Toolbar or Hide Toolbar menu choice is disabled when the measurement information box is displayed by the Image Viewer page.

(4) The display returns to the Image Viewer page with the toolbar either shown or hidden as previously selected.

NOTE

The show or hide toolbar selection affects both the Situational Awareness page and the Image Viewer page. The toolbar is shown or hidden, as previously selected, when viewing either of these pages and is not affected by cycling DAGR power.

j. Edit or create a waypoint.

NOTE

Present position waypoint 000 cannot be edited.

(1) Edit waypoint position.

(a) From the Image Viewer page with a map displayed, move the cursor (using cursor control keys) and highlight the desired waypoint to edit.

(b) Push the MENU key.

(c) Highlight Show/Edit, then push the ENTER key.

(d) Highlight Position, then push the ENTER key.

(e) Edit waypoint position coordinates, then push the ENTER key.

(f) If the waypoint is being used for navigation, an alert, or a route, the operator is prompted to confirm overwriting the waypoint before the display will return to the Image Viewer page.

(g) Waypoint Stored message is displayed and will automatically time out.

(h) Display returns to the Image Viewer page showing the waypoint with changes made.

(2) Edit waypoint name.

(a) From the Image Viewer page with a map displayed, move the cursor (using cursor control keys) and highlight the desired waypoint to edit.

(b) Push the MENU key.

(c) Highlight Show/Edit, then push the ENTER key.

(d) Highlight Name, then push the ENTER key.

(e) Edit name as desired, then push the MENU key.

(f) Highlight Save & Exit, then push the ENTER key.

(g) Waypoint Stored message is displayed and will automatically time out.

(h) The display returns to the Image Viewer page with the waypoint highlighted.

(3) Edit waypoint remark.

(a) From the Image Viewer page with a map displayed, move the cursor (using cursor control keys) and highlight the desired waypoint to edit.

(b) Push the MENU key.

(c) Highlight Show/Edit, then push the ENTER key.

(d) Highlight Remark, then push the ENTER key.

(e) Edit remark as desired, then push the MENU key.

(f) Highlight Save & Exit, then push the ENTER key.

(g) Waypoint Stored message is displayed and will automatically time out.

(h) The display returns to the Image Viewer page with the waypoint highlighted.

(4) Edit waypoint identity.

(a) From the Image Viewer page with a map displayed, move the cursor (using cursor control keys) and highlight the desired waypoint to edit.

(b) Push the MENU key.

(c) Highlight Show/Edit, then push the ENTER key.

(d) Highlight Identity, then push the ENTER key.

(e) Highlight the desired identity, then push the ENTER key.

(f) Waypoint Stored message is displayed and will automatically time out.

(g) The display returns to the Image Viewer page with the waypoint highlighted.

(5) Edit waypoint using the Waypoint Editor page.

(a) From the Image Viewer page with a map displayed, move the cursor (using cursor control keys) and highlight the desired waypoint to edit.

(b) Push the MENU key.

(c) Highlight Show/Edit, then push the ENTER key.

(d) Highlight Edit WP, then push the ENTER key.

(e) The Waypoint Editor page is displayed.

(f) When editing is performed, the operator is prompted to confirm overwriting the waypoint.

(g) Revise waypoint information as necessary. Refer to Paragraph 8.3 for information on using the Waypoint Editor page.

(h) Push the MENU key, highlight Save & Exit, then push the ENTER key.

(i) Waypoint Stored message is displayed and will automatically time out.

(j) The display returns to the Waypoints page with the revised waypoint highlighted.

(k) Push and hold the POS key until the Present Position page is displayed. Push the PAGE key or QUIT key to return to the Image Viewer page.

(6) Create a waypoint at a selected location.

(a) From the Image Viewer page with a map displayed, move the cursor (using cursor control keys) to a location desired to create a waypoint.

(b) Push the MENU key.

(c) Highlight Show/Edit, then push the ENTER key.

(d) Highlight Create WP Here, then push the ENTER key.

(e) A scrollable list displays all waypoints with the first unused waypoint highlighted.

(f) Highlight the desired waypoint to store in, then push the ENTER key. If an existing waypoint is selected, the operator is prompted to confirm before the waypoint is overwritten. A waypoint stored message briefly displays.

(g) The display returns to the Image Viewer page with cursor pointing to the new waypoint highlighted.

NOTE

The Image Viewer page view must be set to view all waypoints (refer to select waypoints to view procedure). Edit the created waypoint as required for use.

k. Perform measurement function.

(1) Start measurement function.

(a) From the Image Viewer page with a map displayed, use cursor control keys to place the cursor at the desired point or waypoint to measure range from present position. A dashed line interconnects the measurement points.

(b) At the bottom of the page, a measurement box covers the toolbar. A second box also appears for five seconds next to the selected point with identification information.

NOTE

The measurement box provides azimuth, range, elevation angle (ELA) (optional), and slant range (SR) (optional) data referencing present position (starting point) to cursor (selected point). When a waypoint is not selected by the cursor, the top line of the measurement box is labeled Cursor. When a waypoint is selected, the top line of the measurement box provides the waypoint identity type, number, and name.

(c) Perform the following steps to add or remove the optional ELA and SR data.

1 Push the MENU key.

2 Highlight View, then push the ENTER key.

3 Highlight either Show ELA and SR or Hide ELA and SR, then push the ENTER key.

4 The display returns to the Image Viewer page with ELA and SR measurement box data added or removed, as selected.

NOTE

If you return to the measurement function after cycling DAGR power, ELA and SR data is automatically removed from the measurement box.

(d) Move the cursor as desired to measure other points from present position. The measurement box automatically updates measurement data.

(e) Push the QUIT key to exit the measurement function and remove the measurement box and cursor.

(f) After leaving the measurement function, the default scale is displayed on the map.

(2) Restart measurement function.

NOTE

The operator uses this function to restart the measurement using a selected starting point other than present position. The measurement function must already be in process before restarting is possible.

(a) With the Image Viewer page displayed and a measurement function previously started, move the cursor to the desired new starting point (dashed line remains connected to previous starting point), then push the MENU key.

(b) Highlight Restart Meas Here, then push the ENTER key.

(c) The dashed line is removed. The cursor position is the new starting point, and the information in the measurement box is reset.

(d) Move the cursor to the desired point or waypoint to measure range to (dashed line connects from new starting point) and the information in the measurement box updates automatically.

(e) Move the cursor as desired to measure other points from the starting point. The measurement box automatically updates measurement data.

(f) Repeat this procedure for any amount of starting points needed.

(g) Push the QUIT key to exit the measurement function and remove the cursor and measurement box.

(h) After leaving the measurement function, the default scale is displayed on the map.

l. Clear maps and images.

CAUTION

When the clear maps and images procedure is performed, **all maps and images** loaded into the DAGR are removed. DAGR support of a particular mission can become seriously impaired without the required maps or images.

(1) From any display (except a message pop-up), push the MENU key twice to display the Main Menu.

(2) Highlight System, then push the ENTER key.

(3) Highlight Data Clear Options, then push the ENTER key.

(4) From the clear data message display, use the cursor control keys to scroll to Maps/Images.

(5) Push the ENTER key to confirm and perform the clear data function.

NOTE

• If the QUIT key is pushed to cancel the clear data function, the display returns to the last page viewed.

• After the maps/images clear data function has started, DAGR displays an in progress message that states no DAGR functions are available until the clear data function has been completed.

(6) Push the ENTER key to acknowledge the clear data passed message. The display returns to the POS page set.

9.7.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 9-54 shows the keystroke map for the Image Viewer page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Image Viewer page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the POS page set. If the POS page set has been customized to not include the Image Viewer page, using the PAGE or QUIT keys will scroll through the pages of the Navigation submenu instead of the POS page set.

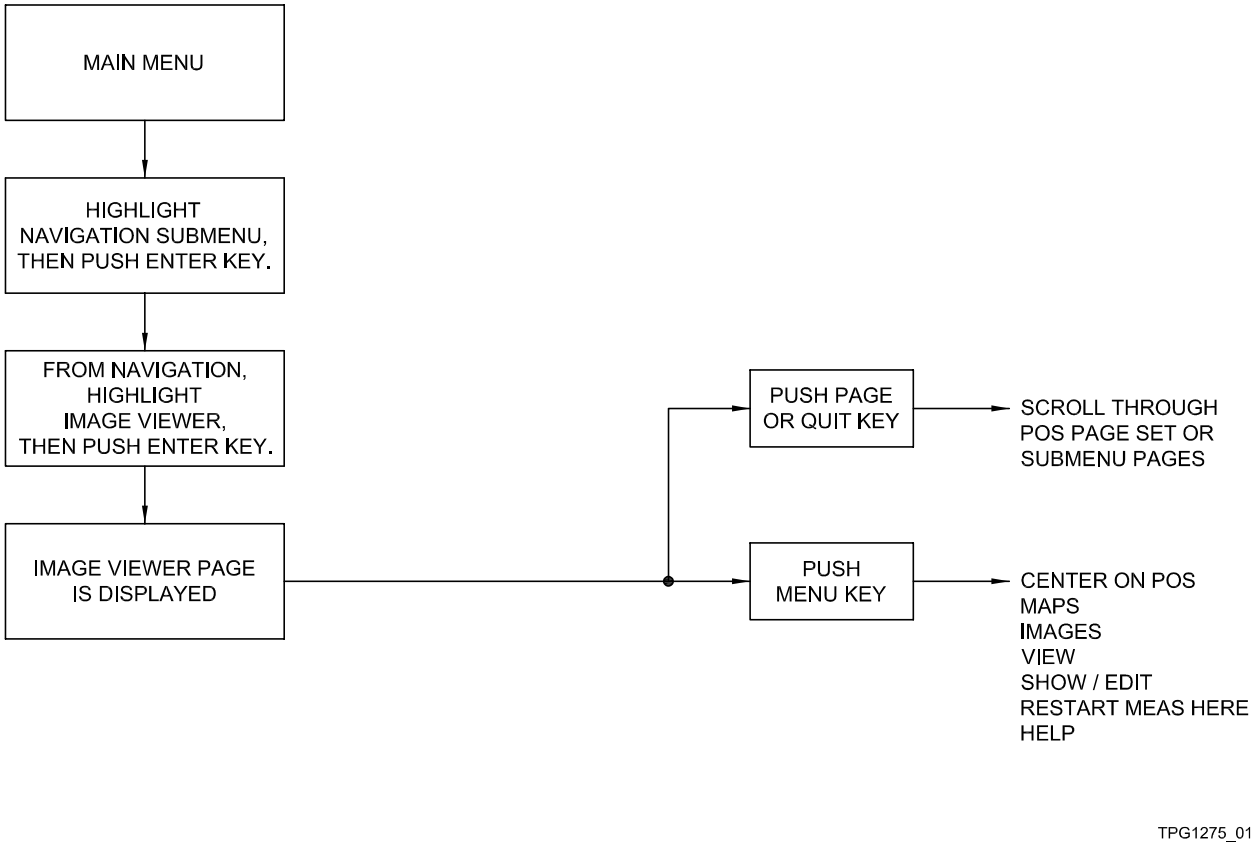


Figure 9-54. Image Viewer Page Keystroke Map

CHAPTER 10
OPERATOR INSTRUCTIONS — DISPLAY SETUP SUBMENU OPERATION

10.1. DISPLAY SETUP SUBMENU.

This chapter contains Display Setup submenu operation information. The Display Setup submenu page set provides the following page selections described in this chapter:

- Units
- Internal Compass
- Light/Contrast
- Customize (Advanced)
- User Datums
- User Grids (Advanced)

10.2. UNITS PAGE.

10.2.1. Page Function.

The Units page is accessed from the Display Setup submenu. The Units page allows the operator to select appropriate units used to format data of other displays. The operator performs display configuration setup of the datum, coordinate and grid system, elevation reference, MAGVAR type (Calculated-WMM, Local, or NAV (Navigation) Waypoint), and units of measure. The operator selects the grid resolution (1, 10, 100, or 1000 units) used by the receiver to display grid coordinates. Grid resolution is not selectable when using a latitude/longitude coordinate grid system. Vertical scrolling is provided to view all page fields as shown in Figure 10-1.

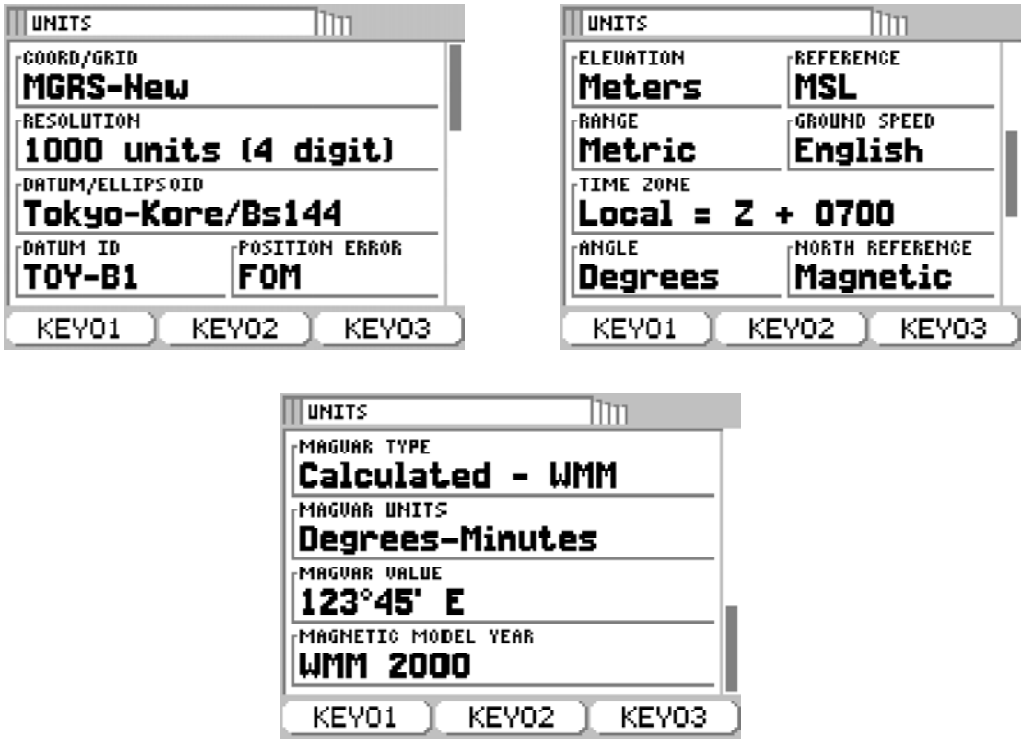


Figure 10-1. Units Page

10.2.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 10-3. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

10.2.2.1. Coord/Grid Field.

NOTE

For some coordinate/grid systems, position data may be rounded by approximately 1 meter or grid north variance resolution may be limited to 1 mil.

Displays the selected coordinate/grid system used when displaying position data. The coordinate system specifies the reference point and units of measure used to define the current position. Coordinate/grid system selections are shown in Table 10-1. Some coordinate/grid systems are available only when using the advanced function set as designated in Table 10-1.

Table 10-1. Coordinate/Grid System Selections

Coordinate/Grid System ID	Coordinate/Grid System Name
BNG	British National Grid
BrnRSO (Advanced)	Borneo Rectified Skew Orthomorphic Grid
CeylonB (Advanced)	Ceylon Belt
In-I (Advanced)	India Zone I
In-IIA (Advanced)	India Zone IIA
In-IIB (Advanced)	India Zone IIB
In-IIIA (Advanced)	India Zone IIIA
In-IIIB (Advanced)	India Zone IIIB
In-IVA (Advanced)	India Zone IVA
In-IVB (Advanced)	India Zone IVB
ITMG	Irish Transverse Mercator Grid
L/L Deg	Latitude/Longitude Degrees
L/L dm	Latitude/Longitude Degrees Minutes
L/L dms	Latitude/Longitude Degrees Minutes Seconds
MalayRSO (Advanced)	West Malaysian Rectified Skew Orthomorphic Grid
Mdgascr (Advanced)	Madagascar grid
MGRS-New	Military Grid Reference
MGRS-Old	Military Grid Reference
NAlgerie (Advanced)	Nord Algerie Grid
NEI (Advanced)	Netherlands East Indies Equatorial Zone
NMaroc (Advanced)	Nord Maroc Grid
NTunisie (Advanced)	Nord Tunisie Grid
NZMG (Advanced)	New Zealand Map Grid
RT90 (Advanced)	Swedish National Grid System
SAlgerie (Advanced)	Sud Algerie Grid
SMaroc (Advanced)	Sud Maroc Grid
STunisie (Advanced)	Sud Tunisie Grid
Sys42 (Advanced)	Gauss Krassovsky System 1942 Grid
USNG	United States National Grid
UTM/UPS	Universal Transverse Mercator Grid Universal Polar Stereographic Grid
GRID1 (Advanced)	User defined
GRID2 (Advanced)	User defined
GRID3 (Advanced)	User defined

Table 10-1. Coordinate/Grid System Selections - Continued

Coordinate/Grid System ID	Coordinate/Grid System Name
GRID4 (Advanced)	User defined
GRID5 (Advanced)	User defined
GRID6 (Advanced)	User defined

NOTE

The operator can change the names of Grid 1 through Grid 6. Refer to the User Grids page (Paragraph 10.7) in this chapter for information on these selections.

10.2.2.2. Resolution Field. Displays the level of grid resolution selected when displaying position in grid coordinates. When not using MGRS-New or MGRS-Old coordinate grid system, resolution selections are 1, 10, 100, or 1000 units. When using MGRS-New or MGRS-Old coordinate grid system, resolution selections are 1 (10 digit), 10 (8 digit), 100 (6 digit), or 1000 (4 digit) units. The Resolution field does not apply and is disabled when DAGR is using a latitude/longitude coordinate grid system.

10.2.2.3. Datum/Ellipsoid Field. Displays the selected datum name reference used when displaying position. Refer to Table 10-3 for a list of datum name selections in alphabetical order by datum ID. The field editor used to edit this field (refer to the keystroke map in Figure 10-3) provides the datums listed in alphabetical order by datum name. The selection of a map datum defines an elevation datum and ellipsoid reference used when displaying position. Older maps use spheroid, newer maps use ellipsoid.

10.2.2.3.1. A datum is a representation of the surface of the earth. Some datums encompass the entire globe, while others are more localized for more precise values. All receiver position data is referenced to the selected datum. Maps have two associated datums: horizontal and vertical (elevation). For proper orientation, always check the name of the Elevation Datum and Ellipsoid printed on the map being used.

10.2.2.4. Datum ID Field. Displays the selected datum ID reference used when displaying position. Refer to Table 10-3 for a list of datum ID selections in alphabetical order as they appear in the field editor (refer to the keystroke map in Figure 10-3). The selection of a map datum defines an elevation datum and ellipsoid reference used when displaying position.

10.2.2.5. Position Error Field. Displays the selected position error type used when displaying position error. Selection choices are EPE (Estimated Position Error), figure of merit (FOM), EHE (Estimated Horizontal Error), and EVE (Estimated Vertical Error). Field data displayed for EPE, EHE, and EVE fields is in miles, nautical miles, or kilometers, and feet, yards, or meters.

10.2.2.6. Elevation Field. Displays the selected elevation units used when displaying elevation. Selection choices are Meters or Feet.

10.2.2.7. Reference Field. Displays the selected elevation reference used when displaying elevation. Selection choices are MSL (Mean Sea Level) or DTM (Datum) referencing the operator selected datum.

10.2.2.8. Range Field. Displays the selected range units used when displaying range. Selection choices are Metric (km, m), English (mi, ft), and Nautical (nm, yd). Range units include approach horizontal range, and EPE/EHE/EVE/XTE field data.

10.2.2.9. Ground Speed Field. Displays the selected speed units used when displaying ground speed. Selection choices are Metric (kph), English (mph), and Nautical (kts).

10.2.2.10. Time Zone Field. Time zone is Zulu (Z) or Local (L). Zulu time is offset by the operator for local time zones as referenced in Table 10-2. DAGR page fields display time as hours, minutes and seconds, or hours and minutes.

Table 10-2. Local Time Zone Offset

Local Time Zone Offset List		
Zulu	Local = Z + 0800	Local = Z - 0930
Local = Z + 0000	Local = Z + 0900	Local = Z - 0900

Table 10-2. Local Time Zone Offset - Continued

Local Time Zone Offset List		
Local = Z + 0100	Local = Z + 0930	Local = Z - 0830
Local = Z + 0200	Local = Z + 1000	Local = Z - 0800
Local = Z + 0300	Local = Z + 1030	Local = Z - 0700
Local = Z + 0330	Local = Z + 1100	Local = Z - 0600
Local = Z + 0400	Local = Z + 1130	Local = Z - 0500
Local = Z + 0430	Local = Z + 1200	Local = Z - 0400
Local = Z + 0500	Local = Z + 1300	Local = Z - 0330
Local = Z + 0530	Local = Z + 1400	Local = Z - 0300
Local = Z + 0600	Local = Z - 1200	Local = Z - 0200
Local = Z + 0630	Local = Z - 1100	Local = Z - 0100
Local = Z + 0700	Local = Z - 1000	

10.2.2.11. Angle Field. Displays the selected angular units used when displaying angles (e.g., azimuth, track). Selection choices are Mils, Degrees, and Strecks.

10.2.2.12. North Reference Field. Displays the selected north reference used when displaying track or azimuth. Selection choices are True, Magnetic, and Grid.

10.2.2.13. MAGVAR Type Field.

Do not select NAV Waypoint MAGVAR type. If NAV Waypoint MAGVAR type is selected, track will be incorrect.

Displays the selected magnetic variation (MAGVAR) type used when displaying track or azimuth. Selections are Calculated-WMM, Local, and NAV Waypoint (Advanced). At a given position, MAGVAR is the horizontal angle from true north to magnetic north, east or west according to whether magnetic north lies east or west of true north. Refer to Figure 10-2.

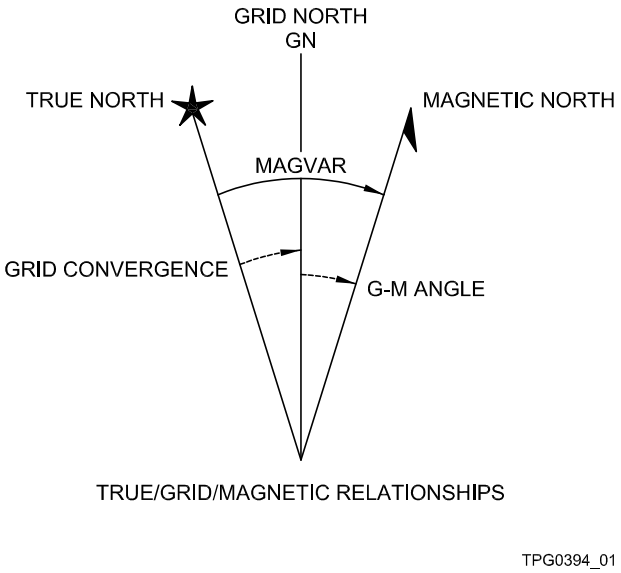


Figure 10-2. True/Grid/Magnetic Relationships

10.2.2.13.1. The DAGR provides three operator selected choices of MAGVAR type for calculating magnetic angles.

- **Calculated-WMM** — Uses the world magnetic model (WMM), an algorithm updated every five years to calculate appropriate magnetic angle.
- **Local** — The operator can enter and use a local MAGVAR value for present position or for any waypoint. This accommodates operation in those parts of the world with unique conditions, such as large underground ore deposits.
- **NAV Waypoint (Advanced)** — Uses the navigation waypoint MAGVAR value as determined by the navigation waypoints MAGVAR type. This replicates an electronic ground based navigation aid. NAV Waypoint cannot be selected as a MAGVAR type for a waypoint entry.

10.2.2.14. MAGVAR Units Field. Displays the selected MAGVAR units used when displaying MAGVAR. Selection choices are Degrees, Degrees-Minutes, Mils, and Strecks.

10.2.2.15. MAGVAR Value Field. Displays the MAGVAR value used (as determined by the MAGVAR Type field) when displaying azimuth or track. The MAGVAR Type field must be set to Local before a MAGVAR value can be entered and then used by the operator. Before using a value from this field, appropriate units and MAGVAR Type must be selected. Field data format is as follows:

- **Degrees units selected** — Format is DDD.D E/W, where D represents degrees and E/W represents east or west.
- **Degrees-Minutes units selected** — Format is DDD°MM' E/W, where D represents degrees, M represents minutes, and E/W represents east or west.
- **Mils or Strecks units selected** — Format is NNNN E/W, where N represents mils or strecks, and E/W represents east or west.

10.2.2.16. Magnetic Model Year Field. Displays the year of the world magnetic model (WMM) used if the MAGVAR type is set to Calculated. This field cannot be edited by the operator.

10.2.3. How To Use The Units Page.

This page contains information used to configure and set up the DAGR units of measure and references shown on the display. Information set on this page is reflected throughout all other DAGR pages of information. The units of measure and reference information (e.g. elevation, ground speed, track and north reference) can also be changed on other pages, and when done, those changes are reflected here on the Units page and also wherever those changes are applicable on other pages. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting data and changing field information.

10.2.3.1. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Display Setup, then push the ENTER key.
3. Highlight Units, then push the ENTER key. The Units page is displayed.

a. From the Units page, push the ENTER key to highlight a field. Push the ENTER key again for edit capabilities of the field.

NOTE

All fields are edited using a list editor except the MAGVAR Value field which uses a number editor, and the Magnetic Model Year field which is for information only. Elevation, Ground Speed, and Range fields are units of measure that are also changed in other procedures on various DAGR pages (e.g. Waypoints/Routes/Alerts Chapter 8). The Datum/Ellipsoid and Datum ID fields interact with each other.

b. Revise the selected field with appropriate information, then push the ENTER key to save changes to that field.

c. Use the cursor control keys and the ENTER key in a similar manner to individually revise all of the remaining fields as required.

10.2.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 10-3 shows the keystroke map for the Units page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Units page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Display Setup submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

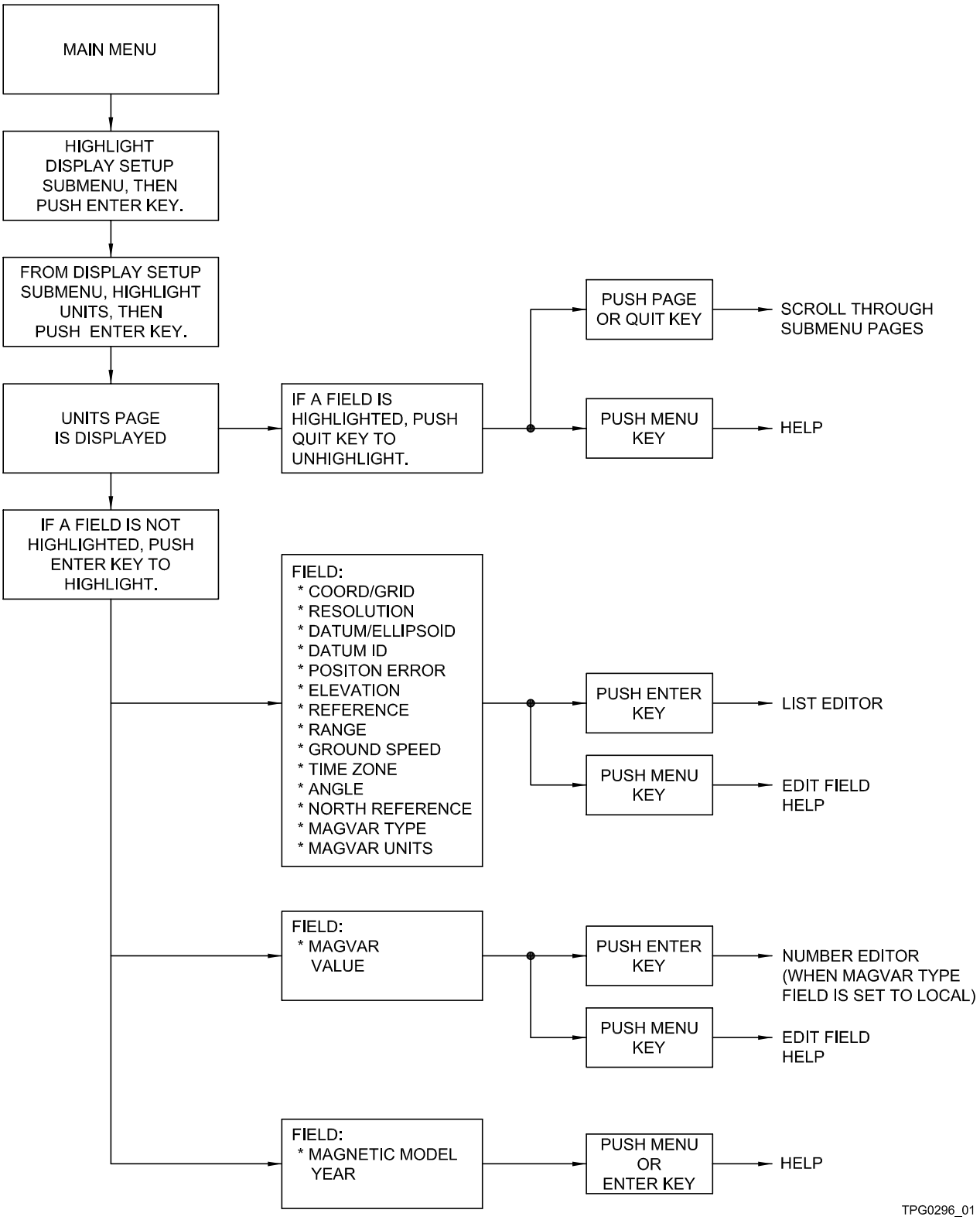


Figure 10-3. Units Page Keystroke Map.

Table 10-3. Map Datums

Datum Code	Datum Description	Datum Name	Ellipsoid
ADI-A	ADIND-Ethi/Clk80	Adindan - Ethiopia	Clarke 1880
ADI-B	ADIND-Suda/Clk80	Adindan - Sudan	Clarke 1880
ADI-C	ADIND-Mali/Clk80	Adindan - Mali	Clarke 1880
ADI-D	ADIND-Sene/Clk80	Adindan - Senegal	Clarke 1880
ADI-E	ADIND-Burk/Clk80	Adindan - Burkina Faso	Clarke 1880
ADI-F	ADIND-Camr/Clk80	Adindan - Cameroon	Clarke 1880
ADI-M	ADIND-Mean/Clk80	Adindan - Mean Solution (Ethiopia and Sudan)	Clarke 1880
AFG	Somalia /Krs40	Afgooye - Somalia	Krassovsky 1940
AIA	AntiguaIsl/Clk80	Antigua Island Astro 1943 - Antigua and Leeward Islands	Clarke 1880
AIN-A	Ain70-Bahr/Int24	Ain EL ABD 1970 - Bahrain Island	International 1924
AIN-B	AinElABD70/Int24	Ain EL ABD 1970 - Saudi Arabia	International 1924
AMA	AmerSamo62/Clk66	American Samoa 1962 - American Samoa Islands	Clarke 1866
ANO	AnnaAstr65/AusNa	Anna 1 Astro 1965 - Coco Islands	Australian National
ARF-A	ARC50-Bots/Clk80	ARC 1950 - Botswana	Clarke 1880
ARF-B	ARC50-Leso/Clk80	ARC 1950 - Lesotho	Clarke 1880
ARF-C	ARC50-Mala/Clk80	ARC 1950 - Malawi	Clarke 1880
ARF-D	ARC50-Swaz/Clk80	ARC 1950 - Swaziland	Clarke 1880
ARF-E	ARC50-Zair/Clk80	ARC 1950 - Zaire	Clarke 1880
ARF-F	ARC50-Zamb/Clk80	ARC 1950 - Zambia	Clarke 1880
ARF-G	ARC50-Zimb/Clk80	ARC 1950 - Zimbabwe	Clarke 1880
ARF-H	ARC50-Buru/Clk80	ARC 1950 - Burundi	Clarke 1880
ARF-M	ARC 1950-M/Clk80	ARC 1950 - Mean Solution (Botswana, Lesotho, Malowi, Swaziland, Zaire, Zambia, Zimbabwe)	Clarke 1880
ARS	ARC 1960 /Clk80	ARC 1960	Clarke 1880
ARS-A	ARC60-Keny/Clk80	ARC 1960 - Kenya	Clarke 1880
ARS-B	ARC60-Tanz/Clk80	ARC 1960 - Tanzania	Clarke 1880
ARS-M	ARC 1960 /Clk80	ARC 1960 - Mean Solution (Kenya and Tanzania)	Clarke 1880
ASC	AscensionI/Int24	Ascension Island 1958 - Ascension Island	International 1924
ASM	MontseIs58/Clk80	Montserrat Island Astro 1958 - Montserrat and Leeward Islands	Clarke 1880
ASQ	MarcusIs52/Int24	Astronomical Station 1952-Marcus Island	International 1924
ATF	Astro45Iwo/Int24	Astro Beacon “E” 1945-Iwo Jima	International 1924
AUA	Austral.66/AusNa	Australian Geodetic 1966 - Australia and Tasmania	Australian National
AUG	Austral.84/AusNa	Australian Geodetic 1984 - Australia and Tasmania	Australian National
BAT	Djakarta /Bsl41	Djakarta (Batavia) - Sumatra (Indonesia)	Bessel 1841

Table 10-3. Map Datums - Continued

Datum Code	Datum Description	Datum Name	Ellipsoid
BBOHM	BesselBohm/Bs141	Bessel-Bohm (Sweden)	Bessel 1841
BER	Bermuda57 /Clk66	Bermuda 1957 - Bermuda Islands	Clarke 1866
BID	BissauGuin/Int24	Bissau - Guinea-Bissau	International 1924
BOO	Bogota Obs/Int24	Bogota Observatory - Colombia	International 1924
BUR	BukitRimpa/Bsl41	Bukit Rimpah-Bangka and Belitung Islands (Indonesia)	Bessel 1841
CAC	CapeCanav /Clk66	Cape Canaveral - Mean Solution (Florida and Bahamas)	Clarke 1866
CAI	Campo Inch/Int24	Campo Inchauspe 1969 - Argentina	International 1924
CAO	CantAstr66/Int24	Canton Astro 1966 - Phoenix Islands	International 1924
CAP	Cape/Clk80	Cape - South Africa	Clarke 1880
CAZ	CampMcMurd/Int24	Camp Area Astro - Camp McMurdo Area, Antarctica	International 1924
CCD	S-JTSKCzec/Bsl41	S-JTSK - Czechoslovakia	Bessel 1841
CGE	Carthage /Clk80	Carthage - Tunisia	Clarke 1880
CHI	Chatham 71/Int24	Chatham Island Astro 1971 - Chathan Island (New Zealand)	International 1924
CHU	Chua Astro/Int24	Chua Astro - Paraguay	International 1924
COA	Corrego Al/Int24	Corrego Alegre - Brazil	International 1924
DAL	DabolaGuin/Clk80	Dabola - Guinea	Clarke 1880
DID	DecepIslan/Clk80	Deception Island - Deception Island and Antarctica	Clarke 1880
DOB	GuadalCana/Int24	Gux 1 Astro - Guadalcanal Island	International 1924
EAS	EasterIs67/Int24	Easter Island 1967 - Easter Island	International 1924
ENW	Wake-Eni60/Hou60	Wake-Eniwetok 1960 - Marshall Islands	Hough 1960
EST	Estonia37 /Bsl41	Co-ordinate System 1937 of Estonia - Estonia	Bessel 1841
EUR-A	Eur50-West/Int24	European 1950 - West Europe (Limited to Austria, Denmark, France, FRG - Federal Republic of Germany, Netherlands and Switzerland)	International 1924
EUR-B	Eur50-Grce/Int24	European 1950 - Greece	International 1924
EUR-C	Eur50-Norw/Int24	European 1950 - Norway and Finland	International 1924
EUR-D	Eur50-Spai/Int24	European 1950 - Portugal and Spain	International 1924
EUR-E	Eur50-Cypr/Int24	European 1950 - Cyprus	International 1924
EUR-F	Eur50-Egyp/Int24	European 1950 - Egypt	International 1924
EUR-G	Eur50-Engl/Int24	European 1950 - England, Channel Islands, Scotland, and Shetland Island	International 1924
EUR-H	Eur50-Iran/Int24	European 1950 - Iran	International 1924
EUR-I	Eur50-Sard/Int24	European 1950 - Sardinia (Italy)	International 1924
EUR-J	Eur50-Scly/Int24	European 1950 - Sicily (Italy)	International 1924

Table 10-3. Map Datums - Continued

Datum Code	Datum Description	Datum Name	Ellipsoid
EUR-K	Eur50-UK /Int24	European 1950 - England, Ireland, Scotland and Shetland Island	International 1924
EUR-L	Eur50-Malt/Int24	European 1950 - Malta	International 1924
EUR-M	Eur50-Mean/Int24	European 1950 - Mean Solution (Austria, Belgium, Denmark, Finland, France, FRG - Federal Republic of Germany, Gibraltar, Greece, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden and Switzerland)	International 1924
EUR-S	Eur50-MidE/Int24	European 1950 - Iraq, Israel, Jordan, Kuwait, Lebanon, Saudi Arabia and Syria	International 1924
EUR-T	Eur50-Tuni/Int24	European 1950 - Tunisia	International 1924
EUS	European79/Int24	European 1979 - Mean Solution (Austria, Finland, Netherlands, Norway, Spain, Sweden and Switzerland)	International 1924
FAH	Oman/Clk80	Oman - Oman	Clarke 1880
FLO	Azores39 /Int24	Observatorio Meteorologico 1939 - Corvo and Flores Islands (Azores)	International 1924
FOT	Ft.Tom55 /Clk80	Fort Thomas 1955 - Nevis, St. Kitts and Leeward Islands	Clarke 1880
GAA	Gan 70 /Int24	Gan 1970 - Republic of Maldives	International 1924
GEO	Geo Dtm 49/Int24	Geodetic Datum 1949 - New Zealand	International 1924
GIZ	GizoIs68 /Int24	Dos 1968 - Gizo Island (New Georgia Islands)	International 1924
GRA	Azores48 /Int24	Graciosa Base SW 1948 - Faial, Graciosa, Pico, Sao Jorge and Terceira Islands (Azores)	International 1924
GSE	Kalimanta /Bsl41	Gunung Segara-Kalimantan (Indonesia)	Bessel 1841
GUA	Guam63 /Clk66	Guam 1963 - Guam	Clarke 1866
HEN	Afghanist /Int24	Herat North - Afghanistan	International 1924
HER	Yugoslav /Bsl41	Hermannskogel - Yugoslavia (prior to 1990)Slovenia, Croatia, Bosnia and Herzegovina, Serbia	Bessel 1841
HIT	SoChile63 /Int24	Provisional South Chilean 1963 - Southern Chile (near 53° S)	International 1924
HJO	Hjorsey 55/Int24	Hjorsey 1955 - Iceland	International 1924
HKD	HongKong63/Int24	Hong Kong 1963 - Hong Kong	International 1924
HTN	HuTzuShan /Int24	Hu-Tzu-Shan - Taiwan	International 1924
IBE	Bellevue /Int24	Bellevue (IGN) - Efate and Erromango Islands	International 1924
IDN	IND74-Indo/Ind74	Indonesian 1974 - Indonesia	Indonesian 1974
IND-B	IND-Bangla/Evr30	Indian - Bangladesh	Everest 1830
IND-I	IND-In-Npl/Evr56	Indian - India and Nepal	Everest 1956
IND-S	IND-India /Evr30	Indian - India	Everest 1830

Table 10-3. Map Datums - Continued

Datum Code	Datum Description	Datum Name	Ellipsoid
IND-P	IND-Pakis /Evrst	Indian - Pakistan	Everest
INF-A	IND54-Thai/Evr30	Indian 1954 - Thailand	Everest 1830
ING-A	IND60-Viet/Evr30	Indian 1960 - Vietnam (Near 16° N)	Everest 1830
ING-B	IND60-CSI /Evr30	Indian 1960 - Con Son Island (Vietnam)	Everest 1830
INH-A	IND75-Thai/Evr30	Indian 1975 - Thailand	Everest 1830
INH-A1	IND75-Thai/Evr30	Indian 1975 - Thailand Cycle 1	Everest 1830
IRL	Ireland 65/MAiry	Ireland 1965 - Ireland	Modified Airy
ISG	SGeorgiaIs/Int24	ISTS 061 Astro 1968 - South Georgia Island	International 1924
IST	DiegoGarci/Int24	ISTS 073 Astro 1969 - Diego Garcia	International 1924
JOH	JohnsIs61 /Int24	Johnston Island 1961 - Johnston Island	International 1924
KAN	Kandawala /Evr30	Kandawala - Sri Lanka	Everest 1830
KEA	Kertau 48 /Evr48	Kertau 1948 - West Malaysia and Singapore	Everest 1948
KEG	KergueIs49/Int24	Kerguelen Island 1949 - Kerguelen Island	International 1924
KGS	SouthKorea/WGS84	Korean Geodetic System 1995 - South Korea	WGS-84
KUS	KusaiAst51/Int24	Kusaie Astro 1951 - Caroline Islands, Fed. States of Micronesia	International 1924
LCF	LC5Astro61/Clk66	L.C.5 Astro 1961 - Cayman Brac Island	Clarke 1866
LEH	Leigon/Clk80	Leigon - Ghana	Clarke 1880
LIB	Liberia 64/Clk80	Liberia 1964 - Liberia	Clarke 1880
LUZ-A	Luzon-Phil/Clk66	Luzon - Philippines (Excluding Mindanao Island)	Clarke 1866
LUZ-B	Luzon-Mind/Clk66	Luzon - Mindanao Island	Clarke 1866
MAS	Massawa/Bsl41	Massawa - Eritrea (Ethiopia)	Bessel 1841
MER	Merchich /Clk80	Merchich - Morocco	Clarke 1880
MID	MdwayAst61/Int24	Midway Astro 1961 - Midway Islands	International 1924
MIK	MaheIs71 /Clk80	Mahe 1971 - Mahe Island	Clarke 1880
MIN-A	Minna-Came/Clk80	Minna - Cameroon	Clarke 1880
MIN-B	Minna/Clk80	Minna - Nigeria	Clarke 1880
MOD	Rome40-Sar/Int24	Rome 1940 - Sardinia	International 1924
MPO	Mpor-Gabon/Clk80	M'Poraloko - Gabon	Clarke 1880
MVS	VitiLev16 /Clk80	Viti Levu 1916 - Viti Levu Island (Fiji Islands)	Clarke 1880
NAH-A	NahrwanMIs/Clk80	Nahrwan - Masirah Island (Oman)	Clarke 1880
NAH-B	NahrwanUAE/Clk80	Nahrwan - United Arab Emirates	Clarke 1880
NAH-C	Nahrwan/Clk80	Nahrwan - Saudi Arabia	Clarke 1880
NAP	Naparima /Int24	Naparima, BWI - Trinidad and Tobago	International 1924

Table 10-3. Map Datums - Continued

Datum Code	Datum Description	Datum Name	Ellipsoid
NAR	NA83CONUS /GRS80	North American 1983 - CONUS	GRS 80
NAR-A	NA83Alaska/GRS80	North American 1983 - Alaska (Excluding Aleutian Islands)	GRS 80
NAR-B	NA83Canada/GRS80	North American 1983 - Canada	GRS 80
NAR-C	NA83CONUS /GRS80	North American 1983 - CONUS	GRS 80
NAR-D	NA83Mexico/GRS80	North American 1983 - Mexico and Central America	GRS 80
NAR-E	NA83Aleuti/GRS80	North American 1983 - Aleutian Islands	GRS 80
NAR-H	NA83Hawaii/GRS80	North American 1983 - Hawaii	GRS 80
NAS-A	NA27EastUS/Clk66	North American 1927 - Eastern United States (Alabama, Connecticut, Delaware, District of Columbia, Florida, Georgia, Illinois, Indiana, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Vermont, Virginia, West Virginia, and Wisconsin)	Clarke 1866
NAS-B	NA27WestUS/Clk66	North American 1927 - Western United States (Arizona, Arkansas, California, Colorado, Idaho, Iowa, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming)	Clarke 1866
NAS-C	NA27CONUS /Clk66	North American 1927 - Mean Solution (CONUS)	Clarke 1866
NAS-D	NA27Alaska/Clk66	North American 1927 - Alaska (Excluding Aleutian Islands)	Clarke 1866
NAS-E	NA27Canada/Clk66	North American 1927 - Canada Mean Solution (Including Newfoundland)	Clarke 1866
NAS-F	NA27AlbBrC/Clk66	North American 1927 - Alberta and British Columbia	Clarke 1866
NAS-G	NA27ECanad/Clk66	North American 1927 - Eastern Canada (Newfoundland, New Brunswick, Nova Scotia, and Quebec)	Clarke 1866
NAS-H	NA27ManOnt/Clk66	North American 1927 - Manitoba and Ontario	Clarke 1866
NAS-I	NA27NWTSas/Clk66	North American 1927 - Northwest Territories and Saskatchewan	Clarke 1866
NAS-J	NA27Yukon /Clk66	North American 1927 - Yukon	Clarke 1866
NAS-L	NA27Mexico/Clk66	North American 1927 - Mexico	Clarke 1866
NAS-N	NA27CentAm/Clk66	North American 1927 - Central America (Belize, Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua)	Clarke 1866
NAS-O	NA27CanalZ/Clk66	North American 1927 - Canal Zone	Clarke 1866
NAS-P	NA27Caribb/Clk66	North American 1927 - Caribbean (Antigua Island, Barbados, Barbuda, Caicos Islands, Cuba, Dominican Republic, Grand Cayman, Jamaica, and Turks Islands)	Clarke 1866

Table 10-3. Map Datums - Continued

Datum Code	Datum Description	Datum Name	Ellipsoid
NAS-Q	NA27Bahama/Clk66	North American 1927 - Bahamas (Excluding San Salvador)	Clarke 1866
NAS-R	NA27SanSal/Clk66	North American 1927 - San Salvador Island	Clarke 1866
NAS-T	NA27Cuba /Clk66	North American 1927 - Cuba	Clarke 1866
NAS-U	NA27Greenl/Clk66	North American 1927 - Greenland (Hayes Peninsula)	Clarke 1866
NAS-V	NA27EaluIs/Clk66	North American 1927 - Aleutian Islands (East of 180° W)	Clarke 1866
NAS-W	NA27WaluIs/Clk66	North American 1927 - Aleutian Islands (West of 180° W)	Clarke 1866
NSD	No Sah 59/Clk80	North Sahara 1959 - Algeria	Clarke 1880
OEG	OldEgypt07/Hlm06	Old Egyptian 1907 - Egypt	Helmert 1906
OGB-A	OSGB36-Engl/Airy	Ordinance Survey Great Britain 1936 - England	Airy
OGB-B	OSGB36-EnWa/Airy	Ordinance Survey Great Britain 1936 - England, Isle of Man, and Wales	Airy
OGB-C	OSGB36-Scot/Airy	Ordinance Survey Great Britain 1936 - Scotland and Shetland Islands	Airy
OGB-D	OSGB36-Wale/Airy	Ordinance Survey Great Britain 1936 - Wales	Airy
OGB-M	OrdSrvGB36/Airy	Ordinance Survey Great Britain 1936 - Mean Solution (England, Isle of Man, Scotland, Shetland Islands and Wales)	Airy
OHA-A	OldHaw-Haw/Clk66	Old Hawaiian - Hawaii	Clarke 1866
OHA-B	OldHaw-Kau/Clk66	Old Hawaiian - Kauai	Clarke 1866
OHA-C	OldHaw-Mau/Clk66	Old Hawaiian - Maui	Clarke 1866
OHA-D	OldHaw-Oah/Clk66	Old Hawaiian - Oahu	Clarke 1866
OHA-M	OldHaw-Mea/Clk66	Old Hawaiian - Mean Solution	Clarke 1866
OHI-A	OldHaw-Haw/Int24	Old Hawaiian - Hawaii	International 1924
OHI-B	OldHaw-Kau/Int24	Old Hawaiian - Kauai	International 1924
OHI-C	OldHaw-Mau/Int24	Old Hawaiian - Maui	International 1924
OHI-D	OldHaw-Oah/Int24	Old Hawaiian - Oahu	International 1924
OHI-M	OldHaw-Mea/Int24	Old Hawaiian - Mean Solution	International 1924
PHA	N/A	Ayabelle Lighthouse - Djibouti	Clarke 1880
PIT	Pitcairn67/Int24	Pitcairn Astro 1967 - Pitcairn Island	International 1924
PLN	CanaryIs /Int24	Pico De Las Nieves - Canary Islands	International 1924
POS	PortoSan36/Int24	Porto Santo 1936 - Porto Santo and Madeira Islands	International 1924
PRP-A	PSAm56-Bol/Int24	Provisional South American 1956 - Bolivia	International 1924
PRP-B	PSAm56-NCh/Int24	Provisional South American 1956 - Northern Chile (Near 19° S)	International 1924

Table 10-3. Map Datums - Continued

Datum Code	Datum Description	Datum Name	Ellipsoid
PRP-C	PSAm56-SCh/Int24	Provisional South American 1956 - Southern Chile (Near 43° S)	International 1924
PRP-D	PSAm56-Col/Int24	Provisional South American 1956 - Colombia	International 1924
PRP-E	PSAm56-Ecu/Int24	Provisional South American 1956 - Ecuador	International 1924
PRP-F	PSAm56-Guy/Int24	Provisional South American 1956 - Guyana	International 1924
PRP-G	PSAm56-Per/Int24	Provisional South American 1956 - Peru	International 1924
PRP-H	PSAm56-Ven/Int24	Provisional South American 1956 - Venezuela	International 1924
PRP-M	ProSoAm56 /Int24	Provisional South American 1956 - Mean Solution (Bolivia, Chile, Colombia, Ecuador, Guyana, Peru and Venezuela)	International 1924
PTB	Pt58-Burk /Clk80	Point 58 - Mean Solution (Burkina Faso and Niger)	Clarke 1880
PTN	PtN48-Cong/Clk80	Pointe Noire 1948 - Congo	Clarke 1880
PUK	Pulkovo42 /Krs40	Pulkovo 1942 - Russia	Krassovsky 1940
PUR	PuertoRico/Clk66	Puerto Rico - Puerto Rico and Virgin Islands	Clarke 1866
QAT	Qatar Nat /Int24	Qatar National - Qatar	International 1924
QUO	Qornoq/Int24	Qornoq - South Greenland	International 1924
REU	Reunion/Int24	Reunion - Mascarene Islands	International 1924
SAE	SantoIs65 /Int24	Santo (Dos) 1965 - Espirito Santo Island	International 1924
SAN-A	SAm69-Arge/SAm69	South America 1969 - Argentina	South American 1969
SAN-B	SAm69-Boli/SAm69	South America 1969 - Bolivia	South American 1969
SAN-C	SAm69-Braz/SAm69	South America 1969 - Brazil	South American 1969
SAN-D	SAm69-Chil/SAm69	South America 1969 - Chile	South American 1969
SAN-E	SAm69-Colo/SAm69	South America 1969 - Colombia	South American 1969
SAN-F	SAm69-Ecua/SAm69	South America 1969 - Ecuador (Excluding Galapagos Islands)	South American 1969
SAN-G	SAm69-Guya/SAm69	South America 1969 - Guyana	South American 1969
SAN-H	SAm69-Para/SAm69	South America 1969 - Paraguay	South American 1969
SAN-I	SAm69-Peru/SAm69	South America 1969 - Peru	South American 1969
SAN-J	SAm69-Balt/SAm69	South America 1969 - Baltra, Galapagos Islands	South American 1969
SAN-K	SAm69-Trin/SAm69	South America 1969 - Trinidad and Tobago	South American 1969
SAN-L	SAm69-Vene/SAm69	South America 1969 - Venezuela	South American 1969
SAN-M	So Amer 69/SAm69	South America 1969 - Mean Solution (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Trinidad and Tobago and Venezuela)	South American 1969
SAO	SaoBraz-Az/Int24	Sao Braz - Sao Miguel, Santa Maria Islands (Azores)	International 1924
SAP	SapperHill/Int24	Sapper Hill 1943 - East Falkland Island	International 1924

Table 10-3. Map Datums - Continued

Datum Code	Datum Description	Datum Name	Ellipsoid
SCK	Schwarzeck/Bsl41	Schwarzeck - Namibia	Bessel 1841
SGM	SelGran38/Int24	Selvagem Grande 1938 - Salvage Islands	International 1924
SHB	AstroDos71/Int24	Astro Dos 71/4 - St. Helena Island	International 1924
SIR	SIRGASSAm /GRS80	South American Geocentric Reference System (SIRGAS) - South America	GRS 80
SOA	Sasia-Sing/MFi60	South Asia - Singapore	Modified Fischer 1960
SPK-A	Pulk42-Hun/Krs40	S-42 (Pulkovo 1942) - Hungary	Krassovsky 1940
SPK-B	Pulk42-Pol/Krs40	S-42 (Pulkovo 1942) - Poland	Krassovsky 1940
SPK-C	Pulk42-Cze/Krs40	S-42 (Pulkovo 1942) - Czechoslovakia	Krassovsky 1940
SPK-D	Pulk42-Lat/Krs40	S-42 (Pulkovo 1942) - Latvia	Krassovsky 1940
SPK-E	Pulk42-Kaz/Krs40	S-42 (Pulkovo 1942) - Kazakhstan	Krassovsky 1940
SPK-F	Pulk42-Alb/Krs40	S-42 (Pulkovo 1942) - Albania	Krassovsky 1940
SPK-G	Pulk42-Rom/Krs40	S-42 (Pulkovo 1942) - Romania	Krassovsky 1940
SRL	SierrLeo60/Clk80	Sierra Leone 1960 - Sierra Leone	Clarke 1880
TAN	TananObs25/Int24	Tananarive Observatory 1925 - Madagascar	International 1924
TDC	TristAst68/Int24	Tristan Astro 1968 - Tristan da Cunha	International 1924
TIL	Timbalai48/Evrst	Timbalai 1948 - Brunei and East Malaysia (Sarawak and Sabah)	Everest
TIL-S	Timbalai48/Bs141	Timbalai - Netherlands East Indies	Bessel 1841
TOY-A	Tokyo-Japa/Bsl41	Tokyo - Japan	Bessel 1841
TOY-B	Tokyo-Kore/Bsl41	Tokyo - South Korea	Bessel 1841
TOY-B1	Tokyo-Kore/Bs141	Tokyo - South Korea Cycle 1	Bessel 1841
TOY-C	Tokyo-Okin/Bsl41	Tokyo - Okinawa	Bessel 1841
TOY-M	Tokyo-Mean/Bsl41	Tokyo - Mean Solution (Japan, Okinawa and South Korea)	Bessel 1841
TRN	AstTernI61/Int24	Astro Tern Island (Frig) 1961 - Tern Island	International 1924
VOI	Voirol1874/Clk80	Voirol 1874 - Tunisia and Algeria	Clarke 1880
VOR	Voirol1960/Clk80	Voirol 1960 - Algeria	Clarke 1880
WAK	WakeIAst52/Int24	Wake Island Astro 1952 - Wake Atoll	International 1924
WGD	WGS-84	WGS 1984	WGS-84
WGS	WGS-72	WGS 1972	WGS-72
YAC	Yacare-Uru/Int24	Yacare - Uruguay	International 1924
ZAN	Zanderij /Int24	Zanderij - Suriname	International 1924
USER1 *	N/A	User 1	N/A
USER2 *	N/A	User 2	N/A
USER3 *	N/A	User 3	N/A

Table 10-3. Map Datums - Continued

Datum Code	Datum Description	Datum Name	Ellipsoid
USER4 *	N/A	User 4	N/A
USER5 *	N/A	User 5	N/A
USER6 *	N/A	User 6	N/A
* The operator can change User 1 through User 6 datum IDs. Refer to the User Datums page (Paragraph 10.6) in this chapter for information on these selections.			

10.3. INTERNAL COMPASS PAGE.

CAUTION

Prior to a mission, manually enable and orient (calibrate) the internal compass, then orient the internal compass as required during a mission. Ensure the DAGR is kept horizontally level when orienting or using the internal compass. Avoid operation near ferrous materials and electronic devices producing magnetic fields. Compass orientation (calibration) should be performed on a regular basis during the use of the receiver; especially when changing environments (going from inside a building to the outside), or upon initial operation at any change of location. Failure to do these can result in inaccurate track data when the DAGR is not moving or is moving below a preset ground speed value for a specified amount of time.

NOTE

The DAGR uses the internal compass to compute track when moving at or below 0.56 meters per second.

10.3.1. Page Function.

The Internal Compass page (shown in Figure 10-4) is accessed from the Display Setup submenu. The Internal Compass is enabled by the operator to determine track when the receiver is moving slow or when a good position fix is unavailable. The Pointer field of the NAV Pointer, NAV Displays, and Man Overboard pages displays Hold Level, advising the operator the internal compass is active and the DAGR must be kept horizontally level. After being enabled by the operator, the internal compass becomes active only when the following conditions are met:

- Operating mode set to Continuous, Fix, Standby, Averaging, or Time Only mode.
- Ground speed is below the level set by the operator, for the amount of time set by the operator in the page fields.

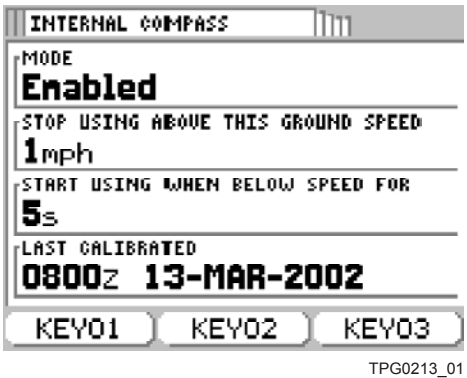


Figure 10-4. Internal Compass Page

10.3.1.1. The DAGR must be held horizontally level during internal compass operation. Avoid large metal objects, strong magnetic fields, or other electromagnetic interference when using the internal compass as it may give erroneous readings. Use of an external compass does not affect the DAGR internal compass operation, but using another electronic device within close proximity of the DAGR may affect internal compass operation. DAGR primary batteries have a varying effect on the magnetic field of the internal compass operation. It is recommended to orient (calibrate) the internal compass when the following occurs:

- Approximately 50 percent of primary battery life remaining as shown on primary battery indicator
- Approximately 25 percent of primary battery life remaining as shown on primary battery indicator
- After replacing primary batteries
- As required during a mission

10.3.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 10-5. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

10.3.2.1. Mode Field. The operator selects Enabled to enable activation or Disabled to disable activation of the Internal Compass from this field. The field displays one of the following:

- **Active** — When the Internal Compass is enabled by the operator and active (in use).
- **Enabled** — When the Internal Compass is enabled by the operator and inactive.
- **Disabled** — When the Internal Compass is disabled by the operator or left at default (Disabled) selection.

10.3.2.2. Stop Using Above This Ground Speed Field. Displays the operator selected ground speed value (default is 0.56 meters per second). When the DAGR speed (movement) exceeds this value, the Internal Compass is prevented from activating. The Internal Compass activates when the DAGR speed (movement) is under the operator selected ground speed value (set in this field) for the amount of time specified in the Start Using When Below Speed For field, and the operating mode is Continuous, Fix, Standby, Averaging, or Time Only. Appropriate units must be selected before editing this field. Field data format is XXX, where X represents the numeric value of speed in units (kph, mph, or kts).

NOTE

Whenever the DAGR speed drops below the operator selected ground speed value, the time delay (set by Start Using When Below Speed For field) starts. Undesired delays in activating the Internal Compass can result if the time delay is repeatedly restarted due to the DAGR alternating above and below the selected ground speed value.

10.3.2.3. Start Using When Below Speed For Field. Displays the operator selected value of time from 0 seconds to 999 seconds (default is 5 seconds). Set this field to the desired time delay required before the Internal Compass can activate. The Internal Compass activates when the DAGR speed (movement) is under the operator selected ground speed value (set by the Stop Using Above This Ground Speed field) for the amount of time specified in this field, and the operating mode is Continuous, Fix, Standby, Averaging, or Time Only. Field data format is XXXs, where X represents seconds.

10.3.2.4. Last Calibrated Field. Displays the time and date of the last internal compass orientation. If the internal compass has not been oriented, the field displays Never Calibrated. The operator cannot edit this field. Field data format is HHMMZ/L DD-NNN-YYYY, where H represents hours, M represents minutes, Z/L represents Zulu or Local, D represents day, N represents month, and Y represents year.

10.3.3. How To Use The Internal Compass Page.

This page contains information used to enable and set up the DAGR internal compass. Prior to a mission, perform the orientation procedure. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting data and changing field information. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.

2. Highlight Display Setup, then push the ENTER key.
3. Highlight Internal Compass, then push the ENTER key. The Internal Compass page is displayed.

a. Enable Internal Compass

(1) From the Internal Compass page, highlight the Mode field, then set to Enabled.

(2) Set the speed value for the Stop Using Above This Ground Speed field. Select appropriate speed units of measure if required.

(3) Set the time value for the Start Using When Below Speed For field.

(4) The DAGR activates the internal compass as required without further operator action.

b. Orient the Internal Compass

(1) Place the DAGR, face up, on a flat level surface.

(2) From the Internal Compass page (with or without fields highlighted), push the MENU key.

(3) Highlight Calibrate, then push the ENTER key. The Internal Compass Calibration message is displayed.

(4) Slowly rotate the DAGR clockwise until the DAGR indicates calibration is complete. The display advises the operator to maintain or alter current rotation speed. Push the QUIT key to cancel the orientation.

(5) Upon completion of the orientation, DAGR notifies the operator and requests acknowledgement. Push the ENTER key to acknowledge or allow it to time out and return to the Internal Compass page.

10.3.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 10-5 shows the keystroke map for the Internal Compass page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Internal Compass page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Display Setup submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

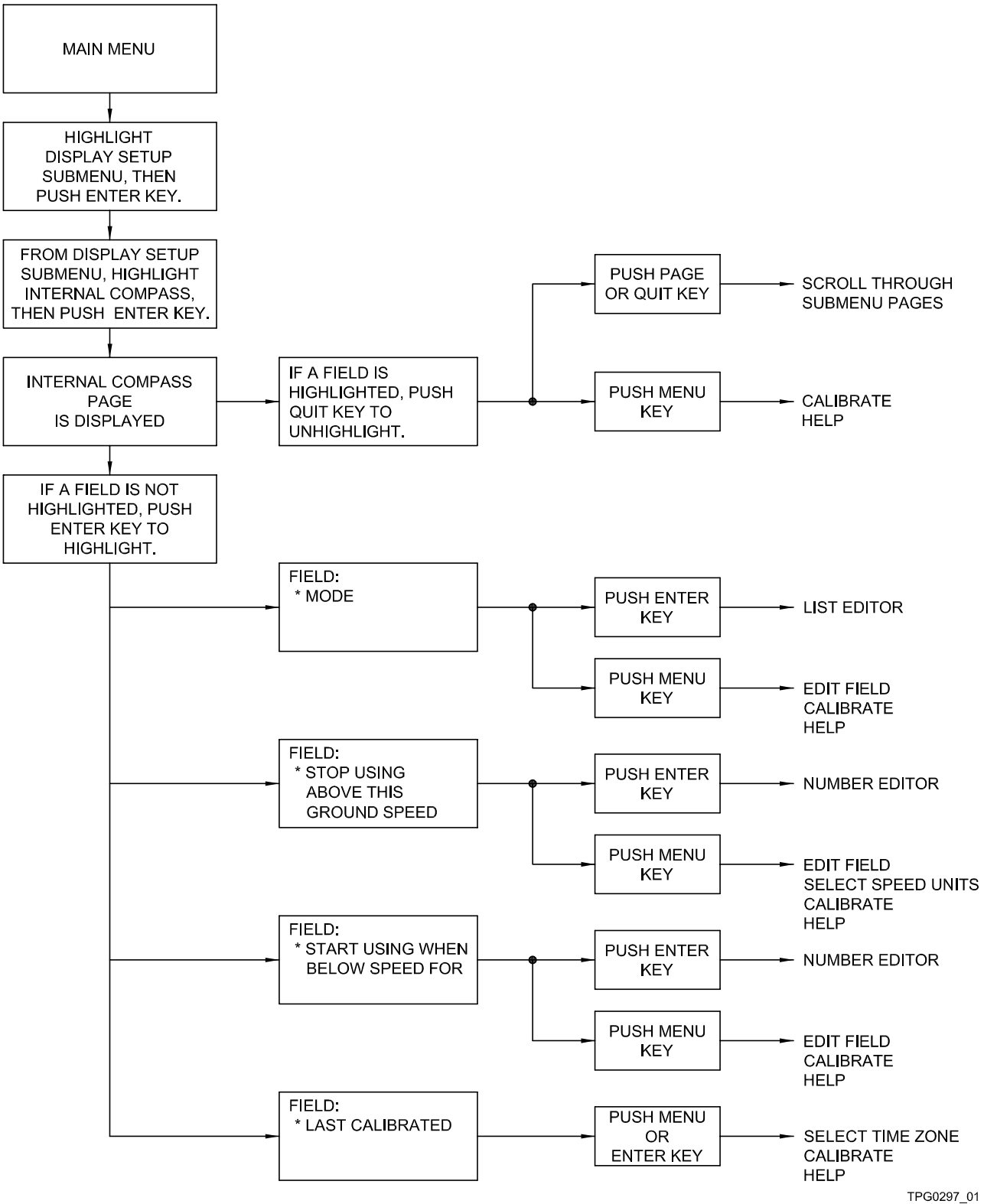


Figure 10-5. Internal Compass Page Keystroke Map.

10.4. LIGHT/CONTRAST PAGE.

10.4.1. Page Function.

The Light/Contrast page is accessed from the Display Setup submenu. The Light/Contrast page provides control and adjustment of keypad/display lighting and display contrast levels. Both the light level and contrast level adjustments display a percentage value of 0 to 100% and a corresponding graphical slider control. Figure 10-6 illustrates how the slider controls and percentage values correspond for each adjustment.

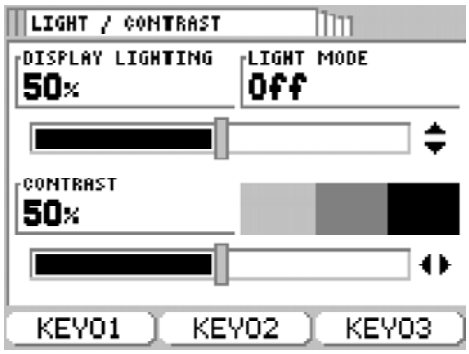


Figure 10-6. Light/Contrast Page

10.4.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 10-7. Field information contained in this page is changed using various editor techniques, or by just using the cursor control keys. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

10.4.2.1. Display Lighting Field. Displays the keypad/display lighting level as a percentage and is also reflected by the graphical slider control. The higher the percentage, the higher the lighting level.

10.4.2.2. Light Mode Field. Displays the keypad/display lighting as On or Off.

10.4.2.3. Contrast Field. Displays the display contrast level as a percentage and is also reflected by the graphical slider control. The higher the percentage, the higher the display contrast level.

10.4.3. How To Use The Light/Contrast Page.

The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Display Setup, then push the ENTER key.
3. Highlight Light/Contrast, then push the ENTER key. The Light/Contrast page is displayed.

10.4.3.1. How To Turn Keypad/Display Lighting On/Off. There are two methods that can be used for turning the keypad/display lighting on or off. The first method (most direct) is using the Brightness key from any display, and the second method is using keystrokes from the Light/Contrast page. When keypad/display lighting is on, the lighting status indicator appears at the upper right corner of the DAGR display.

a. Brightness key method

   (1) From any display, push and hold the BRIGHTNESS key (illuminated bulb icon).

   (2) Keypad/display lighting toggles on and off.

b. Light/Contrast page method

(1) From the Light/Contrast page, highlight the Light Mode field, then push the ENTER key.

(2) Select either On or Off, then push the ENTER key. Display returns to the Light/Contrast page with change made.

10.4.3.2. How To Adjust Keypad/Display Lighting Level. There are two methods that can be used for adjusting the keypad/display lighting level. The first method (most direct) is using the Brightness key from any display, and the second method is using keystrokes from the Light/Contrast page.

a. Brightness key method

(1) From any display, push and hold the BRIGHTNESS key (illuminated bulb icon) and simultaneously push and hold the respective up or down cursor control key.

(2) Keypad/display lighting level adjusts up or down depending on which cursor control key is pushed.

(3) Verify the keypad/display lighting by viewing the DAGR display in a dark area.

b. Light/Contrast page method

(1) From the Light/Contrast page, and no fields selected, push the respective up or down cursor control key.

(2) The Display Lighting field percentage value and slider control adjust by one percent for each push of the up or down cursor control key. For larger adjustments, push and hold the up or down cursor control key.

(3) Verify the keypad/display lighting by viewing the DAGR display in a dark area.

NOTE

This adjustment method is also made by highlighting the Display Lighting field, pushing the ENTER key, then using editing techniques to change the display lighting value.

10.4.3.3. How To Adjust Display Contrast Level.

a. From the Light/Contrast page, and no fields selected, push the respective left or right cursor control key.

b. The Contrast field percentage value and slider control adjust by one percent for each push of the left or right cursor control key. For larger adjustments, push and hold the left or right cursor control key.

NOTE

This adjustment is also made by selecting the Contrast field, pushing the ENTER key, then using editing techniques to change the contrast value.

10.4.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 10-7 shows the keystroke map for the Light/Contrast page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Light/Contrast page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Display Setup submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

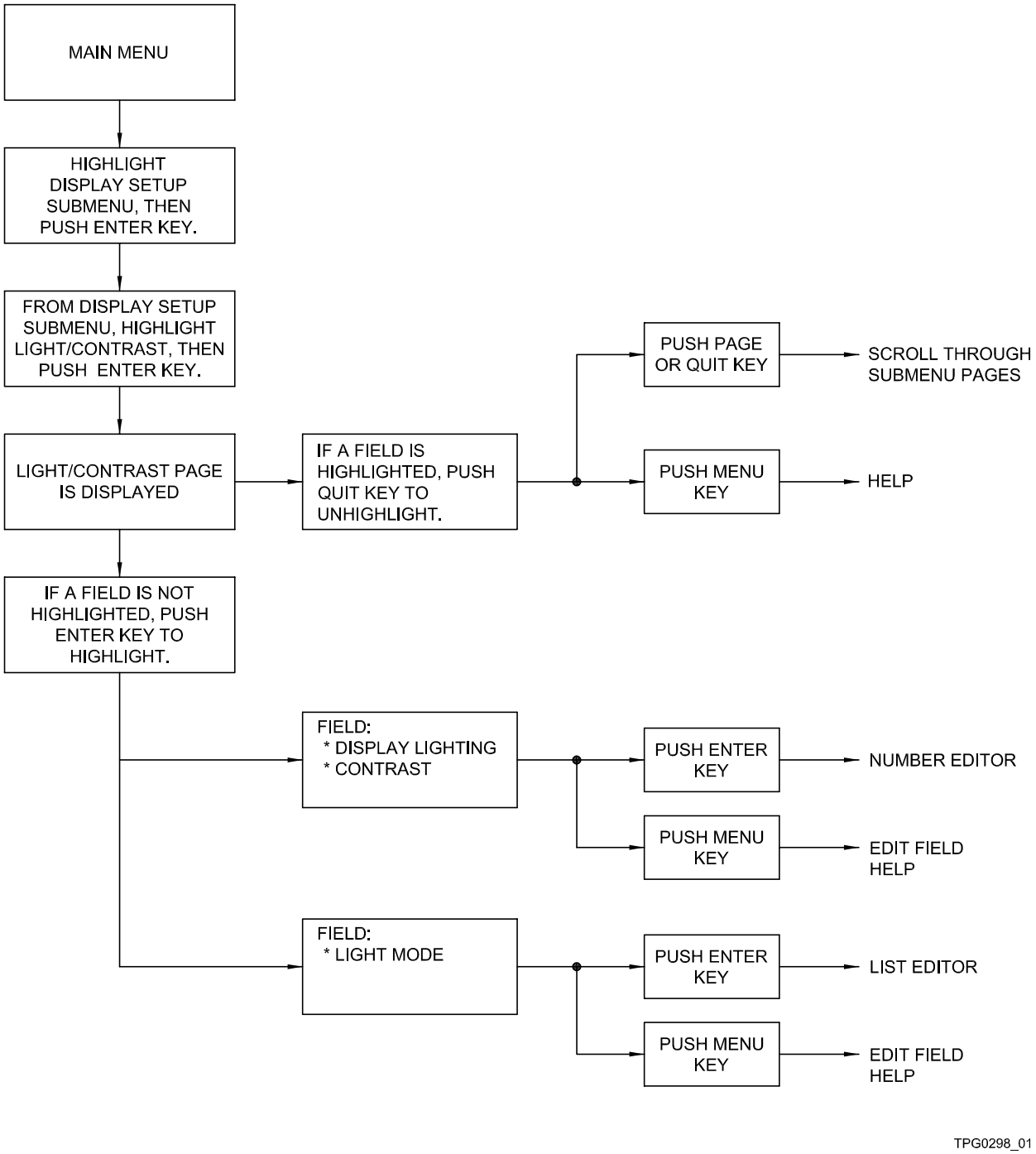


Figure 10-7. Light/Contrast Page Keystroke Map.

10.5. CUSTOMIZE FUNCTION (ADVANCED).

NOTE

The operator can remove the SV (Satellite) Sky View page or Image Viewer page from the POS page set. However, the Present Position, Situational Awareness, and NAV Pointer pages cannot be removed from the POS page set. The operator can add up to seven additional display pages to the three non-removable pages of the POS page set for a total of up to ten display pages.

10.5.1. Page Function.

The Customize function is accessed from the Display Setup submenu. This function provides capability to customize the POS page set or Tool Bar function keys (F1, F2, and F3). Customize is only available when the advanced function set is in use. Refer to Paragraph 6.2.9 for POS page set information, and to Paragraph 4.2.2 for Tool Bar information. Pages may be added, removed, or moved in the POS page set. The Tool Bar function key push and hold functions can be customized to provide quick access to DAGR pages regularly used during a mission. When the Customize function is selected, an editor appears with the following choices:

- **Add To POS Pages** — Allows the operator to display a page and then add it to the POS page set.
- **Clear From POS** — Allows the operator to display a page of the POS page set and then remove it from the page set.
- **Move After Next** — Allows the operator to move an existing POS page set page after the next page of the POS page set.
- **Move Before Prev** — Allows the operator to move an existing POS page set page before the previous page of the POS page set.
- **Tool Bar Keys** — Allows the operator to activate a function key (same as push and hold function) or customize function keys to display desired pages.

10.5.1.1. The DAGR Tool Bar function keys are configured with the following default selections (push and hold operations). Refer to Table 10-4 for a complete list of customize selections.

- **Mark** — Appears above F1 key. Displays the Mark a Waypoint message.
- **Fast Fix** — Appears above F2 key. Enters Fix operating mode.
- **Back** — Appears above F3 key. Returns display to the previous page viewed.

10.5.2. How To Use The Customize Function.

Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting data and changing field information. The following procedures provide information on how to add submenu pages, clear or move pages within the POS page set, and how to customize the Tool Bar function keys. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Display Setup, then push the ENTER key.
3. Highlight Customize, then push the ENTER key. The Customize page is displayed.

a. Add a Page to the POS Page Set

   (1) Display the desired page to be added to the POS page set.

   (2) Push the MENU key twice to access the Main Menu.

   (3) Highlight Display Setup, then push the ENTER key.

   (4) Highlight Customize, then push the ENTER key.

   (5) Highlight Add To POS Pages from the list editor, then push the ENTER key.

NOTE

When adding a page to the POS page set, operator acknowledgement is required.

(6) Push and hold the POS key to view the POS page set.

(7) Push the PAGE or QUIT key to verify the desired page change was made to the POS page set.

b. Clear or Move a Page of the POS Page Set

(1) Display the page of the POS page set to be cleared or moved.

(2) Push the MENU key twice to access the Main Menu.

(3) Highlight Display Setup, then push the ENTER key.

(4) Highlight Customize, then push the ENTER key.

(5) Highlight the desired function (Clear From POS, Move After Next, or Move Before Prev) from the list editor, then push the ENTER key.

NOTE

When clearing a page of the POS page set, operator acknowledgement is required.

(6) Push and hold the POS key to view the POS page set.

(7) Push the PAGE or QUIT key to verify the desired page change was made to the POS page set.

c. Customize Tool Bar Function Keys

(1) Push the MENU key twice to access the Main Menu.

(2) Highlight Display Setup, then push the ENTER key.

(3) Highlight Customize, then push the ENTER key.

(4) Highlight Tool Bar Keys, then push the ENTER key. Display returns to the last page viewed with one of the tool bar keys highlighted.

(5) Using the cursor control keys, highlight the desired tool bar function key to customize, then push the ENTER key.

(6) Highlight Customize Key from the editor, then push the ENTER key.

NOTE

If Activate is selected from the editor, the page designated by the function key is displayed the same as if the function key was pushed and held.

(7) From the list editor (refer to Table 10-4), highlight the desired page or function for the function key, then push the ENTER key.

(8) The Tool Bar reappears with the function key changed to the desired selection and highlighted. To customize function keys further, repeat steps (5) through (7). To deselect the function key and move on to other operations, push the QUIT key.

Table 10-4. Customize Function Key Selections

Function Key Selections	Response When Activated
ALERTS	Displays the Alerts page.
BACK	Displays the last viewed page from the previous page set.
COM PORT	Displays the COM Port Setup page.
DATA XFR	Displays the Data Transfer page.
DOP CALC	Displays the DOP Calculation page.
FAST FIX	If current operating mode is not FIX, changes the operating mode to FIX. If current operating mode is FIX, changes the operating mode to Standby.

Table 10-4. Customize Function Key Selections - Continued

Function Key Selections	Response When Activated
FS CALC	Displays the Fire Support page.
GOTO WP	GOTO Waypoint message is displayed. This function key is disabled when the Tool Bar is the selected display window.
MARK	Displays the Mark a Waypoint message.
NAV	Displays the NAV Setup page.
OP MODE	Provides the list editor of operating modes.
ROUTES	Displays the Routes page.
SITAWARE	Displays the Situational Awareness page.
SV SCHED	Displays the SV (Satellite Vehicle) Schedule page.
SV SKY	Displays the SV Sky View page.
WPs	Displays the Waypoints Page.
WP RANGE	Displays the Range Between WPs page.

10.5.3. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 10-8 shows the keystroke map for the Customize Function. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Customize Function.

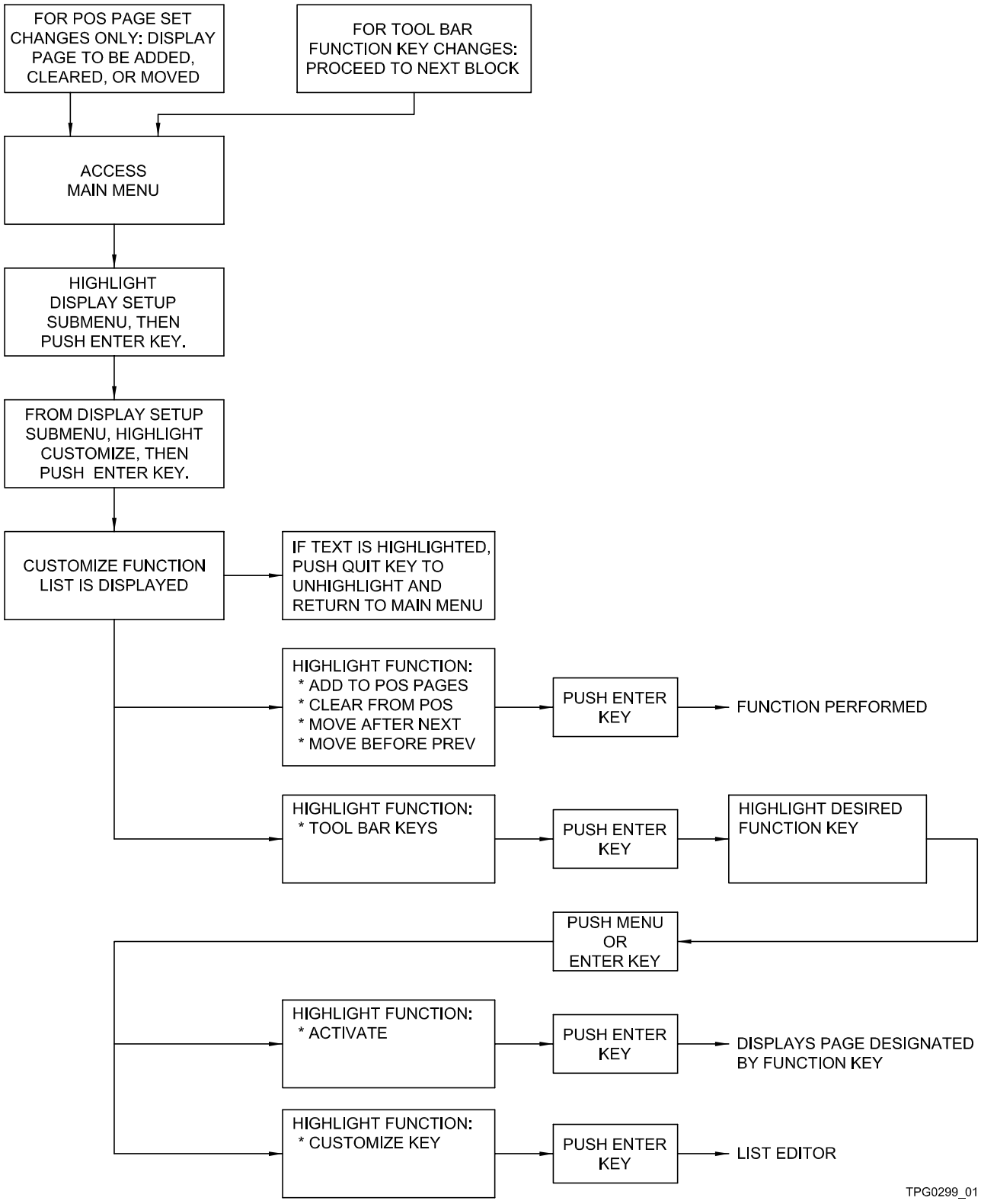


Figure 10-8. Customize Function Keystroke Map.

10.6. USER DATUMS PAGE.

CAUTION

When in use, field data of the user datum must be accurate to provide accurate position coordinates. User datums are to be input and used only if the DAGR does not already support the required datum. Select the required datum, using the Units page (refer to Paragraph 10.2), before using position data on other displays. Ensure the correct datum is being used for the geographical area before entering or using waypoints.

10.6.1. Page Function.

The User Datums page (shown in Figure 10-9) is accessed from the Display Setup submenu. Some missions may require a customized datum other than the standard datums (refer to Table 10-3) loaded into the DAGR. DAGR provides up to six configurable user datums. The User Datums page provides capability to input the user datum name, and define the datum parameters. The selection of a map datum defines an elevation datum and ellipsoid reference used when displaying position. Older maps use spheroid, newer maps use ellipsoid. A datum is a representation of the surface of the earth. Some datums encompass the entire globe, while others are more localized for more precise values. All receiver position data is referenced to the selected datum. Maps have two associated datums: horizontal and vertical (elevation). For proper orientation, always check the name of the Elevation Datum and Ellipsoid (Spheroid) printed on the map being used.

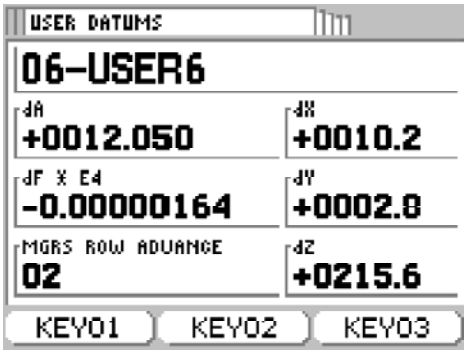


Figure 10-9. User Datums Page

10.6.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 10-10. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

10.6.2.1. Number and Name Field. Displays the user datum number (01 through 06) and the operator selectable name. The user datum name consists of up to six characters. Field data format is XX-NNNNNN, where X represents the user datum number and N represents the user datum name. Prior to being changed by the operator, the name appears as USER followed by the user datum number as shown in Figure 10-9.

10.6.2.2. dA Field. Displays the dA (delta semi-major axis) parameter in meters of the selected user datum. Consists of seven digits (including three fractional). Field data format is +/- XXXX.XXX, where X represents meters. This parameter (one of five) must be provided to the operator by the appropriate authority and represents a National Imagery and Mapping Agency (NIMA) or non-NIMA datum/ellipsoid.

10.6.2.3. dX Field. Displays the dX (mean datum shift along X-axis) parameter in meters of the selected user datum. Consists of five digits (including one fractional). Field data format is +/- XXXX.X, where X represents meters. This parameter (one of five) must be provided to the operator by the appropriate authority and represents a National Imagery and Mapping Agency (NIMA) or non-NIMA datum/ellipsoid.

10.6.2.4. dF * E4 Field. Displays the dF * E4 (delta flattening) parameter in meters of the selected user datum. Consists of nine digits (including eight fractional). The dF parameter is scaled by a factor of 10,000 (10E4). Field data format is +/- X.XXXXXXXX, where X represents meters. This parameter (one of five) must be provided to the operator by the appropriate authority and represents a National Imagery and Mapping Agency (NIMA) or non-NIMA datum/ellipsoid.

10.6.2.5. dY Field. Displays the dY (mean datum shift along Y-axis) parameter in meters of the selected user datum. Consists of five digits (including one fractional). Field data format is +/- XXXX.X, where X represents meters. This parameter (one of five) must be provided to the operator by the appropriate authority and represents a National Imagery and Mapping Agency (NIMA) or non-NIMA datum/ellipsoid.

10.6.2.6. dZ Field. Displays the dZ (mean datum shift along Z-axis) parameter in meters of the selected user datum. Consists of five digits (including one fractional). Field data format is +/- XXXX.X, where X represents meters. This parameter (one of five) must be provided to the operator by the appropriate authority and represents a National Imagery and Mapping Agency (NIMA) or non-NIMA datum/ellipsoid.

10.6.2.7. MGRS Row Advance Field. Displays the MGRS row advance parameter of the selected user datum. Consists of two digits (00 through 20).

10.6.3. How To Use The User Datums Page.

This page contains information used to configure and set up the DAGR when inputting a user defined datum only. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting data and changing field information. When a text editor is used, the menu key can be pushed to access a list of options (undo changes, save and exit, exit and no save, reset to default, and editor help). These options provide text editor shortcuts and pertain to the immediate function being performed (e.g., using a text editor).

10.6.3.1. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Display Setup, then push the ENTER key.
3. Highlight User Datums, then push the ENTER key. The User Datums page is displayed.

NOTE

The user name field is a text editor; all remaining fields are edited using a number editor.

a. From the User Datums page, push the MENU key.

b. Highlight Select User Datum, then push the ENTER key.

c. Highlight the desired user datum (01–USER1 through 06–USER6), then push the ENTER key. Display returns to the User Datum page.

d. Highlight the user name field. Push the ENTER key for edit capabilities.

e. Revise the user name field with appropriate information. Highlight SAVE from the text editor or push the MENU key and highlight SAVE and EXIT, then push the ENTER key.

f. Use the cursor control keys and the ENTER key to highlight and edit the remaining fields as required, then push the ENTER key to save changes for number editors.

10.6.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 10-10 shows the keystroke map for the User Datums page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the User Datums page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Display Setup submenu.

- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

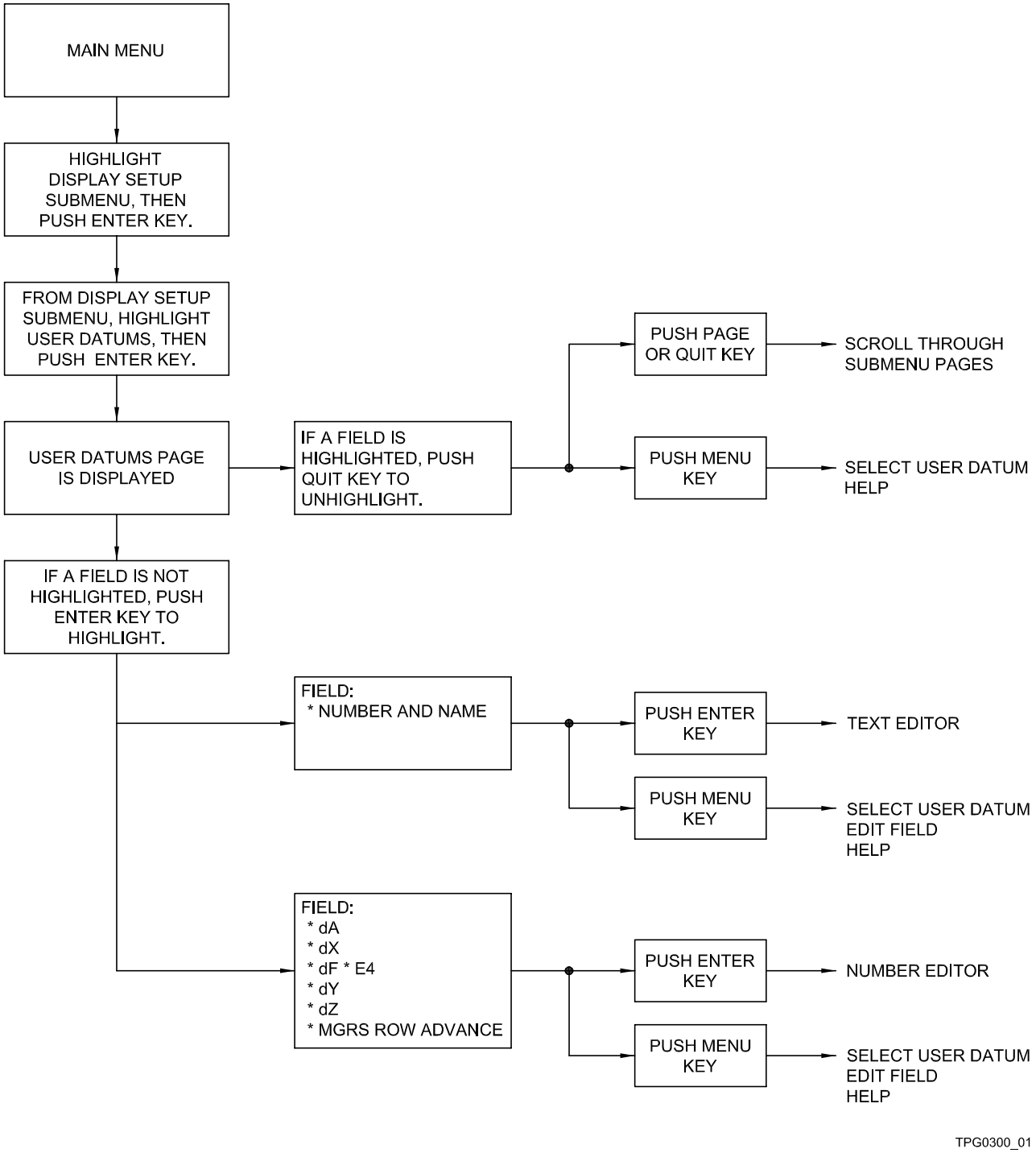


Figure 10-10. User Datums Page Keystroke Map.

10.7. USER GRIDS PAGE (ADVANCED).

CAUTION

When in use, field data of the user grid must be accurate to provide accurate position coordinates. User grids are to be input and used only if the DAGR does not already support the required grid. Select the required grid, using the Units Page (refer to Paragraph 10.2), before using position data on other displays.

10.7.1. Page Function.

The User Grids page is accessed from the Display Setup submenu when using the advanced function set. Some missions may require a customized grid other than the standard coordinate/grid systems (refer to Table 10-1) loaded into the DAGR. These are called User Grids and six are configurable within DAGR. The User Grids page provides capability to view or input the user grids name, and define the grid parameters for a selected map projection. The fourteen selectable map projections are listed in Table 10-5, and also in the User Grids page display shown in Figure 10-11 through Figure 10-17. The selection of the map projection determines which associated fields of data are displayed.

Table 10-5. Map Projections

Projection Name	Description
AEN	Azimuthal Equidistant North Polar.
AEO	Azimuthal Equidistant Oblique.
AES	Azimuthal Equidistant South Polar.
CAS	Cassini
LCC	Lambert Conformal Conic
M	Mercator
OM1	Oblique Mercator Type 1 (single point/azimuth)
OM2	Oblique Mercator Type 2 (two point)
PC	Polyconic
STE	Stereographic Equatorial
STN	Stereographic North Polar
STO	Stereographic Oblique Polar
STS	Stereographic South Polar
TM	Transverse Mercator

10.7.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 10-18. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

10.7.2.1. Grid Number and Name Field. Displays the two digit grid number (00 through 06) and the operator selectable grid name of up to ten characters. Field data format is XX-NNNNNNNNNN, where X represents the user grid number and N represents the user grid name. Prior to being changed by the operator, the name appears as USER followed by the user grid number as shown in Figure 10-11.

10.7.2.2. Projection Field. Displays the map projection name and description listed in Table 10-5. The selected map projection determines which associated fields are displayed.

10.7.2.3. Datum Field. Displays the selected datum ID for the user grid as listed in Table 10-3.

10.7.2.4. Origin Field. Displays the origin latitude (top line) and longitude (bottom line) for the user grid in degrees, minutes, and seconds. The latitude and longitude values are individually selectable. Field data format is DDD°MM'SS.SS”X, where D represents degrees, M represents minutes, S represents seconds, and X represents north/south latitude or east/west longitude.

10.7.2.5. False Origin Field. Displays the false origin easting (top line) and northing (bottom line) for the user grid using eight characters each. The easting and northing values are individually selectable. Field data format is +/- XXXXXXXX, where X represents easting or northing.

10.7.2.6. Grid Unit Size Field. Displays the grid unit size for the user grid. The displayed value is in meters and nine digits long (six digits fractional). Field data format is XXX.XXXXXX, where X represents meters.

10.7.2.7. Standard Parallel Fields. Displays the standard parallel, standard parallel 1, and standard parallel 2 field for the user grid in degrees, minutes, and seconds. Field data format is DD°MM'SS.SS”X, where D represents degrees, M represents minutes, S represents seconds, and X represents north or south latitude.

10.7.2.8. Central Meridian Field. Displays the central meridian for the user grid in degrees, minutes, and seconds. Field data format is DDD°MM'SS.SS”X, where D represents degrees, M represents minutes, S represents seconds, and X represents east or west longitude.

10.7.2.9. Scale Factor (Ko) Field. Displays the scale factor for the user grid. The displayed value is nine digits long (eight digits fractional). Field data format is X.XXXXXXXX, where X represents the scale factor value.

10.7.2.10. Scale Latitude Field. Displays the scale latitude for the user grid in degrees, minutes, and seconds. Field data format is DD°MM'SS.SS”X, where D represents degrees, M represents minutes, S represents seconds, and X represents north or south latitude.

10.7.2.11. Azimuth Field. Displays the azimuth for the user grid in degrees, minutes, and seconds in reference to north reference (True, Magnetic, or Grid). Field data format is DD°MM'SS.SS”, where D represents degrees, M represents minutes, and S represents seconds.

10.7.2.12. Central Latitude Field. Displays the central latitude for the user grid in degrees, minutes, and seconds. Field data format is DD°MM'SS.SS”X, where D represents degrees, M represents minutes, S represents seconds, and X represents north or south latitude.

10.7.2.13. Point 1 Field. Displays the latitude (top line) and longitude (bottom line) of the first point for the central line of the user grid in degrees, minutes, and seconds. The latitude and longitude values are individually selectable. Field data format is DDD°MM'SS.SS”X, where D represents degrees, M represents minutes, S represents seconds, and X represents north/south latitude or east/west longitude.

10.7.2.14. Point 2 Field. Displays the latitude (top line) and longitude (bottom line) of the second point for the central line of the user grid in degrees, minutes, and seconds. The latitude and longitude values are individually selectable. Field data format is DDD°MM'SS.SS”X, where D represents degrees, M represents minutes, S represents seconds, and X represents north/south latitude or east/west longitude.

10.7.2.15. Figure 10-11 illustrates the fields of the User Grids page when using map projections AEN, AEO, AES, CAS, or PC. Figure 10-12 illustrates the fields of the User Grids page when using map projection LCC. Figure 10-13 illustrates the fields of the User Grids page when using map projection M. Figure 10-14 illustrates the fields of the User Grids page when using map projection OM1. Figure 10-15 illustrates the fields of the User Grids page when using map projection OM2. Figure 10-16 illustrates the fields of the User Grids page when using map projections STE, STO, or TM. Figure 10-17 illustrates the fields of the User Grids page when using map projections STN or STS.

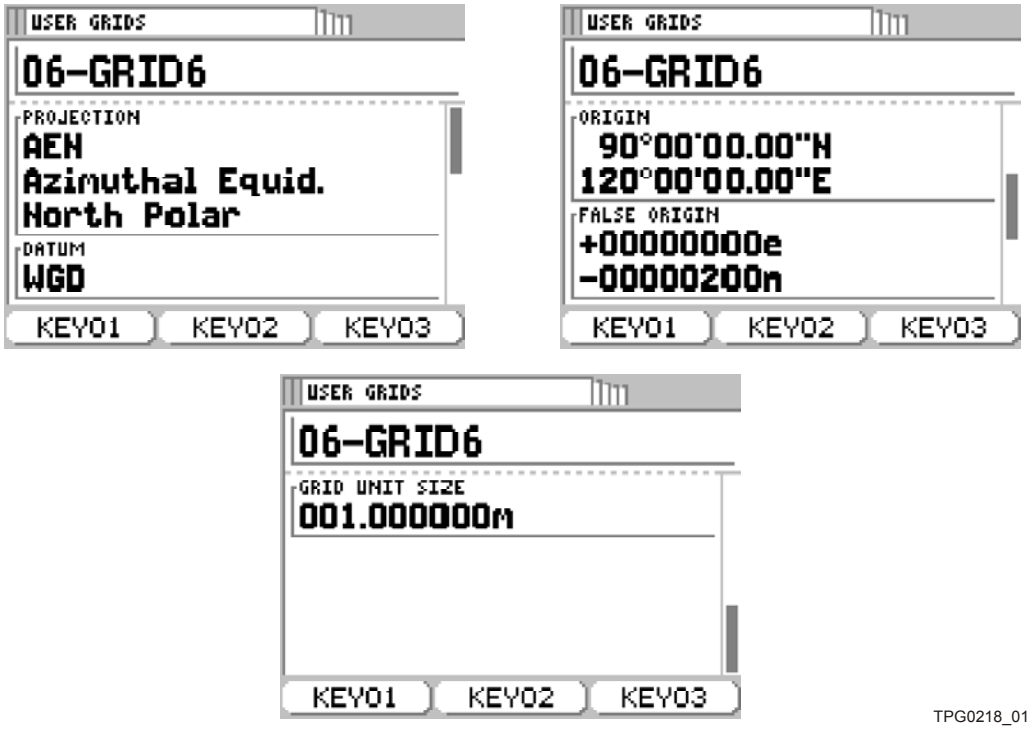


Figure 10-11. User Grids Page/AEN (Advanced)

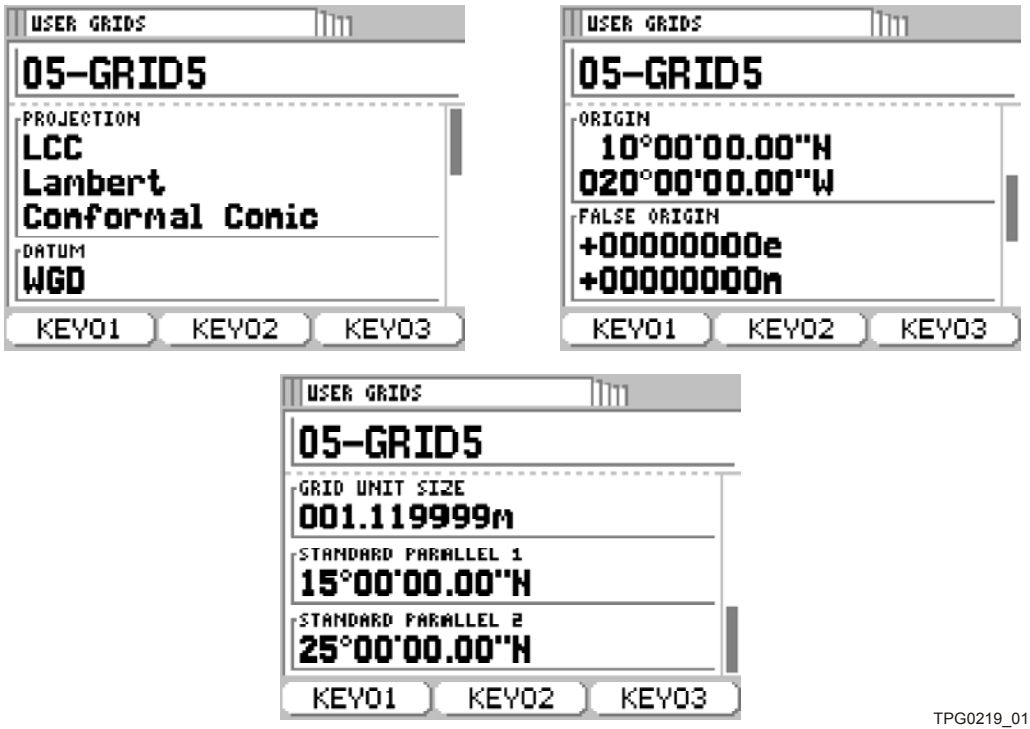


Figure 10-12. User Grids Page/LCC (Advanced)

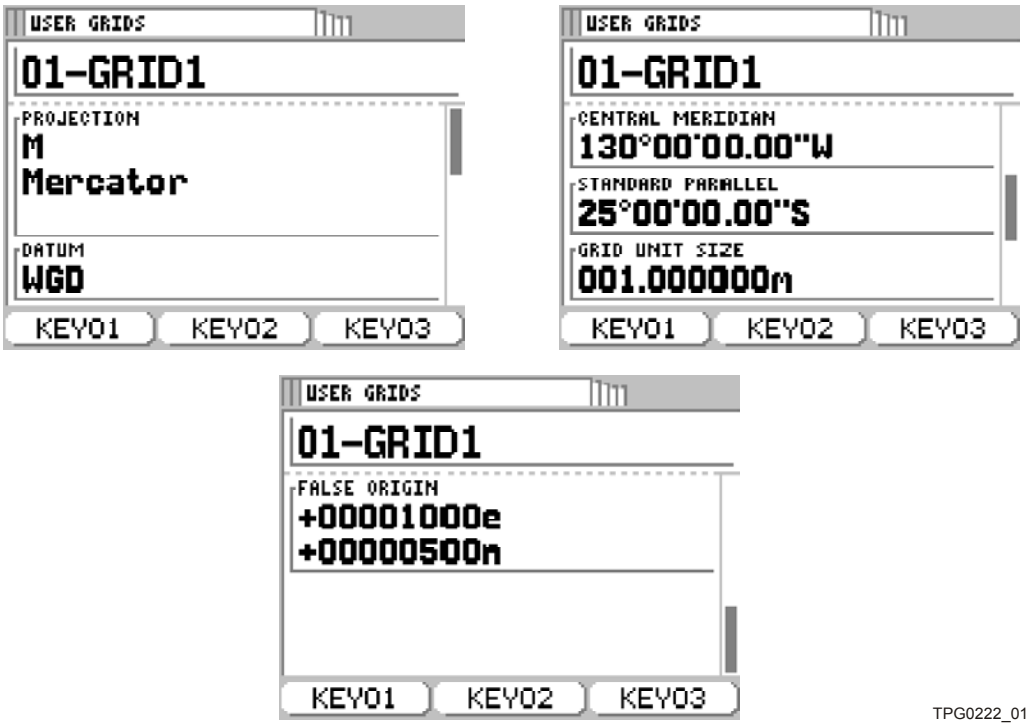


Figure 10-13. User Grids Page/M (Advanced)

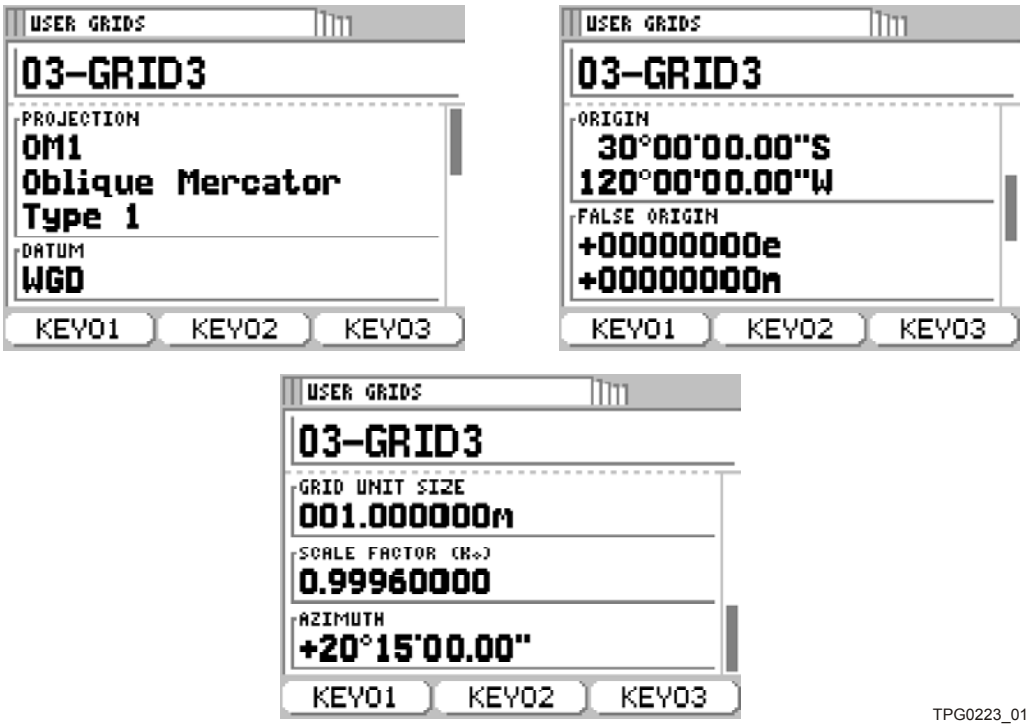


Figure 10-14. User Grids Page/OM1 (Advanced)

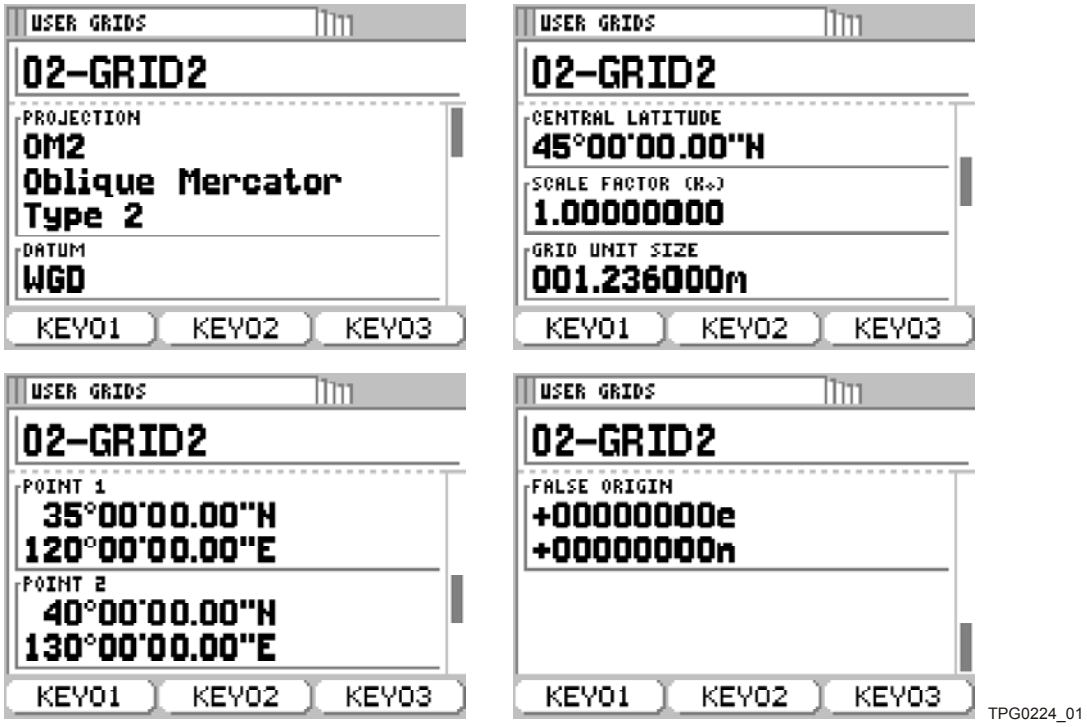


Figure 10-15. User Grids Page/OM2 (Advanced)

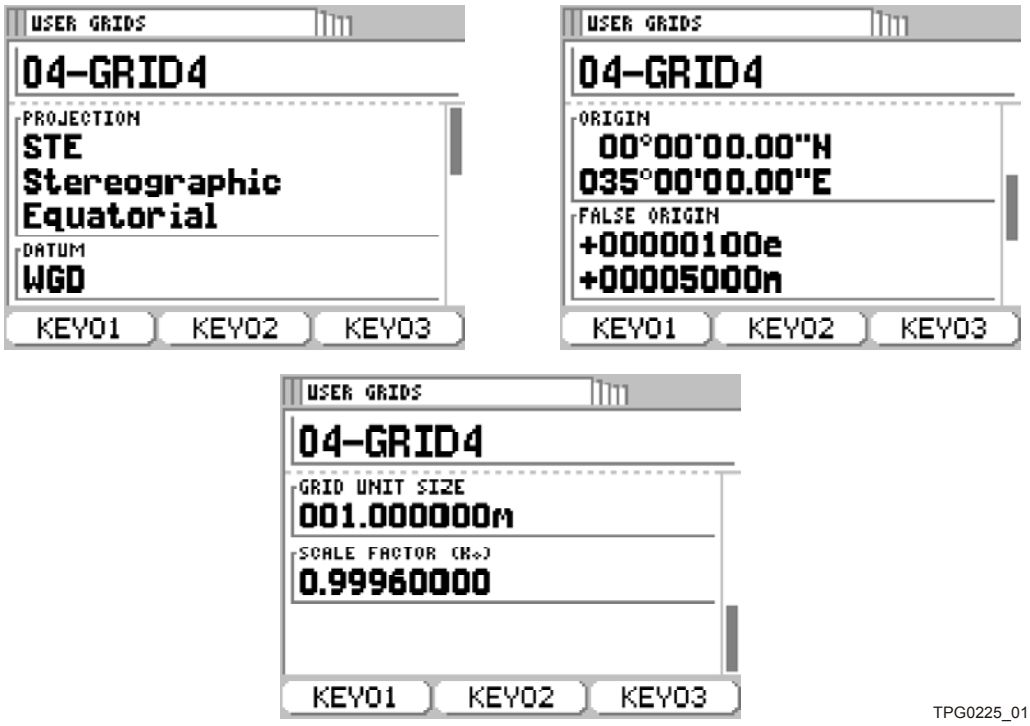


Figure 10-16. User Grids Page/STE (Advanced)

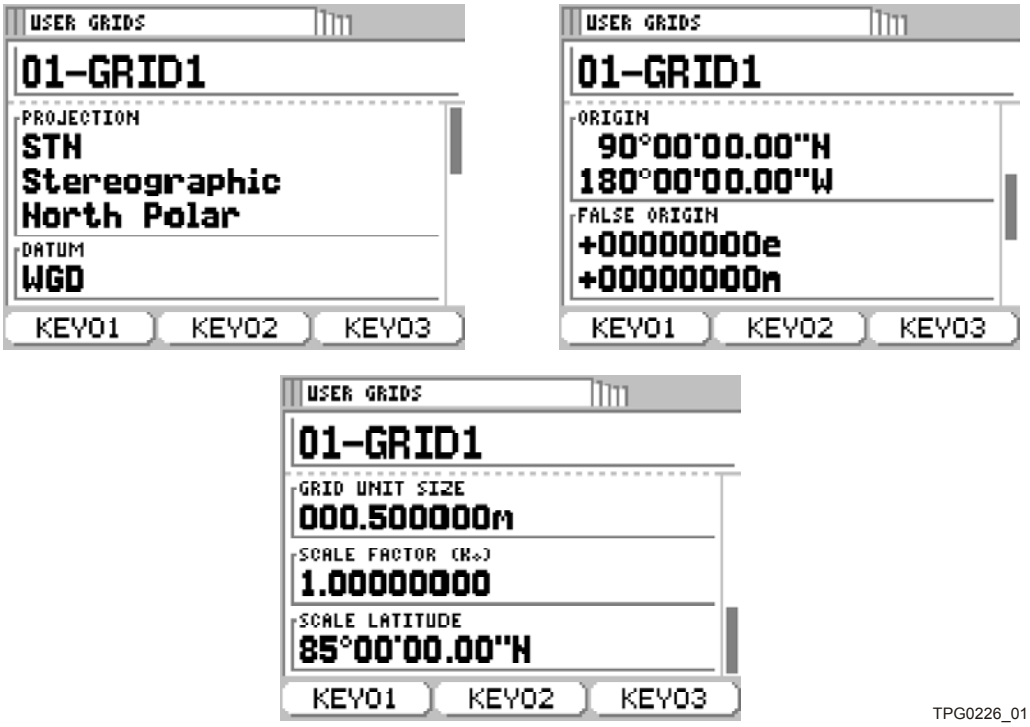


Figure 10-17. User Grids Page/STN (Advanced)

10.7.3. How To Use The User Grids Page.

This page contains information used to configure and set up the DAGR when inputting a user defined grid only. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting data and changing field information. When a text editor is used, the menu key can be pushed to access a list of options (undo changes, save and exit, exit and no save, reset to default, and editor help). These options provide text editor shortcuts and pertain to the immediate function being performed (e.g., using a text editor).

10.7.3.1. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Display Setup, then push the ENTER key.
3. Highlight User Grids, then push the ENTER key. The User Grids page is displayed.

a. User Grid Configuration

NOTE

All fields use either a text or number editor for revising information.

(1) From the User Grids page, highlight the user grid name field, then push the MENU key.

(2) Highlight Select User Grid, then push the ENTER key.

(3) Highlight the desired user grid (01–GRID1 through 06–GRID6), then push the ENTER key. Display returns to the User Grid page.

(4) Highlight the user grid name field. Push the ENTER key for edit capabilities.

(5) Revise the user grid name field with appropriate information. Highlight SAVE from the text editor or push the MENU key and highlight SAVE and EXIT, then push the ENTER key.

(6) Use the cursor control keys and the ENTER key to highlight and edit the remaining fields as required, then push the ENTER key to save changes for number editors.

b. Clear Current User Grid Information

(1) From the User Grid page, push the MENU key (with or without a field highlighted).

(2) Highlight Clear, then push the ENTER key.

(3) All fields for the user grid currently being used are reset to default information as follows.

- **Grid Number and Name** — XX-GRIDX (Where X represents grid number and default name.)
- **Projection** — TM Transverse Mercator
- **Datum** — WGD
- **Origin** — 00°00'00.00N and 93°00'00.00W
- **False Origin** — 00000000e and 00000000n
- **Grid Unit Size** — 001.000000m
- **Scale Factor** — 0.99960000

10.7.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 10-18 shows the keystroke map for the User Grids page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the User Grids page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Display Setup submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

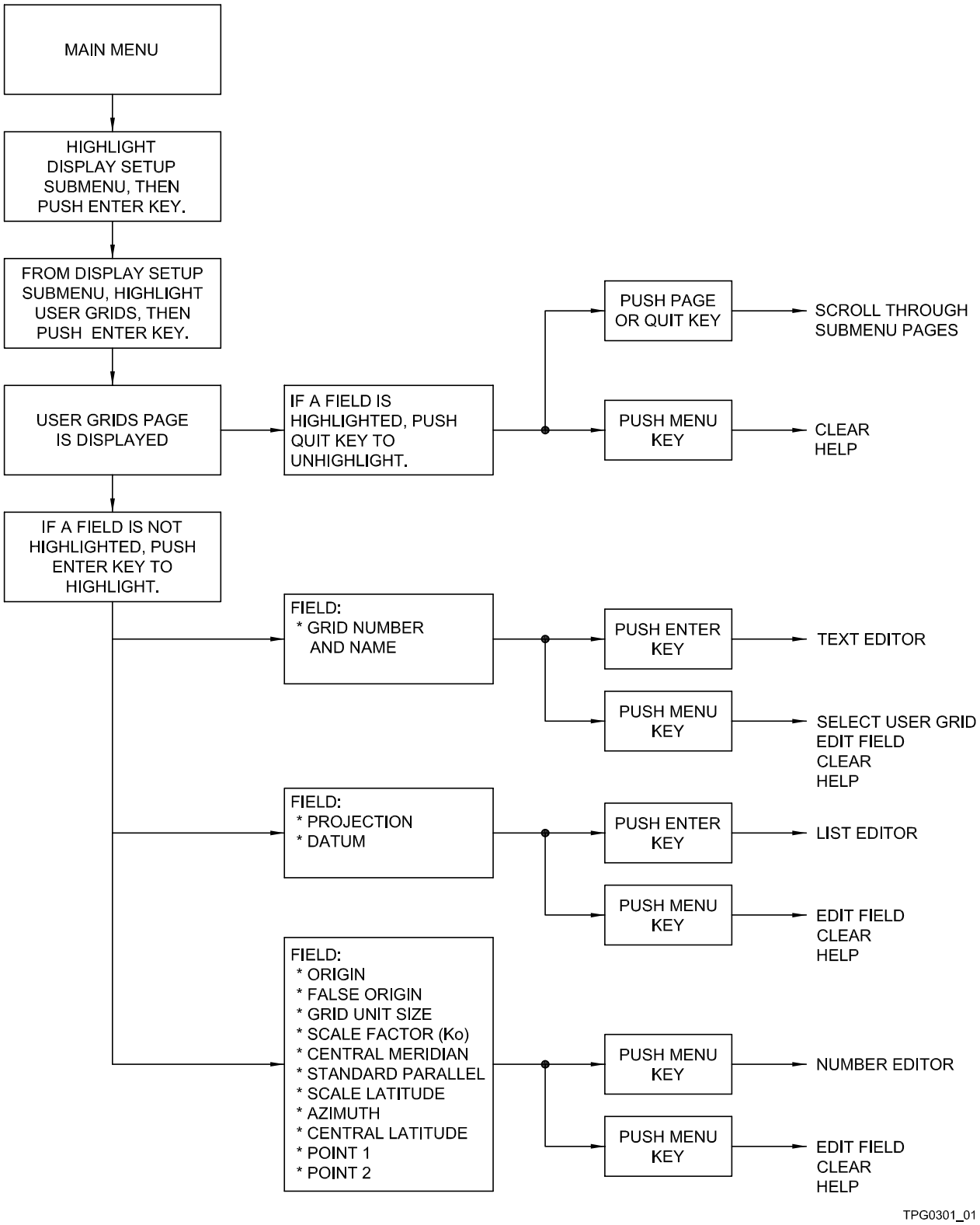


Figure 10-18. User Grids Page Keystroke Map

CHAPTER 11
OPERATOR INSTRUCTIONS — COMMUNICATIONS SUBMENU OPERATION

11.1. COMMUNICATIONS SUBMENU.

This chapter contains Communications submenu operation information. The Communications submenu page set provides the following page selections described in this chapter:

- Data Transfer
- COM Port Setup
- PPS, HQ, SINCGARS
- Crypto Fill
- Connector Status

11.2. DATA TRANSFER PAGE.

NOTE

Operator changes to Data Transfer page field content are not saved if the DAGR power is cycled off and on.

11.2.1. Page Function.

The Data Transfer page is accessed from the Communications submenu. The Data Transfer page is used to transfer selected data from the DAGR over a selected receiver port. Data set selections for transfer are listed in the Data To Transfer field. The From WP and To WP fields are disabled (appear light gray) when the selected set of data to transfer does not include waypoints. Refer to Figure 11-1.

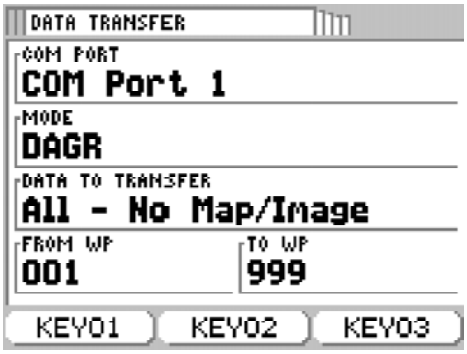


Figure 11-1. Data Transfer Page

11.2.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 11-2. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

11.2.2.1. COM Port Field. Displays the COM port for data transfer. Operator choices are COM Port 1, COM Port 2, or COM Port 3.

NOTE

COM Port 1 and COM Port 2 are accessed from DAGR connector J2. COM Port 3 is accessed from DAGR connector J1.

11.2.2.2. Mode Field. Displays type of data format to output. Choices are PLGR and DAGR.

11.2.2.3. Data To Transfer Field. Displays the data set to output. Choices are as follows:

- **All - No Map/Image** — All available data except for maps and images (Waypoint (WP)/Mission Data, Satellite (SV)/POS/Time Data, Setup Data, Display Setup, Position Report, User Datums, and User Grids)
- **WP/Mission Data** — Waypoints, alerts, remarks, routes, and bullseye setup.
- **SV/POS/Time Data** — Satellite data, PVT (position, velocity (ground speed), and time) initialization data, and UTC time.
- **Setup Data** — Units of measure and COM port setup.
- **Display Setup** — Custom navigation pages, custom page sets, and situational awareness setup.
- **Position Report** — Position data.
- **User Datums** — Datums.
- **User Grids (Advanced)** — Grids.
- **Maps/Images (see note)** — Maps and images currently loaded.

NOTE

The Maps/Images selection is disabled if no maps or images are loaded into the DAGR.

11.2.2.4. From WP Field. Displays the number of the first waypoint to be transferred. Used with the To WP field to establish a waypoint range. Field data format is XXX, where X represents the waypoint number.

11.2.2.5. To WP Field. Displays the number of the last waypoint to be transferred. Used with the From WP field to establish a waypoint range. Field data format is XXX, where X represents the waypoint number.

11.2.3. How To Use The Data Transfer Page.

This page contains information used to configure the DAGR for transferring information between the DAGR and another piece of equipment. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting data and changing field information. The following procedures set up information in the Data Transfer page, and also refers to the COM Port Setup page, when necessary, to set up COM port related information. When using the basic function set, only the Standard configuration is possible and no COM port setup is necessary. There may be some fields not mentioned in the pages, and are user optional for the individual procedure. When transferring data between a DAGR and a PLGR, refer to the following manuals for additional PLGR information as required.

- Air Force: TO 31R4–2PSN11–1
- Army: TM 11–5825–291–13
- Marine Corps: PCN 60000282000
- Navy: EE174–AA-OMI-010/PSN-11

11.2.3.1. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Communications, then push the ENTER key.

3. Highlight Data Transfer, then push the ENTER key. The Data Transfer page is displayed.

NOTE

Refer to Paragraph 11.3 for more COM port setting information, and Table 11-1 for COM Port standard configuration information.

a. DAGR to DAGR Information Transfer (Basic Function Set)

(1) Connect both DAGRs together with the DAGR to DAGR data cable assembly using the J2 external connector on both units.

(2) Push the PWR key to set power ON for both DAGRs. Acknowledge power-on status display if required.

(3) Set both DAGRs to use the Basic Function Set. Refer to Paragraph 12.3 for additional information.

(4) On the Data Transfer page of the sending DAGR, set the COM Port field to COM Port 1.

(a) Highlight the COM Port field, then push the ENTER key.

(b) Highlight COM Port 1, then push the ENTER key.

(5) On the Data Transfer page of the sending DAGR, set the Mode field to DAGR.

(a) Highlight the Mode field, then push the ENTER key.

(b) Highlight DAGR, then push the ENTER key.

(6) On the Data Transfer page of the sending DAGR, select the type of data to be sent in the Data To Transfer field.

NOTE

If transferring waypoint data, use standard editing practices to set the From WP and To WP fields to the appropriate range of waypoints needed, otherwise all 999 waypoints will be transferred.

(a) Highlight the Data To Transfer field, then push the ENTER key.

(b) Highlight the desired selection, then push the ENTER key.

(7) On the Data Transfer page of the sending DAGR, push the MENU key, then highlight Start Data XFR. Push ENTER key to initiate the data transfer process.

(8) If maps/images are being transferred, the sending DAGR displays a message that maps and images may take a long time (up to 35 minutes). When the message is displayed, push the ENTER key to continue.

(9) Messages will show on both DAGR displays indicating the data transfer is starting, in progress, complete, aborted, or failed. Follow instructions on display.

(10) While maps/images are being transferred, both DAGRs display a progress bar and a percentage of completion value (for data transmit or data receive). When prompted by the display, push the ENTER key on both DAGRs to perform a restart.

NOTE

Maps and images loaded into the receiving DAGR can be viewed by using procedures found in Paragraph 9.6.3 (Situational Awareness page) and Paragraph 9.7.3 (Image Viewer page).

(11) When data transfer is complete, perform one of the following:

(a) Set power to off on both pieces of equipment (push and hold DAGR PWR key). Remove the data cable assembly.

(b) Disconnect the data cable assembly and perform other DAGR operations as desired.

NOTE

To prevent an unintended DAGR power down when disconnecting the data cable, do not allow the cable shield to contact any connector pins. After disconnecting the cable, verify a power down message is not displayed. If a power down message is displayed, push the QUIT key to cancel the power down.

b. DAGR to DAGR Information Transfer (Advanced Function Set)

NOTE

In the following steps, refer to Paragraph 12.3 for setting DAGR to the advanced function set and refer to Paragraph 11.3.3 for additional COM Port Setup page information.

(1) Connect both DAGRs together with the DAGR to DAGR data cable assembly using the J2 external connector on both units.

(2) Push the PWR key to set power ON for both DAGRs. Acknowledge power-on status display if required.

(3) Set both DAGRs to use the Advanced Function Set.

(4) On both DAGRs, from the main menu, highlight Communications. Push the ENTER key. Highlight COM Port Setup, then push the ENTER key.

(5) On the COM Port Setup page of both DAGRs, set the COM field to COM Port 1.

(6) On the COM Port Setup page of both DAGRs, set the Configuration field to Standard.

(7) On the sending DAGR, push the PAGE key to access the Data Transfer page.

(8) On the Data Transfer page of the sending DAGR, set the COM Port field to COM Port 1.

(a) Highlight the COM Port field, then push the ENTER key.

(b) Highlight COM Port 1, then push the ENTER key.

(9) On the Data Transfer page of the sending DAGR, set the Mode field to DAGR.

(a) Highlight the Mode field, then push the ENTER key.

(b) Highlight DAGR, then push the ENTER key.

(10) On the Data Transfer page of the sending DAGR, select the type of data to be sent in the Data To Transfer field.

NOTE

If transferring waypoint data, use standard editing practices to set the From WP and To WP fields to the appropriate range of waypoints needed, otherwise all 999 waypoints will be transferred.

(a) Highlight the Data To Transfer field, then push the ENTER key.

(b) Highlight the desired selection, then push the ENTER key.

(11) On the Data Transfer page of the sending DAGR, push the MENU key, then highlight Start Data XFR. Push ENTER key to initiate the data transfer process.

(12) If maps/images are being transferred, the sending DAGR displays a message that maps and images may take a long time (up to 35 minutes). When the message is displayed, push the ENTER key to continue.

(13) Messages will show on both DAGR displays indicating the data transfer is starting, in progress, complete, aborted, or failed. Follow instructions on display.

(14) While maps/images are being transferred, both DAGRs display a progress bar and a percentage of completion value (for data transmit or data receive). When prompted by the display, push the ENTER key on both DAGRs to perform a restart.

NOTE

Maps and images loaded into the receiving DAGR can be viewed by using procedures found in Paragraph 9.6.3 (Situational Awareness page) and Paragraph 9.7.3 (Image Viewer page).

(15) When data transfer is complete, perform one of the following:

(a) Set power to off on both pieces of equipment (push and hold DAGR PWR key). Remove the data cable assembly.

(b) Disconnect the data cable assembly and perform other DAGR operations as desired.

NOTE

To prevent an unintended DAGR power down when disconnecting the data cable, do not allow the cable shield to contact any connector pins. After disconnecting the cable, verify a power down message is not displayed. If a power down message is displayed, push the QUIT key to cancel the power down.

c. DAGR (Basic Function Set) to PLGR Information Transfer

(1) Connect the DAGR and PLGR together with the DAGR to DAGR data cable assembly using the J2 external connector on both units.

(2) Push the PWR key to set power ON for the DAGR. Acknowledge power-on status display if required. Set power to ON for the PLGR.

(3) Set the DAGR to use the Basic Function Set. Refer to Paragraph 12.3 for additional information.

(4) On the PLGR, set the I/O configuration to Standard (baud = 9600 and parity = none).

(5) On the Data Transfer page of the DAGR, set the COM Port field to COM Port 1.

(a) Highlight the COM Port field, then push the ENTER key.

(b) Highlight COM Port 1, then push the ENTER key.

(6) On the Data Transfer page of the DAGR, set the Mode field to PLGR.

(a) Highlight the Mode field, then push the ENTER key.

(b) Highlight PLGR, then push the ENTER key.

(7) On the Data Transfer page of the DAGR, select the type of data to be sent in the Data To Transfer field.

NOTE

If transferring waypoint data, use standard editing practices to set the From WP and To WP fields to the appropriate range of waypoints needed, otherwise all 999 waypoints will be transferred.

(a) Highlight the Data To Transfer field, then push the ENTER key.

(b) Highlight the desired selection, then push the ENTER key.

(8) On the Data Transfer page of the DAGR, push the MENU key, then highlight Start Data XFR. Push the ENTER key to initiate the data transfer process.

(9) Messages will show on both DAGR and PLGR displays indicating the data transfer is starting, in progress, complete, aborted, or failed. Follow instructions on display.

(10) When data transfer is complete, perform one of the following:

(a) Set power to off on both pieces of equipment (push and hold DAGR PWR key). Remove the data cable assembly.

(b) Disconnect the data cable assembly and perform other DAGR operations as desired.

NOTE

To prevent an unintended DAGR power down when disconnecting the data cable, do not allow the cable shield to contact any connector pins. After disconnecting the cable, verify a power down message is not displayed. If a power down message is displayed, push the QUIT key to cancel the power down.

d. DAGR (Advanced Function Set) to PLGR Information Transfer

NOTE

In the following steps, refer to Paragraph 12.3 for setting DAGR to the advanced function set and refer to Paragraph 11.3.3 for additional COM Port Setup page information.

(1) Connect the DAGR and PLGR together with the DAGR to DAGR data cable assembly using the J2 external connector on both units.

(2) Push the PWR key to set power ON for the DAGR. Acknowledge power-on status display if required. Set power to ON for the PLGR.

(3) Set the DAGR to use the Advanced Function Set.

(4) From the DAGR main menu, highlight Communications. Push the ENTER key. Highlight COM Port Setup, then push the ENTER key.

(5) On the COM Port Setup page of the DAGR, set the COM field to COM Port 1.

(6) On the COM Port Setup page of the DAGR, set the Configuration field to Standard.

(7) On the PLGR, set the I/O configuration to Standard (baud = 9600 and parity = none).

(8) On the DAGR, push the PAGE key to access the Data Transfer page.

(9) On the Data Transfer page of the DAGR, set the COM Port field to COM Port 1.

(a) Highlight the COM Port field, then push the ENTER key.

(b) Highlight COM Port 1, then push the ENTER key.

(10) On the Data Transfer page of the DAGR, set the Mode field to PLGR.

(a) Highlight the Mode field, then push the ENTER key.

(b) Highlight PLGR, then push the ENTER key.

(11) On the Data Transfer page of the DAGR, select the type of data to be sent in the Data To Transfer field.

NOTE

If transferring waypoint data, use standard editing practices to set the From WP and To WP fields to the appropriate range of waypoints needed, otherwise all 999 waypoints will be transferred.

(a) Highlight the Data To Transfer field, then push the ENTER key.

(b) Highlight the desired selection, then push the ENTER key.

(12) On the Data Transfer page of the DAGR, push the MENU key, then highlight Start Data XFR. Push the ENTER key to initiate the data transfer process.

(13) Messages will show on both DAGR and PLGR displays indicating the data transfer is starting, in progress, complete, aborted, or failed. Follow instructions on display.

(14) When data transfer is complete, perform one of the following:

(a) Set power to off on both pieces of equipment (push and hold DAGR PWR key). Remove the data cable assembly.

(b) Disconnect the data cable assembly and perform other DAGR operations as desired.

NOTE

To prevent an unintended DAGR power down when disconnecting the data cable, do not allow the cable shield to contact any connector pins. After disconnecting the cable, verify a power down message is not displayed. If a power down message is displayed, push the QUIT key to cancel the power down.

e. PLGR to DAGR (Basic Function Set) Information Transfer

(1) Connect the DAGR and PLGR together with the DAGR to DAGR data cable assembly using the J2 external connector on both units.

(2) Push the PWR key to set power ON for the DAGR. Acknowledge power-on status display if required. Set power to ON for the PLGR.

(3) Set the DAGR to use the Basic Function Set. Refer to Paragraph 12.3 for additional information.

(4) On the PLGR, set the I/O configuration to Standard (baud = 9600 and parity = none).

(5) On the PLGR, select data to be sent.

(6) On the PLGR, initiate the data transfer.

(7) Messages will show on both PLGR and DAGR displays indicating the data transfer is starting, in progress, complete, aborted, or failed. Follow instructions on display.

(8) When data transfer is complete, perform one of the following:

(a) Set power to off on both pieces of equipment (push and hold DAGR PWR key). Remove the data cable assembly.

(b) Disconnect the data cable assembly and perform other DAGR operations as desired.

NOTE

To prevent an unintended DAGR power down when disconnecting the data cable, do not allow the cable shield to contact any connector pins. After disconnecting the cable, verify a power down message is not displayed. If a power down message is displayed, push the QUIT key to cancel the power down.

f. PLGR to DAGR (Advanced Function Set) Information Transfer

NOTE

In the following steps, refer to Paragraph 12.3 for setting DAGR to the advanced function set and refer to Paragraph 11.3.3 for additional COM Port Setup page information.

(1) Connect the DAGR and PLGR together with the DAGR to DAGR data cable assembly using the J2 external connector on both units.

(2) Push the PWR key to set power ON for the DAGR. Acknowledge power-on status display if required. Set power to ON for the PLGR.

(3) Set the DAGR to use the Advanced Function Set.

(4) From the DAGR main menu, highlight Communications. Push the ENTER key. Highlight COM Port Setup, then push the ENTER key.

(5) On the COM Port Setup page of the DAGR, set the COM field to COM Port 1.

(6) On the COM Port Setup page of the DAGR, set the Configuration field to Standard.

(7) On the PLGR, set the I/O configuration to Standard (baud = 9600 and parity = none).

(8) On the PLGR, select data to be sent.

(9) On the PLGR, initiate the data transfer.

(10) Messages will show on both PLGR and DAGR displays indicating the data transfer is starting, in progress, complete, aborted, or failed. Follow instructions on display.

(11) When data transfer is complete, perform one of the following:

(a) Set power to off on both pieces of equipment (push and hold DAGR PWR key). Remove the data cable assembly.

(b) Disconnect the data cable assembly and perform other DAGR operations as desired.

NOTE

To prevent an unintended DAGR power down when disconnecting the data cable, do not allow the cable shield to contact any connector pins. After disconnecting the cable, verify a power down message is not displayed. If a power down message is displayed, push the QUIT key to cancel the power down.

11.2.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 11-2 shows the keystroke map for the Data Transfer page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Data Transfer page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Communications submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

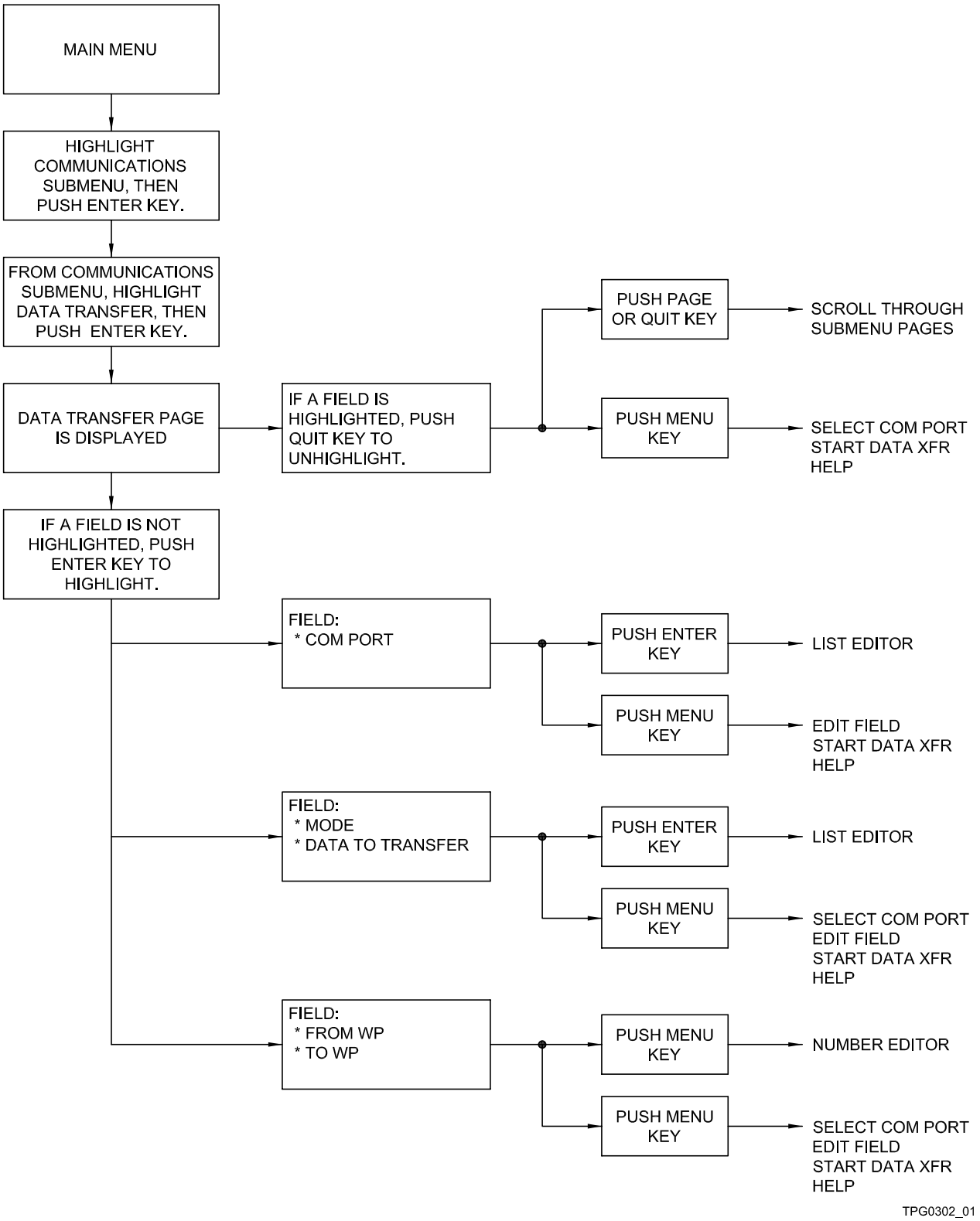


Figure 11-2. Data Transfer Page Keystroke Map

11.3. COM PORT SETUP PAGE (ADVANCED).

11.3.1. Page Function.

The COM Port Setup page is accessed from the Communications submenu. The COM Port Setup page is used to configure the COM1, COM2, and COM3 data interface ports. COM Port 1 and COM Port 2 are accessed from DAGR connector J2. COM Port 3 is accessed from DAGR connector J1. Configuration can be set for the COM 2 port to operate redundant of the COM 1 port. Using the basic function set, the operator cannot change the COM port settings from the DAGR keypad. The standard configuration is as follows:

- **Protocol** — ICD-153
- **In/Out Baud** — 9600
- **In/Out Parity** — None

11.3.1.1. When in the standard configuration, the configuration field displays Standard. It is possible to change the COM port settings over the serial port. When this has occurred, the configuration field displays Custom. The operator can reset the configuration back to Standard from the page menu. The Operator ID is edited to a unique self identifying value. Figure 11-3 shows the COM Port Setup page using the basic function set.

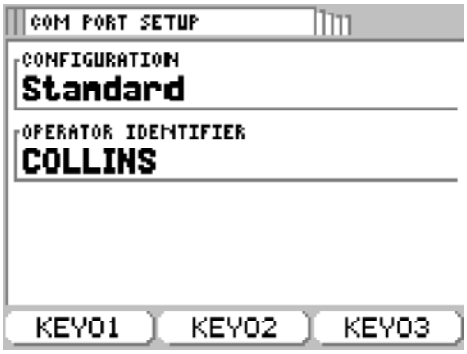


Figure 11-3. COM Port Setup Page (Basic)

11.3.1.2. When using the advanced function set, all fields are viewed using vertical scrolling. Each COM port protocol, baud rate, and parity can be independently configured. The current COM port being edited is displayed at the top of the second and third page views. Change the COM field to edit a different COM port.

11.3.1.3. When configured for National Marine Electronics Association (NMEA), the operator must select which NMEA sentences to output as well as the NMEA Interval (rate the data is output) and the NMEA Node ID (only needed for the STN NMEA sentence). Figure 11-4 shows the COM Port Setup page using the advanced function set. The DAGR supports the following protocols:

- Input and Output ICD-153
- Output NMEA (Advanced)
- Input DGPS Corrections (Advanced)

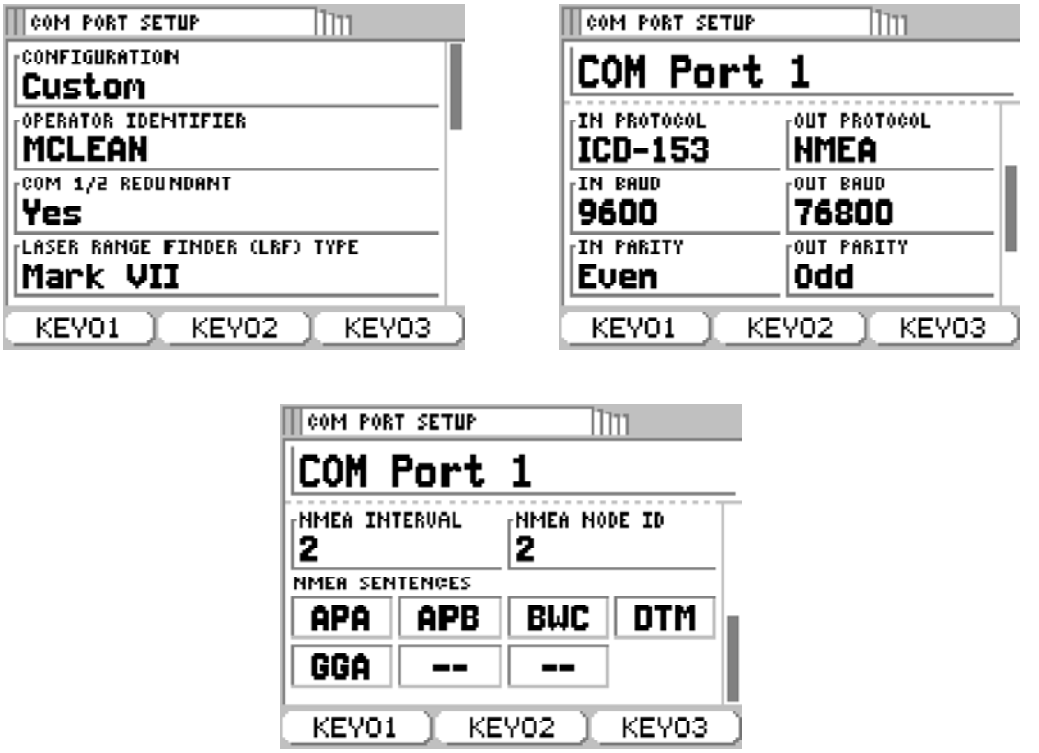


Figure 11-4. COM Port Setup Page (Advanced)

11.3.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 11-5. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

11.3.2.1. Configuration Field. Displays Standard when all data interface parameters are set to standard (default) configuration values, otherwise, Custom is displayed. To fully configure data interface parameters requires use of the advanced function set. Table 11-1 provides a listing of Standard configuration values.

Table 11-1. Standard Configuration Values

COM 1, COM 2, and COM 3 Standard Configuration	
In Protocol	ICD-153
In Baud	9600
In Parity	None
Out Protocol	ICD–153
Out Baud	9600
Out Parity	None

Table 11-1. Standard Configuration Values - Continued

COM 1, COM 2, and COM 3 Standard Configuration	
NMEA Interval	2 Seconds
NMEA Sentence	RMC

11.3.2.2. Operator Identifier Field. Displays the operator identifier as a unique ten character self identifying value. Up to eleven operator IDs can be input and stored. Any changes made to the field content or stored operator IDs will also change the Present Position page Operator ID field.

11.3.2.3. COM 1/2 Redundant Field (Advanced). Displays Yes or No. When Yes is displayed, COM Port 2 is configured the same as COM Port 1 (protocol, baud rate, parity, and selected data) and these ports output identical data.

11.3.2.4. Laser Range Finder (LRF) Type Field (Advanced). Displays Other or Mark VII. When Other is displayed, the DAGR can be used with a laser range finder other than the Mark VII. When Mark VII is displayed, the DAGR can be used with a Mark VII laser range finder.

11.3.2.5. COM Field (Advanced). Displays the current COM port to be configured from the page fields. Field selections are COM Port 1, COM Port 2, and COM Port 3.

11.3.2.6. In Protocol Field (Advanced). Displays the protocol as ICD-153 or LADGPS, used to receive data. Each COM port is independently configured.

11.3.2.7. Out Protocol Field (Advanced). Displays the protocol as ICD-153 or NMEA, used to output data. Each COM port is independently configured.

11.3.2.8. In Baud Field (Advanced). Displays the baud rate used to receive data. Each COM port is independently configured. Baud rate value selections are 300, 600, 1200, 2400, 4800, 9600, 19200, 38400 and 76800. COM 2 also supports 115200 baud.

11.3.2.9. Out Baud Field (Advanced). Displays the baud rate used to output data. Each COM port is independently configured. Baud rate value selections are 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, and 76800. COM 2 also supports 115200 baud.

11.3.2.10. In Parity Field (Advanced). Displays the parity used to receive data. Each COM port is independently configured. Selections are None, Odd, or Even.

11.3.2.11. Out Parity Field (Advanced). Displays the parity used to output data. Each COM port is independently configured. Selections are None, Odd, or Even.

11.3.2.12. NMEA Interval Field (Advanced). Displays the National Marine Electronics Association (NMEA) interval selection in seconds. The displayed time value is the number of seconds (1 to 10) to elapse before repeating each set of selected NMEA sentences.

11.3.2.13. NMEA Node ID Field (Advanced). Displays the selected NMEA node ID (0 to 99). This identification value is unique on the NMEA network. NMEA Node ID is only needed for the STN NMEA sentence.

11.3.2.14. NMEA Sentences Field (Advanced). Seven fields display up to seven NMEA sentences selected to output. All selections, except the double dash, can only appear in one sentence field at a time. Possible selections are as follows: --, APA, APB, BWC, DTM, GGA, GLL, GSA, GSV, RMA, RMB, RMC, RTE, STN, TXT, VTG, WCV, WNC, WPL, XTE, ZDA, ZDL, ZLZ, and ZTG.

11.3.3. How To Use The COM Port Setup Page.

This page contains information used to configure the DAGR communication ports (COM1, COM2, or COM3) for compatibility with another piece of equipment. This configuration enables successful transfer of data to and from the DAGR using external connectors J1 or J2. The communication port protocol, baud, and parity data are set per standard configuration values when using the basic function set; and are either set to standard, or revised in accordance with the equipment used in the data transfer when using the advanced function set. Once the communication port is configured, refer to Paragraph 11.2 on how to transfer data.

11.3.3.1. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting data and changing field information. When a text editor is used, the menu key can be pushed to access a list of options

(undo changes, save and exit, exit and no save, reset to default, and editor help). These options provide text editor shortcuts and pertain to the immediate function being performed (e.g., using a text editor).

11.3.3.2. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Communications, then push the ENTER key.
3. Highlight COM Port Setup, then push the ENTER key. The COM Port Setup page is displayed.

a. Configuration using basic function set

(1) Configuration is set to Standard and cannot be edited. Refer to Table 11-1 for standard configuration values.

(2) Only the Operator Identifier field can be edited, and is a user option.

b. Configuration using advanced function set

NOTE

All fields use either a list, text, or number editor for revising information.

(1) From the COM Port Setup page (without any fields highlighted), push the MENU key.

(2) Highlight Select COM Port, then push the ENTER key.

(3) Highlight desired COM port (COM Port 1, COM Port 2, or COM Port 3), then push the ENTER key. Display returns to the COM Port Setup page.

(4) Highlight desired field to be revised. Push the ENTER key for edit capabilities.

(5) Revise the selected field information, then push the ENTER key to save changes for number or list editors. When using a text editor, highlight SAVE or push the MENU key and highlight SAVE and EXIT, then push the ENTER key to save changes.

(6) Use the cursor control keys and the ENTER key in a similar manner to select and individually revise all of the remaining fields as required.

(7) Repeat entire procedure for remaining COM ports as required.

c. Reset configuration to standard

(1) From the COM Port Setup page with no fields highlighted, push the MENU key.

(2) Highlight Reset To Standard, then push the ENTER key.

(3) Display returns to the COM Port Setup page and resets the following to standard configuration for all COM ports.

- In/Out parity
- In/Out baud rate
- In/Out protocol
- NMEA values

d. Use NMEA defaults (Advanced)

(1) From the COM Port Setup page, highlight the Out Protocol field, then push the ENTER key.

(2) Highlight NMEA, then push the ENTER key.

(3) Highlight Out Protocol field, then push the MENU key.

(4) Highlight Use NMEA Defaults, then push the ENTER key.

(5) Display returns to the COM Port Setup page and the following fields are set as listed. The COM ports must be individually set to use NMEA defaults.

- Out parity set to NONE
- Out baud rate set to 4800

11.3.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 11-5 shows the keystroke map for the COM Port Setup page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the COM Port Setup page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Communications submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

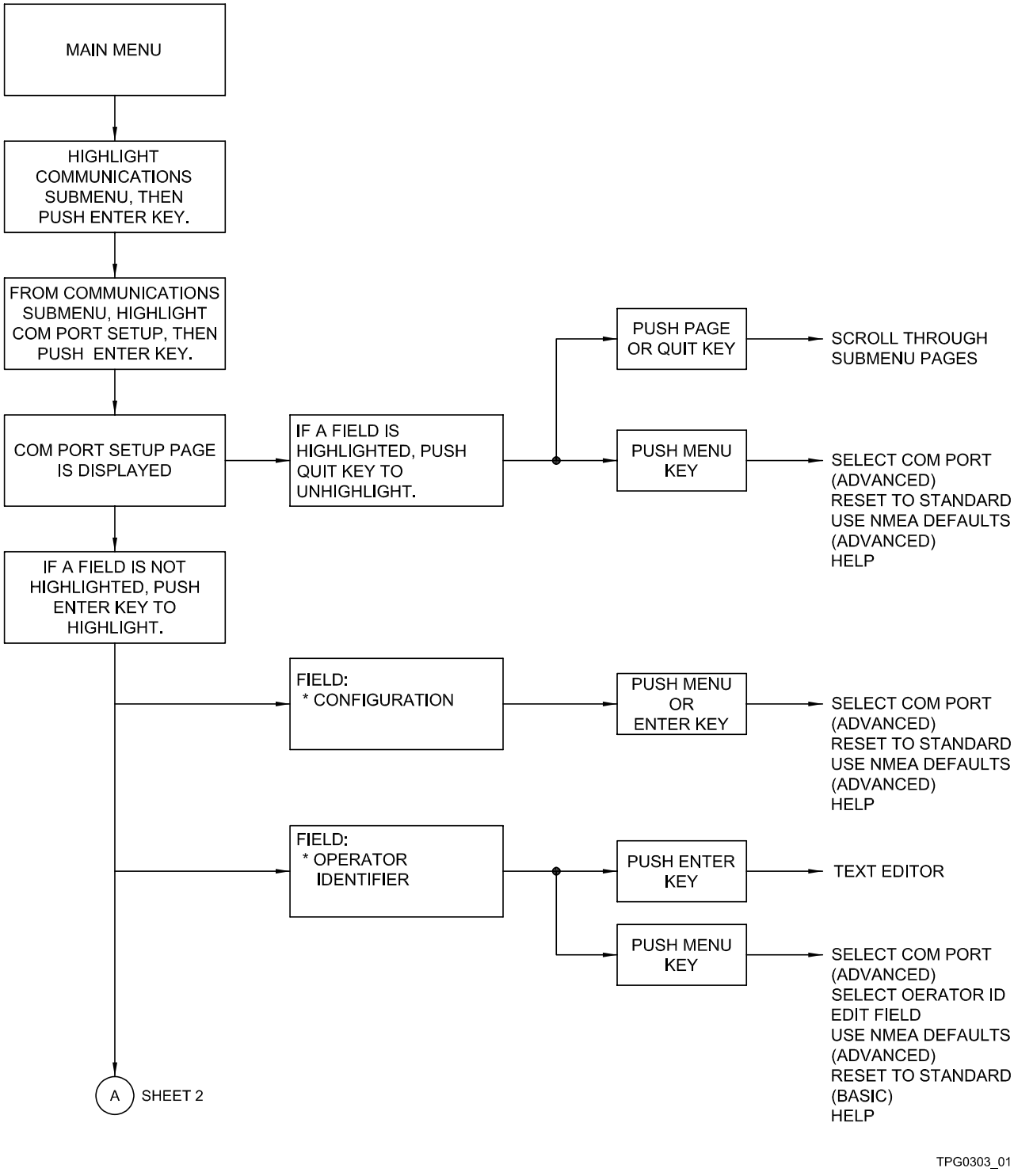


Figure 11-5. COM Port Setup Page Keystroke Map (Sheet 1 of 2)

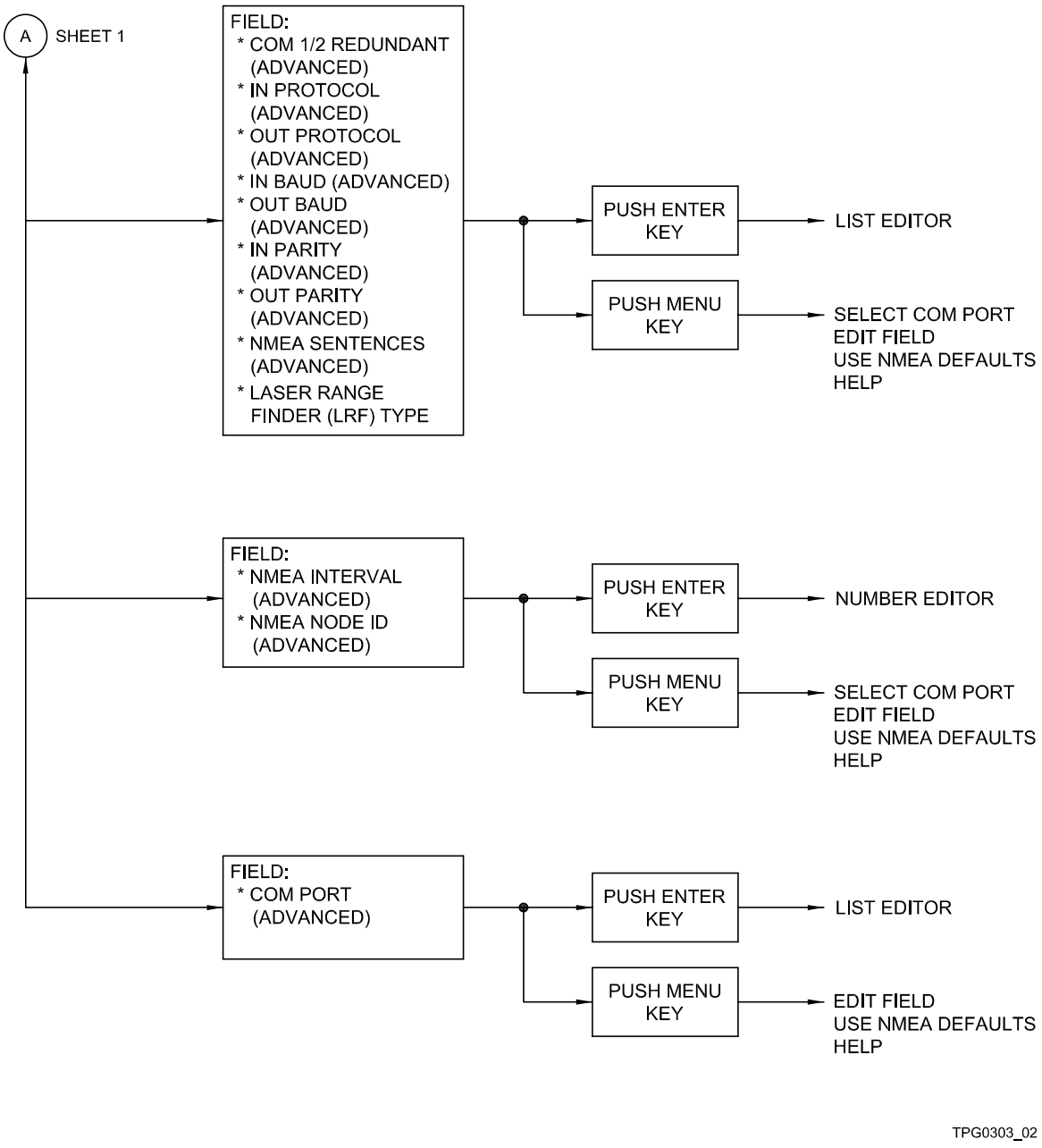


Figure 11-5. COM Port Setup Page Keystroke Map (Sheet 2)

11.4. PPS, HQ, SINCGARS PAGE.

11.4.1. Page Function.

The PPS (Pulse-Per-Second), HQ (Have Quick), SINCGARS (Single Channel Ground and Airborne Radio System) page is accessed from the Communications submenu. This page provides time outputs from the DAGR used to synchronize radios or other devices. The PPS, HQ, SINCGARS page is shown in Figure 11-6 and Figure 11-7.

NOTE

COM Port 1 and COM Port 2 are accessed from DAGR connector J2. COM Port 3 is accessed from DAGR connector J1.

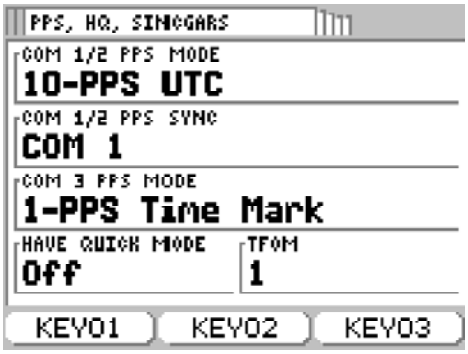


Figure 11-6. PPS, HQ, SINCGARS Page (AN/PSN-13)

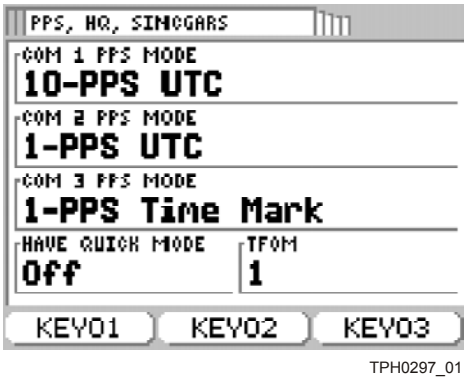


Figure 11-7. PPS, HQ, SINCGARS Page (AN/PSN-13A)

11.4.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 11-8. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

11.4.2.1. COM 1/2 PPS Mode Field (AN/PSN-13). Displays the type of pulse per second (PPS) mode used for the COM 1 and COM 2 PPS sync selection output. The PPS time pulse output data is associated with COM 1, COM 2, or both COM 1 and COM 2 simultaneously. Selections are:

- Off

- 1-PPS UTC (time downloaded from satellite)
- 1-PPS Time Mark (time from DAGR internal clock)
- 10-PPS UTC (time downloaded from satellite)

11.4.2.2. COM 1/2 PPS Sync Field (AN/PSN-13). Displays the port selected for outputting PPS time outputs (of the COM 1 and COM 2 PPS Mode). Selections are:

- COM 1
- COM 2
- COM 1 and COM 2

11.4.2.3. COM 1 PPS Mode Field (AN/PSN-13A). Displays the type of PPS mode used for the COM 1 PPS sync selection output. The COM 1 PPS Mode field controls the COM 2 PPS output when the COM 1/2 Redundant field of the COM Port Setup page is set to Yes. Selections are:

- Off
- 1-PPS UTC (time downloaded from satellite)
- 1-PPS Time Mark (time from DAGR internal clock)
- 10-PPS UTC (time downloaded from satellite)

11.4.2.4. COM 2 PPS Mode Field (AN/PSN-13A). Displays the type of PPS mode used for the COM 2 PPS sync selection output. Selections are:

- Off
- 1-PPS UTC (time downloaded from satellite)
- 1-PPS Time Mark (time from DAGR internal clock)
- 10-PPS UTC (time downloaded from satellite)

11.4.2.5. COM 3 PPS Mode Field. Displays the type of PPS mode used for the COM 3 PPS sync selection output. Selections are:

- Off
- 1-PPS UTC (time downloaded from satellite)
- 1-PPS Time Mark (time from DAGR internal clock)
- 10-PPS UTC (time downloaded from satellite)

11.4.2.6. Have Quick Mode Field. Displays the Have Quick mode status as On or Off. When Have Quick mode is set to On, the DAGR performs timefill (outputs current time of day). The timefill is output on DAGR J2 connector. Before the timefill output can occur, the time figure of merit (TFOM) field must have a value of 7 or less.

11.4.2.7. TFOM Field. Displays the time error as time figure of merit (TFOM) number (1 through 9) where 1 is best. Refer to Table 9-2 for corresponding time estimated error values. This field is for status only and not editable by the operator.

11.4.3. How To Use The PPS, HQ, SINCGARS Page .

This page is used to configure a DAGR communication port for a time synchronizing output from the DAGR (using external connectors J1 or J2) to another piece of equipment. Once DAGR is configured and the other equipment is connected to DAGR, select the Activate SINCGARS function from the PPS, HQ, SINCGARS page menu to perform the synchronization process. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting data and changing field information.

11.4.3.1. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Communications, then push the ENTER key.
3. Highlight PPS/HQ/SINCGARS, then push the ENTER key. The PPS/HQ/SINCGARS page is displayed.

NOTE

All fields use a list editor for revising field information, except for the TFOM field which is for status information only and is not edited.

a. From the PPS, HQ, SINCGARS page, push the ENTER key to highlight a field.
b. Scroll to highlight the desired field, then push the ENTER key for edit capabilities.
c. Revise the selected field with appropriate information.
d. Use the cursor control keys and the ENTER key in a similar manner to select and individually revise all of the remaining fields as required.
e. When all fields are revised with appropriate information, push the MENU key.
f. Connect DAGR to external equipment and ensure external equipment is powered on before activating the SINCGARS function.

NOTE

The DAGR is connected to external equipment using the applicable cable as follows:

- SINCGARS — PLGR/SINCGARS cable adapter connected to DAGR connector J1.
- HAVE QUICK — DAGR/HAVE QUICK cable connected to DAGR connector J2.
- PPS — DAGR/DAGR/PLGR cable connected to DAGR connector J2.

g. Highlight Activate SINCGARS, then push the ENTER key and follow display instructions and messages.

11.4.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 11-8 shows the keystroke map for the PPS, HQ, SINCGARS page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the PPS, HQ, SINCGARS page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Communications submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

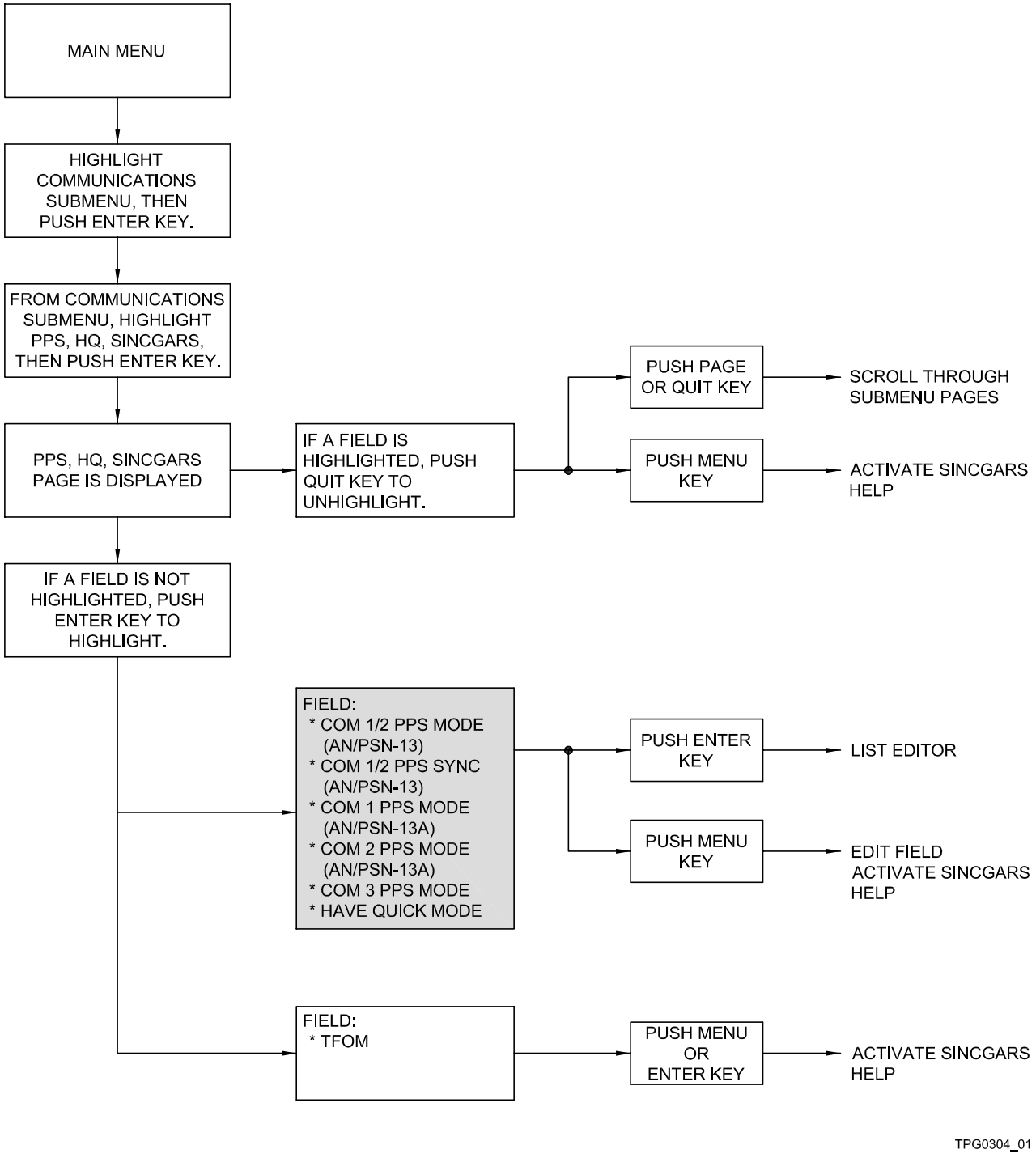


Figure 11-8. PPS, HQ, SINCGARS Page Keystroke Map

11.5. CRYPTO FILL PAGE.

Refer to Crypto Fill page information in Paragraph 7.2.

11.6. CONNECTOR STATUS PAGE.

11.6.1. Page Function.

The Connector Status page is accessed from the Communications submenu. The Connector Status page identifies the DAGR power supply type, antenna type, 1PPS input activity, and individual COM port activity based upon signals input to the receiver. The Connector Status page is shown in Figure 11-9.

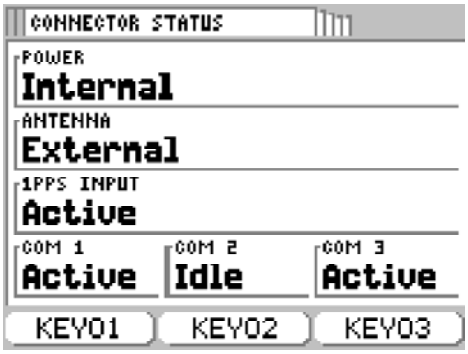


Figure 11-9. Connector Status Page

11.6.2. Field Descriptions.

Field information of this page cannot be edited by the operator. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors. The following information describes the various fields contained in this page.

11.6.2.1. Power Field. Displays power source status as External or Internal.

11.6.2.2. Antenna Field. Displays antenna status as Internal or External.

11.6.2.3. 1PPS Input Field. Displays 1PPS input status as inactive or active.

11.6.2.4. COM Fields. Displays the receiver COM port status for each of three COM ports (COM 1, COM 2, and COM 3) as Idle or Active.

11.6.3. How To Use The Connector Status Page.

This page is used to acquire status information only, and cannot be edited by the operator. Refer to the keystroke map, and use the preceding field descriptions to acquire DAGR connector status information. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Communications, then push the ENTER key.
3. Highlight Connector Status, then push the ENTER key. The Connector Status page is displayed.

11.6.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 11-10 shows the keystroke map for the Connector Status page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Connector Status page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Communications submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

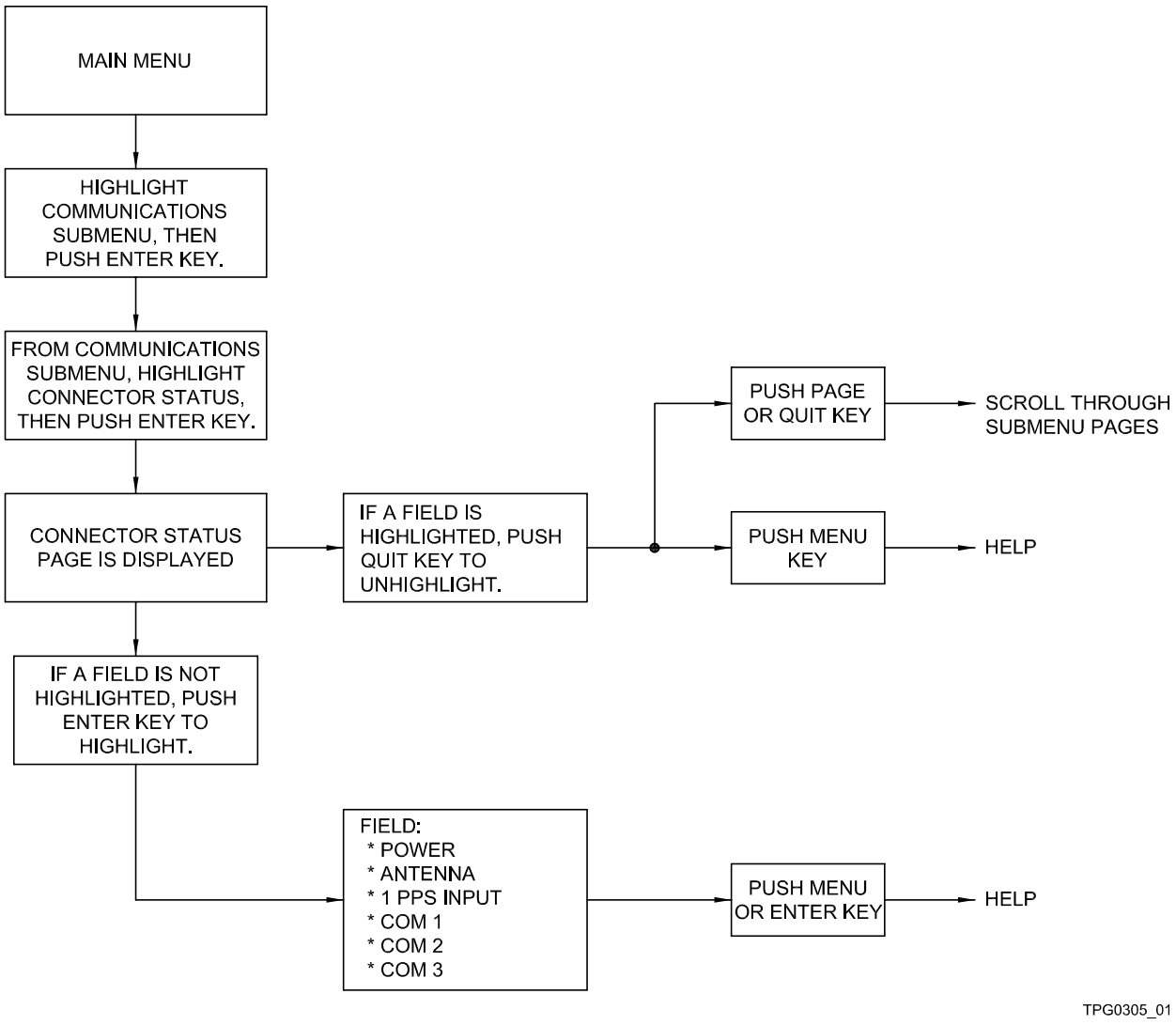


Figure 11-10. Connector Status Page Keystroke Map

CHAPTER 12
OPERATOR INSTRUCTIONS — SYSTEM SUBMENU OPERATION

12.1. SYSTEM SUBMENU.

This chapter contains System submenu operation information. The System submenu page set provides the following selections described in this chapter:

- Test Summary
- Select Function Set
- User Profiles (Advanced)
- Data Clear Options
- About

12.2. TEST SUMMARY PAGE.

CAUTION

If the Test Summary page Status field indicates Test Failed, do not use the DAGR. The DAGR is not fully functional and could provide inaccurate data.

12.2.1. Page Function.

The Test Summary page is accessed from the System submenu. Refer to Figure 12-1. The Test Summary page displays results of the last self-test performed (power-on or operator commanded) in support of DAGR maintenance. Information obtained through self-test is shown in the results table. This information is designated as Fail or Info in the F/I column, and described in the Device Description column. The Fail notation indicates a problem with DAGR in accordance with the description. The Info notation provides information about DAGR and can be ignored as it does not impact DAGR operation. The information contained in the results table can be reviewed by the user, but is used mostly by the repair technician. The F/I and Device Description columns of the table are most important to the user. These two columns provide the user with descriptive information about DAGR performance. The page is scrolled vertically to view all rows and scrolled horizontally to view all columns of the results table. Specific page fields involving testing and displayed information are described as follows.

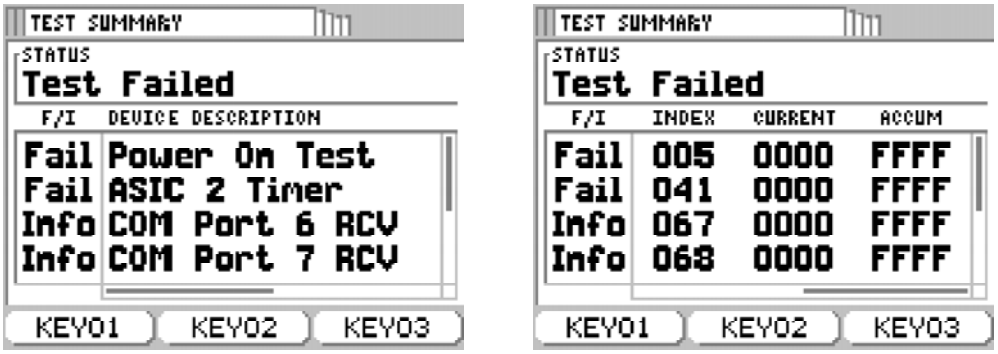


Figure 12-1. Test Summary Page

12.2.2. Field Descriptions.

Field information of this page cannot be edited by the operator except for clearing a single device or all device information shown in the results table. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors. The following information describes the various fields contained in this page.

12.2.2.1. Status Field. Displays the results of the last self-test (power-on or operator commanded) as Test Failed or Test Passed.

12.2.2.2. Results Table. The results table displays five columns of information described as follows. If no faults or information messages exist, the individual table fields display "- -".

- **F/I** — Displays information as FAIL or INFO.
- **DEVICE DESCRIPTION** — Displays a brief device description. Refer to Table 12-1 for a listing of all fail or info device descriptions and corresponding index values.
- **INDEX** — Displays an index value of three digits corresponding to the device description.
- **CURRENT** — Displays the current device value consisting of four digits.
- **ACCUM** — Displays an accumulated device value consisting of four digits.

Table 12-1. Results Table Data

F/I	DEVICE DESCRIPTION	IN-DEX	F/I	DEVICE DESCRIPTION	IN-DEX
Fail	Power On Test (AN/PSN-13) Spare (AN/PSN-13A)	005	Fail	LPTS Test	006
Fail	1PPS/HaveQuick	007	Fail	Security Module (AN/PSN-13) Spare (AN/PSN-13A)	008
Fail	RAM Zeroize	009	Fail	RAM Test	010
Fail	ROM Test	011	Fail	EEPROM Test	012
Fail	Freq Standard	013	Fail	ASIC Access Test (AN/PSN-13) Spare (AN/PSN-13A)	014
Fail	ACE Test (AN/PSN-13) Spare (AN/PSN-13A)	015	Fail	Channel 1 Test	016
Fail	Channel 2 Test	017	Fail	Channel 3 Test	018
Fail	Channel 4 Test	019	Fail	Channel 5 Test	020
Fail	Channel 6 Test	021	Fail	Channel 7 Test	022
Fail	Channel 8 Test	023	Fail	Channel 9 Test	024
Fail	Channel 10 Test	025	Fail	Channel 11 Test	026
Fail	Channel 12 Test	027	Fail	Channel 13 Test	028
Fail	Channel 14 Test	029	Fail	Channel 15 Test	030
Fail	Channel 16 Test	031	Fail	Channel 17 Test	032
Fail	Channel 18 Test	033	Fail	Channel 19 Test	034
Fail	Channel 20 Test	035	Fail	Channel 21 Test	036
Fail	Channel 22 Test	037	Fail	Channel 23 Test	038

Table 12-1. Results Table Data - Continued

F/I	DEVICE DESCRIPTION	IN-DEX	F/I	DEVICE DESCRIPTION	IN-DEX
Fail	Channel 24 Test	039	Fail	ASIC 1 Timer	040
Fail	ASIC 2 Timer	041	Fail	COM Ports 1-4	042
Fail	COM Ports 5-8	043	Fail	GPO Test	044
Fail	KDP Test	045	Fail	SAASM Test 2	046
Fail	SAASM Test 3	047	Fail	SAASM Test 4	048
Fail	RTOS/Boot Test 1 (AN/PSN-13) Spare (AN/PSN-13A)	049	Fail	RTOS/Boot Test 2 (AN/PSN-13) Spare (AN/PSN-13A)	050
Fail	APPS Test	051	Fail	CIO Wrap Test	052
Fail	Spare (AN/PSN-13) AAMP-BIST Test (AN/PSN-13A)	053	Fail	Spare (AN/PSN-13) Cougar BIST Test (AN/PSN-13A)	054
Fail	Spare (AN/PSN-13) Health Monitor (AN/PSN-13A)	055	Info	KDP Comm Info	056
Info	Real Time Exec 1	057	Info	Real Time Exec 2	058
Info	Real Time Exec 3	059	Info	RCVR Manager	060
Info	Keyboard Display	061	Info	COM Port 1 RCV	062
Info	COM Port 2 RCV	063	Info	COM Port 3 RCV	064
Info	COM Port 4 RCV	065	Info	COM Port 5 RCV	066
Info	COM Port 6 RCV	067	Info	COM Port 7 RCV	068
Info	COM Port 8 RCV	069	Info	COM Port 1 XMIT	070
Info	COM Port 2 XMIT	071	Info	COM Port 3 XMIT	072
Info	COM Port 4 XMIT	073	Info	COM Port 5 XMIT	074
Info	COM Port 6 XMIT	075	Info	COM Port 7 XMIT	076
Info	COM Port 8 XMIT	077	Info	SAASM Status	078
Info	NV Clear Status	079	Info	RCVR-to-P-Code	080
Info	Time Manager	081	Info	Antenna Status	082
Info	Power Status	083	Info	Real Time Exec 4	084
Info	Real Time Exec 5	085	Info	Real Time Exec 6	086
Info	SAASM KDP 1	087	Info	SAASM KDP 2	088
Info	SAASM KDP 3	089	Info	SAASM KDP 4	090
Info	SAASM SDBM	091	Info	SAASM Info	092
Info	SAASM Misc	093	Info	RTOS/Boot Info (AN/PSN-13) SAASM RTE 1 (AN/PSN-13A)	094
Info	RTOS/Boot Status (AN/PSN-13) SAASM RTE 2 (AN/PSN-13A)	095	Info	RTOS/Boot Memory (AN/PSN-13) SAASM RTE 3 (AN/PSN-13A)	096

Table 12-1. Results Table Data - Continued

F/I	DEVICE DESCRIPTION	IN-DEX	F/I	DEVICE DESCRIPTION	IN-DEX
Info	RTOS/Boot Fault (AN/PSN-13) SAASM RTE 4 (AN/PSN-13A)	097	Info	RTOS/Boot PCF (AN/PSN-13) SAASM RTE 5 (AN/PSN-13A)	098
Info	RTOS/Boot Count (AN/PSN-13) SAASM RTE 6 (AN/PSN-13A)	099	Info	APPS Info	100

12.2.3. How To Use The Test Summary Page.

This page contains information for the support of DAGR maintenance. If the Test Summary page Status field indicates Test Failed, it is recommended that the DAGR not be used, but check the information contained in the results table. This information is collected from the last DAGR self-test. This information guides the user to areas of the DAGR unit that may be checked. After any checks are made, do a power-on self-test, or rerun a commanded self-test (Activate Test from page menu), or perform the troubleshooting procedure in its entirety (refer to Chapter 19) to see if the problem was resolved. Refer to the keystroke map in Figure 12-2.

12.2.3.1. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight System, then push the ENTER key.
3. Highlight Test Summary, then push the ENTER key. The Test Summary page is displayed.

a. Activate Commanded Self-Test

   (1) When Activate Test is selected from the page menu, the DAGR performs a commanded self-test (refer to Paragraph 6.3.3) and shows current information in the Results table.

   (2) If the Status field shows TEST PASSED, the DAGR is ready for use. If the Status field shows TEST FAILED, the DAGR should not be used.

b. Clear Device

   (1) When Clear Device is selected from the page menu, the DAGR clears a row of information highlighted in the results table.

   (2) Some information may reappear after it is cleared. This information is a result of continuous monitoring done by the DAGR. Any Info notation that reappears can be ignored as it does not impact DAGR operation. Any Fail notation that reappears indicates a failure remains and the DAGR should not be used.

c. Clear All Devices

   (1) When Clear All Devices is selected from the page menu, the DAGR clears all information in the results table regardless of what is highlighted.

   (2) Some information may reappear after it is cleared. This information is a result of continuous monitoring done by the DAGR. Any Info notation that reappears can be ignored as it does not impact DAGR operation. Any Fail notation that reappears indicates a failure remains and the DAGR should not be used.

12.2.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 12-2 shows the keystroke map for the Test Summary page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Test Summary page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the System submenu.

- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

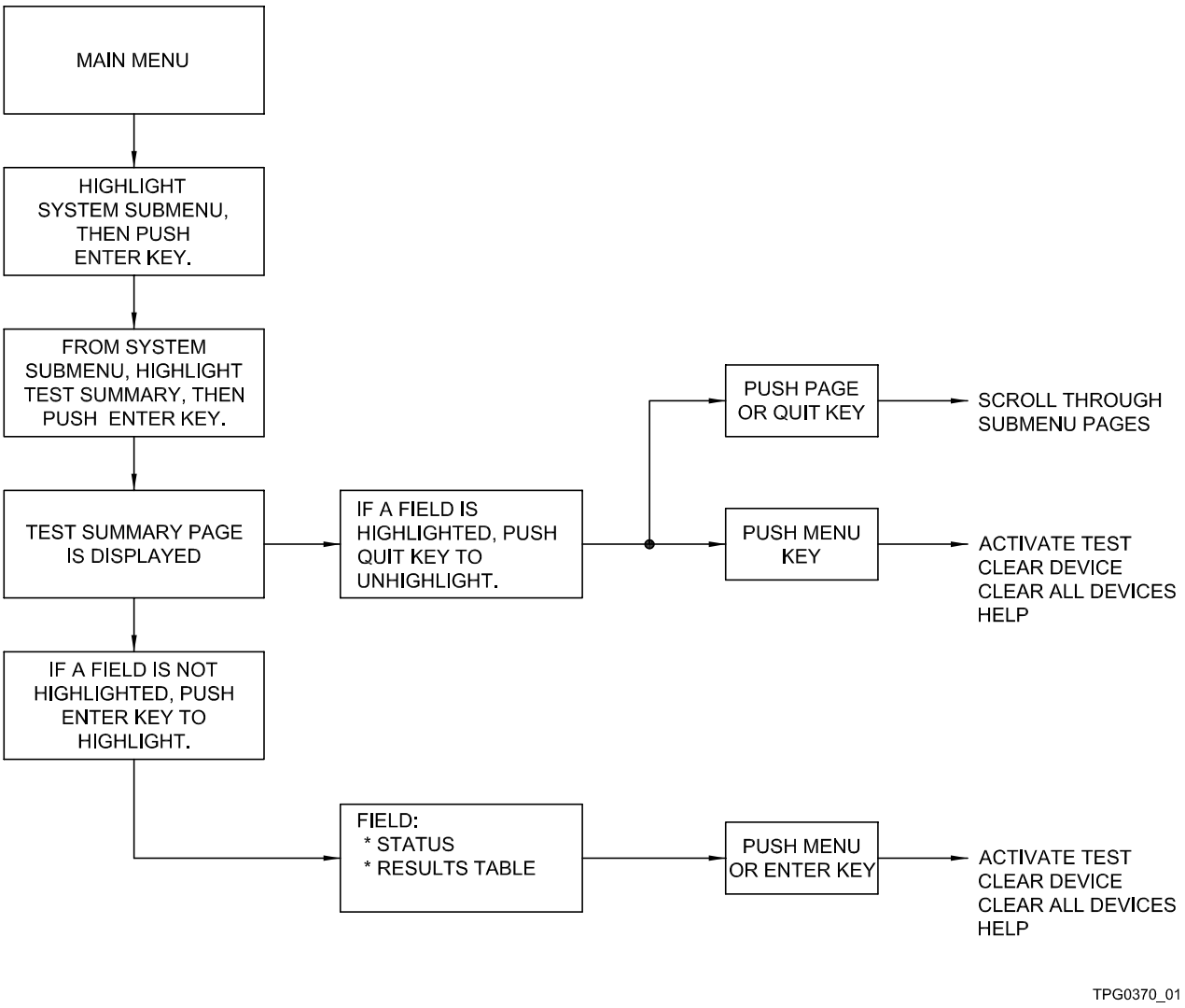


Figure 12-2. Test Summary Page Keystroke Map

12.3. SELECT FUNCTION SET (BASIC AND ADVANCED).

CAUTION

The Basic function set contains only one user profile, but the Advanced function set contains ten user profiles. When changing from Basic to Advanced function set, the DAGR defaults to the last used advanced user profile. Ensure the correct user profile is active after switching to the Advanced function set. The mission could be compromised when using the wrong user profile in the advanced function set.

12.3.1. Select Function Set Operation.

Select Function Set is accessed from the System submenu, or by using the Status key and Receiver Status menu (refer to Paragraph 6.2.24). When accessed, an editor appears instead of an actual display page, allowing the operator to choose between the basic and advanced function set. The advanced function set includes all basic function set operations plus additional operations. Refer to the menu tree shown in Figure 6-2 for a listing of submenu pages labeled Advanced. Operator confirmation is required before the DAGR changes function sets. Once the operator confirms the selection, the chosen function set is activated. The function set used when the DAGR is powered off is the function set that will be activated when the DAGR is powered back on. The Status key can be used to check current function set and user profile information.

NOTE

When switching between function sets, settings may be different using the advanced function set as opposed to the basic function set and vice versa. This is because basic function set settings (and any changes made while using the basic function set) apply to the basic function set only, and advanced function set settings (and any changes made while using the advanced function set) apply to the advanced function set only.

12.3.2. How To Select The Function Set.

This function allows the operator to switch from basic to advanced function set or vise versa. Refer to the keystroke map in Figure 12-3. After highlighting the desired function set choice (basic or advanced), the MENU key can be pushed for a list of actions (undo changes, save and exit, exit and no save, reset to default, and editor help) that can be performed when selected. Selecting a function set is directly related to the user profile information.

a. Select a function set

(1) Highlight System from the Main menu, then push the ENTER key.

(2) Highlight Select Function Set, then push the ENTER key.

(3) The current function set appears inside a box and is highlighted.

(4) Highlight the desired function set from the list editor, then push the ENTER key.

(5) When changing to a different function set, a message is displayed advising the operator that changing profiles may switch user settings. Push the ENTER key to confirm the selection and return to the Present Position page (displaying position coordinates) or push the QUIT key to cancel the selection and return to the prior page displayed.

NOTE

When using the Advanced function set, the current user profile being used can be checked by accessing the User Profile page from the System submenu. The profile shown in the Current User Profile field is the active profile being used. The Status key can also be used to check current function set and user profile information (refer to Paragraph 6.2.24).

b. Reset to the default function set

(1) Highlight System from the Main menu, then push the ENTER key.

(2) Highlight Select Function Set, then push the ENTER key.

(3) Push the MENU key.

(4) Highlight Reset To Default, then push the ENTER key. Display returns to the list editor with the default function set highlighted. Push the ENTER key to activate the default function set.

12.3.3. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 12-3 shows the keystroke map for the Select Function Set function. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Select Function Set function.

- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

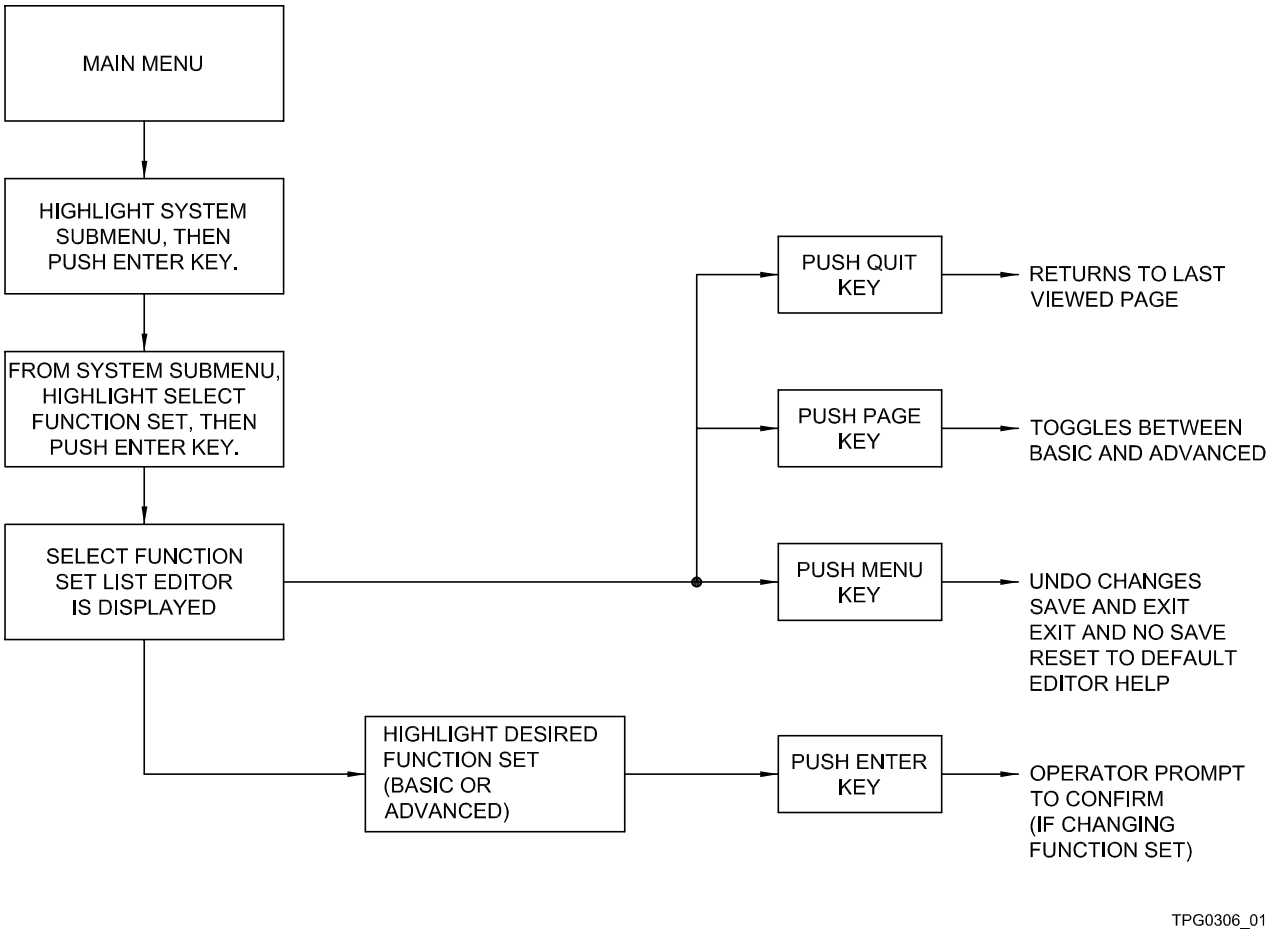


Figure 12-3. Select Function Set Keystroke Map

12.4. USER PROFILES PAGE (ADVANCED).

CAUTION

Changing DAGR settings modifies the configuration of the current user profile displayed in the Current User Profile field. Changes to a particular profile that is unfamiliar to the user could possibly put the individual or mission in danger. When changing from Basic to Advanced function set, the DAGR defaults to the last used advanced user profile. Ensure the correct user profile is active after switching to the Advanced function set.

12.4.1. Page Function.

The User Profiles page is only available when using the advanced function set and is accessed from the System submenu. DAGR can store eleven profiles consisting of one basic function set profile and ten individual advanced function set profiles. User profile number 00 is assigned to the basic function set and user profile numbers 01 through 10 are assigned to the advanced function set. A user profile is used to save a particular DAGR configuration for an individual or for a specific mission phase. User profiles are to be named appropriately to indicate intended use. Switching to a different function set or cycling power on the DAGR does not affect stored user profile receiver settings. The profile used when the DAGR is powered off is the profile that will be activated when the DAGR is powered back on. The Status key can be used to check current user profile and function set information (refer to Paragraph 6.2.24). All user profiles store the default settings shown in Table 6-1 plus any changes to these settings. Current settings of the DAGR basic function set can be copied into any user profile or reset to default values. Refer to Table 6-1 for a listing of DAGR default values. The User Profiles page is shown in Figure 12-4.

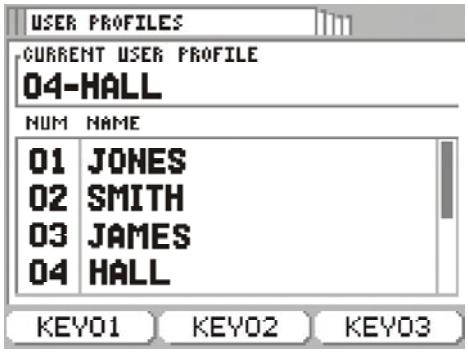


Figure 12-4. User Profiles Page (Advanced)

12.4.2. Page Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 12-5. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

12.4.2.1. Current User Profile Field. Displays the current user profile being used and includes the user profile number and name. The user profile number (not editable) consists of numbers 01 through 10, and user profile name consists of up to ten characters that can be edited by the operator. The user profile name can be edited in this field or while selected in the user profile table. Field data format is XX-NNNNNNNNNN, where X represents the user profile number and N represents the user profile name.

12.4.2.2. User Profile Table. Displays the number and name of all user profiles. The user profile number (not editable) consists of numbers 01 through 10, and user profile name consists of up to ten characters that can be edited by the operator. The user profile name can be edited in this table or while selected in the current user profile field. Vertical scrolling is used to view all user profiles.

12.4.3. How To Use The User Profiles Page.

This page contains information used to configure the DAGR according to the user profiles assigned to the DAGR. Changes made to the settings of the DAGR while using a particular user profile are automatically saved within that profile when performed. The names of the individual profiles can be edited according to user preference. When a text editor is used, the menu key can be pushed to access a list of options (undo changes, save and exit, exit and no save, reset to default, and editor help). These options provide text editor shortcuts and pertain to the immediate function being performed (e.g., using a text editor). Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting data and changing field information. The user must be in the advanced function set in order to perform the following procedures.

12.4.3.1. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight System, then push the ENTER key.
3. Highlight User Profiles, then push the ENTER key. The User Profiles page is displayed.

a. Clear Basic

NOTE

This procedure returns all user profile 00 (basic function set) settings to default values.

(1) From the User Profiles page, push the MENU key.

(2) Highlight Clear Basic, then push the ENTER key. The basic function set user profile 00 is reset to default values shown in Table 6-1.

(3) Display returns to the User Profiles page.

b. Clear Profile

The Clear Profile procedure deletes user entered information from a selected advanced function set user profile. This procedure should be used only for individual user profiles the operator is familiar with. Clearing a particular profile that is unfamiliar to the user could possibly put the individual or mission in danger.

(1) From the User Profiles page, push the ENTER key. A field is highlighted.

(2) Scroll to highlight the desired profile to be cleared, then push the MENU key.

(3) Highlight Clear Profile, then push the ENTER key.

(4) Display returns to the User Profiles page with the selected profile reset to the default name and values shown in Table 6-1.

c. Clear All Profiles

The Clear All Profiles procedure deletes user entered information in all ten advanced function set user profiles (01 through 10). If the operator does not know the use of all user profiles, this selection should not be used. Instead, the Clear Profile selection should be used only for individual user profiles the operator is familiar with. Clearing a particular profile that is unfamiliar to the user could possibly put the individual or mission in danger.

(1) From the User Profiles page, push the MENU key.

(2) Highlight Clear All Profiles, then push the ENTER key. All ten advanced function set user profiles (01 through 10) are reset to default names and values shown in Table 6-1.

(3) Display returns to the User Profiles page.

d. Select Function Set

User profile information is directly related to selecting a function set. Ensure the correct user profile is active when switching to the advanced function set. Changes to a particular profile that is unfamiliar to the user could possibly put the individual or mission in danger.

(1) From the User Profiles page, push the MENU key.

(2) Choose Select Function Set, then push the ENTER key.

(3) The current function set appears inside a box and is highlighted.

(4) Highlight the desired function set from the list editor, then push the ENTER key.

(5) When changing to a different function set, a message is displayed advising the operator that changing profiles may switch user settings. Push the ENTER key to confirm the selection and return to the Present Position page or push the QUIT key to cancel the selection and return to the User Profile page.

NOTE

When using the Advanced function set, the current user profile being used can be checked from the Current User Profile field of the User Profiles page. The Status key can also be used to check current function set and user profile information (refer to Paragraph 6.2.24).

e. Set As Current

NOTE

This procedure selects the user profile to be used.

(1) From the User Profiles page, push the ENTER key. A field is highlighted.

(2) Scroll to highlight the desired user profile to be used, then push the MENU key.

(3) Highlight Set As Current, then push the ENTER key.

(4) Display returns to the User Profiles page with the selected user profile in the Current User Profile field.

f. Copy Current Here

NOTE

This procedure copies the current user profile name and settings to a selected user profile.

(1) From the User Profiles page, push the ENTER key. A field is highlighted.

(2) Scroll to highlight the desired profile where the current user profile is going to be copied **to**, then push the MENU key.

(3) Highlight Copy Current Here, then push the ENTER key.

(4) Display returns to the User Profiles page with the selected profile reset to the current profile's name and settings. The profile number remains the same.

g. Copy Basic Here

NOTE

This procedure copies user profile 00 (basic function set) settings to a selected user profile.

(1) From the User Profiles page, push the ENTER key. A field is highlighted.

(2) Scroll to the desired profile where the Basic function set profile is going to be copied **to**, then push the MENU key.

(3) Highlight Copy Basic Here, then push the ENTER key.

(4) Display returns to the User Profiles page with the selected profile reset to user profile 00 (basic function set) settings. The profile name is changed to BASIC, but the profile number remains unchanged.

12.4.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 12-5 shows the keystroke map for the User Profiles page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the User Profiles page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the System submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

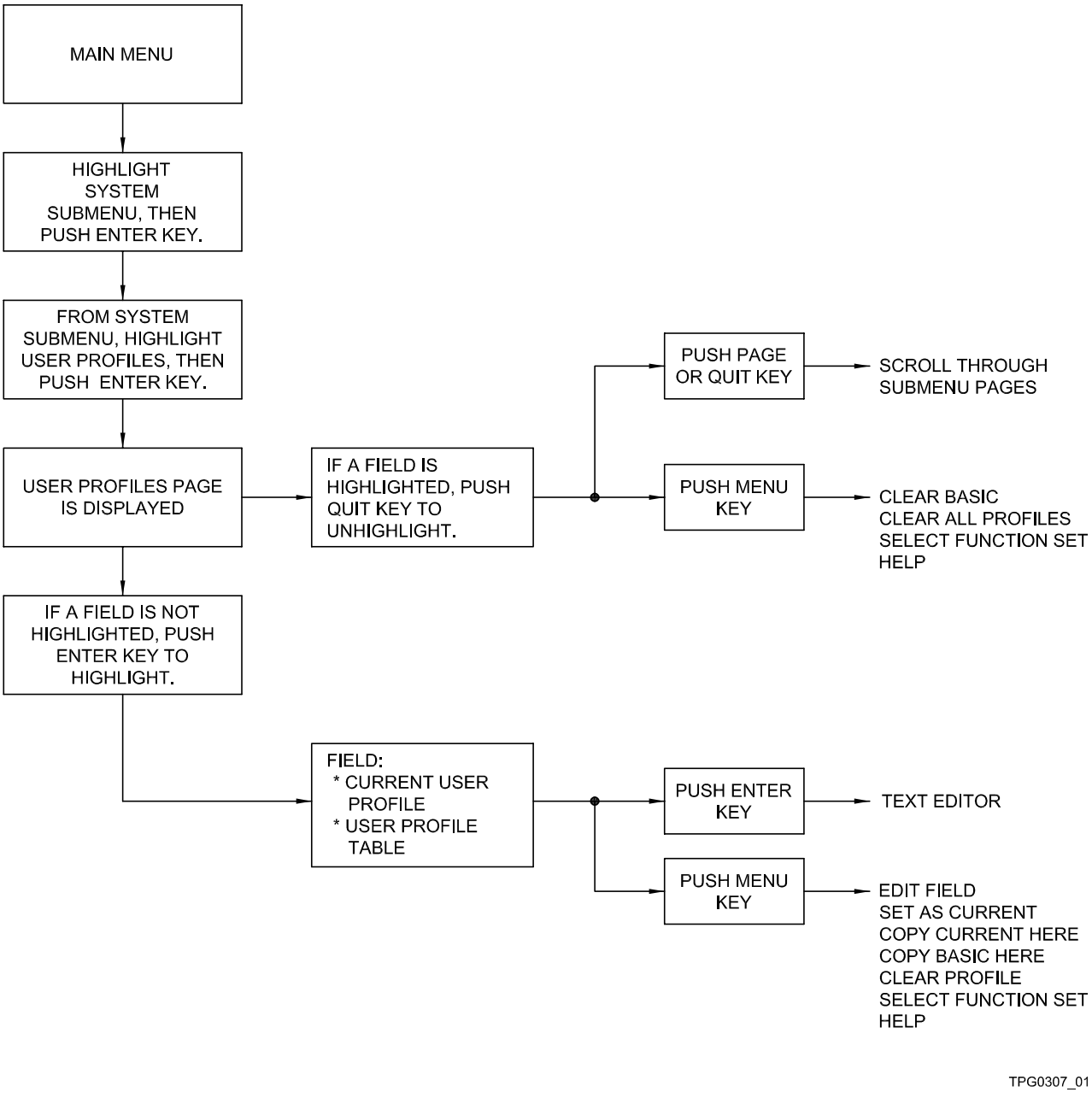


Figure 12-5. User Profiles Page Keystroke Map

12.5. DATA CLEAR OPTIONS.

CAUTION

Data Clear Options can destroy mission critical data. DAGR operation can become seriously impaired for a particular mission without this data.

12.5.1. Data Clear Options Function.

Data Clear Options are accessed from the System submenu. Data Clear Options provides capability to destroy data entered into the DAGR. DAGR defaults for user entered data are listed in Table 6-1. After selecting the clear data options function, a warning message appears as shown in Figure 12-6. The operator selects the data type and then provides confirmation before the function is performed. Pushing the ENTER key clears the chosen data. Pushing the QUIT key cancels the clear data operation. Choices of data types are:

- **Mission Data** — Clears all waypoints, routes, and alerts.
- **User-Entered** — Clears all user selected and entered settings.
- **Maps/Images** — Clears all maps and images.
- **Basic Set (Advanced)** — Clears all user selected and entered settings in the basic function set (User Profile 00). Refer to Paragraph 12.4 for additional user profile information. This choice appears only when using the advanced function set.
- **Advanced Set (Advanced)** — Clears all user selected and entered settings in the advanced function set for all defined user profiles (User Profiles 01 through 10). Refer to Paragraph 12.4 for additional user profile information. This choice appears only when using the advanced function set.

TPG0402_01

Figure 12-6. Data Clear Message

12.5.2. How To Use The Data Clear Options Function.

The data clear function is used to provide a quick way to delete mission critical data and protect sensitive information. Refer to the keystroke map when doing the following procedure. Pushing the MENU key while viewing the data clear message provides additional selections which duplicate key functions. The menu also provides message help text access.

a. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.

b. Highlight System from the Main Menu, then push the ENTER key.

c. Highlight Data Clear Options from the System submenu, then push the ENTER key.

d. From the clear data message display, scroll to the desired data selection to be cleared using the cursor control keys.

e. Push the ENTER key to confirm and perform the clear data function.

NOTE

- If the QUIT key is pushed to cancel the clear data function, the display returns to the last page viewed.
- After the maps/images clear data function has started, DAGR displays an in progress message that states no DAGR functions are available until the clear data function has been completed.

f. Push the ENTER key to acknowledge the clear data passed message. The display returns to the POS page set.

12.5.3. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 12-7 shows the keystroke map for the Data Clear Options page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Data Clear Options page.

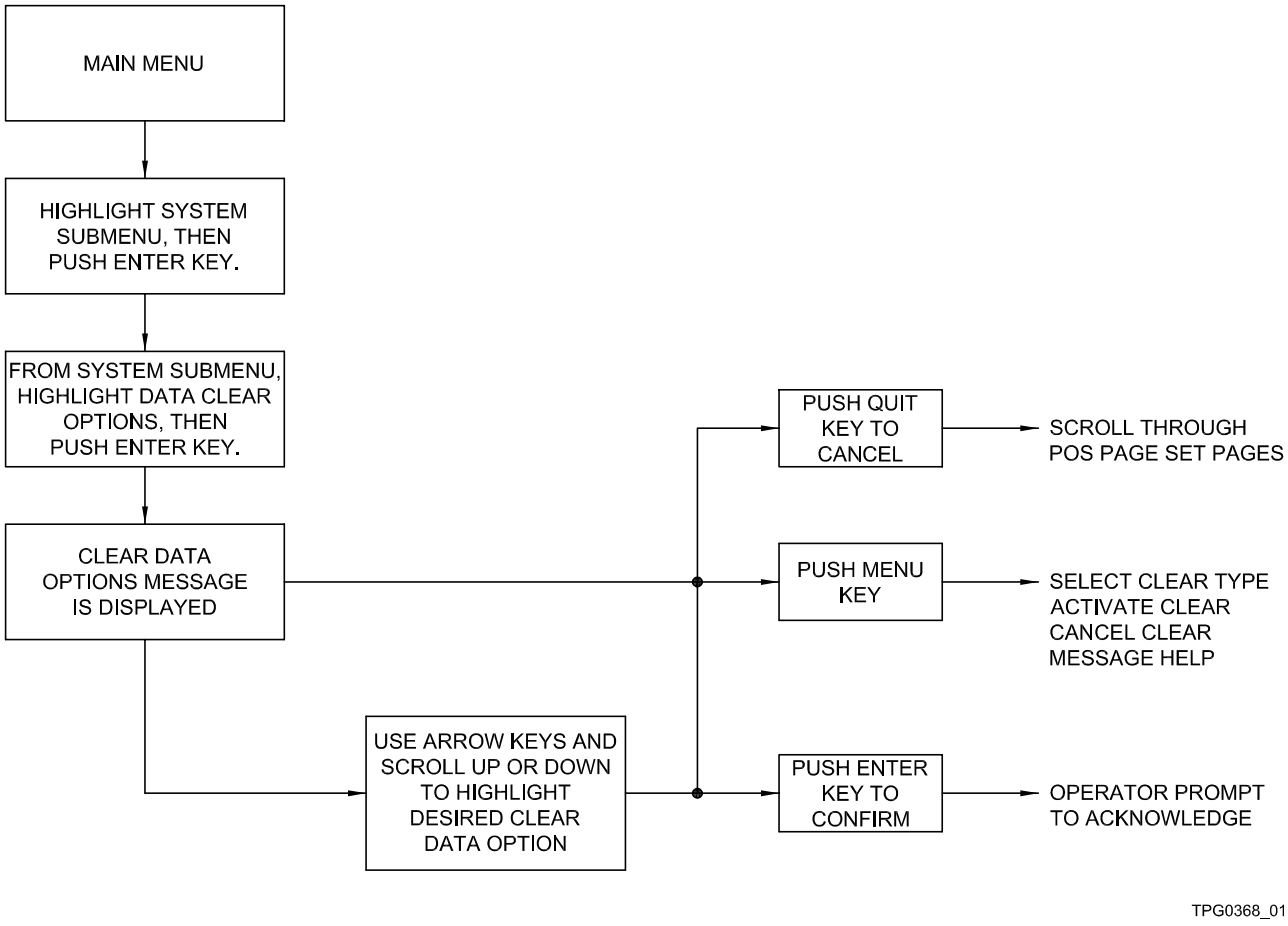


Figure 12-7. Data Clear Options Keystroke Map

12.6. ABOUT PAGE.

12.6.1. Page Function.

The About page is accessed from the System submenu. Refer to Figure 12-8. The About page provides DAGR copyright information, hardware version number, and software version number. When using the advanced function set, the About page provides capability to transfer software from one DAGR to another.

NOTE

To determine the latest DAGR software version, refer to the Replication, Distribution, Installation, and Training (RDIT) website at http://www.sed.monmouth.army.mil/RDIT or refer to the GPS PLGR/DAGR/GB-GRAM MWO/TCTO and Software website at https://rdit.army.mil/gps.

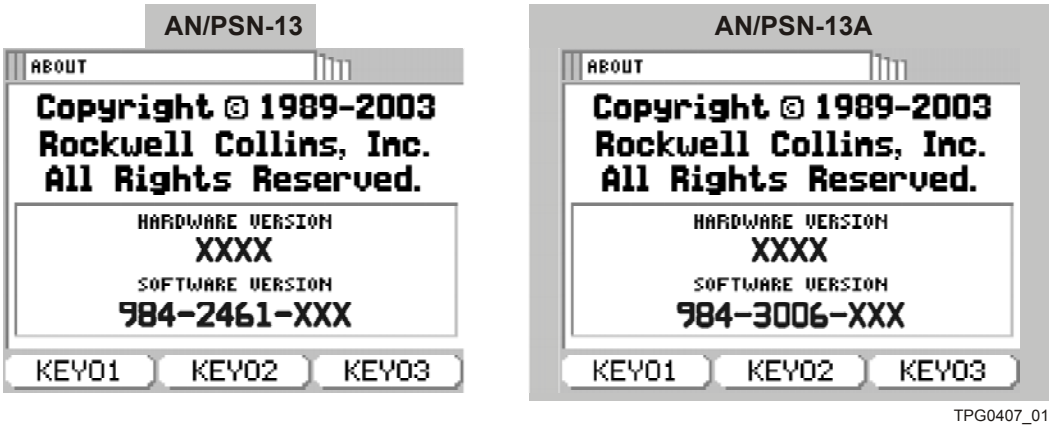


Figure 12-8. About Page

12.6.2. How To Use The About Page.

This page is used to acquire copyright information, hardware version, and software version information about the DAGR. This information cannot be edited by the operator. Software can be transferred from one DAGR to another using the DAGR to DAGR reprogramming procedure. When software is transferred, all data except for crypto keys and maps/images is cleared from the receiving DAGR.

a. View copyright information, hardware version, and software version information.

(1) From any display (except a message pop-up), push the MENU key twice to display the Main Menu.

(2) Highlight System from the Main Menu, then push the ENTER key.

(3) Highlight About from the System submenu, then push the ENTER key.

(4) View page data.

NOTE

• In the following steps, refer to Paragraph 12.3 for setting DAGR to the advanced function set and refer to Paragraph 11.3.3 for additional COM Port Setup page information.

• Before DAGR to DAGR reprogramming can be performed, both DAGRs must have either software version 984-2461-011 (AN/PSN-13) or later, or both DAGRs must have software version 984-3006-001 (AN/PSN-13A) or later. Reprogramming cannot be performed between an AN/PSN-13 and an AN/PSN-13A DAGR.

b. DAGR to DAGR Reprogramming (Advanced).

(1) Connect both DAGRs together with the DAGR to DAGR data cable assembly using the J2 external connector on both units.

(2) Push the PWR key to set power ON for both DAGRs. Acknowledge power-on status display if required.

(3) Set both DAGRs to use the advanced function set.

(4) On both DAGRs, from the main menu, highlight Communications. Push the ENTER key. Highlight COM Port Setup, then push the ENTER key.

(5) On the COM Port Setup page of both DAGRs, set the COM field to COM Port 1.

(6) On the COM Port Setup page of both DAGRs, set the Configuration field to Standard.

(7) Use the following steps to start the software transfer from the sending DAGR.

(a) Open the About page.

1 Push the MENU key twice to display the Main Menu.

2 Highlight System from the Main Menu, then push the ENTER key.

3 Highlight About from the System submenu, then push the ENTER key.

(b) Push the MENU key.

NOTE

• DAGR to DAGR reprogramming takes approximately ninety seconds. Neither DAGR can be used for other operations during reprogramming.

• All prior data on the receiving DAGR (except for crypto keys and maps/images) is lost regardless of whether reprogramming is completed or fails.

(c) Highlight Start Reprogrammer, then push the ENTER key.

(d) The DAGR displays a warning that reprogramming will clear all data on the receiving DAGR.

(e) Push the ENTER key to continue.

NOTE

If the QUIT key is pushed, the DAGR returns to the About page.

(f) When prompted by the display of the sending DAGR, turn the receiving DAGR off and then back on.

NOTE

A message appears when the first seven digits of the DAGR software part numbers have differences or when overwriting a newer version of software with an older version. Push the ENTER key to continue reprogramming or push the QUIT key to cancel reprogramming.

(8) After reprogramming is started, messages on the sending DAGR indicate the software transfer is in progress, complete, canceled, or failed. Follow instructions on the display. The receiving DAGR display is blank during reprogramming.

NOTE

If a reprogramming failed or canceled message is displayed, the sending DAGR must be restarted by pushing the ENTER key. The receiving DAGR must have all power and batteries removed and then replaced before it can be powered back on.

(9) When the sending DAGR displays reprogramming complete, push the ENTER key to restart the sending DAGR. The receiving DAGR automatically displays the power-on status display and is set to the basic function set.

(10) Verify the receiving DAGR has been reprogrammed by viewing the software version shown on the About page (refer to procedure a).

(11) Perform one of the following:

(a) Set power to off on both DAGRs (push and hold DAGR PWR key).

(b) Disconnect the data cable assembly and perform other DAGR operations as desired.

NOTE

To prevent an unintended DAGR power down when disconnecting the data cable, do not allow the cable shield to contact any connector pins. After disconnecting the cable, verify a power down message is not displayed. If a power down message is displayed, push the QUIT key to cancel the power down.

12.6.3. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 12-9 shows the keystroke map for the About page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the About page.

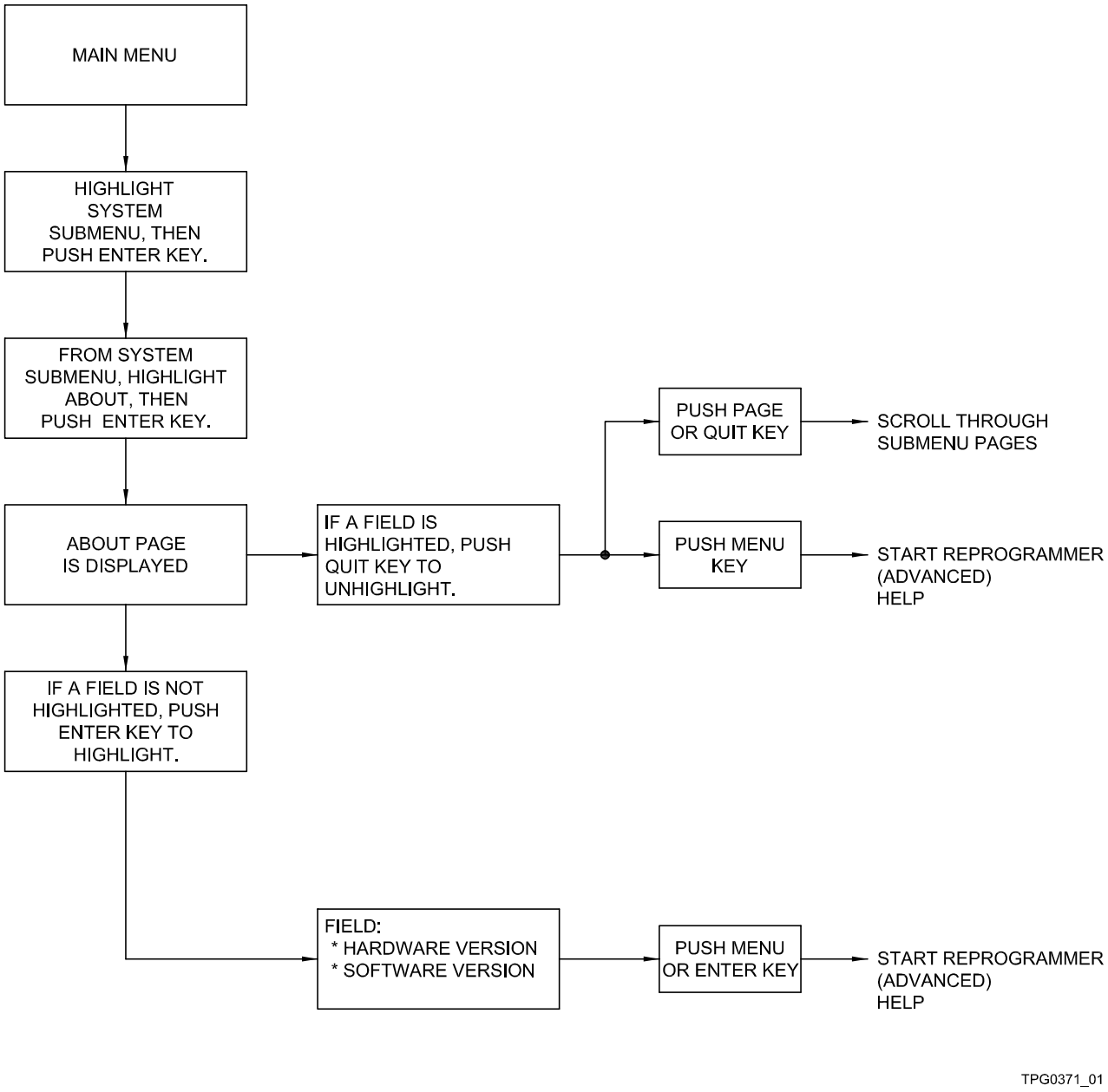


Figure 12-9. About Page Keystroke Map

CHAPTER 13
OPERATOR INSTRUCTIONS — SATELLITE SUBMENU OPERATION

13.1. SATELLITE SUBMENU.

This chapter contains Satellite submenu operation information. The Satellite submenu page set provides the following selections described in this chapter:

- SV (Satellite Vehicle) Sky View
- Channel Status
- SV Status
- SV Message (Advanced)
- DOP Calculation (Advanced)
- SV Schedule (Advanced)
- SV Select

13.2. SV SKY VIEW PAGE.

13.2.1. Page Function.

The SV Sky View page is accessed from the Satellite submenu or from the POS page set (refer to Paragraph 6.2.9). Refer to Figure 13-1. The SV Sky View page displays graphical status and signal strength information on visible and tracked satellites (SVs) at left side of display. A graphical representation of satellite positions is also displayed. The current status is shown at the top of the display (e.g., Navigating). The visible (VIS) count indicates the number of SVs visible from the current DAGR position. The good (GOOD) count indicates the number of visible SVs in good health. A satellite in good health is reporting good almanac or ephemeris data. Almanac age (ALM AGE) is the age of the SV data in days, typically one to two days old for recently collected SV data. Almanac data is updated by tracking satellites for at least 12.5 minutes. If a portion of the almanac data is not received within that time period, another 12.5 minutes tracking time is required. Once almanac data is updated, the display changes to 1 day. Satellite data includes a unique satellite identifier pseudo random number (PRN), received signal strength, and code (C/A, P, or Y). The current operating mode of the DAGR can be set using the SV Sky View page menu, and can also be changed from the Present Position page menu, the GPS Setup page field; or by using the Status key and the Receiver Status menu (refer to Paragraph 6.2.24). The SV Status page or Channel Status page can be accessed using the SV Sky View page menu.

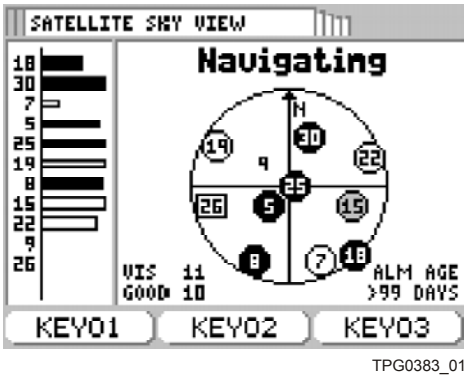


Figure 13-1. SV Sky View Page

13.2.2. Field Descriptions.

Select page field information by using keystrokes shown on the keystroke map in Figure 13-2. Field information contained in this page cannot be edited by the operator. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

13.2.2.1. Channel Signals Field. Displays a bar graph representation (at left side of display) of signal strength and code status (P (Y) or C/A) of satellites being tracked. Each satellite bar graph unique satellite identifier PRN, at the far left, corresponds with a numbered symbol of the SV Visibility field (at right side of display). Use the following information to interpret the satellite bar graphs.

- **Bar Length** — Indicates received signal strength (from 10 dB Hz to 50 dB Hz). The longer the bar, the greater the signal strength.
- **Bar Thickness** — Indicates the type of code in use (thick bar for Y or P code, and thin bar for C/A code).
- **No Bar** — Indicates that the satellite is being acquired.
- **White (hollow) Bar** — Indicates the satellite is being tracked but has not yet collected ephemeris data for that particular satellite.
- **Black (solid) Bar** — Indicates the satellite is being tracked and DAGR has collected ephemeris data for that particular satellite.

13.2.2.2. SV Visibility Field. Displays a graphical representation of each satellite's position (azimuth and elevation) in the sky. When applicable, text appears at the top of the field as Acquiring SVs, Tracking SVs, Navigating (present position acquired), Simulating SVs (Rehearsal mode), or Standby Mode (when in Standby mode).

13.2.2.2.1. The following information defines the text appearing at the top of this field.

- **Acquiring SVs** — Displayed when the DAGR is currently acquiring satellites (less than four bars displayed in the Channel Signals field). If this status remains for an extended period of time instead of changing to "Tracking SVs", the DAGR most likely has poor satellite visibility, strong jammers present, etc.
- **Tracking SVs** — Displayed when the DAGR is currently tracking four or more satellites (any combination of hollow or black bars displayed in the Channel Signals field). If this status remains for an extended period of time instead of changing to "Navigating", the DAGR most likely has a poor dilution of precision (DOP) condition that may be caused by poor satellite visibility. Poor satellite visibility may be caused by mountainous terrain, dense foliage, structures, or other obstructions to the DAGR antenna.
- **Navigating** — Displayed when the DAGR is tracking at least four satellites all showing solid black bars. The DAGR also has a satisfactory DOP and acquired current position coordinates. When this tracking state is achieved, the data fields of the display stop blinking.

13.2.2.2.2. The following information defines the numbers and shapes appearing in this field.

- **PRN Satellite Identifier** — Represent visible satellites.
- **Black Circles** — Indicate satellites in use for the PVT (position, velocity (ground speed), and time) solution.
- **Gray Circles** — Indicate satellites being tracked but not used.
- **White Circles** — Indicate satellites being searched for.
- **Squares** — Indicate the satellite is present but in bad health. A satellite in bad health is reporting bad almanac or ephemeris data.

13.2.3. How To Use The SV Sky View Page.

This page provides capability to select the operating mode, and also used to monitor satellite status information and show almanac age. Refer to keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting data and changing field information. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Satellite, then push the ENTER key.
3. Highlight SV Sky View, then push the ENTER key. The SV Sky View page is displayed.

a. Select Operating Mode.

(1) From the SV Sky View page (with or without an area highlighted), push the MENU key.

(2) Highlight Select Op Mode, then push the ENTER key.

(3) Highlight the desired operating mode, then push the ENTER key.

(4) The display returns to the SV Sky View page with the change made to the operating mode.

NOTE

When Standby operating mode is selected, Standby Mode is displayed at the top of the display. If not in Standby operating mode, either Acquiring SVs, Tracking SVs, Navigating, or Simulating SVs (Rehearsal operating mode) is displayed.

b. Select and display SV Status page or Channel Status page.

(1) From the SV Sky View page (with or without an area highlighted), push the MENU key.

(2) Highlight the desired page (SV Status or Channel Status), then push the ENTER key.

(3) The selected page is displayed.

c. Interpretation of information in Channel Signals field (left side of display)

(1) Displays a bar graph representation of signal strength and code status (P (Y) or C/A) of satellites being tracked. Each satellite bar graph unique satellite identifier PRN (left side of field), corresponds with a numbered symbol shown in the SV Visibility field.

(2) Refer to Paragraph 13.2.2.1 for additional information.

d. Interpretation of information in SV Visibility field (right side of display)

(1) Displays a graphical representation of each satellite's position in the sky. When applicable, text appears at the top of the field as Acquiring SVs, Tracking SVs, Navigating, Simulating SVs (Rehearsal operating mode), or Standby Mode (Standby operating mode).

(2) Refer to Paragraph 13.2.2.2 for additional information.

13.2.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 13-2 shows the keystroke map for the SV Sky View page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the SV Sky View page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the POS page set.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

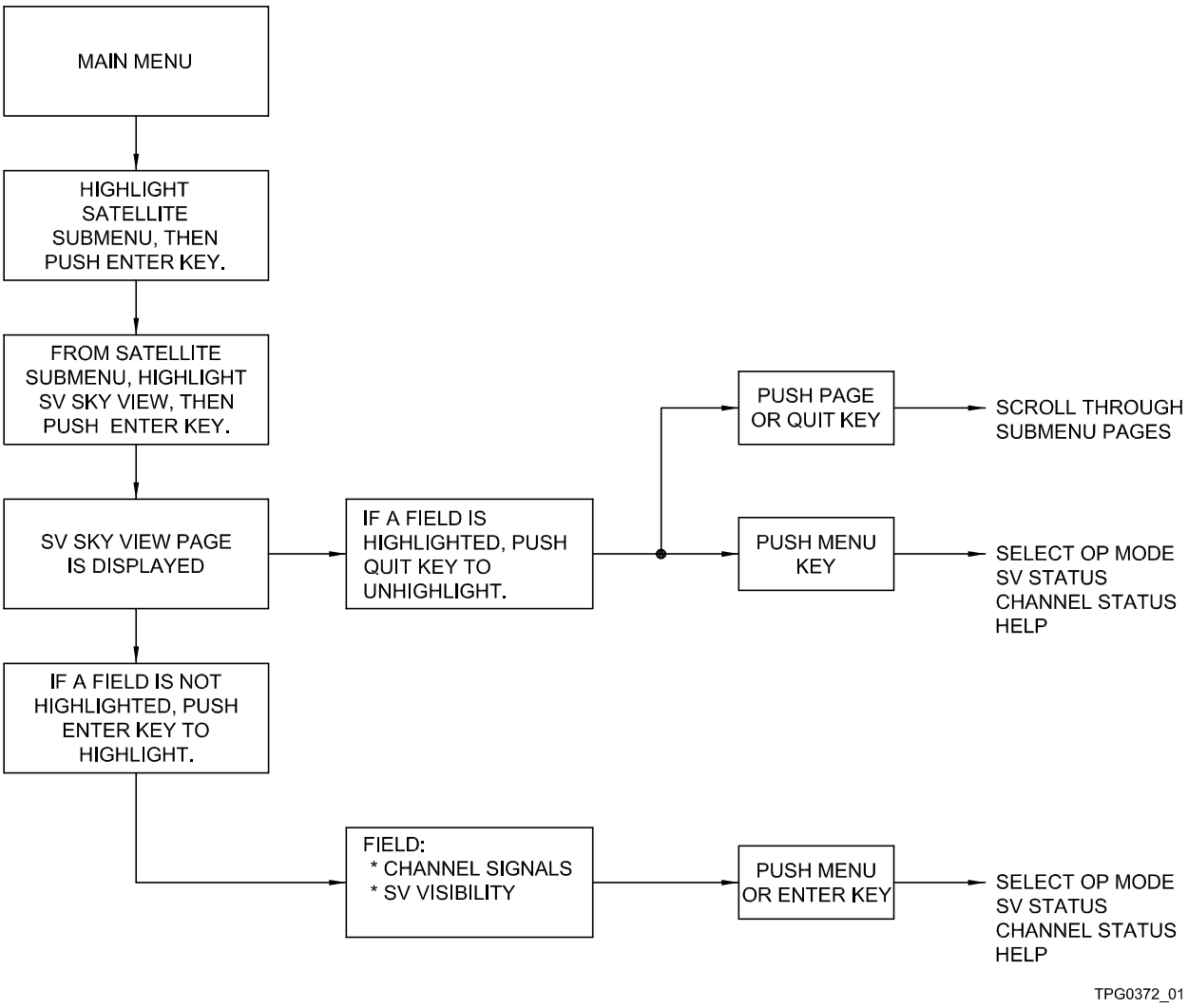


Figure 13-2. SV Sky View Page Keystroke Map

13.3. CHANNEL STATUS PAGE.

13.3.1. Page Function.

The Channel Status page is accessed from the Satellite submenu or from the SV Sky View page menu. Refer to Figure 13-3. The Channel Status page table provides individual satellite data for active channels. Vertical scrolling is used to view all table rows. The table rows wrap from the last row to the first row (or vice versa) when scrolling through the table. If a satellite's information is not available, the table columns display double dashes instead of data. Channel Status page data cannot be edited by the operator. The following information describes the data provided by each table column.

- **SV** — Satellite unique, identifying, pseudo random number (PRN) (two digits).
- **C/No** — Carrier to noise ratio (dB Hz). Typical value is 37 to 50 (dB Hz).
- **CODE** — Code type from the satellite (CA, Y, or P)
- **FREQ** — Frequency being used (L1 or L2)
- **J/I** — Jamming or interference detected (Yes or No)

NOTE

If jamming is detected, refer to Paragraph 15.3.2 for further information.

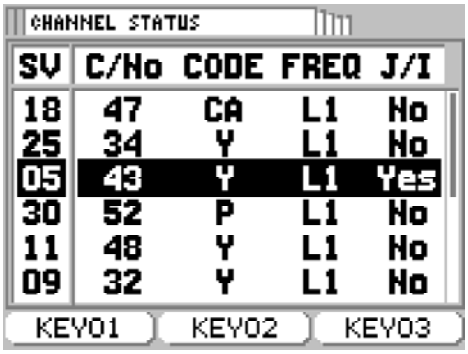


Figure 13-3. Channel Status Page

13.3.2. How To Use The Channel Status Page.

This page is used to gain individual satellite channel status information as described in the previous field descriptions. This status information cannot be edited by the operator.

a. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.

b. Highlight Satellite from the Main Menu, then push the ENTER key.

c. Highlight Channel Status from the System submenu, then push the ENTER key.

d. Use the cursor control keys to view data.

13.3.3. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 13-4 shows the keystroke map for the Channel Status page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Channel Status page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Satellite submenu.

- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

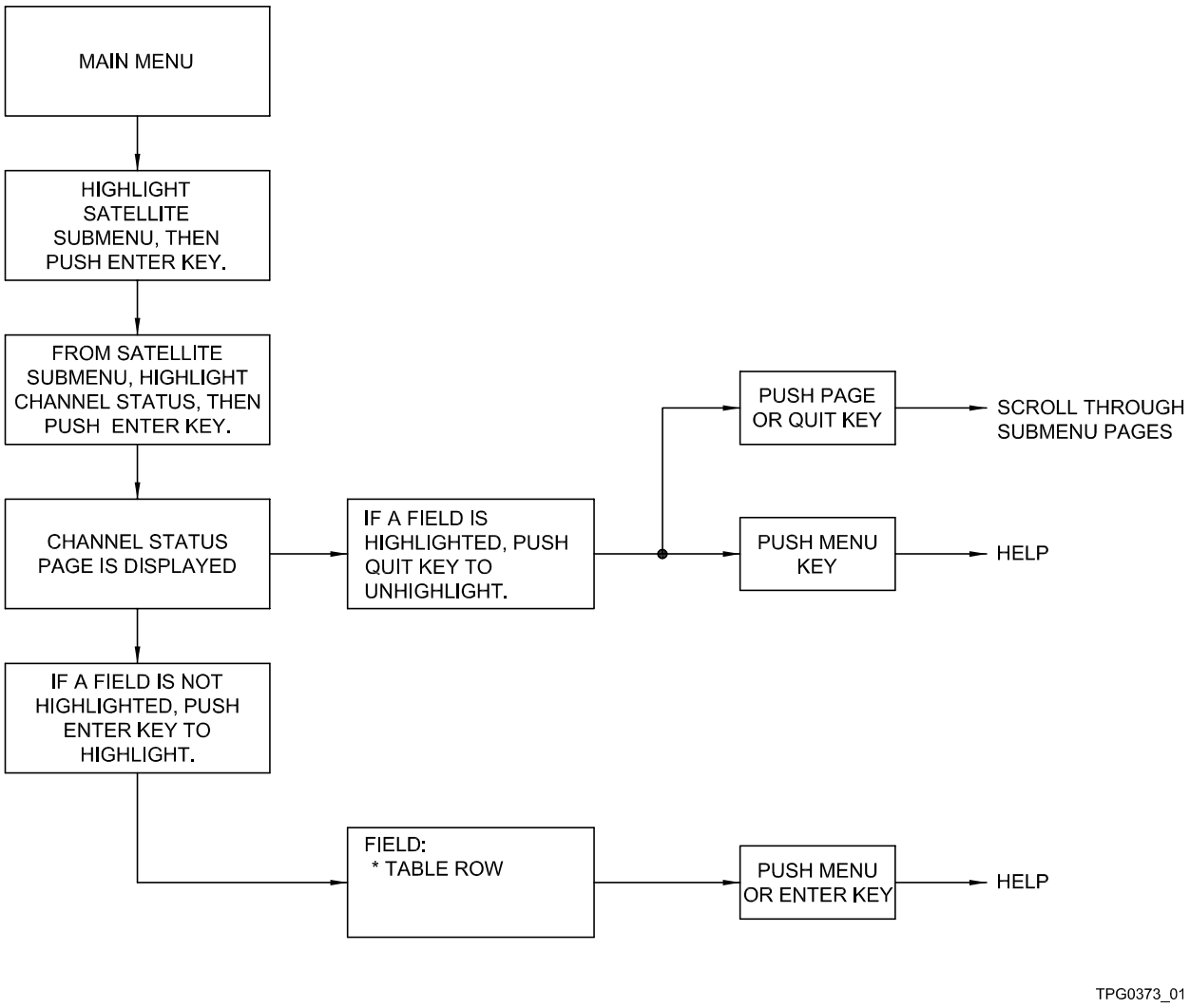


Figure 13-4. Channel Status Page Keystroke Map

13.4. SV STATUS PAGE.

13.4.1. Page Function.

The SV Status page is accessed from the Satellite submenu or from the SV Sky View page menu. In addition, the page is automatically displayed after the operator acknowledges a warning message that the DAGR cannot obtain fix or cannot track satellites. The SV Status page table provides status of all currently visible satellites from the present position. Vertical scrolling is used to view all table rows. The table rows wrap from the last row to the first row (or vice versa) when scrolling through the table. The SV Status page data cannot be edited by the operator. The following information describes the data provided by each table column shown in Figure 13-5.

- **SV** — Satellite unique, identifying, pseudo random number (PRN) (two digits).
- **AZ** — Azimuth angle (three digits, in degrees) to the SV in reference to the north reference (True, Magnetic, or Grid).
- **ELA** — Elevation angle (two digits, in degrees) to the SV. SVs with a higher elevation are located directly above the DAGR. An arrow pointing up indicates rising and an arrow pointing down indicates setting.
- **SET** — The time (Zulu (Z) or Local (L)) the SV drops below the horizon mask angle and cannot be tracked. Format is HHMMZ/L, where H represents hours, M represents minutes, and Z/L represents Zulu or Local. Displays N/A if time cannot be calculated or is invalid.
- **HLTH** — Health status (OK or BAD). When BAD satellite health status is indicated, the satellite is reporting bad almanac or ephemeris data. The DAGR automatically deselects the satellite until the health status returns to OK.

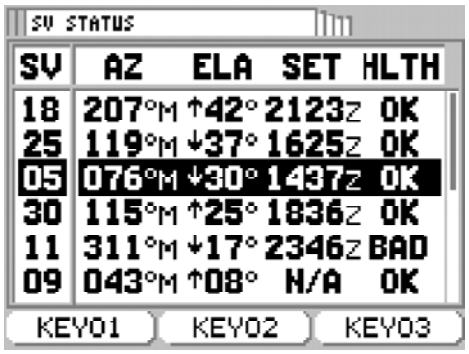


Figure 13-5. SV Status Page

13.4.2. How To Use The SV Status Page.

This page is used to gain individual satellite status information as described in the previous field descriptions. This status information cannot be edited by the operator. Only north reference and time zone can be changed from the page menu using the following procedure.

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Satellite, then push the ENTER key.
3. Highlight SV Status, then push the ENTER key. The SV Status page is displayed.

a. From the SV Status Page, with or without a table row highlighted, push the MENU key.

b. Highlight desired selection (North Ref or Select Time Zone), then push the ENTER key.

c. Highlight desired selection, then push the ENTER key.

d. Display returns to the SV Status page with changes shown.

NOTE

Changing the north reference affects the AZ (azimuth) column. Changing the time zone affects the SET (set time) column.

13.4.3. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 13-6 shows the keystroke map for the SV Status page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the SV Status page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Satellite submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

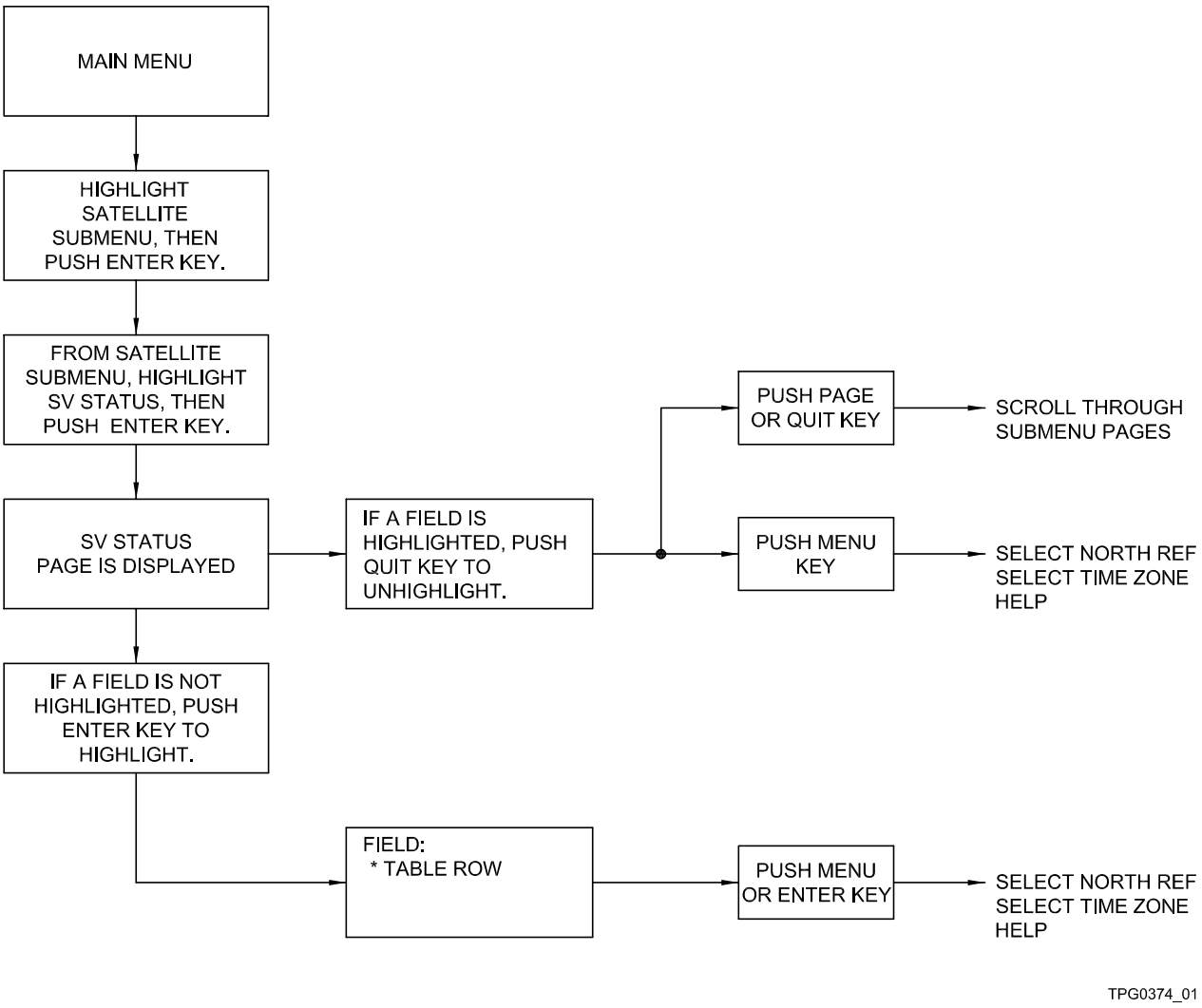


Figure 13-6. SV Status Page Keystroke Map

13.5. SV MESSAGE PAGE (ADVANCED).

13.5.1. Page Function.

The SV Message page is accessed from the Satellite submenu using the advanced function set. The SV Message page displays the almanac age of the oldest, healthy satellite data and any satellite special messages (satellite page 17, subframe 4 data). Figure 13-7 provides examples of the page with and without SV messages.

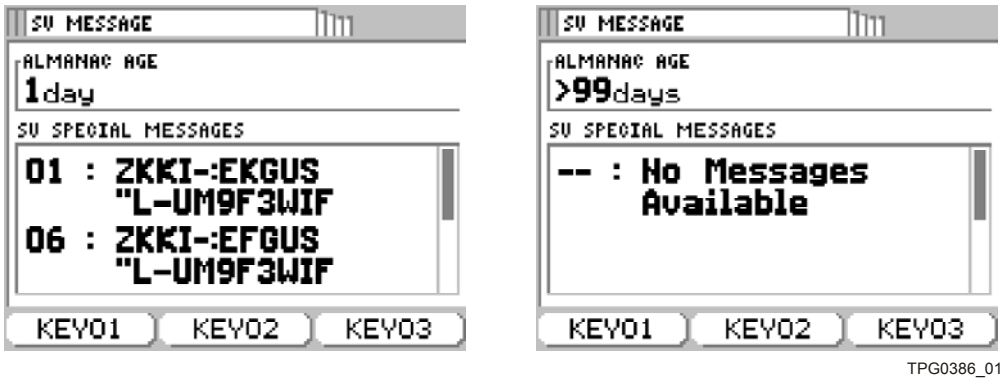


Figure 13-7. SV Message Page (Advanced)

13.5.2. Field Descriptions.

Field information contained in this page cannot be edited by the operator. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

13.5.2.1. Almanac Age Field. Displays the current almanac age in days. Almanac age is the age of SV data and is typically one to two days old for recently collected data. For any value greater than 99 days, >99 days is displayed. Almanac data is updated by tracking satellites for at least 12.5 minutes. If a portion of the almanac data is not received within that time period, another 12.5 minutes tracking time is required. Once almanac data is updated, the display changes to 1 day.

13.5.2.2. SV Special Messages Field. Displays special messages (up to 22 characters long, satellite page 17, subframe 4 data) received from satellites. Messages are displayed in ascending order by SV number. The operator scrolls vertically to view multiple messages (if applicable). When no messages are available, the field displays double dashes for the SV number and "No Messages Available" as text.

13.5.3. How To Use The SV Message Page.

This page is used to acquire satellite almanac age and any individual satellite messages as described in previous field descriptions. Field content cannot be edited by the operator.

a. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.

b. Highlight Satellite from the Main Menu, then push the ENTER key.

c. Highlight SV Message from the System submenu, then push the ENTER key.

d. Use the cursor control keys to view data.

13.5.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 13-8 shows the keystroke map for the SV Message page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the SV Message page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Satellite submenu.

- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

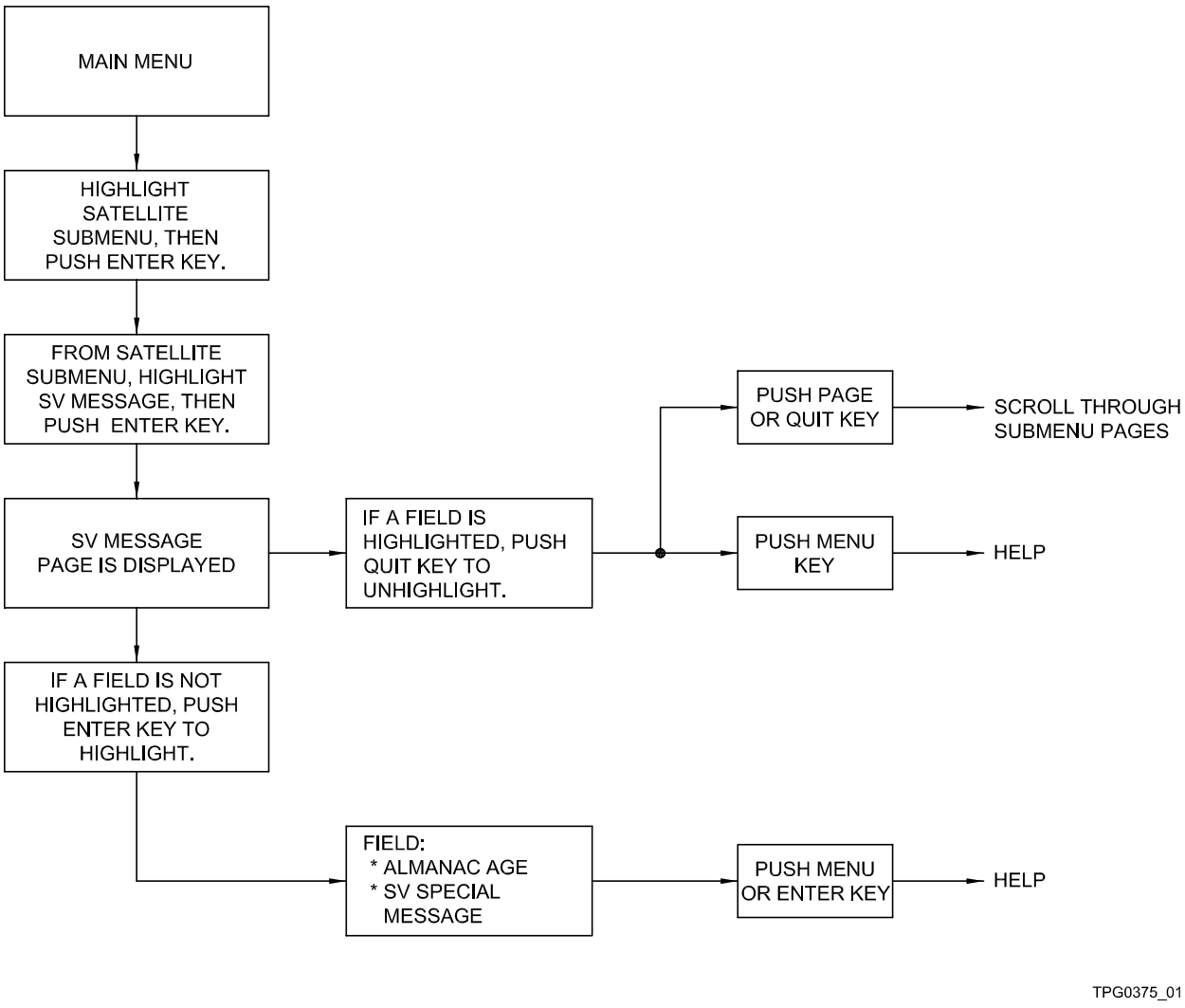


Figure 13-8. SV Message Page Keystroke Map

13.6. DOP CALCULATION PAGE (ADVANCED).

13.6.1. Page Function.

The DOP (dilution of precision) Calculation page is accessed from the Satellite submenu using the advanced function set. The DOP calculation determines the best and worst times for DAGR accuracy at a specified position based upon predicted satellite coverage over a specified time. After required setup data is entered into the fields, the operator initiates the calculation. Page fields are shown in Figure 13-9. Up to four mask areas (sectors) simulating obstructions to satellite signal reception (e.g., mountains, buildings, etc.) can be set up by the operator. Each sector is defined horizontally by an entered azimuth range (from azimuth/to azimuth fields). Each sector is defined vertically by an entered mask angle in reference to the horizon.

NOTE

When the DAGR is turned off, all DOP Calculation page field setup and calculated data is lost. The calculation process is disabled if any changes are made to field setup data while the calculation is running, or if entered field values are invalid.

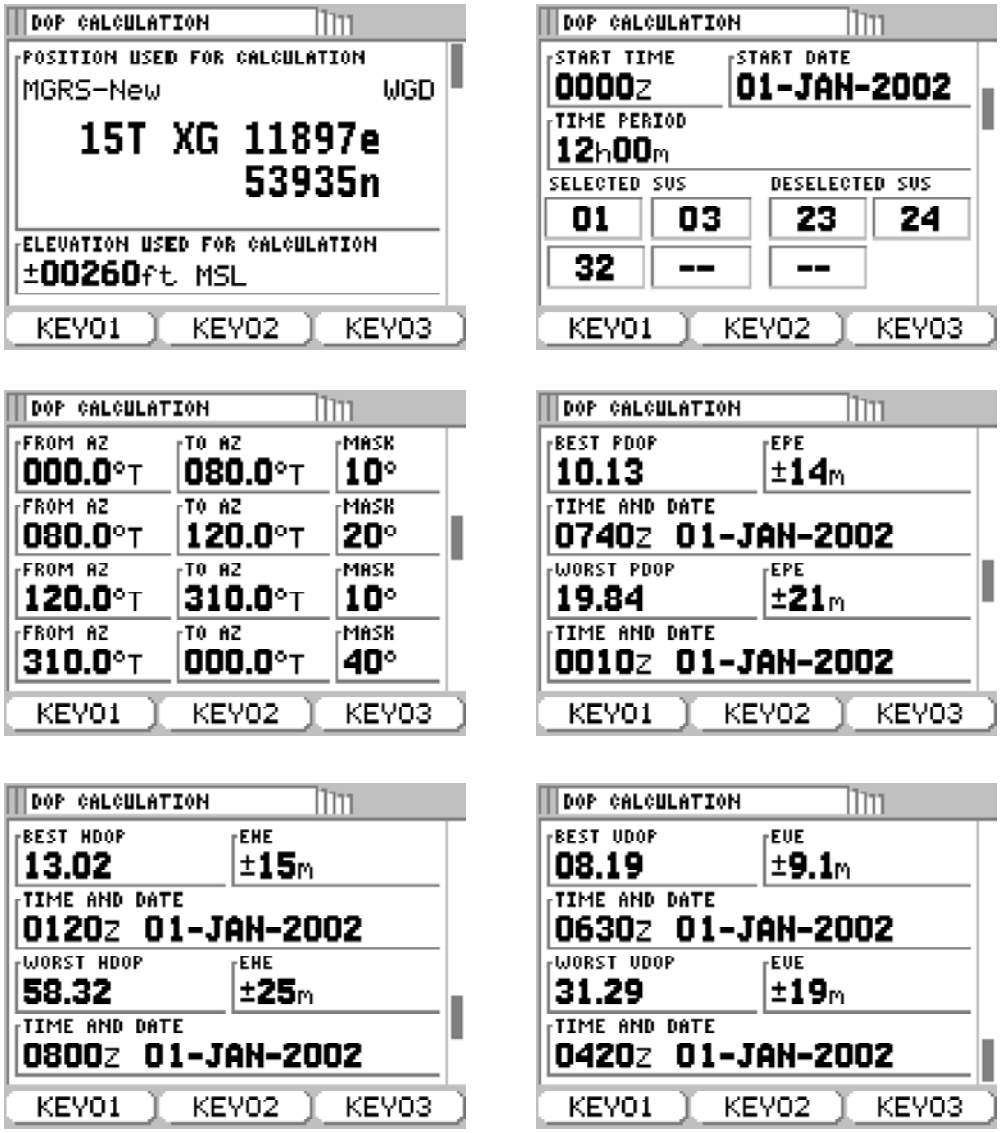


Figure 13-9. DOP Calculation Page (Advanced)

13.6.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 13-10. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

13.6.2.1. Position Used For Calculation Field. Displays the selected coordinate/grid system, datum, and position coordinates for DOP calculation. Grid resolution is also set by the operator. A waypoint can be selected and supply position coordinates for calculations instead of using operator entered position coordinates by selecting Use WP Position from the field menu. Any changes made to the waypoint position after it is selected do not affect the calculation. Ensure the appropriate datum coordinate/grid system, and grid resolution are selected before using or editing position coordinates.

- **Coordinate/grid system** — Appears in the upper left corner. Refer to Paragraph 10.2.2.1 for additional information. Refer to Paragraph 10.2.2.2 for grid resolution information.

- **Datum ID** — Appears in the upper right corner. Refer to Paragraph 10.2.2.4 for additional information.
- **Position coordinates** — Horizontal coordinates appear center of field. Refer to Paragraph 6.2.21.15 for editor information.

13.6.2.2. Elevation Used For Calculation Field. Displays the entered elevation value used for the DOP calculation. Elevation is displayed as the vertical range from the surface of the earth as measured from the elevation reference. The elevation reference mean sea level (MSL) or datum (DTM) is also displayed. The appropriate units and elevation reference must be selected before editing this field. Refer to Paragraph 10.2 or the keystroke map in Figure 13-10 for information on making these selections. Field data format is +/- XXXXX, where X represents feet or meters.

13.6.2.3. Start Time Field. Displays the entered start time used for the DOP calculation. The DAGR uses Start Time, Start Date, and the Time Period field selections as the time limits for the DOP calculation. Field data format is HHMMZ/L format, where H represents hours, M represents minutes, and Z/L represents Zulu (maximum time is 23 hours, 59 minutes) or Local (Zulu +/- time zone offset).

13.6.2.4. Start Date Field. Displays the entered date used for the DOP calculation. The DAGR uses Start Time, Start Date, and the Time Period field selections as the time limits for the DOP calculation. Field data format is DD-MMM-YYYY, where D represents day, M represents month, and Y represents year.

13.6.2.5. Time Period Field. Displays the entered time period (24 hours maximum) used for the DOP calculation. The DAGR uses Start Time, Start Date, and the Time Period field selections as the time limits for the DOP calculation. Field data format is HHhMMm format, where H represents hours and M represents minutes.

13.6.2.6. Selected SVs Field. Displays the operator selected list of satellites, by ID numbers (two digits each) ensured to be included in the DOP calculation. Up to four satellites can be added to the DOP calculation from this field. A double dash value indicates no satellite is selected.

13.6.2.7. Deselected SVs Field. Displays the operator selected list of satellites, by ID numbers (two digits each), ensured to be excluded in the DOP calculation. Up to three satellites can be excluded from the DOP calculation using this field. A double dash value indicates no satellite is selected.

13.6.2.8. From AZ Field. Displays the beginning azimuth of a sector used to define a mask used for the DOP calculation. Masks are used in the calculation to simulate obstructions to satellite coverage (e.g., mountains, buildings, etc.). The DAGR modifies the operator entered field value if mask/sector overlap is detected. A sector can be defined from 360° to 0.1°. Field data format is XXX.X (in degrees) or XXXX (in mils or strecks) in reference to north reference (True, Magnetic, or Grid).

13.6.2.9. To AZ Field. Displays the ending azimuth of a sector used to define a mask used for the DOP calculation. Masks are used in the calculation to simulate obstructions to satellite coverage (e.g., mountains, buildings, etc.). The DAGR modifies the operator entered field value if mask/sector overlap is detected. A sector can be defined from 360° to 0.1°. Field data format is XXX.X (in degrees) or XXXX (in mils or strecks) in reference to north reference (True, Magnetic, or Grid).

13.6.2.10. Mask Field. Displays the value defining the mask angle of the sector. Only satellites above the mask angle (relative to the horizon) are used for the DOP calculation. Field data format is XX, where X represents the angle in degrees (0° to 90°).

13.6.2.11. Best PDOP Field. Displays the estimated best position dilution of precision (PDOP) for the specified time period. The operator cannot edit this field.

13.6.2.12. Best HDOP Field. Displays the estimated best horizontal dilution of precision (HDOP) for the specified time period. The operator cannot edit this field.

13.6.2.13. Best VDOP Field. Displays the estimated best vertical dilution of precision (VDOP) for the specified time period. The operator cannot edit this field.

13.6.2.14. Best EPE Field. Displays the estimated position error (3D) at the time and date of the best PDOP. The operator cannot edit this field. Field data format is N.N, NN, or NNN, where N represents miles, nautical miles, kilometers, feet, yards, or meters. Position data (horizontal and vertical) is estimated to be accurate to within the ± value.

13.6.2.15. Best EHE Field. Displays the estimated horizontal error (2D) at the time and date of the best HDOP. The operator cannot edit this field. Field data format is N.N, NN, or NNN, where N represents miles, nautical miles, kilometers, feet, yards, or meters. Position data is estimated to be accurate to within the ± value.

13.6.2.16. Best EVE Field. Displays the estimated vertical error (2D) at the time and date of the best VDOP. The operator cannot edit this field. Field data format is N.N, NN, or NNN, where N represents miles, nautical miles, kilometers, feet, yards, or meters. Position data is estimated to be accurate to within the ± value.

13.6.2.17. Best Time and Date Field. Displays the time and date of the best corresponding PDOP, HDOP, or VDOP. The operator cannot edit this field. Field data format is HHMMZ/L DD-NN-YYYY, where H represents hours, M represents minutes, Z represents Zulu or Local, D represents day, N represents month, and Y represents year.

13.6.2.18. Worst PDOP Field. Displays the estimated worst position dilution of precision (PDOP) for the specified time period. The operator cannot edit this field.

13.6.2.19. Worst HDOP Field. Displays the estimated worst horizontal dilution of precision (HDOP) for the specified time period. The operator cannot edit this field.

13.6.2.20. Worst VDOP Field. Displays the estimated worst vertical dilution of precision (VDOP) for the specified time period. The operator cannot edit this field.

13.6.2.21. Worst EPE Field. Displays the estimated position error (3D) at the time and date of the worst PDOP. The operator cannot edit this field. Field data format is N.N, NN, or NNN, where N represents miles, nautical miles, kilometers, feet, yards, or meters. Position data (horizontal and vertical) is estimated to be accurate to within the ± value.

13.6.2.22. Worst EHE Field. Displays the estimated horizontal error (2D) at the time and date of the worst HDOP. The operator cannot edit this field. Field data format is N.N, NN, or NNN, where N represents miles, nautical miles, kilometers, feet, yards, or meters. Position data is estimated to be accurate to within the ± value.

13.6.2.23. Worst EVE Field. Displays the estimated vertical error (2D) at the time and date of the worst VDOP. The operator cannot edit this field. Field data format is N.N, NN, or NNN, where N represents miles, nautical miles, kilometers, feet, yards, or meters. Position data is estimated to be accurate to within the ± value.

13.6.2.24. Worst Time and Date Field. Displays the time and date of the worst corresponding PDOP, HDOP, or VDOP. The operator cannot edit this field. Field data format is HHMMZ/L DD-NN-YYYY, where H represents hours, M represents minutes, Z/L represents Zulu or Local, D represents day, N represents month, and Y represents year.

13.6.3. How To Use The DOP Calculation Page.

This page contains information used to configure and set up the DAGR for DOP calculation. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting data and changing field information. Select appropriate units before entering field data for calculation. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Satellite, then push the ENTER key.
3. Highlight DOP Calculation, then push the ENTER key. The DOP Calculation page is displayed.

a. Set Up Units/References

   (1) Prior to using field information, view the page fields to determine if changes to units of measure or references used in the fields are required (metric or decimal, etc.).

   (2) When unit or reference changes are required, highlight the desired field, then push the MENU key.

   (3) Highlight the desired type of units or reference to change (e.g., Select Elev Units), then push the ENTER key.

   (4) Highlight the desired selection, then push the ENTER key.

   (5) The page displays all associated field information with the change made.

   (6) If required, repeat the procedure for the remaining selections.

b. DOP Calculation

   (1) Set position used for the calculation.

NOTE

Position coordinates used for the calculation can be entered from an editor, or acquired from a selected waypoint. Both methods are described in the following steps.

(a) Editor method.

1 From the DOP Calculation page, highlight the Position Used For Calculation field. Push the ENTER key.

2 Enter position coordinates using the editor, then push the ENTER key. The operator is prompted to confirm the position adjustment.

3 The display returns to the DOP Calculation page displaying highlighted position coordinates.

(b) Waypoint method.

1 From the DOP Calculation page, highlight the Position Used For Calculation field. Push the MENU key.

2 Highlight Use WP Position, then push the ENTER key.

3 Highlight the desired waypoint, then push the ENTER key.

4 The display returns to the DOP Calculation page displaying highlighted position coordinates.

(2) Set elevation used for calculation.

NOTE

When a waypoint is used to set position used for the calculation, the waypoint elevation is also used. Therefore, the Elevation Used For Calculation field does not require operator input.

(a) From the DOP Calculation page, highlight the Elevation Used For Calculation field. Push the ENTER key.

(b) Enter elevation value using the editor, then push the ENTER key.

(c) The display returns to the DOP Calculation page displaying highlighted elevation value.

(3) Set start time used for calculation.

(a) From the DOP Calculation page, highlight the Start Time field. Push the ENTER key.

(b) Enter start time using the editor, then push the ENTER key.

(c) The display returns to the DOP Calculation page displaying highlighted start time.

(4) Set the start date used for calculation.

(a) From the DOP Calculation page, highlight the Start Date field. Push the ENTER key.

(b) Enter date using the editor, then push the ENTER key.

(c) The display returns to the DOP Calculation page displaying highlighted start date.

(5) Set the time period used for calculation.

(a) From the DOP Calculation page, highlight the Time Period field. Push the ENTER key.

(b) Enter time period using the editor, then push the ENTER key.

(c) The display returns to the DOP Calculation page displaying highlighted time period.

(6) Select satellites ensured to be used for calculation. Up to four can be selected.

(a) From the DOP Calculation page, highlight one of the four Selected SVs fields. Push the ENTER key.

(b) Enter SV two digit ID number (01 up to 32) using the editor, then push the ENTER key.

(c) The display returns to the DOP Calculation page displaying highlighted Selected SVs field.

NOTE

Satellites selected or deselected for the calculation in the Selected SVs or Deselected SVs fields can be removed by using field menu selection Clear SV. After Clear SV is used, the field displays double dashes indicating the SV (ID number) has been cleared.

(7) Deselect satellites to be used for calculation. Up to three can be deselected.

(a) From the DOP Calculation page, highlight one of the three Deselected SVs fields. Push the ENTER key.

(b) Enter SV two digit ID number (01 up to 32) using the editor, then push the ENTER key.

(c) The display returns to the DOP Calculation page displaying highlighted Deselected SVs field.

NOTE

Satellites selected or deselected for the calculation in the Selected SVs or Deselected SVs fields can be removed by using field menu selection Clear SV. After Clear SV is used, the field displays double dashes indicating the SV (ID number) has been cleared.

(8) Set up mask sector(s) used to simulate obstructions on the horizon to satellite signal reception. Up to four mask sectors (not overlapping) can be set up. Each sector is defined by a From AZ field (starting azimuth), To AZ field (ending azimuth), and Mask field (vertical angle from horizon).

(a) Set the From AZ field (starting azimuth).

1 From the DOP Calculation page, highlight the desired From AZ field. Push the ENTER key.

2 Enter angle value (e.g., 0.1° up to 360°) using the editor, then push the ENTER key.

3 The display returns to the DOP Calculation page displaying highlighted azimuth.

4 If desired, repeat steps 1 through 3 for remaining three sectors.

(b) Set the To AZ field (ending azimuth).

1 From the DOP Calculation page, highlight the To AZ field corresponding to the From AZ field previously entered. Push the ENTER key.

2 Enter angle value (e.g., 0.1° up to 360°) using the editor, then push the ENTER key.

3 The display returns to the DOP Calculation page displaying highlighted azimuth.

4 If desired, repeat steps 1 through 3 for remaining three sectors.

(c) Set the Mask field (vertical angle from horizon).

1 From the DOP Calculation page, highlight the Mask field corresponding to the From AZ field previously entered. Push the ENTER key.

2 Enter angle value (00° up to 90°) using the editor, then push the ENTER key.

3 The display returns to the DOP Calculation page displaying highlighted mask angle.

4 If desired, repeat steps 1 through 3 for remaining three sectors.

(9) Start the DOP calculation.

(a) Push the MENU key (with or without a field highlighted).

(b) Highlight Start DOP Calc, then push the ENTER key.

(c) After a short delay, the remaining page fields (last three page views previously displayed in gray) display the DOP calculation data. Use vertical scrolling to view all data.

13.6.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 13-10 shows the keystroke map for the DOP Calculation page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the DOP Calculation page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Satellite submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

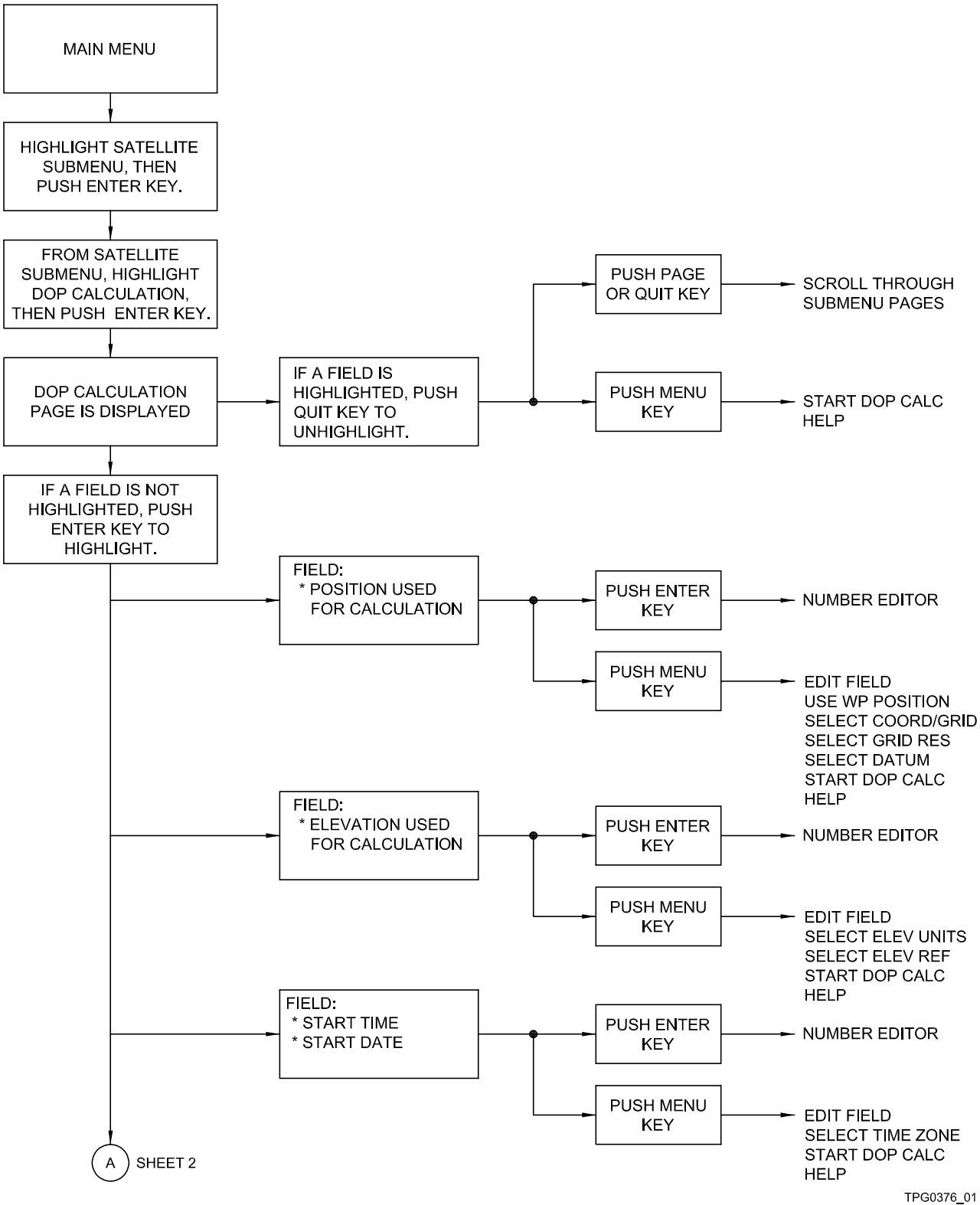


Figure 13-10. DOP Calculation Page Keystroke Map (Sheet 1 of 2)

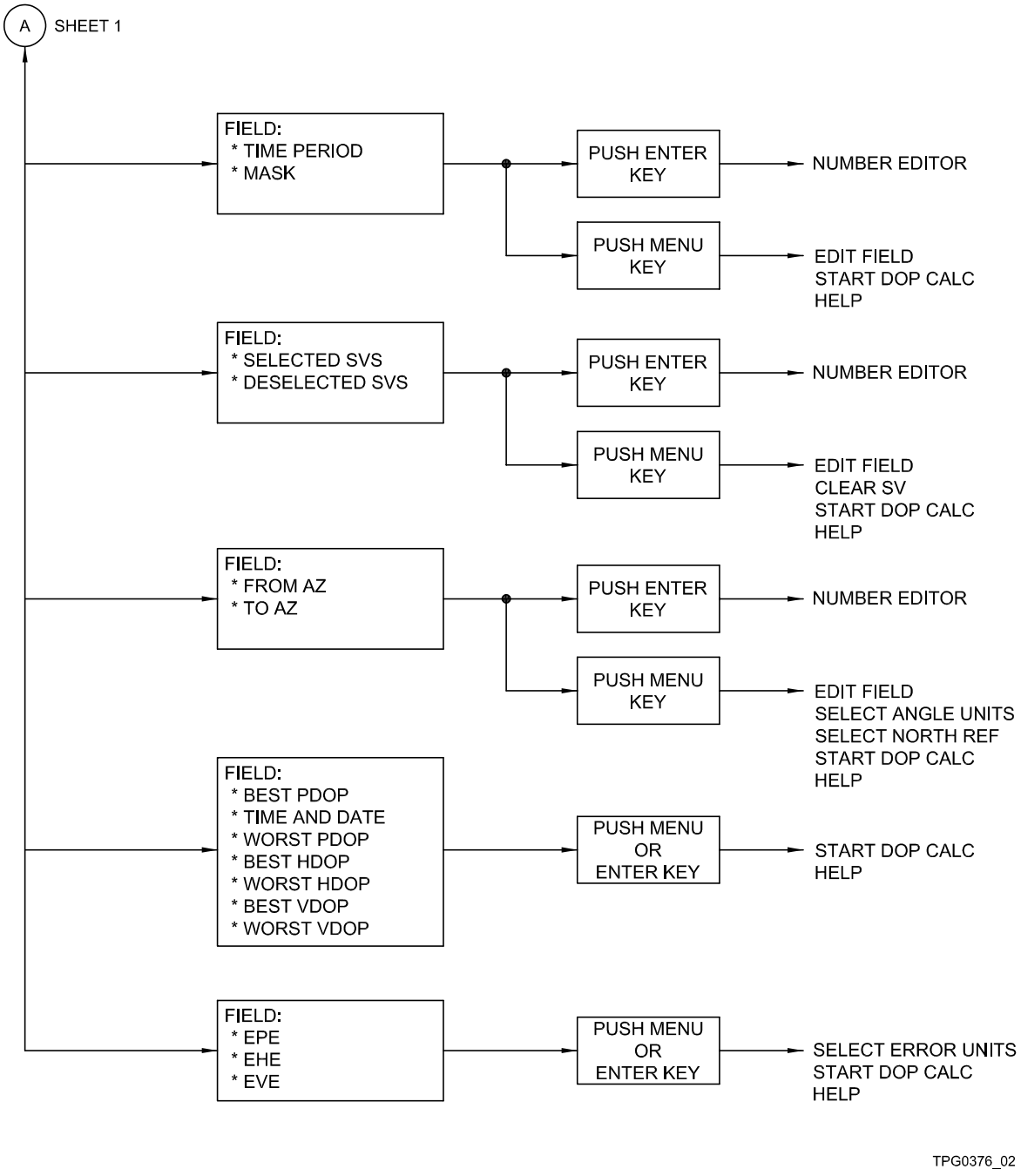


Figure 13-10. DOP Calculation Page Keystroke Map (Sheet 2)

13.7. SV SCHEDULE PAGE (ADVANCED).

13.7.1. Page Function.

The SV Schedule page is accessed from the Satellite submenu using the advanced function set. The SV Schedule page provides calculations used to determine satellite visibility at a position and time specified by the operator. This calculation is based upon predicted satellite coverage. After setup data (position, elevation, start time, start date, and mask angle) is entered into the fields, the operator initiates the calculation. Vertical scrolling is used to view all fields in the page. Horizontal scrolling is used to view satellite data included in the Rise/Set Data table. Page fields are shown in Figure 13-11.

NOTE

When the DAGR is turned off, all SV Schedule page field setup and calculated data is lost. The calculation process is disabled if any changes are made to field setup data while the calculation is running, or if entered field values are invalid.

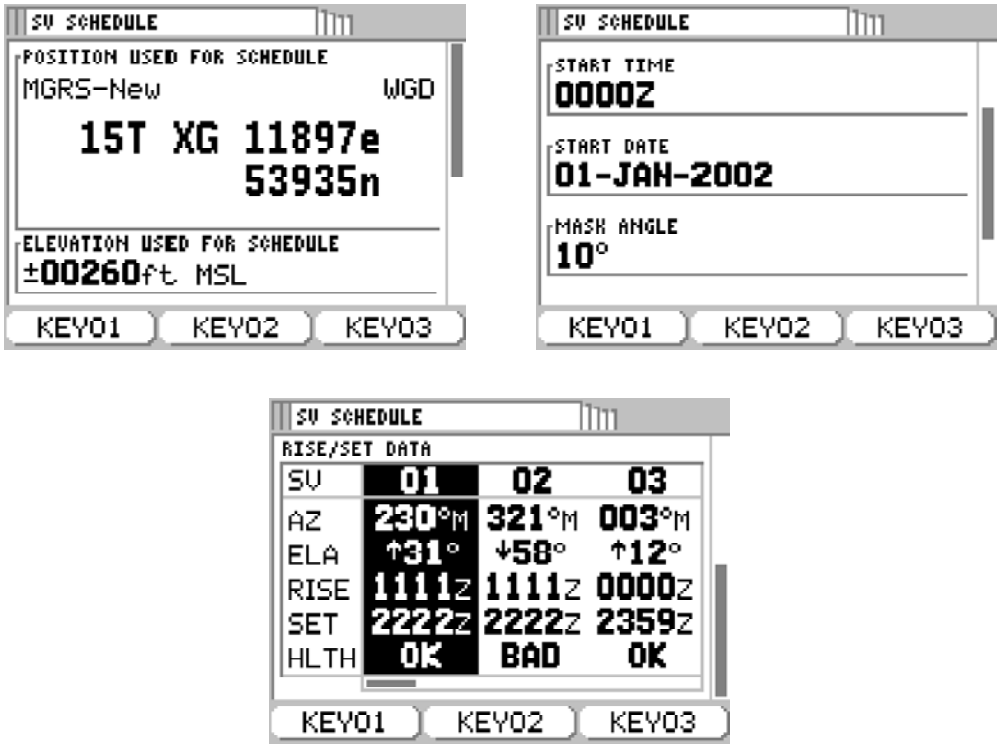


Figure 13-11. SV Schedule Page (Advanced)

13.7.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 13-12. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

13.7.2.1. Position Used For Schedule Field. Displays the selected coordinate/grid system, datum, and position coordinates for satellite schedule calculation. Grid resolution is also set by the operator. A waypoint can be selected and supply position coordinates for calculations instead of using operator entered position coordinates by selecting Use WP Position from the field menu. Any changes made to the waypoint position after it is selected do not affect the calculation. Ensure the appropriate datum coordinate/grid system, and grid resolution are selected before using or editing position coordinates.

- **Coordinate/grid system** — Appears in the upper left corner. Refer to Paragraph 10.2.2.1 for additional information. Refer to Paragraph 10.2.2.2 for grid resolution information.
- **Datum ID** — Appears in the upper right corner. Refer to Paragraph 10.2.2.4 for additional information.
- **Position coordinates** — Horizontal coordinates appear center of field. Refer to Paragraph 6.2.21.15 for editor information.

13.7.2.2. Elevation Field. Displays the selected elevation value for satellite schedule calculation. Elevation is displayed as the vertical range from the surface of the earth as measured from the elevation reference. The elevation reference mean sea level (MSL) or datum (DTM) is also displayed. The appropriate units and elevation reference must be selected before editing this field. Field data format is +/- XXXXX, where X represents feet or meters.

13.7.2.3. Start Time Field. Displays the selected start time used in the calculation. Field data format is HHMMZ/L format, where H represents hours, M represents minutes, and Z/L represents Zulu (maximum time is 23 hours, 59 minutes) or Local (Zulu +/- time zone offset).

13.7.2.4. Start Date Field. Displays the selected start date used in the calculation. Field data format is DD-MMM-YYYY, where D represents day, M represents month, and Y represents year.

13.7.2.5. Mask Angle Field. Displays the selected elevation angle used to calculate satellite rise and set times. The angle is measured from the horizon. Field data format is XX°, where X represents degrees.

13.7.2.6. Rise/Set Data Table. Displays the calculated satellite schedule data for individual satellites in a table column format. Satellites are identified by a unique two digit pseudo random number (PRN) in the SV row. Each satellite column can be scrolled to and highlighted, but content cannot be edited. If the calculation has not been performed or operator entered data is invalid (i.e., no satellite schedule calculation available for the entered field data), double dashes appear instead of data. If operator entered data is correct but there is no calculated data for a field (e.g., a satellite that never rises or sets), the field displays N/A. The table provides the following rows of information for each satellite.

- **AZ** — Provides the azimuth angle to the satellite. Data format is XXX°, where X represents degree value in reference to north reference (True, Magnetic, or Grid).
- **ELA** — Provides the elevation angle (in degrees) to the satellite. An arrow pointing up indicates rising and an arrow pointing down indicates setting. Data format is XX°, where X represents degree value.
- **RISE** — Provides the time the satellite next rises above the elevation mask angle. Data format is HHMMZ/L, where H represents hours, M represents minutes, and Z/L represents Zulu or Local.
- **SET** — Provides the time the satellite next drops below the elevation mask angle. Data format is HHMMZ/L, where H represents hours, M represents minutes, and Z/L represents Zulu or Local.
- **HLTH** — Provides the satellite health status. Indicates OK for healthy satellites. Indicates BAD for satellites without data or satellites reporting bad almanac or ephemeris data.

13.7.3. How To Use The SV Schedule Page.

This page contains information used to obtain satellite position and health information for a particular time and date entered in the calculation. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting data and changing field information. Select appropriate units before entering field data for calculation. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Satellite, then push the ENTER key.
3. Highlight SV Schedule, then push the ENTER key. The SV Schedule page is displayed.

a. Set Up Units/References

(1) Prior to using field information, view the page fields to determine if changes to units of measure or references used in the fields are required (metric or decimal, etc.).

(2) When unit or reference changes are required, highlight the desired field, then push the MENU key.

(3) Highlight the desired type of units or reference to change (e.g., Select Elev Units), then push the ENTER key.

(4) Highlight the desired selection, then push the ENTER key.

(5) The page displays all associated field information with the change made.

(6) If required, repeat the procedure for the remaining selections.

b. Satellite Schedule Calculation

(1) Set position used for the satellite schedule.

NOTE

Position coordinates used for the schedule can be entered from an editor, or acquired from a selected waypoint. Both methods are described in the following steps.

(a) Editor method.

1 From the SV Schedule page, highlight the Position Used For Schedule field. Push the ENTER key.

2 Enter position coordinates using the editor, then push the ENTER key. The operator is prompted to confirm the position adjustment.

3 The display returns to the SV Schedule page displaying highlighted position coordinates.

(b) Waypoint method.

1 From the SV Schedule page, highlight the Position Used For Schedule field. Push the MENU key.

2 Highlight Use WP Position, then push the ENTER key.

3 Highlight the desired waypoint, then push the ENTER key.

4 The display returns to the SV Schedule page displaying highlighted position coordinates.

(2) Set elevation used for satellite schedule.

NOTE

When a waypoint is used to set position used for the satellite schedule, the waypoint elevation is also used. Therefore, the Elevation Used For Schedule field does not require operator input.

(a) From the SV Schedule page, highlight the Elevation Used For Schedule field. Push the ENTER key.

(b) Enter elevation value using the editor, then push the ENTER key.

(c) The display returns to the SV Schedule page displaying highlighted elevation value.

(3) Set start time used for satellite schedule.

(a) From the SV Schedule page, highlight the Start Time field. Push the ENTER key.

(b) Enter start time using the editor, then push the ENTER key.

(c) The display returns to the SV Schedule page displaying highlighted start time.

(4) Set the start date used for satellite schedule.

(a) From the SV Schedule page, highlight the Start Date field. Push the ENTER key.

(b) Enter date using the editor, then push the ENTER key.

(c) The display returns to the SV Schedule page displaying highlighted start date.

(5) Set the mask angle used for satellite schedule.

(a) From the SV Schedule page, highlight the Mask Angle field. Push the ENTER key.

(b) Enter angle value using the editor, then push the ENTER key.

(c) The display returns to the SV Schedule page displaying highlighted mask angle.

(6) Start the satellite schedule calculation.

(a) Push the MENU key (with or without a field highlighted).

(b) Highlight Start SV Schedule, then push the ENTER key.

(c) After a short delay, the Rise/Set Data table displays satellite schedule data according to the data entered for the calculation. Use horizontal and vertical scrolling to view all data.

13.7.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 13-12 shows the keystroke map for the SV Schedule page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the SV Schedule page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Satellite submenu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

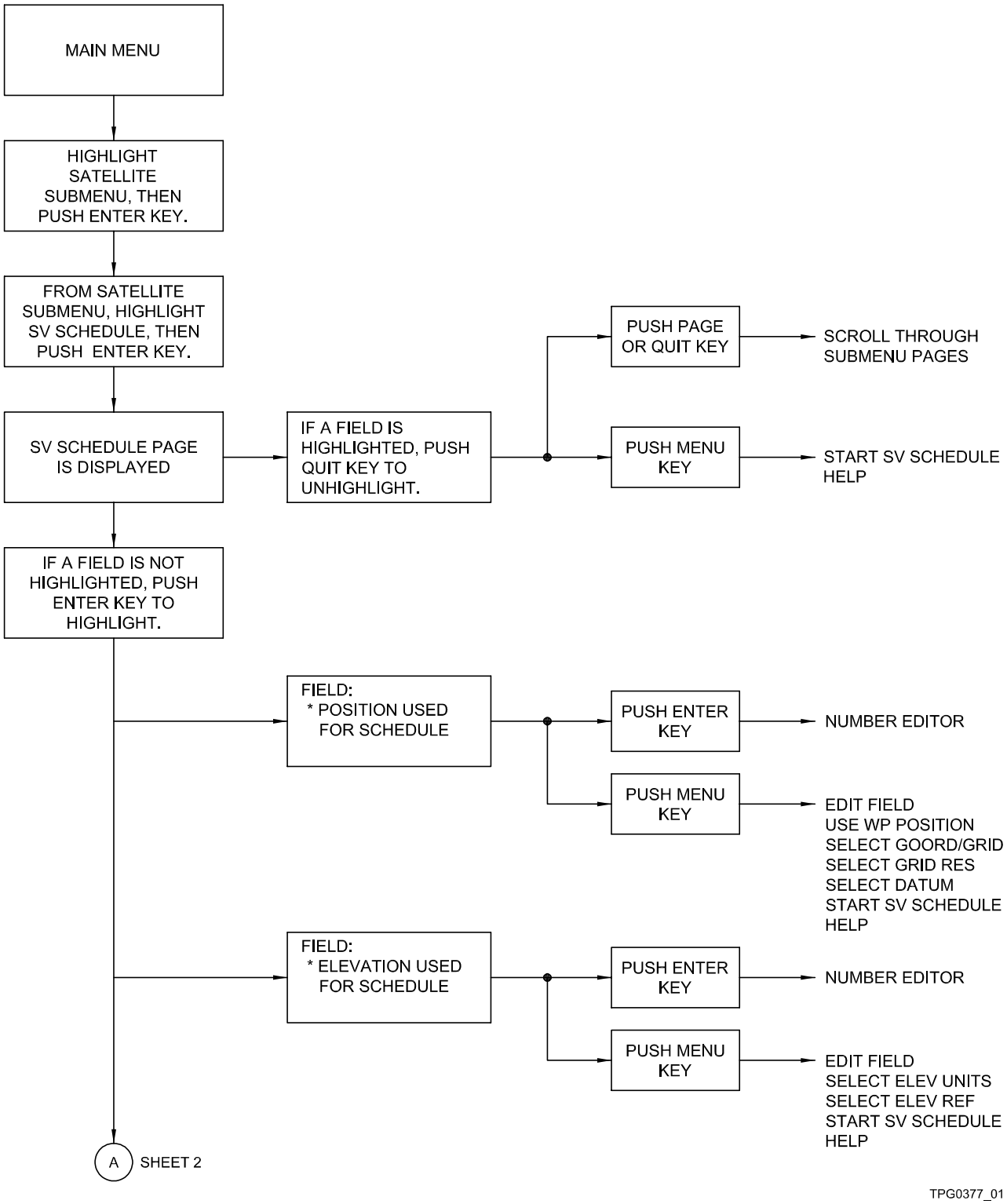


Figure 13-12. SV Schedule Page Keystroke Map (Sheet 1 of 2)

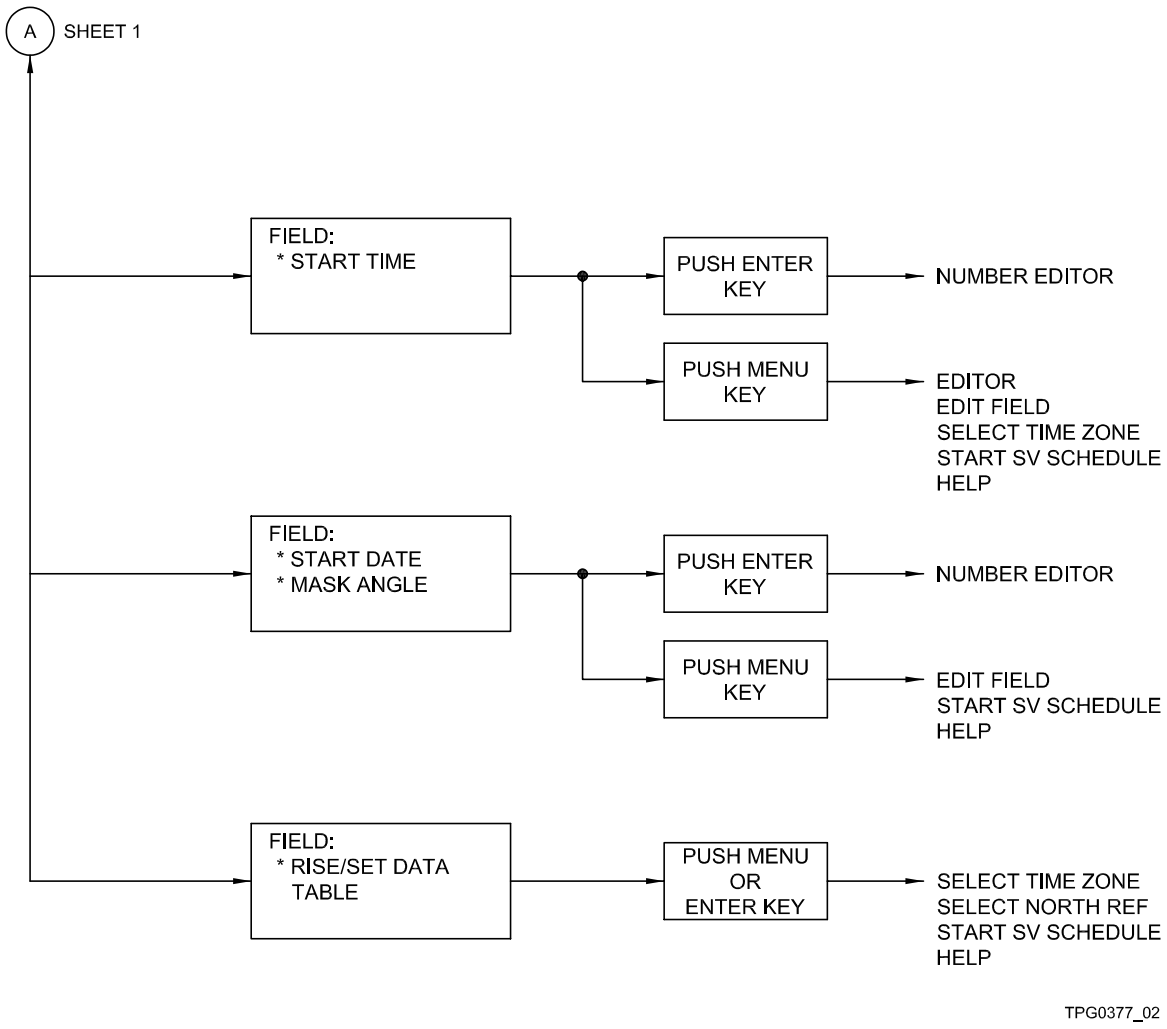


Figure 13-12. SV Schedule Page Keystroke Map (Sheet 2)

13.8. SV SELECT PAGE.

CAUTION

DAGR performance can be degraded when the operator uses the SV Select page to manually deselect satellites or select satellite tracking frequency, code, or acquisition method. When DAGR power is cycled, all operator satellite selections are lost and the DAGR resumes full control of satellite selection.

13.8.1. Page Function.

The SV Select page is accessed from the Satellite submenu. The SV Select page table allows the operator to individually select specific satellite frequencies, codes, acquisition methods, or deselect satellites. When a satellite is deselected, the DAGR does not acquire or track the satellite. The default (Mode column) setting for all satellites allows the DAGR to determine all satellite selection parameters. Any satellite selection changes made by the operator using this page are removed by cycling DAGR power or by using a page menu Clear All function. Scrolling is used to view all table rows. The table rows wrap from the last row to the first row (or vice versa) when scrolling through the table. Satellites are identified by a unique two digit pseudo random number (PRN) in the SV column. Satellite select/deselect information is displayed in the table Mode column shown in Figure 13-13.

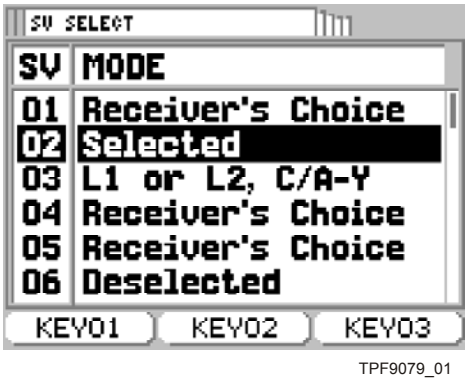


Figure 13-13. SV Select Page

13.8.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 13-14. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

13.8.2.1. Mode Column. The mode for each satellite is individually selectable by the operator. Operator choices are:

- **Receiver's Choice** — The DAGR determines selection and use of the satellite in the PVT solution. All satellites are set to Receiver's Choice mode (default) unless changed by the operator. Cycling DAGR power or using the page menu Clear All function, sets all satellites to Receiver's Choice.
- **Selected** — The satellite is manually selected, however, code and frequency are unspecified.
- **L1, C/A** — The satellite is manually selected to use L1 frequency and C/A tracking code.
- **L1, C/A-P** — The satellite is manually selected to use L1 frequency and P tracking code. C/A tracking code can be used to acquire P tracking code.
- **L1, C/A-Y** — The satellite is manually selected to use L1 frequency and Y tracking code. C/A tracking code can be used to acquire Y tracking code.
- **L1, Y** — The satellite is manually selected to use L1 frequency and Y tracking code.
- **L2, Y** — The satellite is manually selected to use L2 frequency and Y tracking code.

- **L1 or L2, C/A-P** — The satellite is manually selected to use L1 frequency and P tracking code (C/A tracking code can be used to acquire P tracking code) OR L2 frequency and P tracking code.
- **L1 or L2, Y** — The satellite is manually selected to use L1 frequency and Y tracking code OR L2 frequency and Y tracking code.
- **L1 or L2, C/A-Y** — The satellite is manually selected to use L1 frequency and Y tracking code (C/A tracking code can be used to acquire Y tracking code) OR L2 frequency and Y tracking code.
- **Deselected** — The satellite is manually deselected for acquisition and tracking.

13.8.3. How To Use The SV Select Page.

The SV Select page contains information used to configure satellite tracking and acquisition. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting data and changing field information. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Satellite, then push the ENTER key.
3. Highlight SV Select, then push the ENTER key. The SV Select page is displayed.

a. Select Individual Satellite Tracking/Acquisition Mode

   (1) From the SV Select page, highlight a table row, then scroll to the desired satellite row (individual satellite SV number and Mode selection).

   (2) Push the ENTER key.

   (3) Highlight the desired mode from the list (refer to Paragraph 13.8.2.1), then push the ENTER key.

   (4) The display returns to the SV Select page with the individual satellite row highlighted and mode column information changed accordingly.

b. Return All Satellites to Receiver's Choice Mode (default).

NOTE

An alternative to performing this procedure is simply cycling DAGR power off then on.

   (1) From the SV Select page (with or without table row highlighted), push the MENU key.

   (2) Highlight Clear All, then push the ENTER key.

   (3) The display returns to the SV Select page with all satellites set to Receiver's Choice in the Mode column.

13.8.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 13-14 shows the keystroke map for the SV Select page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the SV Select page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Satellite submenu
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

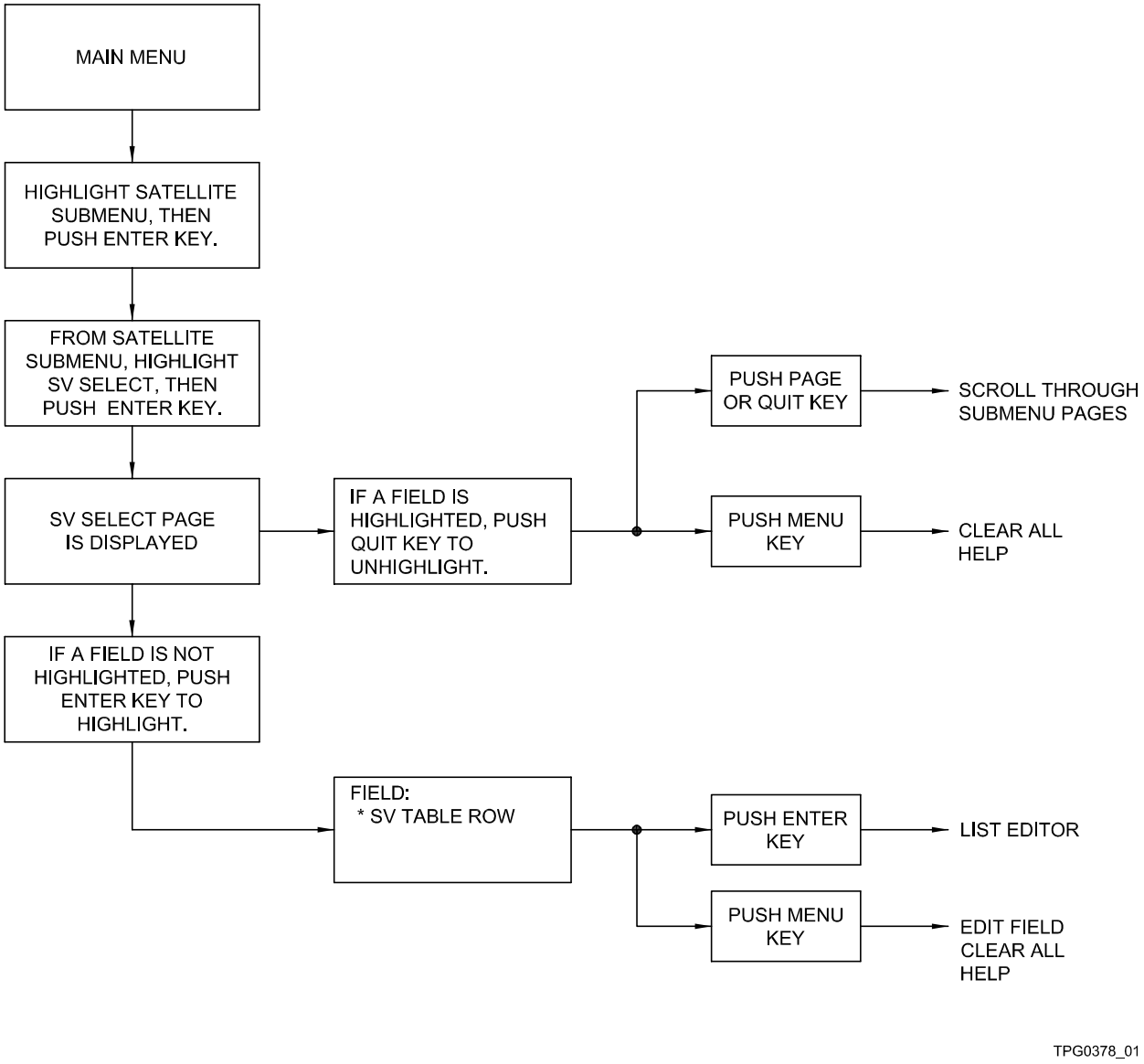


Figure 13-14. SV Select Page Keystroke Map

CHAPTER 14
OPERATOR INSTRUCTIONS — APPLICATIONS SUBMENU OPERATION

14.1. APPLICATIONS SUBMENU.

This chapter contains Applications submenu operation information. The Applications submenu page set provides the following selections described in this chapter:

- Fire Support (Advanced) - Calculates and stores a target position using operator input or laser range finder data.
- CAS 9–Line Brief (Advanced) - Provides close air support positioning data used between ground personnel and aircraft.
- Jammer Finder - Stores azimuth data from multiple positions to determine the approximate position of a jamming source.
- Gun Laying (GLS) (Advanced) - Calculates an accurate azimuth between two points used in sighting weaponry (e.g., artillery) to a target.

14.2. FIRE SUPPORT PAGE (ADVANCED).

WARNING

• If DAGR power is cycled while using the Fire Support page, calculated position coordinates and elevation of a target are lost unless stored as a waypoint. When the Power-On sequence is complete, the Present Position page is displayed and NOT the Fire Support page. You must recalculate the target position coordinates after the Power-On sequence is completed. Prior to communicating or using any calculated target position coordinates, always verify page title FIRE SUPPORT appears at the top of the display and position coordinates field title is Calculated Target Position.

• DAGR displays a warning to prevent misuse of the present position as a target position that could cause personal injury or death. After power-on and prior to the DAGR automatically displaying the Present Position page, a warning stating your position is displayed, NOT the target position if the Fire Support page was used or nonvolatile memory was cleared prior to power-on.

• Before using or communicating a Fire Support page target position, take appropriate action according to any warning or danger message that is displayed. Then check all data in the Safety Check fields to ensure your present position is a safe distance from the target position relative to the ordinance being used. Failure to do so could result in injury or death.

CAUTION

• When DAGR present position (000–PRES POS) is used in the From WP field for the target calculation and fields are blinking between black and gray text (From WP, POS To Target Slant Range, Calculated Target Position, and Calculated Target Elevation fields), the DAGR was not tracking satellites or had not yet acquired a current position fix before the calculation. Calculated target coordinates referencing present position may be inaccurate when the DAGR does not use a current position fix for the calculation.

• The operator must use the Stored As WP field to store the target position and elevation as a fire support (FS) waypoint or laser range finder (LRF) waypoint, or the target position will be lost when the DAGR is turned off.

• Verify appropriate units of measure, elevation reference, coordinate/grid system, grid resolution, and datum are selected before entering field data for calculation. Verification of this data ensures accurate target data.

• A high level of position error may place a mission at risk. Verify the figure of merit (FOM) level is sufficient to accomplish the mission. Refer to the position error field (EPE/EHE/EVE) of either the Present Position page or NAV Displays page to view the current FOM. Refer to Table 9-1 to convert FOM into a position error range (in meters). If the FOM is too high, refer to Paragraph 18.4. An FOM of 1 (25 meter accuracy) is best.

14.2.1. Page Function.

The Fire Support page is accessed from the Applications submenu using the advanced function set. A target position is calculated and stored by the Fire Support page using either operator input data or LRF data. The Fire Support page is used to calculate the three dimensional position coordinates of a target location from any waypoint or present DAGR position. This calculation is automatically performed once the operator inputs the following information:

- Source waypoint or present position (From WP field)
- Azimuth to target
- Slant range or horizontal range to target (whichever is available).
- Target elevation or elevation angle (whichever is available).

14.2.1.1. Line of sight is used to calculate the new position. When target data is manually entered in view one (shown top of Figure 14-1) of the Fire Support page, the calculated position can be stored as a fire support (FS) waypoint. When target data is electronically entered using a laser range finder, the calculated position can be stored as a laser range finder (LRF) waypoint. FS and LRF waypoints are stored with a MAGVAR value calculated from their target position and their MAGVAR type is stored as Calculated. FS and LRF waypoints are also used by the CAS 9–Line Brief page (refer to Paragraph 14.3) for close air support (CAS) applications. Check all data in the Safety Check fields (of view two shown lower left in Figure 14-1) prior to using or communicating a Fire Support page target position. Figure 14-1 shows the Fire Support page using Slant Range and Target Elevation fields. Figure 14-2 shows the Fire Support page using Range and Elevation Angle fields.

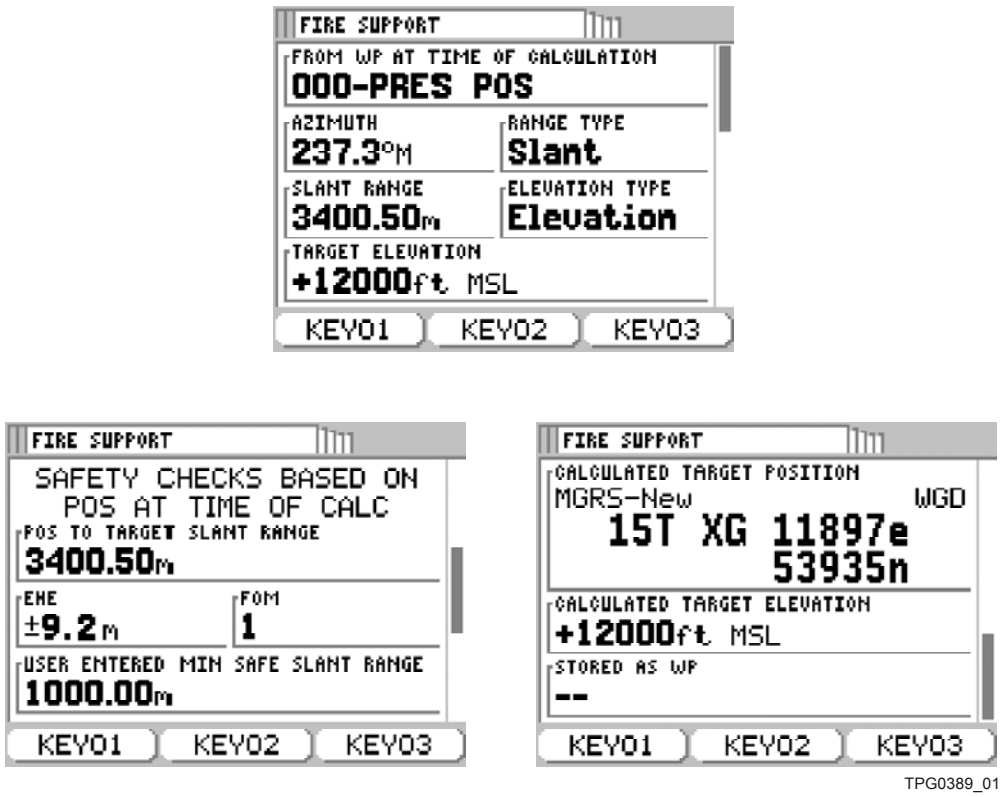


Figure 14-1. Fire Support Page Using Slant Range and Target Elevation Fields (Advanced)

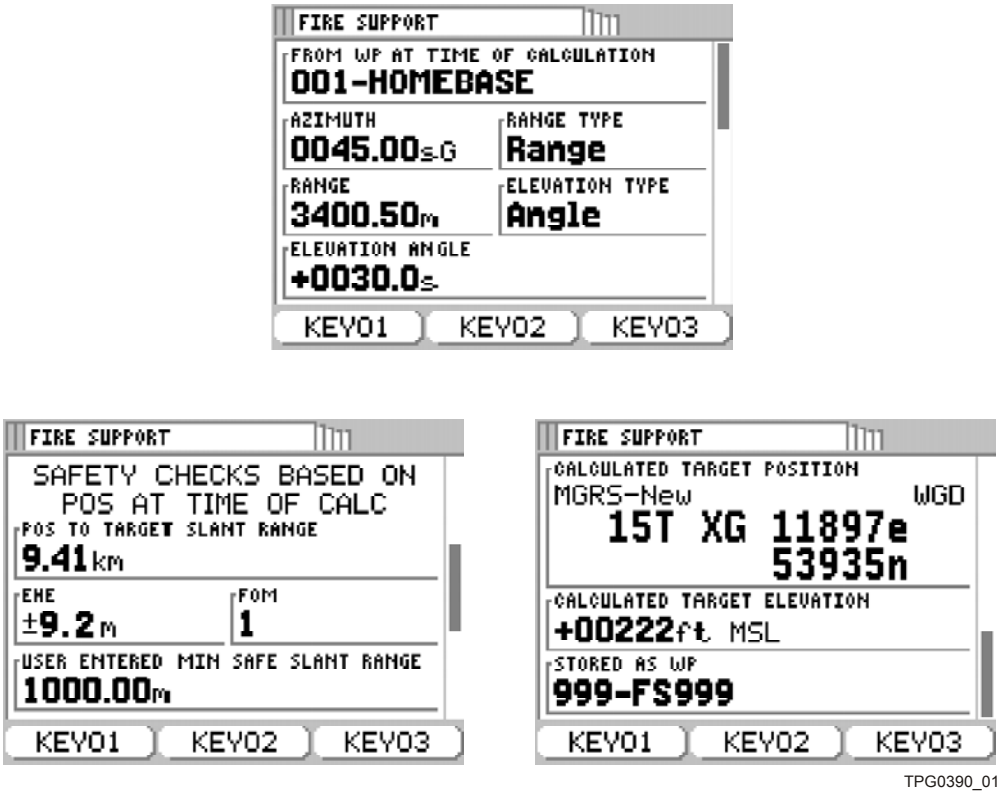


Figure 14-2. Fire Support Page Using Range and Elevation Angle Fields (Advanced)

14.2.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 14-6. Vertical scrolling is used to view all page fields. Double dashes appear in fields that require data entry or data calculation. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

14.2.2.1. From WP Field. Displays the starting point (source) waypoint number and name selected by the operator for use in the calculation. After required data is entered and the calculation is performed, this field title changes from **From WP** to **From WP At Time Of Calculation**. Field data format is XXX-NNNNNNNNN, where X represents the waypoint number and N represents the waypoint name. This field also indicates the following:

- This field does not blink when a waypoint is used instead of present position (000–PRES POS).
- This field does not blink when present position (000–PRES POS) is used and the DAGR has a present position fix before the calculation is performed.
- This field blinks when present position (000–PRES POS) is used and the DAGR does not have a present position fix before the calculation is performed.
- After the calculation is performed using present position (000–PRES POS), this field blinks if the DAGR did not have a current position fix when the calculation was performed.

14.2.2.2. Azimuth Field. Displays the azimuth from the source waypoint to the new (calculated) position. Field data format is XXX.XX (X represents degrees (°)) or XXXX.XX (X represents mils (μ) or strecks (s)) in reference to north reference (True (T), Magnetic (M), or Grid (G)). The Azimuth field in Figure 14-2 shows a value of 45 strecks using the grid north reference.

14.2.2.3. Range Type Field. Operator selects Range when only horizontal range data is being used in the calculation. Operator selects Slant when both horizontal and vertical range data is being used in the calculation. The operator selection determines whether the Slant Range or Range field is displayed.

14.2.2.4. Elevation Type Field. Operator selects Elevation when elevation feet or meters are being used in the calculation. Operator selects Angle when an elevation angle is being used in the calculation. This operator selection determines whether the Target Elevation or Elevation Angle field is displayed.

14.2.2.5. Slant Range Field. This field is displayed when Range Type field is set to Slant. Displays the slant range entered from the source waypoint to the new (calculated) position. Field data format is XXXX.XX or XXXX.X, where X represents miles, nautical miles, kilometers, feet, yards, or meters.

14.2.2.6. Range Field. This field is displayed when Range Type field is set to Range. Displays the range entered from the source waypoint to the new (calculated) position. Field data format is XXXX.XX or XXXX.X, where X represents miles, nautical miles, kilometers, feet, yards, or meters.

14.2.2.7. Target Elevation Field. This field is displayed when Elevation Type field is set to Elevation. Displays the entered elevation of the new (calculated) position. The field provides the elevation or vertical range from the surface of the earth from either mean sea level (MSL) or datum (DTM) elevation reference. Field data format is +/- XXXXX, where X represents feet or meters. Positive (+) indicates the target is above the elevation reference. Negative (–) indicates the target is below the elevation reference.

14.2.2.8. Elevation Angle Field. This field is displayed when Elevation Type field is set to Angle. Displays the entered elevation angle from the source waypoint to the new (calculated) position. Field data format is +/- XXX.X (X represents degrees (°)) or XXXX.X (X represents mils (μ) or strecks (s)). Positive (+) indicates the target is above the source waypoint position. Negative (–) indicates the target is below the source waypoint position.

14.2.2.9. POS To Target Slant Range Field.

WARNING

Always verify this field data as a safety check prior to using or communicating a Fire Support page target position. Always maintain a safe slant range between present position and target position to ensure safety of operator and other personnel.

Displays the slant range from the DAGR position fix at time of calculation to the calculated target position. This field cannot be edited by the operator. Units of measure can be selected using the Range or Slant Range field menu. Field data blinks if the DAGR did not have a current position fix when the calculation was performed. Field data format is XXXX.XX or XXXX.X, where X represents miles, nautical miles, kilometers, feet, yards, or meters.

14.2.2.10. EPE/EHE Field.

WARNING

Always verify this field data as a safety check prior to using or communicating a Fire Support page target position. A high level of position error may place the safety of personnel at risk.

Displays either the estimated position error (EPE) or the estimated horizontal error (EHE). The operator can use the field menu to select either EPE or EHE. Error is displayed as a ± value. Calculated target position data is accurate to within the ± value. This field data cannot be edited by the operator. Units of measure can be selected using the Range or Slant Range field menu. Field data format is N.N, NN, or NNN, where N represents miles, nautical miles, kilometers, feet, yards, or meters.

14.2.2.11. FOM Field.

WARNING

Always verify this field data as a safety check prior to using or communicating a Fire Support page target position. A high level of position error may place the safety of personnel at risk. Refer to Table 9-1 to determine the FOM amount of position error in meters. An FOM above 3 is considered a high level of position error.

Displays the figure of merit (FOM) for the calculated position. FOM ranges from 1 to 9, with a value of 1 being the best. This field cannot be edited by the operator.

14.2.2.12. User Entered Minimum Safe Slant Range Field.

WARNING

Always verify this field data as a safety check prior to using or communicating a Fire Support page target position. Always maintain a safe slant range between present position and target position to ensure safety of operator and other personnel.

Displays the minimum safe slant range between present position of the DAGR and the calculated target position. A warning is displayed when the slant range between DAGR present position and the target position is less than the displayed value. The operator can edit the value, but the field returns to the default value (1,000 meters) when DAGR power is cycled. Units of measure can be selected using the Range or Slant Range field menu.

14.2.2.13. Calculated Target Position Field. Displays the calculated target position, datum, and coordinate system. Whenever the source waypoint, range, elevation, or azimuth data is changed, the calculation is automatically performed. Displays NO SOLUTION POSSIBLE when field data required for the calculation has not yet been entered. Field data blinks if the source waypoint is 000–PRES POS and the DAGR did not have a current position fix when the calculation was performed.

14.2.2.14. Calculated Target Elevation Field. Displays the calculated target elevation. Whenever the source waypoint, range, elevation, or azimuth data is changed, the calculation is automatically performed. Field data blinks if the source waypoint is 000–PRES POS and the DAGR did not have a current position fix when the calculation was performed.

NOTE

Target elevation calculation requires the operator provide an input to the Elevation Angle field. When the Elevation Type field displays Elevation, the Target Elevation field and Calculated Target Elevation field values are similar.

14.2.2.15. Stored As WP Field. Displays the waypoint number and name of the waypoint used to store the calculated target position and elevation. The waypoint name begins with FS for fire support waypoints (manual entry), or LRF for laser range finder waypoints (electronic entry). The operator is prompted for confirmation before any waypoint is overwritten. If the calculated target position is not stored as a waypoint, the field displays double dashes. Field data format is XXX-TTTNNNNNNN, where X represents waypoint number, T represents FS or LRF, and N represents waypoint name (displays waypoint number until edited). Refer to Paragraph 8.2 for additional waypoint information. The operator stores the calculated target position and elevation as a waypoint according to one of the following:

- The first unused waypoint starting with waypoint 999 and counting down (e.g., 998, 997, etc.)
- Any waypoint number selected by the operator.
- Waypoint 001 if all waypoints are used.

14.2.3. How To Use The Fire Support Page.

WARNING

Before using or communicating a Fire Support page target position, take appropriate action according to any warning or danger message that is displayed. Then check all data in the Safety Check fields to ensure your present position is a safe distance from the target position relative to the ordinance being used. If the operator edits field data of Fire Support page view one after the calculation is performed, the calculation is automatically repeated and the Safety Check fields must again be checked. Failure to do so could result in injury or death.

This page is used to calculate the three dimensional position coordinates of a target location from any waypoint or present DAGR position. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting data and changing field information. When a text editor is used, the menu key can be pushed to access a list of options (undo changes, save and exit, exit and no save, reset to default, and editor help). These options provide text editor shortcuts and pertain to the immediate function being performed (e.g., using a text editor). Select appropriate units before entering field data for calculation.

14.2.3.1. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Applications, then push the ENTER key.
3. Highlight Fire Support, then push the ENTER key. The Fire Support page is displayed.

a. Set Up Units/References

   (1) Prior to using display data, view the page to determine if changes to units of measure or references used in the display are required (metric or decimal, mils or degrees, true or magnetic, etc.).

   (2) When unit or reference changes are required, highlight the field, then push the MENU key.

   (3) Highlight the desired type of units or reference selection (e.g., Select Range Units), then push the ENTER key.

   (4) Highlight the desired selection, then push the ENTER key.

   (5) The page displays all associated information with the change made.

   (6) If required, repeat the procedure for the remaining selections.

b. Calculate Target Position and Elevation

   (1) From the Fire Support page, individually highlight each field, then push the ENTER key to edit field content described as follows:

      (a) **From WP field** — Select the source waypoint as desired, or leave it set to present position (000–PRES POS).

      (b) **Azimuth field** — Input the azimuth (from the source waypoint to the target position).

      (c) **Range Type field and Elevation Type field** — Determine, then input the range type and elevation type into their corresponding fields. This field corresponds with the Range/Slant Range field and Target Elevation/Elevation Angle field.

      (d) **Range or Slant Range field** — Input the range or slant range field value (from the source waypoint to the target position). This field is dependent on the type of range set in the Range Type field.

      (e) **Target Elevation or Elevation Angle field** — Input the target elevation or elevation angle (from the source waypoint to the target position) field value. This field is dependent on the type of elevation set in the Elevation Type field. If data is not entered, the calculation is performed using default values (Target Elevation 0.0 meters using datum (DTM) elevation reference, or Elevation Angle 0.0 °).

WARNING

• If any fields on the Fire Support page are blinking, the DAGR did not have a current position fix when the calculation was performed. Calculated field data may be inaccurate and result in injury or death.

• When the calculation is performed and the slant range between DAGR present position and the target position is equal to or less than 100 meters, the DAGR displays a **danger** message that present position and target position are the same. When this message is displayed, immediately obtain a safe slant range to prevent injury or death.

• When the calculation is performed and the slant range between DAGR present position and the target position is equal to or less than the value shown in the User Entered Minimum Safe Slant Range field (but greater than 100 meters), the DAGR displays a **warning** message and displays the slant range from DAGR present position to target position. When this message is displayed, immediately obtain a safe slant range to prevent injury or death.

(2) Calculated Target Position and Calculated Target Elevation fields automatically display their calculated values. The From WP field title changes to From WP At Time Of Calculation.

(3) Scroll to the Safety Checks view two of the Fire Support page, then review all safety check field information.

(a) POS to Target Slant Range field — Verify a safe range between present position and target position.

(b) EPE/EHE field — Verify acceptable position accuracy to meet mission requirements.

(c) FOM field — Verify acceptable position accuracy to meet mission requirements.

(d) User Entered Minimum Safe Slant Range field — Verify a safe user entered minimum slant range value between present position and target position.

WARNING

A high level of position error may place the safety of personnel and the mission at risk. Before storing calculation values as a waypoint, verify the FOM field and EPE or EHE field indicate acceptable position accuracy to meet mission requirements. Refer to Table 9-1 to determine the FOM amount of position error in meters. An FOM above 3 is considered a high level of position error.

(4) Store the calculation values as a waypoint.

(a) Highlight the Stored As WP field, then push the MENU key.

(b) Highlight Store As WP, then push the ENTER key.

(c) DAGR displays and highlights the first unused waypoint starting with waypoint 999 and counting down (e.g., 998, 997, etc.). Highlight the desired waypoint, then push the ENTER key.

(d) DAGR briefly displays the waypoint stored message, then returns to the Fire Support page with the Stored As WP field displaying XXX-FSXXX, where X represents the stored waypoint number.

(5) Edit the Stored as WP field waypoint (name, remark, or identity type) as desired using the field menu selections. Refer to Paragraph 8.2 for additional waypoint information.

14.2.4. How To Use A Laser Range Finder With DAGR.

WARNING

• A high level of position error may place the safety of personnel and the mission at risk. Before storing laser range finder (LRF) values as a waypoint, verify the current DAGR figure of merit (FOM) indicates acceptable position accuracy to meet mission requirements. Refer to the position error field (EPE/EHE/EVE) of either the Present Position page or NAV Displays page to view the current FOM. An FOM above 3 is considered a high level of position error.

• Prior to using a laser range finder with DAGR, ensure present position is current and accurate. When used with a laser range finder, the DAGR must be set to Continuous mode, OR if set to Standby mode, verify the present position fix is current and accurate. DO NOT set the DAGR to auto transition to Standby mode. When DAGR ceases tracking satellites (e.g., placed in Standby mode) and is moved to another location, the last present position fix is no longer current or accurate.

• Before using or communicating an LRF waypoint target position, take appropriate action according to any warning or danger message that is displayed. Then check all data in the Safety Check fields to ensure your present position is a safe distance from the target position relative to the ordinance being used. If the operator edits field data of Fire Support page view one after LRF data is displayed, a target calculation is automatically performed and the Safety Check fields must again be checked. Failure to do so could result in injury or death.

NOTE

At close range (100 meters or less), the LRF waypoint azimuth value may have a small amount of error. To ensure accurate targeting, the azimuth should be crosschecked using a map and compass prior to use.

A target position is calculated and stored by the Fire Support page using either operator input data or LRF data.Use only laser range finders approved for use with the DAGR. Refer to website http://army-gps.robins.af.mil for a listing of approved laser range finders. This procedure is used to interconnect the laser range finder (LRF) with the DAGR to create and store an LRF waypoint. The procedure is recommended for advanced operators only. The advanced function set must be used (refer to Paragraph 12.3).

CAUTION

Do not connect the LRF to the DAGR while the DAGR is powered on. This can cause spurious signals resulting in the DAGR rejecting the first LRF shot data.

a. With the DAGR powered off, attach the LRF interface cable (supplied with the LRF) to the LRF and the RS-232 connector to the DAGR J2 connector.

b. Power-on the DAGR, then access the Communications submenu, COM Port Setup page (refer to Paragraph 11.3).

c. Set the COM Port field to COM Port 1 (advanced function set only).

d. Set the Configuration field to Standard (advanced function set only).

e. Set the Laser Range Finder (LRF) Type field to Mark VII if using the Mark VII LRF (advanced function set only).

f. Set the Laser Range Finder (LRF) Type field to Other if using a LRF other than the Mark VII (advanced function set only).

g. Ensure the DAGR is not set for auto transition to Standby mode (refer to Paragraph 7.5.2.2).

h. Prior to using the LRF, use the Present Position page position error field (EPE/EHE/EVE) to ensure present position is current and accurate (refer to Paragraph 9.5).

i. Using LRF procedures (initiated from the LRF), determine the target range, azimuth, and vertical angle of the desired point. The LRF transfers data to the DAGR.

j. Verify accuracy of the LRF shot data by lazing and checking data multiple times and comparing LRF shot data with a map to ensure that it is accurate.

(1) The DAGR automatically displays the LRF Shot Received message (refer to Figure 14-3).

NOTE

• If multiple LRF shots are taken, only the data of the last shot taken is displayed in the LRF Shot Received message. All prior LRF shot data is overwritten.

• If the LRF Shot Received message is not displayed, verify that the DAGR is using the advanced function set and that the COM Port Setup page field selections are correct (as given in steps c, d, e, and f). If the LRF Type field is incorrectly set or if the DAGR is not using the advanced function set, the DAGR will either reject the LRF data or automatically store the shot as a FS waypoint, depending on the type of LRF being used.

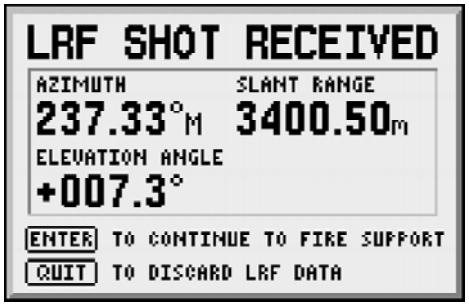


Figure 14-3. LRF Shot Received Message

(2) Check the accuracy of the displayed azimuth, slant range, and elevation angle of the LRF shot data. Then perform one of the following:

(a) To accept the data and store an LRF waypoint, push the ENTER key. Then proceed to step k.

(b) To replace the data with a new LRF shot, return to step i.

(c) To discard the data and remove the LRF Shot Received message, push the QUIT key. The DAGR returns to the page displayed prior to the LRF Shot Received message.

WARNING

If any fields on the Fire Support page are blinking, the DAGR did not have a current position fix when the calculation was performed. Calculated field data may be inaccurate and result in injury or death.

k. Store the LRF waypoint.

(1) The DAGR automatically displays the Fire Support page with the LRF shot data. Refer to Figure 14-1.

WARNING

• When the calculation is performed and the slant range between DAGR present position and the target position is equal to or less than 100 meters, the DAGR displays a **danger** message that present position and target position are the same. When this message is displayed, immediately obtain a safe slant range to prevent injury or death. Refer to Figure 14-4.

• When the calculation is performed and the slant range between DAGR present position and the target position is equal to or less than the value shown in the User Entered Minimum Safe Slant Range field (but greater than 100 meters), the DAGR displays a **warning** message and displays the slant range from DAGR present position to target position. When this message is displayed, immediately obtain a safe slant range to prevent injury or death. Refer to Figure 14-5.

• A high level of position error may place the safety of personnel and the mission at risk. Before storing LRF shot values as a waypoint, verify the FOM field and EPE or EHE field indicate acceptable position accuracy to meet mission requirements. Refer to Table 9-1 to determine the FOM amount of position error in meters.

TPG9389_01

Figure 14-4. Target Position Danger Message

TPG9388_01

Figure 14-5. Target Position Warning Message

(2) Scroll to view two of Fire Support page Safety Checks display (refer to Figure 14-1), then review all safety check field information.

(a) POS to Target Slant Range field — Verify a safe range between present position and target position.

(b) EPE/EHE field — Verify acceptable position accuracy to meet mission requirements.

(c) FOM field — Verify acceptable position accuracy to meet mission requirements. An FOM above 3 is considered a high level of position error.

(d) User Entered Minimum Safe Slant Range field — Verify a safe user entered minimum slant range value between present position and target position.

(3) Scroll to view three of Fire Support page (refer to Figure 14-1). The Calculated Target Position and Calculated Target Elevation fields automatically display their calculated values.

(4) Store the LRF shot data as a waypoint.

(a) Highlight the Stored As WP field, then push the MENU key.

(b) Highlight Store As WP, then push the ENTER key.

(c) DAGR displays and highlights the first unused waypoint starting with waypoint 999 and counting down (e.g., 998, 997, etc.). Highlight the desired waypoint, then push the ENTER key.

(d) DAGR briefly displays the waypoint stored message, then returns to the Fire Support page with the Stored As WP field displaying XXX-LRFXXX, where X represents the stored waypoint number.

(5) Edit the Stored as WP field waypoint (name, remark, or identity type) as desired using the field menu selections. Refer to Paragraph 8.2 for additional waypoint information.

NOTE

If the operator edits field data of the Fire Support page view one, the waypoint name prefix changes from LRF to FS.

l. Verify the LRF waypoint is stored using the Waypoints page (refer to Paragraph 8.2).

m. Use the Waypoints page and Waypoint Editor page to check LRF waypoint data (e.g., position, elevation, azimuth, slant range, EPE, etc.).

NOTE

The sort function of the Waypoints page provides capability to sort and display the stored LRF waypoints by name for quick access. Refer to Paragraph 8.2.3 for more information.

14.2.5. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 14-6 shows the keystroke map for the Fire Support page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Fire Support page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Applications sub-menu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

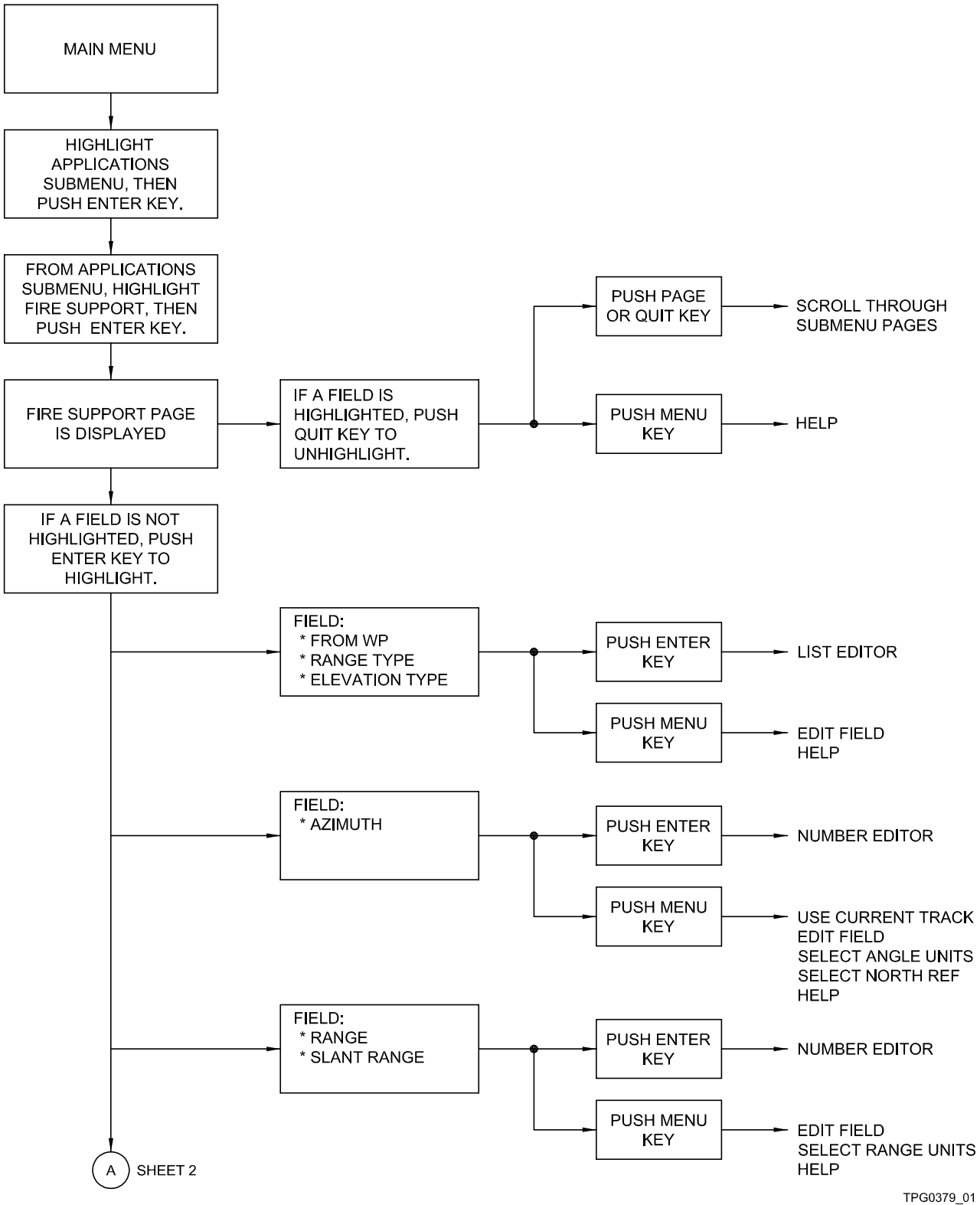


Figure 14-6. Fire Support Page Keystroke Map (Sheet 1 of 2)

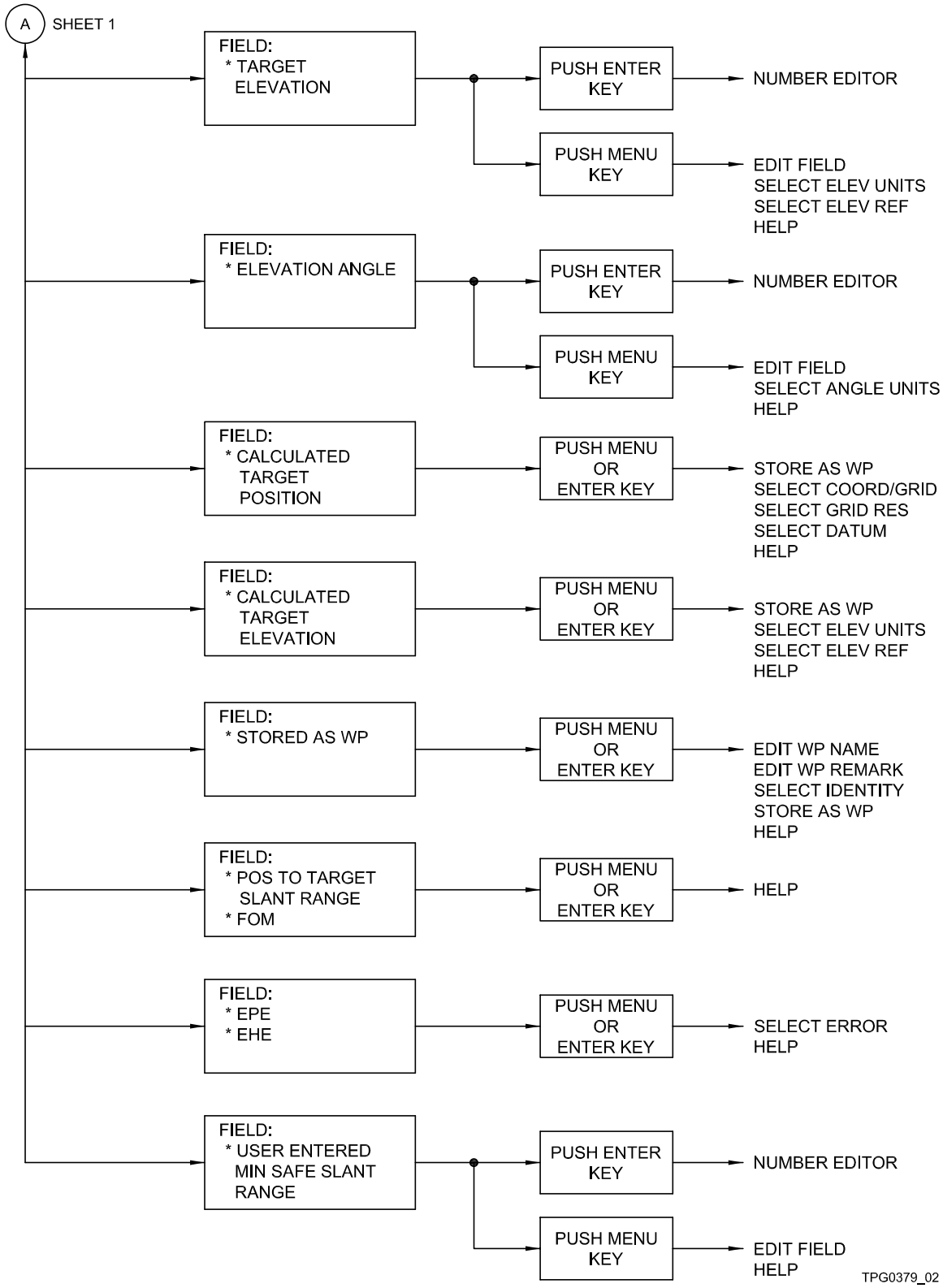


Figure 14-6. Fire Support Page Keystroke Map (Sheet 2)

14.3. CAS 9-LINE BRIEF PAGE (ADVANCED).

WARNING

Check all data appearing in the Safety Check fields prior to calling for close air support to ensure safety of operator and other personnel.

CAUTION

A high level of position error may place a mission at risk. Verify the figure of merit (FOM) level is sufficient to accomplish the mission. Refer to the position error field (EPE/EHE/EVE) of either the Present Position page or NAV Displays page to view the current FOM. Refer to Table 9-1 to convert FOM into a position error range (in meters). If the FOM is too high, refer to Paragraph 18.4.

14.3.1. Page Function.

The CAS 9-Line Brief page is accessed from the Applications submenu using the advanced function set. The CAS 9-Line Brief page provides close air support (CAS) positioning data used and called in by the operator to acquire aircraft close air support. This information is provided in a common form for ease of communication between service branches. The DAGR displays computed CAS data after the following is entered by the operator:

- Initial point position used by inbound aircraft to orient target acquisition.
- Target position typically acquired from a fire support waypoint.

14.3.1.1. The CAS 9-Line Brief page can use fire support waypoints (waypoints stored using the Fire Support page) or other waypoints to provide target and initial point (IP) position data. Certain page fields are numbered one through nine, corresponding to the CAS 9-Line Brief form. The two bottom views of the page (refer to Figure 14-7) have safety check fields that must be checked prior to calling for support. The operator is prompted by the DAGR to view and acknowledge the safety check fields under the following conditions:

- When initial point (IP) and target position are entered or changed.
- When datum, unit selection, or reference (other than coordinate/grid) are changed.
- When present position changes more than 50 meters.

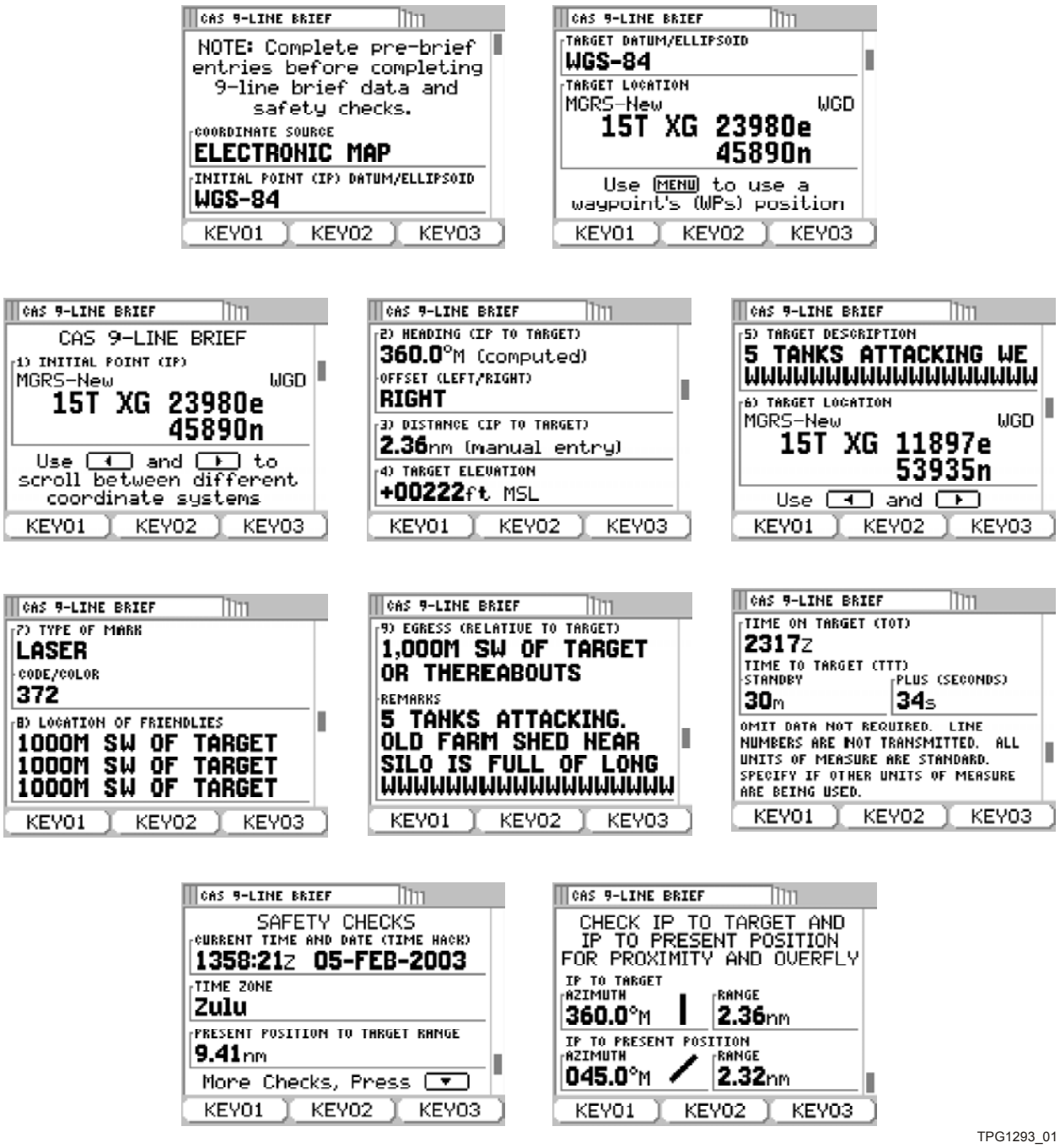


Figure 14-7. CAS 9–Line Brief Page (Advanced)

14.3.2. Field Descriptions.

The Target Location and Initial Point fields initially display the current DAGR coordinate/grid system until changed by the operator. After selecting a waypoint or a datum, the datum is also displayed. If the target location and initial point datums are displayed but mismatched, the DAGR displays a datum mismatch message. Select page/field information by using keystrokes shown on the keystroke map in Figure 14-8. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

14.3.2.1. Coordinate Source Field. Displays the coordinate source used by the operator for gathering data. Selections are:

- – – (none)
- Paper Map
- Electronic Map
- GPS
- Other

14.3.2.2. Initial Point (IP) Datum/Ellipsoid Field. Displays the ellipsoid and horizontal datum reference used for the initial point (IP) position. This field is automatically filled in when a waypoint is entered for the 1) Initial Point (IP) field. The field displays Required Entry until an entry is made.

14.3.2.3. Target Datum/Ellipsoid Field. Displays the selected ellipsoid and horizontal datum reference used for the target position. This field is automatically filled in when a waypoint is entered for the 6) Target Location field. The field displays Required Entry until an entry is made.

14.3.2.4. Target Location Field. Displays the target position data same as the 6) Target Location field (refer to Paragraph 14.3.2.11). Any changes made to this field also changes the 6) Target Location field. A waypoint is selected to provide target position, datum, and elevation data. Ensure the appropriate datum and coordinate/grid system is selected before editing horizontal coordinates. The field displays Required Entry until an entry is made.

14.3.2.5. 1) Initial Point (IP) Field. Displays the initial point (IP) position data for use by inbound aircraft to orient target acquisition. A waypoint is selected to provide IP position, datum, and elevation data. Ensure the appropriate datum, coordinate/grid system, and grid resolution are selected before editing horizontal coordinates. With the field highlighted, the left and right cursor control keys can be used to rapidly change the coordinate/grid system as required for inbound aircraft. The field displays Required Entry until an entry is made.

14.3.2.6. 2) Heading (IP to Target) Field. Displays the initial point to target course (azimuth), normally acquired using a paper map. The course can be entered by the operator or computed by the DAGR. The field menu provides a Compute Value selection for the DAGR to compute the course. The words Manual Entry or Computed appear after the course value to indicate how the course was provided. Double dashes appear if the course has not been entered or cannot be computed. Field data format is XXX.X (X represents degrees) or XXXX (X represents mils or strecks).

14.3.2.7. Offset (Left/Right) Field. Displays the selected course offset, if applicable. Selections are:

- – – (none)
- Right
- Left

14.3.2.8. 3) Distance (IP to Target) Field. Displays the initial point to target horizontal range. The range can be entered by the operator or computed by the DAGR. The field menu provides a Compute Value selection for the DAGR to compute the range. The words Manual Entry or Computed appear after the range value to indicate how the range was provided. Double dashes appear if the range has not been entered or cannot be computed. Field data format is XXXX.XX or XXXX.X, where X represents miles, nautical miles, kilometers, feet, yards, or meters.

14.3.2.9. 4) Target Elevation Field. Displays the elevation of the target. When a waypoint position is used in the Target Position field, the waypoint elevation is automatically displayed in the Target Elevation field. Displays double dashes if elevation has not been entered. Field data format is +/- XXXXX, where X represents feet or meters.

14.3.2.10. 5) Target Description Field. Displays information entered about the target. The description can consist of up to 36 characters.

14.3.2.11. 6) Target Location Field. Displays the target position data same as the Target Location field (refer to Paragraph 14.3.2.4). Any changes made to this field also changes the Target Location field. A waypoint is selected to provide target position, datum, and elevation data. Ensure the appropriate datum and coordinate/grid system is selected before editing horizontal coordinates. With the field highlighted containing position data, the left and right cursor control keys can be used to rapidly change the coordinate/grid system as required for inbound aircraft. The field displays Required Entry until an entry is made.

14.3.2.12. 7) Type of Mark Field. Displays information entered about the type of mark used. The information can consist of up to 18 characters.

14.3.2.13. Code/Color Field. Displays entered code/color to add mark information. The information can consist of up to 18 characters.

14.3.2.14. 8) Location of Friendlies Field. Displays information entered about the location of friendlies. The information can consist of up to 54 characters.

14.3.2.15. 9) Egress (Relative to Target) Field. Displays information entered about the egress. The information can consist of up to 36 characters.

14.3.2.16. Remarks Field. Displays entered remarks. Remarks can consist of up to 72 characters.

14.3.2.17. Time on Target (TOT) Field. Displays the time on target using the HHMM L/Z format, where H represents hours, M represents minutes, L represents local, and Z represents zulu. Displays double dashes when field data has not been entered.

14.3.2.18. Time to Target (TTT) Standby Field. Displays the time to target in minutes (0 up to 99). Displays double dashes when field data has not been entered.

14.3.2.19. Time to Target (TTT) Plus (Seconds) Field. Displays the time to target in seconds (0 up to 59), additional to minutes. Displays double dashes when field data has not been entered.

14.3.2.20. Current Time and Date (Time Hack) Field.

WARNING

Always verify this field data as a safety check prior to calling for close air support. Verify accuracy of current time and date information to ensure safety of operator and other personnel.

Displays the current time and date. This field cannot be edited by the operator. However, the time zone can be edited using the Time on Target (TOT) field menu.

14.3.2.21. Time Zone Field.

WARNING

Always verify this field data as a safety check prior to calling for close air support. Verify accuracy of time zone information to ensure safety of operator and other personnel.

Displays the current time zone. This field cannot be edited by the operator. However, the time zone can be edited using the Time on Target (TOT) field menu.

14.3.2.22. Present Position to Target Range Field.

WARNING

Always verify this field data as a safety check prior to calling for close air support. Always maintain a safe range between present position, target position, and initial point position to ensure safety of operator and other personnel.

Displays the horizontal range from present position to the target position. This field cannot be edited by the operator. Displays double dashes if the target position has not been entered. Range units can be changed using the 3) Distance (IP to Target) field menu.

14.3.2.23. IP to Target Azimuth Field.

WARNING

Always verify this field data as a safety check prior to calling for close air support. Avoid having inbound aircraft overfly your present position to ensure safety of operator and other personnel. When the IP to Target Azimuth field and IP to Present Position Azimuth field overfly bars are positioned in the same direction, inbound aircraft could overfly your present position.

Displays the azimuth from the IP to the target position. Also displays an inbound aircraft overfly bar positioned relative to the azimuth value. This field cannot be edited by the operator. Displays double dashes (and no overfly bar) if the IP or target position has not been entered. Angle units can be changed using the 2) Heading (IP to Target) field menu.

14.3.2.24. IP to Target Range Field.

WARNING

Always verify this field data as a safety check prior to calling for close air support. Always maintain a safe range between present position, target position, and initial point position to ensure safety of operator and other personnel.

Displays the horizontal range from the IP to the target position. This field cannot be edited by the operator. Displays double dashes if the IP or target position has not been entered. Range units can be changed using the 3) Distance (IP to Target) field menu.

14.3.2.25. IP to Present Position Azimuth Field.

WARNING

Always verify this field data as a safety check prior to calling for close air support. Avoid having inbound aircraft overfly your present position to ensure safety of operator and other personnel. When the IP to Target Azimuth field and IP to Present Position Azimuth field overfly bars are positioned in the same direction, inbound aircraft could overfly your present position.

Displays the azimuth from the IP to the present position. Also displays an inbound aircraft overfly bar positioned relative to the azimuth value. This field cannot be edited by the operator. Displays double dashes (and no overfly bar) if the IP or present position has not been entered. Angle units can be changed using the 2) Heading (IP to Target) field menu.

14.3.2.26. IP to Present Position Range Field.

WARNING

Always verify this field data as a safety check prior to calling for close air support. Always maintain a safe range between present position, target position, and initial point position to ensure safety of operator and other personnel.

Displays the horizontal range from the IP to the present position. This field cannot be edited by the operator. Displays double dashes if the IP or present position has not been entered. Range units can be changed using the 3) Distance (IP to Target) field menu.

14.3.3. How To Use The CAS 9–Line Brief Page.

This page is used to provide accurate close air support position coordinates data used between ground personnel and aircraft. This information is provided in a common form for ease of communication between service branches. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting data and changing field information. When a text editor is used, the menu key can be pushed to access a list of options (undo changes, save and exit, exit and no save, reset to default, and editor help). These options provide text editor shortcuts and pertain to the immediate function being performed (e.g., using a text editor). Select appropriate units before entering field data for calculation.

14.3.3.1. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Applications, then push the ENTER key.
3. Highlight CAS 9–Line Brief, then push the ENTER key. The CAS 9–Line Brief page is displayed.

a. Set Up Units/References

NOTE

All CAS 9–Line Brief page units of measure and references are standard. If other units or references are used, specify these in the page Remarks field. Any changes made to units or references on the CAS 9–Line Brief page do not affect other pages units of measure or references.

(1) Prior to using display data, view the page to determine if changes to units of measure or references used in the display are required (metric or decimal, mils or degrees, true or magnetic, etc.).

(2) When unit or reference changes are required, highlight the field, then push the MENU key.

(3) Highlight the desired type of units or reference selection (e.g., Select Range Units), then push the ENTER key.

(4) Highlight the desired selection, then push the ENTER key.

(5) The page displays all associated information with the change made.

(6) If required, repeat the procedure for the remaining selections.

b. Entering and Using CAS 9–Line Brief Data

NOTE

At any time during the following procedure, the operator can select Clear All from the page menu or any field menu to clear all data for the CAS 9–Line page and start over. The Clear All menu selection is used at the beginning of the procedure to make sure no old computed or manually entered field data is retained.

(1) From the CAS 9–Line Brief page, push the MENU key.

(2) Highlight Clear All, then push the ENTER key.

(3) Manually enter data as applicable for the following fields:

- Coordinate Source field
- 5) Target Description field
- 7) Type of Mark field
- Code/Color
- 8) Location of Friendlies
- 9) Egress (Relative to Target)
- Remarks
- Time on Target (TOT)
- Time to Target (TTT) Standby
- Time to Target (TTT) Plus (Seconds)

(4) Scroll the page views and highlight the 1) Initial Point (IP) field, then push the MENU key.

(5) Highlight Use WP Position, then push the ENTER key.

(6) Highlight the waypoint desired for the initial point (position used by inbound aircraft to orient target acquisition), then push the ENTER key. The display returns to the CAS 9–Line Brief page displaying the 1) Initial Point (IP) field highlighted with the initial point waypoint position data.

NOTE

The Initial Point (IP) Datum/Ellipsoid field automatically displays the waypoint datum.

(7) As required, use the left and right cursor control keys to select the grid/coordinate system used by the inbound aircraft (part of the 1) Initial Point (IP) field).

(8) Highlight the 6) Target Location field, then push the MENU key.

(9) Highlight Use WP Position, then push the ENTER key.

(10) Highlight the waypoint desired for the target location, then push the ENTER key. The operator is prompted to review and acknowledge safety checks.

(11) The display returns to the CAS 9–Line Brief page displaying the 6) Target Location field highlighted with target waypoint position data.

NOTE

The Target Datum/Ellipsoid field automatically displays the waypoint datum.

(12) As required, use the left and right cursor control keys to select the grid/coordinate system used by the inbound aircraft (part of the 6) Target Location field).

(13) After the target location field is populated, the DAGR automatically computes and displays data for the following fields:

- 2) Heading (IP to Target) field. The word (computed) is displayed following the data.
- 3) Distance (IP to Target) field. The word (computed) is displayed following the data.
- 4) Target Elevation field

NOTE

The 2) Heading (IP to Target) field and 3) Distance (IP to Target) field can be revised manually and will show the words (manual entry) following the data. When this is displayed, the 1) Initial Point (IP) and 6) Target Location field position data is not used by DAGR to compute IP to target heading (course) or distance (range). The manual entry data can be changed back to computed data by using the MENU key and selecting Compute Value (see procedure in step c).

(14) Scroll to the Safety Checks view of the CAS 9–Line Brief page, and review all safety check field information.

If the DAGR is not tracking satellites or has no position fix, the displayed position data blinks between gray and black to notify the operator. Field data may be inaccurate and/or unavailable when the DAGR does not have a position fix.

(a) **Current Time and Date (Time Hack) field** — Verify accuracy of current time and date information.

(b) **Time Zone field** — Verify accuracy of current time zone information.

(c) **Present Position to Target Range field** — Verify a safe range between present position, target position, and initial point position.

(d) **IP to Target — Azimuth field and Range field** — Verify a safe range between present position, target position, and initial point position. Avoid having inbound aircraft overfly your present position. When the IP to Target Azimuth field and IP to Present Position Azimuth field overfly bars are positioned in the same direction, inbound aircraft could overfly your present position.

(e) **IP to Present Position — Azimuth field and Range field** — Verify a safe range between present position, target position, and initial point position. Avoid having inbound aircraft overfly your present position. When the IP to Target Azimuth field and IP to Present Position Azimuth field overfly bars are positioned in the same direction, inbound aircraft could overfly your present position.

WARNING

Check all data appearing in the Safety Check fields prior to calling for close air support to ensure safety of operator and other personnel.

(15) After verifying all safety check information indicates it is safe to proceed, communicate data as required for close air support.

c. Revise Heading or Distance field information from manual entry to computed data.

NOTE

When data in the 2) Heading (IP To Target) field and the 3) Distance (IP To Target) field is revised manually, the DAGR does not automatically compute or update these fields after entering IP or Target (waypoint) position data. When data is manually entered, the field has (manual entry) displayed after their data. Use the following procedure to command the DAGR to compute or update these fields based upon IP and target position data.

(1) From the CAS 9–Line Brief page, highlight the 2) Heading (IP To Target) field.

(2) Push the MENU key.

(3) Highlight Compute Value, then push the ENTER key.

(4) The DAGR performs computation according to the data shown in the Initial Point and Target Location fields. Display returns to the CAS 9–Line Brief page with the field highlighted and the word (computed) displayed following the data.

(5) Repeat steps (1) through (4) of this procedure for the 3) Distance (IP To Target) field.

14.3.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 14-8 shows the keystroke map for the CAS 9–Line Brief page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the CAS 9–Line Brief page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Applications sub-menu.
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

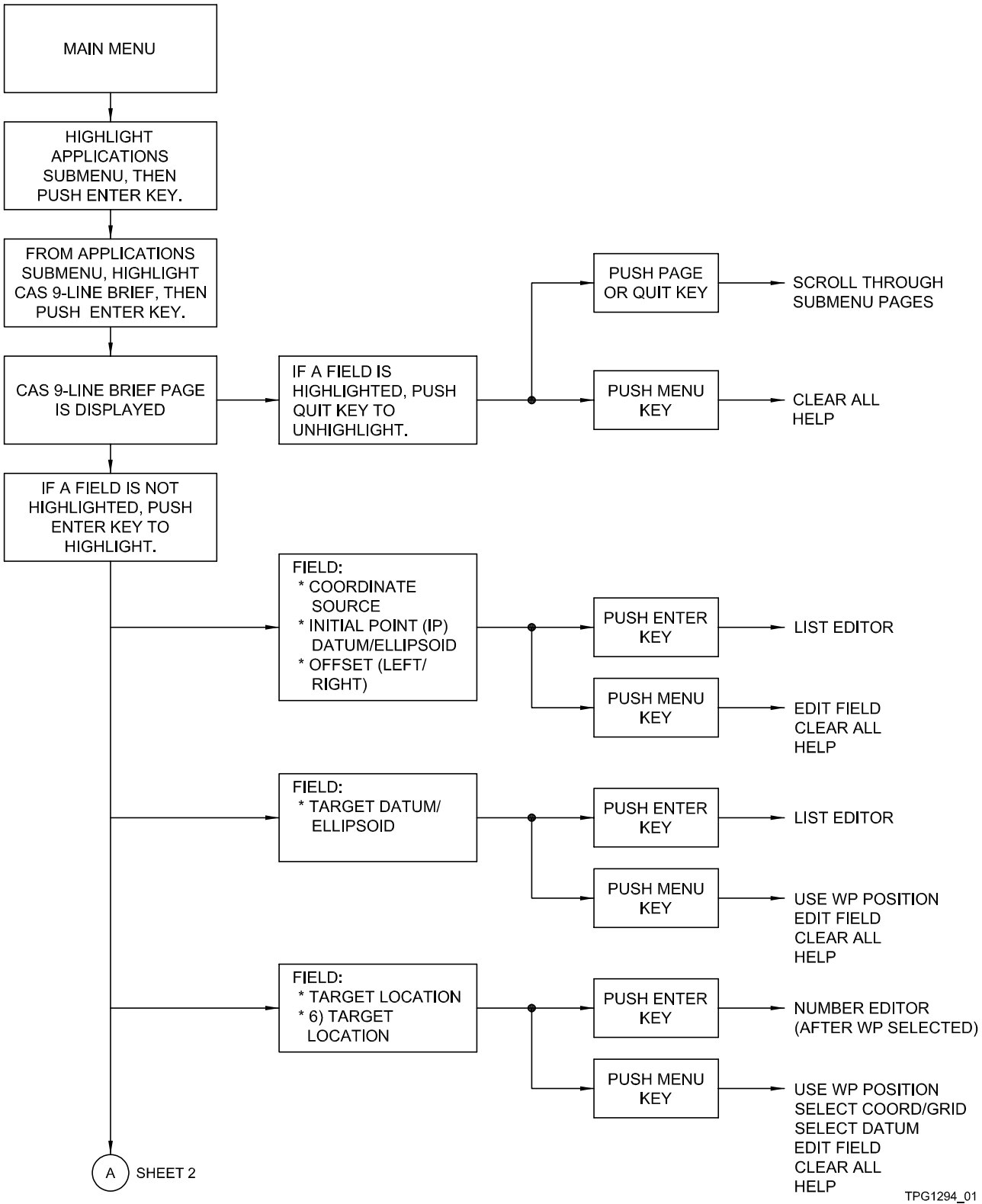


Figure 14-8. CAS 9–Line Brief Page Keystroke Map (Sheet 1 of 3)

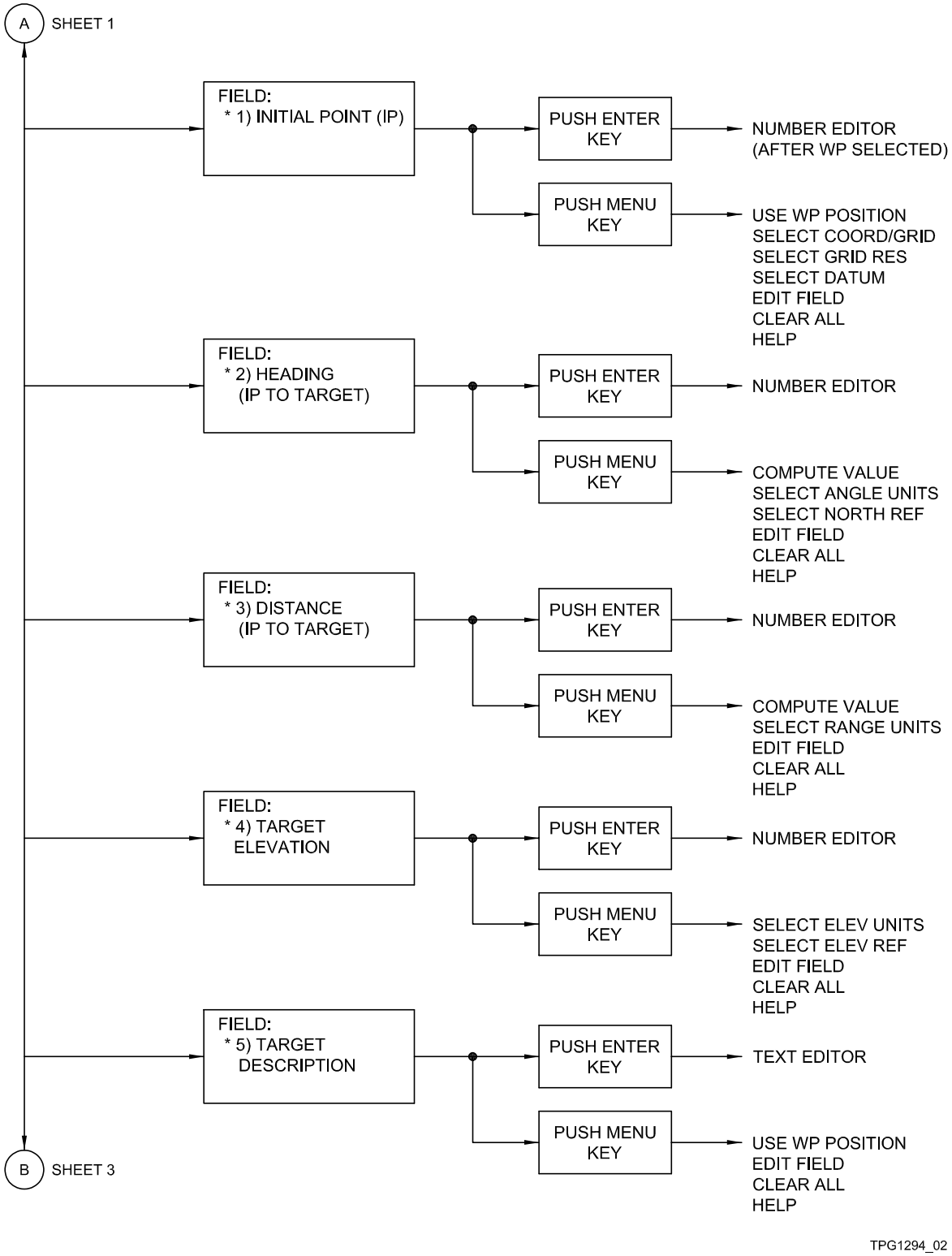


Figure 14-8. CAS 9–Line Brief Page Keystroke Map (Sheet 2)

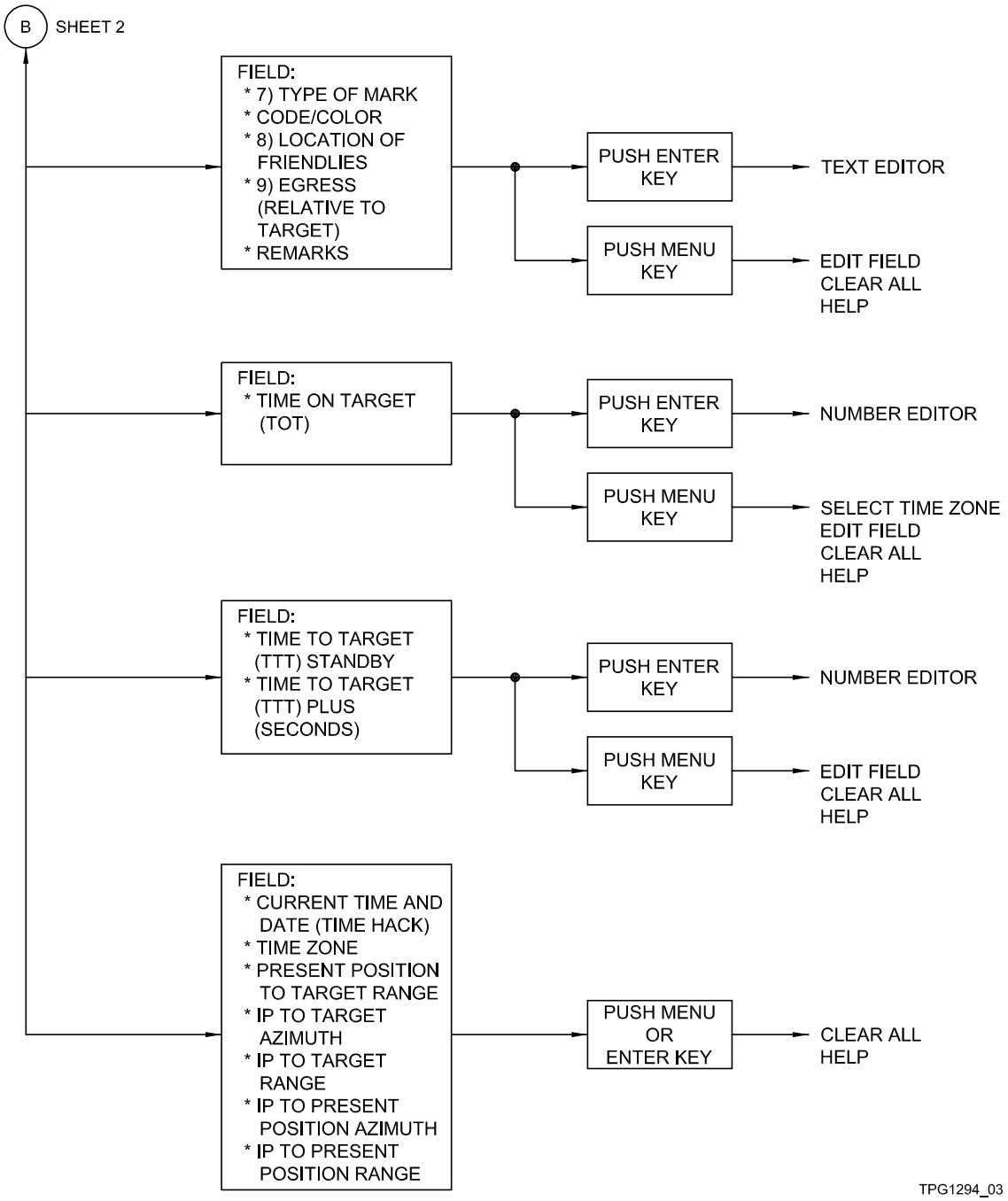


Figure 14-8. CAS 9–Line Brief Page Keystroke Map (Sheet 3)

14.4. JAMMER FINDER PAGE.

CAUTION

A high level of position error may place a mission at risk. Verify the figure of merit (FOM) level is sufficient to accomplish the mission. Refer to the position error field (EPE/EHE/EVE) of either the Present Position page or NAV Displays page to view the current FOM. Refer to Table 9-1 to convert FOM into a position error range (in meters). If the FOM is too high, refer to Paragraph 18.4.

14.4.1. Page Function.

The Jammer Finder page is accessed from the Applications submenu. Refer to Figure 14-9. The Jammer Finder page provides capability to determine the azimuth of an L1 and L2 frequency jamming (signal noise) source. Azimuth data is stored from multiple positions and used with a map to determine the approximate position of a jamming source. After the DAGR determines the direction of the jamming signal, a compass is used to determine the azimuth (track) of the jamming source in relation to present position. The operator then enters the azimuth into the Entered Azimuth field and stores it along with the DAGR present position as an electronic warfare (EW) waypoint. Multiple EW waypoints are used to calculate the position of the jamming source. Vertical scrolling is used to view all page fields.

NOTE

Appropriate angle units and north reference must be used. Refer to Paragraph 10.2 for additional information.

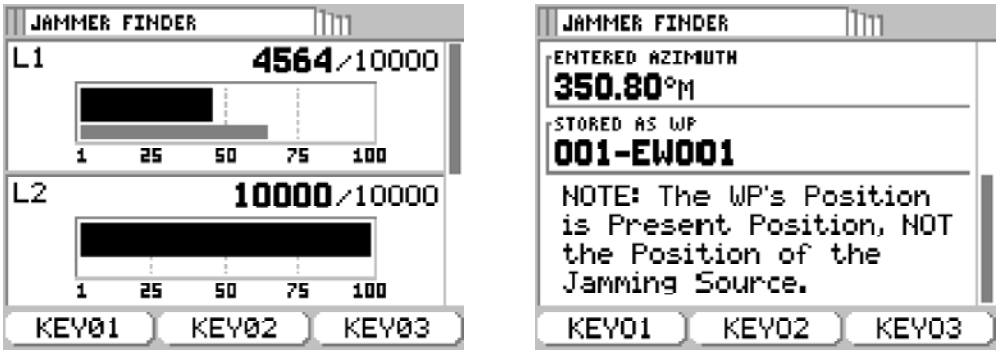


Figure 14-9. Jammer Finder Page

14.4.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 14-11. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

14.4.2.1. L1 and L2 Fields. Displays signal noise strength as a numeric value and bar graphs for the L1 and L2 frequencies. Signal noise strength is used to determine the direction jamming signals are coming from. The bar graph consists of a black bar and a gray bar. The black bar represents the numeric value thousands and hundreds digits. The gray bar represents the numeric value tens and ones digits. Figure 14-9 provides an example L1 signal noise strength value of 4564 and L2 signal noise strength of 10000. The greater the signal noise strength, the greater the values displayed by the fields. Field values for the same level of jamming can vary between DAGRs. This field data is to be used only with the Jammer Finder page.

14.4.2.2. Entered Azimuth Field. Displays the entered azimuth value. The operator acquires this value from a compass while viewing the maximum signal noise strength of the L1 and L2 fields. The azimuth is the angle measured clockwise in reference to

north reference (True, Magnetic, or Grid). If a value is not entered, the field displays double dashes. Field data format is XXX.XX (X represents degrees) or XXXX (X represents mils or strecks).

14.4.2.3. Stored As WP Field. Displays the waypoint number and name used to store the DAGR present position and entered azimuth value. The next unused waypoint will automatically be used or WP 001 is used if all waypoints are used. Another waypoint may be selected for use by the operator. Prior to overwriting existing waypoints, the DAGR prompts the operator for confirmation. Unless edited, the waypoint name is preceded by EW (electronic warfare). The DAGR MAGVAR and MAGVAR type values determine those values stored with the waypoint. If a value is not entered, the field displays double dashes. Field data format is XXX-EWNNN, where X represents the waypoint number and N represents the waypoint name (displayed as waypoint number unless edited).

14.4.3. How To Use The Jammer Finder Page.

This page provides capability to determine the azimuth of an L1 and L2 frequency jamming source in relation to present position. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting data and changing field information. When a text editor is used, the menu key can be pushed to access a list of options (undo changes, save and exit, exit and no save, reset to default, and editor help). These options provide text editor shortcuts and pertain to the immediate function being performed (e.g., using a text editor). Select appropriate units before entering field data for calculation.

14.4.3.1. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Applications, then push the ENTER key.
3. Highlight Jammer Finder, then push the ENTER key. The Jammer Finder page is displayed.

a. Set Up Units/References

   (1) Prior to using display data, view the page to determine if changes to units of measure or references used in the display are required (metric or decimal, mils or degrees, true or magnetic, etc.).

   (2) When unit or reference changes are required, highlight the field, then push the MENU key.

   (3) Highlight the desired type of units or reference selection (e.g., Select Angle Units), then push the ENTER key.

   (4) Highlight the desired selection, then push the ENTER key.

   (5) The page displays all associated information with the change made.

   (6) If required, repeat the procedure for the remaining selections.

b. Determine Signal Jamming Source Azimuth

NOTE

The following procedure requires that the operator use an external compass with the DAGR.

   (1) Block signal noise from behind by holding the DAGR level, in front of and close to the midsection of your body.

   (2) From the Jammer Finder page, view the L1 and L2 fields for signal noise strength (refer to Paragraph 14.4.2.1 for field descriptions).

   (3) Slowly turn in a circle. Watch the L1 and L2 fields closely to determine the starting and stopping point (not a single point) where the greatest signal noise strength occurs (this could be a 45° to 150° angle where the highest signal noise strength begins and ends).

   (4) Point the DAGR at the middle of the angle between the starting and stopping point where signal noise strength is greatest. The DAGR now points to the most likely direction of the signal jamming source.

   (5) Use a compass to determine the azimuth of the direction pointed by the DAGR (refer to Paragraph 14.4.2.2 for field description).

   (6) Highlight the Entered Azimuth field, push the ENTER key. Enter the azimuth value, then push the ENTER key.

NOTE

An alternate method of entering azimuth (not requiring a compass) is to use the Entered Azimuth field menu selection Use Current Track while pointing the DAGR at the most likely direction of the signal jamming source.

(7) Store present position and entered azimuth as a waypoint.

(a) Highlight the Store As Waypoint field, then push the MENU key.

(b) Highlight Store As WP, then push the ENTER key.

(c) The first unused waypoint is highlighted. Highlight the desired waypoint, then push the ENTER key. DAGR requires confirmation before overwriting an existing waypoint.

(d) Present position and azimuth are stored as an electronic warfare (EW) waypoint. The display returns to the Jammer Finder page Stored As WP field. The stored waypoint is displayed as XXX-EWXXX, where X represents the waypoint number. The waypoint name, remark, and identity type can be edited using field menu selections. Refer to Paragraph 8.3 for additional waypoint information as required.

WARNING

The calculated jammer signal source area is **not** to be used as an accurate GPS position (e.g., Fire Support).

(8) Gather an additional EW waypoint from another position, as required, for use in calculating (triangulating) the jammer signal source area. The calculation requires at least two EW waypoints and the use of a map to plot EW waypoint positions and azimuths to the jammer signal source.

(9) A stored EW waypoint azimuth to jammer value can be viewed from the Waypoint Editor page Track field when using the AN/PSN-13 DAGR. A stored EW waypoint azimuth to jammer value can be viewed from the Waypoint Editor page Remark field when using the AN/PSN-13A DAGR. Refer to Figure 14-10. Refer to Paragraph 8.3 for Waypoint Editor page information.

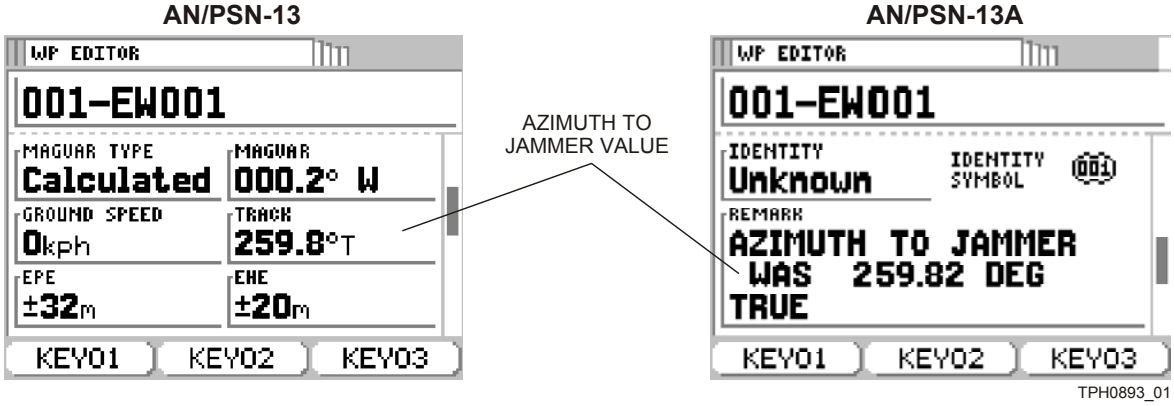


Figure 14-10. EW Waypoint Azimuth to Jammer Value

14.4.4. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 14-11 shows the keystroke map for the Jammer Finder page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Jammer Finder page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Applications submenu.

- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

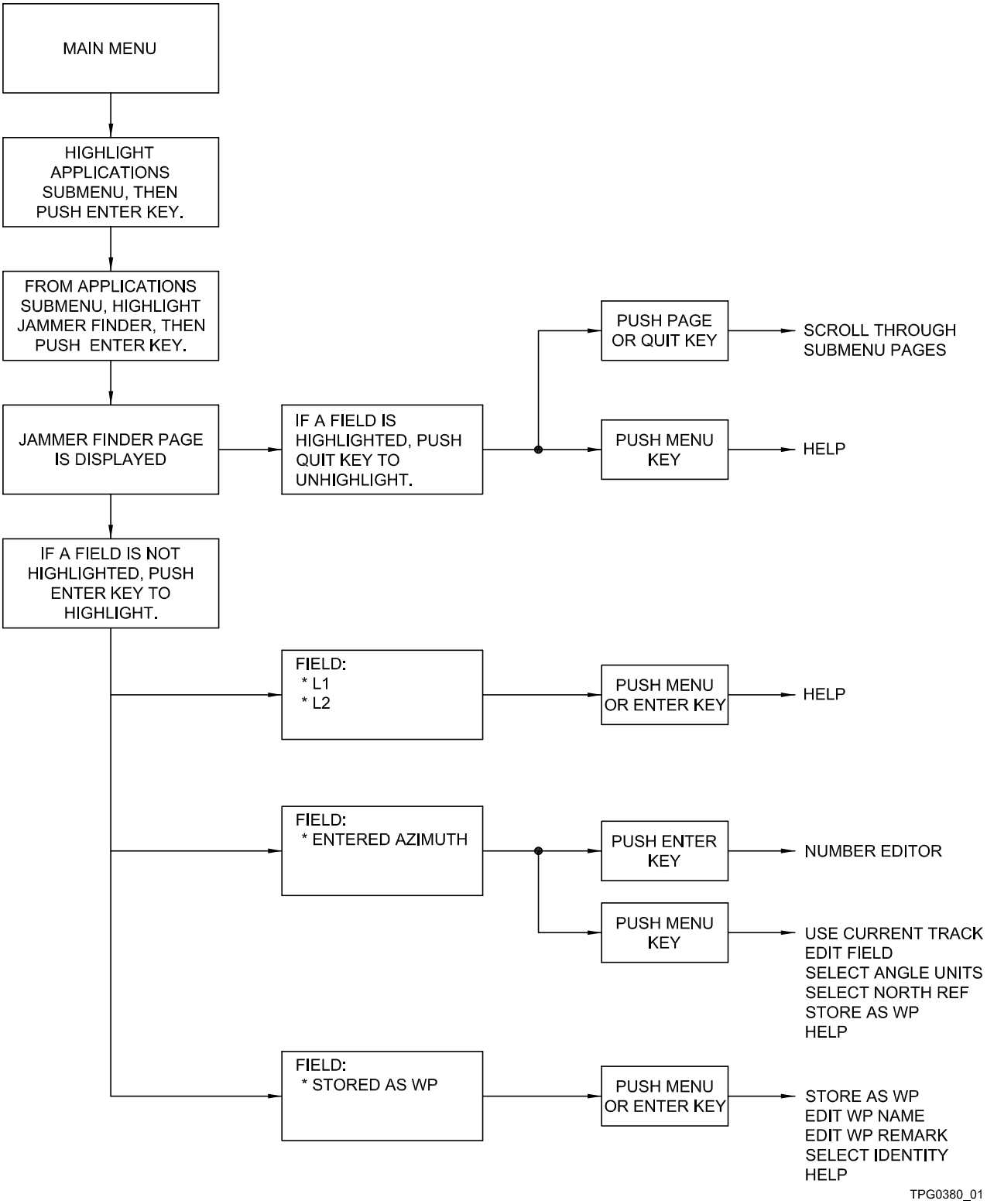


Figure 14-11. Jammer Finder Page Keystroke Map

14.5. GUN LAYING (GLS) PAGE (ADVANCED).

CAUTION

A high level of position error may place a mission at risk. Verify the figure of merit (FOM) level is sufficient to accomplish the mission. Refer to the position error field (EPE/EHE/EVE) of either the Present Position page or NAV Displays page to view the current FOM. Refer to Table 9-1 to convert FOM into a position error range (in meters). If the FOM is too high, refer to Paragraph 18.4.

14.5.1. Page Function.

The Gun Laying System (GLS) page is accessed from the Applications submenu using the advanced function set. Refer to Figure 14-12. The Gun Laying System (GLS) page calculates an accurate azimuth between two points used in sighting weaponry (e.g., artillery) to a target. When a field is disabled or contains no data, double dashes appear. Fields may require units setup prior to performing a calculation (refer to Paragraph 10.2 for more information). There are two methods used for the GLS azimuth calculation:

- **GLS Single receiver method** — Using one DAGR, the operator activates the GLS calculation and walks the receiver from the first point to the second point. Walking in a straight line between points is not required, however, the DAGR must maintain a clear view of the sky to track satellites. After reaching the second point, the GLS calculation is completed. The single receiver method offers simplicity and speed of setup. This method is performed with a remote antenna.
- **Sub-Mil GLS Dual receiver method** — The operator configures two DAGRs with matching port settings and interconnects both DAGRs using a DAGR to DAGR cable. One of the DAGRs is designated the master and one is the slave. The operator activates the GLS calculation from the master receiver. The slave receiver must not be moved during the calculation. When interconnected, the DAGR detects the opposite receiver and automatically selects dual receiver GLS operation. After activation, the operator disconnects the master receiver from the slave receiver and walks the master receiver to the second point and remains there until the preset walk time has expired. Walking in a straight line between points is not required, however, the DAGR must maintain a clear view of the sky to track satellites. After the walk time is expired, the operator returns the master receiver to the slave receiver and reconnects them to allow completion of the GLS calculation. The dual receiver method offers increased accuracy over the single receiver method. This method requires each DAGR be connected to a remote antenna.

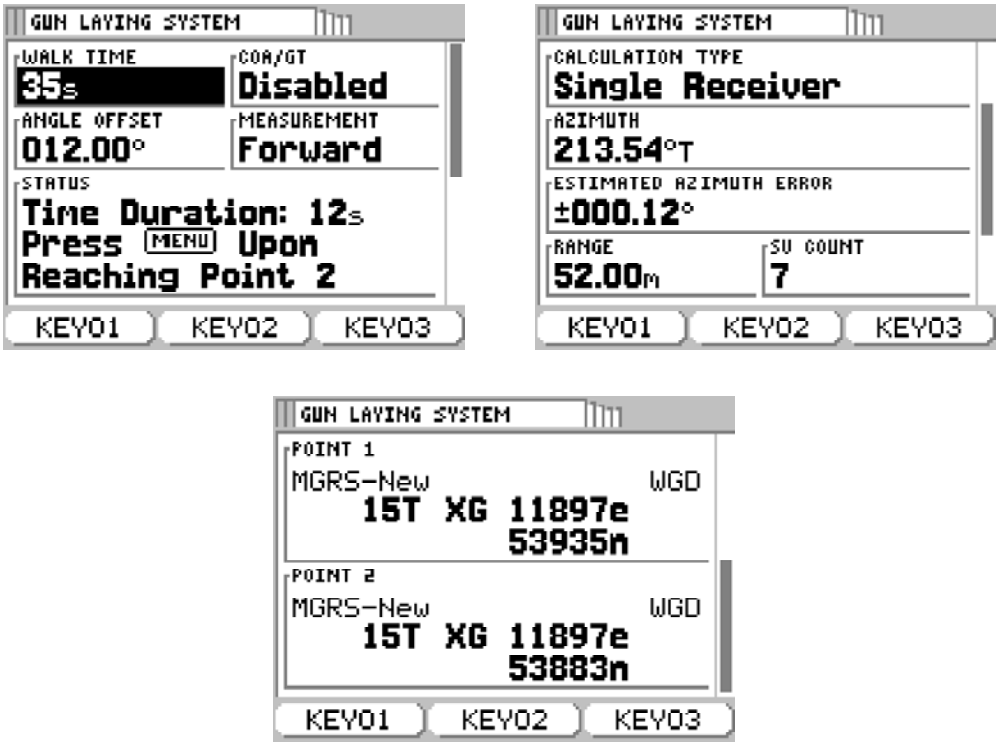


Figure 14-12. Gun Laying System Page (Advanced)

14.5.2. Field Descriptions.

Select page/field information by using keystrokes shown on the keystroke map in Figure 14-14. Vertical scrolling is used to view all page fields. Field information contained in this page is changed using various editor techniques. Refer to Chapter 6 for information on the menu tree, page and page sets, menus, submenus, selecting fields, and using editors to change information in fields. The following information describes the various fields contained in this page.

14.5.2.1. Walk Time Field. Displays the estimated amount of time (1 to 180 seconds) required to walk from Point 1 to Point 2. For improved accuracy, enter the seconds required to walk a minimum of 50 meters (164 feet). Less distance results in less accuracy. Field data format is XXXs, where X represents seconds. This field applies to dual receiver method only.

14.5.2.2. COA/GT Field. Displays the center of arc (COA)/gun target (GT) mode as Enabled or Disabled. When enabled, the Angle Offset and Measurement fields become enabled.

14.5.2.3. Angle Offset Field. Displays the offset angle (0.00° to 359.99°) to be applied to the calculated azimuth. This field is enabled only when the COA/GT field is enabled. Field data format is XXX.XX (X represents degrees) or XXXX.XX (X represents mils or strecks).

14.5.2.4. Measurement Field. Displays Forward to calculate the azimuth from Point 1 to Point 2. Displays Reverse to calculate the azimuth from Point 2 to Point 1. This field is enabled only when the COA/GT field is enabled or after a GLS calculation has been successfully completed.

14.5.2.5. Status Field. Displays the current status of the Gun Laying (GLS) page as follows:

- Use the Menu to Start the GLS Calculation
- Initializing GLS...
- Starting Standard GLS (applies to single receiver method only)
- Slave Receiver Detected (2 second delay) (applies to dual receiver method only)

- Tracking: XX of YY Need 4 SVs to Start (XX is the number of SVs being searched/tracked. YY is the total number of SVs available.)
- Tracking: XX of YY Use <MENU> to Continue (XX is the number of SVs being searched/tracked. YY is the total number of SVs available.)
- Waiting to Latch Data
- Time Duration: ###s Use <MENU> Upon Reaching Point 2 (Applies to single receiver GLS only. ### is the number of seconds elapsed, counting up, while walking path. Maximum time is specified in the Walk Time field.)
- Time Remaining: ###s Do Not Move the Receiver (Applies to dual receiver GLS only. ### is the number of seconds remaining to walk path, counting down from the value specified in the Walk Time field.)
- Time Remaining: ###s Use <MENU> Upon Reaching Point 2 (Applies to dual receiver GLS only. ### is the number of seconds remaining to walk path, counting down from the value specified in the Walk Time field.)
- Time Remaining: ###s Waiting to Latch Data (Applies to dual receiver GLS only. ### is the number of seconds remaining to walk path, counting down from the value specified in the Walk Time field.)
- Processing: ##s Do Not Move the Receiver (Applies to single receiver GLS only. ## is half of the actual time (rounded up), counted down, taken to walk from Point 1 to Point 2.
- Maximum Time Exceeded, Try Again (applies to single receiver method only)
- Time Exceeded, Extend Walk Time and Try Again (applies to dual receiver method only)
- Reconnect Receivers to Complete Calculation (Applies to dual receiver GLS only.)
- No Solution-Poor SV (Satellite Vehicle) Visibility, Try Again
- Calculation Complete Degraded Solution, Check EAZ (Estimated Azimuth Error field)
- Calculation Complete Good Solution
- Recalled Solution Computed at: (The time and date when the last valid GLS calculation was completed.)
- GLS in Progress Do Not Move the Receiver (applies to dual receiver method only)
- Waiting for Response Use <MENU> to Continue or Stop Calculation (applies to dual receiver method only)
- Errors Occurred: (Two lines display errors that occurred during the GLS calculation.)

14.5.2.6. Calculation Type Field. The DAGR automatically determines if a second receiver is connected and displays the type of GLS calculation being performed as follows. The operator cannot edit this field.

- **Single Receiver** — Only one DAGR used for the GLS calculation.
- **Dual Receiver** — Two DAGRs interconnected via serial ports for the GLS calculation.

14.5.2.7. Azimuth Field. Displays the calculated azimuth angle from Point 1 to Point 2 when the Measurement field is set to Forward. Displays the calculated azimuth angle from Point 2 to Point 1 when the Measurement field is set to Reverse. The operator cannot edit the Azimuth field. Field data format is XXX.XX (X represents degrees) or XXXX.XX (X represents mils or strecks) in reference to north reference (True, Magnetic, or Grid).

14.5.2.8. Estimated Azimuth Error Field. Displays the estimated error (EAZ) for the calculated azimuth. The operator cannot edit this field. Field data format is +/- XXX.XX (where X represents degrees, positive up) or XXXX.XX (where X represents mils or strecks).

14.5.2.9. Range Field. Displays the range between the two points. The operator cannot edit this field. Field data format is XXXX.XX or XXXX.X, where X represents miles, nautical miles, kilometers, feet, yards, or meters.

14.5.2.10. SV Count Field. Displays the number of satellites used in the GLS calculation. The operator cannot edit this field.

14.5.2.11. Point 1 and Point 2 Fields. The Point 1 field displays the position of the DAGR when the walk time is started. The Point 2 field displays the position of the DAGR when the walk time is stopped. The operator cannot edit these fields.

14.5.3. Gun Laying System Page Functions.

Gun Laying (GLS) page menu functions are described in the following list. Refer to the keystroke map in Figure 14-14.

- **Start/Stop Calculation** — Start Calc selection starts the DAGR GLS calculation. Stop Calc stops an ongoing GLS calculation.
- **Recall Solution** — If the DAGR is not performing a GLS calculation, this selection displays the previous GLS calculated solution.
- **Clear All Data** — Sets configurable Gun Laying (GLS) page fields to their default values.
- **Continue** — Selected by the operator to continue operation when prompted by the Status field.
- **Point Reached** — Selected by the operator to continue operation when prompted by the Status field.

14.5.4. How To Use The Gun Laying System Page.

This page is used to calculate an accurate azimuth between two points using the advanced function set. When performing GLS procedures, the DAGR is connected to a remote antenna located on an antenna mounting pole assembly. The antenna mounting pole assembly (with DAGR held by the operator) is used individually as a stand alone assembly for the GLS single DAGR procedures. The antenna mounting pole assemblies (with DAGRs installed on the poles) are secured to stationary mounts (e.g., tripod) for the Sub-Mil GLS dual DAGR procedures. The antenna mounting pole assemblies should be held completely still when specified during both the single and dual GLS calculation procedures. The antenna mounting pole assembly procedures provide instructions on assembling the individual pieces of hardware included (and not included) in the antenna mounting pole kits. Refer to the keystroke map, and use the preceding field descriptions and associated editing practices found in Chapter 6 for setting data and changing field information. Select appropriate units before entering field data for calculation. The keystroke map is structured beginning at the Main Menu, then progressing to the desired page, then to individual field editing. The following procedure(s) follow the keystroke map, but are structured with the individual page displayed unless otherwise noted. Prior to performing the following procedure(s), acquire the page by:

1. From any display (except a message pop-up), push the MENU key twice to display the Main Menu.
2. Highlight Applications, then push the ENTER key.
3. Highlight Gun Laying (GLS), then push the ENTER key. The Gun Laying page is displayed.

14.5.4.1. Set Up Units/References. Prior to using display data, view the page to determine if changes to units of measure or references used in the display are required (metric or decimal, mils or degrees, true or magnetic, etc.).

a. When unit or reference changes are required, highlight the field, then push the MENU key.
b. Highlight the desired type of units or reference selection (e.g., Select Range Units), then push the ENTER key.
c. Highlight the desired selection, then push the ENTER key.
d. The page displays all associated information with the change made.
e. If required, repeat the procedure for the remaining selections.

14.5.4.2. GLS Single Receiver. When performing GLS single receiver procedures, use of a remote antenna is required. Procedures associated with the GLS single receiver include assembling the antenna mounting pole, performing GLS single receiver calculation, and performing the recall calculation solution.

a. Antenna Mounting Pole Assembly (refer to Figure 25-1)

NOTE

• The RA-1 antenna and RA-1 antenna cable are not supplied in the antenna mounting pole kit, but are described here for assembly purposes.

• The bubble level and grip are pre-assembled to the upper antenna mounting pole. The steel point is pre-assembled to the lower antenna mounting pole.

• The RA-1 antenna cable can be any one of the cables used for the RA-1 antenna (DAGR to helmet cable, 5–meter cable, or 10–meter cable).

(1) Mount the RA-1 antenna to the antenna/pole adapter.
(2) Screw the antenna/pole adapter onto the upper antenna mounting pole.
(3) Connect non-spinner end of the RA-1 antenna cable to the antenna (spinner end connects to DAGR when installed).

(4) Screw the upper and lower antenna mounting poles together.

(5) The steel point end of the antenna mounting pole assembly rests on the ground and held still by the operator (watching the bubble level) while in use. The DAGR is also held separately by the operator.

b. GLS Single DAGR Receiver Calculation

NOTE

At any time during the following procedure, the operator can select Clear All Data from the page menu or any field menu to clear all data for the Gun Laying System page and start over. The Clear All Data menu selection is used at the beginning of the procedure to ensure no previous field data is retained.

(1) From the Gun Laying System page, push the MENU key.

(2) Highlight Clear All Data, then push the ENTER key.

(3) From the Gun Laying System page, configure the fields:

- **COA/GT** — Set to Enabled or Disabled to enable or disable the Angle Offset and Measurement fields.
- **Measurement** — This field is applicable only when the COA/GT field is enabled. Set to Forward to calculate azimuth from point 1 to point 2. Set to Reverse to calculate azimuth from point 2 to point 1.
- **Angle Offset** — This field is applicable only when the COA/GT field is enabled. Set the desired angle offset (0.00° to 359.99°) to be applied to the calculated azimuth.

(4) Position the DAGR at point 1.

(5) Connect the helmet antenna cable of the antenna mounting pole assembly to DAGR connector J3.

(6) While observing the bubble level, hold the antenna mounting pole assembly level and completely still.

(7) With the Gun Laying System page displayed and the Status field in view, push the MENU key.

(8) Highlight Start Calc, then push the ENTER key. The Status field displays Initializing GLS followed by satellite tracking status information.

NOTE

If the satellite count drops below four during the procedure, the Status field advises the need to acquire satellites to start, or No Solution — Poor SV Visibility, Try Again. The Status field also displays any errors occurring during the procedure.

(9) When the Status field prompts the operator to use the menu to continue, push the MENU key. Highlight Continue, then push the ENTER key.

(10) Prior to DAGR storing point 1 data, the Status field momentarily displays Waiting to Latch Data. (This status may display too quickly to be observed.)

(11) The Status field displays time duration information and begins counting up to 180 seconds (maximum).

(12) Walk the DAGR and antenna mounting pole assembly to point 2. Walking in a straight line is not required. Maintaining satellite visibility is required. For improved accuracy, walk a minimum of 50 meters (164 feet). Less distance results in less accuracy.

(13) When point 2 is reached, push the MENU key.

(14) Highlight Point Reached, then push the ENTER key.

(15) While observing the bubble level, hold the antenna mounting pole assembly level and completely still. The DAGR stores point 2 data.

(16) The Status field displays Processing: XXs, Do Not Move the Receiver. XX represents a count down timer with half the actual seconds used to reach point 2.

(17) Do not move the DAGR or antenna pole assembly until the Status field displays Calculation Complete Good Solution.

NOTE

If the Status field displays Calculation Complete Degraded Solution, verify the estimated azimuth error (EAZ) field data before using the calculated GLS solution.

(18) The calculated Gun Laying System page data is ready for use.

c. Recall Calculation Solution

NOTE

When the GLS calculation is not in progress, the operator can view the last computed GLS solution.

(1) From the Gun Laying System page, push the MENU key.

(2) Highlight Recall Solution, then push the ENTER key.

(3) The status field displays Recalled Solution Computed at: (time and date of last GLS solution). The other fields display data of the last GLS solution.

14.5.4.3. Sub-Mil GLS Dual Receiver. When performing Sub-Mil GLS dual receiver procedures, use of remote antennas are required. Procedures associated with the Sub-Mil GLS dual receiver include assembling the antenna mounting poles, performing Sub-Mil GLS dual receiver calculations, and performing the recall calculation solution.

a. Antenna Mounting Pole Assembly (refer to Figure 14-13 and Figure 25-1)

NOTE

• The RA-1 antennas, RA-1 antenna cables, and DAGR to DAGR data cable are not supplied in the antenna mounting pole kit, but are described here for assembly purposes.

• The RA-1 antenna cable can be any one of the cables used for the RA-1 antenna (DAGR to helmet cable, 5–meter cable, or 10–meter cable).

(1) With the installation mounts facing you, use the two holes on the right side of the mounts to connect the installation mounts to the antenna mounting poles.

(2) Mount the RA-1 antennas to the antenna/pole adapters.

(3) Screw the antenna/pole adapters onto the antenna mounting poles.

(4) Connect non-spinner end of the RA-1 antenna cables to the antennas (spinner end connects to DAGR when installed).

(5) Screw the antenna mounting pole adapter into the bottom of the antenna mounting pole (one antenna mounting pole only).

(6) The dual antenna mount (comes previously assembled, but refer to Figure 25-1 for a list of individual piece parts) is connected to the tripod (or other source of stationary mount) using the antenna mounting pole receptacle that is located in the dual antenna mount.

(7) The antenna mounting pole assembly (with antenna mounting pole adapter) slides onto the antenna mounting pole receptacle of the dual antenna mount.

(8) The antenna mounting pole assembly (without antenna mounting pole adapter) screws onto the dual antenna threaded bar.

(9) The DAGR to DAGR cable is used in the Sub-Mil Dual DAGR Procedure to connect both DAGRs together.

(10) Mount the remaining antenna pole receptacle to the second tripod (or other source of stationary mount).

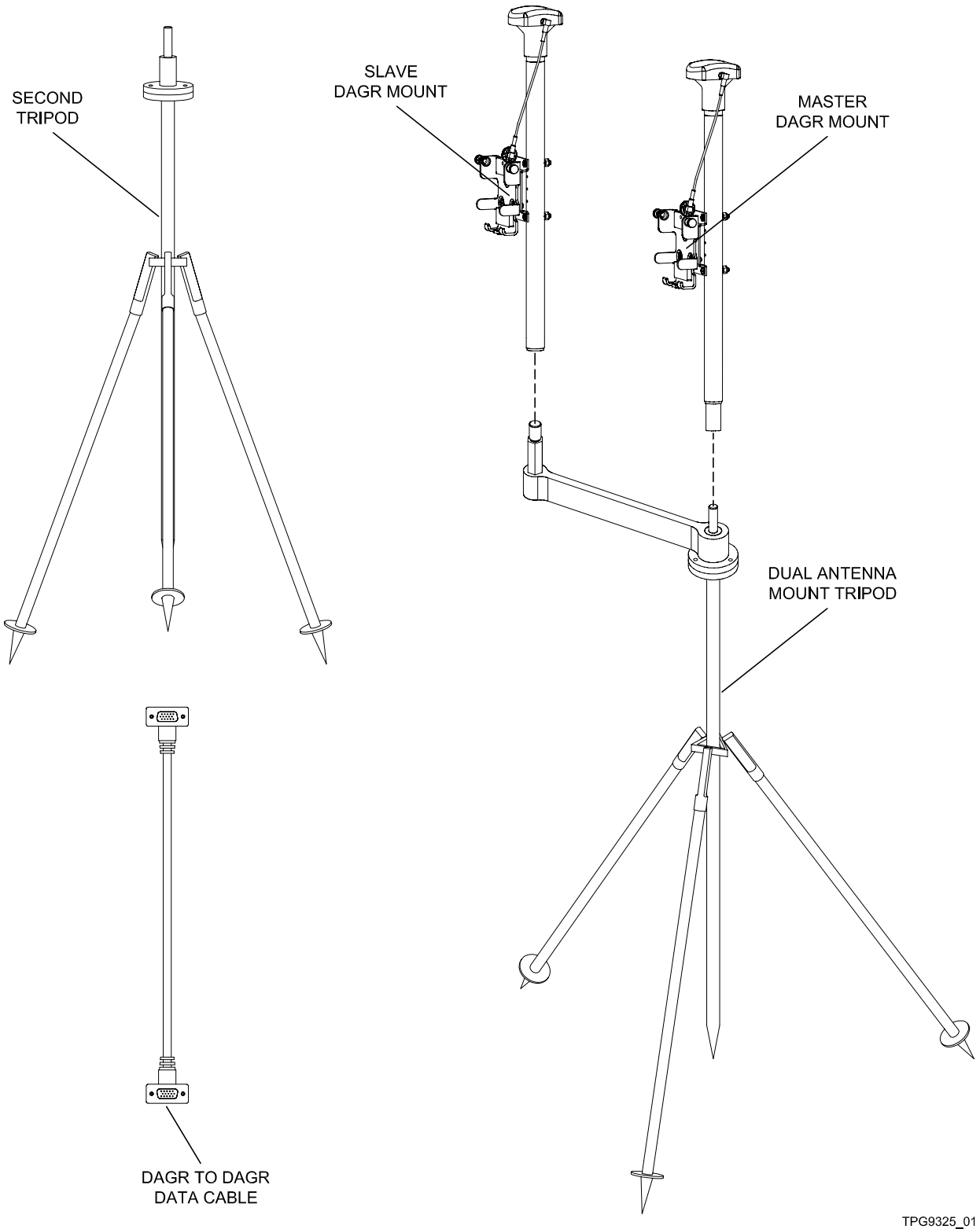


Figure 14-13. Antenna Mounting Poles With Tripods

b. Sub-Mil GLS Dual DAGR Receiver Calculation

NOTE

• Both DAGR receivers must have the same crypto key status (ie., both DAGRs loaded or not loaded with crypto keys).

• At any time during the following procedure, the operator can select Clear All Data from the page menu or any field menu to clear all data for the Gun Laying System page and start over. The Clear All Data menu selection is used at the beginning of the procedure to ensure no previous field data is retained.

(1) Two separate measurement positions (point 1 and point 2) are required in this calculation. Set up a stationary mount (e.g., tripod) at each position prior to performing the procedure. For improved accuracy, set a distance between points of not less than 50 meters (164 feet). Less distance results in less accuracy.

(2) Configure both master and slave DAGR receivers.

(a) From the Gun Laying System page, push the MENU key.

(b) Highlight Clear All Data, then push the ENTER key.

(c) Set COM Port 1 to Standard configuration (refer to Paragraph 11.3).

1 Access the COM Port Setup page from the Communications submenu, then set the Configuration field to Standard.

2 Scroll down and set the page to Com Port 1.

(3) Designate one of the DAGRs as the master DAGR, then configure the master DAGR receiver Gun Laying System page fields:

- **Walk Time** — Set the estimated walk time from point 1 to point 2 (up to 180 seconds). If walk time is exceeded during the procedure, the procedure must be started over. For improved accuracy, set the field for enough seconds to walk a minimum of 50 meters (164 feet). Less distance results in less accuracy.
- **COA/GT** — Set to Enabled or Disabled to enable or disable the Angle Offset and Measurement fields.
- **Measurement** — Set to Forward to calculate azimuth from point 1 to point 2. Set to Reverse to calculate azimuth from point 2 to point 1.
- **Angle Offset** — Set the desired angle offset (0.00° to 359.99°) to be applied to the calculated azimuth.

(4) Position master and slave DAGRs at point 1. The slave DAGR must not be moved until the procedure has been completed.

(5) Mount each DAGR to an installation mount of an antenna mounting pole assembly, then connect the remote antennas to each DAGR connector J3.

(6) If not previously done, secure both antenna mounting pole assemblies (with DAGRs installed) to a stationary mount (e.g., tripod). The master DAGR antenna mounting pole assembly slides onto the center of the stationary mount for easy removal. The slave DAGR antenna mounting pole assembly screws onto the offset position of the stationary mount. Refer to Figure 14-13.

(7) Interconnect the J2 connectors of the master DAGR and slave DAGR using a DAGR to DAGR cable.

NOTE

The following steps are performed on the master DAGR, unless specified otherwise. During the procedure, the slave DAGR Status field states the slave DAGR is not to be moved.

(8) With the Gun Laying System page displayed and the Status field in view, push the MENU key.

(9) Highlight Start Calc, then push the ENTER key. The Status field displays Initializing GLS followed by satellite tracking status information.

NOTE

- If the satellite count drops below four during the procedure, the Status field advises the need to acquire satellites to start, or No Solution — Poor SV Visibility, Try Again. The Status field also displays any errors occurring during the procedure.
- After starting the calculation, the slave DAGR automatically displays the Gun Laying System page.

(10) The Status field displays Slave Receiver Detected and satellite tracking status information.

(11) When the Status field prompts the operator to use the menu to continue, push the MENU key. Highlight Continue, then push the ENTER key.

(12) The Status field displays Waiting to Latch Data, then the DAGR stores point 1 data.

(13) The Status field begins counting down from the time entered in the Walk Time field.

(14) Disconnect the DAGR to DAGR cable from the J2 connector of the master DAGR.

(15) Remove the master DAGR antenna mounting pole assembly (with DAGR installed) from the stationary mount (e.g., tripod).

(16) Walk the master DAGR antenna mounting pole assembly (with DAGR installed) to point 2 before all walk time elapses. Walking in a straight line is not required. Maintaining satellite visibility is required, keep the antenna held above your head. For improved accuracy, walk a minimum of 50 meters (164 feet). Less distance results in less accuracy.

(17) When point 2 is reached, secure the antenna mounting pole assembly (with DAGR installed) to a stationary mount (e.g., tripod).

(18) Push the MENU key.

(19) Highlight Point Reached, then push the ENTER key. Do not move from point 2 position.

NOTE

If all walk time elapses before point 2 data is entered, the Status field displays Time Exceeded, Extend Walk Time and Try Again.

(20) The Status field displays time remaining to stay at point 2 position and latch data (store point 2 position).

(21) After Status field displays Reconnect Receivers to Complete Calculation, return the master DAGR antenna mounting pole assembly (with DAGR installed) to the point 1 position.

NOTE

If the Status field displays Waiting For Response Use Menu to Continue or Stop Calculation, push the MENU key. Highlight Continue, then push the ENTER key.

(22) After returning to point 1, secure the master DAGR antenna mounting pole assembly (with DAGR installed) to the stationary mount (e.g., tripod).

(23) Reconnect the J2 connectors of the master DAGR and the slave DAGR using the DAGR to DAGR cable. The GLS calculation is automatically performed. Do not move the DAGRs.

(24) The master DAGR Status field displays Calculation Complete Good Solution. The slave DAGR Status field displays Use Menu to Start GLS Calculation.

NOTE

If the master DAGR Status field displays Calculation Complete Degraded Solution, verify the estimated azimuth error (EAZ) field data before using the calculated GLS solution.

(25) The calculated Gun Laying System page data is ready for use.

c. Recall Calculation Solution

NOTE

When the GLS calculation is not in progress, the operator can view the last computed GLS solution.

(1) From the Gun Laying System page, push the MENU key.

(2) Highlight Recall Solution, then push the ENTER key.

(3) The status field displays Recalled Solution Computed at: (time and date of last GLS solution). The other fields display data of the last GLS solution.

14.5.5. Keystroke Map.

The keystroke map is intended as an aid while using keystrokes associated with the page shown on the DAGR display. Figure 14-14 shows the keystroke map for the Gun Laying System page. Selecting Help (with or without fields selected) displays help text associated with the individual page, fields within the page, or general receiver information. The keystroke map starts at the main menu and proceeds to selections available using the Gun Laying System page.

- With no fields highlighted, use the PAGE or QUIT keys to scroll through the available pages included in the Applications submenu
- When a field is highlighted, use the MENU or ENTER keys to access available selections. These selections may include choosing an item from a list editor, using the text editor, etc.

14.5.5.1. The following field menu choices shown in the keystroke map appear as described or under the following conditions:

- **Edit Field and Recall Solution** — Both disabled when GLS calculation is in progress. Recall Solution is disabled when no previous GLS calculation is available.
- **Continue** — Appears only when the Status field prompts the operator to use the menu to continue or when returning to slave DAGR during dual receiver calculation.
- **Point Reached** — Appears only when the Status field prompts the operator to use the menu upon reaching Point 2.

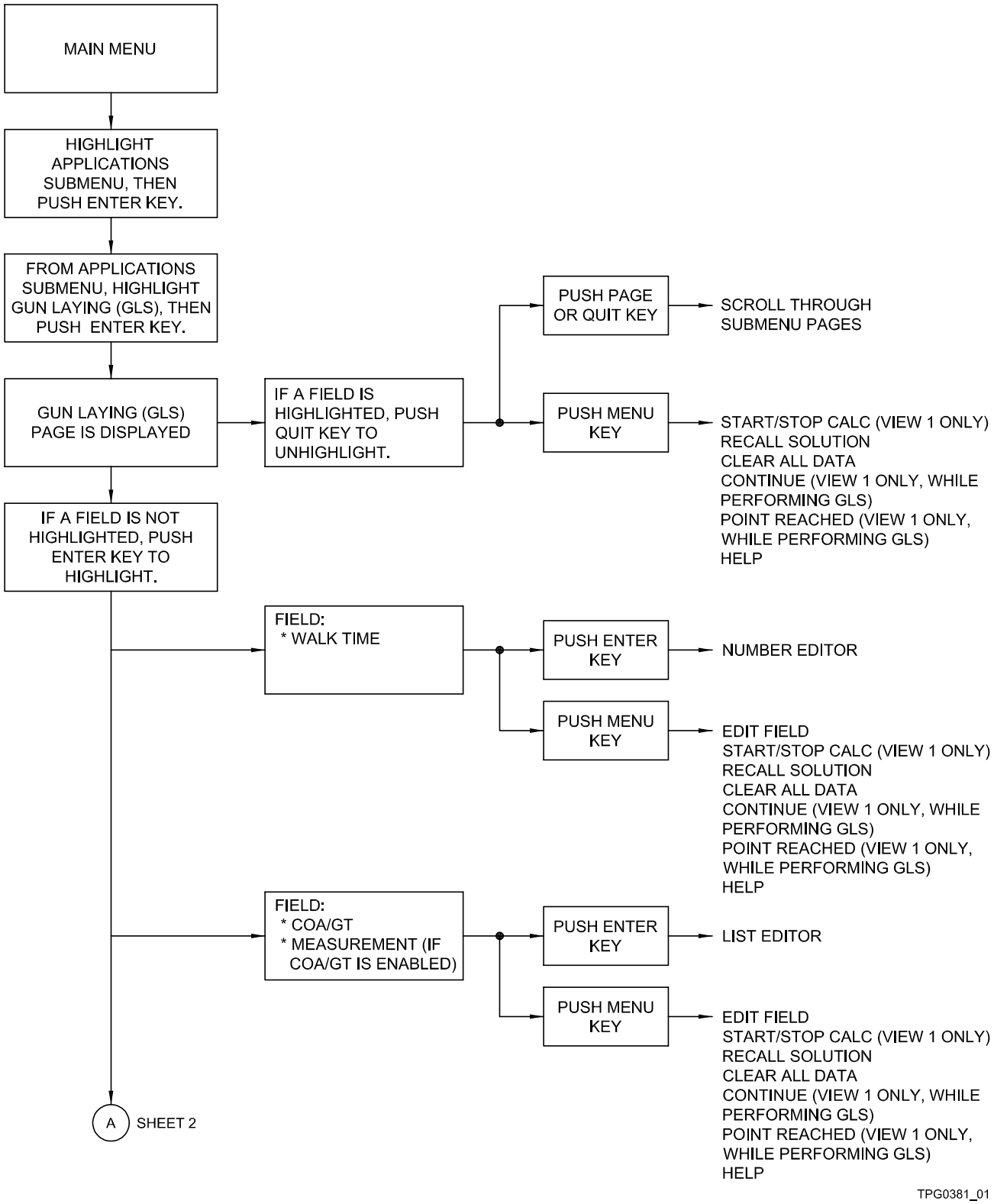


Figure 14-14. Gun Laying System Page Keystroke Map (Sheet 1 of 3)

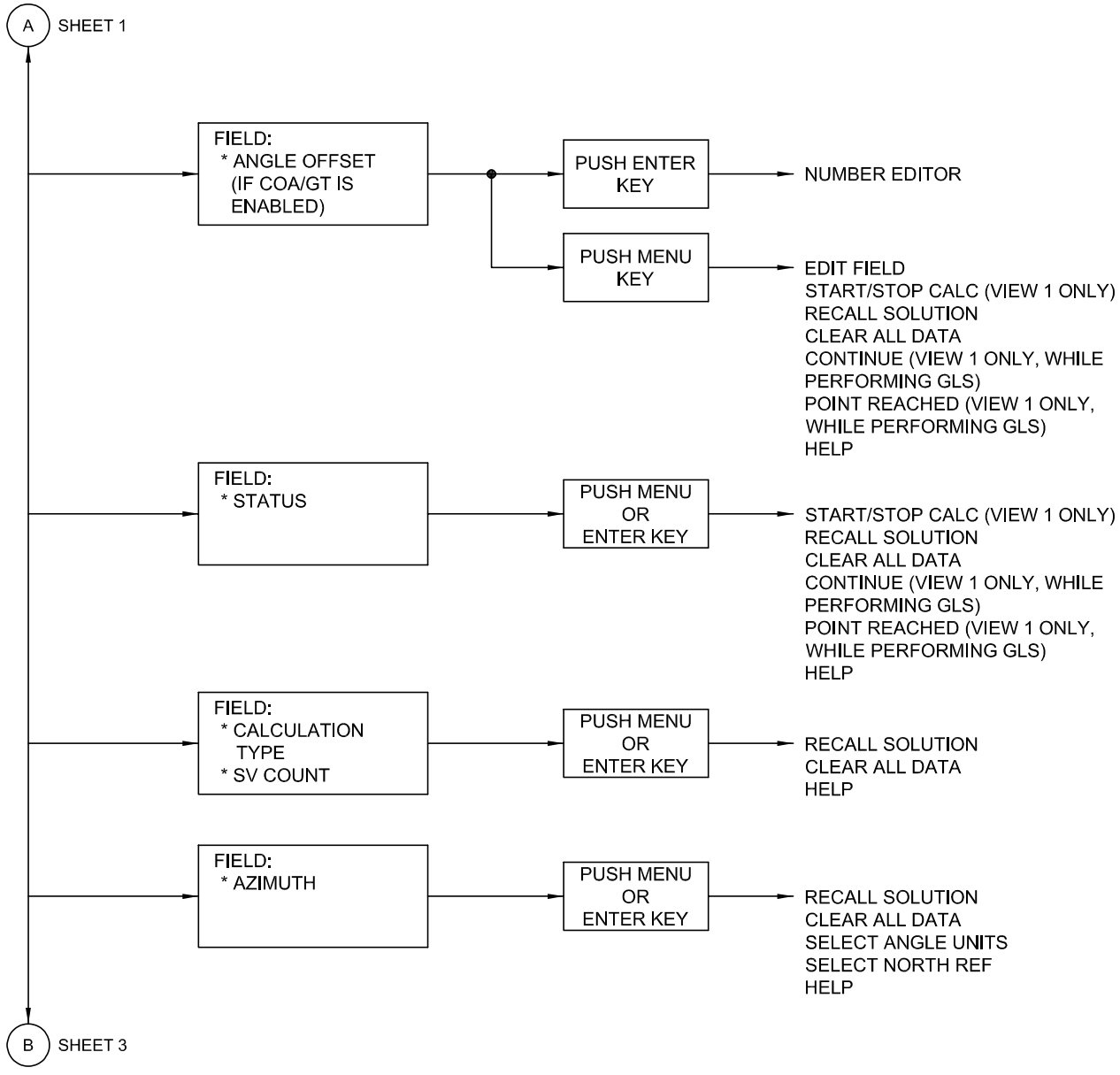


Figure 14-14. Gun Laying System Page Keystroke Map (Sheet 2)

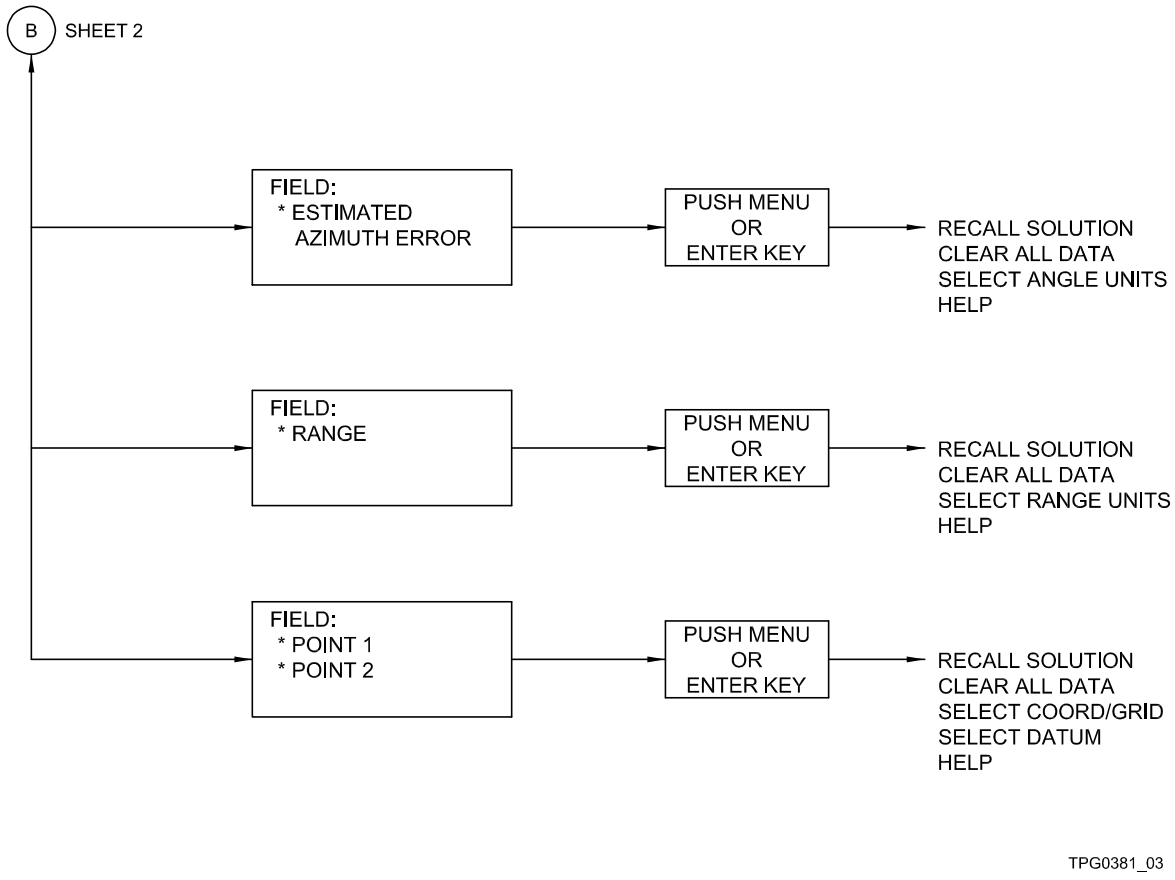


Figure 14-14. Gun Laying System Page Keystroke Map (Sheet 3)

CHAPTER 15
OPERATOR INSTRUCTIONS — OPERATION UNDER UNUSUAL CONDITIONS

15.1. GENERAL INFORMATION.

This chapter contains operation under unusual conditions information including jamming and electronic countermeasures.

15.2. UNUSUAL ENVIRONMENT/WEATHER.

15.2.1. Areas Blocking Satellite Signals.

Satellite signals can be blocked by dense foliage, caves, buildings, etc.

NOTE

• The DAGR antenna must have an unobstructed view of the sky. When using the DAGR internal antenna, the receiver must be held at a 90° angle to the horizon for best reception.

• If the DAGR is turned off for more than four hours during unusual conditions, the ability to perform a direct Y-code acquisition may be lost.

15.2.1.1. When attempting to acquire satellites after the signals have been blocked for a period of time (e.g., when exiting a cave) acquisition time may be improved by momentarily cycling the unit to Standby mode and then back to the previous operating mode.

15.2.1.2. If expecting to operate in conditions where tracking satellites is not possible (such as entering a cave), the DAGR should be placed in Standby mode prior to entering these conditions. When back in unobscured conditions, set the DAGR back to a satellite tracking mode, and the DAGR performs a direct Y-code acquisition (if CV keys are loaded). If the DAGR is left in a satellite tracking mode for a period of one hour or more while obscured, the ability to perform direct Y-code reacquisitions may be lost.

15.2.1.3. If expecting to operate in conditions where satellite signals are weak (such as dense foliage or tall buildings), the DAGR should be placed in Average mode and DAGR should be kept stationary. Do not move DAGR in Average mode. If the DAGR is left in a satellite tracking mode for a period of one hour or more while obscured, the ability to perform direct Y-code reacquisitions may be lost. When back in unobscured conditions, cycle the DAGR to Standby then back to a satellite tracking mode, and the DAGR performs a direct Y-code acquisition (if CV keys are loaded).

15.2.2. Temperature and Humidity.

If the operating temperature range is exceeded while batteries are installed, DAGR memory data can become corrupted and performance degraded.

DAGR temperature and humidity ranges are listed below. Anything outside these limits is considered unusual conditions. Refer to Paragraph 20.3.4.2 for information on the Cold Weather Battery Pack.

- **Operating temperature range** — -32 to +70 °C (-26 to +158 °F)
- **Storage temperature range (without batteries)** — -55 to +70 °C (-67 to +158 °F)
- **Humidity range** — 0 to 100%
- **Display heater** — When enabled, turns on at approximately -20 °C (-4 °F)

15.2.3. Altitude.

- **Operating altitude range** — -400 to +9100 m (-1312 to +29 857 ft) Mean Sea Level (maximum rate of change for operation is 100 m (328 ft) per second)
- **Storage altitude range** — -400 to +15 000 m (-1312 to +49 215 ft)

15.2.4. Dust and Water.

The DAGR is sealed against dust and water to a depth of 1 meter (3 feet) for 20 minutes.

15.3. ELECTRONIC WARFARE.

When loaded with crypto keys, the DAGR provides accurate PVT (position, velocity (ground speed), and time) in a spoofing environment; including fast direct-Y acquisition and area navigation functions. The operator can detect and minimize the effects of a jamming environment by using the information provided in this chapter.

15.3.1. Spoofing and Anti-Spoofing.

Hostile parties may attempt to imitate (spoof) GPS satellite signals to cause errors in navigation and position information. The DAGR employs crypto keys to protect against these attempts. Other than loading crypto keys, no other operator action is necessary to initiate anti-spoofing. Some signals generated by the satellites are encrypted to deny certain users the reception of those signals. This is called anti-spoofing (A-S). Entering crypto keys allows the DAGR to receive those signals, when available. Code types Coarse/Acquisition (C/A), Precise (P), and Encrypted Y code are used for advanced security. When operating the DAGR in a secure environment, valid crypto keys are loaded into the receiver for protection from intentionally degraded (spoofing) satellite signals. Refer to Paragraph 7.2 for more information on loading crypto keys.

15.3.1.1. How To Improve Operation When Spoofing Occurs.

To enable DAGR operation during spoofing, the receiver must be loaded with current crypto keys.

Ensure current crypto keys are loaded (refer to Paragraph 7.2). The DAGR can be commanded to use only satellites transmitting Y-code signals (refer to Paragraph 7.4.2.4).

15.3.2. Jamming and Anti-Jamming.

Hostile parties may use electromagnetic energy in an attempt to disrupt (jam) the reception of satellite signals. The effects of jamming can be minimized by using the information provided in Paragraph 15.3.2.3.

15.3.2.1. Anti-Jamming Frequency Selection. The DAGR utilizes multiple frequency selections for anti-jamming. Refer to Paragraph 7.4 for additional information on DAGR satellite frequency selection.

- **L1 Primary** — Tracks satellites on L1. Performs atmospheric correction calculations on L2. When jammed on L1, uses L2.
- **L2 Primary** — Tracks satellites on L2. Performs atmospheric correction calculations on L1. When jammed on L2, uses L1.
- **L1 Only** — Only tracks satellites on L1. Used only when an L1 Only antenna is being used.

15.3.2.2. Detection of Jamming. The DAGR provides multiple methods of detecting jamming as follows.

- **Jammer Finder page of the Application submenu** — The L1 and L2 frequencies are monitored for signal jamming noise. The direction of the jamming signal is determined by signal strength. The signal azimuth and the DAGR present position are stored as an electronic warfare (EW) waypoint. Multiple EW waypoints are used to calculate the jammer signal source position. Refer to Paragraph 14.4 for more information on using the Jammer Finder page.
- **Channel Status page of the Satellite submenu** — Individual satellite data for active channels is viewed using the Channel Status page of the Satellite submenu. The J/I (jamming or interference) column of the page indicates if jamming or interference are detected (yes or no). Refer to Paragraph 13.3 for more information on using the Channel Status page.

15.3.2.3. How To Improve Operation When Jamming Occurs.

CAUTION

• Accidental jamming may occur when operating the DAGR near a tank or a source of high power electronic emissions, and DAGR communication with satellites could be compromised. Move away from these sources and verify operation.

• L-band radio transmissions may interfere with DAGR operations, and DAGR communication with satellites could be compromised.

15.3.2.3.1. DAGR Position. If possible, move to a position where detection of the jamming signal is minimized. Operate the DAGR close to the ground while maintaining a clear view of the sky. Block the jamming signal by placing a barrier (e.g., your body) between the DAGR and the source of jamming. The effects of any ground based signals are minimized. Avoid operating the DAGR near a tank, dense foliage, or a source of high power electronic emissions. Move away from these sources and verify operation.

15.3.2.3.2. Average Operation Mode. Average operating mode can be used to acquire present position data in a jamming environment (refer to Paragraph 6.2.23 for additional information).

15.3.2.3.3. Anti-Jam Accessory. When connected to the DAGR, the Anti-Jam Accessory (AJA) is enabled or disabled by the operator using the GPS Setup page (refer to Paragraph 7.4) Anti-Jam Accessory Mode field. When AJA is enabled and jamming is detected by the DAGR, the AJA provides DAGR increased anti-jam capability.

15.4. DECONTAMINATION.

WARNING

Due to the type of materials used to construct the DAGR, RA-1 and RA-2, supertropical bleach (STB) or decontamination solution number 2 (DS-2) should not be used during decontamination. Exposure may significantly degrade the material structural integrity, window transparency and/or keypad legibility.

The DAGR, RA-1 and RA-2 should be considered vulnerable electronic equipment and decontaminated in accordance with FM 3-11, chapter 2, section 3 decontamination, and instructions included herein.

15.4.1. Decon Level: Immediate.

Radiological contamination: Brush, wipe or vacuum contamination from the equipment. Care must be taken to not wipe the display window with abrasive particles that could scratch and otherwise compromise the window's protective layer of hard coat. If possible, keep battery compartments and connector covers engaged (installed) to prevent further spread of contaminates into hard to clean areas.

15.4.1.1. Biological and chemical contamination: Use an Individual Equipment Decontamination Kit (IEDK) on all surfaces except for the display window. Use a soft cloth and preferably hot, soapy water to clean the display window as well as the rest of the equipment. Care must be taken to not wipe the protective display window with abrasive particles that could compromise the window's protective layer of hard coat. When cleaning the window use a dabbing rather than rubbing motion. If possible, keep battery compartments and connector covers engaged (installed) to prevent further spread of contaminates into hard to clean areas.

15.4.2. Decon Level: Thorough.

Radiological contamination: Brush, wipe or vacuum contamination from the equipment. Care must be taken to not wipe the protective display window with abrasive particles that could compromise the window's protective layer of hard coat. If possible, keep battery compartments and connector covers engaged (installed) to prevent further spread of contaminates into hard to clean areas.

15.4.2.1. Biological and chemical contamination: Use an Individual Equipment Decontamination Kit (IEDK) on all surfaces except for the display window. Use a soft cloth and preferably hot, soapy water to clean the display window as well as the rest of the equipment. Care must be taken to not wipe the protective display window with abrasive particles that could scratch and otherwise compromise the window's protective layer of hard coat. When cleaning the window use a dabbing rather than rubbing motion. The DAGR, RA-1 and RA-2 are sealed and, therefore, can be immersed in hot, soapy water and/or placed under low pressure running

water for cleaning assistance. The Prime Power Battery Pack, Memory Battery Cover and Connector Covers should remain installed for initial thorough decon but removed for final decontamination inspection to ensure contaminates are not present in areas that are otherwise not accessible. The gasket seals should be visually inspected and replaced if they appear damaged or determine to be contaminated.

CHAPTER 16
OPERATOR INSTRUCTIONS — MESSAGES

16.1. GENERAL.

This chapter lists all messages used in the DAGR (refer to Table 16-1). Messages provide operation status, information, and navigation alerts. Messages also include warnings, cautions, and notes as described below.

- Warnings are displayed by the DAGR when conditions exist that could result in operator injury, loss of life, or mission failure unless corrective action is taken.
- Cautions are displayed by the DAGR when conditions exist that could result in damage to equipment or compromise mission effectiveness unless corrective action is taken.
- Notes are displayed by the DAGR when conditions exist that should be brought to the operators attention.

Table 16-1. Messages

Message Text	Description
ALERT! — ADVANCE ROUTE TO (Waypoint Name) Leg XXX	The end of the current route leg has been reached. The next route leg is displayed. Push ENTER to change course and navigate the next route leg. Push QUIT to continue the same course.
ALERT! — ANCHOR EXITED (Alert Number-Name)	Currently outside the safe zone defined by the anchor alert. View the alert to display the azimuth and range to the position that the alert was exited.
ALERT! — AREA ENTERED (Alert Number-Name)	Currently inside the danger zone or outside the safe zone defined by the area alert.
ALERT! — AREA EXITED (Alert Number-Name)	
ALERT! — BOUNDARY CROSSED (Alert Number-Name)	Crossed the line defined by the boundary line alert. Boundary lines are not to be crossed.
ALERT! — BUFFER ZONE ENTERED (Alert Number-Name)	Currently inside the danger zone defined by the buffer zone alert. View the alert to display the azimuth and range to the position that the alert was entered.
ALERT! — CORRIDOR EXITED (Alert Number-Name)	Currently outside the safe zone defined by the corridor alert. View the alert to display the azimuth and range to the position that the alert was exited.
ALERT! — DATUM MIS-MATCH (Waypoint Number-Name) (Waypoint Number-Name)	Displays two waypoints with mis-matched datums. Using position coordinates defined with differing datums may result in inaccurate or incorrect navigation/alert information.
ALERT! — END OF ROUTE (Waypoint Name) Leg XXX	The end of the route was reached. The receiver will continue to navigate to the last WP in the route until new navigation data is entered.
ALERT! — HAZARD ENTERED (Alert Number-Name)	Currently inside the danger zone defined by the hazard alert. View the alert to display the azimuth and range to the position that the alert was entered.
ALERT! — PHASE LINE CROSSED (Alert Number-Name)	Crossed the line defined by the phase line alert. Crossing a phase line indicates the completion of a phase of a mission.
ALERT! — REACHED WP (Waypoint Number-Name)	The navigation WP has been reached.

Table 16-1. Messages - Continued

Message Text	Description
ALERT! — ROUTE LEG ADVANCED (Waypoint Name) Leg XXX	The end of the previous route leg was reached. The displayed leg is now being navigated.
ALERT! — TIME/DATE ALARM (Alert Number-Name)	The time/date alert has been triggered. Use the down cursor control key to view remark.
ALERT! — (TIME/DATE REMARK)	The time/date alert has been triggered. Use the up and down cursor control keys to view the remark information specified for the alert.
ALERT! — 1-D POSITION ERROR (Alert Number-Name)	The current position error exceeds the maximum allowed position error defined by the position error alert.
ALERT! — 2-D POSITION ERROR (Alert Number-Name)	
ALERT! — 3-D POSITION ERROR (Alert Number-Name)	
CAUTION! — CLEAR ALERTS FROM XX TO XX?	The selected range of alert numbers will be cleared. Cancel the clear to select a different alert range.
CAUTION! — CLEAR ROUTES FROM XX TO XX?	The selected range of route (RTE) numbers will be cleared. One of these routes may currently be used for navigation. Cancel the clear to select a different route range.
CAUTION! — CLEAR WPs FROM XXX TO XXX?	The selected range of waypoint (WP) numbers will be cleared. One or more of these WPs may currently be used for navigation, routes, or alerts. Cancel the clear to select a different WP range.
CAUTION! — ENTERING POLAR REGION Features May Move, Appear, or Disappear	The area being displayed has transitioned from a non-polar region to a polar region. The projection used to display features and/or symbols has changed. This may cause features and/or symbols on this display to move, appear or disappear.
CAUTION! — JAMMING DETECTED Using Single Frequency	The receiver has detected a jamming environment. The receiver is using the single available frequency (L1/L2). Position and navigation data may be degraded.
CAUTION! — LEAVING POLAR REGION Features May Move, Appear, or Disappear	The area being displayed has transitioned from a polar region to a non-polar region. The projection used to display features and/or symbols has changed. This may cause features and/or symbols on this display to move, appear or disappear.
CAUTION! — MAP SCALE CHANGED Switched to Different Map	The map scale has changed due to switching between maps of different scales.
CAUTION! — POSITION ADJUSTED XXX XX XXXXX e/w, XXXXX n/s	The entered position is invalid for the selected grid. The entry was adjusted to be a valid position entry. The adjusted value should be verified as correct before saving the adjusted position. Push ENTER to save the adjusted position coordinates. Push QUIT to cancel the edit.
CAUTION! — RAIM ERROR Faulty SV Signal Not Excluded	RAIM has failed to exclude a faulty SV (Satellite Vehicle) signal.
CAUTION! — REHEARSAL CANCELED Rehearsal Route is Invalid	The rehearsal route is not valid. Select another route and restart rehearsal.

Table 16-1. Messages - Continued

Message Text	Description
CAUTION! — RELOAD MAPS/IMAGES Application SW Does Not Support Current Version	The application software does not support the version of maps and/or images currently loaded. Either load a different version of maps and/or images or load a different version of application software.
CAUTION! — SV CODE IS SET TO MIXED	SV Code is set to Mixed mode. The receiver is not restricted to SVs transmitting Y-code. Position and navigation data may be degraded.
CONTRAST TEST — (0% to 100%)	The receiver is testing the display contrast. The contrast will continuously change between 0% and 100%. Examine the display to determine if the contrast is functioning properly. This test will continue running until the message is acknowledged.
DANGER! — TARGET POSITION SAME AS YOUR POSITION! RE-CHECK!	The target position which was calculated is within 100m of your position. Verify this is the correct target position before continuing.
DATA RECEIVE STARTING	The receiver is receiving data from an external device via the serial port. When maps/images are being received, the receiver displays a progress bar with a matching completion percentage value. Do not disconnect the cable while the transfer is in progress. If the transfer fails, check the cable and COM port settings before trying again. If transfer fails due to incompatible map/image versions, verify software and hardware versions are compatible before reattempting a data transfer. After a maps/image data transfer is completed, aborted, or failed, the display prompts the operator to push the ENTER key to restart the receiver.
DATA RECEIVE IN PROGRESS	
DATA RECEIVE MAPS/IMAGES — XX%	
DATA RECEIVE COMPLETE	
DATA RECEIVE ABORTED	
DATA RECEIVE FAILED — CHECK CABLE	
DATA RECEIVE FAILED — CHECK CABLE AND COM PORT SETTINGS	
DATA RECEIVE FAILED — MAP/IMAGE VERSIONS INCOMPATIBLE	
DATA TRANSMIT STARTING	The receiver is sending data to an external device via the serial port. When maps/images are being transmitted, the receiver displays a progress bar with a matching completion percentage value. Do not disconnect the cable while the transfer is in progress. If the transfer fails, check the cable and COM port settings before trying again. If transfer fails due to incompatible map/image versions, verify software and hardware versions are compatible before reattempting a data transfer. After a maps/image data transfer is completed, aborted, or failed, the display prompts the operator to push the ENTER key to restart the receiver.
DATA TRANSMIT IN PROGRESS	
DATA TRANSMIT MAPS/IMAGES — XX%	
DATA TRANSMIT COMPLETE	
DATA TRANSMIT ABORTED	
DATA TRANSMIT FAILED — CHECK CABLE	
DATA TRANSMIT FAILED — CHECK CABLE AND COM PORT SETTINGS	
DATA TRANSMIT FAILED — MAP/IMAGE VERSIONS INCOMPATIBLE	
DISPLAY LIGHT TEST (0% to 100%)	The receiver is testing the display lighting. The display light will continuously change between its brightest and dimmest settings. Examine the display to determine if the display light is functioning properly. This test will continue running until the message is acknowledged.

Table 16-1. Messages - Continued

Message Text	Description
INTERNAL COMPASS CALIBRATION — MAINTAIN CURRENT ROTATION SPEED	Place the receiver face up, on a flat, level surface. Rotate the receiver clockwise and follow display instructions.
INTERNAL COMPASS CALIBRATION — ROTATE THE RECEIVER SLOWER	
INTERNAL COMPASS CALIBRATION — ROTATE THE RECEIVER FASTER	
INTERNAL COMPASS CALIBRATION COMPLETE	
KEYPAD TEST	The operator pushes each key to verify a display key highlighted response. Pushing a key a second time returns the key display to its original appearance.
LRF SHOT RECEIVED	The laser range finder (LRF) data has been received. Check the displayed information, then push the ENTER key to continue to the Fire Support page and store data as a waypoint, or push the QUIT key to discard the data.
MARK PRESENT POSITION (Waypoint Number-Name)	Present position can be stored as a WP. The stored WP can later be used to get back to this position or to provide info about this position. Push the MENU key to enter more information about this position. Use Man Overboard to immediately navigate back to this position.
NOTE! — ALERT STORED	The alert has been stored.
NOTE! — ANTI-JAM Transitioned to Nulling Mode Due to Jamming	The Anti-Jam Accessory (AJA) has transitioned to nulling mode due to the detection of jamming or interference.
NOTE! — AUTOMARK AND OFF MODE DISPLAY HEATER ARE ENABLED	The receiver will automatically power-on and track SVs to obtain position fixes. Put the receiver in a place where it has visibility to the SVs. The receiver will automatically heat the display when it is cold to allow the display to be usable as soon as the receiver is turned on.
NOTE! — AUTOMARK IS ENABLED	The receiver will automatically power-on and track SVs to obtain position fixes. Put the receiver in a place where it has visibility to the SVs.
NOTE! — AUTOMARK WP RANGE, RANGE CONTAINS VALID WPs, OVERWRITE?	The WP range specified by Automark contains valid WPs. Confirming this message will cause the WPs to be overwritten by automarked WPs.
NOTE! — AUTO-ON AND OFF MODE DISPLAY HEATER ARE ENABLED	The receiver will automatically power-on and track SVs to maintain data needed to track SVs quickly and provide good position and navigation data. Put the receiver in a place where it has visibility to the SVs. The receiver will automatically heat the display when it is cold to allow the display to be usable as soon as the receiver is turned on.
NOTE! — AUTO-ON IS ENABLED	The receiver will automatically power-on and track SVs to maintain data needed to track SVs quickly and provide good position and navigation data. Put the receiver in a place where it has visibility to the SVs.
NOTE! — CHANGING PROFILES MAY SWITCH USER SETTINGS	Changing between user profiles will switch user settings to the selected user profile settings.
NOTE! — COLLECTING SV INFORMATION	The receiver is waiting to collect SV information that is needed to obtain todays CV (crypto fill).

Table 16-1. Messages - Continued

Message Text	Description
NOTE! — CONTINUOUS LOSS OF SV SIGNAL ENTER STANDBY?	The receiver has not been able to obtain a FIX over the past four (4) hours. Entering Standby mode is recommended.
NOTE! — DATA TRANSFER FAILED Check COM Port Settings	The current COM port settings do not support the requested data transfer.
NOTE! — DISABLE SV HOLD Recommend Disabling SV Hold to Track More SVs	Disable SV Hold to allow the receiver to track four (4) or more SVs. Position and navigation data may be degraded.
NOTE! — DISPLAY TEST BEGINNING	The receiver will demonstrate each display color (white, light gray, dark gray, black). Examine the display to determine if any of the pixels are malfunctioning.
NOTE! — DISPLAY TEST COMPLETED	
NOTE! — DO NOT MOVE Averaging Mode	The receiver must remain stationary during Averaging mode.
NOTE! — DO NOT MOVE Time Only Mode	The receiver must remain stationary during Time Only mode.
NOTE! — ENTER TEST MODE?	The test may take several minutes to complete. SVs will NOT be tracked during test mode. Position and navigation data will NOT be available during test mode.
NOTE! — FAST FIX ACTIVATED	Fast Fix has been activated.
NOTE! — HOLD ELEVATION? ELEVATION ± XXXXX FT	The receiver is not tracking enough SVs with good vertical geometry for position and navigation computations. Enter an elevation or accept current elevation to enter elevation hold mode. Cancel elevation hold if moving in the vertical direction. Elevation hold assists navigation by fixing the elevation allowing the receiver to provide a 2-D solution.
NOTE! — INTERNAL COMPASS Calibrate Before Using for Best Performance	The internal compass needs to be calibrated to allow it to compensate for local magnetic fields. Acknowledge the message, then push <menu> to calibrate.
NOTE! — INTERNAL COMPASS Hold Level For at Least Two Seconds Before Acknowledging	The receiver must be held level to get an accurate track value when using the internal compass.
NOTE! — MOVING WPS Limit Five, Remaining WPs Converted to Stationary WPS.	Only five (5) WPs can be designated as moving WPs at any given time.
NOTE! — NORMAL SV COVERAGE RESUMED	The receiver is tracking enough SVs with good vertical geometry for position and navigation computations. Elevation hold is no longer required.
NOTE! — OFF MODE DISPLAY HEATER IS ENABLED	The receiver will automatically heat the display when it is cold to allow the display to be usable as soon as the receiver is turned on.
NOTE! — OVERWRITE EXISTING ALERT?	The selected alert number already contains an alert. Cancel the overwrite to select a different alert number.
NOTE! — OVERWRITE EXISTING ROUTE?	The selected route number already contains a route. Cancel the overwrite to select a different route number.
NOTE! — OVERWRITE EXISTING WP?	The selected WP number already contains a WP. That WP is NOT currently used for navigation, routes or alerts. Cancel the overwrite to select a different WP number.
NOTE! — OVERWRITE WP USED FOR NAVIGATION, ROUTE AND ALERT?	The selected WP number already contains a WP, and that WP is currently used for navigation, routes or alerts.

Table 16-1. Messages - Continued

Message Text	Description
NOTE! — OVERWRITE WP USED FOR NAVIGATION AND ROUTE?	Overwriting that WP may compromise the mission. Cancel the overwrite to select a different WP number.
NOTE! — OVERWRITE WP USED FOR NAVIGATION AND ALERT?	
NOTE! — OVERWRITE WP USED FOR NAVIGATION?	
NOTE! — OVERWRITE WP USED IN ROUTE AND ALERT?	
NOTE! — OVERWRITE WP USED IN ROUTE?	
NOTE! — OVERWRITE WP USED IN ALERT?	
NOTE! — PAGE ADDED TO POS PAGES	This page has been added to the POS page-set.
NOTE! — PAGE CLEARED FROM POS PAGES	This page has been cleared from the POS page-set.
NOTE! — POSITION REPORT DATA SENT	The position report data was transmitted.
NOTE! — REPROGRAMMING Start Reprogramming by Turning Other Receiver Off Then On	Follow message instructions to perform DAGR to DAGR reprogramming.
NOTE! — REPROGRAMMING to Software Application Types Are Different	Follow message instructions to perform DAGR to DAGR reprogramming. Push the ENTER key to continue or push QUIT key to cancel.
NOTE! — REPROGRAMMING Overwrite Newer Version With Older?	Follow message instructions to perform DAGR to DAGR reprogramming. Push the ENTER key to confirm or push QUIT key to cancel.
NOTE! — REVIEW SAFETY CHECKS View Bottom of CAS 9-Line Brief Before Call for Support	Scroll to the bottom of the CAS 9-Line Brief display and review the Safety Checks before calling for support.
NOTE! — ROUTE LENGTH XXXX.XX	The total length of the route (not including Leg 000) is displayed.
NOTE! — ROUTE STORED	The route has been stored.
NOTE! — SAVE ALERT?	Select Confirm to save the changes to the alert.
NOTE! — SAVE ROUTE?	Select Confirm to save the changes to the route.
NOTE! — SAVE WP?	Select Confirm to save the changes to the WP.
NOTE! — SLAVE MUST BE IN ADVANCED MODE TO PERFORM A DUAL GLS CALCULATION	To perform a dual GLS calculation both receivers must be in advanced mode and must have the same COM port settings.
NOTE! — STRING NOT FOUND	The search string was not found. Enter another string and try again.
NOTE! — SV HOLD EXITED	SV Hold has been exited due to user action.
NOTE! — SV LOST Unable to Track Held SV	An SV that is being used by SV Hold has been lost and can no longer be tracked. Select another SV or disable SV Hold, if necessary.

Table 16-1. Messages - Continued

Message Text	Description
NOTE! — SV SELECTIVITY RAIM Would Exclude Selected SV	SV Selectivity has selected an SV that would have been excluded by RAIM.
NOTE! — TODAY'S CV HAS BEEN COLLECTED	The receiver just collected today's CV (crypto fill). The receiver will be able to track Y-code SV signals today.
NOTE! — TOMORROW'S CV HAS BEEN COLLECTED	The receiver just collected tomorrows CV (crypto fill). The receiver will be able to track Y-code SV signals tomorrow.
NOTE! — TOO MANY NMEA SENTENCES ON COM 1 (OR COM 2, OR COM 3)	The current baud rate, parity and NMEA interval may cause some of the NMEA sentences to not be output. Increase the baud rate, decrease the NMEA interval or reduce the number of NMEA sentences.
NOTE! — TRANSFER OF MAPS AND IMAGES MAY TAKE A LONG TIME	The transfer of maps/images can take a long amount of time (up to 35 minutes) depending on the COM Port settings and the size and number of maps/images transferred. While transferring maps/images the receiver cannot be used for anything else, verify there is enough time before starting the transfer.
NOTE! — TRANSITIONED TO STANDBY MODE	The receiver has automatically entered Standby mode.
NOTE! — TRANSITIONED TO STANDBY MODE Could Not Track SVs	The receiver has automatically entered Standby mode because it could not track SVs. The Auto-Standby feature can be disabled or the time-out period can be changed from setup.
NOTE! — TURN OFF AUTO-ON BEFORE TURNING ON AUTOMARK	Automark and Auto-On cannot be active at the same time. Turn off Auto-On before attempting to turn on Automark.
NOTE! — TURN OFF AUTOMARK BEFORE TURNING ON AUTO-ON	Automark and Auto-On cannot be active at the same time. Turn off Automark before attempting to turn on Auto-On.
NOTE! — UPDATE MOVING WP LAST FIX TIME?	The position for a moving WP has been modified. Select confirm to use current time as the last FIX time. Select cancel to use previously entered FIX time.
NOTE! — UPDATE MOVING WP GROUND SPEED AND TRACK?	The position for a moving WP has been modified. Select confirm to compute new ground speed and track using the previous FIX position and the newly entered FIX position. Select cancel to use previously entered ground speed and track.
NOTE! — VALID CV LOADED	The CV (crypto fill) was loaded.
NOTE! — WAYPOINT STORED	The waypoint has been stored.
NOTE! — WP SUMMARY USED: XXX UNUSED: XXX	USED specifies the number of WPs currently defined. UNUSED specifies the number of WPs currently undefined.
POWER-ON STATUS — (Power-On Status Data)	Check displayed messages before using the receiver. If a receiver failure was detected, e.g. self test failed, turn the receiver in for repair.
RECEIVER STATUS — (MODE, GPS TYPE, CV LOADED, POS ERROR, FUNCTION SET, ALERTS, SV CODE, AUTOMARK, AUTO-ON, AND OFF MODE DISPLAY HEATER)	The current status of the receiver is displayed.
REMOTE CONTROL LOCKOUT	The serial port is controlling the receiver. It has issued a remote control lockout command.

Table 16-1. Messages - Continued

Message Text	Description
REPROGRAMMING Canceled	DAGR to DAGR reprogramming has been canceled. Push the ENTER key to restart the sending receiver.
REPROGRAMMING Complete	DAGR to DAGR reprogramming is completed. Push the ENTER key to restart the receiver.
REPROGRAMMING FAILED Check Cable and Remove/Replace Power/Batteries in the Target Receiver	DAGR to DAGR reprogramming has failed. Check the cable, then remove and replace all power and batteries to the target receiver. Push the ENTER key to restart the sending receiver.
REPROGRAMMING FAILED Software/Hardware Versions Incompatible	DAGR to DAGR reprogramming has failed. Check the software and hardware versions of the sending and target receiver for compatibility. Push the ENTER key to restart the sending receiver.
REPROGRAMMING In Progress... No Other Functions Available Until Complete	DAGR to DAGR reprogramming is in progress. Other DAGR functions cannot be performed until reprogramming is completed.
ROCKWELL COLLINS 1989–2003 SW VERSION XXX-XXXX-XXX HW VERSION XXXX	Copyright, software version, and hardware version are displayed.
SINCGARS — ACCURATE TIME NOT GUARANTEED	The GPS receiver cannot currently provide accurate time data to the Single Channel Ground and Airborne Radio System (SINCGARS) due to the current Time Figure-of-Merit (TFOM) being greater than seven (7).
SINCGARS — INVALID EQUIPMENT ID	The Single Channel Ground and Airborne Radio System (SINCGARS) has an invalid equipment ID. Verify the correct SINCGARS is connected before retrying.
SINCGARS — PRESS LOAD KEY ON THE RADIO	Push load key on the Single Channel Ground and Airborne Radio System (SINCGARS) to continue.
SINCGARS — RADIO NOT RESPONDING	The Single Channel Ground and Airborne Radio System (SINCGARS) is not responding. Verify the cable is firmly connected and the SINCGARS is turned on before retrying.
SINCGARS — TIMEFILL DATA FAILED PARITY	The Single Channel Ground and Airborne Radio System (SINCGARS) failed the timefill data parity check. Verify the cable is firmly connected before retrying.
SINCGARS — TIMEFILL SUCCESSFUL	The Single Channel Ground and Airborne Radio System (SINCGARS) has successfully completed the timefill.
TEST IN PROGRESS TESTING — (RAM, ROM, SAASM, TRACK, PPS/HQ, LPTS, or I/O)	The test may take several minutes to complete. SVs will NOT be tracked during the test. Position and navigation data will NOT be available during the test. The keypad will not be available during certain sections of the test.
WARNING! — ACTIVATE CV ZEROIZE?	CV Zeroize is used to destroy all CV keys that have been entered into the receiver.
WARNING! — ACTIVATE EMERGENCY ZEROIZE?	Emergency Zeroize is used to destroy all data and CV keys that have been entered into or collected by the receiver. Maps/images are zeroized after all other data has been zeroized and can require approximately one minute to ninety minutes to zeroize (as determined by the amount of data).

Table 16-1. Messages - Continued

Message Text	Description
WARNING! — ANTI-JAM ANTENNA COMMUNICATION LOST CHECK CABLE, POWER, AND COM SETTINGS	The receiver has lost the antenna interface connection or COM port communication with the Anti-Jam Accessory (AJA). Check the cable, AJA power, and COM port settings.
WARNING! — ANTI-JAM PRIME BATTERY LOW	The Anti-Jam Accessory (AJA) has a low prime battery. Replace the prime battery on the AJA.
WARNING! — CANNOT OBTAIN FIX Due to Poor SV Visibility or Using Indoors	The receiver is unable to obtain a position fix. This could be caused by poor SV visibility or receiver located inside a building.
WARNING! — CANNOT TRACK SVs Due to Jamming, Poor SV Visibility or Using Indoors	The receiver is unable to track SVs. This could be caused by jamming, poor SV visibility or receiver located inside a building.
WARNING! — CHECK GUV ISSUE NUMBER	Try loading a different GUV (crypto fill).
WARNING! — CLEAR DATA (Mission Data, Basic Set, Advanced Set, User-Entered, or Maps/Images)	Clear Data is used to destroy data that has been entered into the receiver. Select Mission Data to clear all waypoints, routes and alerts. In advanced function set, select Basic Set to clear all user-entered and user-selected settings in the basic function set. In advanced function set, select Advanced Set to clear all user-entered and user-selected settings in the advanced function set. Select User-Entered to clear all user-entered and user-selected settings. Select Maps/Images to clear all loaded maps and images. Maps/Images can require approximately one minute to ninety minutes to clear (as determined by the amount of data).
WARNING! — CLEAR DATA PASSED	The selected data has been cleared.
WARNING! — CV ZEROIZE PASSED	The receiver does not contain CVs (crypto fill).
WARNING! — EMERGENCY ZEROIZE FAILED	The receiver may still contain CVs (crypto fill) mission data and operator entries. Try zeroizing again.
WARNING! — EMERGENCY ZEROIZE PASSED	The receiver does not contain CVs (crypto fill) mission data, or operator entries.
WARNING! — EXTERNAL ANTENNA CONNECTION LOST	Check cables and connectors.
WARNING! — EXTERNAL ANTENNA FAULT DETECTED	Check external antenna, cables and connectors.
WARNING! — EXTERNAL POWER CONNECTION LOST	Check cables and connectors.
WARNING! — FAILED CLEAR DATA	The selected data was not cleared. Try clearing again.
WARNING! — FAILED CV ZEROIZE	The receiver may still contain CVs (crypto fill). Try zeroizing again.
WARNING! — FAILED IP ZEROIZE	The receiver may still contain key data processor (KDP) initialization parameters.
WARNING! — INSUFFICIENT SVs FOR ALL Y-CODE	There are not enough available Y-code SVs to maintain good position and navigation data.
WARNING! — INVALID CV LOADED	Try loading the CV (crypto fill) again.

Table 16-1. Messages - Continued

Message Text	Description
WARNING! — IP ZEROIZE PASSED	The receiver does not contain key data processor (KDP) initialization parameters.
WARNING! — JAMMING ENVIRONMENT DETECTED	The receiver has detected a jamming environment. The receiver may be unable to track SVs. Position and navigation data may be degraded.
WARNING! — MAPS/IMAGES DATA CLEAR IN PROGRESS... No Other Functions Available Until Complete	Maps/images data clear is in progress. Other DAGR functions cannot be performed until data clear is completed.
WARNING! — MAPS/IMAGES ZEROIZE IN PROGRESS... No Other Functions Available Until Complete	Maps/images zeroize is in progress. Other DAGR functions cannot be performed until zeroize is completed.
WARNING! — MEMORY BATTERY IS GETTING LOW	Replace memory battery with a 3.6 volt, ½ AA type lithium battery. Do NOT use a 1.5 volt battery. After installing a new battery, modify the install date on the Battery page.
WARNING! — NO CV FOR TOMORROW	A CV (crypto fill) for tomorrow is not loaded. The receiver will not be able to track Y-code SV signals. Position and navigation data may be degraded.
WARNING! — NO CV FOR TODAY	A CV (crypto fill) for today is not loaded. The receiver will not be able to track Y-code SV signals. Position and navigation data may be degraded.
WARNING! — NO CVs LOADED	No CVs (crypto fill) are loaded. The receiver will not be able to track Y-code SV signals. Position and navigation data may be degraded.
WARNING! — NOT ENOUGH CVs FOR MISSION DURATION XX DAYS	There are not enough CVs loaded to cover the mission duration. The receiver will not be able to track Y-code SV signals. Position and navigation data may be degraded.
WARNING! — POSSIBLE SPOOFERS DETECTED	The receiver has detected a possible SV spoofer. Position and navigation data may be degraded or incorrect.
WARNING! — POWER BATTERIES ARE GETTING LOW	Replace all primary power batteries with 1.5 volt AA size batteries. Use Lithium batteries for longer life. Do NOT use 3.6 volt, ½ AA type lithium batteries. After installing new batteries, reset the primary battery life information on the Battery page.
WARNING! — POWER DOWN IN XX SECONDS	The receiver will turn off when the timer expires. Push ENTER to turn the receiver off immediately. Push QUIT to cancel the power down.
WARNING! — RECEIVER MEMORY HAS BEEN CLEARED	Memory battery power failed. Mission data and operator entries have been lost. The receiver may still contain CVs (crypto fill). Ignore this message if the receiver has just been reprogrammed.
WARNING! — RECOMMEND INITIALIZATION	The receiver has uninitialized position and time/date. Initialize these values for faster SV acquisition.
WARNING! — REPROGRAMMING WILL CLEAR ALL DATA ON THE OTHER RECEIVER	DAGR to DAGR software reprogramming can take approximately ninety seconds. While reprogramming software, neither receiver can be used for anything else. Verify there is enough time before starting reprogramming. Data on the other receiver will be lost, regardless of the successful completion of the reprogramming. Push the ENTER key to continue or the QUIT key to cancel.
WARNING! — SELF-TEST FAILURE DETECTED	The receiver has detected an internal failure. Do not use this receiver.

Table 16-1. Messages - Continued

Message Text	Description
WARNING! — TARGET IS XXX.XXm FROM YOU!	The range from present position to the calculated target position is less than the minimum safe range. Verify the target position is correct before continuing.
WARNING! — YOUR POSITION IS DISPLAYED — NOT TARGET POSITION	The position currently being displayed by the receiver is present position, not a target position. Go to the Fire Support page to recalculate a target position.

CHAPTER 17
OPERATOR INSTRUCTIONS — REPROGRAMMING AND MAPS INSTALLATION

17.1. INTRODUCTION.

For DAGR reprogramming information, refer to Paragraph 17.2. For DAGR maps installation information, refer to Paragraph 17.3. For DAGR maps creation information, refer to Paragraph 17.4.

17.2. REPROGRAMMING.

The DAGR can be reprogrammed by field level maintenance personnel without returning the unit to the manufacturer. When reprogramming of the DAGR is necessary, the required authorization, instructions, and software required for the task are accessed using the RDIT website, http://www.sed.monmouth.army.mil/RDITor refer to the GPS PLGR/DAGR/GB-GRAM MWO/TCTO and Software website at https://rdit.army.mil/gps. After accessing the RDIT website, reprogramming instructions are provided by a DAGR Time Compliance Technical Order (TCTO) and/or Modification Work Order (MWO). Refer to Paragraph 12.6 for information on performing DAGR to DAGR reprogramming.

17.2.1. Purpose.

Reprogramming instructions are used to reprogram software in the DAGR for units covered by this manual. All user and satellite data stored in the DAGR is **erased** during the reprogramming process. This includes any waypoints and routes, satellite almanac data, and user setup information. Be sure to save any critical data prior to reprogramming. Crypto keys are not erased during reprogramming.

17.2.2. Equipment Required.

Refer to Table 17-1 for a listing of equipment required for DAGR reprogramming.

Table 17-1. Reprogramming Equipment Required

Item	Nomenclature	Part Number/NSN	Source (CAGE Code)	Qty
1	PC Reprogramming Software and DAGR Software	Refer to Paragraph 17.2.	Refer to Paragraph 17.2.	1
2	External AC Power Cable (optional)	NSN 6130-01-521-3157	13499	1
3	DAGR to PC Data Cable (see note)	NSN 5995-01-521-3198	13499	1
4	IBM Compatible Personal Computer	Refer to Paragraph 17.2.2.1.	Refer to Paragraph 17.2.2.1.	1

NOTE

This cable is interchangeable with the PLGR to PC Data Cable (NSN 6150-01-375-8664).

17.2.2.1. Personal Computer Minimum Specifications.

- Pentium II with 166-MHz processor
- 5.5-Mb RAM for 1 port, up to 65-Mb RAM for 16 ports
- Hard drive with 12-Mb free space

- Microsoft Windows© NT, 2000, or XP. The personal computer should meet or exceed the minimum specifications of the installed version of Microsoft Windows©.
- RS-232 serial port (with up to 16 Comports) (9-pin version). Additional ports may be added to the personal computer at anytime after the multiple receiver programming software is installed. On some computers, the only available communication port may be used for a serial mouse. In this case, the mouse must be disabled.

17.3. MAPS INSTALLATION.

CAUTION

Maps or images previously loaded into the DAGR are erased when maps are installed.

Maps and image can be installed in the DAGR by appropriate personnel without returning the unit to the manufacturer. Unless specified otherwise, the following maps installation information also applies to images. To transfer maps and images between two DAGR units, refer to Paragraph 11.2.

17.3.1. Purpose.

These instructions are used to install maps in the DAGR for units covered by this manual. Critical data (e.g., crypto keys, user setup, and satellite data) is not erased during the maps installation process.

17.3.2. Equipment Required.

NOTE

The person operating the personal computer must have access to a drive with read-write capability.

Refer to Table 17-2 for a listing of equipment required for DAGR maps installation.

Table 17-2. Maps Installation Equipment Required

Item	Nomenclature	Part Number/NSN	Source (CAGE Code)	Qty
1	GPS Map Toolkit Software	P/N 984-3095-xxx	13499	1
2	Map Set Data File	Varies with map	Various	1
3	External AC Power Cable (optional)	NSN 6130-01-521-3157	13499	1
4	DAGR to PC Data Cable (see note)	NSN 5995-01-521-3198	13499	1
5	IBM Compatible Personal Computer	Refer to Paragraph 17.3.2.1.	Refer to Paragraph 17.3.2.1.	1

NOTE

This cable is interchangeable with the PLGR to PC Data Cable (NSN 6150-01-375-8664).

17.3.2.1. Personal Computer Minimum Specifications.

- Pentium 166-MHz processor
- 16-Mb RAM
- Hard drive with 100-Mb free space for map installation software and map set data files

- Microsoft Windows© NT (4.0 with service pack 6 or later) , 2000, or XP. The personal computer should meet or exceed the minimum specifications of the installed version of Microsoft Windows©.
- RS-232 serial port (COM1 to COM4) (9-pin version). On some computers, the only available communication port may be used for a serial mouse. In this case, the mouse must be disabled.

17.3.3. Setup Instructions.

CAUTION

Ensure you have write access to a personal computer drive (e.g., desktop or drive C) before starting the installation of the GPS Map Toolkit software into the personal computer. If necessary, contact your system administrator to obtain write access.

The following must be done to each computer that is used for maps installation.

NOTE

Disable the screen saver program active in Windows to guard against possible unexpected errors during maps installation. To accomplish, open Display Properties either by right clicking on your desktop and then selecting PROPERTIES; or by going through the control panel and when the Display Properties window comes up, select NONE for the screen saver.

17.3.3.1. Installing Maps Installation Software.

NOTE

Before installing maps installation software, the PC must not have any previous version of the GPS Map Toolkit software. Refer to Paragraph 17.3.4.4.2 to uninstall a previous version.

a. Insert the disk containing the GPS Map Toolkit software into the PC CD-ROM drive (refer to Table 17-2 for software part number).

b. Right click on the Start task bar, move the mouse pointer over Explore on the list, then left click.

c. Left click on My Computer.

d. Locate the CD-ROM drive in the Explore window, move the mouse pointer over it, then left click.

e. Move the mouse pointer over the setup.exe file, then double left click. Installation windows appear.

NOTE

Follow instructions as required for any preliminary setup windows that may appear.

f. From the first Install Shield Wizard window, left click the Next button.

g. Modify user name and organization name (optional), select from two installation choices (for anyone or for an individual) (optional).

h. Left click the Next button.

i. Left click the Install button. The installation begins and progress bars are displayed.

j. When displayed, left click the Finish button.

k. Verify the GPS Map Loader shortcut appears on your desktop. If it appears, remove the GPS Map Toolkit software CD from the CD-ROM drive. If it does not appear, repeat steps a through j.

17.3.3.2. Equipment Connections. Refer to Figure 17-1 through Figure 17-3 for illustrations, and to Table 25-8 for equipment part numbers.

NOTE

If external power is being used as primary power for the DAGR, perform steps a and b of this procedure. If internal primary batteries are being used, perform step b only.

a. Connect one end of the external AC power cable to J4 power connector of the DAGR, and the other end to any 110 VAC outlet.

b. Connect the DAGR to PC data cable between J2 data interface connector of the DAGR and the serial port of the PC.

NOTE

The PC serial port connected to the DAGR must be recognized by the PC before the GPS Map Loader (GML) software can be used to transfer a map set to or from the DAGR. After the GML software is started, it does not detect new PC serial ports. If a new PC serial port becomes available after the GML software is started, the GML software must be restarted before the new serial port can be used to transfer a map set to or from the DAGR.

Figure 17-1. External AC Power Cable

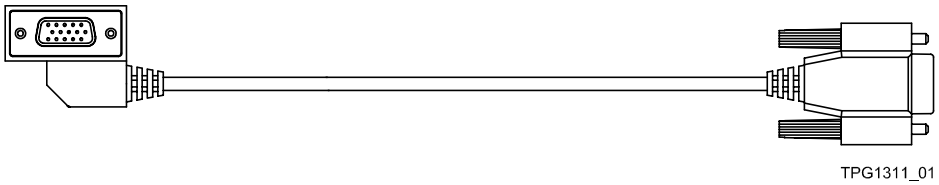


Figure 17-2. DAGR to PC Data Cable

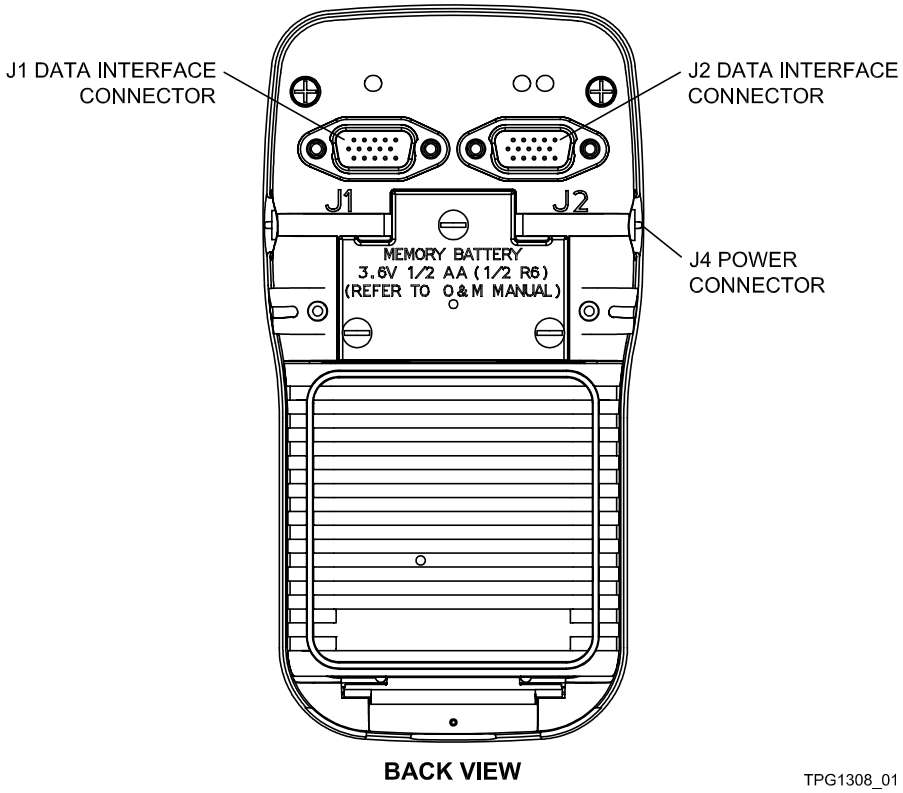


Figure 17-3. DAGR Connector Locations

17.3.4. Maps Installation Procedure.

Maps installation includes loading maps, verifying the maps were correctly loaded, and ending the maps installation. Refer to Paragraph 17.4 for information on creating maps.

NOTE

Do not remove power to the DAGR while maps installation is in progress or maps installation must be started over.

17.3.4.1. Loading Maps From PC Into DAGR. This procedure loads maps into the DAGR from a personal computer using a disk loaded with a map set data file. A map set data file can include a combination of vector maps (for the Situational Awareness page only), and raster maps and images (for the Image Viewer page only) called a map set. All maps and images previously loaded into the DAGR are erased when maps are loaded. The following steps are performed on the personal computer unless stated otherwise.

a. Ensure DAGR power is on.

b. Ensure the GPS Map Toolkit software is installed in the personal computer (refer to Paragraph 17.3.3.1) and equipment connections have been performed (refer to Paragraph 17.3.3.2).

c. Insert the disk containing the map set data file into the PC CD-ROM drive.

d. Start the map loading software by double left clicking the GPS Map Loader shortcut located on the desktop.

e. The GPS Map Loader (GML) window appears on the PC screen. Use the click and drag method to move the window as required. Refer to Figure 17-4.

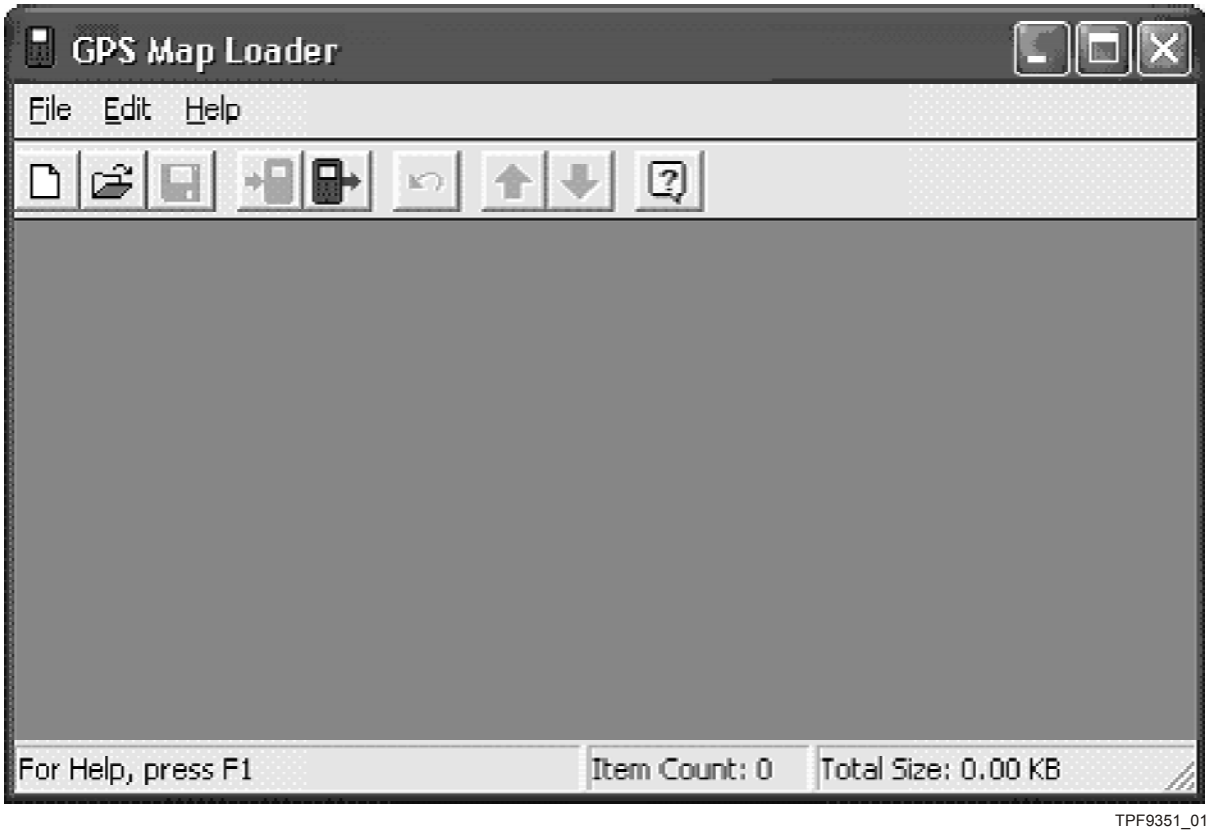


Figure 17-4. GPS Map Loader Screen

f. Set up the PC COM port.
   (1) From the GML window, left click File.
   (2) From the File pull down menu, left click COM Port Setup.
   (3) From the COM Port Setup pull down menu, left click Communication Port. Then left click the PC COM port connected to the DAGR.
   (4) Return to the COM Port Setup pull down menu, then left click Baud Rate.
   (5) Left click 9600.
   (6) Return to the COM Port Setup pull down menu, then left click Parity.
   (7) Left click None.

g. Set up the DAGR COM port.
   (1) From the DAGR, access the Communications submenu, COM Port Setup page (refer to Paragraph 11.3).
   (2) Set the COM Port field to COM Port 1 (advanced function set only).
   (3) Set the Configuration field to Standard (advanced function set only).

h. From the PC GML window, left click File, then left click Open from the drop down list.

i. If the disk drive contents are not already displayed, place the cursor over the disk drive, then left click to open.

NOTE

Map set data files have a .gmp extension. A map set data file can include a combination of vector maps (for the Situational Awareness page only), and raster maps and images (for the Image Viewer page only). When loading is performed, all of the map set data file is loaded into the DAGR. Any prior maps or images loaded into the DAGR are erased.

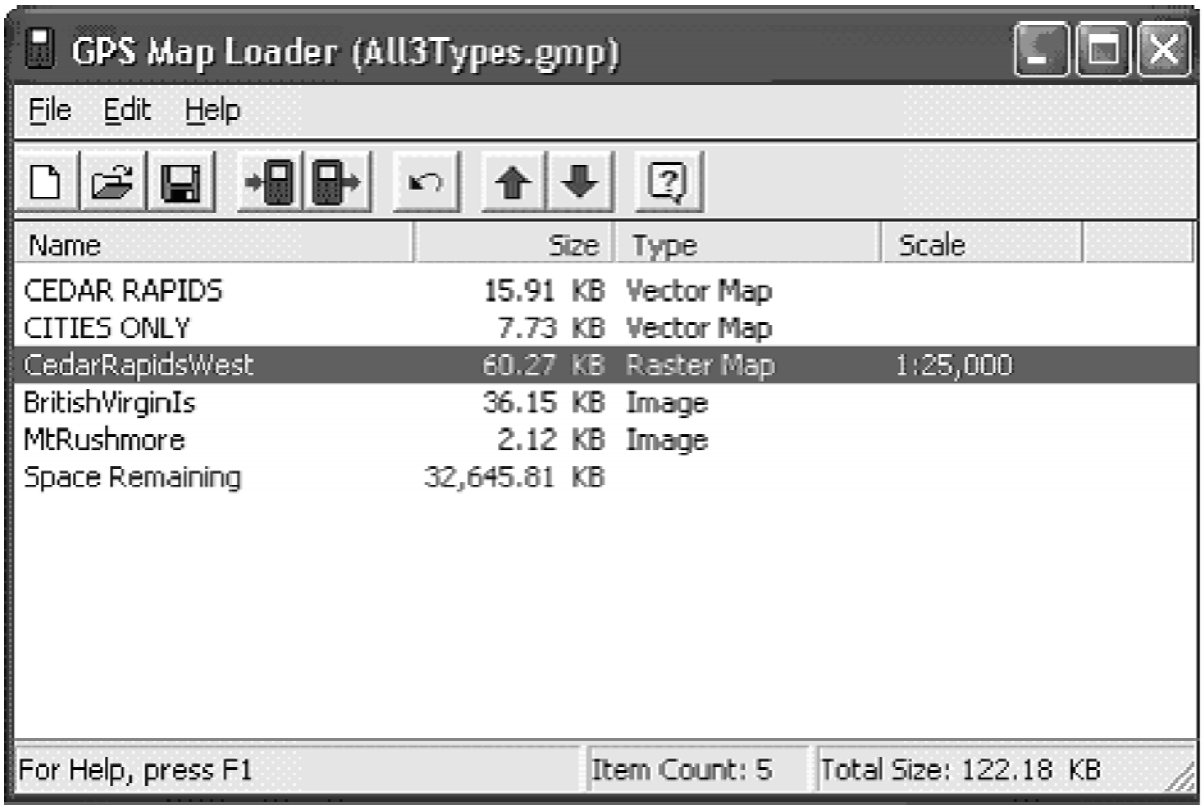
j. From the disk drive contents, select the required map set data file. Then left click the Open button.

k. The opened file name appears in parenthesis at the top of the GML window. All maps and images of the map set data file are listed with their name, size, type, scale (if applicable), and space remaining of DAGR 32 megabyte memory. The bottom of the GML window provides a map set item count and the total size of the map set data file. Refer to Figure 17-5.

NOTE

• If the opened map set data file exceeds DAGR 32 megabyte memory capacity or a 100 item count limit, the GML window displays Maps/Images Beyond Memory and/or Count Limit inside of a dark gray line. Below this line is a list of map set items causing the condition.

• The name of a map set data file item can be edited by left clicking a selected item (inside of a blue line). In Figure 17-5, Cedar Rapids West is shown selected. Up to sixteen alphanumeric characters can be used when editing the item name.



TPG0871_01

Figure 17-5. Map Set Open

CAUTION

All maps and images previously loaded into the DAGR are erased when maps are loaded. Make certain maps or images required for a mission are not erased.

l. Left click File. Then left click Send from the drop down list.

m. A Download Confirmation box is displayed. Left click Yes to continue map loading.

n. A Data Transfer box briefly displays Data Send Querying Receiver, Data Send Starting, then displays Data Send In Progress and a progress bar displays loading status.

NOTE

• The size of the map set data file determines the time required to complete map loading. Load time is approximately two minutes for each 1,000 kilobytes of data.

• Map loading can be stopped by left clicking Cancel. When this is done, the operator must acknowledge a Data Send Aborted display.

o. Observe the PC and DAGR displays and follow instructions as required.

p. When map loading is completed, the PC displays Data Send Complete, the DAGR displays Data Receive Complete.

q. Push the DAGR ENTER key to restart the DAGR and resume other operations as required.

r. Disconnect the DAGR to PC cable from the DAGR J2 connector. Refer to Figure 17-3.

17.3.4.2. Verification of Maps Loaded Into DAGR. Perform this procedure on the DAGR to verify the maps and/or images from the map set data file were loaded into the DAGR.

a. Power the DAGR on. If DAGR is already powered on, proceed to step b.
   (1) Push the PWR key once.
   (2) Clear all popup messages using the ENTER key.

b. Verify vector maps for the Situational Awareness page are loaded.
   (1) Push and hold the POS key until the Present Position page is displayed.
   (2) Push and release the PAGE or QUIT key until the Situational Awareness page is displayed.
   (3) Push the MENU key to display the page menu.
   (4) Push the up or down cursor control key to highlight Maps, then push the ENTER key.
   (5) Push the up or down cursor control key to highlight Setup, then push the ENTER key.
   (6) From the displayed list, verify the vector maps of the loaded map set data file are all listed.
   (7) Push the QUIT key.

c. Verify raster maps and images for the Image Viewer page are loaded.
   (1) Push and hold the POS key until the Present Position page is displayed.
   (2) Push and release the PAGE or QUIT key until the Image Viewer page is displayed.
   (3) Push the MENU key to display the page menu.
   (4) Push the up or down cursor control key to highlight Maps, then push the ENTER key.
   (5) Push the up or down cursor control key to highlight Setup, then push the ENTER key.
   (6) From the displayed list, verify the raster maps of the loaded map set data file are all listed.
   (7) Push the QUIT key.
   (8) Push the MENU key to display the page menu.

(9) Push the up or down cursor control key to highlight Images, then push the ENTER key.

(10) Push the up or down cursor control key to highlight Select Image, then push the ENTER key.

(11) From the displayed list, verify the images of the loaded map set data file are all listed.

NOTE

- Refer to Paragraph 17.3.4.4 to end the maps installation session.
- To transfer maps and images between two DAGR units, refer to Paragraph 11.2.

17.3.4.3. Loading Maps From DAGR Into PC. This procedure loads a map set data file from the DAGR into a personal computer. A map set data file can include a combination of vector maps (for the Situational Awareness page only), and raster maps and images (for the Image Viewer page only). After maps and images are loaded from the DAGR to the PC, the maps and images are still stored in the DAGR. The following steps are performed on the personal computer unless stated otherwise.

a. Ensure DAGR power is on.

b. Ensure the GPS Map Toolkit software is installed in the personal computer (refer to Paragraph 17.3.3.1) and equipment connections have been performed (refer to Paragraph 17.3.3.2).

c. Start the map loading software by double left clicking the GPS Map Loader shortcut located on the desktop.

d. The GPS Map Loader (GML) window appears on the PC screen. Use the click and drag method to move the window as required. Refer to Figure 17-4.

e. Set up the PC COM port.

(1) From the GML window, left click File.

(2) From the File pull down menu, left click COM Port Setup.

(3) From the COM Port Setup pull down menu, left click Communication Port. Then left click the PC COM port connected to the DAGR.

(4) Return to the COM Port Setup pull down menu, then left click Baud Rate.

(5) Left click 9600.

(6) Return to the COM Port Setup pull down menu, then left click Parity.

(7) Left click None.

f. Set up the DAGR COM port.

(1) From the DAGR, access the Communications submenu, COM Port Setup page.

(2) Set the COM Port field to COM Port 1 (advanced function set only).

(3) Set the Configuration field to Standard (advanced function set only).

g. Left click File from the GML window of the PC. Then left click Receive from the drop down list.

h. When a map set data file is already open in the GML window, an Add To Map Set window appears. Left click Yes to add the DAGR map set to the open GML map set data file or left click No to create a new GML map set data file.

i. A Data Transfer box briefly displays Data Receive Querying Receiver, Data Receive Starting, then displays Data Receive In Progress and a progress bar displays loading status.

NOTE

- The size of the map set data file determines the time required to complete map loading. Load time is approximately two minutes for each 1,000 kilobytes of data.
- Map loading can be stopped by left clicking Cancel. When this is done, the operator must acknowledge a Data Receive Aborted display.

j. Observe the PC and DAGR displays and follow instructions as required.

k. When map loading is completed, the PC displays Data Receive Complete and the GML window displays the map set data file received from the DAGR. The DAGR displays Data Send Complete.

l. Store the map set data file to the desired folder or location in the PC.

m. Push the DAGR ENTER key to restart the DAGR and resume other operations as required.

n. Disconnect the DAGR to PC cable from the DAGR J2 connector. Refer to Figure 17-3.

17.3.4.4. End Maps Installation Session.

NOTE

Disregard the following paragraphs if you have additional DAGRs to load maps into.

Do the following when DAGR Maps installation has been completed. Store the Maps installation equipment and disks in a safe place until needed again.

17.3.4.4.1. Remove and Reset Hardware

a. Remove the disk containing the map set data file from the CD-ROM drive.

b. On the PC, left click File, then left click Exit to shut down the GML software.

c. Re-enable the screen saver on the PC.

d. Re-enable the mouse if it was previously disabled for the Maps installation COM port on the PC.

e. Disconnect the DAGR to PC data cable from the PC.

f. If applicable, disconnect AC power cable used for the DAGR.

17.3.4.4.2. Remove GPS Map Toolkit Software From PC (Optional)

a. Left click the Start task bar.

b. Left click Control Panel.

c. Double left click Add or Remove a Program.

d. Left click Change or Remove Programs.

e. Select GPS Map Tool Kit, then left click the Remove button.

f. When displayed, left click Yes from the Add or Remove Programs window.

g. Verify the GPS Map Loader shortcut is removed from the desktop.

17.3.5. Frequently Asked Questions (FAQs).

The following information provides frequently asked questions (FAQs) in question (Q) and answer (A) format.

- **Q** — I need help. How do I contact the GPS Help Desk?

  A — For questions regarding map loading software, send email to wralc.lsaga.gpshelp@robins.af.mil or call 478-926-3518, DSN: 468-3518 (for technical questions).

- **Q** — What do I do for a serial port problem?

  A — If GPS Map Loader error messages indicate a problem with the serial port, check the following: Ensure the serial port selected in GPS Map Loader is actually the port that the cable is plugged into (on some computers, serial port identification is difficult). When in doubt, experiment and try each available port for GPS Map Loader in turn.

  A — Another program is using the serial port. Normally this will cause an error message (Communication port is in use, Communication port not present), but there is a possibility that it would not. Shut down any programs or utilities that may use a serial port (it is preferable to run GPS Map Loader by itself, to minimize the possibility of conflicts or time-outs).

A — If the mouse is on a serial port, it could be interfering with communications. On most PCs, COM1 shares an Interrupt Request (IRQ) with COM3, and COM2 shares an IRQ with COM4 (IRQ is the mechanism to get the computer's attention to have tasks done). Since a mouse operates continuously, it can't share an IRQ with anything else, including the GPS Map Toolkit software. If your mouse is on COM1 or COM3, the GPS Map Toolkit software must be on COM2 or COM4. If your mouse is on COM2 or COM4, the GPS Map Loader software must be on COM1 or COM 3.

A — If you only have one COM port and the mouse is using it (or if you only have COM1 and COM3), disable the mouse by disconnecting it and rebooting your computer. (This will cause an error message when the mouse driver tries to load, but otherwise the computer functions normally). This frees up the serial port for use by the GPS Map Toolkit software.

A — If the port selected is COM3 or COM4, there may be a problem in the Windows setup of this port. Try to verify the port is set up and working correctly by using another program to access that port (Windows Terminal will do). If the other program doesn't work either, the problem is in the COM port or its setup.

- **Q** — What do I do when I receive an error message?

  A — If GPS Map Loader is aborted or fails before maps installation is completed, view the DAGR for messages and follow instructions. Any previously loaded map set data file has likely been erased.

17.4. MAPS CREATION.

Maps can be created for the DAGR by using GPS Map Creator software. Both GPS Map Creator (GMC) and GPS Map Loader (GML) software reside in the GPS Map Toolkit software (refer to Table 17-3). Before GMC software can be used, the PC must have Commercial Joint Mapping Tool Kit (C/JMTK) ArcObjects software installed and have National Geospatial-Intelligence Agency (NGA) map data loaded. Support of raster maps (Compressed Arc Digitized Raster Graphics (CADRG) and Controlled Image Base (CIB)) in C/JMTK is provided using the Military Analyst application. For more information on C/JMTK ArcObjects and Military Analyst software, contact the GPS Help Desk via email at wralc.lsaga.gpshelp@robins.af.mil or call 478-926-3518, DSN: 468-3518 (for technical questions).

17.4.1. Purpose.

Procedures that follow are used to create maps for the DAGR units covered by this manual. Maps created using GMC software are exported to GML for loading into the DAGR. GMC provides the following capabilities:

- Create a layer on a map using C/JMTK ArcObjects.
- Draw a map region (rectangle) on the created layer. Multiple map regions can be created on one map layer.
- Export the content within the map region to a GML map set data file as a raster or vector map. The GML map set data file can be loaded into the DAGR.
- Support of raster map types Compressed Arc Digitized Raster Graphics (CADRG) and Controlled Image Base (CIB).
- Support of vector map types Vector Map (VMap) levels 0 through 2 and Urban Vector Map (UVMap).

17.4.2. Equipment Required.

Refer to Table 17-3 for a listing of equipment required for map creation.

Table 17-3. Maps Creation Equipment Required

Item	Nomenclature	Part Number/NSN	Source (CAGE Code)	Qty
1	GPS Map Toolkit Software	P/N 984-3095-xxx	13499	1
2	IBM Compatible Personal Computer	Refer to Paragraph 17.4.2.1.	Refer to Paragraph 17.4.2.1.	1
3	C/JMTK ArcObjects Software	Refer to Paragraph 17.4.2.1.	Refer to Paragraph 17.4.2.1.	1

17.4.2.1. Personal Computer Minimum Specifications.

- Pentium 800-MHz processor
- 256-Mb RAM
- Hard drive with 5-GB memory
- Microsoft Windows© 2000 or XP. The personal computer should meet or exceed the minimum specifications of the installed version of Microsoft Windows©.
- C/JMTK ArcObjects software and C/JMTK Military Analyst software

17.4.3. Setup Instructions.

CAUTION

Ensure you have write access to a personal computer drive (e.g., desktop or drive C) before starting the installation of the GPS Map Toolkit software into the personal computer. If necessary, contact your system administrator to obtain write access.

The following must be done to each computer used for maps creation.

17.4.3.1. Installing Maps Creation Software. Refer to Paragraph 17.3.3.1 to install GPS Map Toolkit software. Before GPS Map Creator (GMC) software can be used, the PC must have Commercial Joint Mapping Tool Kit (C/JMTK) ArcObjects software installed and have map files loaded.

17.4.4. Maps Creation Procedure.

The following procedures are used to open GPS Map Creator, create a map layer, create and edit a map region, and export map(s) to GML.

a. Open GPS Map Creator

(1) Left click Start, then left click All Programs.

(2) From the programs list, left click ArcGIS, then left click ArcMap from the drop down menu.

(3) From the ArcMap window menu bar, left click View. Then left click Toolbars.

(4) From the drop down menu, if there is not a check mark next to GPS Map Creator, left click on GPS Map Creator.

(5) The GMC toolbar appears at the top of the display next to other tools or at another location on the window. Position the GMC toolbar as required (using click and drag method). The GMC toolbar provides two buttons, an Add/Edit Export Regions button and an Export Regions To GPS Map Loader button. The left side of the ArcMap window provides a TOC Pane with a layer listing. Refer to Figure 17-6.

NOTE

When the pointer is placed over a GMC Toolbar button, the button name appears next to the pointer.

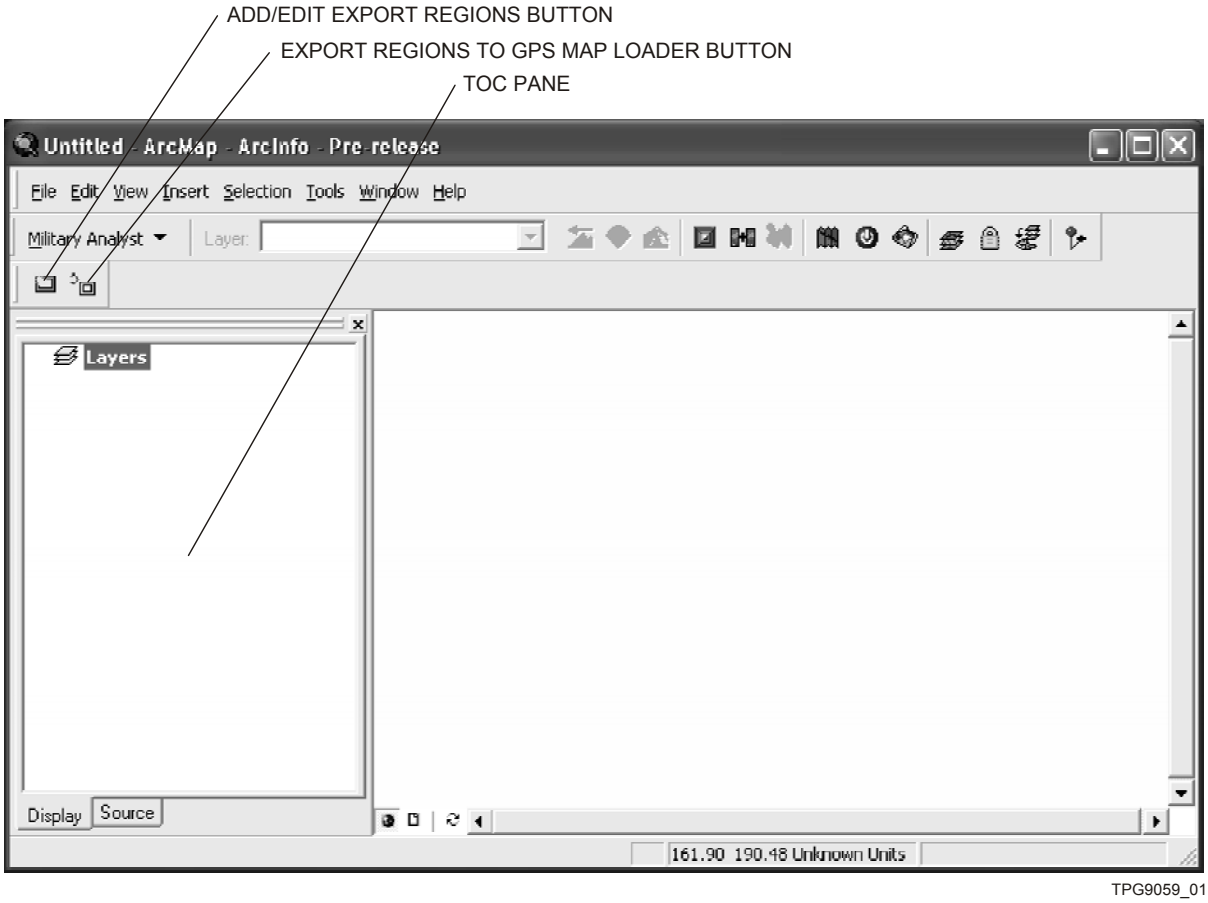


Figure 17-6. GMC Toolbar

b. Create a GMC layer and a map region (rectangle).

(1) Follow your ArcMap software procedures to open and display the required map.

(2) Ensure all C/JMTK map data is displayed in WGS-84 datum by using the following procedure:

(a) Right click on Layers in the TOC Pane.

(b) Select the “Properties...” entry.

(c) Switch to the Coordinate System tab.

(d) Select “Predefined\Geographic Coordinate Systems\World\WGS 1984”, then push the Apply button.

(3) Use the zoom in and zoom out buttons of the toolbar to view the desired map area.

(4) Left click the Add/Edit Export Regions button.

(5) The layer listing (of the TOC pane) at the left side of the window displays GPS Map Creator Regions.

(6) Designate the desired map region by starting at the upper right corner of the map rectangle/region, push and hold the left mouse button, then drag to the desired lower left corner of the map region. Then release the left mouse button.

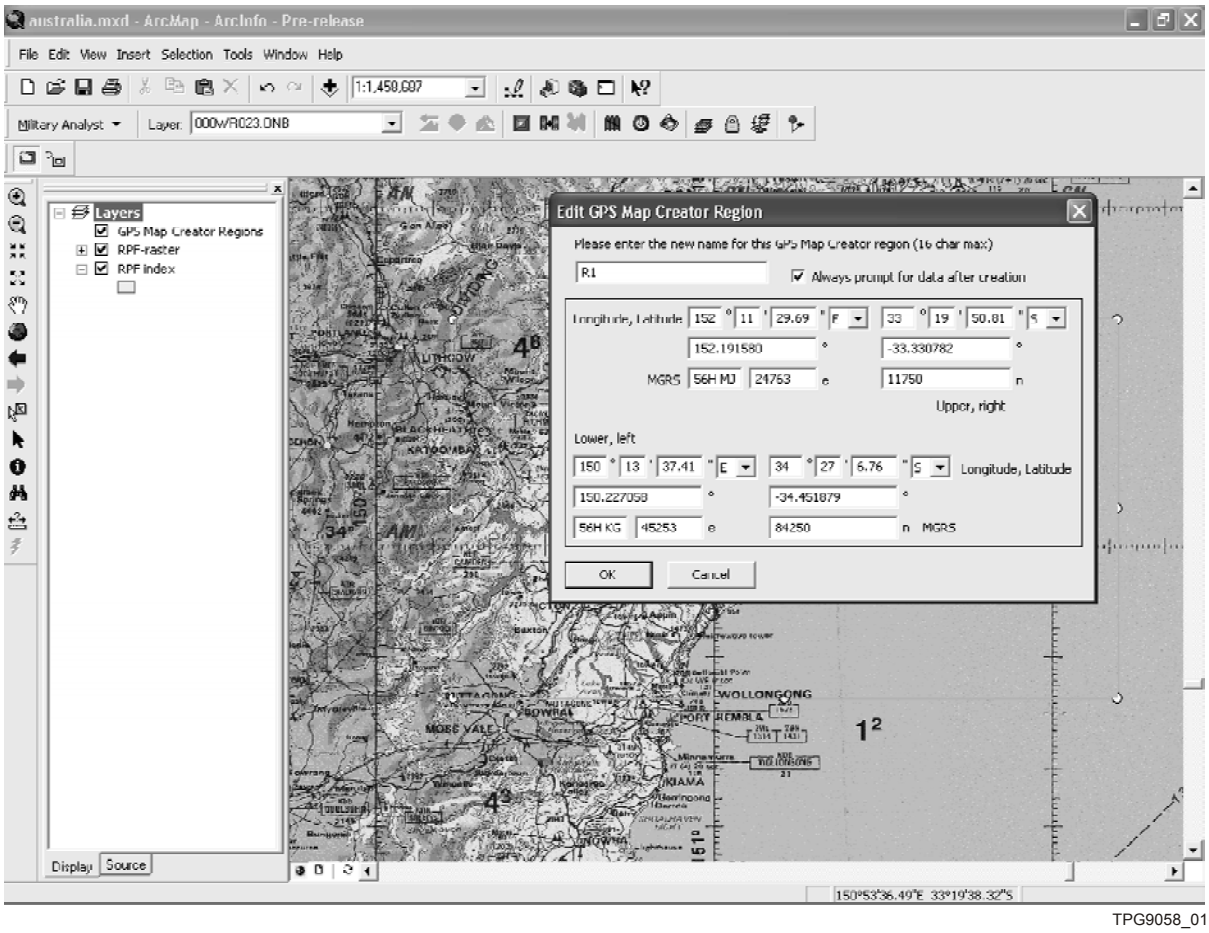
(7) The Edit GPS Map Creator Region window automatically appears. Refer to Figure 17-7. Use the following steps to edit the new region as required.

(a) If desired, enter a new region name of up to sixteen alphanumeric characters. The default name of the first created region is R1 (any subsequent regions are R2, R3, etc.).

(b) If desired, edit the coordinates of the upper right and lower left region points using either longitude and latitude (in degrees, minutes, seconds or decimal degrees), or MGRS.

NOTE

To prevent the Edit GPS Map Creator Region window from displaying every time a region is created, deselect the box labeled Always Prompt For Data After Creation.



TPG9058_01

Figure 17-7. Edit GPS Map Creator Region Window

(8) Left click the OK button. The Edit GPS Map Creator Region window is removed.

(9) The created region (rectangle) and its name is displayed on the map. Figure 17-8 shows a created region with default name R1.

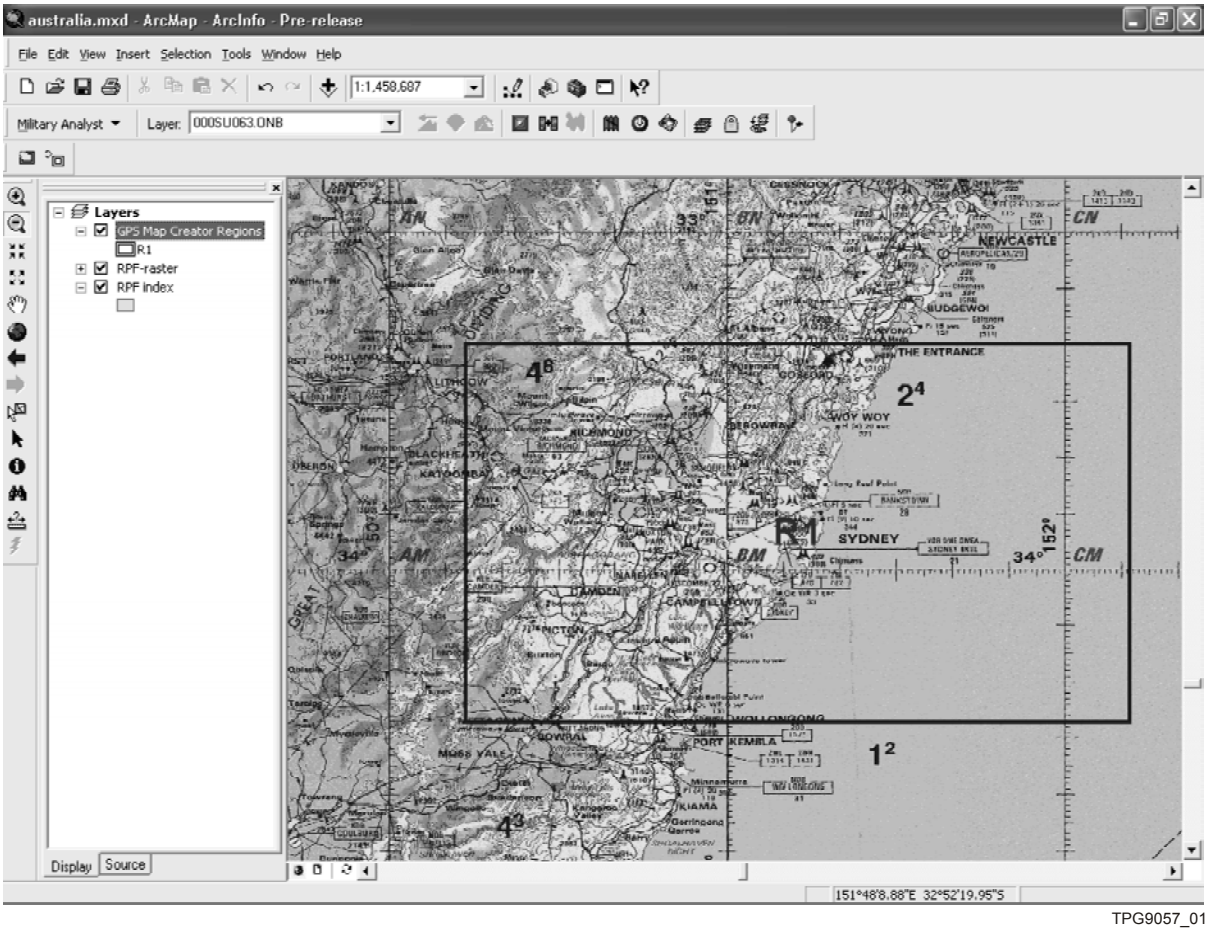


Figure 17-8. Created Region

(10) Repeat steps (6) through (9) to create more regions as required.

c. Edit or delete a displayed map region.

(1) Edit a region (rectangle).

(a) If not already depressed, left click the Add/Edit Export Regions button.

(b) Right click the rectangle being edited, then left click Edit from the displayed list.

(c) The Edit GPS Map Creator Region window automatically appears. Refer to Figure 17-7. The following steps can be used to edit the new region as required.

1 Enter a new name of up to sixteen alphanumeric characters.

2 Edit the longitude and latitude (degrees, minutes, seconds or decimal degrees), or MGRS coordinates of the upper right and lower left region points.

3 Left click the OK button. The Edit GPS Map Creator Region window is removed and the edited region is displayed on the map.

(2) Delete a region (rectangle).

(a) Right click the rectangle being deleted, then left click Delete from the displayed list.

(b) The region is removed from the map and the TOC pane (at the left side of the window).

d. Export created map region(s) to GPS Map Loader.

(1) After creating map region(s), right click GPS Map Creator Regions in the layer listing of the TOC pane (at the left side of the window).

(2) From the drop down menu, left click Zoom To Layer. The map is automatically resized to display all regions (rectangles) of the GPS Map Creator Regions layer.

(3) Use one of the steps below to export region(s) to GML.

(a) To export all regions (rectangles) to GML, left click the Export Regions To GPS Map Loader button (refer to Figure 17-6).

(b) To export only one region (rectangle) to GML:

1 If not already depressed, left click the Add/Edit Export Regions button.

2 Right click the rectangle, then left click Export from the displayed list.

(4) When raster map data is being exported, the Edit GPS Map Creator Scale window is automatically displayed.

(a) Enter a raster scale value matching the source raster map resolution. The lower the number, the greater the memory used and detail displayed. Resolution for raster map regions (rectangles) being exported is controlled by this setting.

(b) Left click OK.

NOTE

Map export progress is displayed at the lower left corner of the ArcMap window. After regions are exported to GML, their outline color turns from yellow to blue.

(5) The GML window is automatically displayed in preparation for DAGR map loading (refer to Paragraph 17.3.4.1, step e to perform DAGR map loading).

e. Delete a displayed map layer.

(1) Right click on GPS Map Creator Regions in the TOC pane (at the left side of the window), then left click Remove.

(2) The layer and its regions are removed from the TOC pane and from the map.

17.4.5. Frequently Asked Questions (FAQs).

The following information provides frequently asked questions (FAQs) in question (Q) and answer (A) format.

- **Q** — I need help. How do I contact the GPS Help Desk?

  A — For questions regarding map creation software, send email to wralc.lsaga.gpshelp@robins.af.mil or call 478-926-3518, DSN: 468-3518 (for technical questions).

- **Q** — Why is it when I attempt to export a map region/rectangle from GPS Map Creator to GPS Map Loader, nothing shows up in GPS Map Loader?

  A — It may be necessary to reset the communication interface between GMC and GML by doing the following. Close all PC applications, then restart the PC. Open ArcMap and (without GML running) export the desired map region to GML. If a message is displayed that indicates a necessary process for exporting map data is not running, left click Yes to start the process. The GML application will automatically start. Contact the GPS Help Desk if further questions arise.

CHAPTER 18
OPERATIONAL CHECKOUT PROCEDURES

18.1. INTRODUCTION.

Performing the following operational checkout of the DAGR shows whether the unit is operating correctly or not. If the DAGR passes the operational checkout procedure, the unit is ready to use; if the DAGR does not pass the operational checkout procedure, proceed to the troubleshooting procedures listed in Chapter 19 of this manual. The mission operations checks procedure is designed to aid the user in detecting a DAGR malfunction that may be corrected in the field. If the malfunction cannot be corrected, perform the troubleshooting procedure.

18.2. PRETEST SETUP.

WARNING

If abused, lithium batteries can explode causing severe injury. Be sure to store batteries in original packaging until ready to use and observe polarity during installation. Reverse polarity can cause damage to the battery and receiver.

CAUTION

• Do not mix battery types. Do not mix old batteries with new batteries. Replace all primary power batteries at the same time. Ensure DAGR primary batteries are good (check battery indicator on display) before using unit. These precautions are done to ensure proper battery life and proper unit operation.

• If using external DC power, ensure positive (red) lead of external DC power cable is connected to the positive lead of external power source to prevent possible damage to the unit. Internal batteries may remain installed while using external power. The memory battery should always remain installed. The DAGR is protected against accidental reverse connection of external power.

NOTE

• The DAGR antenna needs a clear field of view to the sky (line of sight) for best satellite visibility. For best reception, the DAGR should be held at a 90 degree angle in relation to the earth's surface (not applicable to system installation).

• If applying power to DAGR in cold weather and the display does not come on, do not keep turning the unit off and then back on for power-up. The DAGR has the capability for the user to enable a display heater, and without the heater enabled, the DAGR could take up to 20 minutes to become operational (refer to Paragraph 7.5.2.3 for more display heater information). To conserve battery power, the DAGR should be kept warm before applying power, then kept warm in between usage such as keeping the DAGR inside a vehicle or inside the users coat.

There are no pretest connections or adjustments required to check out the DAGR as a handheld unit. If the DAGR is used in a host platform system for the checkout procedure, install the DAGR into the host platform mount, then install the external power source and external antenna along with related cables. Additional host platform mount information is included in brackets within the procedure.

18.3. OPERATIONAL CHECKOUT PROCEDURE.

a. Inspect the DAGR [and external cables and equipment] for damage and/or missing parts. Refer to the parts list (Table 25-8) for associated parts used.

b. Push the POWER key to turn the DAGR on, and make sure the DAGR [or DAGR system antenna] has a clear view of the sky.

c. During power up, observe the power-on status display. Make sure that self-test passes and battery indication [batteries not applicable to system installation] shows sufficient battery power left. Do not use the DAGR if a failed self-test is indicated. Refer to Paragraph 1.12 for information on returning the DAGR to manufacturer.

NOTE

A Test Summary page can be accessed from the System submenu for a listing of tests that passed or failed. Do not use the DAGR if the Status field shows FAILED. Refer to Paragraph 12.2 for additional Test Summary page information.

d. After the DAGR successfully completes power-on self-test and shows the SV (Satellite) Sky View page or Present Position page, perform the following procedure for an operator induced commanded self-test. Refer to Paragraph 6.3.3 for detailed display information.

NOTE

Self-test does not track SVs, determine position, or provide navigation data. Operator confirmation is required to enter this mode. The test requires approximately four minutes to complete, and also requires operator intervention to complete the self-test.

(1) Activate commanded DAGR self-test.

(a) If the Present Position page is not already displayed, push and hold the POS key (except when showing a message pop-up, then push the QUIT key first). The Present Position page is displayed.

(b) From the Present Position page, push the MENU key.

(c) Highlight Select Op Mode, then push the ENTER key.

(d) Highlight Test, then push the ENTER key.

(e) The DAGR displays an ENTER TEST MODE message prompting the operator to confirm or cancel entering test mode. Push ENTER key to confirm.

(2) Test In Progress display appears with specific area of testing listed at bottom and a bar graph denoting progress. The DAGR automatically tests multiple areas.

NOTE

While performing the following keypad test, push and hold the ENTER key to test the ENTER key. Push and release the ENTER key will advance to the next display.

(3) After the test in progress tests are completed, Keypad Test is displayed. Push each key on the keypad and verify the corresponding key shown on the display toggles between normal and highlighted appearance. Push the ENTER key to continue to the next display.

(4) Display Light Test display appears with the brightness adjustment cycling between 0% and 100%. The percentage adjustment is reflected in the light bulb of the display. Verify the display lighting by viewing the DAGR display in a dark area. Push ENTER key to continue.

(5) Contrast Test display appears with the contrast adjustment cycling between 0% and 100%. The percentage adjustment is reflected in the bar graph of the display. Push ENTER key to continue.

(6) The Display Test Beginning message appears momentarily. After sequencing through white, light gray, dark gray, and black, the Display Test Completed message appears, followed by the Power-On Status display listing self-test results as Pass or Fail.

NOTE

A Test Summary page can be accessed from the System submenu for a listing of tests that passed or failed. Do not use the DAGR if the Status field shows FAILED. Refer to Paragraph 12.2 for additional Test Summary page information.

(7) If Power-On Status remains displayed and does not time out, push the ENTER key to acknowledge.

(8) The SV Sky View page is displayed.

e. With the SV Sky View page displayed, push the MENU key.

f. Highlight Select Op Mode, then push the ENTER key.

g. Highlight Continuous, then push the ENTER key. This mode enables the DAGR to acquire a current position fix.

h. After satellites are acquired and a current position fix is obtained, the DAGR display stops blinking and Navigating is shown on the SV Sky View page, then automatically switches to the Present Position page.

NOTE

If the DAGR does not acquire satellites, the display blinks between black and gray text and goes into Standby mode (both handheld and host platform operation). If the DAGR display continues to blink, verify a clear view of the sky, then perform the manual initialization procedure in Paragraph 5.4.2 of this manual, or refer to the troubleshooting procedure in Chapter 19 of this manual.

i. Do the following before using the DAGR.

- Ensure the correct function set is being used (Basic or Advanced, refer Paragraph 12.3).
- Ensure the correct user profile is being used if using the advanced function set (refer to Paragraph 12.4.3).
- Set the DAGR to the desired operating mode.

18.4. MISSION OPERATION CHECKS.

During mission operations, and the user experiences an abnormal indication, the DAGR may not be malfunctioning. Use the mission operation checks to assist you in isolating the cause. If the malfunction cannot be corrected, perform the troubleshooting procedure.

- **INDICATION** — High FOM/Position Error

  Action — Check SV Sky View Page or SV Status Page.

  Action — Ensure you are tracking at least four satellites.

  Action — Ensure the antenna is not masked. Move to position where antenna has clear view of the sky. If you are stationary and the antenna is masked by foliage, select the Average mode of operation.

  Action — Ensure keys are loaded and you have current key. Check Crypto Fill page.

  Reference — SV Sky View page (Paragraph 13.2), SV Status page (Paragraph 13.4), Crypto Fill page (Paragraph 7.2)

- **INDICATION** — Unexpected Power Off

  Action — Check Power Saver page, auto-off timer field.

  Action — Check for dead battery. If DAGR will not power-on at all, the battery is dead. Replace it.

  Reference — Power Saver page (Paragraph 7.5)

- **INDICATION** — ON display sequence does not complete. DAGR shuts off when new batteries are installed.

  Action — Push PWR key repeatedly until DAGR stays on. If DAGR still does not stay on, replace batteries.

  Reference — Battery page (Paragraph 7.6)

- **INDICATION** — Obtaining a position fix takes too long

  Action — Initialize position, date, and time. Check Present Position page.

  Action — Ensure you are tracking satellites. Check SV Sky View page or SV Status page.

  Action — Ensure the antenna is not masked. Move to position where antenna has clear view of the sky. If you can not move and the antenna is masked by foliage, select the Average mode of operation (refer to Paragraph 6.2.23).

  Reference — Present Position page (Paragraph 9.5), SV Sky View page (Paragraph 13.2), SV Status page (Paragraph 13.4)

- **INDICATION** — DAGR not tracking satellites (display fields blinking)

  Action — Check SV Sky View page or SV Status page.

  Action — Ensure DAGR is not in Standby mode or Rehearsal mode

  Action — Ensure the antenna is not masked. Move to position where antenna has clear view of the sky.

  Action — If the DAGR has been in Continuous mode while masked, recycle power or select Standby and then Fix or Continuous mode.

  Reference — SV Sky View page (Paragraph 13.2), SV Status page (Paragraph 13.4)

- **INDICATION** — Position does not agree with map or other navigation sources

  Action — Check Present Position page.

  Action — Check for proper datum and ellipsoid.

  Reference — Present Position page (Paragraph 9.5)

- **INDICATION** — Navigation information does not agree with map or other navigation sources

  Action — Check NAV Displays pages.

  Action — Ensure waypoint datum matches setup datum.

  Action — Check coordinates system if using MGRS and second letter of 100,000 meter square designation is different.

  Action — Check for proper range and ground speed units (metric, English, or nautical)

  Reference — NAV Displays pages (Paragraph 9.4), Waypoint Editor page (Paragraph 8.3), Present Position page (Paragraph 9.5)

- **INDICATION** — Azimuth does not agree with other navigation sources

  Action — Check NAV Displays pages.

  Action — Ensure MAGVAR type, direction, and value in setup matches your map or other navigation source.

  Action — Check for proper north reference (True, Magnetic, or Grid)

  Reference — NAV Displays pages (Paragraph 9.4), Present Position page (Paragraph 9.5)

- **INDICATION** — Elevation does not agree with map or other navigation sources.

  Action — Check Present Position page.

  Action — Check for proper elevation reference. MSL is normally used.

  Action — Check to see if you are in elevation hold on POS display. Ensure you are tracking at least four satellites so that elevation can be calculated accurately. Check SV Sky View or SV Status pages. Select AUTOMATIC elevation hold in setup.

  Reference — Present Position page (Paragraph 9.5), SV Sky View page (Paragraph 13.2), SV Status page (Paragraph 13.4)

- **INDICATION** — DAGR will not compute ground speed, track, steering, time to go, minimum miss distance, or glide path deviation

Action — The DAGR internal compass may be disabled or need orientation. Check Internal Compass page.

Action — You may not be moving fast enough. You must move at least 0.5 m/s (approx 1.8 K/hr or 1 mph), or enable the internal compass.

Action — Ensure you are not in Standby mode. In Standby, the DAGR does not track satellites or compute navigation information.

Reference — Internal Compass page (Paragraph 10.3)

- **INDICATION** — Averaging operating mode counter will not increment

  Action — Check Present Position page.

  Action — Ensure the DAGR has a good position fix. The counter will not begin incrementing until 13 seconds after a position fix is obtained.

  Reference — Present Position page (Paragraph 9.5)

- **INDICATION** — Multiple symptoms

  Action — Check Test Summary page.

  Action — Clear temporary receiver information faults (some information may reappear after it is cleared).

  Reference — Test Summary page (Paragraph 12.2)

CHAPTER 19
TROUBLESHOOTING PROCEDURES

19.1. INTRODUCTION.

The troubleshooting procedure is designed to detect and isolate DAGR failures and malfunctions. The troubleshooting procedure directly relates to the operational checkout procedure. After a DAGR failure has been found and corrected, perform the operational checkout procedure listed in Paragraph 18.3 of this manual to make sure the DAGR is operating properly. If troubleshooting confirms a DAGR failure, and repair is beyond what is covered in this manual, return the DAGR unit to the manufacturer (refer to Paragraph 1.12 for warranty information and return address).

19.2. PRETEST SETUP.

WARNING

If abused, lithium batteries can explode causing severe injury. Be sure to store batteries in original packaging until ready to use and observe polarity during installation. Reverse polarity can cause damage to the battery and receiver.

CAUTION

• Do not mix battery types. Do not mix old batteries with new batteries. Replace all primary power batteries at the same time. Ensure DAGR primary batteries are good (check battery indicator on display) before using unit. These precautions are done to ensure proper battery life and proper unit operation.

• If using external DC power, ensure positive (red) lead of external DC power cable is connected to the positive lead of external power source to prevent possible damage to the unit. Internal batteries may remain installed while using external power. The memory battery should always remain installed. The DAGR is protected against accidental reverse connection of external power.

NOTE

• The DAGR antenna needs a clear field of view to the sky (line of sight) for best satellite visibility. For best reception, the DAGR should be held at a 90 degree angle in relation to the earth's surface.

• If applying power to DAGR in cold weather and the display does not come on, do not keep turning the unit off and then back on for power-up. The DAGR has the capability for the user to enable a display heater, and without the heater enabled, the DAGR could take up to 20 minutes to become operational (refer to Paragraph 7.5.2.3 for more display heater information). To conserve battery power, the DAGR should be kept warm before applying power, then kept warm in between usage such as keeping the DAGR inside a vehicle or inside the users coat.

There are no pretest connections or adjustments required to troubleshoot the DAGR as a handheld unit. If the DAGR is used in a host platform system for the troubleshooting procedure, install the DAGR into the host platform, then install the external power source and external antenna along with related cables. Additional host platform information is included in brackets within the procedure.

19.3. TROUBLESHOOTING PROCEDURE.

The troubleshooting procedure is shown in Figure 19-1. Refer to Chapter 16 in this manual for specific information on messages displayed.

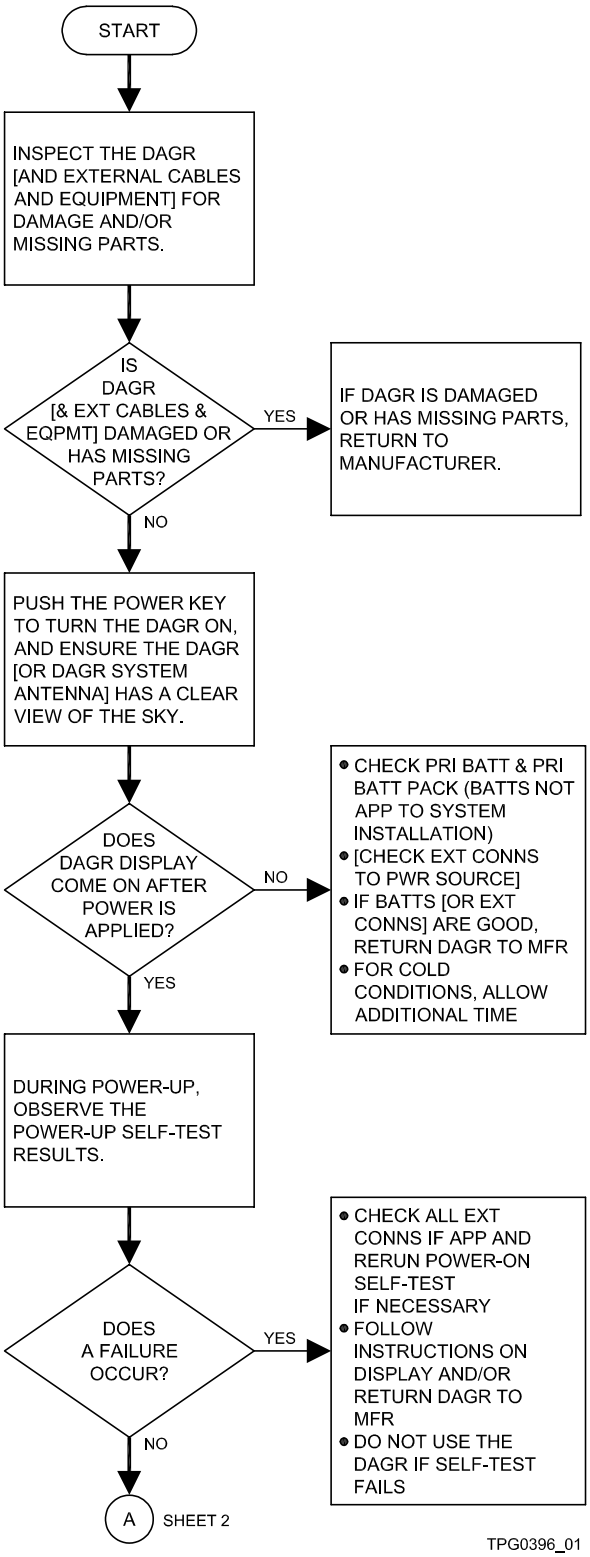


Figure 19-1. Troubleshooting Procedure (Sheet 1 of 3)

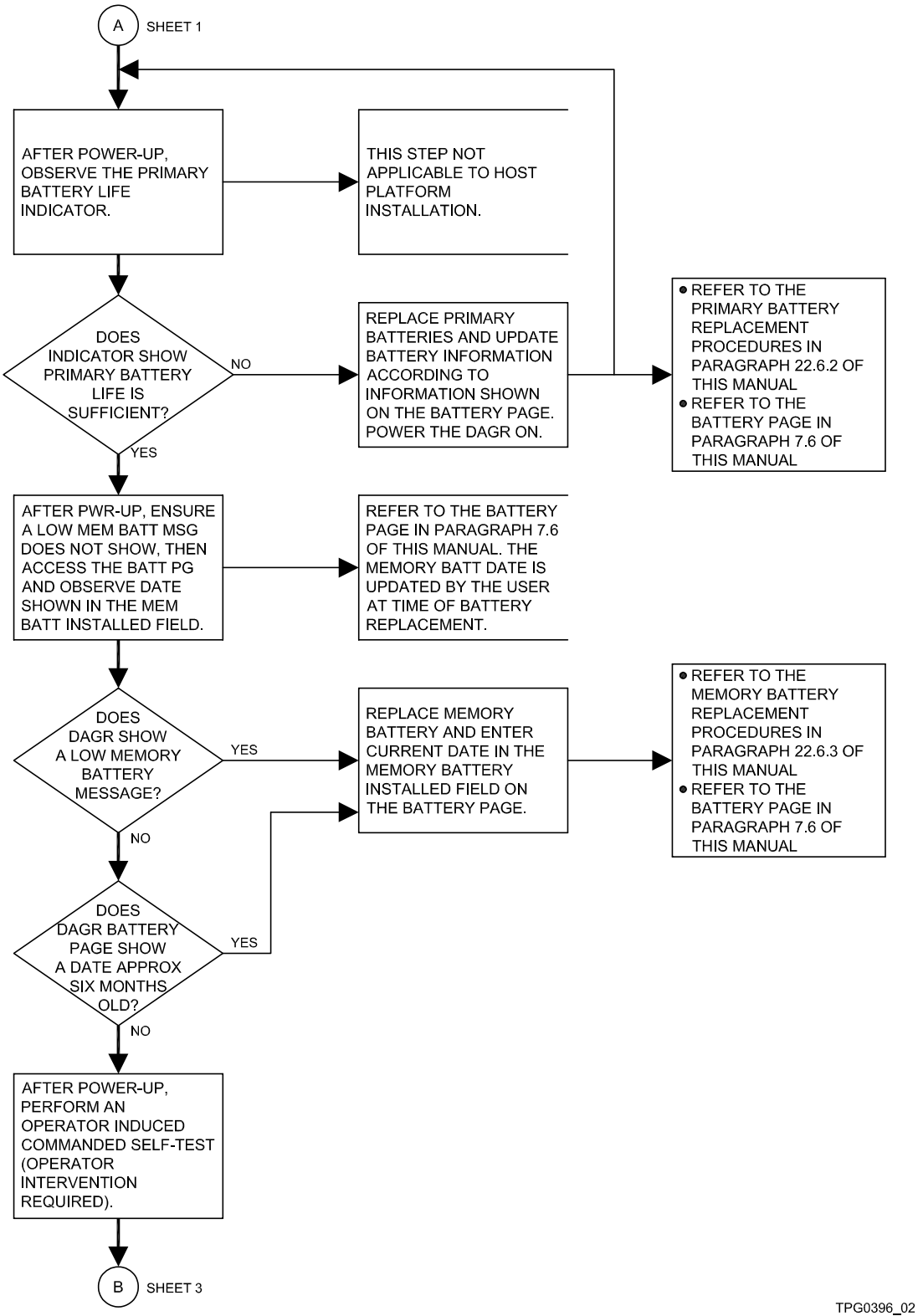


Figure 19-1. Troubleshooting Procedure (Sheet 2)

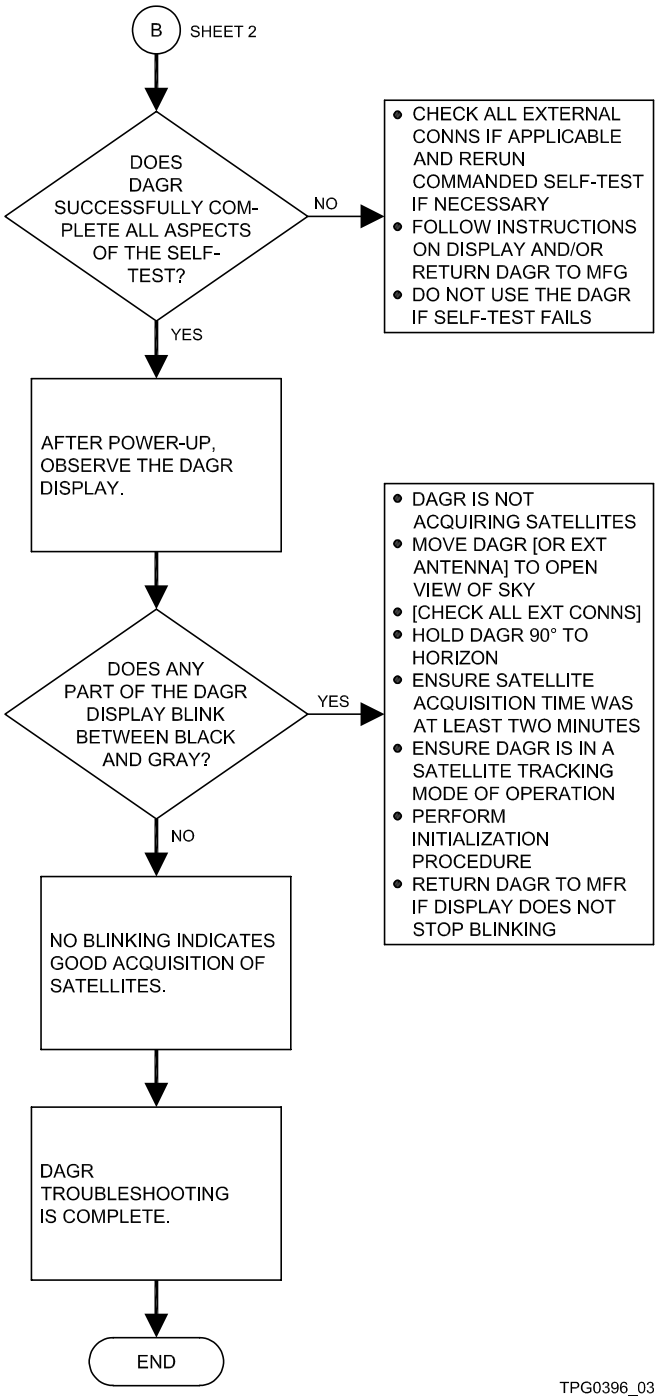


Figure 19-1. Troubleshooting Procedure (Sheet 3)

CHAPTER 20
MAINTENANCE — SERVICE UPON RECEIPT

20.1. GENERAL.

This chapter contains service upon receipt information including unpacking, installation, assembly, external power source, and external interface.

20.2. SERVICE UPON RECEIPT OF MATERIEL.

20.2.1. Unpacking.

There are no special unpacking instructions or action necessary to protect the equipment. Retain reusable container for possible returns through normal transportation channels. Man-hour requirements and total man-hours required for unpacking the equipment is less than one hour.

NOTE

• DO NOT send any DAGR receivers to a Defense Reutilization and Marketing Office (DRMO). Return all receivers to the contractor address as listed for Warranty Returns (refer to Paragraph 1.12).

• When DAGRs are initially issued from Rockwell Collins, they are overpacked with a memory battery. Primary batteries are not supplied with the DAGR. Install both memory and primary batteries before using DAGR.

20.2.2. Checking Unpacked Equipment.

- Check display surface for scratches.
- Check keypad for legible printing of each key label.
- Check antenna, power, and data port connectors (J1, J2, J3, J4) for bent or damaged pins.
- Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on an SF 361 Transportation Discrepancy Report, DA Form 2404 Equipment Inspection and Maintenance Worksheet, or DA Form 5988E Equipment Maintenance and Inspection Worksheet.
- Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with applicable service instructions (e.g., Army instructions, see DA PAM 738–750).
- Check to see if equipment has been modified.
- The DAGR should be returned in the reusable container to the manufacturer for any repair not covered by this manual.

20.2.3. Processing Unpacked Equipment.

Not applicable.

20.3. INSTALLATION.

20.3.1. General.

This section provides installation information for the handheld DAGR, and also for a host platform. The DAGR by itself is a handheld self contained unit operating on battery power and requiring no external connections. The DAGR can also be installed in a host platform location that requires external power and antenna. The DAGR also interfaces with data interface devices for input and output transfer of information. The DAGR is ready for use after both memory and primary batteries are installed. No special use of tools are required; a 3/16 inch flat tip screw driver is needed for the memory battery cover; and a number zero phillips head screw

driver, number one phillips head screw driver, 1/16 inch hex socket bit screw driver, and 3/8 inch wrench (box and open) are needed in part for the host platform installation mount, installation mount adapter, and keyfill cable adapter bracket. No special lubrication, orientation (except when using the internal compass, refer to Paragraph 10.3), or adjustment is necessary.

20.3.2. DAGR/PLGR Accessory Interchangeability.

DAGR and PLGR accessories are interchangeable as described in the following paragraphs.

20.3.2.1. PLGR Installation Mount. The bolt patterns of the PLGR installation mount are used when installing the DAGR installation mount. An installation mount adapter is required for an installation where more bulkhead clearance is needed (i.e., non-standard connectors). Refer to Figure 20-6.

20.3.2.2. PLGR External Remote Antenna and Cable. To use an existing PLGR external remote antenna and cable with the DAGR, a PLGR external antenna cable adapter is needed. Refer to Figure 25-1, item 36. The adapter allows the existing PLGR remote antenna to be used. However, the PLGR remote antenna provides only L1 signal operation. The DAGR acquires and tracks both L1 and L2 satellite signals. It is recommended that the DAGR only use antennas that provide both L1 and L2 operation.

20.3.2.3. External Power. To use an existing PLGR power cable to power the DAGR, a PLGR external power cable adapter is needed. Refer to Figure 25-1, item 35.

20.3.2.4. Communication Port. The DAGR J2 connector matches the PLGR J2 connector. Data interface cables that connect to PLGR J2 (FBCB2 WP3 cable or standard issued) can be used with the DAGR J2 connector. Refer to Figure 20-3.

20.3.2.5. PLGR Bradley Vehicle Cable. The following cable and adapters are required when using the existing PLGR Bradley Vehicle cable. The adapters are short pig tail type cables. Refer to Figure 25-1, items 28, 35, and 36.

- Bradley Vehicle Data Adapter Cable (NSN 5995–01–521–3071)
- PLGR External Power Cable Adapter (NSN 6150–01–521–3510)
- PLGR External Antenna Cable Adapter (NSN 5995–01–521–3120)

20.3.2.6. SINCGARS. When using the existing PLGR to SINCGARS cable with a DAGR, the PLGR/SINCGARS cable adapter (NSN 5995–01–521–3182) is required. Refer to Figure 25-1, item 34.

20.3.3. Installation of Equipment.

WARNING

• If abused, lithium batteries can explode causing severe injury. Be sure to store batteries in original packaging until ready to use and observe polarity during installation. Reverse polarity can cause damage to the battery and receiver.

• To prevent electrical shock, never open the external 110 V AC power cable adapter and never come in contact with its AC plug during operation.

CAUTION

• Ensure DAGR primary batteries are good, and do not mix battery types or mix old batteries with new batteries. Install all primary power batteries at the same time. These precautions are done to ensure proper battery life and proper unit operation.

• If the primary batteries cannot be installed easily, they may be positioned backwards. Check for proper polarity and do not force primary batteries into primary battery pack as this may damage the battery connectors in the battery pack.

• If using external DC power, ensure positive (red) lead of external DC power cable is connected to the positive lead of external power source to prevent possible damage to the unit. Internal batteries may remain installed while using external power. The memory battery should always remain installed. The DAGR is protected against accidental reverse connection of external power.

NOTE

• The DAGR antenna needs a clear field of view to the sky (line of sight) for best satellite visibility. For best reception, the DAGR should be held at a 90 degree angle in relation to the earth's surface.

• The DAGR is capable of being hooked up to one or more external devices simultaneously. When using the DAGR in a host platform, make sure all mating connector, jacks, and plugs are seated correctly. Make sure all moisture covers are in place for connectors not in use.

20.3.3.1. Handheld. No installation is necessary when using the DAGR as a handheld navigational unit. The DAGR is ready for use as a single handheld navigational unit when removed from the packaging material (both primary and memory batteries must be installed separately). Refer to Paragraph 22.6.2 and Paragraph 22.6.3 for primary and memory battery installation and replacement.

20.3.3.2. Host Platform. When installing the DAGR in a host platform, an external power source and antenna (along with required cables) may be required. When using the DAGR in a jamming environment, the anti-jam accessory (AJA) may also be required. Refer to Figure 20-1 for a system interconnection block diagram of the DAGR with a host platform, including external interface capabilities. Refer to the following procedures for connecting the DAGR as a host platform navigational unit.

a. Host Platform Without Anti-Jam Accessory

(1) Install DAGR into the host platform installation mount.

(2) Connect J4 of the DAGR to the power source cable, then connect power source cable to external power source (black to negative and red to positive). If applicable, ensure the external cable includes a good fuse.

(3) Connect J3 of the DAGR to the antenna cable, then connect antenna cable to external antenna.

b. Host Platform With Anti-Jam Accessory

NOTE

When using the anti-jam accessory, the AJA unit provides the antenna. The AJA unit must be mounted face up with the round antennas having a clear view of the sky.

(1) Install DAGR into the host platform installation mount.

(2) Connect J4 of the DAGR to the power source cable, then connect power source cable to external power source (black to negative and red to positive). (Internal primary battery power can also be used.)

(3) Connect J3 of the DAGR to the RA-1 antenna cable, then connect antenna cable to J2 of the anti-jam accessory.

(4) Connect the round plug (P2) of the AJA cable to J1 of the anti-jam accessory.

(5) Connect the rectangular plug (P1) of the AJA cable to J1 of the DAGR.

(6) Connect the two electrical connectors of the AJA cable (black to negative and red to positive battery terminals) to the host platform DC power source.

20.3.3.3. External Interface. When transferring information from the DAGR to an external data interface device, connect the DAGR (J1 or J2) to the data interface cable, then connect data interface cable to external input/output data interface device. Refer to the external interface Paragraph 20.3.5 for more information.

NOTE

Ensure the proper cable is used to transfer information from the DAGR to a particular external data interface device. Refer to the Parts List Chapter 25 for cables used.

20.3.3.4. Keyfill Cable Adapter Bracket. The keyfill cable adapter bracket is used along with the host platform installation mount for securing either the crypto keyfill cable or the PLGR/SINCGARS cable adapter. When the keyfill cable adapter bracket is installed, either cable can be easily installed or removed from the bracket (along with DAGR connection), and the cable is held in a solid position for easy use. Refer to the following procedures and Figure 20-5, Figure 20-6, and Figure 20-7 for installation of the keyfill cable adapter bracket into the host platform installation mount.

a. Keyfill Cable Adapter Bracket

(1) Use a #1 phillips head screw driver and 3/8 inch wrench to remove three phillips screws, lock washers, flat washers, and nuts securing the two individual pieces of the host platform installation mount.

(2) Separate the two pieces, then place the pieces and fastening hardware on a flat surface.

NOTE

• For the following steps, the two individual pieces of the host platform installation mount will be called the installation mount and the mounting adapter. The installation mount can use either the short or long mounting adapter.

• Note location of existing flat and lock washers, and length of existing screws (1/2 inch long).

• Three phillips screws (5/8 inches long) and three flat washers are supplied with the keyfill cable adapter bracket.

• The keyfill cable adapter bracket can be mounted on either the left or right side of the host platform installation mount. Determine the desired side before proceeding.

(3) Insert three 5/8 inch screws (supplied with keyfill cable adapter bracket) into the installation mount (similar placement as original screws).

(4) Position the keyfill cable adapter bracket onto the three screws (no flat washer in between), using the three holes that match for the left or right side installation.

(5) While holding the screws and the keyfill cable adapter bracket in place, position one flat washer onto each of the screws.

(6) Position the mounting adapter onto the three screws.

(7) Install one flat washer, one lock washer, and one nut on each screw.

(8) Use a #1 phillips head screw driver and 3/8 inch wrench to tighten the screws and nuts.

b. Individual Crypto Keyfill Cable or PLGR/SINCGARS Cable Adapter

(1) Perform step a. of this procedure to install the keyfill cable adapter bracket.

(2) Use a #0 phillips head screw driver to loosen two captive screws securing the top and bottom halves of the black cable holder on the keyfill cable adapter bracket.

(3) Remove the loose half of the cable holder, and ensure the Allen screw is not protruding through the secured half of the cable holder.

(4) Install selected cable into the cable holder, ensuring the flat sides of the cable connector align with the cable holder.

NOTE

Ensure the opposite end of the cable is positioned to properly connect to the J1 DAGR connector. If required, reposition the cable in the cable holder.

(5) Position the loose half of the cable holder back into position, then use a #0 phillips head screw driver to tighten the two captive screws.

(6) Use a 1/16 hex socket bit screw driver to snug the Allen screw in the cable holder against the cable connector to prevent vibration.

(7) Install DAGR into the host platform installation mount.

(8) Connect cable to applicable J1 or J2 connector on DAGR.

20.3.3.5. Helmet Antenna Mount and Cable.

WARNING

• The helmet antenna cable is designed to disengage at the breakaway connection if the cable is caught on something and the user keeps moving. Do not tamper with or remove the breakaway feature of the helmet antenna cable. The breakaway feature prevents possible injury to the user.

The helmet antenna mount provides the user with external antenna capabilities. When using the helmet antenna, the DAGR is able to track satellites regardless of the DAGRs placement by the user. The helmet antenna mount is secured to the top of the helmet with elastic straps. The mount holds the RA-1 antenna in a pouch with a velcro fastener. The antenna is connected to the DAGR with a cable that includes a breakaway feature (8 to 16 pounds of separation force) to protect the user from injures if the cable would get caught on something. Refer to the following procedure and Figure 20-11 for installation of the helmet antenna mount, RA-1 helmet antenna, and helmet antenna cable.

a. Place helmet on a flat surface.

b. Locate the straight clip on the helmet antenna mount. Fasten this clip to the rear of the helmet.

c. Locate the two remaining angled clips on the helmet antenna mount. Fasten these two clips to each side of the helmet.

NOTE

The antenna pouch should be positioned so the pouch opening for the antenna is on the right side of the helmet.

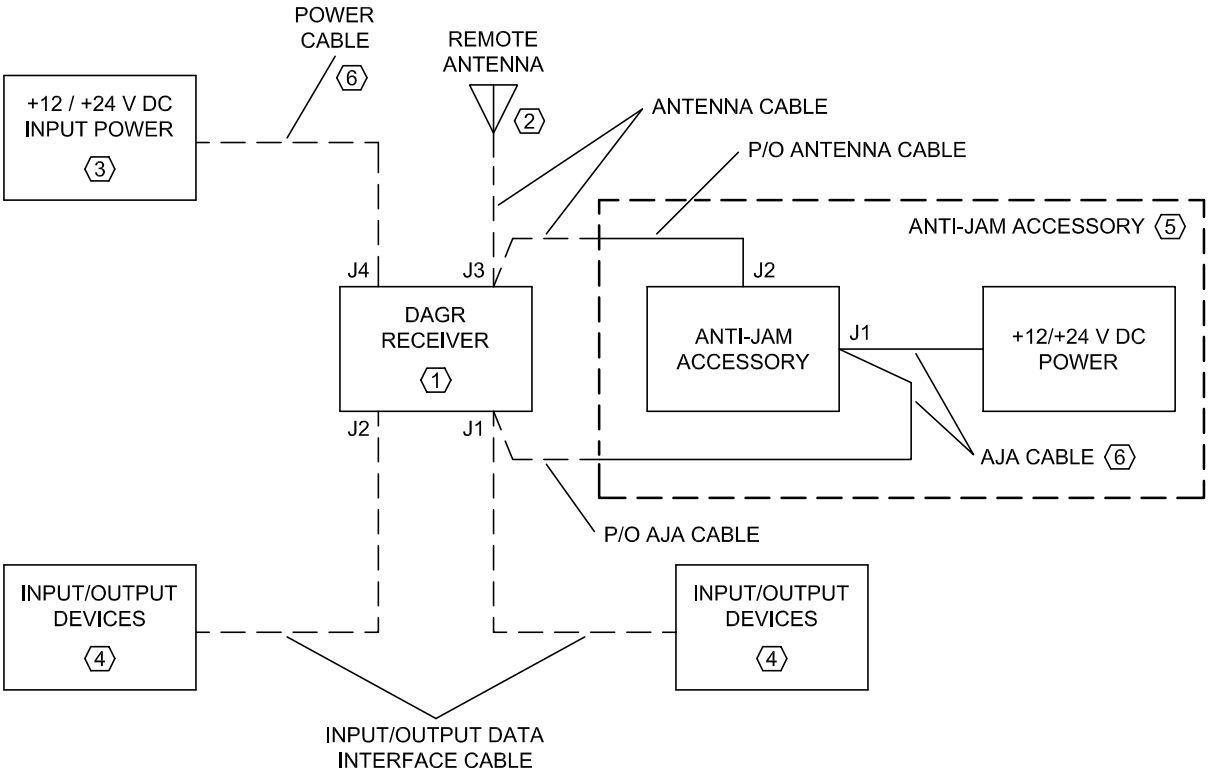
d. Connect the non-spinner end of the helmet antenna cable to the RA-1 helmet antenna.

e. Slide the RA-1 helmet antenna with cable attached into the pouch on the helmet antenna cable. The cable should protrude toward the rear of the helmet.

f. Fold the velcro fastener together to close the pouch.

g. Connect the spinner end of the helmet antenna cable to the DAGR.

20.3.3.6. System Interconnects. System interconnections are shown in Figure 20-1. External power connections are shown in Figure 20-2. External interface connectors are shown in Figure 20-3. Installation diagrams showing the DAGR physical dimensions are shown in Figure 20-4. The host platform installation mount is shown in Figure 20-5. The installation mount includes a short adapter as part of the installation mount assembly. A long adapter, shown in Figure 20-6, is available and may be used in place of the short adapter on the installation mount. The keyfill cable adapter bracket is shown in Figure 20-7, and is mounted to the host platform installation mount for securing the crypto keyfill cable or the PLGR/SINCGARS cable adapter. The magnetic antenna (also used as the helmet antenna) is shown in Figure 20-8. The non-magnetic antenna is shown in Figure 20-9. The anti-jam accessory is shown in Figure 20-10. Refer to external power, Paragraph 20.3.4, and external data interface, Paragraph 20.3.5, for more external power and data interface information. The helmet antenna mount, RA-1 helmet antenna, and helmet antenna cable are shown connected to the helmet in Figure 20-11.



NOTES:

1. THE DAGR RECEIVER IS OPERATIONAL AS A STAND ALONE UNIT, BUT INCLUDES CAPABILITIES FOR EXTERNAL INTERFACE.
2. REMOTE ANTENNA USED WHEN RECEIVER DOES NOT HAVE A CLEAR VIEW OF THE SKY.
3. EXTERNAL POWER SOURCE USED IN PLACE OF BATTERIES. ONLY THE DC POWER SOURCE IS SHOWN, BUT AN AC POWER SOURCE CAN ALSO BE USED.
4. INPUT/OUTPUT DATA INTERFACE.
5. ANTI-JAM ACCESSORY (AJA) USED IN PLACE OF REMOTE ANTENNA FOR SIGNAL JAMMING ENVIRONMENTS.
6. ENSURE CORRECT POLARITY WHEN CONNECTING EXTERNAL DC POWER SOURCE TO CABLE CONNECTORS (BLACK TO NEGATIVE AND RED TO POSITIVE).

TPF9394_01

Figure 20-1. System Interconnection Diagram

20.3.4. External Power.

WARNING

To prevent electrical shock, never open the external 110 V AC power cable adapter and never come in contact with its AC plug during operation.

CAUTION

• Failure to observe correct polarity when installing the external DC power cable may result in damage to the DAGR. If using an external DC power source, ensure positive (red) lead of the external DC power cable is connected to the positive lead of external power source. The DAGR is protected against accidental reverse connection of external power.

• Installation in host platforms using positive battery grounding is not approved, and may cause abnormal DAGR operation.

NOTE

• Internal primary power batteries are not required while using external power, but may remain installed when using external power. If batteries are removed, the battery pack should remain installed to seal the battery compartment from foreign material. The memory battery should always remain installed.

• When connecting or disconnecting from an external power source, the user must manually update the External Power Source Type field located on the Battery page. This field has an effect on the Continuous and Fix modes of operation.

20.3.4.1. External Power Source. This section provides information about the external power source when using the DAGR in a host platform. The DAGR is designed to operate from either a +12 V DC or +24 V DC external system with a negative ground using an external power cable connected to J4 of the receiver. The DAGR can also operate from 110 V AC external power source using the applicable external AC power cable. Refer to Parts List Chapter 25 when choosing the correct cable for the type of external power being used. When connected to external power, the DAGR automatically updates itself to reflect using non-battery power. Wiring interconnections to an external DC power source are shown in Figure 20-2. When applicable, some external power cables use a 2-amp in-line fuse.

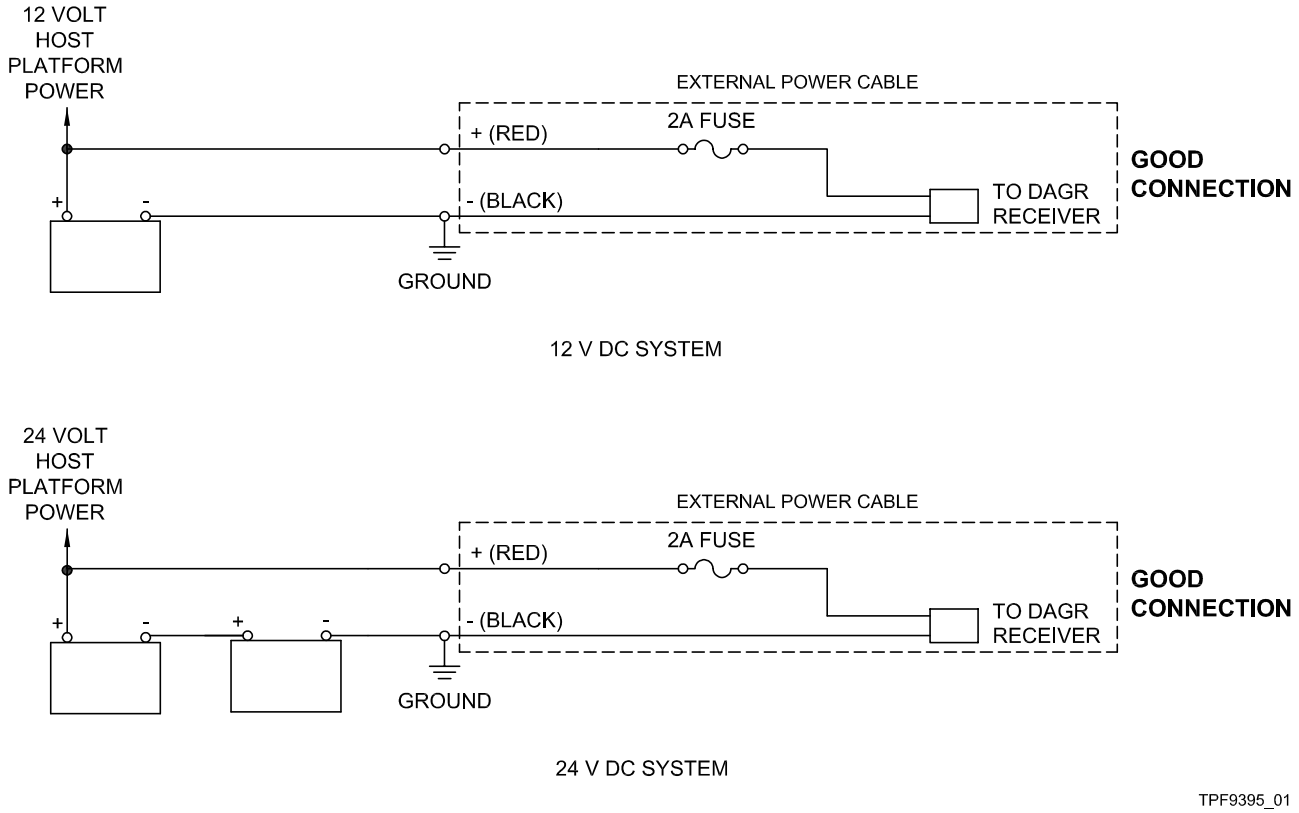


Figure 20-2. DAGR/Host Platform Power Connections

20.3.4.2. Cold Weather Battery Pack.

CAUTION

• When using the cold weather battery pack (CWBP), make sure that any excess length of the CWBP cable is inserted in a vest or pocket and not wrapped around a belt to prevent the cable from snagging on objects.

• Do not mix new batteries with old batteries. Do not mix battery types. Do not reverse battery polarity. Use only fresh/new batteries. Replace all eight batteries at the same time. These precautions are done to ensure proper battery life and proper unit operation.

The Cold Weather Battery Pack (CWBP) provides an external power source for extended use with a DAGR in cold environments (e.g., -32 °C or colder) when batteries are the only practical means of power. The CWBP connects to J4 of the DAGR using a cold weather battery pack cable. Two DAGR primary battery packs (with four batteries each) are required by the CWBP for a total capacity of eight AA size batteries. The unit is designed to fit into the 1 or 2 Clip Molle Pouch, or equivalent, and can be carried or worn inside cold weather clothing. The DAGR automatically detects and selects power from the CWBP when connected. The CWBP can be used with or without internal primary batteries installed in the DAGR. If internal batteries are installed, the DAGR displays a warning to the operator when primary battery power is low. When the CWBP is no longer able to supply power to the DAGR, the DAGR switches to internal battery power without any interruption in operation. When disconnecting the CWBP from the DAGR, a warning advises the operator that external power is lost. The CWBP uses a 2–amp fuse installed in the CWBP case. Refer to Parts List Chapter 25 for the CWBP and cold weather battery pack cable. Refer to Table 22-1 for additional battery information.

20.3.5. External Interface.

The DAGR interfaces with a variety of devices to support time fill operations, key loading, transfer of serial data, external remote on, and similar actions. The DAGR has four physical interface connections that are used to support these functions. J1 and J2 support three independent serial communications ports (COM Port 1, 2, and 3), a SINCGARS time fill port, HAVE QUICK timing data output, one PPS input signal, two configurable PPS output signals (AN/PSN-13) or three configurable PPS output signals (AN/PSN-13A), and two selectable keyfill interfaces. J3 is an RF input for remote antenna connection, and J4 is an external power input.

20.3.5.1. The four connectors that interface the DAGR to external devices are described as follows: one radio frequency (RF) coaxial antenna connector (J3), two HD-15 D-type subminiature serial connectors (J1 and J2), and one power connector (J4), as shown in Figure 20-3. The remote antenna (J3) is used to connect an external antenna, and also used to connect the RF output of the anti-jam accessory. The external power connector (J4) is used as the external power input only (anti-jam equipment uses a separate power connection). The two serial connectors (J1 and J2) contain all the other input and output signals, with J1 also being used for a connection to the anti-jam accessory. Connectors J1 and J2 use the same type of connector but provide different pin functions as shown in Table 20-1 and Table 20-2.

NOTE

When connecting to an external connector of the DAGR, ensure the correct cable is used for power, antenna, or data transfer. Refer to the Parts List Chapter 25 for types of cables available. Interchanging J1 or J2 connections will not damage the DAGR, but will not work correctly.

20.3.5.2. The J1 connector (identified by a single raised dot next to the connector) is used for the following:

- COM Port 3
- PPS Out for COM Port 3
- SINCGARS
- Crypto Key

20.3.5.3. SINCGARS and COM Port 3 share connector pins on J1 and cannot be used simultaneously.

20.3.5.4. The J2 connector (identified by two raised dots next to the connector) is used for the following:

- PLGR Compatible Interface
- COM Port 1
- COM Port 2
- PPS Out for COM Ports 1 and 2
- HAVE QUICK
- Remote On

20.3.5.5. Single PPS input is provided with pins available on both J1 and J2 connectors, but these two inputs cannot be used simultaneously. COM Port 3 (J1) and COM Port 1/COM Port 2 (J2) can be configured to output simultaneously. Pin numbers and definitions of J1 and J2 are shown in Table 20-1 and Table 20-2, and are provided for use by system integrators. Ensure the moisture covers for J1, J2, J3, and J4 are installed when the connectors are not being used with an external cable. The DAGR external connector locations are shown in Figure 20-3.

Table 20-1. J1 Pin Connections

PIN NO	IN/OUT	PIN NAME	PIN DESCRIPTION
1	I	1PPS_IN_J1 (note 3)	1 pulse per second input
2	O	S_MUX	SINCGARS MUX override

Table 20-1. J1 Pin Connections - Continued

PIN NO	IN/OUT	PIN NAME	PIN DESCRIPTION
3	—	GND	Signal reference
4	—	COM3/S_MODE	COM Port 3/SINCGARS mode control
5	O	N/A	Reserved
6	O	PPS_OUT_J1(AN/PSN-13)	Pulse per second output
6	O	PPS_OUT_COM3 (AN/PSN-13A)	Pulse per second output
7	I/O	KYKDATA/TX_101 (note 2)	DS-102 keyfill pin D (note 4) / DS-101 transmit
8	I/O	KYKCLK/FCO_101 (note 2)	DS-102 keyfill pin E (note 4) / DS-101 flow control in false
9	I/I	KYKON/FCI_101 (note 2)	DS-102 keyfill pin B (note 4) / DS-101 flow control out false
10	—	KYKREF/REF_101 (note 2)	Keyfill pin A 4 / Signal reference
11	I	S_CLK	SINCGARS clock
12	I/O	S_CCD	SINCGARS CCD
13	I/O	KYKREQ/RX_101 (note 2)	DS-101 receive / DS-102 keyfill pin C (note 4)
14	O/O	COM3_XMT/S_INFO (note 1)	COM Port 3 transmit / SINCGARS information
15	I/O	COM3_RCV/S_REQ (note 1)	COM Port 3 receive / SINCGARS request

Notes:

1. These pins are shared between the COM Port 3 and SINCGARS interfaces. Their behavior is determined by the associated cable or automatically when SINCGARS is activated.
2. These pins are shared between the DS-102 and CYZ-10 interfaces. Their behavior is determined by the CV loading interface setting.
3. The 1PPS inputs on the J1 and J2 connectors are connected together internally and cannot be used simultaneously.
4. Pin designations refer to those found on a standard keyfill device.

Table 20-2. J2 Pin Connections

PIN NO	IN/OUT	PIN NAME	PIN DESCRIPTION
1	I	1PPS_IN_J2 (note 1)	1 pulse per second input
2	—	1PPS_IN_RTN	1 pulse per second input return
3	—	GND	Signal reference
4	O	COM2_XMTB	COMPort 2 transmit B
5	O	COM2_XMTA	COMPort 2 transmit A
6	O	PPS_OUT_J2 (AN/PSN-13)	Pulse per second output
6	O	PPS_OUT_COM1 (AN/PSN-13A)	Pulse per second output
7	O	HQ_TXM	Have Quick timing output

Table 20-2. J2 Pin Connections - Continued

PIN NO	IN/OUT	PIN NAME	PIN DESCRIPTION
8	I	EXT_ONF	Remote on
9	I	COM2_RCVB	COMPort 2 receive B
10	I	COM2_RCVA	COMPort 2 receive A
11	—	PPS_OUT_RTN	Pulse per second output return
12	—	NA (AN/PSN-13)	Reserved
12	O	PPS_OUT_COM2 (AN/PSN-13A)	Pulse per second output
13	—	NA	Reserved
14	O	COM1_XMT	COMPort 1 transmit
15	I	COM1_RCV	COMPort 1 receive

Note:

1. The 1PPS inputs on the J1 and J2 connectors are connected together and cannot be used simultaneously.

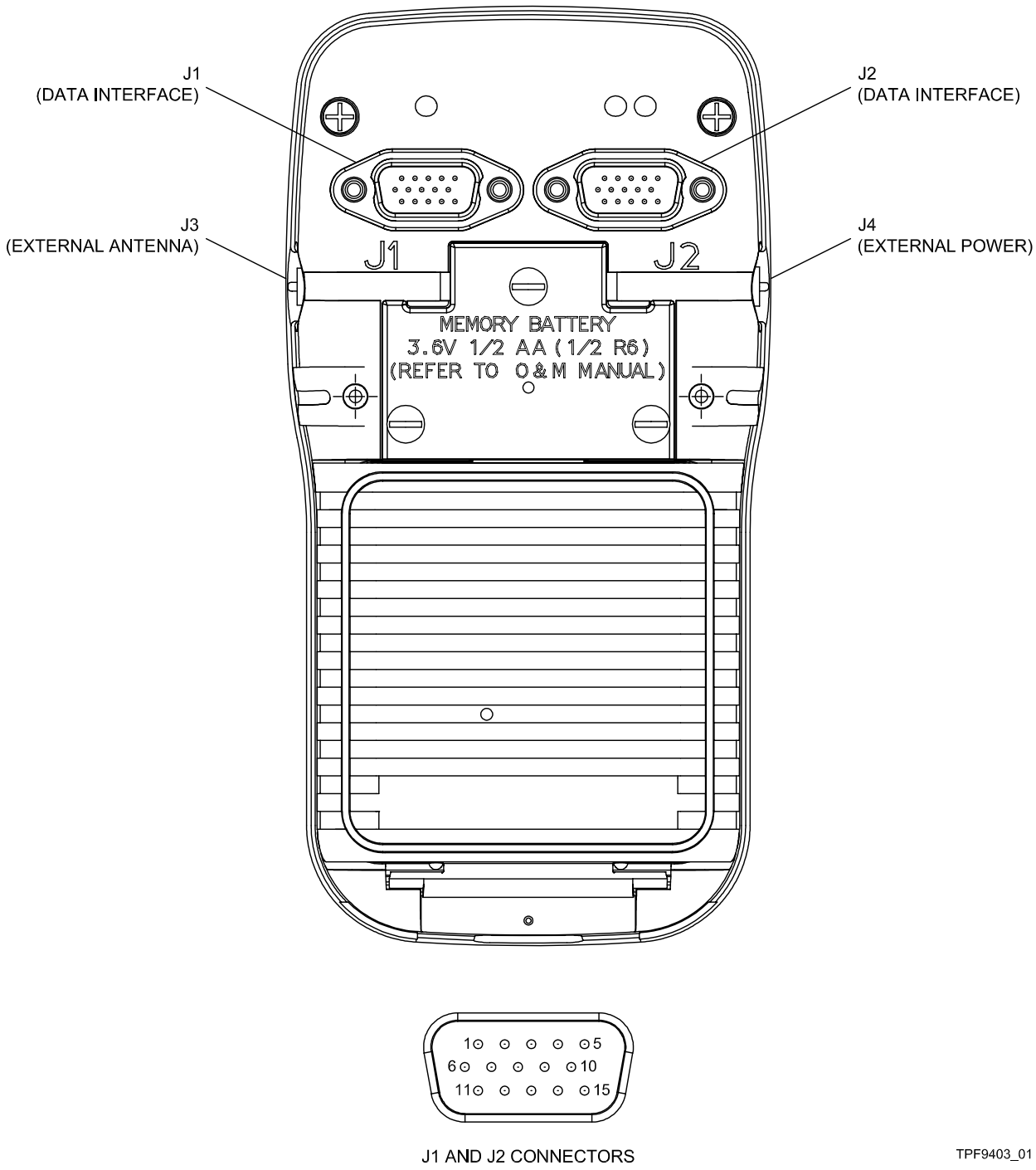
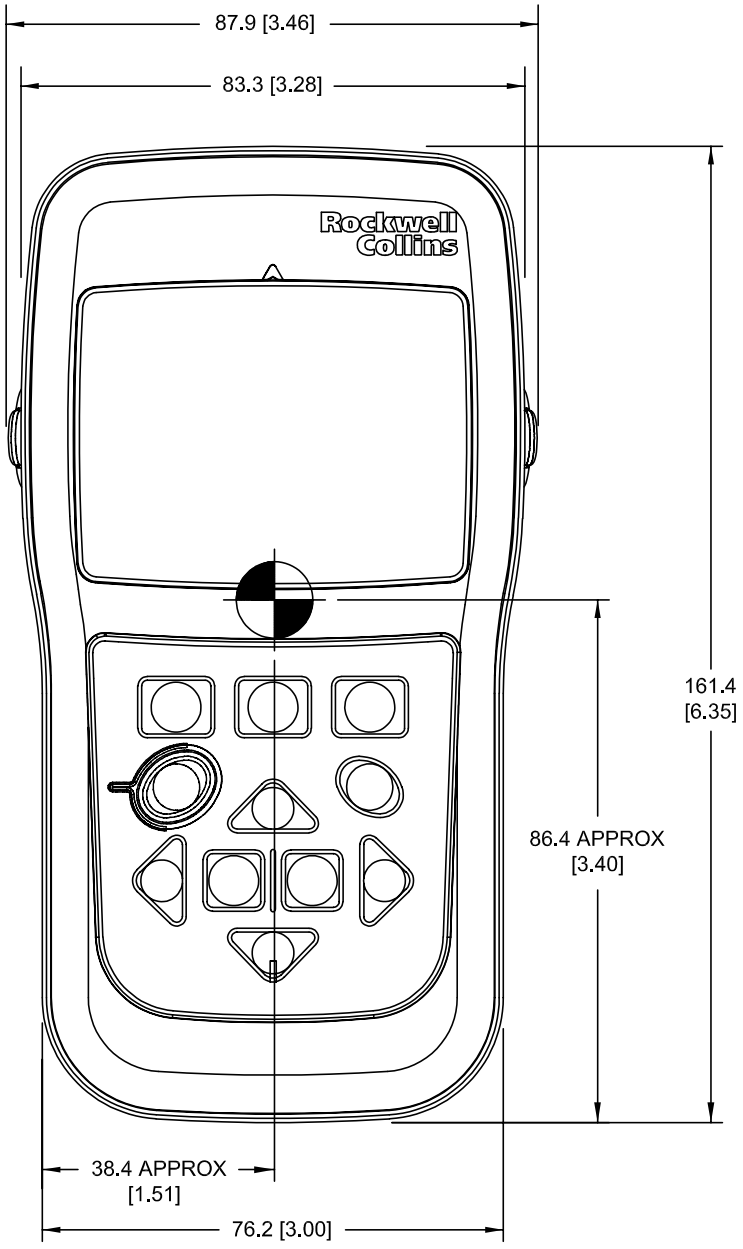


Figure 20-3. DAGR Connector Locations



FRONT VIEW

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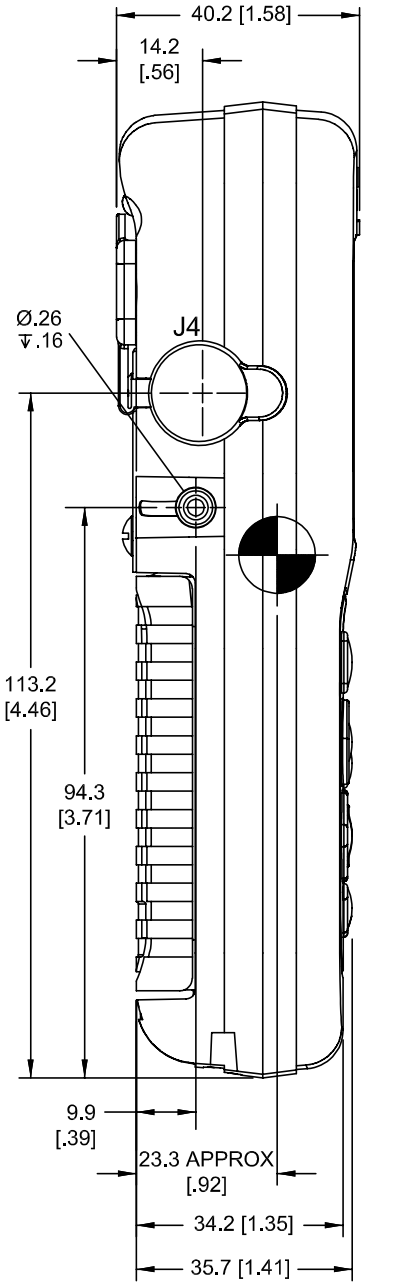
Figure 20-4. DAGR Physical Dimensions (Sheet 1 of 4)



SIDE VIEW

(987-5178-001-)
TPF9396_02

Figure 20-4. DAGR Physical Dimensions (Sheet 2)

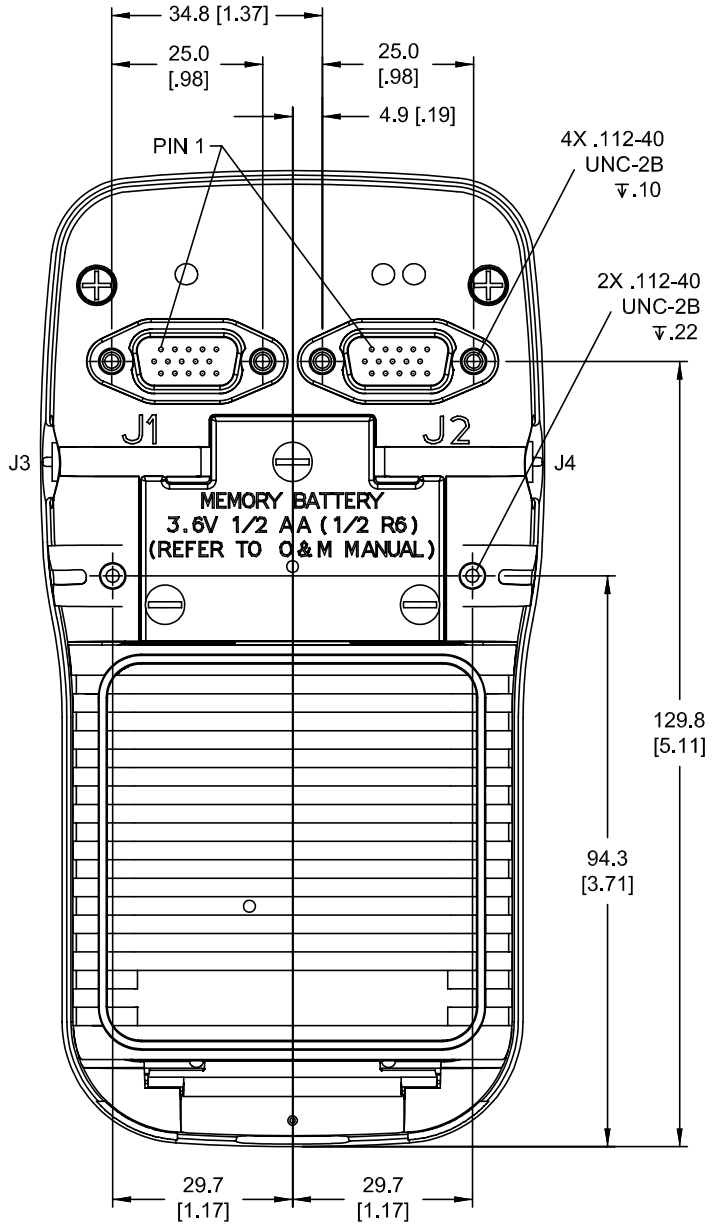


Figure 20-4. DAGR Physical Dimensions (Sheet 3)

NOTES:

1. UNIT WEIGHT: 0.5 KG [1.0 LBS]. (INCLUDES RECEIVER, MEMORY BATTERY, AND FULL 4-CELL PRIMARY BATTERY PACK).
2. ⊕ DENOTES CENTER OF GRAVITY. (INCLUDES RECEIVER, MEMORY BATTERY, AND AN EMPTY 4-CELL BATTERY PACK).
3. POWER DISIPATED: 2.5 WATTS MAXIMUM.
4. OPERATING VOLTAGE: 9-32 VOLTS DC.
5. FOR PROPER OPERATION THIS UNIT REQUIRES INSTALLATION OF 4-CELL BATTERY PACK, 987-5161-001.
6. CONNECTOR DATA: SEE TABLE.
7. DIMENSIONS ARE IN MILLIMETERS [INCHES].

REF DES	UNIT CONNECTOR	MATING CONNECTOR	INTERFACE
J1	370-0097-030	M24308/2-11 OR EQUIVALENT	CRYPTO/DATA/SINCGARS/TIMING
J2	370-0097-030	M24308/2-11 OR EQUIVALENT	DATA AND TIMING
J3	357-7466-060	M39012/55-3112 OR EQUIVALENT (SMA PLUG IAW MIL-C-39012)	REMOTE ANTENNA
J4	357-2313-010	TURCK PART NUMBER PKG 3M OR EQUIVALENT	EXT POWER

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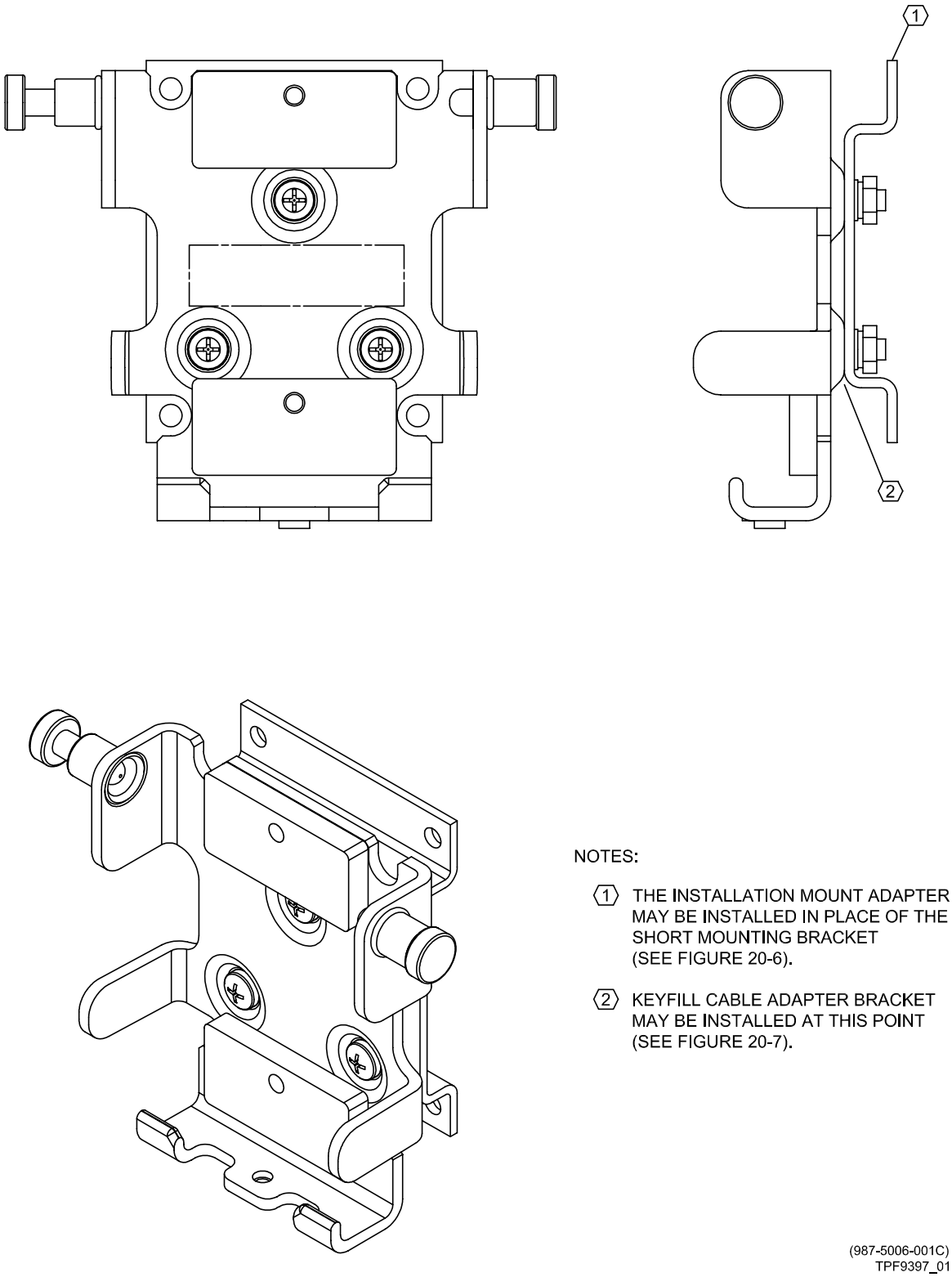
TPF9396_04

Figure 20-4. DAGR Physical Dimensions (Sheet 4)



NOTES:

1. THE INSTALLATION MOUNT ADAPTER MAY BE INSTALLED IN PLACE OF THE SHORT MOUNTING BRACKET (SEE FIGURE 20-6).

2. KEYFILL CABLE ADAPTER BRACKET MAY BE INSTALLED AT THIS POINT (SEE FIGURE 20-7).

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Figure 20-5. Host Platform Installation Mount (Sheet 1 of 2)

NOTES:

1. DIMENSIONS ARE IN INCHES
2. INSIDE BEND RADII .040 - .100.

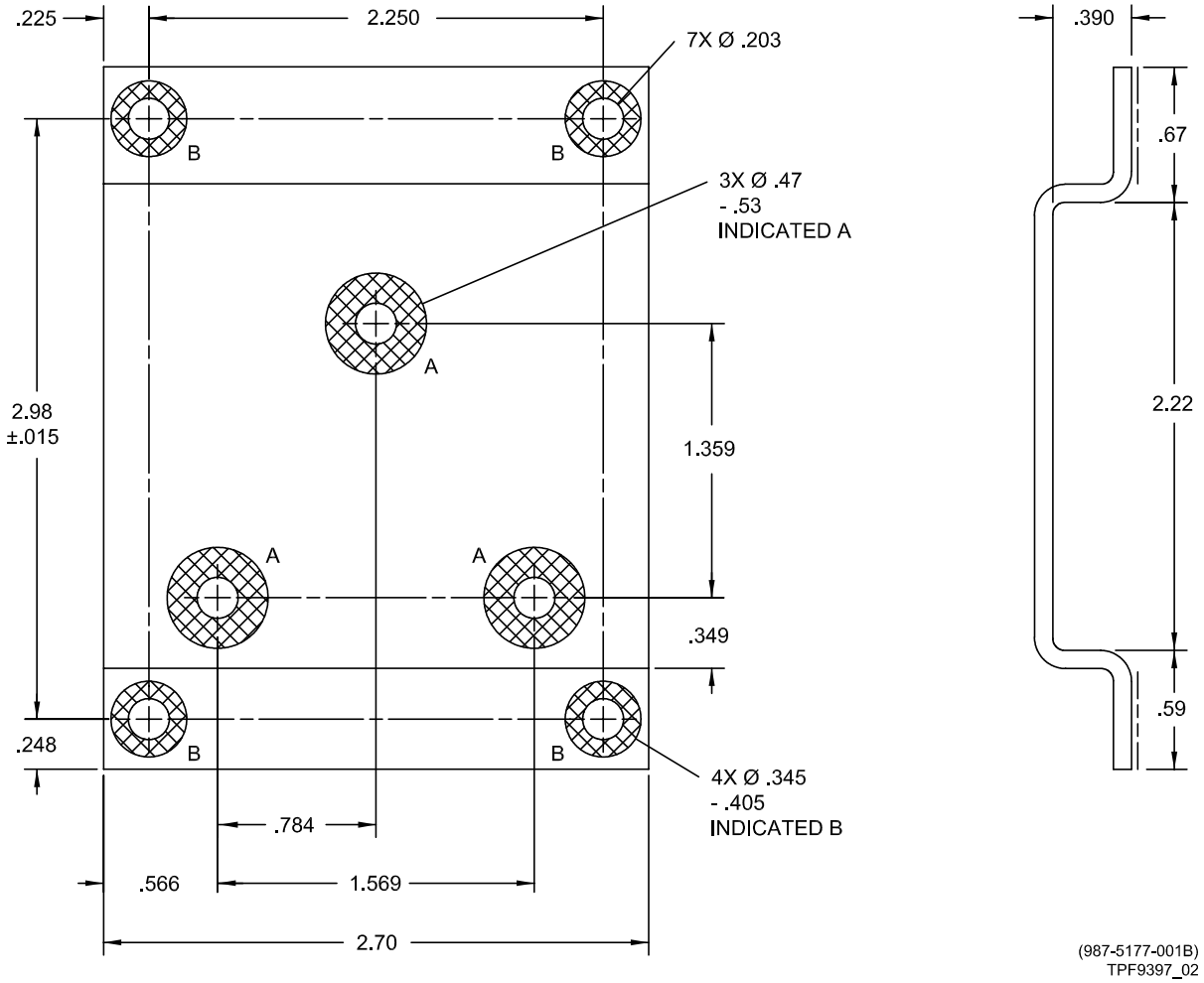


Figure 20-5. Host Platform Installation Mount (Sheet 2)

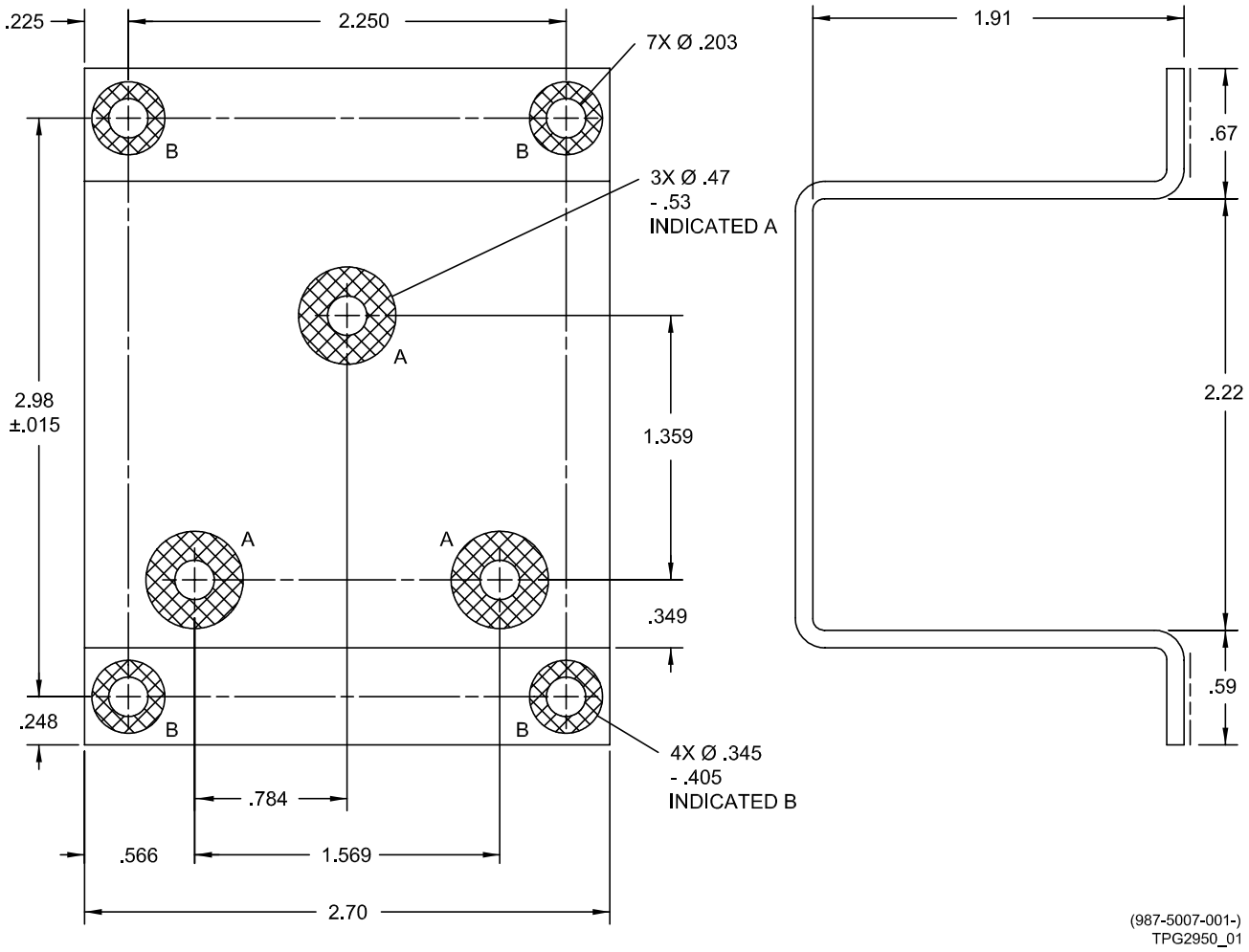


Figure 20-6. Host Platform Installation Mount Adapter (Sheet 1 of 2)

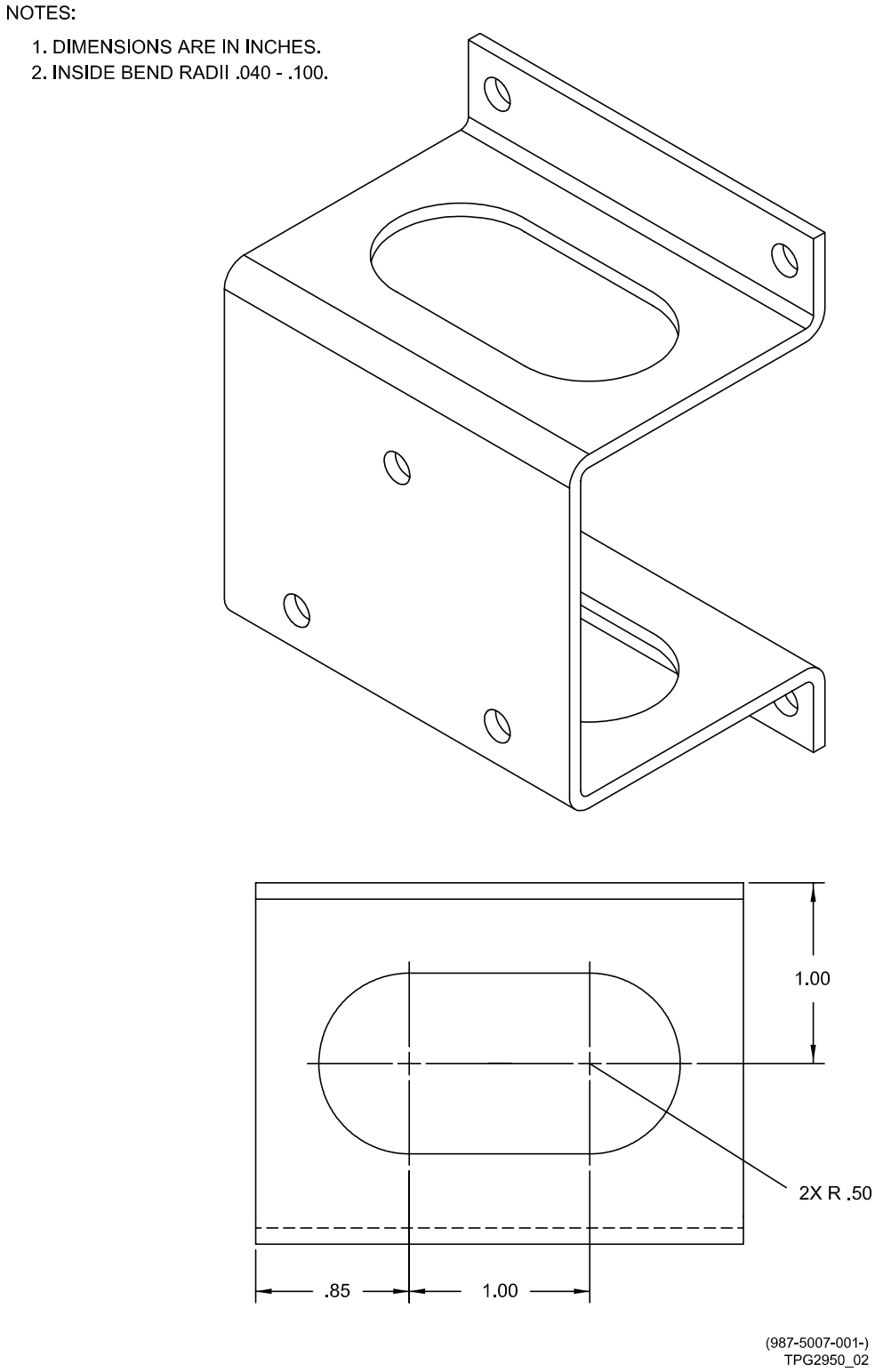


Figure 20-6. Host Platform Installation Mount Adapter (Sheet 2)

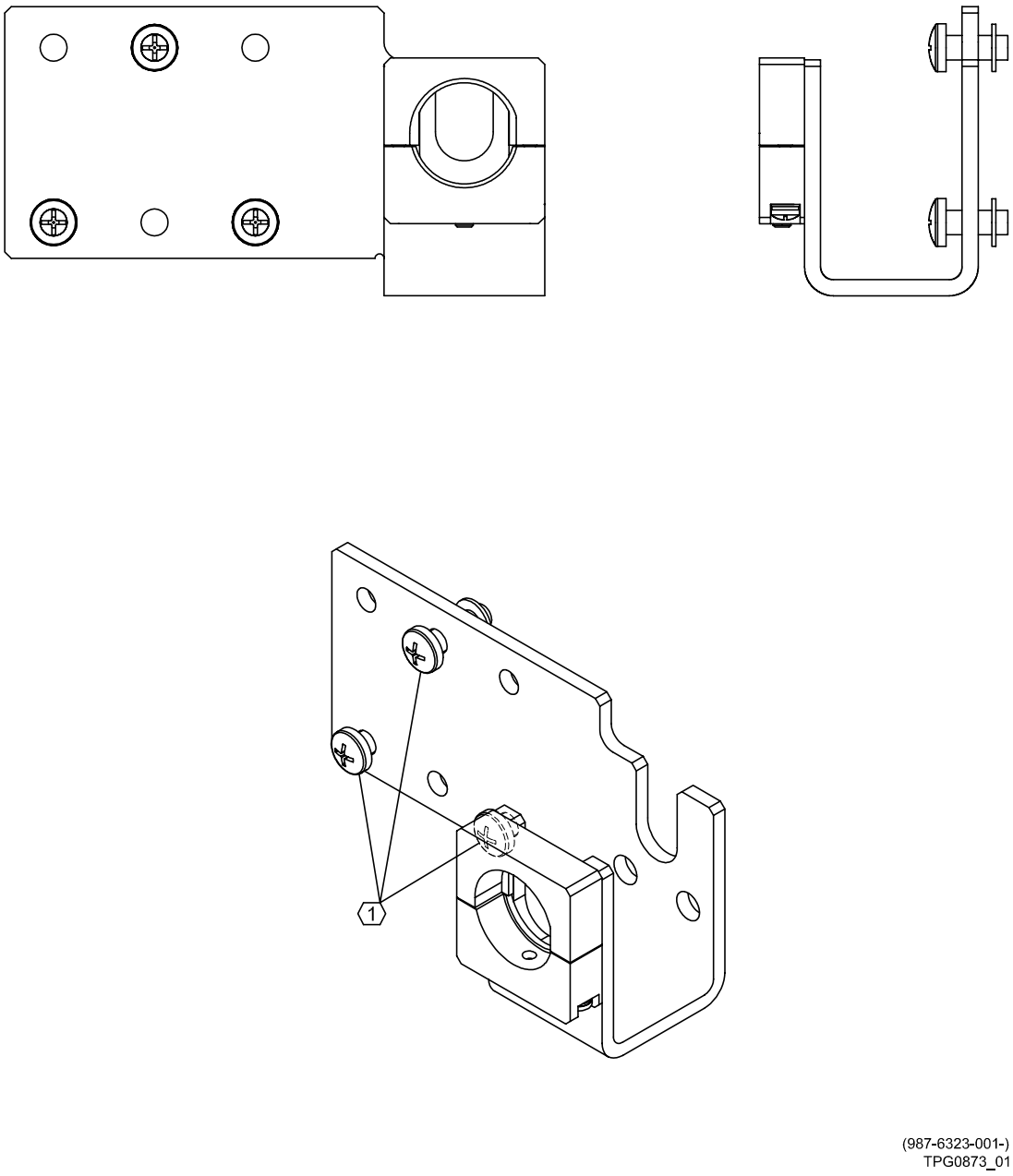


Figure 20-7. Keyfill Cable Adapter Bracket (Sheet 1 of 3)

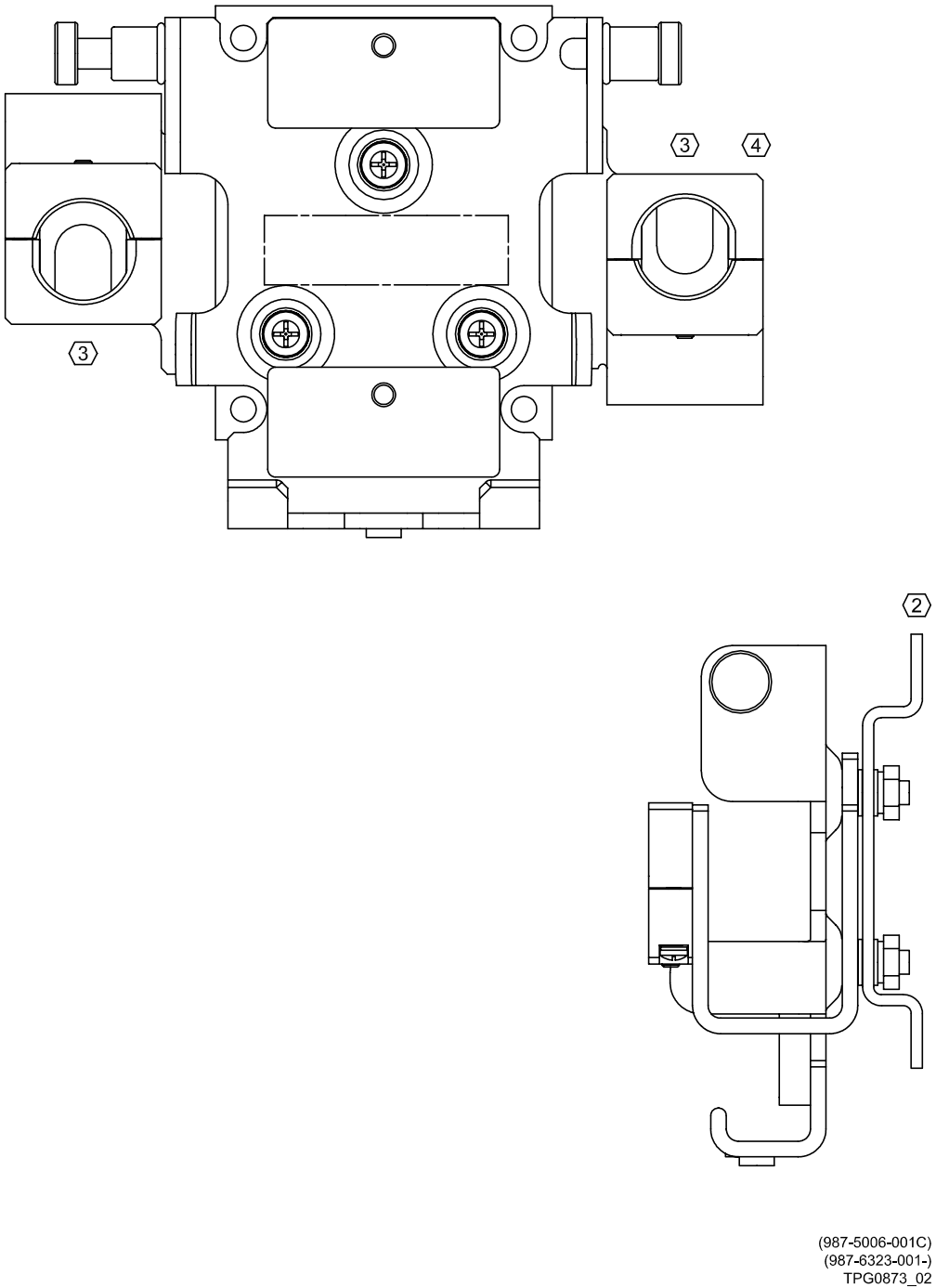
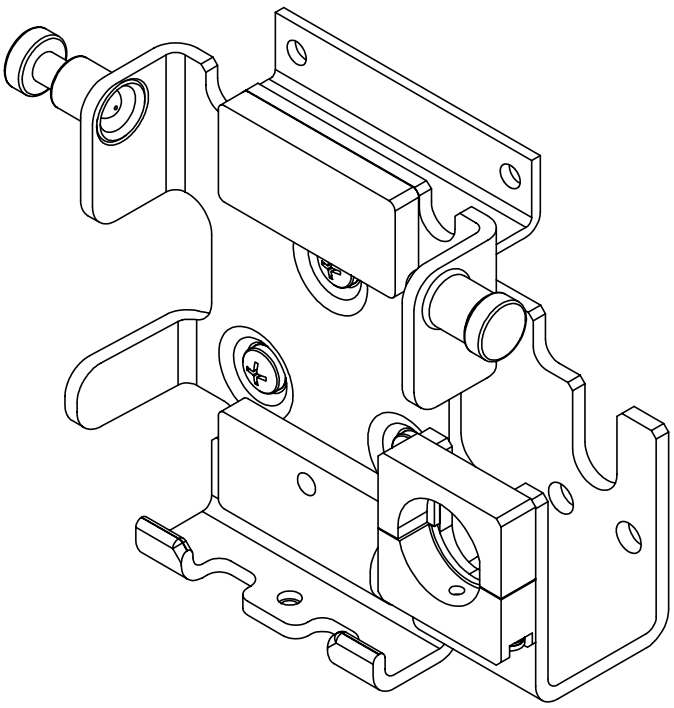


Figure 20-7. Keyfill Cable Adapter Bracket (Sheet 2)



NOTES:

1. THREE 5/8 INCH LONG SCREWS, THREE FLAT WASHERS, AND MOUNTING BRACKET ARE ONLY ITEMS PROVIDED IN KIT. SHEETS 2 AND 3 OF THIS FIGURE ARE PROVIDED FOR REFERENCE ONLY.

2. THE LONGER INSTALLATION MOUNT ADAPTER MAY BE INSTALLED IN PLACE OF THE SHORT MOUNTING BRACKET (SEE FIGURE 20-6).

3. THE KEYFILL CABLE ADAPTER BRACKET MAY BE INSTALLED ON EITHER THE LEFT OR RIGHT SIDE OF THE HOST PLATFORM INSTALLATION MOUNT.

4. IT IS RECOMMENDED THAT THE KEYFILL CABLE ADAPTER BRACKET BE MOUNTED ONLY ON THE RIGHT SIDE WHEN USING THE PLGR/SINCGARS CABLE ADAPTER.

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Figure 20-7. Keyfill Cable Adapter Bracket (Sheet 3)

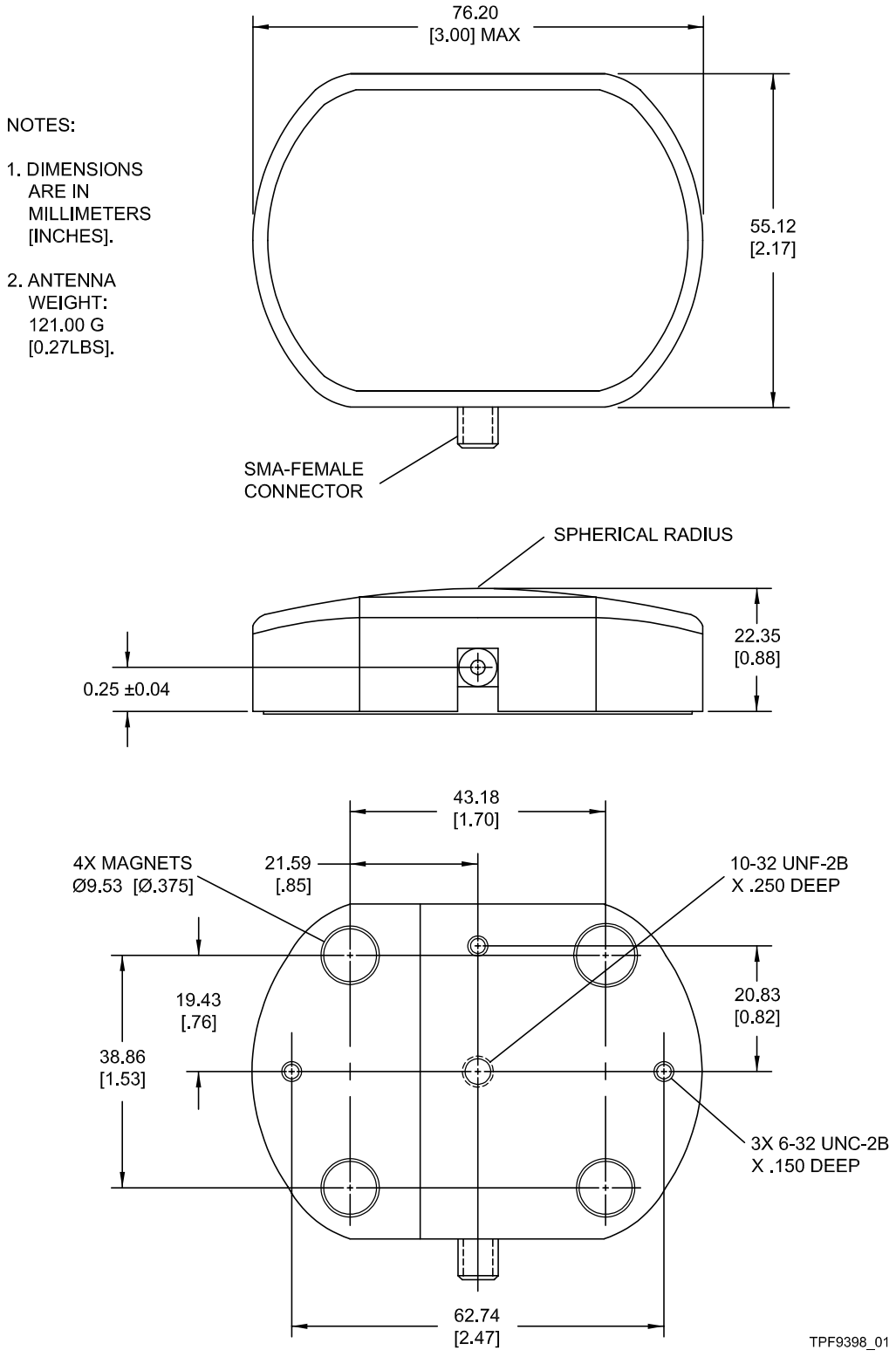
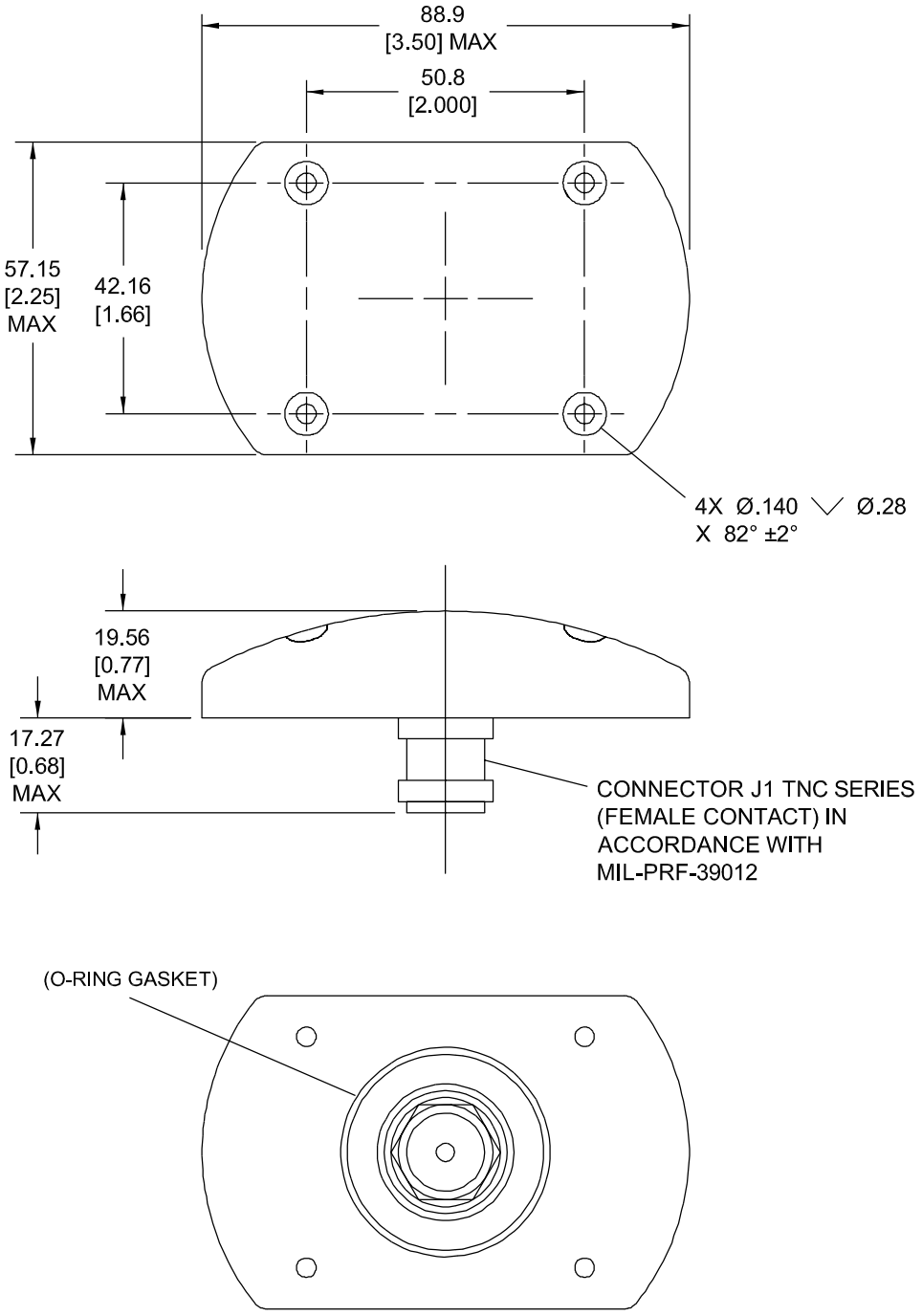


Figure 20-8. Magnetic Remote and Helmet Antenna (RA-1)



NOTES:

1. DIMENSIONS ARE IN MILLIMETERS [INCHES].

2. ANTENNA WEIGHT: 149.00 G [0.33 LBS].

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Figure 20-9. Non-Magnetic Remote Antenna (RA-2)

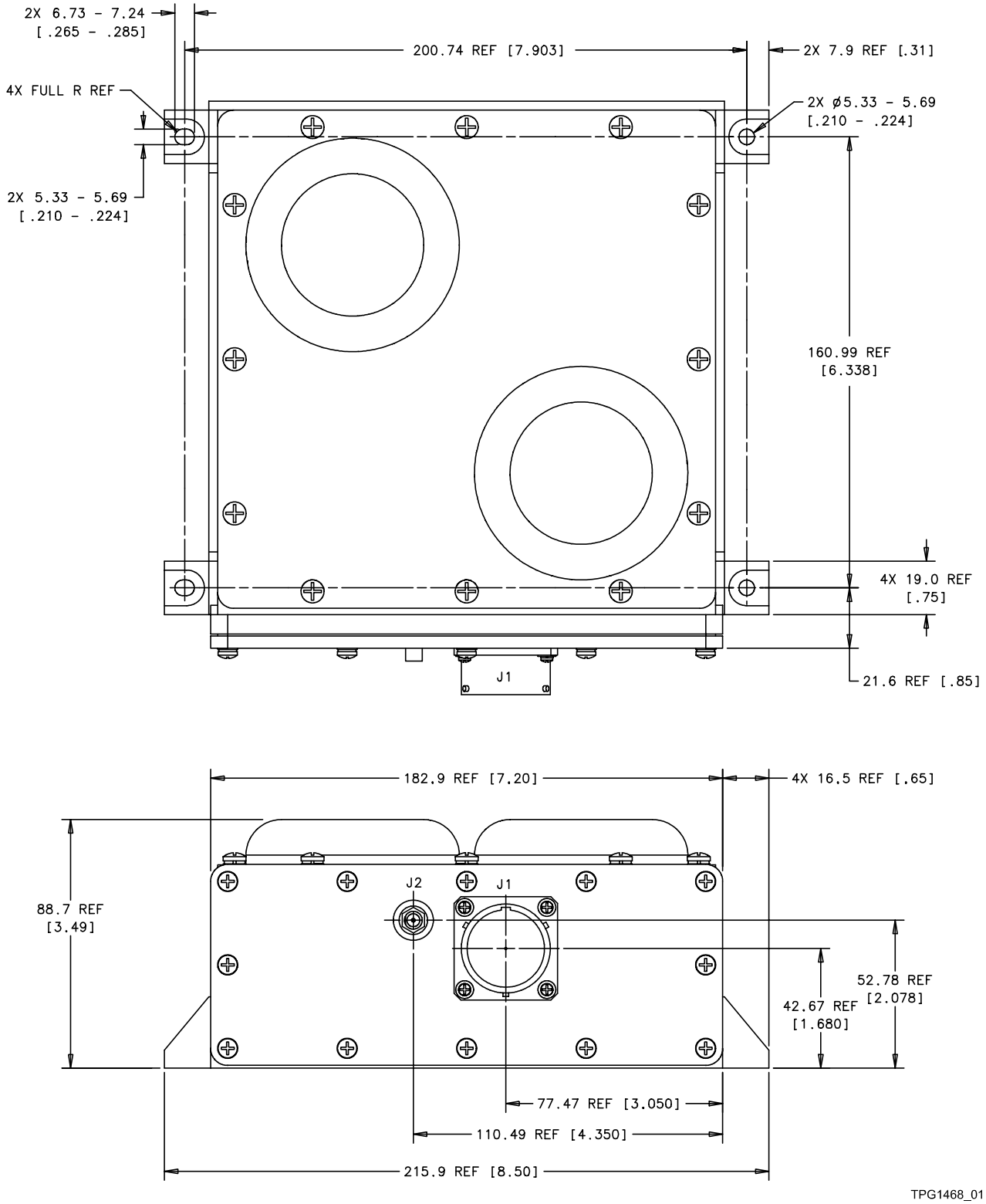

Figure 20-10. Anti-Jam Accessory (Sheet 1 of 3)

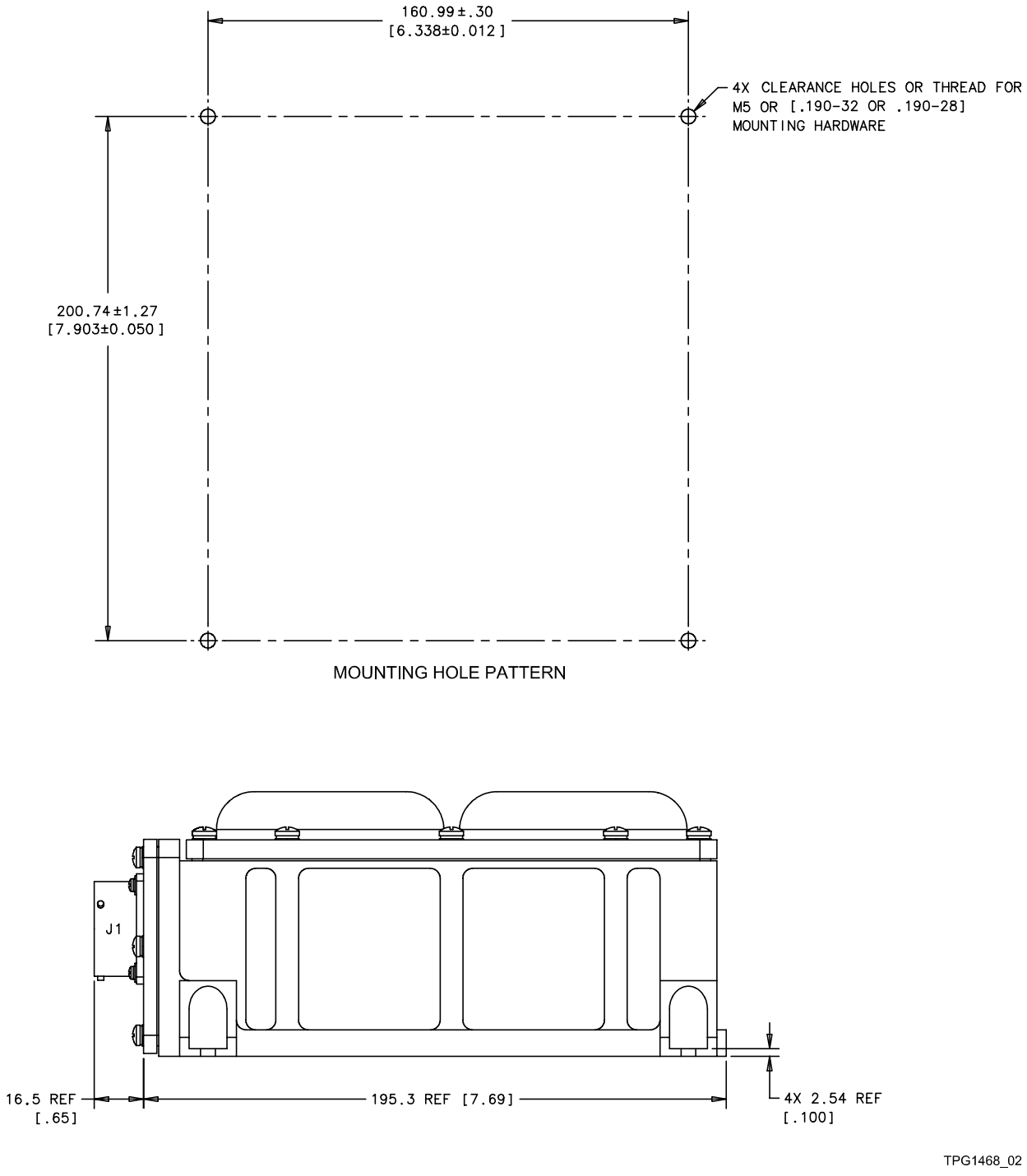

Figure 20-10. Anti-Jam Accessory (Sheet 2)

NOTES:

1. DIMENSIONS ARE IN MILLIMETERS [INCHES].
2. UNIT WEIGHT: 2.84 KG [6.25 LBS] TYPICAL.
3. POWER DISSIPATED: 20 WATTS MAXIMUM.
4. CENTER OF GRAVITY IS NOT PROVIDED FOR THIS UNIT.
5. THIS IS AN INSTALLATION DRAWING FOR A 2 CHANNEL ANTI-JAM ACCESSORY.
6. CAUTION: THIS ASSEMBLY CONTAINS ELECTROSTATIC DISCHARGE SENSITIVE DEVICES AND/OR ASSEMBLIES IDENTIFIED AS CLASS 1 IN ACCORDANCE WITH MIL-STD-1686.

	UNIT CONNECTORS		
CONNECTOR DESIGNATION	PART NUMBER	FUNCTION	MATING CONNECTOR
J1	371-8625-320 (MIL-C-26482 SERIES 1) (W/20-41 INSERT)	LRU I/O INTERFACE	MS3116J20-41S
J2	9453-1083-510 (APPLIED ENGINEERING PRODUCTS) (TYPE SMA)	RADIO FREQUENCY OUT	M39012/55-3026 OR EQUIVALENT (SMA TYPE) USE WITH ROCKWELL COLLINS PART NUMBER 988-9389-001 SPINNER

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Figure 20-10. Anti-Jam Accessory (Sheet 3)

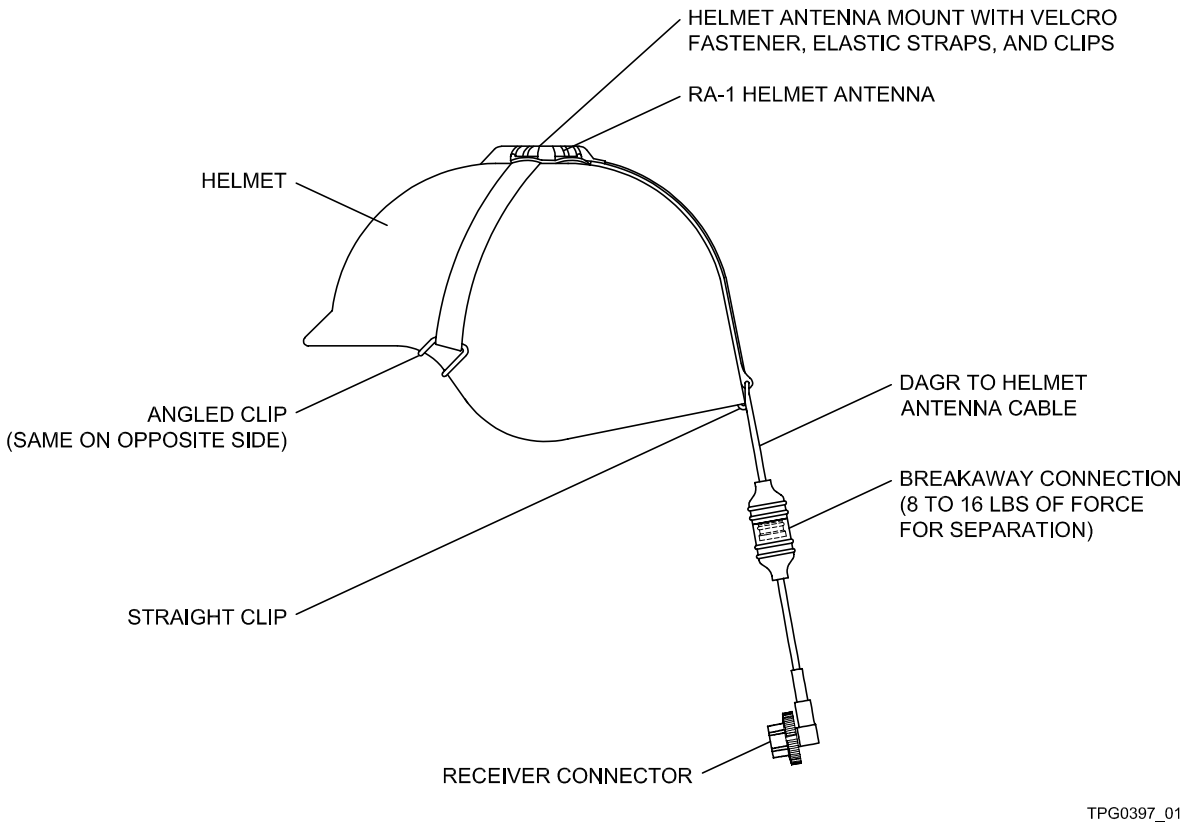


Figure 20-11. Helmet Antenna Mount and Cable

CHAPTER 21
MAINTENANCE — PREVENTIVE MAINTENANCE CHECKS AND SERVICES

21.1. INTRODUCTION.

This chapter contains introductory Preventive Maintenance Checks and Services (PMCS) that are essential to the efficient operation of the DAGR, keep it in good operating condition, and to prevent possible damage that might occur through neglect or failure to observe warning indications in a timely manner. An explanation is prepared for each PMCS entry and any general checks/services that are common to the equipment. The explanation for the item numbers details how the item numbers are used when recording results of PMCS on DA Form 5988E or SF 368, Product Quality Deficiency Report. For information on forms and records, see DA PAM 738-750 and DA PAM 738-751. Corrosion Prevention and Control (CPC) consist of routine checks of the unit such as cleaning, dusting, washing, covering unused receptacles, and checking for damage not covered in the PMCS table. These checks should be done any time they are necessary. Unit is waterproof, and submersible in water up to 1 meter for 20 minutes.

21.1.1. Explanations of Columns.

The PMCS table contains six columns and are explained as follows.

21.1.1.1. Column (1) — Item number. Contains a number for each procedure to be performed.

21.1.1.2. Columns (2) — Interval. Informs the user when to do a procedure.

21.1.1.3. Column (3) — Manhours. Lists the required time to accomplish the required checks and services on the equipment.

21.1.1.4. Column (4) — Item to be checked or serviced. Lists the name of the item to be inspected.

21.1.1.5. Column (5) — Procedure. Lists the location, and describes the procedure to do required checks and services on the equipment.

21.1.1.6. Column (6) — Equipment not ready/available if. Lists the conditions that will cause the equipment not to be ready for use.

21.1.2. Preventive Maintenance Checks and Services.

The PMCS table (refer to Table 21-1) lists all the scheduled maintenance tasks required for the DAGR.

Table 21-1. Preventive Maintenance Checks and Services

ITEM NO	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
1	As needed	NA	Cleaning	Clean unit using soft cloth (wet or dry), remove excessive debris.	Dirt and debris hinder unit from normal operation
2	Before	NA	External surface	Check for missing screws, cracks in casing, separation of unit halves.	Any hardware is missing, cracked, or damaged.
3	Before	NA	Display surface	Check display surface for scratches, cracks, and nicks.	Scratches seriously hinder users view of information displayed.
4	Before	NA	Keypad	Check keypad for legible printing of each key label.	Numbers and letters on keypads are marred beyond recognition.

Table 21-1. Preventive Maintenance Checks and Services - Continued

ITEM NO	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
5	Before	NA	Power, antenna, and data port connectors	Check power, antenna, and data port connectors for bent, burned, and/or missing pins.	Pins are missing, severely bent, or have a charred/burned appearance.
6	Before	NA	External power cables	Check external power cables (wire insulation, contacts, 2-amp in-line fuse).	Cable insulation is cut or nicked, cable contacts are charred/burnt, or in-line fuse is open or corroded.
7	Before	NA	Primary battery pack	Check primary battery pack.	Battery pack has corrosion from batteries, damaged gasket, or has foreign material around gasket or batteries.
8	Before	NA	Memory battery cover	Check memory battery cover.	Cover is bent, has corrosion from battery, damaged gasket, or has foreign material around gasket or battery.
9	Before	NA	Battery leakage	Check primary and memory battery leakage.	Either the primary or memory batteries have corrosion in or around battery compartment.
10	Before	NA	Battery compartment vents	Check primary and memory battery compartment vents. Flush with water only.	Either the primary or memory battery compartment vents are plugged.
11	Before	NA	Primary and memory batteries	Install primary and memory batteries in unit.	Primary and memory batteries are not installed (e.g., new DAGR).
12	As needed	NA	Primary batteries	Replace primary batteries located in primary battery pack on back of unit. Ensure a good memory battery is installed before replacement.	Primary battery power is lost, DAGR will loose power and become disabled.
13	As needed	NA	Memory battery	Replace memory battery located under memory battery cover on back of unit. Ensure good primary batteries are installed before replacement.	Memory battery power is lost, DAGR will loose information stored in memory if primary power is lost.
14	As needed	NA	Primary battery pack gasket	Apply thin layer of lubricant to primary battery pack gasket located on the primary battery pack.	Gasket dries out or contains cracks.
15	As needed	NA	Memory battery cover gasket	Check memory battery cover gasket located on unit under the memory battery cover. Replace if necessary.	Gasket dries out or contains cracks.

Table 21-1. Preventive Maintenance Checks and Services - Continued

ITEM NO	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
16	As needed	NA	Connector moisture covers	Replace moisture covers (a one piece item) located on J1, J2, J3, and J4.	Covers tear loose from the DAGR. (DAGR operation still capable, but replace at the first opportunity.)
17	During	NA	Display activity	Check activity from power-on self-test when unit is turned on.	No activity is evident when unit has been turned on.
18	During	NA	Self-test	Check operation of self-test (Paragraph 6.3.3)	A failed self-test is indicated.
19	During	NA	Navigate through operational displays	Navigate through various displays by pushing appropriate keys.	Unable to navigate through various displays.
20	During	NA	Turn unit off	Push and hold power key to turn off DAGR.	Unable to turn off unit with power key.
21	During	NA	External DC power cable blade fuse holder	Apply a thin layer of lubricant to ridges of fuse holder.	Blade fuse holder has not been lubricated when replacing fuse.
22	Before	NA	Helmet antenna cable	Apply a thin layer of lubricant to ridges of breakaway connection.	Helmet antenna cable hasn't been used for six months or more.
23	As needed	NA	Helmet antenna cable	Apply a thin layer of lubricant to ridges of breakaway connection.	Helmet antenna cable breakaway connection is dry.
24	Before	NA	Helmet antenna cable	Replace the helmet antenna cable.	Helmet antenna cable breakaway connection pulls apart too easily (nominal 8 to 16 pounds of force).
25	As needed	NA	Cold weather battery pack fuse cover gasket	Check the fuse cover gasket located on the cold weather battery pack under the fuse cover. Replace if necessary.	Gasket dries out or contains cracks.
26	As needed	NA	Cold weather battery pack primary battery pack gaskets	Apply thin layer of lubricant to primary battery pack gasket located on the primary battery pack (2 required).	Gasket dries out or contains cracks.

CHAPTER 22
MAINTENANCE — MAINTENANCE PROCEDURES

22.1. GENERAL.

This chapter contains procedures describing maintenance tasks for the DAGR including removal, cleaning, inspection, repair/replacement, lubrication, test/inspection, and preparation for storage. Refer to Paragraph 1.12 for warranty information for the DAGR, and to the MAC chart for level of maintenance and personnel to accomplish maintenance. The DAGR warranty sticker can be viewed on the DAGR after removing the battery pack.

NOTE

• DO NOT send any DAGR receivers to a Defense Reutilization and Marketing Office (DRMO). Return all receivers to the contractor address as listed for Warranty Returns (refer to Paragraph 1.12).

• When DAGRs are initially issued from Rockwell Collins, they are overpacked with a memory battery. Primary batteries are not supplied with the DAGR. Install both memory and primary batteries before using DAGR.

22.2. REMOVAL.

There is no removal necessary when the unit is used as a handheld unit. Refer to the following procedure for removing the unit from the host platform mount.

a. Turn off power to the DAGR.

b. Remove any cables from connectors J1, J2, J3, or J4.

c. Pull outward on two slide pins located on mount, and twist to lock in open position.

d. Remove DAGR from host platform mount and release slide pins.

22.3. CLEANING.

• Do not use solvents stronger than soap and water as they may damage the unit finish and/or the display face.

• Use care not to puncture the breather vent diaphragm when cleaning battery compartments as the puncture may ruin the waterproofness of the unit.

NOTE

Unit is waterproof and can withstand submersion in water up to a depth of one meter up to 20 minutes.

- Clean per standard operating procedures.
- Clean entire unit as necessary using a cleaning solution made of a mild detergent and clean water.
- Clean using a cotton cloth or other non-abrasive cloth.
- Keep breather vents of battery compartments free of dirt.
- Cotton tipped swabs may be used to remove foreign objects from connector ports. Apply minimum pressure to connector contacts.

22.4. INSPECTION.

- Check display surface for scratches.
- Check keypad for legible printing of each key label.
- Check antenna, power, and data port connectors (J1, J2, J3, J4) for bent or damaged pins.
- Check battery compartments for battery contact corrosion, battery leakage, and plugged vents.

22.5. BATTERIES.

22.5.1. General.

The DAGR does not have a battery charger contained in the unit. The DAGR can operate on internal battery power, and can use several types of batteries. Refer to Table 22-1 for a listing of common battery types and approximate life span for each battery type. The approximate battery life is based on operating the DAGR in continuous mode, at room temperature, and without keypad/display lighting. Several operator selectable DAGR settings are available to extend battery life (refer to the Power Saver page, Paragraph 7.5; and tips for extending battery life, Paragraph 1.19). No power conservation is required when using external power. Internal batteries are not required when using external power, and need not be removed when connected to external power.

Table 22-1. Common Battery Types

NOMENCLATURE	RECHARGE-ABLE	BATTERY USE	BATTERY TYPE	APPROXIMATE BATTERY LIFE *	STORAGE TEMPERATURE **
Lithium AA 1.5 volt	No	Primary	L-91	16.5 hours	–40 to +60 °C (–40 to +140 °F)
Alkaline AA 1.5 volt	No	Primary	W-B-101	11.5 hours	–18 to +55 °C (0 to +131 °F)
Nickel Metal Hydride AA 1.5 volt	Yes	Primary	NH–15	10 hours	–40 to +50 °C (–40 to +122 °F)
Lithium ½ AA 3.6 volt	No	Memory	LS14250	8 months	–60 to +70 °C (–76 to +158 °F)

* The approximate battery life values are based on continuous mode of operation and operating at room temperature. Battery life will vary depending on temperature and what mode of operation the DAGR is using. Colder temperatures may decrease battery life. Operating modes other than continuous may increase battery life.

** These storage temperatures are for the individual batteries only. The DAGR, stored with primary and/or memory batteries installed, is limited to the operating temperature range in Paragraph 15.2.2, unless further restricted by these storage temperatures.

22.6. REPAIR OR REPLACEMENT.

For repair not covered by this manual, the DAGR unit including the battery pack should be returned to the manufacturer in the reusable container supplied when DAGR was received. Refer to Paragraph 1.12 for warranty information and return address.

22.6.1. Primary Battery Pack Replacement.

Refer to Figure 22-1.

WARNING

If abused, lithium batteries can explode causing severe injury. Be sure to store batteries in original packaging until ready to use and observe polarity during installation. Reverse polarity can cause damage to the battery and receiver.

CAUTION

• Ensure a good memory battery is installed before removing the primary battery pack to ensure all settings in memory are retained. A good memory battery is indicated by checking the memory battery date on the Battery page, or if the battery is low, a low memory battery message will show on the display.

• If all primary and memory power is lost, memory information is lost and DAGR resets to default settings after power-up.

a. Ensure primary power to unit is off.

b. Hold unit firmly upside down with the battery pack facing up.

c. Pull up on latch located on the battery pack to release battery pack.

d. Lift up on battery pack and remove from unit.

NOTE

Prior to installing the battery pack, inspect the battery pack gasket for damage or dirt, and lubricate or replace gasket if necessary (refer to Paragraph 22.6.4). Ensure battery removal strap is not protruding from the battery pack.

e. To install new battery pack, position tab on battery pack in slot on the DAGR.

f. Close battery pack against DAGR until battery pack in engaged.

NOTE

The next step is only applicable if primary batteries were replaced.

g. Turn the DAGR on and access the Battery page from the Receiver Setup submenu. Update the Power Batteries Installed field, Battery Type field, and Rechargeable field with current information.

h. From the Battery page, push the MENU key, then highlight Reset Battery Used. Push the ENTER key.

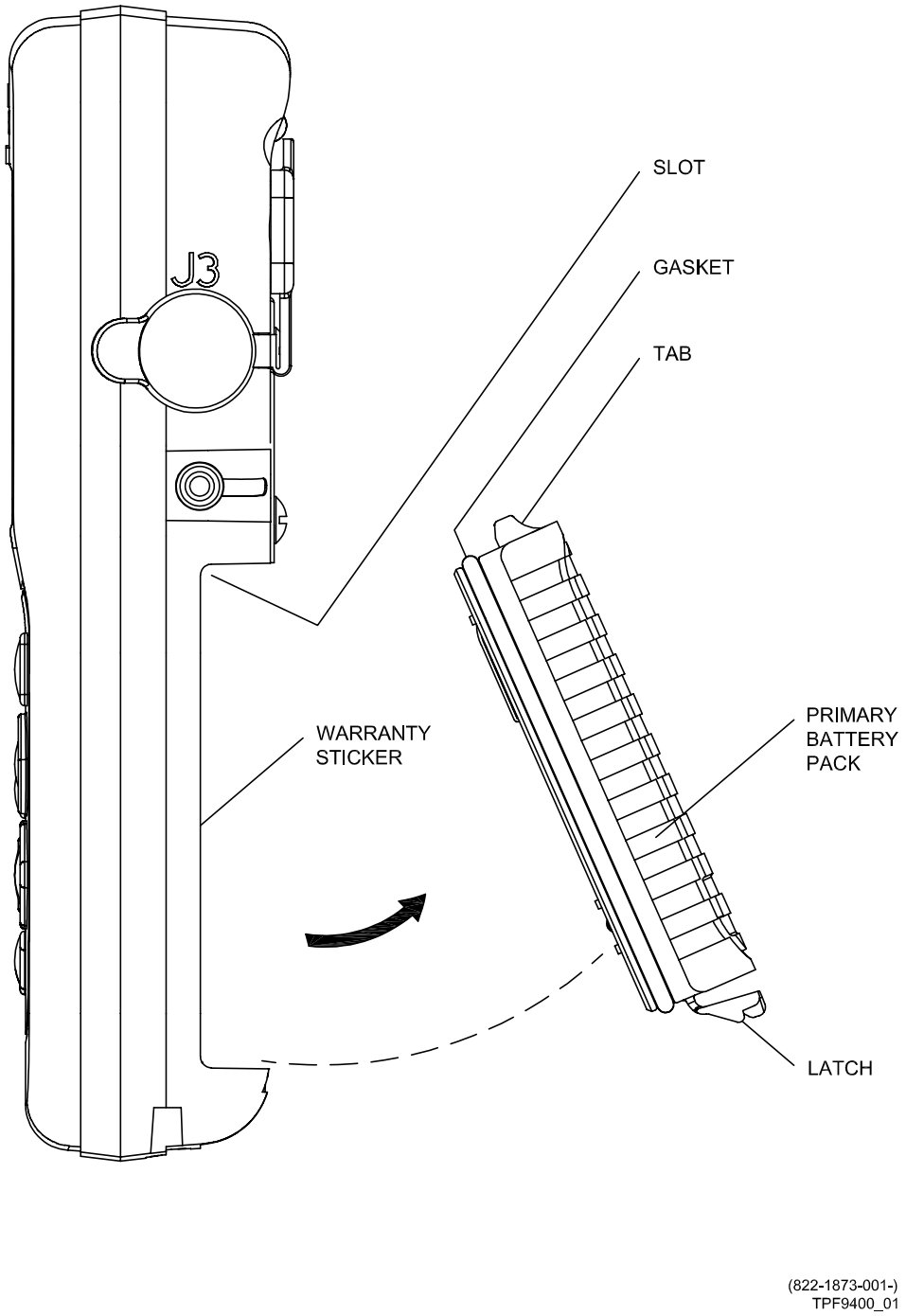


Figure 22-1. Primary Battery Pack Replacement

22.6.2. Primary Battery Replacement.

Refer to Figure 22-2.

WARNING

If abused, lithium batteries can explode causing severe injury. Be sure to store batteries in original packaging until ready to use and observe polarity during installation. Reverse polarity can cause damage to the battery and DAGR.

CAUTION

• Do not mix new batteries with old batteries. Do not mix battery types. Do not reverse battery polarity. Use only fresh/new batteries. Replace all primary power batteries at the same time. These precautions are done to ensure proper battery life and proper unit operation.

• If the primary batteries cannot be installed easily, they may be positioned backwards. Check for proper polarity and do not force primary batteries into primary battery pack as this may damage the battery connectors in the battery pack.

• Ensure a good memory battery is installed before removing the primary battery pack to ensure all settings in memory are retained. A good memory battery is indicated by checking the memory battery date on the Battery page, or if the battery is low, a Low Memory Battery message will show on the display.

• If all primary and memory power is lost, memory information is lost and DAGR resets to default settings after power-up.

NOTE

Refer to Table 22-1 for a list of common battery types and related battery life information. Polarity markings are shown on the battery pack. Rechargeable batteries may be used, but the DAGR does not have a battery charger contained in the unit.

a. Ensure primary power to unit is off.

b. Hold unit firmly upside down with the battery pack facing up.

c. Pull up on latch located on the battery pack to release battery pack.

d. Lift up on battery pack and remove from unit.

e. Pull out on the battery removal strap to remove batteries from the battery pack. Dispose of batteries in accordance with local procedures.

f. Position the battery removal strap into the channel of the battery pack before installing new batteries.

g. Install new batteries and ensure correct polarity installation for each battery (marked on battery pack).

NOTE

Prior to installing the battery pack, inspect the battery pack gasket for damage or dirt, and lubricate or replace gasket if necessary (refer to Paragraph 22.6.4). Ensure battery removal strap is not protruding from the battery pack.

h. To reinstall battery pack, position tab on battery pack in slot on the DAGR.

i. Close battery pack against DAGR until battery pack in engaged.

j. Turn the DAGR on and access the Battery page from the Receiver Setup submenu. Update the Power Batteries Installed field, Battery Type field, and Rechargeable field with current information.

k. From the Battery page, push the MENU key, then highlight Reset Battery Used. Push the ENTER key.

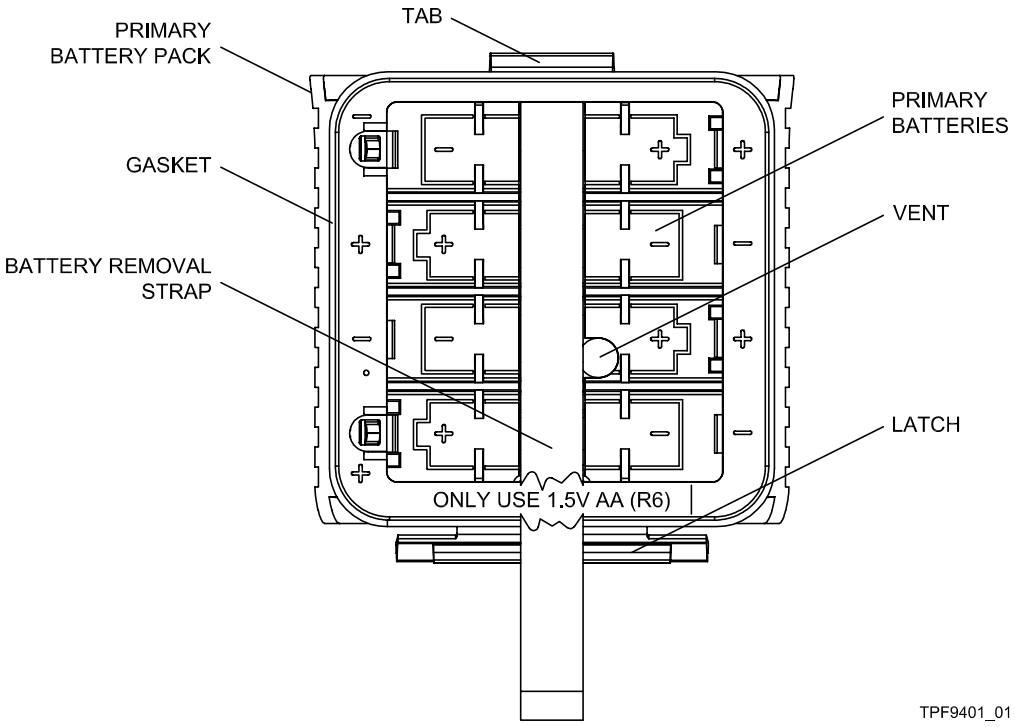


Figure 22-2. Primary Battery Replacement

22.6.3. Memory Battery Replacement.

Refer to Figure 22-3.

WARNING

If abused, lithium batteries can explode causing severe injury. Be sure to store batteries in original packaging until ready to use and observe polarity during installation. Reverse polarity can cause damage to the battery and DAGR.

CAUTION

- Use only a fresh/new battery to ensure proper battery life and proper unit operation.
- Ensure good primary batteries are installed (check battery indicator on display) or external power is applied to unit before replacing the memory battery to ensure all settings in memory are retained.
- If all primary and memory power is lost, memory information is lost and DAGR resets to default settings after power-up.

NOTE

Refer to Table 22-1 for batteries used and approximate life. Polarity markings are shown on the DAGR case.

a. Ensure primary power to unit is off.

b. Place unit upside down on non-abrasive surface with the memory battery cover facing up.

c. Use flat tip screw driver to loosen three captive screws securing memory battery cover, then remove cover from unit.

d. Remove the memory battery, and dispose of battery in accordance with local procedures.

e. Inspect the memory battery cover gasket for damage or dirt. Replace if necessary (refer to Paragraph 22.6.5).

f. Install the memory battery and ensure correct polarity.

CAUTION

Do not overtighten screws that secure the memory battery cover.

g. Install memory battery cover and tighten three captive screws.

h. Turn the DAGR on and access the Battery page from the Receiver Setup submenu. Reset the date shown in the Memory Battery Installed field to the date of battery replacement.

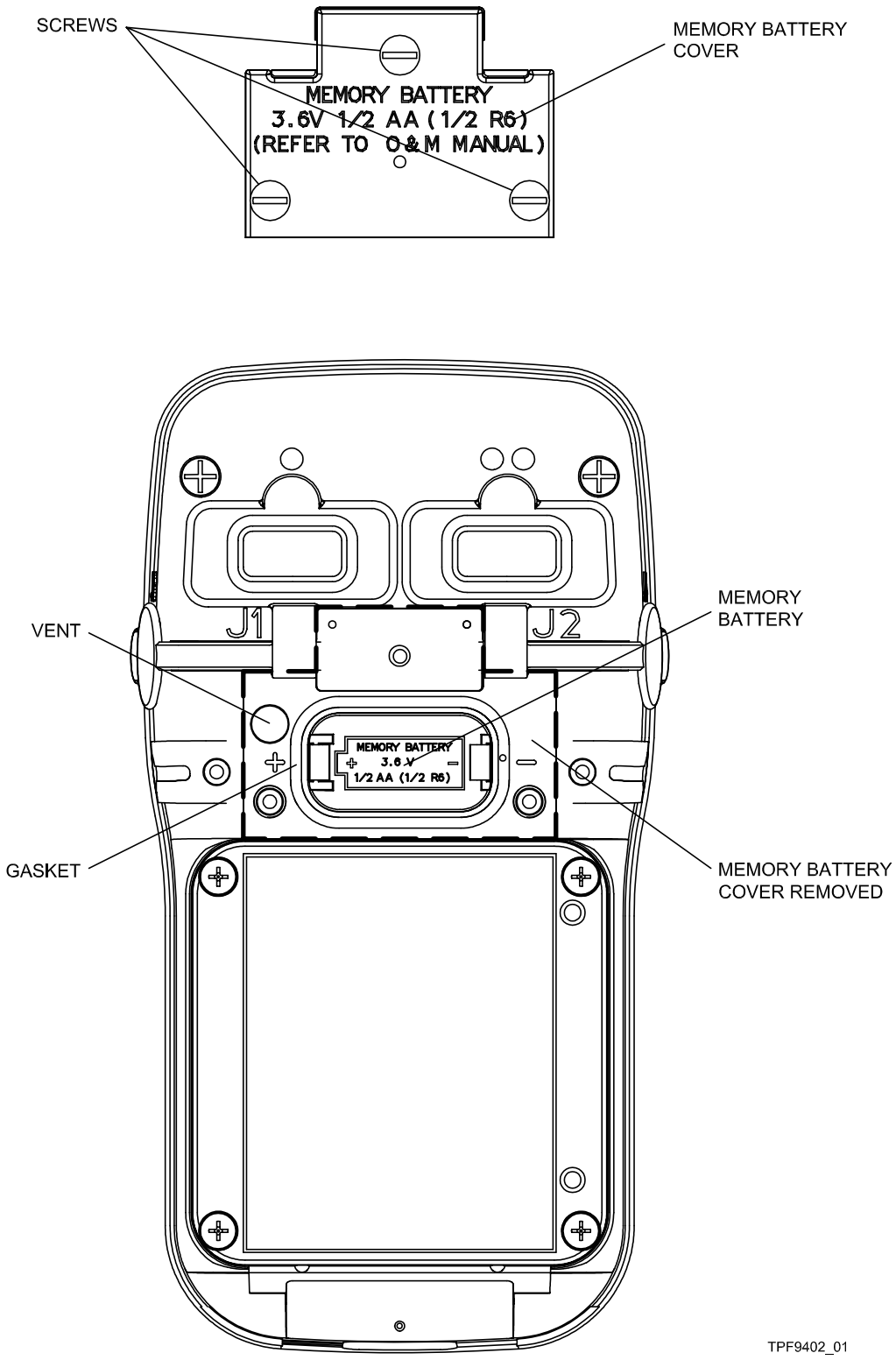


Figure 22-3. Memory Battery Replacement

22.6.4. Primary Battery Pack Gasket Replacement.

Refer to Figure 22-4.

CAUTION

- Ensure a good memory battery is installed before removing the primary battery pack to ensure all settings in memory are retained. A good memory battery is indicated by checking the memory battery date on the Battery page, or if the battery is low, a Low Memory Battery message will show on the display.
- If all primary and memory power is lost, memory information is lost and DAGR resets to default settings after power-up.

a. Ensure primary power to unit is off.

b. Hold unit firmly upside down with the battery pack facing up.

c. Push or pull latch located on the battery pack to release battery pack.

d. Lift up on battery pack and remove from unit.

e. Locate the O-ring gasket on battery pack and remove from battery pack.

f. Inspect groove that the gasket was removed from. Ensure groove is clean, and remove any rough edges and foreign material that may affect seating of the new gasket.

g. Add a light coating of lubrication (refer to Table 30-1) to new O-ring gasket and install new gasket in groove on battery pack.

h. To reinstall battery pack, ensure battery removal strap is not protruding from the battery pack, then position tab on battery pack in slot on the DAGR.

i. Close battery pack against DAGR until battery pack in engaged.

j. Turn the DAGR on and check for proper operation.

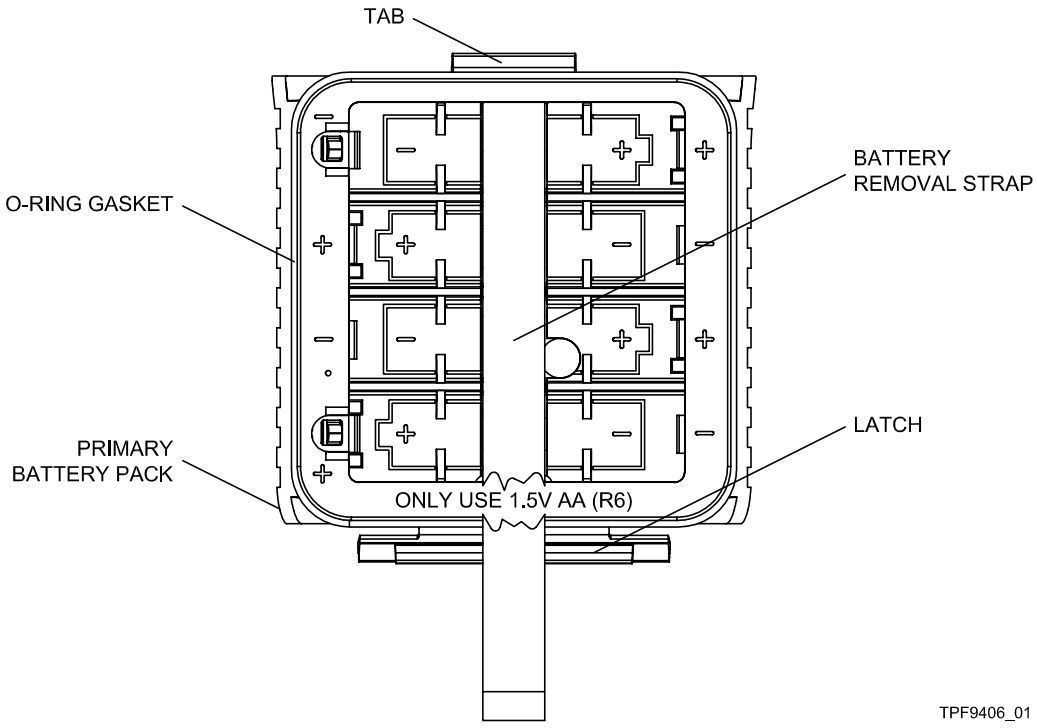


Figure 22-4. Primary Battery Pack Gasket Replacement

22.6.5. Memory Battery Cover Gasket Replacement.

Refer to Figure 22-5.

a. Ensure primary power to unit is off.

b. Place unit upside down on non-abrasive surface with the memory battery cover facing up.

c. Use flat tip screw driver to loosen three captive screws securing memory battery cover, then remove cover from unit.

d. Locate the O-ring gasket on DAGR where the memory battery cover was removed from and remove gasket.

e. Inspect groove that the gasket was removed from. Ensure groove is clean, and remove any rough edges and foreign material that may affect seating of the new gasket.

f. Install new gasket in groove on DAGR.

CAUTION

Do not overtighten screws that secure the memory battery cover.

g. Install memory battery cover and tighten three captive screws.

h. Turn the DAGR on and check for proper operation.

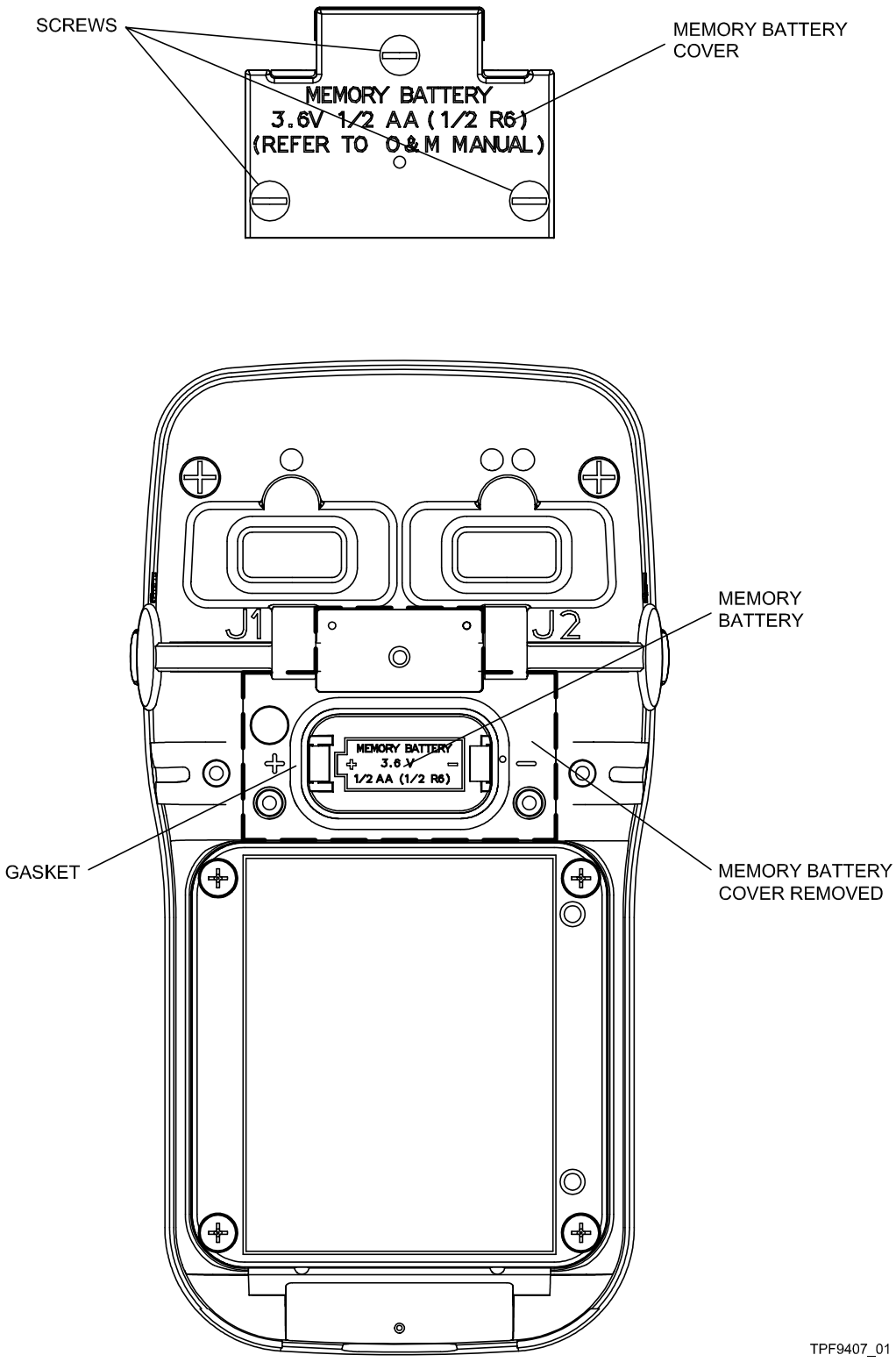


Figure 22-5. Memory Battery Cover Gasket Replacement

22.6.6. Moisture Cover Replacement.

Refer to Figure 22-6.

NOTE

All four of the moisture covers for J1, J2, J3, and J4 connectors are connected by one piece of rubber, and press fitted onto four guide pins on the DAGR. The moisture covers are held into place by the memory battery cover.

a. Ensure primary power to unit is off.

b. Place unit upside down on non-abrasive surface with the memory battery cover facing up.

c. Use flat tip screw driver to loosen three captive screws securing memory battery cover, then remove cover from unit.

d. Locate the moisture covers on DAGR and remove.

e. Inspect groove that the moisture covers were removed from. Ensure groove is clean, and remove any rough edges and foreign material that may affect seating of the new moisture covers.

f. Install new moisture covers over the guide pins in the groove on the DAGR.

CAUTION

Do not overtighten screws that secure the memory battery cover.

g. Install memory battery cover and tighten three captive screws.

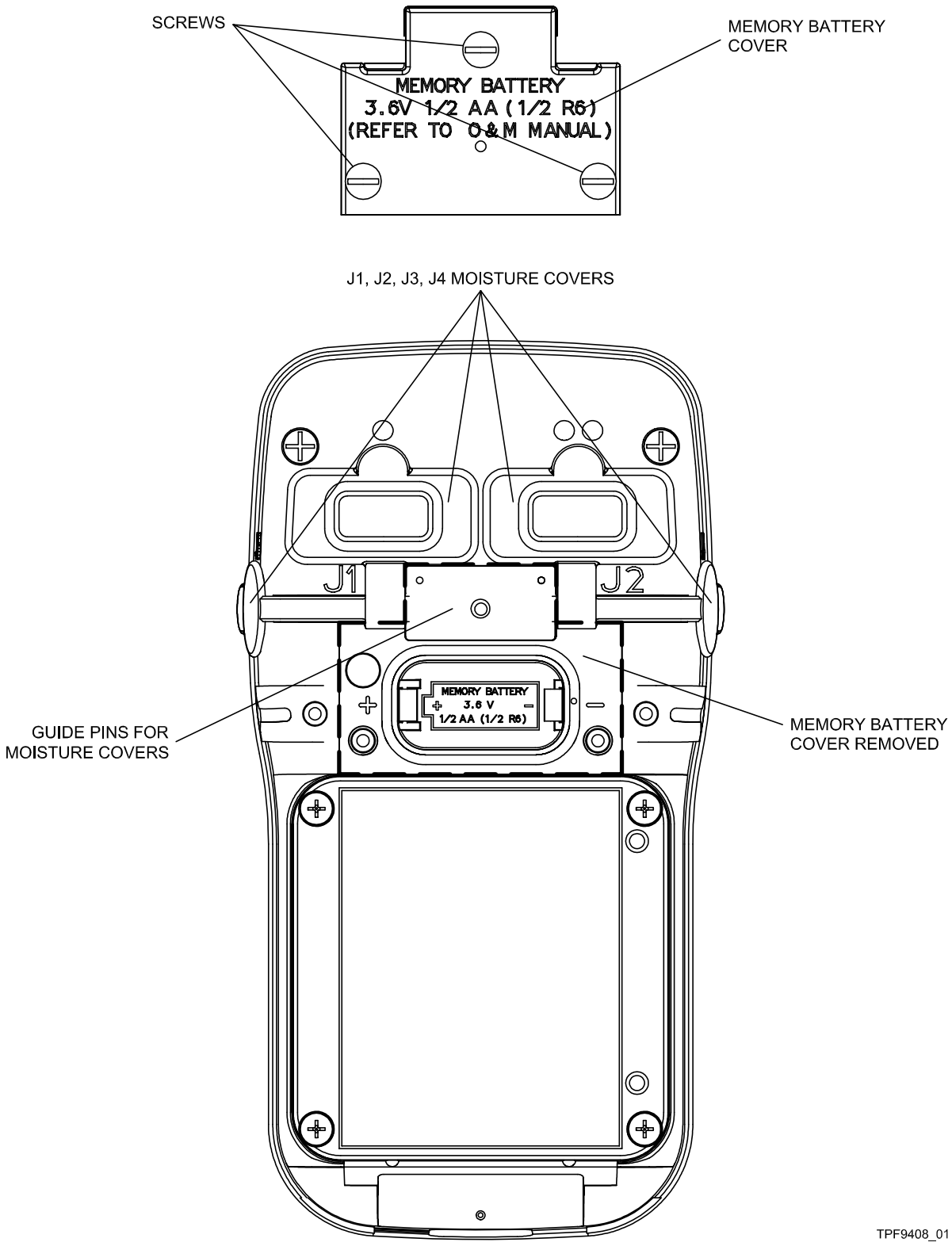


Figure 22-6. Moisture Cover Replacement

22.6.7. External Power Cable Fuse Replacement.

Refer to Figure 22-7.

NOTE

Fuse replacement procedures are applicable to all types of external DC power cables. Figure 22-7 shows the DAGR/DC power cable for illustration purposes of the blade type fuse only. The DAGR/AJ accessory power cable incorporates a round type fuse.

a. Ensure primary power to DAGR is off.

b. Locate and disconnect the external power cable from the external power source.

c. Open the fuse holder to access the fuse.

d. Remove and inspect the fuse for serviceability, and replace with a new fuse as required (2A fuse only, refer to Table 30-1).

e. For blade fuse holders only, add a light coating of lubrication (refer to Table 30-1) to the ridges of the fuse holder.

f. Reconnect and securely close the fuse holder.

g. Reconnect external power cable to the external power source.

h. Turn the DAGR on and check for proper operation.

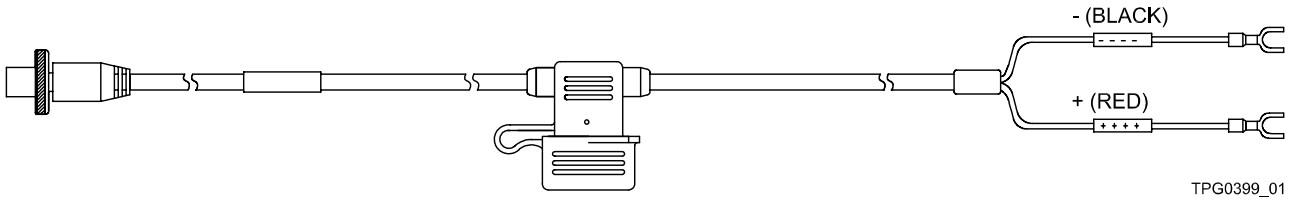


Figure 22-7. External Power Cable Fuse Replacement

22.6.8. Lubrication.

Refer to Table 30-1 for maintenance information on items that need lubricated shown as follows:

- O-ring gasket on the primary battery pack (used for both the DAGR and the CWBP)
- External power cable blade type fuse holder
- Helmet antenna cable breakaway connection

22.6.8.1. Regularly check the gaskets for dirt, cracks, nicks, and wear, then replace as necessary. During gasket inspection or replacement, apply a thin layer of lubricant to entire gasket surface. During replacement of blade type fuses in external power cables, apply a thin layer of lubricant to ridges of fuse holder. During inspection of the breakaway connection of the helmet antenna cable, apply a thin layer of lubricant to the ridges of the breakaway connection.

22.6.9. Test and Inspection.

There are no specific maintenance test procedures for the DAGR. Refer to Chapter 18 for an operational checkout procedure and mission operation checks, or to Chapter 19 for a troubleshooting procedure.

22.6.10. Preservation, Packaging, and Marking.

Prepare the DAGR for shipment or storage according to the following procedure.

a. Zeroize the unit as specified in Paragraph 7.3.

b. If the DAGR is placed in inactive storage for 30 days or more, both the memory battery and primary batteries must be removed. This prevents possible damage to the DAGR caused by battery chemical leakage.

CHAPTER 23
SUPPORTING INFORMATION — REFERENCES

23.1. GENERAL.

This chapter lists all field manuals, forms, and technical manuals associated with or referenced in this manual. A copy of DA Form 2028 is provided in the back of this manual.

23.2. FORMS.

AFTO Form 22	Technical Manual Change Recommendation and Reply Form
DA Form 285	U. S. Army Accident Report
DA Form 2028	Recommended Changes to Publications and Blank Forms
DA Form 2062	Hand Receipt
DA Form 2404	Equipment Inspection and Maintenance Worksheet
DA Form 5988E	Equipment Maintenance and Inspection Worksheet (electronic version of DA Form 2404)
DD Form 518	Accident Identification Report
DD Form 1149	Requisition and Invoice/Shipping Document
DD Form 1577-2	Unserviceable (Repairable Tag-Materiel)
NAVSEA 4160/1	Technical Manual Deficiency/Evaluation Report (TMDER)
SF Form 361	Transportation Discrepancy Report
SF Form 368	Product Quality Deficiency Report

23.3. TECHNICAL MANUALS.

TM 750-244-6	Destruction of Electronic Equipment
TO- 31R4-2PSN13-1	DAGR Operator and Maintenance Manual
TM- 11-5820-1172-13	DAGR Operator and Maintenance Manual
EE- 174-AD-OMI-010	DAGR Operator and Maintenance Manual
16-PSN13-1	DAGR Operator and Maintenance Manual
TM 09880C-OI	DAGR Operator and Maintenance Manual
PCN 18409880200	DAGR Operator and Maintenance Manual
TO- 31R4-2PSN13-8-1	DAGR Operator's Pocket Guide
TB- 11-5820-1172-10	DAGR Operator's Pocket Guide
EE- 174-AD-OPI-010	DAGR Operator's Pocket Guide
16–PSN13–2	DAGR Operator's Pocket Guide
TM 09880C-OR	DAGR Operator's Pocket Guide
PCN 18409880300	DAGR Operator's Pocket Guide
TO- 31R4-2PSN11-1	PLGR Operations and Maintenance Manual
TM- 11-5825-291-13	PLGR Operations and Maintenance Manual
EE- 174-AA-OMI-010/PSN-11	PLGR Operations and Maintenance Manual

CHAPTER 24
SUPPORTING INFORMATION — MAINTENANCE ALLOCATION CHART (ARMY ONLY)

24.1. THE ARMY MAINTENANCE ALLOCATION SYSTEM.

24.1.1. General.

This introduction provides a general explanation of all maintenance and repair functions authorized at the two maintenance levels under the two-level maintenance system concept. This concept consists of the maintenance allocation chart, tools and test equipment requirements, and remarks information.

24.1.1.1. The Maintenance Allocation Chart (MAC) designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component shall be consistent with the capacities and capabilities of the designated maintenance levels, which are shown on the MAC in column (4) as:

- **FIELD**

  Unit — Includes two subcolumns, C (operator/crew) and O (unit) maintenance

  Direct Support — Includes an F subcolumn

- **SUSTAINMENT**

  General Support — Includes an H subcolumn

  Depot — Includes a D subcolumn

24.1.1.2. The tools and test equipment requirements (immediately following the MAC) list the tools and test equipment (both special and common tools) required for each maintenance function as referenced from the MAC.

24.1.1.3. The remarks (immediately following the tools and test equipment requirements) contain supplemental instructions and explanatory notes for a particular maintenance function.

24.1.2. Maintenance Functions.

Maintenance functions are limited to and defined as follows:

- **Inspect** — To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel). This includes scheduled inspection and gagings and evaluation of cannon tubes.
- **Test** — To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards on a scheduled basis (i.e., load testing of lift devices and hydrostatic testing of pressure hoses).
- **Service** — Operations required periodically to keep an item in proper operating condition (e.g., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases). This includes scheduled exercising and purging of recoil mechanisms.
- **Adjust** — To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specified parameters.
- **Align** — To adjust specified variable elements of an item to bring about optimum or desired performance.
- **Orient** — To determine and cause corrections to be made or to be adjusted on instruments of test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

- **Remove/Install** — To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.
- **Replace** — To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and assigned maintenance level is shown as the third position code of the Source, Maintenance and Recoverability (SMR) code.
- **Repair** — The application of maintenance services, including fault location/troubleshooting, removal/installation, disassembly/assembly procedures, and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system. The following definitions are applicable to the "repair" maintenance function:

  Services — Inspect, test, service, adjust, align, orient, and/or replace.

  Fault location/troubleshooting — The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or Unit Under Test (UUT).

  Disassembly/assembly — The step-by-step breakdown (taking apart) of a spare/functional group coded item to the level of its least component, that is assigned an SMR code for the level of maintenance under consideration (i.e., identified as maintenance significant).

  Actions — Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

- **Overhaul** — That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.
- **Rebuild** — Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (e.g., hours/miles) considered in classifying Army equipment/components.

24.2. MAINTENANCE ALLOCATION CHART.

Refer to Table 24-1 for designation of authority and responsibility for performing maintenance functions on the end item or component.

24.2.1. Explanation of Columns.

The maintenance allocation chart contains six columns and are explained as follows.

24.2.1.1. Column (1) — Group Number. Column (1) lists FGC numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the Next Higher Assembly (NHA).

24.2.1.2. Column (2) — Component/Assembly. Column (2) contains the item names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

24.2.1.3. Column (3) — Maintenance Function. Column (3) lists the functions to be performed on the item listed in column (2). (For a detailed explanation of these functions refer to "Maintenance Functions" outlined above).

24.2.1.4. Column (4) — Maintenance Level. Column (4) specifies each level of maintenance authorized to perform each function listed in column (3), by indicating work time required (expressed as man-hours in whole hours or decimals) in the appropriate subcolumn. This work time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance levels, appropriate work time figures are to be shown for each level. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the MAC. The symbol designations for the various maintenance levels are as follows:

- **FIELD**

  C — Operator or crew maintenance

  O — Unit maintenance

  F — Direct support maintenance

- **SUSTAINMENT**

  H — General support maintenance

  D — Depot maintenance

NOTE

• The "L" maintenance level is not included in column (4) of the MAC. Functions to this level of maintenance are identified by a work time figure in the "H" column of column (4), and an associated reference code is used in the REMARKS column (6). This code is keyed to the remarks, and the SRA complete repair application is explained there.

• The work time figure "*" shown in the Depot/D sub-column represents maintenance tasks performed at contractor depot and, therefore, will not include a specific task time.

24.2.1.5. Column (5) — Tools and Equipment Reference Code. Column (5) specifies, by code, those common tool sets (not individual tools), common Test, Measurement and Diagnostic Equipment (TMDE), and special tools, special TMDE and special support equipment required to perform the designated function. Codes are keyed to the entries in the tools and test equipment table.

24.2.1.6. Column (6) — Remarks Code. When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks table entries.

Table 24-1. Maintenance Allocation Chart

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT REF CODE	(6) REMARKS CODE
			FIELD			SUSTAINMENT			
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
00	Satellite Signals, Navigation Set, DAGR	Inspect	0.1						A
		Test	0.1						B
		Repair	0.1						C
		Inspect		0.1				1	A
		Test		0.1					B
		Repair		0.1				1	D, E
		Test		0.1					B
		Repair					*		F

24.3. TOOLS AND TEST EQUIPMENT REQUIREMENTS.

Refer to Table 24-2 for special and common tools required concerning a particular maintenance function.

24.3.1. Explanation of Columns.

The tools and test equipment table contains five columns and are explained as follows.

24.3.1.1. Column (1) — Tool or Test Equipment Reference Code. The tool or test equipment reference code correlates with a code used in column (5) of the MAC.

24.3.1.2. Column (2) — Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

24.3.1.3. Column (3) — Nomenclature. Name or identification of the tool or test equipment.

24.3.1.4. Column (4) — National Stock Number (NSN). The NSN of the tool or test equipment.

24.3.1.5. Column (5) — Tool Number. The manufacturer's part number, model number, or type number.

Table 24-2. Tools and Test Equipment

TOOLS OR TEST EQUIPMENT REF CODE	MAINTE-NANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
1	O	TOOL KIT, ELECTRONIC EQUIPMENT	5180–01–460–9328	TK-105A/G

24.4. REMARKS.

Refer to Table 24-3 for additional remarks concerning a particular maintenance function.

24.4.1. Explanation of Columns.

The remarks table contains two columns and are explained as follows.

24.4.1.1. Column (1) — Remarks Code. The code recorded in column (6) of the MAC.

24.4.1.2. Column (2) — Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC.

Table 24-3. Remarks

REMARKS CODE	REMARKS
A	Visually inspect the DAGR to ensure memory battery cover is in place and without damage. The DAGR is not ready for operation if the memory battery cover is damaged or missing.
B	Operational Test. Automatic self-test upon power-up or operator commanded self-test.
C	Repair limited to replacement of primary batteries and primary battery pack.
D	Lubricate replacement battery pack gasket.
E	Repair is limited to replacement of memory battery, gaskets and moisture covers and other items coded throwaways at organizational level (i.e., connecting cables and other accessories).
F	Repair consists of removal and replacement of the DAGR. Depot level maintenance will be provided by the DAGR prime contractor as follows: 1. During the first 6 years, equipment will be covered under contractor's warranty. In addition, there are support provisions for failures not covered by the warranty. 2. Upon the expiration of the warranty, a support contract will be in place to provide for Depot level support for the life of the equipment.

CHAPTER 25
SUPPORTING INFORMATION — PARTS LIST AND ASSOCIATED EQUIPMENT

25.1. GENERAL.

The parts list and associated equipment lists and authorizes spares and repair parts; special tools; special test, measurement, and diagnostic equipment (TMDE); and other special support equipment required for performance of depot level maintenance of the DAGR. It authorizes the requisitioning, issue, and disposition of spares, repair parts, and special tools as indicated by the source, maintenance, and recoverability (SMR) codes. In addition, this parts list is divided into the following chapters.

- **Parts List and Associated Equipment** — This chapter contains the list of spares and parts authorized by this parts list for use in the performance of maintenance of the DAGR. This chapter also includes parts which must be removed for replacement of the authorized parts. Items listed in Table 25-8 are shown in associated illustrations, Figure 25-1.
- **Cross Reference Indexes** — There are two cross reference index chapters in this parts list: National Stock Number (NSN) index, Chapter 26; and Part Number (P/N) index, Chapter 27. Both the NSN and P/N index chapters refer to the figure and item numbers shown in this parts list.

25.2. PARTS LIST AND ASSOCIATED EQUIPMENT.

25.2.1. Explanation of Columns.

The parts list and associated equipment table (refer to Table 25-8) contains eight columns and are explained as follows.

25.2.1.1. Column (1) — ITEM NO. Indicates the number used to identify items called out in the illustration.

25.2.1.2. Column (2) — NSN. The National Stock Number (NSN) for the item is listed in this column.

25.2.1.3. Column (3) — PART NUMBER. Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items.

NOTE

When you use an NSN to requisition an item, the item you receive may have a different P/N from the number listed.

25.2.1.4. Column (4) — CAGE. The Commercial Activity/Governmental Entity (CAGE) code is a five digit code which is used to identify the manufacturer, distributor, or Government agency/activity that supplies the item.

25.2.1.5. Column (5) — DESCRIPTION. This column includes the federal item name, and when required, a minimum description to identify the item.

25.2.1.6. Column (6) — USABLE ON CODE. This column identifies different models of the end item where the individual item is used. Refer to Paragraph 25.4.1.

25.2.1.7. Column (7) — SMR CODE. The SMR code containing supply/requisitioning information, maintenance level authorization criteria, and disposition instruction, as shown in Table 25-1.

Table 25-1. SMR Code Explanation

Source Code	Maintenance Code		Recoverability Code
x x 1st and 2nd positions: How to get an item.	x 3rd position: Who can install, replace, or use the item.	x 4th position: Who can do complete repair* on the item.	x 5th position: Who determines disposition action on unserviceable items.
* Complete Repair: Maintenance capacity, capability, and authority to perform all corrective maintenance tasks of the repair function in a use/user environment in order to restore serviceability to a failed item.			

25.2.1.7.1. Source Code. The source code explains how you get an item needed for maintenance, repair, or overhaul of an end item/equipment. Explanations of source codes are shown in Table 25-2.

Table 25-2. Source Code Explanation

Source Code	Application/Explanation
PA	Stock items; use the applicable NSN to requisition/request items with these source codes. They are authorized to the level indicated by the code entered in the 3rd position of the SMR code.

25.2.1.7.2. Maintenance Code. Maintenance codes tell you the level(s) of maintenance authorized to use and repair support items. The maintenance codes are entered in the third and fourth positions of the SMR code shown in Table 25-3 and Table 25-4.

25.2.1.7.2.1. Third Position. The maintenance code entered in the third position tells you the lowest maintenance level authorized to remove, replace, and use an item. The maintenance code entered in the third position will indicate authorization to the levels of maintenance shown in Table 25-3.

Table 25-3. Maintenance Code Third Position Explanation

Maintenance Code	Application/Explanation
C —	Crew or operator maintenance done within unit/AVUM maintenance.
O —	Unit level/AVUM maintenance can remove, replace, and use the item.
F —	Direct support/AVIM maintenance can remove, replace, and use the item.
H —	General support maintenance can remove, replace, and use the item.
L —	Specialized repair activity can remove, replace, and use the item.
D —	Depot can remove, replace, and use the item.

25.2.1.7.2.2. Fourth Position. The maintenance code entered in the fourth position tells you whether or not the item is to be repaired, and identifies the lowest maintenance level with the capability to do complete repair (perform all authorized repair functions) shown in Table 25-4.

NOTE

Some limited repair may be done on the item at a lower level of maintenance, if authorized by the MAC and SMR codes.

Table 25-4. Maintenance Code Fourth Position Explanation

Maintenance Code	Application/Explanation
O —	Unit level/AVUM is the lowest level that can do complete repair of the item.
F —	Direct support/AVIM is the lowest level that can do complete repair of the item.
H —	General support is the lowest level that can do complete repair of the item.
L —	Specialized repair activity (enter specialized repair activity designator) is the lowest level that can do complete repair of the item
D —	Depot is the lowest level that can do complete repair of the item.
Z —	Nonrepairable. No repair is authorized.
B —	No repair is authorized. No parts of special tools are authorized for maintenance of "B" coded item. However, the item may be reconditioned by adjusting, lubricating, etc., at the user level.

25.2.1.7.3. Recoverability Code. Recoverability codes are assigned to items to indicate the disposition action on unserviceable items. The recoverability code is shown in the fifth position of the SMR code shown in Table 25-5.

Table 25-5. Recoverability Code Explanation

Recoverability Code	Application/Explanation
Z —	Nonrepairable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in the third position of the SMR code.
O —	Reparable item. When uneconomically reparable, condemn and dispose of the item at the unit level.
F —	Reparable item. When uneconomically reparable, condemn and dispose of the item at the direct support level.
H —	Reparable item. When uneconomically reparable, condemn and dispose of the item at the general support level.
D —	Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal of item are not authorized below depot level.
L —	Reparable item. Condemnation and disposal not authorized below Specialized Repair Activity (SRA).
A —	Item requires special handling or condemnation procedures because of specific reasons (such as precious metal content, high dollar value, critical material, or hazardous material). (Refer to appropriate manuals/directives for specific instructions.)

25.2.1.8. Column (8) — QTY. The quantity (QTY) per figure column indicates the quantity of the item used in the breakout shown on the illustration/figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column instead of a quantity indicates the quantity is variable and quantity may change from application to application.

25.3. CROSS REFERENCE INDEXES.

25.3.1. Explanation of Format and Columns.

Both the national stock number index and part number index contain three columns and are explained as follows.

25.3.1.1. National Stock Number (NSN) Index Chapter (Chapter 26). Stock numbers in this index are listed in ascending alphanumeric sequence (vertical arrangement of letter and number combinations which places the first letter or digit of each group in order A through Z, followed by the numbers 0 through 9 and each following letter or digit in like order).

25.3.1.1.1. Column (1) — Stock Number. This column lists the NSN in National item identification number (NIIN) sequence. The NIIN consists of the last nine digits of the NSN shown in Table 25-6.

Table 25-6. Stock Number Explanation

NUMBER	DESCRIPTION
e.g., 5385-01-574-1476	When using this column to locate an item, ignore the first four digits of the NSN. However, the complete NSN should be used when ordering items by stock number.
NSN = 5385-01-574-1476 and NIIN = 01-574-1476	

25.3.1.1.1.1. Column (2) — Figure. This column lists the number of the figure where the item is identified/located. The figures are in numerical order in the parts list chapter.

25.3.1.1.1.2. Column (3) — Item. The item number identifies the item associated with the figure listed in the adjacent figure column. This item is also identified by the NSN listed on the same line.

25.3.1.2. Part Number (P/N) Index Chapter (Chapter 27). Part numbers in this index are listed in ascending alphanumeric sequence (vertical arrangement of letter and number combinations which places the first letter or digit of each group in order A through Z, followed by the numbers 0 through 9 and each following letter or digit in like order).

25.3.1.2.1. Column (1) — Part Number. Indicates the part number assigned to the item.

25.3.1.2.2. Column (2) — Figure. This column lists the number of the figure where the item is identified/located.

25.3.1.2.3. Column (3) — Item. The item number is the number assigned to the item as it appears in the figure referenced in the adjacent figure number column.

25.4. SPECIAL INFORMATION FOR PARTS LIST.

25.4.1. Usable On Code.

When applicable, gives you a code if the item you need is not the same for different models of equipment. The Usable On Code (UOC) appears in column 6, and is shown as "UOC: ..." in the column. Uncoded items are applicable to all models. Examples of identification are shown in Table 25-7.

Table 25-7. Usable On Code Explanation for Parts List

Code	Used On
A	Model M114-001
B	Model M114-002
C	Model M114-003

25.4.2. Fabrication Instructions.

If applicable, bulk materials required to manufacture items are listed in a bulk material functional group of this parts list. Part numbers for bulk material are also referenced in the Description column of the line item entry for the item to be manufactured/fabricated. If applicable, detailed instructions for items source coded to be manufactured or fabricated will be found in this manual and referenced in this paragraph. No special fabrications instructions are necessary for the DAGR.

25.4.3. Index Numbers.

Items which have the word BULK in the figure column will have an index number shown in the item number column. This index number is a cross reference to the NSN / P/N index chapters.

25.4.4. Illustration List.

The illustrations in this parts list contain unit authorized items, and are provided in Figure 25-1 and Table 25-8.

25.5. HOW TO LOCATE REPAIR PARTS.

25.5.1. When NSNs Or P/Ns Are Not Known.

- **First** — Using Figure 25-1 and Table 25-8, determine the individual item or assembly group to which the item belongs.
- **Second** — Find the illustration in Figure 25-1 covering the item, functional group, or the subfunctional group to which the item belongs.
- **Third** — Note the callout number on the illustration. This relates to the item number in Table 25-8.
- **Fourth** — Look in Table 25-8 for the related item number. The NSN and part number for the part are on the same line as the associated item number.

25.5.2. When NSN Is Known.

- **First** — If you have the NSN and not the P/N, look in the NSN column of Table 25-8. The NSN is arranged in NIIN sequence. Note the item number associated with the NSN.
- **Second** — Turn to Figure 25-1 and locate the item number. Verify that the item is the one you are looking for.

25.5.3. When P/N Is Known.

- **First** — If you have the P/N and not the NSN, look in the PART NUMBER column of the Table 25-8. Note the item number associated with the part number.
- **Second** — Turn to Figure 25-1 and locate the item number. Verify that the item is the one you are looking for.

25.6. PARTS LIST AND ASSOCIATED EQUIPMENT LIST.

Refer to Figure 25-1 for illustrations of parts and equipment associated with the DAGR, and to Table 25-8 for information concerning the parts and equipment associated with the DAGR. The callout number shown in each illustration of Figure 25-1 cross references to the Item Number column in Table 25-8.

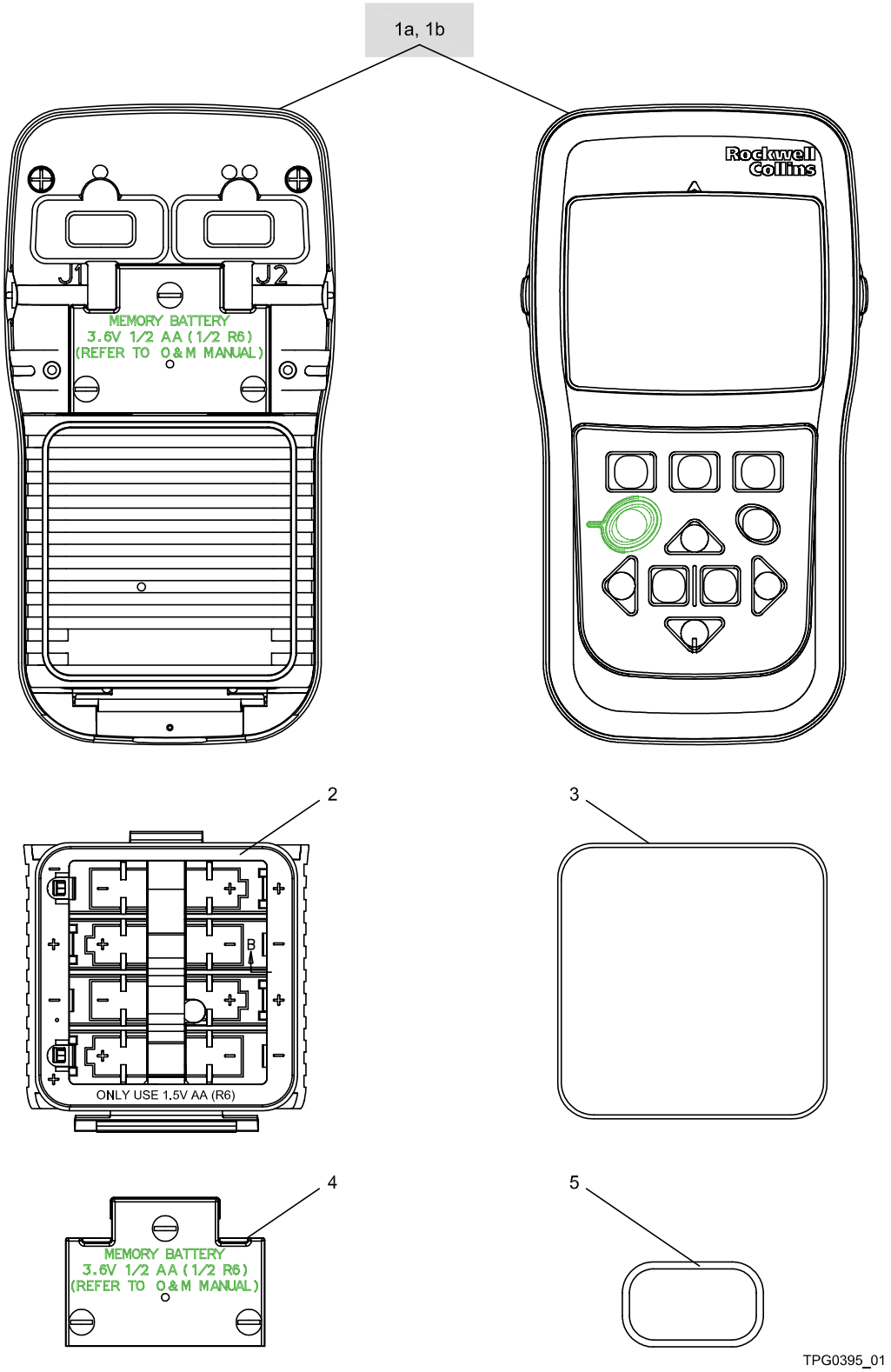


Figure 25-1. Parts List and Associated Equipment (Sheet 1 of 8)

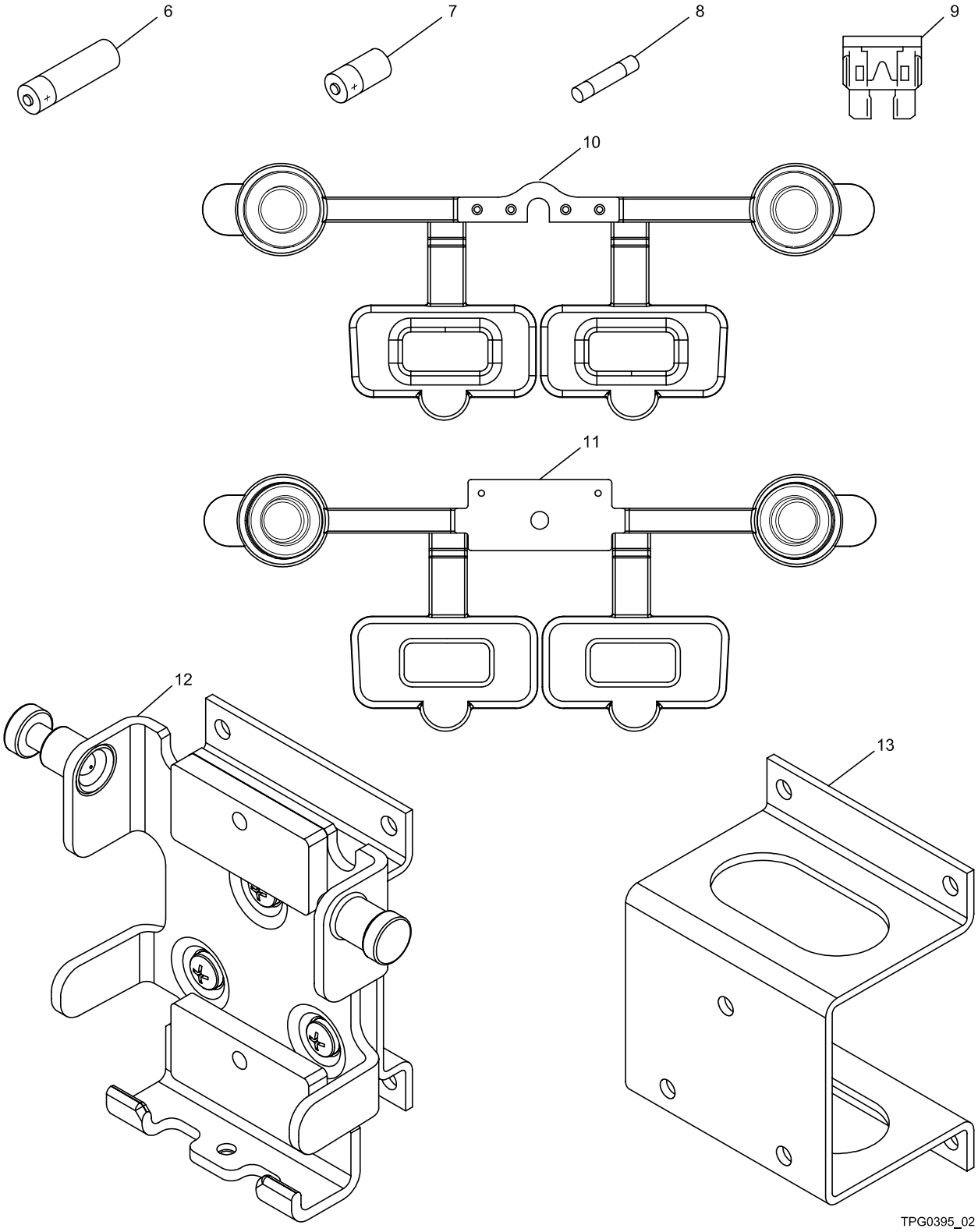


Figure 25-1. Parts List and Associated Equipment (Sheet 2)

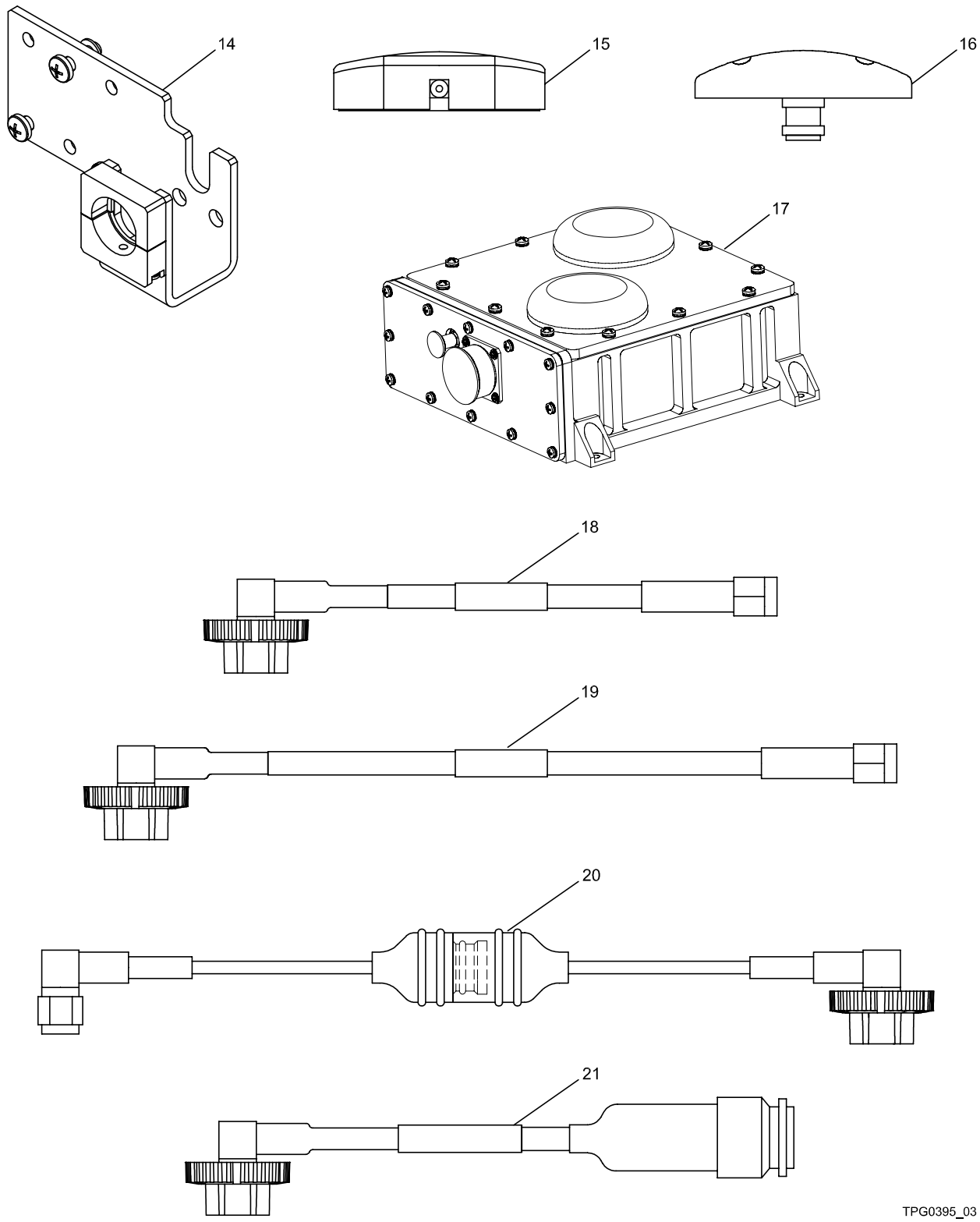


Figure 25-1. Parts List and Associated Equipment (Sheet 3)

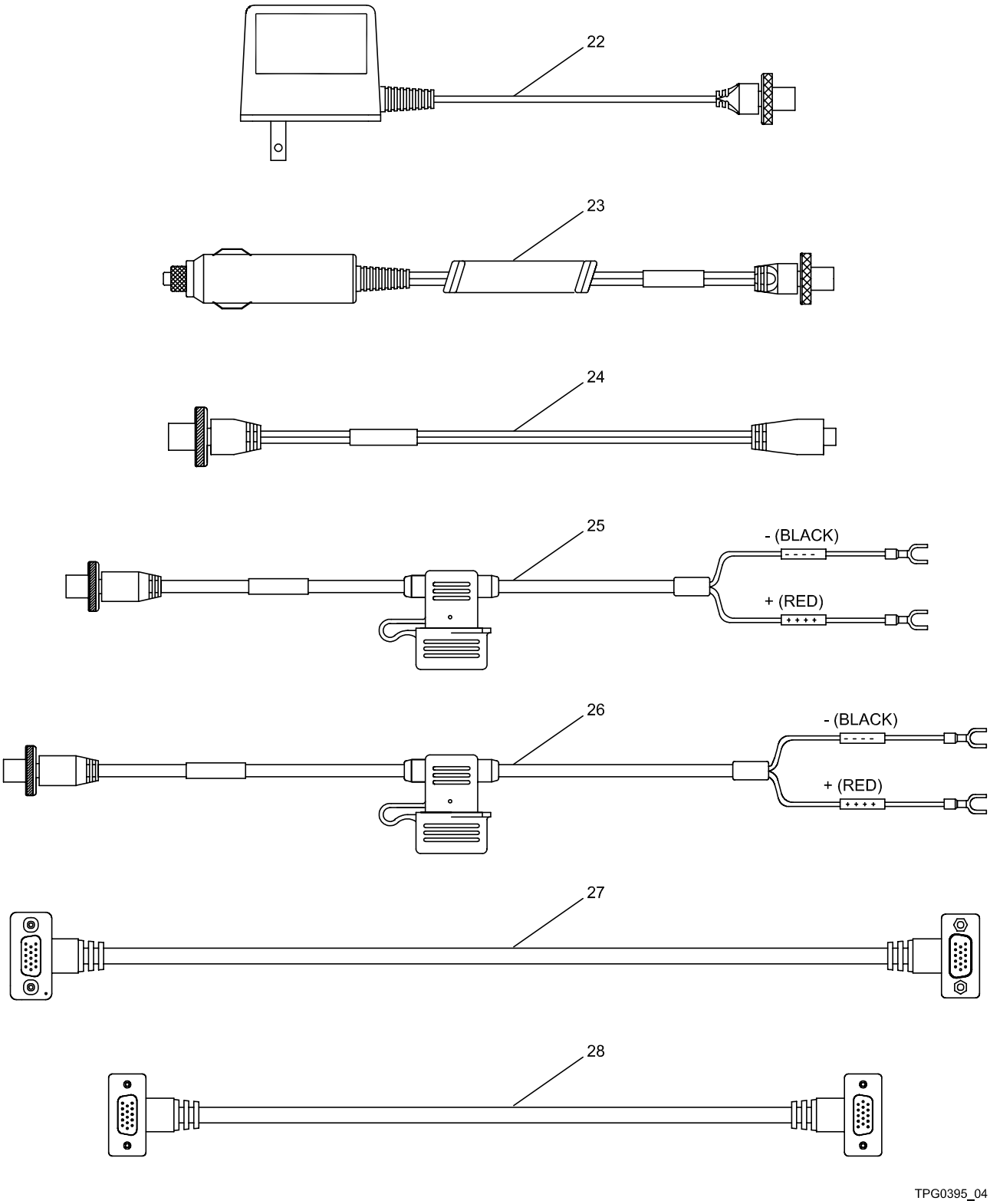


Figure 25-1. Parts List and Associated Equipment (Sheet 4)

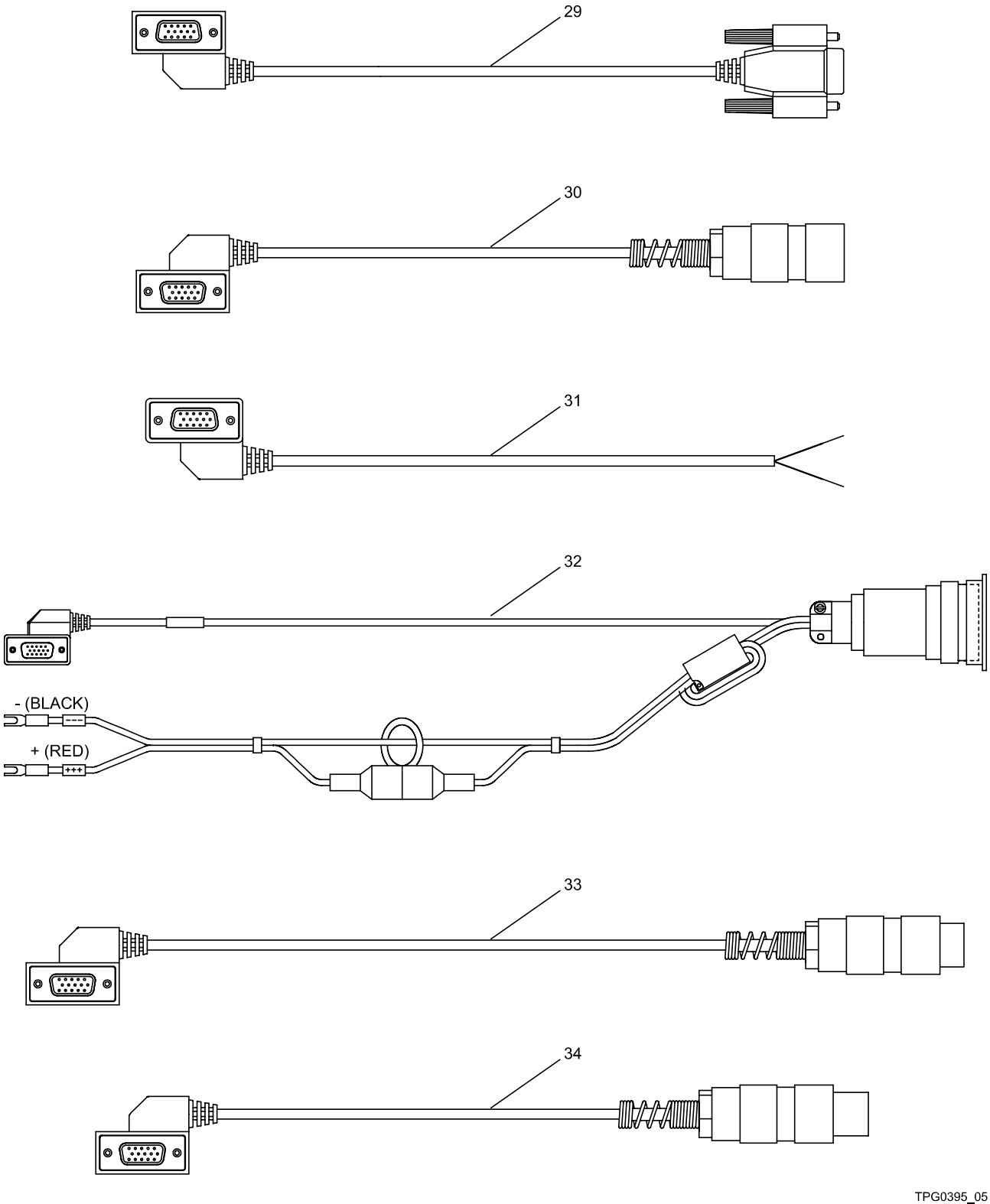


Figure 25-1. Parts List and Associated Equipment (Sheet 5)

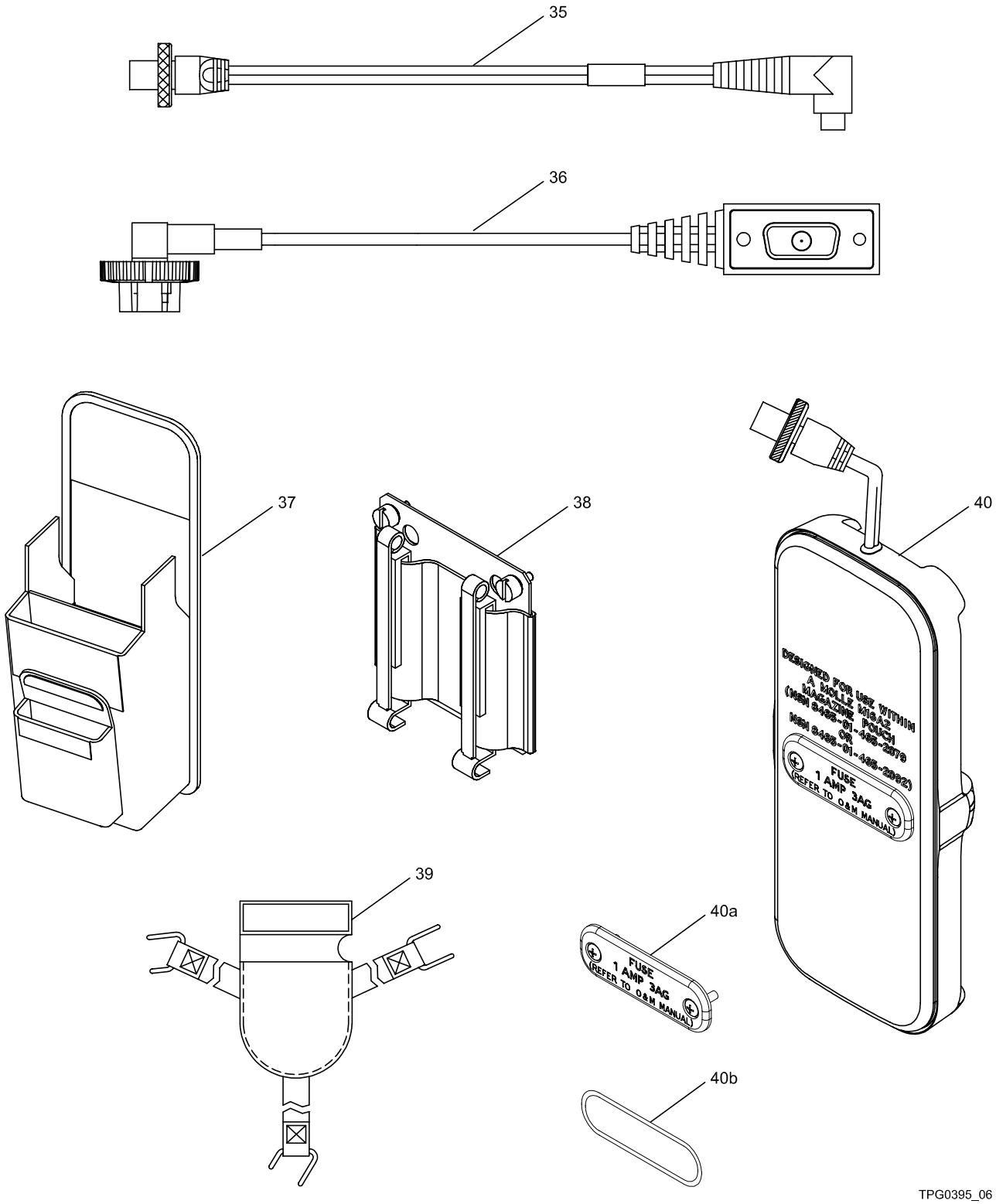


Figure 25-1. Parts List and Associated Equipment (Sheet 6)

NOTES:

1. RA-1 ANTENNA AND RA-1 ANTENNA CABLE ARE NOT INCLUDED IN THE GLS SINGLE DAGR RECEIVER KIT, AND ARE SHOWN FOR ASSEMBLY PURPOSES ONLY.
2. RA-1 ANTENNA, RA-1 ANTENNA CABLE, AND DAGR TO DAGR DATA CABLE ARE NOT INCLUDED IN THE SUB-MIL DUAL DAGR RECEIVER KIT, AND ARE SHOWN FOR ASSEMBLY PURPOSES ONLY.
3. ANTENNA CABLE CAN BE EITHER HELMET, 5-METER, OR 10-METER RA-1 ANTENNA CABLE.

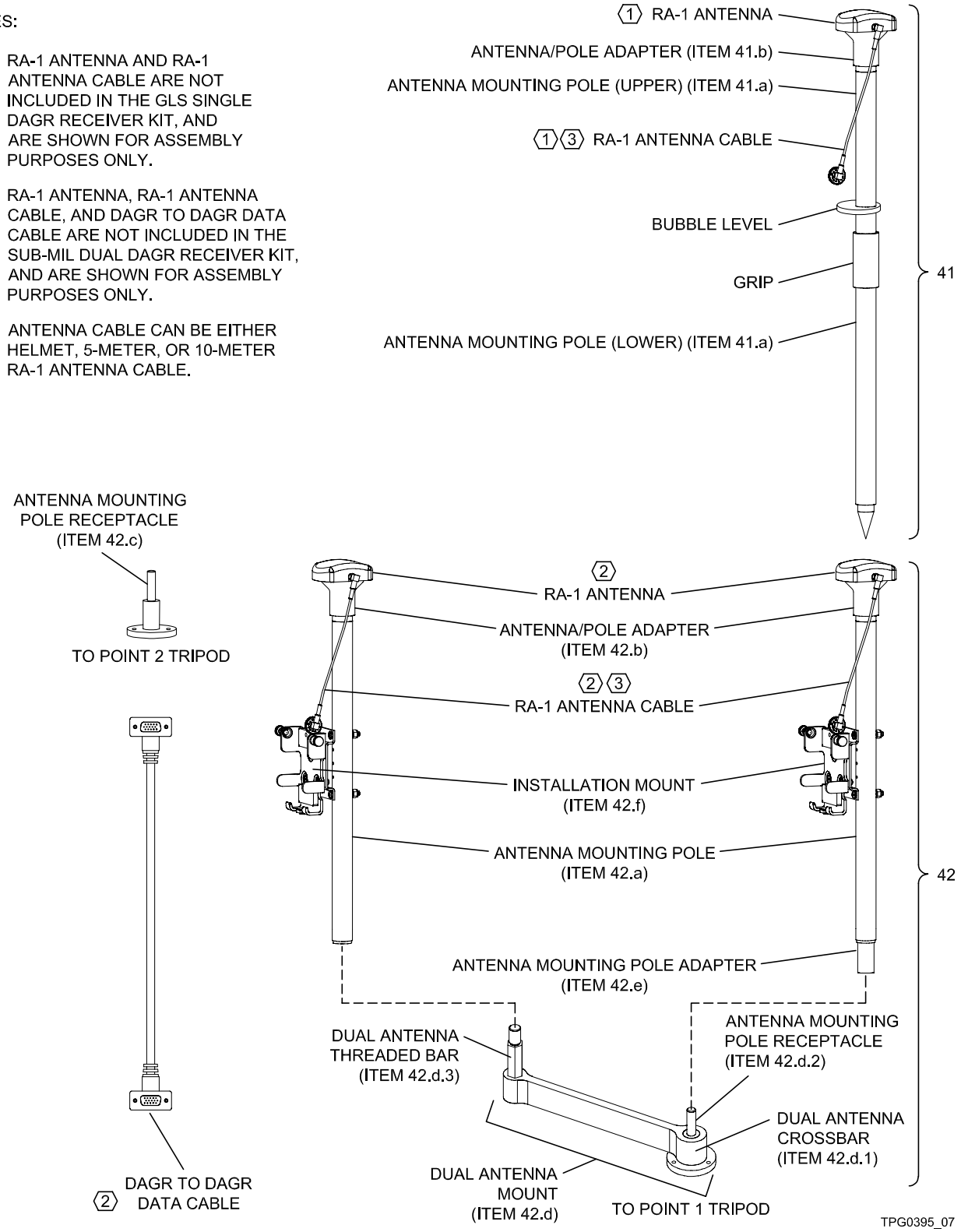
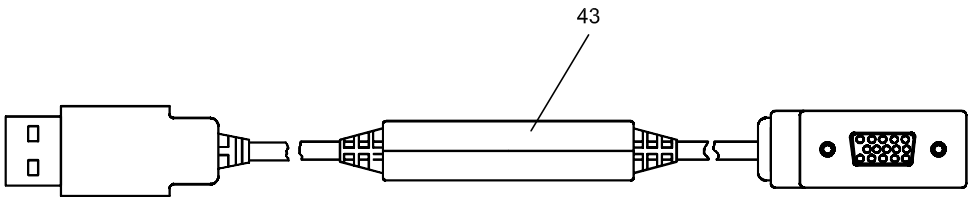


Figure 25-1. Parts List and Associated Equipment (Sheet 7)



TPG0395_08

Figure 25-1. Parts List and Associated Equipment (Sheet 8)

Table 25-8. Parts List and Associated Equipment

(1) ITEM NO	(2) NSN	(3) PART NUMBER	(4) CAGE	(5) DESCRIPTION	(6) UOC	(7) SMR CODE	(8) QTY
1a	5825-01-516-8038	822-1873-001	13499	DAGR AN/PSN-13	NA	PAODD	1
1b	5825-01-526-4783	822-1873-002	13499	DAGR AN/PSN-13A	NA	PAODD	1
2	6135-01-521-3064	987-6641-001	13499	BATTERY PACK, PRIMARY 4-CELL	NA	PAOZZ	1
3	5331-01-521-0987	200-2470-010	13499	GASKET, PRIMARY BATTERY PACK	NA	PAOZZ	1
4	6160-01-521-3136	987-6640-001	13499	COVER, MEMORY BATTERY	NA	PAOZZ	1
5	5331-01-521-1727	200-2442-110	13499	GASKET, MEMORY BATTERY COVER	NA	PAOZZ	1
6	6135-01-333-6101	L-91	83740	BATTERY, PRIMARY STORAGE (LITHIUM)	NA	PAOZZ	4
6	6135-00-985-7845	W-B-101	81348	BATTERY, PRIMARY STORAGE (STANDARD NONRECHARGEABLE ALKALINE)	NA	PAOZZ	4
6	6140-01-467-3225	NH-15	83740	BATTERY, PRIMARY STORAGE (RECHARGEABLE NICKEL METAL HYDRIDE)	NA	PAOZZ	4
7	6135-01-435-4921	LS14250	7X634	BATTERY, MEMORY STORAGE (LITHIUM)	NA	PAOZZ	1
7	6135-01-435-4921	221-0500-030	13499	BATTERY, MEMORY STORAGE (LITHIUM) (ALTERNATE)	NA	PAOZZ	1
8	5920-00-280-4960	F02A250V2A	81349	FUSE, ROUND (2-AMP, 250 VOLT)	NA	PAOZZ	1
8	5920-01-317-5555	264-0295-000	13499	FUSE, ROUND (2-AMP, 250 VOLT)	NA	PAOZZ	1
9	5920-01-433-3097	257002	75915	FUSE, BLADE TERMINAL (2-AMP, GREY)	NA	PAOZZ	1
10	NA	987-5167-001	13499	MOISTURE COVERS, J1, J2, J3, J4 CONNECTOR (DAGR SN 1-280)	NA	XB	1
11	5935-01-521-0072	987-6637-001	13499	MOISTURE COVERS, J1, J2, J3, J4 CONNECTOR (DAGR SN 281 +)	NA	PAOZZ	1
12	5975-01-521-3063	987-5006-001	13499	INSTALLATION MOUNT (HOST PLATFORM)	NA	PAOZZ	1
13	5340-01-521-4394	987-5007-001	13499	INSTALLATION MOUNT ADAPTER (HOST PLATFORM)	NA	PAOZZ	1
14	5935-01-521-3067	987-6323-001	13499	KEYFILL CABLE ADAPTER BRACKET KIT	NA	PAOZZ	1
15	5985-01-502-6692	013-1981-010	13499	ANTENNA, RA-1 REMOTE AND HELMET	NA	PAOZZ	1
16	5985-01-521-1775	013-1981-020	13499	ANTENNA, RA-2 REMOTE	NA	PAOZZ	1

Table 25-8. Parts List and Associated Equipment - Continued

(1) ITEM NO	(2) NSN	(3) PART NUMBER	(4) CAGE	(5) DESCRIPTION	(6) UOC	(7) SMR CODE	(8) QTY
17	TBD	822-1951-xxx	13499	ANTI-JAM ACCESSORY (HOST PLATFORM)	NA	PAODD	1
18	5995-01-504-1762	987-4640-001	13499	CABLE, DAGR TO RA-1 (5 METERS)	NA	PAOZZ	1
19	5995-01-521-4244	987-5016-001	13499	CABLE, DAGR TO RA-1 (10 METERS)	NA	PAOZZ	1
20	5995-01-521-6753	987-7002-001	13499	CABLE, DAGR TO HELMET ANTENNA	NA	PAOZZ	1
21	5995-01-521-2941	987-5015-001	13499	CABLE, DAGR TO RA-2 (10 METERS)	NA	PAOZZ	1
22	6130-01-521-3157	987-4975-001	13499	CABLE, DAGR/AC POWER	NA	PAOZZ	1
23	6150-01-521-2548	987-5008-001	13499	CABLE, DAGR/CIGARETTE LIGHTER POWER	NA	PAOZZ	1
24	TBD	426-0227-010	13499	CABLE, DAGR TO COLD WEATHER BATTERY PACK	NA	PAOZZ	1
25	6150-01-521-6755	987-5009-001	13499	CABLE, DAGR/DC POWER (FUSED, 2 METERS)	NA	PAOZZ	1
26	6150-01-521-6757	987-5019-001	13499	CABLE, DAGR/DC POWER (FUSED, 5 METERS)	NA	PAOZZ	1
27	5995-01-521-2713	987-5011-001	13499	CABLE, DAGR/DAGR/PLGR (39 INCHES) (INTERCHANGEABLE WITH PLGR/PLGR CABLE, NSN 6150-01-375-8663)	NA	PAOZZ	1
28	5995-01-521-3071	987-5182-001	13499	CABLE, BRADLEY VEHICLE DATA ADAPTER (13 INCHES)	NA	PAOZZ	1
29	5995-01-521-3198	987-5012-001	13499	CABLE, DAGR/PC (INTER-CHANGEABLE WITH PLGR/PC CABLE, NSN 6150-01-375-8664)	NA	PAOZZ	1
30	5995-01-521-3187	987-5014-001	13499	CABLE, DAGR/SINCGARS	NA	PAOZZ	1
31	5995-01-521-2680	987-5002-001	13499	CABLE, DAGR/HAVE QUICK (INTERCHANGEABLE WITH PLGR/HAVEQUICK CABLE, NSN 6150-01-375-8665)	NA	PAOZZ	1
32	TBD	987-5567-xxx	13499	CABLE, DAGR/AJ ACCESSORY (10 METERS)	NA	PAOZZ	1
33	5995-01-521-3185	987-5180-001	13499	CABLE, CRYPTO KEYFILL (13 INCHES)	NA	PAOZZ	1

Table 25-8. Parts List and Associated Equipment - Continued

(1) ITEM NO	(2) NSN	(3) PART NUMBER	(4) CAGE	(5) DESCRIPTION	(6) UOC	(7) SMR CODE	(8) QTY
34	5995-01-521-3182	987-5013-001	13499	ADAPTER, PLGR/SINCGARS CABLE (10 INCHES AND YELLOW LABEL)	NA	PAOZZ	1
35	6150-01-521-3510	987-5020-001	13499	ADAPTER, PLGR EXTERNAL POWER CABLE	NA	PAOZZ	1
36	5995-01-521-3120	987-5017-001	13499	ADAPTER, PLGR EXTERNAL ANTENNA CABLE	NA	PAOZZ	1
37	5895-01-521-3111	987-5010-001	13499	PERSONNEL CASE	NA	PAOZZ	1
38	8465-01-522-5638	987-4970-001	13499	ADAPTER, CARTRIDGE/ TROUSER BELT	NA	PAOZZ	1
39	5825-01-469-6033	013-1928-020	13499	MOUNT, HELMET ANTENNA	NA	PAOZZ	1
40	TBD	987-7050-001	13499	BATTERY PACK, COLD WEATHER	NA	PAOOO	1
40a	5920-01-530-0424	987-7296-001	13499	FUSE COVER, COLD WEATHER BATTERY PACK	NA	PAOZZ	1
40b	5331-01-530-0611	200-2442-120	13499	GASKET, COLD WEATHER BATTERY PACK FUSE COVER	NA	PAOZZ	1
41	5985-01-521-2395	987-6279-001	13499	KIT, GLS SINGLE DAGR RECEIVER ANTENNA MOUNTING POLE	NA	PAOOO	1
41a	5985-01-527-3458	270-3609-140	13499	POLE, ANTENNA MOUNTING	NA	PAOZZ	1
41b	5985-01-527-3372	987-6315-001	13499	ADAPTER, ANTENNA/POLE	NA	PAOZZ	1
42	5985-01-521-2625	987-6280-001	13499	KIT, SUB-MIL DUAL DAGR RECEIVER ANTENNA MOUNTING POLE	NA	PAOOO	1
42a	TBD	270-3609-150	13499	POLE, ANTENNA MOUNTING	NA	PAOZZ	2
42b	5985-01-527-3372	987-6315-001	13499	ADAPTER, ANTENNA/POLE	NA	PAOZZ	2
42c	1290-66-108-8792	987-7137-001	13499	RECEPTACLE, ANTENNA MOUNTING POLE	NA	PAOZZ	1
42d	TBD	987-7139-001	13499	MOUNT, DUAL ANTENNA	NA	PAOZZ	1
42d.1	TBD	987-7138-001	13499	CROSSBAR, DUAL ANTENNA	NA	PAOZZ	1
42d.2	1290-66-108-8792	987-7137-001	13499	RECEPTACLE, ANTENNA MOUNTING POLE	NA	PAOZZ	1
42d.3	TBD	987-7136-001	13499	BAR, DUAL ANTENNA THREADED	NA	PAOZZ	1
42e	TBD	987-7135-001	13499	ADAPTER, ANTENNA MOUNTING POLE	NA	PAOZZ	1

Table 25-8. Parts List and Associated Equipment - Continued

(1) ITEM NO	(2) NSN	(3) PART NUMBER	(4) CAGE	(5) DESCRIPTION	(6) UOC	(7) SMR CODE	(8) QTY
42f	5975-01-521-3063	987-5006-001	13499	INSTALLATION MOUNT (HOST PLATFORM)	NA	PAOZZ	2
43	TBD	426-0228-010	13499	CABLE, DAGR RS422/USB	NA	PAOZZ	1

CHAPTER 26
SUPPORTING INFORMATION — NATIONAL STOCK NUMBER INDEX

26.1. NATIONAL STOCK NUMBER INDEX.

Table 26-1 lists the national stock numbers associated with all parts and equipment shown in Chapter 25. The figure and item columns in Table 26-1 cross reference to the callout numbers of Figure 25-1 and the item number column of Table 25-8. Refer to Paragraph 25.3 for column explanations.

Table 26-1. National Stock Number Index

STOCK NUMBER	FIGURE	ITEM
5825-01-516-8038	Figure 25-1	Table 25-8, Item 1a
5825-01-526-4783	Figure 25-1	Table 25-8, Item 1b
6135-01-521-3064	Figure 25-1	Table 25-8, Item 2
5331-01-521-0987	Figure 25-1	Table 25-8, Item 3
6160-01-521-3136	Figure 25-1	Table 25-8, Item 4
5331-01-521-1727	Figure 25-1	Table 25-8, Item 5
6135-01-333-6101	Figure 25-1	Table 25-8, Item 6
6135-00-985-7845	Figure 25-1	Table 25-8, Item 6
6140-01-467-3225	Figure 25-1	Table 25-8, Item 6
6135-01-435-4921	Figure 25-1	Table 25-8, Item 7
5920-00-280-4960	Figure 25-1	Table 25-8, Item 8
5920-01-317-5555	Figure 25-1	Table 25-8, Item 8
5920-01-433-3097	Figure 25-1	Table 25-8, Item 9
NA	Figure 25-1	Table 25-8, Item 10
5935-01-521-0072	Figure 25-1	Table 25-8, Item 11
5975-01-521-3063	Figure 25-1	Table 25-8, Item 12
5340-01-521-4394	Figure 25-1	Table 25-8, Item 13
5935-01-521-3067	Figure 25-1	Table 25-8, Item 14
5985-01-502-6692	Figure 25-1	Table 25-8, Item 15
5985-01-521-1775	Figure 25-1	Table 25-8, Item 16
TBD	Figure 25-1	Table 25-8, Item 17
5995-01-504-1762	Figure 25-1	Table 25-8, Item 18
5995-01-521-4244	Figure 25-1	Table 25-8, Item 19
5995-01-521-6753	Figure 25-1	Table 25-8, Item 20
5995-01-521-2941	Figure 25-1	Table 25-8, Item 21

Table 26-1. National Stock Number Index - Continued

STOCK NUMBER	FIGURE	ITEM
6130-01-521-3157	Figure 25-1	Table 25-8, Item 22
6150-01-521-2548	Figure 25-1	Table 25-8, Item 23
TBD	Figure 25-1	Table 25-8, Item 24
6150-01-521-6755	Figure 25-1	Table 25-8, Item 25
6150-01-521-6757	Figure 25-1	Table 25-8, Item 26
5995-01-521-2713	Figure 25-1	Table 25-8, Item 27
5995-01-521-3071	Figure 25-1	Table 25-8, Item 28
5995-01-521-3198	Figure 25-1	Table 25-8, Item 29
5995-01-521-3187	Figure 25-1	Table 25-8, Item 30
5995-01-521-2680	Figure 25-1	Table 25-8, Item 31
TBD	Figure 25-1	Table 25-8, Item 32
5995-01-521-3185	Figure 25-1	Table 25-8, Item 33
5995-01-521-3182	Figure 25-1	Table 25-8, Item 34
6150-01-521-3510	Figure 25-1	Table 25-8, Item 35
5995-01-521-3120	Figure 25-1	Table 25-8, Item 36
5895-01-521-3111	Figure 25-1	Table 25-8, Item 37
8465-01-522-5638	Figure 25-1	Table 25-8, Item 38
5825-01-469-6033	Figure 25-1	Table 25-8, Item 39
TBD	Figure 25-1	Table 25-8, Item 40
5920-01-530-0424	Figure 25-1	Table 25-8, Item 40a
5331-01-530-0611	Figure 25-1	Table 25-8, Item 40b
5985-01-521-2395	Figure 25-1	Table 25-8, Item 41
5985-01-527-3458	Figure 25-1	Table 25-8, Item 41a
5985-01-527-3372	Figure 25-1	Table 25-8, Item 41b
5985-01-521-2625	Figure 25-1	Table 25-8, Item 42
TBD	Figure 25-1	Table 25-8, Item 42a
5985-01-527-3372	Figure 25-1	Table 25-8, Item 42b
1290-66-108-8792	Figure 25-1	Table 25-8, Item 42c
TBD	Figure 25-1	Table 25-8, Item 42d
TBD	Figure 25-1	Table 25-8, Item 42d.1
1290-66-108-8792	Figure 25-1	Table 25-8, Item 42d.2
TBD	Figure 25-1	Table 25-8, Item 42d.3
TBD	Figure 25-1	Table 25-8, Item 42e

Table 26-1. National Stock Number Index - Continued

STOCK NUMBER	FIGURE	ITEM
5975-01-521-3063	Figure 25-1	Table 25-8, Item 42f
TBD	Figure 25-1	Table 25-8, Item 43

CHAPTER 27
SUPPORTING INFORMATION — PART NUMBER INDEX

27.1. PART NUMBER INDEX.

Table 27-1 lists the part numbers associated with all parts and equipment shown in Chapter 25. The figure and item columns in Table 27-1 cross reference to the callout numbers of Figure 25-1 and the item number column of Table 25-8. Refer to Paragraph 25.3 for column explanations.

Table 27-1. Part Number Index

PART NUMBER	FIGURE	ITEM
822-1873-001	Figure 25-1	Table 25-8, Item 1a
822-1873-002	Figure 25-1	Table 25-8, Item 1b
987-6641-001	Figure 25-1	Table 25-8, Item 2
200-2470-010	Figure 25-1	Table 25-8, Item 3
987-6640-001	Figure 25-1	Table 25-8, Item 4
200-2442-110	Figure 25-1	Table 25-8, Item 5
L91, W-B-101, NH-15	Figure 25-1	Table 25-8, Item 6
LS14250, 221-0500-030	Figure 25-1	Table 25-8, Item 7
F02A250V2A	Figure 25-1	Table 25-8, Item 8
264-0295-000	Figure 25-1	Table 25-8, Item 8
257002	Figure 25-1	Table 25-8, Item 9
987-5167-001	Figure 25-1	Table 25-8, Item 10
987-6637-001	Figure 25-1	Table 25-8, Item 11
987-5006-001	Figure 25-1	Table 25-8, Item 12
987-5007-001	Figure 25-1	Table 25-8, Item 13
987-6323-001	Figure 25-1	Table 25-8, Item 14
013-1981-010	Figure 25-1	Table 25-8, Item 15
013-1981-020	Figure 25-1	Table 25-8, Item 16
822-1951-xxx	Figure 25-1	Table 25-8, Item 17
987-4640-001	Figure 25-1	Table 25-8, Item 18
987-5016-001	Figure 25-1	Table 25-8, Item 19
987-7002-001	Figure 25-1	Table 25-8, Item 20
987-5015-001	Figure 25-1	Table 25-8, Item 21
987-4975-001	Figure 25-1	Table 25-8, Item 22
987-5008-001	Figure 25-1	Table 25-8, Item 23

Table 27-1. Part Number Index - Continued

PART NUMBER	FIGURE	ITEM
426-0227-010	Figure 25-1	Table 25-8, Item 24
987-5009-001	Figure 25-1	Table 25-8, Item 25
987-5019-001	Figure 25-1	Table 25-8, Item 26
987-5011-001	Figure 25-1	Table 25-8, Item 27
987-5182-001	Figure 25-1	Table 25-8, Item 28
987-5012-001	Figure 25-1	Table 25-8, Item 29
987-5014-001	Figure 25-1	Table 25-8, Item 30
987-5002-001	Figure 25-1	Table 25-8, Item 31
987-5567-xxx	Figure 25-1	Table 25-8, Item 32
987-5180-001	Figure 25-1	Table 25-8, Item 33
987-5013-001	Figure 25-1	Table 25-8, Item 34
987-5020-001	Figure 25-1	Table 25-8, Item 35
987-5017-001	Figure 25-1	Table 25-8, Item 36
987-5010-001	Figure 25-1	Table 25-8, Item 37
987-4970-001	Figure 25-1	Table 25-8, Item 38
013–1928–020	Figure 25-1	Table 25-8, Item 39
987-7050-001	Figure 25-1	Table 25-8, Item 40
987-7296-001	Figure 25-1	Table 25-8, Item 40a
200-2442-120	Figure 25-1	Table 25-8, Item 40b
987-6279-001	Figure 25-1	Table 25-8, Item 41
270-3609-140	Figure 25-1	Table 25-8, Item 41a
987-6315-001	Figure 25-1	Table 25-8, Item 41b
987-6280-001	Figure 25-1	Table 25-8, Item 42
270-3609-150	Figure 25-1	Table 25-8, Item 42a
987-6315-001	Figure 25-1	Table 25-8, Item 42b
987-7137-001	Figure 25-1	Table 25-8, Item 42c
987-7139-001	Figure 25-1	Table 25-8, Item 42d
987-7138-001	Figure 25-1	Table 25-8, Item 42d.1
987-7137-001	Figure 25-1	Table 25-8, Item 42d.2
987-7136-001	Figure 25-1	Table 25-8, Item 42d.3
987-7135-001	Figure 25-1	Table 25-8, Item 42e
987-5006-001	Figure 25-1	Table 25-8, Item 42f
426-0228-010	Figure 25-1	Table 25-8, Item 43

CHAPTER 28
SUPPORTING INFORMATION — BASIC ISSUE ITEMS LIST

28.1. INTRODUCTION.

This chapter lists the basic issue items (BII) for the DAGR to help you inventory items for safe and efficient operation of the equipment. The BII information lists essential items that are required to place the DAGR in operation, operate it, and to do emergency repairs. Although shipped separately packaged, BII must be with the DAGR during operation and when it is transferred between property accounts. Listing these items is your authority to request/requisition them for replacement based on authorization of the end item by the TOE/MTOE. Refer to Figure 25-1 for illustrations to help you find and identify the items.

28.1.1. Explanation of Columns.

The basis issue items list (refer to Table 28-2) contains six columns and is explained as follows.

28.1.1.1. Column (1) — Illustration Number. Gives you the number of the item illustrated.

28.1.1.2. Column (2) — National Stock Number (NSN). Identifies the stock number of the item to be used for requisitioning purposes.

28.1.1.3. Column (3) — Description, CAGE, and Part Number. Identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The lines below the description are the Commercial Activity/Government Entity (CAGE) code and the manufacturer's part number.

28.1.1.4. Column (4) — Usable On Code. When applicable, gives you a code if the item you need is not the same for different models of equipment. The Usable On Code (UOC) is shown as “UOC: ...” in the column. Uncoded items are applicable to all models. Examples of identification are shown in Table 28-1.

Table 28-1. Usable On Code Explanation for BII

Code	Used On
A	Model M114-001
B	Model M114-002
C	Model M114-003

28.1.1.5. Column (5) — Unit of Measure (U/M). Indicates the physical measurement or count of the item as issued per the National Stock Number shown in column (2).

28.1.1.6. Column (6) — Qty Rqr. Indicates the quantity required.

28.1.2. Basic Issue Items List.

Refer to Figure 25-1 for illustrations of items listed in Table 28-2. The callout number shown in each illustration of Figure 25-1 cross references to the Illustration Number column in Table 28-2.

Table 28-2. Basic Issue Items List

(1) ILLUS-TRATION NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGE, AND PART NUMBER	(4) USABLE ON CODE	(5) U/M	(6) QTY RQR
Figure 25-1, item 12	5975-01-521-3063	DESC: INSTALLATION MOUNT (HOST PLATFORM) CAGE: 13499 PART NO: 987-5006-001	NA	1	1
Figure 25-1, item 15	5985-01-502-6692	DESC: ANTENNA, RA-1 REMOTE AND HELMET CAGE: 13499 PART NO: 013-1981-010	NA	1	1
Figure 25-1, item 18	5995-01-504-1762	DESC: CABLE, DAGR TO RA-1 (5 METERS) CAGE: 13499 PART NO: 987-4640-001	NA	1	1
Figure 25-1, item 26	6150-01-521-6757	DESC: CABLE, DAGR/DC POWER (FUSED, 5 METERS) CAGE: 13499 PART NO: 987-5019-001	NA	1	1
Figure 25-1, item 37	5895-01-521-3111	DESC: PERSONNEL CASE CAGE: 13499 PART NO: 987-5010-001	NA	1	1

CHAPTER 29
SUPPORTING INFORMATION — ADDITIONAL AUTHORIZATION LIST

29.1. INTRODUCTION.

This chapter lists additional items authorized for the support of the DAGR. This list identifies items that do not have to accompany the end item and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

29.1.1. Explanation of Columns.

The additional authorization list (refer to Table 29-2) contains five columns and are explained as follows.

29.1.1.1. Column (1) — National Stock Number (NSN). Identifies the stock number of the item to be used for requisitioning purposes.

29.1.1.2. Column (2) — Description, CAGE, and Part Number. Identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The lines below the description are the Commercial Activity/Government Entity (CAGE) code and the manufacturer's part number.

29.1.1.3. Column (3) — Usable On Code. When applicable, gives you a code if the item you need is not the same for different models of equipment. The Usable On Code (UOC) is shown as "UOC: ..." in the column. Uncoded items are applicable to all models. Examples of identification are shown in Table 29-1.

Table 29-1. Usable On Code Explanation for AAL

Code	Used On
A	Model M114-001
B	Model M114-002
C	Model M114-003

29.1.1.4. Column (4) — Unit of Measure (U/M). Indicates the physical measurement or count of the item as issued per the National Stock Number shown in column (1).

29.1.1.5. Column (5) — Qty Recm. Indicates the quantity recommended.

29.1.2. Additional Authorization List.

Table 29-2 lists additional items authorized for the support of the DAGR.

Table 29-2. Additional Authorization List

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION, CAGE, AND PART NUMBER	(3) USABLE ON CODE	(4) U/M	(5) QTY RECM
6135-01-521-3064	DESC: BATTERY PACK, PRIMARY 4-CELL CAGE: 13499 PART NO: 987-6641-001	NA	1	1
5340-01-521-4394	DESC: INSTALLATION MOUNT ADAPTER (HOST PLATFORM)	NA	1	1

Table 29-2. Additional Authorization List - Continued

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION, CAGE, AND PART NUMBER	(3) USABLE ON CODE	(4) U/M	(5) QTY RECM
	CAGE: 13499 PART NO: 987-5007-001			
5935-01-521-3067	DESC: KEYFILL CABLE ADAPTER BRACKET KIT CAGE: 13499 PART NO: 987-6323-001	NA	1	1
5985-01-521-1775	DESC: ANTENNA, RA-2 REMOTE CAGE: 13499 PART NO: 013-1981-020	NA	1	1
TBD	DESC: ANTI-JAM ACCESSORY (HOST PLATFORM) CAGE: 13499 PART NO: 822-1951-xxx	NA	1	1
5995-01-521-4244	DESC: CABLE, DAGR TO RA-1 (10 METERS) CAGE: 13499 PART NO: 987-5016-001	NA	1	1
5995-01-521-6753	DESC: CABLE, DAGR TO HELMET ANTENNA CAGE: 13499 PART NO: 987-7002-001	NA	1	1
5995-01-521-2941	DESC: CABLE, DAGR TO RA-2 (10 METERS) CAGE: 13499 PART NO: 987-5015-001	NA	1	1
6130-01-521-3157	DESC: CABLE, DAGR/AC POWER CAGE: 13499 PART NO: 987-4975-001	NA	1	1
6150-01-521-2548	DESC: CABLE, DAGR/CIGARETTE LIGHTER POWER CAGE: 13499 PART NO: 987-5008-001	NA	1	1
TBD	DESC: CABLE, DAGR TO COLD WEATHER BATTERY PACK CAGE: 13499 PART NO: 426-0227-010	NA	1	1
6150-01-521-6755	DESC: CABLE, DAGR/DC POWER (FUSED, 2 METERS)	NA	1	1

Table 29-2. Additional Authorization List - Continued

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION, CAGE, AND PART NUMBER	(3) USABLE ON CODE	(4) U/M	(5) QTY RECM
	CAGE: 13499 PART NO: 987-5009-001			
5995-01-521-2713	DESC: CABLE, DAGR/DAGR/PLGR CAGE: 13499 PART NO: 987-5011-001	NA	1	1
5995-01-521-3071	DESC: CABLE, BRADLEY VEHICLE DATA ADAPTER (13 INCHES) CAGE: 13499 PART NO: 987-5182-001	NA	1	1
5995-01-521-3198	DESC: CABLE, DAGR/PC CAGE: 13499 PART NO: 987-5012-001	NA	1	1
5995-01-521-3187	DESC: CABLE, DAGR/SINCGARS CAGE: 13499 PART NO: 987-5014-001	NA	1	1
5995-01-521-2680	DESC: CABLE, DAGR/HAVE QUICK CAGE: 13499 PART NO: 987-5002-001	NA	1	1
TBD	DESC: CABLE, DAGR/AJ ACCESSORY (10 METERS) CAGE: 13499 PART NO: 987-5567-xxx	NA	1	1
5995-01-521-3185	DESC: CABLE, CRYPTO KEYFILL (13 INCHES) CAGE: 13499 PART NO: 987-5180-001	NA	1	1
5995-01-521-3182	DESC: ADAPTER, PLGR/SINCGARS CABLE (10 INCHES AND YELLOW LABEL) CAGE: 13499 PART NO: 987-5013-001	NA	1	1
6150-01-521-3510	DESC: ADAPTER, PLGR EXTERNAL POWER CABLE CAGE: 13499 PART NO: 987-5020-001	NA	1	1
5995-01-521-3120	DESC: ADAPTER, PLGR EXTERNAL ANTENNA CABLE	NA	1	1

Table 29-2. Additional Authorization List - Continued

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION, CAGE, AND PART NUMBER	(3) USABLE ON CODE	(4) U/M	(5) QTY RECM
	CAGE: 13499 PART NO: 987-5017-001			
8465-01-522-5638	DESC: ADAPTER, CARTRIDGE/TROUSER BELT CAGE: 13499 PART NO: 987-4970-001	NA	1	1
5825-01-469-6033	DESC: MOUNT, HELMET ANTENNA CAGE: 13499 PART NO: 013-1928-020	NA	1	1
TBD	DESC: BATTERY PACK, COLD WEATHER CAGE: 13499 PART NO: 987-7050-001	NA	1	1
5985-01-521-2395	DESC: KIT, GLS SINGLE DAGR RECEIVER ANTENNA MOUNTING POLE CAGE: 13499 PART NO: 987-6279-001	NA	1	1
5985-01-521-2625	DESC: KIT, SUB-MIL DUAL DAGR RECEIVER ANTENNA MOUNTING POLE CAGE: 13499 PART NO: 987-6280-001	NA	1	1
TBD	DESC: CABLE, DAGR RS422/USB CAGE: 13499 PART NO: 426-0228-010	NA	1	1

CHAPTER 30
SUPPORTING INFORMATION — EXPENDABLE AND DURABLE ITEMS LIST

30.1. INTRODUCTION.

This chapter lists expendable and durable items (EDI) that you will need to operate and maintain the DAGR. This list is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V Repair Parts, and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

30.1.1. Explanation of Columns.

The expendable and durable items list (refer to Table 30-1) contains five columns and are explained as follows.

30.1.1.1. Column (1) — Item Number. This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item.

30.1.1.2. Column (2) — Level. This column identifies the lowest level of maintenance that requires the listed item (include as applicable: C = Operator/Crew, O = Unit/AVUM, F = Direct Support/AVIM, H = General Support, D = Depot).

30.1.1.3. Column (3) — National Stock Number. Identifies the stock number of the item to be used for requisitioning purposes.

30.1.1.4. Column (4) — Description, CAGE, and Part Number. Identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The lines below the description are the Commercial Activity/Government Entity (CAGE) code and the manufacturer's part number.

30.1.1.5. Column (5) — Unit of Measure (U/M). This code shows the physical measurement or count of an item such as gallon, dozen, gross, etc.

30.1.2. Expendable and Durable Items List.

Table 30-1 lists expendable and durable items needed to operate and maintain the DAGR.

Table 30-1. Expendable and Durable Items List

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGE, AND PART NUMBER	(5) U/M
1	C	6135-01-333-6101	DESC: Battery, lithium primary power CAGE: 83740 PART NO: L-91	4
2	C	6135-00-985-7845	DESC: Battery, standard primary power (nonrechargeable alkaline) CAGE: 81348 PART NO: W-B-101	4
3	C	6140-01-467-3225	DESC: Battery, nonstandard primary power (rechargeable nickel metal hydride) CAGE: 83740 PART NO: NH-15	4

Table 30-1. Expendable and Durable Items List - Continued

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGE, AND PART NUMBER	(5) U/M
4	C	6135-01-435-4921	DESC: Battery, lithium memory CAGE: 7X634 PART NO: LS14250	1
5	C	6135-01-435-4921	DESC: Battery, lithium memory (alternate) CAGE: 13499 PART NO: 221-0500-030	1
6	C	9150-01-132-8871	DESC: Lubricant - primary battery pack gasket, blade type fuse holder, HA cable breakaway connection, and CWBP battery pack gaskets CAGE: 02697 PART NO: 884-2	NA
7	C	5331-01-521-0987	DESC: Gasket, primary battery pack CAGE: 13499 PART NO: 200-2470-010	1
8	C	5331-01-521-1727	DESC: Gasket, memory battery cover CAGE: 13499 PART NO: 200-2442-110	1
9	C	6160-01-521-3136	DESC: Memory battery cover CAGE: 13499 PART NO: 987-6640-001	1
10	C	NA	DESC: Moisture covers (DAGR serial number 1 through 299) CAGE: 13499 PART NO: 987-5167-001	1
11	C	5935-01-521-0072	DESC: Moisture covers (DAGR serial number 300 and higher) CAGE: 13499 PART NO: 987-6637-001	1
12	C	5920-00-280-4960	DESC: Fuse (round, 2 amp/250 volt) for DAGR/AJ accessory cable CAGE: 81349 PART NO: F02A250V2A	1 per cable
13	C	5920-01-433-3097	DESC: Fuse (blade terminal, 2 amp, grey) for external DC power cables	1 per cable

Table 30-1. Expendable and Durable Items List - Continued

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGE, AND PART NUMBER	(5) U/M
			CAGE: 75915 PART NO: 257002	
14	C	NA	DESC: Cotton cloth CAGE: NA PART NO: NA	NA
15	C	NA	DESC: Cotton tipped swabs CAGE: NA PART NO: NA	NA
16	C	5120-00-056-3934	DESC: 3/16 inch flat tip screw driver CAGE: 62764 PART NO: 108X250	NA
17	C	5120-01-021-7470	DESC: Number zero phillips head screw driver CAGE: 62764 PART NO: 108X252	NA
18	C	5120-00-056-3933	DESC: Number one phillips head screw driver CAGE: 62764 PART NO: 108X254	NA
19	C	5120-01-398-9294	DESC: 3/8 inch wrench box and open CAGE: 53800 PART NO: 9-44693	NA
20	C	5120-00-162-2217	DESC: 1/16 inch hex socket screwdriver bit CAGE: 62764 PART NO: 108X197	NA
21	C	5920-01-317-5555	DESC: Fuse (round, 2 amp/250 volt) for cold weather battery pack CAGE: 13499 PART NO: 264-0295-000	1
22	C	5920-01-530-0424	DESC: Fuse cover for cold weather battery pack CAGE: 13499 PART NO: 987-7296-001	1
23	C	5331-01-530-0611	DESC: Fuse cover gasket for cold weather battery pack	1

Table 30-1. Expendable and Durable Items List - Continued

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGE, AND PART NUMBER	(5) U/M
			CAGE: 13499 PART NO: 200-2442-120	

APPENDIX A

A.1. CRYPTO LOGIC KEY ORDERING INSTRUCTIONS.

A.1.1. Introduction.

The NAVSTAR Global Positioning System is a US satellite-based radio-navigation system that provides accurate position, velocity, and time information to users on a continuous, all-weather, worldwide basis. GPS provides two levels of service: the Standard Positioning Service (SPS) and the Precise Positioning Service (PPS).

A.1.1.1. Standard Positioning Service (SPS). The SPS is a positioning and timing service that is available to all GPS users. The SPS accuracy is set at levels consistent with US national security interests. The SPS is intended primarily for civil use. Access to the SPS is openly available and does not require the use of cryptography.

A.1.1.2. Precise Positioning Service (PPS). The PPS is a highly accurate positioning, velocity, and timing service that is available only to users authorized by the US DoD. The PPS provides the greatest degree of GPS accuracy. The PPS is intended primarily for US military use. However, through special agreements with the US DoD, military and civil agencies of the national governments of US-allied and friendly countries are authorized access to the PPS. Access to the PPS is controlled through the use of cryptography.

A.1.1.3. Objective. The objective of this appendix is to provide procedures for ordering GPS cryptographic keying material. It is intended to inform all parties of these procedures and thereby facilitate the process of ordering keying material.

A.1.1.4. Authority. The Office of the Assistant Secretary of Defense (OASD) for Command, Control, Communications and Intelligence (C3I) designated Headquarters United States Space Command (HQ USSPACECOM) as the Controlling Authority for GPS PPS cryptographic keying material.

A.1.1.5. Reference.

- DOD Global Positioning System (GPS) Security Policy (S)
- US Space Command NAVSTAR Global Positioning System (GPS) Joint Operations Concept (JOC) (S)
- NTISSI No. 4006, Controlling Authorities for COMSEC Keying Material (FOUO)
- NTISSI No. 3006, Operational Security Doctrine for the NAVSTAR Global Positioning System (GPS) User Segment (FOUO)
- NTISSI No. 4003, Reporting COMSEC Insecurities (FOUO)
- National Communications Security (COMSEC) Glossary NCSC-9 (FOUO)
- NSTISSAM COMSEC/1-93, Nomenclature for Communications Security Material (FOUO)
- NAVSTAR Global Positioning System Selective Availability Anti-Spoofing Module Requirements CJCSI 6140.01, 15 Nov 1998

A.1.1.6. Explanation of Terms.

Table A-1. Explanation of Terms

TERM	EXPLANATION
Cryptonet	Stations that hold a specific key for use. For GPS, the cryptonet is the set of all PPS capable receivers.
Controlling Authority	The organization responsible for directing the establishment and operation of the cryptonet and managing the operational use of material assigned to the cryptonet.
Validating Authority	The organization responsible for validating user keying material requirements.

Table A-1. Explanation of Terms - Continued

TERM	EXPLANATION
Short Title	A combination of letters and numbers assigned to communications security (COMSEC) material (keys) for identification purposes.
Key Encryption Key (KEK)	A key that encrypts or decrypts other keys for transmission (rekeying) or storage.
Key Production Key (KPK)	A key used to initialize a key generator for production of other electronically generated keys.
Traffic Encryption Key (TEK)	A key that encrypts or decrypts plain text or previously encrypted information (cipher text).
Crypto Period	The time span a specific Crypto Variable is authorized for use or its designated effectivity period.
Red CRYPTO Key material	Unencrypted CRYPTO keys. Red GPS keys can be used by the GPS receiver with no preprocessing required.
Black CRYPTO Key material	Encrypted CRYPTO keys. Black GPS keys must first be decrypted before they can be used by the GPS receiver. For GPS, black keys can only be decrypted within a SAASM-based GPS receiver. GPS black keys are organized within separate and distinct black key cryptonets.
Black Key Cryptonet	The group of black GPS keys that have been encrypted using a common set of Initialization Parameters (IPs).
Initialization Parameters	Data used by the SAASM-based receiver to determine which algorithm to use when decrypting a GPS black key. With the Exception of the BKAUPD parameter (defined below), these IPs are loaded prior to the fielding of the SAASM receiver.
Daily Crypto Variable (CVd)	The daily Crypto Variable is the Traffic Encryption Key (TEK) for the GPS and is required by the GPS user to access the Precise Positioning Service (PPS). The CVd is obtained as a result of a KEK or KPK operation and is not distributed directly to the GPS user. The CVd has a crypto period of one day.
Weekly Crypto Variable (CVw)	The CVw is a KPK, which is used in the self-contained generation of CVd keys (TEKs) within the GPS user equipment. The GPS CVw is available to specified users in red form only (RCVw). It has a crypto period of one week and can be used to generate 7 CVd keys. The CVw is referred in some NSA publications as a Crypto Key Weekly (CKW).
Monthly Crypto Variable (CVm)	The CVm is a KPK, which is used in the self-contained generation of CVd keys (TEKs) within the GPS user equipment. The GPS CVm is available to specified SAASM-based users in black form only (BCVm). BCVm keys have been organized in unique and distinct black key cryptonets. Multiple black key cryptonets have been defined, and each SAASM-based GPS receiver will be assigned to a specific black key net. For a BCVm to properly work in any given SAASM receiver, the black key cryptonet assignment for the BCVm must match that of the receiver. The BCVm has a crypto period of approximately one month and can be used to generate 28 CVd keys.
Group Unique Variables (GUV)	The GUV is a KEK, which is used to decrypt a portion of the GPS navigation message that contains an encrypted version of the CVd. There are five different GUV keys that have been organized into distinct user groups by policy. GUV keys for groups 1, 3, 4, and 5 are distributed to specified users in the red form (RGUV1, RGUV3, RGUV4, and RGUV5). GUV keys for group 2 are distributed to SAASM-based users in black form (BGUV2). Multiple black key cryptonets have been defined, and each SAASM-based GPS receiver will be assigned to a specific black key net. For a BGUV to properly work in any given SAASM receiver, the black key cryptonet assignment for the BGUV must match that of the receiver. All GUV keys have a crypto period of approximately 60 weeks.

Table A-1. Explanation of Terms - Continued

TERM	EXPLANATION
Black Key Algorithm Update (BKAUPD) Parameters	The BKAUPD is an IP that has been configured to look like a GPS key. The BKAUPD is considered CRYPTO and is used by the SAASM-based GPS receiver for two purposes: 1) Provide information to the SAASM to initiate an annual update to the resident black key decryption algorithm, and 2) instigate the transition of the SAASM-based receiver from one black key cryptonet to another. Multiple black key cryptonets have been defined, and each SAASM-based GPS receiver will be assigned to a specific black key net. For a BKAUPD to properly work in any given SAASM receiver, the black key cryptonet assignment for the BKAUPD must match that of the receiver and Cryptonet. BKAUPD parameters are distributed in black form only and have a crypto period of approximately one year. The crypto period of the BKAUPD is synchronous with that of the GPS GUV (60 weeks) keys.
Selective Available Anti-Spoofing Module (SAASM)	SAASM is a security module that is embedded in newer generations of GPS user equipment. The SAASM functions to protect all GPS keys, and it is the only item capable of decrypting a RED GUVS/CVW and BLACK GPS BCVm, BGUV2, or BKAUPD key.
Key Data Processor (KDP)	The KDP is the crypto processor that resides within the SAASM.

A.1.2. GPS Key Material Description.

A.1.2.1. Operational Key Material. NSA defines operational key as 'key intended for use on-the-air for protection of operational information or for the production or secure electrical transmission of key streams.'

A.1.2.1.1. Operational GPS user keys include the RCVw, BCVm, RGUV and BGUV. Each of these keys can be input into the GPS UE for purposes of generating (RCVw or BCVm) or acquiring (RGUV or BGUV) the daily key (CVd). The operational difference between the RCVw/BCVm and the red and black GUV keys is the strategy and time required to acquire the GPS satellite signal. Since a PPS capable receiver can derive the CVd directly from either the RCVw or BCVm (must be SAASM-based to use the BCVm), it can generate the CVd before it tracks any GPS satellite vehicles (SVs). Therefore, a receiver containing either the RCVw or BCVm can immediately transition from the SPS to the PPS as soon as it starts to track GPS signals. However, a PPS capable receiver that has one of the RGUVs or the BGUV (must be SAASM based to use the BGUV) loaded must first track the signal from a GPS SV, download the navigation (nav) message that is embedded in that signal, and decrypt the CVd that is contained in a portion of the nav message before it can transition from SPS to PPS operations. The act of downloading the nav message from the GPS signal in order to get the CVd can take as long as 12.5 minutes.

A.1.2.1.2. As a result of its special capability, the CVw key will have limited distribution to those users who demonstrate a valid need to initially acquire GPS satellite signals in a minimal amount of time (fast acquisition). The BCVm functions equally with the RCVw, however, the BCV can be issued to a much broader set of authorized users due to the inherent security that stems from the fact that the BCVm is distributed black and can only be decrypted red inside a SAASM-based GPS user set. Operational red keys are classified CONFIDENTIAL and are marked CRYPTO. Operational black keys are unclassified and marked CRYPTO.

A.1.2.1.3. Additionally, the BKAUPD parameter is an operational GPS key that provides critical information to the SAASM BKA. This key is not used for the purpose of obtaining the CVd, but it is an integral component of the SAASM decryption of black GPS keys.

A.1.2.2. Maintenance Key Material. NSA defines a maintenance key as 'key intended only for off-the-air, in-shop use'.

A.1.2.2.1. Maintenance GPS user keys include the RCVw, BCVm, RGUV and BGUV. Each of these keys can be input into the GPS UE for troubleshooting the key fill interfaces of GPS user equipment. The maintenance key does not allow a user to gain access to the daily encryption key. Maintenance keys are not intended for use in troubleshooting the operations of the receiver, nor are they intended for use in association with GPS simulators. Maintenance keys are unclassified, are marked CRYPTO, and may be reused until physically unusable.

A.1.2.3. Key Format Description. GPS keying material is provided in four different formats to accommodate various methods of key loading. Note that not all GPS keys are available in all of the four formats.

A.1.2.3.1. Eight-Level Punched Paper Tape Key Format. The eight-level punched tape format can only be read by the KOI-18 General Purpose Tape Reader. For the purposes of loading punched tape key into GPS user equipment, the KOI-18 can load the key

directly into the user set or it can load the key into a number of NSA designated common fill devices. These devices include, but are not limited to, the KYK-13 Electronic Transfer Device (capable of loading multiple keys), and the AN/CYZ-10 Data Transfer Device (DTD). All GPS user keys are available in the eight-level punched paper tape format.

A.1.2.3.2. Hexadecimal/Decimal Black/Red Printed Keylist Format. If hexadecimal black/red keylist is required contact HQ USSPACECOM/J6O (DSN 271-0685/4150/8556, Coml 402-294-0685/8556) COMSEC CUSTODIAN ONLY. Decimal printed keys are in the process of being phased out. These keys will continue to be provided to users that currently have GPS equipment that can only be loaded with this type of key. No new programs will be authorized decimal printed keys.

A.1.2.3.3. Electronic Key Format. The electronic key format is a digital form of the key that is transferred directly to an approved key fill device such as the KYK-13 or the CYZ-10 via an NSA approved electronic key distribution system. The Electronic Key Management System (EKMS) is an example of a key distribution system.

A.1.2.3.3.1. All operational GPS keys are being generated in the electronic format. Electronic keys circumvent the need for the costly generation of paper-based keying material, and provide for a more rapid and secure means to distribute keys to all of the GPS users.

A.1.2.4. Key Short-Titles . A short title is an identifying combination of letters and numbers assigned to COMSEC material for brevity. It consists of a group of alphabetical designators followed by an alphanumeric suffix. The combination of letters and numbers known as the GPS short titles are unique and are assigned only to GPS cryptographic keying material. The GPS keying material short titles are used exclusively for ordering and managing GPS cryptographic material.

A.1.2.4.1. Key Short Title Alphabetic Portion . Table A-2 defines the alphabetical portion of the key short titles:

Table A-2. Key Short Title Alphabetic Portion Description

ALPHABETIC PORTION OF SHORT TITLE	DESCRIPTION
AKAT	Operational key, 8-level punched paper tape format, releaseable to authorized GPS PPS users
AKAK	Operational key, keylist format (hex or decimal), releaseable to authorized GPS PPS users (call controlling authority)
AKAD	Operational key, electronic format, releaseable to authorized GPS PPS users
AKZT	Test/Simulator key, 8-level punched paper tape format, releaseable to authorized GPS PPS users
AKZK	Test/Simulator key, keylist format (hex or decimal), releaseable to authorized GPS PPS users (call controlling authority)
AKZD	Test/Simulator key, electronic format, releaseable to authorized GPS PPS users
USKAT	Operational key, 8-level punched paper tape format, releaseable to U.S. GPS PPS users only
USKAK	Operational key, keylist format (hex or decimal), releaseable to U.S. GPS PPS users only
USKAD (Not used)	Operational key, electronic format, releaseable to U.S. GPS PPS users only
USKZT	Test/Simulator key, 8-level punched paper tape format, releaseable to U.S. GPS PPS users only (call controlling authority)
USKZK	Test/Simulator key, keylist format (hex or decimal), releaseable to U.S. GPS PPS users only (call controlling authority)
USKZD	Test/Simulator key, electronic format, releaseable to U.S. GPS PPS users only

Table A-2. Key Short Title Alphabetic Portion Description - Continued

ALPHABETIC PORTION OF SHORT TITLE	DESCRIPTION
KMT	Maintenance key, 8-level punched paper tape format, releaseable to authorized GPS PPS users
KMK	Maintenance key, keylist format (hex or decimal), releaseable to authorized GPS PPS users (call controlling authority)

A.1.2.5. Key Short Title Alphanumeric Portion. Table A-3, and Table A-4, define the key short title alpha numeric portion for red operational and maintenance, and black GPS keys respectively:

Table A-3. Key Short Title Alphanumeric Portion – Red Operational and Maintenance Keys

KEY TYPE	ALPHANUMERIC PORTION OF SHORT TITLE
Red CV Weekly	A1001 (punched tape and hex), F1001 (decimal)
Red GUV1	A1101 (punched tape and hex), F1101 (decimal)
Red GUV3	A1103 (punched tape and hex), F1103 (decimal)
Red GUV4	A1104 (punched tape and hex), F1104 (decimal)
Red GUV5	A1105 (punched tape and hex), F1105 (decimal)

Table A-4. Key Short Title Alphanumeric Portion – Black GPS Keys

KEY TYPE	ALPHANUMERIC PORTION OF SHORT TITLE
Black CV Monthly	101xxx, where xxx is the black key cryptonet number
Black GUV2	102xxx, where xxx is the black key cryptonet number
BKAUPD Parameter	103xxx, where xxx is the black key cryptonet number

A.1.2.6. Crypto Periods. The crypto period of a GPS key is the amount of time that the key is valid and can be used. At the time of this document's publication, the crypto period for red CV weekly keys is one week, and the crypto period for the red GUV key is 60 weeks. Note that the GPS year does not coincide with the calendar year, and the actual date of the rollover is classified CONFIDENTIAL. Table A-5 describes the crypto periods of all GPS user keys.

Table A-5. GPS User Key Crypto Periods

KEY TYPE	CRYPTO PERIOD
Red CV Weekly	7 days
Red GUV	60 weeks
Black CV Monthly	28 days
Black GUV2	60 weeks
BKAUPD Parameter	60 weeks

A.1.2.7. Key Editions. GPS user keys are not distributed one key at a time. In order to streamline the distribution process, multiple keys are packaged together. A package of keys is known as an edition of key. Each key edition has an alphabetic designator. The Controlling Authority (CA) disseminates the effectivity period of each key edition to the GPS user. The following paragraphs describe the key edition configuration for each GPS user key.

A.1.2.7.1. Red CV Weekly Paper Key Editions. An edition of red CV weekly key in 8-level punched paper tape, printed hex or printed decimal formats is packaged in canisters where each canister contains 18 paper segments. There are 3 copies each of 6 contiguous RCVw keys. Therefore an edition of RCVw key is effective for 6x1 week = 6 weeks (42 days).

A.1.2.7.2. Red CV Weekly Electronic Key Editions. An edition of red CV weekly key in electronic format contains one digital copy of each of the 6 unique RCVw keys. With the electronic format there is no need to store duplicate copies of the same key.

A.1.2.7.3. Red GUV Paper Key Editions. An edition of red GUV key (RGUV1, RGUV3, RGUV4 or RGUV5) in 8-level punched paper tape, printed hex or printed decimal formats is packaged in canisters where each canister contains 12 paper segments. The canister contains 12 identical copies of the same RGUV1, RGUV3, RGUV4 or RGUV5 key each segment is good for the entire effective period. This allows the user to pull a new copy of their associated RGUV key approximately once per month for the entire 60 weeks that RGUV key is effective.

A.1.2.7.4. Red GUV Electronic Key Editions. An edition of red GUV key (RGUV1, RGUV3, RGUV4 or RGUV5) in electronic format contains one digital copy of the applicable GUV key. With the electronic format there is no need to store duplicate copies of the same key.

A.1.2.7.5. Black CV Monthly Paper Key Editions. An edition of black CV monthly key in 8-level punched paper tape or printed hexadecimal format is packaged in canisters where each canister contains 6 paper segments. There is 1 primary key and 1 copy for each 28-day period with a total of 3 contiguous BCVm keys. Therefore an edition of BCVm key is effective for 84 days (3 seg x 28 days effective period or 12 weeks).

A.1.2.7.6. Black CV Monthly Electronic Key Editions. An edition of black CV monthly key in electronic format contains one digital copy of each of the 3 unique BCVm keys. With the electronic format there is no need to store duplicate copies of the same key.

A.1.2.7.7. Black GUV2 Paper Key Editions. An edition of black GUV2 key in either the 8-level punched paper tape or printed hexadecimal format is packaged in canisters where each canister contains 15 paper segments. The canister contains 15 identical copies of the BGUV2 key each segment is effective for the entire effective period. This allows the user to pull a new copy of BGUV2 key approximately once per month for the entire 60 weeks that BGUV2 is effective. Figure 4 shows the configuration of each segment in a black GUV2 key canister.

A.1.2.7.8. Black GUV2 Electronic Key Editions. An edition of black GUV2 key in electronic format contains one digital copy of the BGUV2 key. With the electronic format there is no need to store duplicate copies of the same key.

A.1.2.7.9. BKAUPD Parameter Paper Key Editions. An edition of BKAUPD parameters in either the 8-level punched paper tape or printed hexadecimal format is packaged in canisters where each canister contains 15 paper segments. The canister contains 15 identical copies of the BKAUPD parameter. Each segment is good for the entire effective period. This allows the user to pull a new copy of BKAUPD parameter approximately once per month for the entire 60 weeks that BKAUPD parameter is effective.

A.1.2.7.10. BKAUPD Parameter Electronic Key Editions. An edition of BKAUPD parameter in electronic format contains one digital copy of the BKAUPD parameter. With the electronic format there is no need to store duplicate copies of the same key.

A.1.3. Key Ordering Information.

A.1.3.1. Guidance For Ordering Crypto Keys For DAGR.

A.1.3.1.1. The user must know the type of key loading device that will be used to load the key. This defines what format of key should be ordered. Most users will order eight-level punched tape format, for use with KOI-18 tape reader and either the KYK-13 or DTD key storage/transfer devices. If your local COMSEC account can support electronic key transfers, Electronic format is preferable over the paper tape. If you do not have access to key loading equipment, order the Hexadecimal printed format.

A.1.3.1.2. DAGR is equipped with SAASM, and is therefore compatible with black keys. While red keys are not prohibited (yet), the use of black keys is strongly advised.

A.1.3.1.3. When ordering black keys, it is necessary to determine whether the GUV or CVm is desired. The Black CVm supports secure, fast direct-Y acquisition and tracking, but must be loaded monthly. The GUV is only loaded annually, but requires initial acquisition on the unsecured C/A code, and 12.5 minutes of download time before transitioning to Y-code track. Most users will desire the CVm for the faster, secure acquisition. However, if the keying process is difficult for your application, you may require the GUV.

A.1.3.1.4. When ordering black keys, the user must then know in what black key cryptonet that equipment resides. If the black key cryptonet for both the black key and the user set do not match, the black key will not work. Normally, you will order keys to match the currently active cryptonet. Most US DAGRs will be in cryptonet 01.

A.1.3.1.5. When ordering black keys, be sure to also order the BKAUPD parameter for the associated black key cryptonet. Loading the BKAUPD parameter prior to loading the operational black key will help to ensure that the black key will be accepted and work properly.

A.1.3.2. Red Operational Keys. Table A-6 describes each of the red operational keys that can be ordered:

Table A-6. Operational Red GPS User Keys

SHORT TITLE	DESCRIPTION	FORMAT
AKAT A1001	Red CV Weekly	8-level punched paper tape
AKAK A1001	Red CV Weekly	Hexadecimal keylist, call controlling authority (C/A)
AKAK F1001	Red CV Weekly	Decimal keylist, call, C/A
AKAD A1001	Red CV Weekly	Electronic
AKAT A1101	Red GUV1	8-level punched paper tape
AKAK A1101	Red GUV1	Hexadecimal keylist, call C/A
AKAK F1101	Red GUV1	Decimal keylist, call, C/A
AKAD A1101	Red GUV1	Electronic
AKAT A1103	Red GUV3	8-level punched paper tape
AKAK A1103	Red GUV3	Hexadecimal keylist, call C/A
AKAK F1103	Red GUV3	Decimal keylist, call, C/A
AKAD A1103	Red GUV3	Electronic
AKAT A1104	Red GUV4	8-level punched paper tape
AKAK A1104	Red GUV4	Hexadecimal keylist, call C/A
AKAK F1104	Red GUV4	Decimal keylist, call, C/A
AKAD A1104	Red GUV4	Electronic
AKAT A1105	Red GUV5	8-level punched paper tape
AKAK A1105	Red GUV5	Hexadecimal keylist, call C/A
AKAK F1105	Red GUV5	Decimal keylist, call, C/A
AKAD A1105	Red GUV5	Electronic

A.1.3.3. Black Operational Keys. Black Keys for DAGR will be ordered by short title as shown in Table A-7 below:

Table A-7. Operational Black GPS User Keys

SHORT TITLE	DESCRIPTION	FORMAT
USKAT 10xxx	Black CV Monthly	8-level punched paper tape
USKAK 101xxx	Black CV Monthly	Hexadecimal keylist
USKAD 101xxx	Black CV Monthly	Electronic
USKAT 102xxx	Black GUV2	8-level punched paper tape

Table A-7. Operational Black GPS User Keys - Continued

SHORT TITLE	DESCRIPTION	FORMAT
USKAK 102xxx	Black GUV2	Hexadecimal keylist
USKAD 102xxx	Black GUV2	Electronic
USKAT 103xxx	BKAUPD Parameter	8-level punched paper tape
USKAK 103xxx	BKAUPD Parameter	Hexadecimal keylist
USKAD 103xxx	BKAUPD Parameter	Electronic

NOTE

The last 3 digits of the short title (represented here as xxx) are to be filled in with the appropriate three-digit cryptonet number, i.e., a monthly key in 8-level punched tape for cryptonet 01 would be USKAT 101001, and an electronic GUV for cryptonet 40 would be USKAD 102040. When ordering a black key, choose the appropriate key (Monthly or GUV), and the equivalent BKAUPD parameter in the same cryptonet and format; i.e., USKAK 101001 and USKAK 103001.

A.1.3.4. Black Maintenance Keys. Table A-8 describes each of the black maintenance (test) keys that can be ordered:

Table A-8. Maintenance Black GPS User Keys

SHORT TITLE	DESCRIPTION	FORMAT
KMT 101060	Black CV Monthly	8-level punched paper tape
KMK 101060	Black CV Monthly	Hexadecimal keylist
KMD 101060	Black CV Monthly	Electronic
KMT 102060	Black GUV2	8-level punched paper tape
KMK 102060	Black GUV2	Hexadecimal keylist
KMD 102060	Black GUV2	Electronic
KMT 103060	BKAUPD Parameter	8-level punched paper tape
KMK 103060	BKAUPD Parameter	Hexadecimal keylist
KMD 103060	BKAUPD Parameter	Electronic

A.1.4. GPS Key Management Structure.

A.1.4.1. Overview. Every effort has been made to use standard COMSEC procedures when requesting, shipping, and destroying GPS cryptographic keying material. However, because GPS has worldwide applications and the number of users will exceed those of other crypto systems by several orders of magnitude, special procedures are necessary for the application, approval and distribution of the GPS cryptographic keying material.

A.1.4.2. Controlling Authority. The Controlling Authority for GPS user keys is STRATCOM/J6623 at Offutt AFB, NE.

A.1.4.3. Validating Authority. The Validating Authority function for GPS keying material is performed by the following organizations:

US Army	USARSPACE/MOSC-OO for Army contractors
	CSLA/SELCL-KPD-KEY for Army units
US Air Force	HQ AFSPACECOM/DOGS

US Navy	COMNAVSPACECOM/N312
US Marine Corps	COMDT MARINE CORPS/CSBT
US Coast Guard	COGARD-TISCOM/OPS4
NASA	NASA HQ Code OI

A.1.4.4. GPS Key Request Process. There is a unique key ordering process for US DoD, US DoD contractors, US non-DoD government agencies, US civil, and foreign users. The key request structure is illustrated in Figure A-1.

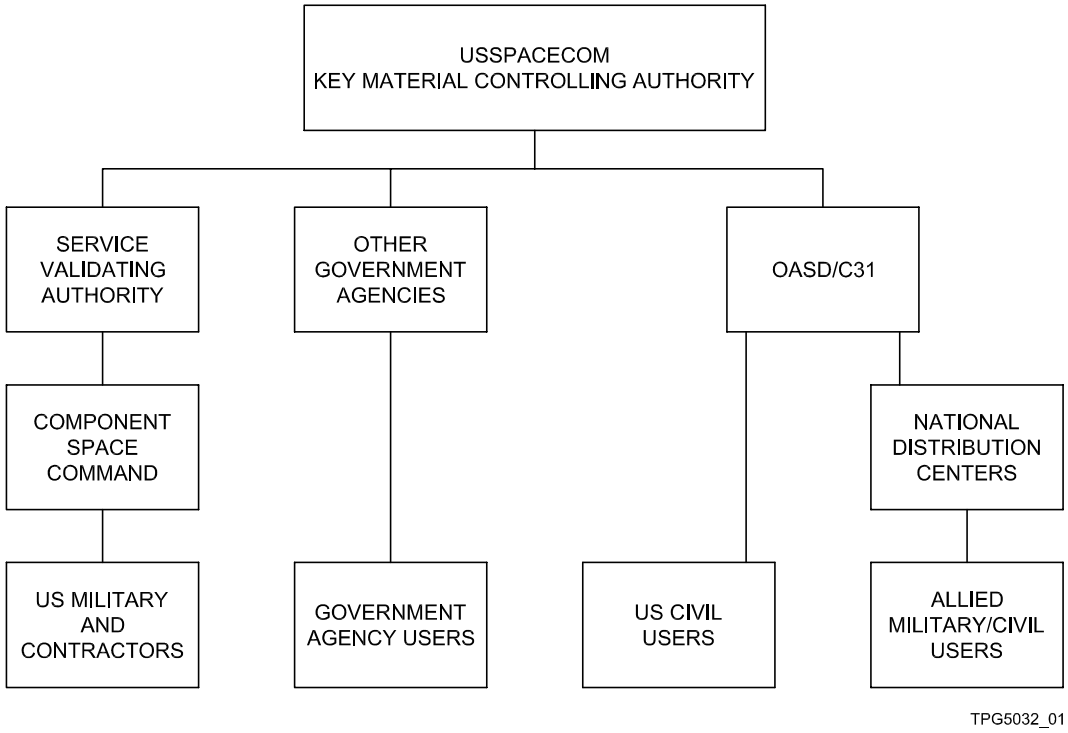


Figure A-1. Key Request Structure

A.1.4.5. US Military Users. All DoD PPS users operating crypto capable GPS receivers are authorized users of GPS crypto keys, provided they possess a confidential clearance. Requests for GPS PPS keying material must follow the Services standard COMSEC procedures. In general, the user contacts the organization's COMSEC custodian who submits the necessary unit and mission information along with the desired GPS keying material short titles to the appropriate Service Validating Authority with an information copy to the GPS COMSEC Manager.

A.1.4.5.1. The validating authority consolidates, validates, and forwards all requests to the GPS Controlling Authority. The Controlling Authority reviews each key request for compliance with DoD policy regarding type of keys authorized and GUV assignment. Validating authorities are notified by the Controlling Authority if a request for keys appears to violate DoD policy. Unresolved conflicts will be processed by the Joint Chiefs of Staff (JCS) and forwarded to OASD/C3I, as appropriate.

A.1.4.5.2. Upon review, the GPS Controlling Authority sends authorizations to the appropriate Crytpological Distribution Center to distribute keying material. Information copies of the authorization are also sent to the component command and to the user COMSEC custodian.

A.1.4.5.3. DoD contractors must request keying material through their sponsoring Service Contracting Officer. Requests are then forwarded to the appropriate Service Validating Authority and Controlling Authority.

A.1.4.6. Other Government Agency Users. For a Government agency to be an authorized user of GPS crypto keying material, a Memorandum of Agreement (MOA) must first be established between DoD and that agency. MOAs should be submitted

to OASD/C3I for processing. A validating authority for that agency should be established in the MOA OASD/C3I forwards all validated requests to the Controlling Authority for action.

A.1.4.7. Foreign Users (Military and Civil). Prior to receipt of crypto-capable user equipment, crypto keys and associated fill devices, a foreign government must negotiate appropriate security Memoranda of Understanding (MOU) with the US DoD. They must have received the specific approval of OASD/C3I. Once the MOU is established, users must submit their requests through their Minister of Defense to OASD/C3I for approval. OASD/C3I will forward requests to Controlling Authority for processing.

A.1.4.8. US Civil Users. All Civil Users without a DoD sponsor must submit GPS crypto access requirements to OASD/C3I for approval. Upon approval, Civil User must submit request for keying material to Controlling Authority in accordance with Industrial Security standards. Upon completion of review, Controlling Authority will instruct NSA to distribute keying material to the user.

A.1.5. GPS Key Material Security.

A.1.5.1. Reporting Insecurities.

A.1.5.1.1. All PPS users will report incidents of suspected compromise of keying material to the GPS Controlling Authority and inform their chain of command, validating authority and NSA/V4131. Specific guidance for reportable insecurities can be found in NTISSI No. 4003 and appropriate Service or NATO regulations.

A.1.5.1.2. All lost GPS/SAASM receivers must be reported to the Controlling Authority by type and serial number.

A.1.5.2. Adjudicating Security Incidents. HQ USSPACECOM/J60, as the GPS Controlling Authority, is responsible for evaluating all security incidents. In coordination with and NSA, Controlling Authority will take appropriate action and notify users to resolve any security incident involving GPS keying material.

A.1.6. Message and Mailing Addresses.

A.1.6.1. GPS Controlling Authority. HQ United States Strategic Command (USSTRATCOM)

GPS COMSEC MANAGER

- **Primary POC** — MSgt Mary Grier
- **DSN** — 271-0685
- **COM** — 402-294-0685
- **Alt POC** — Mr. Dennis Minich
- **DSN** — 271-4150
- **COM** — 402-294-4150
- **FAX** — Unclass – DSN Secure – DSN

A.1.7. More Information.

Questions, comments or suggestions regarding this appendix should be directed to the GPS COMSEC manager, MSgt Grier at DSN 271-0685 or COM 402-294-0685; or Mr. Minich at DSN 271-4150 or COM 402-294-4150.

APPENDIX B

B.1. LIST OF ABBREVIATIONS / ACRONYMS.

Term	Definition
µs	Microsecond
1-D	One Dimensional
1-D POS-A	One Dimensional Position Alert
1-PPS	1 Pulse Per Second
10-PPS	10 Pulses Per Second
2-D	Two Dimensional
2-D POS-A	Two Dimensional Position Alert
2-D-E	Two Dimensional Error
2DRMS	Twice the RMS Horizontal Error
3-D	Three Dimensional
3-D POS-A	Three Dimensional Position Alert
3-D-E	Three Dimensional Error
	A
AAL	Additional Authorization List
ACE	Acquisition Correlator Engine
ADC	Advanced Data Controller
AEPS	Army Electronic Product Support
AFCSC	Air Force Cryptologic Support Center
AJ	Anti-Jam
AJA	Anti-Jam Accessory
ALM	Almanac
ALRT	Alert
AMK	Automark
ANC	Anchor
ANC-A	Anchor Alert
ANCD	Automated Net Control Device
Ang	Angle
AR-A	Area Alert
A-S	Anti-Spoof
ASTM	American Society for Testing and Materials
AVG	Average
AVIN	All in View Navigation
AWP	Approach Waypoint
AZ	Azimuth
	B
B-ALRT	Buffer Alert
batt	Battery
BB	Broadband
BCVM	Black Crypto Variable Monthly
BII	Basic Issue Item
BIT	Built-In-Test

Term	Definition
BKAUPD	Black Key Algorithm Update Parameters
BL	Boundary Line
BL-A	Boundary Line Alert
BNG	British National Grid
BOI	Basis Of Issue
BrnRSO	Borneo Rectified Skew Orthomorphic Grid
BRT	Brightness (Display / Keypad Lighting)
BZ	Buffer Zone
BZ-A	Buffer Zone Alert
BZP	Buffer Zone End Points

C

C	Celsius or Centigrade
C4I	Command, Control, Communications, Computers & Intelligence
C/A or CA	Coarse/Acquisition
CADRG	Compressed Arc Digitized Raster Graphics
CAGE	Commercial Activity/Government Entity
CALC	Calculate
CAS	Close Air Support
C-ALRT	Corridor Alert
CCI	Controlled Cryptographic Items
CD	Code or Compact Disc
CECOM	Communication-Electronics Command
CEP	Circular Error Probable
CeylonB	Ceylon Belt
CIB	Controlled Image Base
CLR	Clear
CLSA	Communications Security Logistics Agency
COA	Center Of Arc
COEI	Components Of End Item
COM	Communications Port
COMP	Compression
COMSEC	Communications Security
CONT	Continuous
CONUS	Continental United States
COR	Corridor
COR-A	Corridor Alert
CPN	Collins Part Number
CRS	Course
CSE	Control Segment Error
CSMA	Carrier Sense Multiple Access
CTS	Clear To Send
CV	Crypto Variable
CVD	Crypto Variable Daily
CVM	Crypto Variable Monthly
CVW	Crypto Variable Weekly
CW	Continuous Wave
CWBP	Cold Weather Battery Pack

D

D	Elevation as Datum/Ellipsoid

Term	Definition
DB	Decibel
DAGR	Defense Advanced GPS Receiver
DBW	Decibels Reference To 1 Watt
DC	Direct Current
DCMS	Directorate of COMSEC Material System
DDMC	Digital Data Mode Control
DEG or °	Degree
DESEL	Deselect
DGPS	Differential Global Positioning System (same as LADGPS)
DII	Defense Information Infrastructure
DIR	Direction
DIST	Distance
dm	Degrees, Minutes
DMM-A	Datum Mis-Match Alert
dms	Degrees, Minutes, Seconds
DOD	Department Of Defense
DOP	Dilution Of Precision
DOS	Department Of State
DS	Direct Support
DS-2	Decontamination Solution Number 2
DSF	Days Since Fix
DTD	Data Transfer Device
DTG	Date / Time / Group
DTM	Datum
Dur	Duration
DX	Direct Exchange

E

E	East
EA	External Antenna
EAR	Export Administration Regulation
EAZ	Estimated Azimuth Error
EDI	Expendable and Durable Item
EELA	Estimated Elevation Error
EHE	Estimated Horizontal Error
EIC	End Item Code
EIR	Equipment Improvement Recommendation
EKMS	Electronic Key Management System
EL	Elevation
EL REF	Elevation Reference
ELA	Elevation Angle
ELD	Elevation Difference (NAV Pages)
ELH	Elevation Hold
EMI	Electromagnetic Interference
EMP	Electromagnetic Pulse
EPE	Estimated Position Error
ERR	Error
ET	Elapsed Time
ETE	Estimated Time Error
EVE	Estimated Vertical Error (1-D)
EW	Electronic Warfare
Ext	External

Term	Definition
	F
F	Fahrenheit or Fail
F ORG	False Origin
FEC	Forward Error Correction
FIX	Fix
FM	Field Manual
FOM	Figure Of Merit
FOUO	For Official Use Only
FPM	Feet Per Minute
FRM	From
FS	Fire Support
FT	Feet
ftpm	Feet per minute
FULL AIVN	Full All in View Navigation
FWD	Forward
	G
G	Gravity or Grid
GDOP	Geometric Dilution of Precision
GFE	Government Furnished Equipment
GFP	Government Furnished Property
GGR	GPS Ground Receiver
GLS	Gun-Laying System
G-M	Grid Magentic
GMT	Greenwich Mean Time
GND	Ground
GOTO	Go To Waypoint
GPA	Glide Path Angle
GPdev	Glide Path Deviation
GPS	Global Positioning System
GPU	General Purpose User
GPWP	Glide Path Waypoint
GS	Ground Speed, General Support
GSA	Graphic Situational Awareness
GT	Gun Target Line
GUK	Group Unique Key
GUV	Group Unique Variable
	H
h	Hours
HAL	Highly Accurate Low Power Time Source or Horizontal Alert Limit
HAZ	Hazard
HAZ-A	Hazard Alert
HCI	Human Computer Interface
HDOP	Horizontal Dilution Of Precision
HEMP	High Altitude Electro-Magnetic Pulse
HEX/DEX	Hexadecimal/Decimal
HPL	Horizontal Protection Level
HQ	Have Quick
HSF	Hours Since Fix
HUL	Horizontal Uncertainty Level

Term	Definition
HW	Hardware
Hz	Hertz (Cycle Per Second)
HZP	Hazard Point
	I
I/O	Input/Output
IAW	In Accordance With
ICD	Interface Control Document
ID	Identification
IEDK	Individual Equipment Decontamination Kit
IKP	Instructor Key Personnel
IM	Installation Mount
In-I	India Zone I
In-IIA	India Zone IIA
In-IIB	India Zone IIB
In-IIIA	India Zone IIIA
In-IIIB	India Zone IIIB
INIT	Initialize
In-IVA	India Zone IVA
In-IVB	India Zone IVB
IP	Initial Point or Instrumentation Protocol
IR&D	Independent Research and Development
ITAR	International Traffic in Arms Regulation
ITMG	Irish Transverse Mercator Grid
	J
J/S	Jamming-To-Signal (ratio)
JCS	Joint Chiefs of Staff
JOC	Joint Operations Concept
	K
KDP	Key Data Processor
KEK	Key Encryption Key
kg	Kilogram
KHz	Kilohertz
KLIF	KDP Loading Installation Facility
km	Kilometer
KMD	Keyboard Menu Definition
KMDE	Keyboard Menu Definition Editor
KPH	Kilometers Per Hour
KPK	Key Production Key
kts	Knots
	L
L	Left or Local Time
L1	Link 1 (SV Frequency)
L2	Link 2 (SV Frequency)
L/L	Latitude/Longitude
LADGPS	Local Area DGPS

Term	Definition
LAT	Latitude
lb	Pound
LCD	Liquid Crystal Display
LCL	Local Entry (MAGVAR Type)
LL	Loss of Lock
LOC	Location
LON	Longitude
LPTS	Low Power Time Source
LRF	Laser Range Finder
LRU	Line Replaceable Unit

M

m	Meter or Minutes
M	Azimuth North Reference or Magnetic
mA	Milliampere
m/s	Meters/Second
M/s^2	Meters/Second/Second
MAC	Maintenance Allocation Chart
MAG	Magnetic
MAGVAR	Magnetic Variation
MalayRSO	West Malaysian Rectified Skew Orthomorphic Grid
Mdgascr	Madagascar Grid
MGRS	Military Grid Reference System
MHz	Megahertz
mi	Mile
MIL	1/6400th of a circle
Mil or µ	Mils
Mil-M	Gunner's mils displayed as µ symbol
MIN (')	Minutes (degree of measurement)
mis	Mission
MK	Mark
MKP	Marked Point
mm	Millimeter
MMD	Minimum Miss Distance
MMD2d	Minimum Miss Distance, 2-D
MMD3d	Minimum Miss Distance, 3-D
MOB	Man Overboard
MPE	Miniature PLGR Engine
MPH	Miles per Hour
mpm	Meters per minute
MPS	Mission Planning Station
MRK	Mark
ms	Millisecond
MSF	Minutes Since Fix
MSL	Mean Sea Level
MTOE	Modification of Table of Organization and Equipment
MTTR	Mean Time To Repair
MWO	Maintenance Work Order, Modification Work Order
MWP	Moving Waypoint

N

N	Numeric Control or North

Term	Definition
N/A	Not Applicable
NAlgerie	Nord Algerie Grid
NATO	North Atlantic Treaty Organization
NAV	Navigation
NB	Narrow Band
NBC	Nuclear, Biological & Chemical
NDA	National Distribution Authorities
NEI	Netherlands East Indies Equatorial Zone
NGA	National Geospatial-Intelligence Agency
NHA	Next Higher Assembly
NIIN	National Item Identification Number
NIMA	National Imagery and Mapping Agency
nm	Nautical Miles
NMaroc	Nord Maroc Grid
NMEA	National Marine Electronics Association
NMCT	Navigation Message Correction Table
N/R	Not Required
NREF	North Reference
ns	Nanoseconds
NSA	National Security Agency
NSN	National Stock Number
NTISSI	National Telecommunications & Information Systems Security Instruction
NTunisie	Nord Tunisie Grid
NUM	Numeric
NVG	Night Vision Goggles
NZMG	New Zealand Map Grid
	O
OCS	Operational Control System
OPS	Operations
Org	Origin
	P
P	Page or Precise
PAL	Parallel
P-ALRT	Position Alert
PAR	Parity
PC	Personal Computer
PDOP	Position Dilution of Precision
pF	Pico Farad
PL	Phase Line
PL-A	Phase Line Alert
PLGR	Precision Lightweight GPS Receiver
PMCS	Preventive Maintenance Checks and Services
PN or P/N	Part Number
POS	Position
PPS	Precise Positioning Service, Pulse Per Second
PPS-SM	Precise Positioning Service - Security Module
PREV	Previous
PRN	Pseudo Random Noise
psi	Pounds Per Square Inch
PTTI	Precise Time and Time Interval

Term	Definition
PVT	Position, Velocity (Ground Speed), Time
PWR	Power

Q

QTY	Quantity

R

R	Right
RA	Remote Antenna
RAIM	Receiver Autonomous Integrity Monitor
RAM	Random Access Memory
RC	Remote Control
RCVd	Red Crypto Variable Daily
RCVm	Red Crypto Variable Monthly
RCVw	Red Crypto Variable Weekly
RCVR	Receiver
RDIT	Replication, Distribution, Installation and Training (website)
RF	Radio Frequency
RHRSL	Rehearsal
RLG-A	Route Leg Alert
RLP	Rally Point
RMS	Root Mean Square
RNAV	Area Navigation
RNG	Range
ROM	Read Only Memory
RPSTL	Repair Parts and Special Tools List
RPT	Repeat
RST	Reset
RT-90	Swedish National Grid System
RTCM	Radio Technical Commission for Maritime Services
RTE	Route
RTS	Request To Send
RU	Remote Unit
RX	Repairable Exchange

S

S	South or Seconds
SA	Selective Availability
SAlgerie	Sud Algerie Grid
SAASM	Selective Availability/Anti-Spoofing Module
SDGPS	Secure Differential GPS
SE	Support Equipment
SEC (“)	Seconds (degree of measurement)
SEL	Select
SEP	Spherical Error Probable
SINCGARS	Single Channel Ground and Airborne Radio System
SMaroc	Sud Maroc Grid
SMR	Source, Maintenance, and Recoverability
SNCS	Swiss National Coordinate System
SOF	Special Operations Forces
SOLN	Solution

Term	Definition
SPD	Speed
SPEC MSG	Special Message
SPS	Standard Positioning Service
SR	Slant Range
SRA	Specialized Repair Activity
SRC	Source
SRTE	Survey Route
SSE	Space Segment Error
SSF	Seconds Since Fix
ST	Scenario Timer
STAT	Status
STB	Super Tropical Bleach
STBY	Standby
STD	Standard
STK	Streck
STO	Store
STR	Steering
STR2d	Steering, 2-D
STR3d	Steering, 3-D
STunisie	Sud Tunisie Grid
STXX	Scenario Time
SV	Satellite Vehicle
SW	Software
Sys42	Gauss-Krassovsky System 1942 Grid

T

T	True
TA	Time Accuracy
TAMMS	Total Army Maintenance Management System
TCTO	Time Compliance Technical Order
TEK	Traffic Encryption Key
TEST	Self-Test
TFOM	Time Figure Of Merit
TGT	Target
TIME	Time Only
TIME-A	Time Alert
TM	Transverse Mercator or Technical Manual
TMDE	Test, Measurement, and Diagnostic Equipment
TNG	Training
T-ONLY	Time Only Mode
TOD	Time Of Day
TOE	Table of Organization and Equipment
TOT	Time On Target
TRK	Track
TSLF	Time Since Last Fix
TSS	Tailored Screen Sequence
TTFF	Time To First Fix
TTG	Time To Go
TTG2d	Time To Go, 2-D
TTG3d	Time To Go, 3-D
TTSF	Time To Subsequent Fix
TTT	Time To Target

Term	Definition
	U
UC1-UC6	User Defined Coordinate System
U/M	Unit of Measure
UD	User Datum
UEE	User Equipment Error
UERE	User Range Error
UG	User Grid
UI	User Interface
ULLSG	Unit Level Logistics System Ground
unt	Units
UOC	Usable On Code
UPS	Universal Polar Stereographic
µs	Microseconds
USB	Universal Serial Bus
UTC	Universal Time Coordinated
UTM	Universal Transverse Mercator
UUT	Unit Under Test
	V
VAC	Volts, Alternating Current
VAL	Vertical Alert Limit
VAC	Volts, Direct Current
VDC	Vertical Dilution of Precision
VEL	Velocity
VEP	Vertical Error Probable
VIS	Visible
V/M	Volts Per Meter
VPF	Vector Product Format
VPL	Vertical Protection Level
VRT	Vertical
VTA	Vertical Angle
VUL	Vertical Uncertainty Level
	W
W	West
WAGE	Wide Area GPS Enhancements
WARCO	Warranty Control Officer
WGS	World Geodetic System
WMM	World Magnetic Model
WP	Waypoint
WP-A	Waypoint Alert
	X
XFER	Transfer
XTE	Cross Track Error
	Y
Y	Encrypted P or Y-Code (SV Signal)
YD	Yard

Term	Definition
ydpm	Yards per minute
	Z
Z	Zulu Time

GLOSSARY

Term	Definition
	A
A beam of the Waypoint	Passing a line through the waypoint that is perpendicular to the inbound course to the waypoint. In Course To navigation, when the azimuth swings 90 degrees from the inbound course to the waypoint and the range to the waypoint stops decreasing. In Direct To navigation, when the azimuth swings 90 degrees from the inbound track and range stops decreasing.
Active Window	The active window is the window currently receiving key pushes from the command queue. The active window is: the window associated with a pop-up if a pop-up is present; the window that has the currently selected field; or the page window if no fields are selected.
Alert	Operator defined; conditions exist, based on operator inputs to the DAGR, that require the operator's acknowledgment and subsequent action.
All Satellites in View	Acquire, track and use in the GPS solution a minimum of ten valid and healthy satellites above the DAGR antenna's local horizon. The number of visible satellites is referenced to the constellation size IAW SS-GPS-300.
All-Y	Use only Y-code in the GPS PVT solution.
Almanac Data	General position and time data applicable to all satellites.
Angle	The geometric figure or algebraic signed quantity determined by two planes emanating from a common point or line.
Antenna Masking	The inability of the DAGR to receive satellite signals, due to interference with line-of-sight visibility to the sky.
Anti-jamming	Methods used to prevent hostile parties using electromagnetic energy from disrupting (jamming) the reception of satellite signals. An anti-jam accessory can also be used.
Anti-spoofing	A security technique used to protect against hostile attempts to imitate GPS satellite signals.
Azimuth	An angle measured clockwise in the horizontal plane between a reference direction and any other line. The reference is North (true, magnetic, or grid).
	B
Borneo Rectified Skew Orthomorphic Grid (BrnRSO)	A grid coordinate system that uses a metric-scale grid square specific to the area around the island of Borneo. A position is described by a distance to the east followed by a distance to the north; both measured from a reference point.
British National Grid (BNG)	A grid coordinate system that uses a metric-scale grid square specific to the area around Great Britain. A position is described by a series of numbers and letters to describe a 100 000 meter square and a distance to the east followed by a distance to the north, both measured from the southern most point of the square.
Buffer Zone	An area of distance (parameter) set to define borders between or around waypoints.
	C
Caution	DAGR generated; conditions exist that could result in damage to equipment or compromise mission effectiveness unless the operator takes corrective actions.
C/A Code	A code used by navigation sets to acquire satellites and perform rough navigation calculations.

GLOSSARY

Term	Definition
C/No Estimate	The ratio, in dB-Hz, of the observed carrier power (C) to the calculated noise power density (No).
Ceylon Belt (CeylonB)	A grid coordinate system that uses an Indian yard grid square specific to the area around the island of Sri Lanka. A position is described by a distance to the east followed by a distance to the north; both measured from a reference point.
Cold Start	Unassisted start. A cold start applies to a DAGR having no position, velocity (ground speed), time (PVT) and satellite vehicle (SV) information residing in memory when turned on. The DAGR has been zeroized, suffered a total loss of power, or came from the factory or maintenance. The DAGR is turned on and left alone. The DAGR eventually acquires and tracks GPS signals and provides a stable and valid display of position, date and time information, ground speed and track, if available.
Course	The intended path of movement in the horizontal plane expressed in degrees from North (true, magnetic, or grid).
Course From Navigation	Depart a waypoint on a specific operator-entered course.
Course To Navigation	Go to a waypoint on a specific operator-entered course.
Crosstrack Error	The perpendicular Great Circle distance that the DAGR is to the left or right of the course.
Crypto/Key	Cryptographic (encoded) data provided to the DAGR to enable full capabilities of the SA/A-S function.
Current Page	The current page is the page currently being displayed on the page window.
Current Page-Set	The current page-set is the page-set currently being displayed. The current page-set will default to the main page-set on power up.
Cursor	The cursor shows (highlights) the current character (typically in an edit field). The cursor is viewed on the display in reverse video.
D	
Datum	The reference frame for a selected map coordinate system.
Datum Transformation	The act of transforming the coordinates of one datum to another.
Default	An operator selectable mode, function or setting, each with more than one option where the DAGR uses a default option until the operator selects a different option. An operator selectable mode, function or setting, each with more than one option that resets to the default option as a result of total power loss or emergency zeroization. The default options are factory set; some can be reprogrammed.
Differential GPS	GPS correction transmitted from the reference station to mathematically correct for position errors.
Direct To Navigation	Go to a waypoint using the shortest range from present position.
Direct Y-Code	Acquire and track the P(Y)-code without first acquiring the C/A-code. For dual frequency receivers, when switching from L2 to L1, the switch is directly to L1 Y-code.
Display Field	A Display Field is a field providing visible user interface information computed and stored by the DAGR. This information is a result of user key strokes and data from satellites.
Distance To Go	Great Circle distance from the present position to a selected waypoint.
E	
Easting	Eastward (that is left to right) reading of grid values on a map.
Edit Field	A selection available from various menus used to edit alphanumeric characters of a selected field.
Elevation	The range above (positive) or below (negative) mean sea level or datum surface.

GLOSSARY

Term	Definition
Elevation Angle	The angle in a vertical plane between the local horizontal and ascending line, as from an observer to an object.
Elevation Difference	The difference between user position elevation (altitude) and a selected waypoint elevation (altitude).
Ellipsoid	A mathematical figure generated by the revolution of an ellipse about one of its axes. 1) Datum-Centered Ellipsoid. The ellipsoid that gives the best fit to the astrogeodetic network of a particular datum, and hence does not necessarily have its center at the center of the earth. (MCG) This is a local or regional ellipsoid. 2) Earth-Centered Ellipsoid. A reference ellipsoid whose geometric center coincides with the earth's center of gravity and whose semi-minor axis coincides with the earth's rotational axis. (MCG) This is a world ellipsoid such as that used in the World Geodetic System (WGS).
Ellipsoidal Height	The height above the reference ellipsoid. (MCG) This is the elevation reference identified as Datum (DTM) in JPO procured receivers.
Ephemeris Data	Specific position and clock data peculiar to a particular satellite.
External Power	The DAGR is powered from an unlimited power source as compared to internal prime batteries or batteries carried by the operator. For example, power from a vehicle or facility.
	F
Fields	A field is a defined area on the DAGR display. A field contains receiver output data, receiver control/setup data, or other data. Labels, titles, and headings themselves are not considered fields, but fields may include labels, titles, and headings. Fields are subdivisions of a window. A pop-up may or may not have fields (e.g., an editable waypoint name in the Mark message). Editor, menu and help pop-ups do not have fields. Each field can contain single or multiple data elements. The operator can scroll to fields. Each field can have a unique menu or help text.
Figure of Merit	The amount of position error that can exist when satellites are being tracked.
Function Key	A function key is an implementation in the DAGR to provide a capability for one hand action. Function keys can take on different meanings; when the meaning of a key changes, its label in the window is modified to reflect the action that will be executed if the key is used.
	G
Gauss Krassovsky System 1942 Grid	A worldwide grid coordinate system that uses a metric-scale grid. A position is described by a distance to the north followed by a zone number and a distance to the east, both measured from the origin of the zone.
General Purpose User (GPU)	A person with hand size in the range from a 5th percentile female to a 95th percentile male with an 8th grade reading level. 5th percentile hand size is a hand length of 6.3 inches and a hand breadth of 3.2 inches. 95th percentile hand size is a hand length of 8.1 inches and a hand breadth of 3.8 inches.
Geoid	The equipotential surface in the gravity field of the earth which approximates the undisturbed mean sea level extended continuously through the continents. The geoid serves as the elevation reference identified as Mean Sea Level (MSL).
Glide Path Angle	Elevation angle special case where the reference point is the glide path intercept point on a runway or landing zone.
Glide Path Deviation	The difference between the flight path of an aircraft in a glide (as seen from the side), from the desired value corresponding to the set point.
Graphic Situational Awareness	The ability to have accurate and real time information of friendly, enemy, neutral and noncombatant locations.

GLOSSARY

Term	Definition
Great Circle	The spherical path defined by a fixed radius from the center of the earth in a specified direction from a given reference point.
Grid North	The northerly or zero direction, indicated by the grid datum of directional reference.
Ground Speed	The horizontal component of the speed of a vehicle relative to the earth's surface.
Gunner's Mils	A scale graduated in mils used to measure the amount of deflection (angle). Typically displayed as the μ symbol.
	H
HAVE QUICK	A frequency hopping scheme used to maintain communications security in the high-frequency range.
Heading	The direction in which the longitudinal axis of an aircraft or ship is pointed, expressed in degrees clockwise from North (true, magnetic, compass, or grid).
Helmet Antenna	An antenna that is mounted to a helmet.
Help	Help is textual information pertaining to the current focus or selected display field. This information should enhance operator orientation and training. It is not intended to replace training.
Hexadecimal A numbering system using the base 16.	
Horizontal Dilution of Precision	Horizontal position error that degrades position accuracy when satellites are being tracked.
Hot Start	Assisted Start. A hot start applies to a DAGR containing a valid and current crypto variable key and has been provided actual local position, date and time information, ground speed and track, if available, and current satellite vehicle (SV) information.
Human-Computer Interface (HCI)	The HCI is the hardware and software allowing information exchange between the operator and the computer (DAGR).
	I
India Zone I (In I)	A grid coordinate system that uses a metric scale grid square specific to the area around India. A position is described by a distance to the east followed by a distance to the north; both measured from a reference point.
India Zone IIA (In-IIA)	A grid coordinate system that uses an Indian yard grid square specific to the area around India. A position is described by a distance to the east followed by a distance to the north; both measured from a reference point.
India Zone IIB (In-IIB)	A grid coordinate system that uses an Indian yard grid square specific to the area around India. A position is described by a distance to the east followed by a distance to the north; both measured from a reference point.
India Zone IIIA (In-IIIA)	A grid coordinate system that uses an Indian yard grid square specific to the area around India. A position is described by a distance to the east followed by a distance to the north; both measured from a reference point.
India Zone IIIB (In-IIIB)	A grid coordinate system that uses an Indian yard grid square specific to the area around India. A position is described by a distance to the east followed by a distance to the north; both measured from a reference point.

GLOSSARY

Term	Definition
India Zone IVA (In-IVA)	A grid coordinate system that uses an Indian yard grid square specific to the area around India. A position is described by a distance to the east followed by a distance to the north; both measured from a reference point.
India Zone IVB (In-IVB)	A grid coordinate system that uses an Indian yard grid square specific to the area around India. A position is described by a distance to the east followed by a distance to the north; both measured from a reference point.
Initialize	Assist DAGR in expediting satellite acquisition manually or via the serial data port. Manually, the operator enters estimates for position, date and time, and ground speed and track, if available. Over the serial data port, provide position, date and time, and ground speed and track, if available, and, as a minimum, satellite almanac data.
Interference	Any electromagnetic disturbance that interrupts, obstructs or otherwise degrades or limits the effective performance of electronics/electrical equipment. (JCS) Unintentional disruption.
Irish Transverse Mercator Grid (ITMG)	A grid coordinate system that uses a metric scale grid square specific to the area around Ireland. A position is described by a series of numbers and letters to describe a 100 000 meter square and a distance to the east followed by a distance to the north, both measured from the southern most point of the square.
J	
Jamming	Deliberate radiation, reradiation or reflection of electromagnetic energy for the purpose of preventing or reducing an enemy's effective use of the electromagnetic spectrum and with the intent of degrading or neutralizing the enemy's combat capability. Intentional disruption.
K	
Keys	Data provided to the DAGR to enable full capabilities of the SA/A-S function.
L	
L/L Deg	A grid coordinate system based on degrees of latitude and longitude.
L/L Dm	A grid coordinate system based on degrees and minutes of latitude and longitude.
L/L Dms	A grid coordinate system based on degrees, minutes, and seconds of latitude and longitude.
Latitude	Angular distance from a primary great circle or plane, as on the celestial sphere or the earth.
Last Selected Field	The last selected field is the field that was last selected. Each window/page maintains its own last selected field to allow the operator to quickly go back to the most recently accessed field.
Last Selected Menu Option	The last selected menu option is the last selected menu option from a menu. Menus (except editor menus) maintain their own last selected menu option to allow the operator to quickly go back to the most recently accessed menu option.
Last Viewed Page	The last viewed page is the last page displayed from a given page-set. Each page-set maintains its own last viewed page to allow the operator to quickly go back to the most recently accessed page.
List Editor	Provides a predefined list of choices used in a selected field.
Local Area Differential GPS (LADGPS)	A means of improving GPS PVT by providing corrections to a DAGR from a reference GPS receiver at an accurately surveyed location.
Longitude	Angular distance along the Equator, between the meridian passing through a position and, usually, the meridian of Greenwich.

GLOSSARY

Term	Definition
	M
Madagascar Grid (Mdgascr)	A grid coordinate system that uses a metric scale grid square specific to the area around the island of Madagascar. A position is described by a distance to the east followed by a distance to the north, both measured from a reference point.
Magnetic Heading	Direction of the vehicle measured from magnetic north.
Magnetic Variation	The horizontal angle at a place between the true north and magnetic north measured in degrees and minutes east or west according to whether magnetic north lies east or west of true north.
MAGVAR Types	Three operator-selected choices for the DAGR to calculate magnetic angles. 1. Calculate-WMM. The DAGR uses the World Magnetic Model, an algorithm updated every five years, to calculate appropriate magnetic angle. 2. Local. The operator enters a local MAGVAR value for present position or for any waypoint. This is for operations in those parts of the world that have unique conditions that cannot be accommodated by the algorithm, e.g., large underground ore deposits. 3. Navigation Waypoint. The DAGR uses the waypoint MAGVAR value. This replicates an electronic ground-based navigation aid. Navigation Waypoint cannot be selected as a MAGVAR type for a waypoint entry.
Main Menu	The main menu allows the operator to access all (or vast majority) of the DAGR display pages. This menu is accessible from all DAGR display pages.
Main Help	Main help allows the operator to access help text on general topics. This help text is accessible from all DAGR display pages.
Map Datum	The elevation reference used for special topographical (map) applications, from which calculation or measurement may be taken. West Malaysian Rectified Skew Orthomorphic Grid (MalayRSO)
MalayRSO	Refer to West Malaysian Rectified Skew Orthomorphic Grid
Mean Sea Level	The elevation reference used for normal applications, from which calculation or measurement may be taken.
Menu Options	Menu options are selectable options pertaining to the current focus or selected display field. These options facilitate ease of use.
Military Grid Reference System (MGRS)	A system that uses standard scale grid square based on a point of origin on a map projection of the earth's surface in an accurate and consistent manner to permit either position referencing or the computation of azimuth and range between grid positions. A position is described by a series of numbers and letters to describe a grid zone, a 100,000 meter square, and a distance to the east followed by a distance to the north. Both measured from the coordinate origin of the square. 100,000 m Grid Zone, Square, Easting (e) / Northing (n). e.g., NNL LL NNNNe / NNNNNn. This format provides a position resolution of one meter square. Minimum accuracy resolution required for military operational utility is a 100 meter square, e.g., NNL LL NNN / NNN. (Caution: For certain datum/ellipsoid pairs, the second letter of the 100,000 meter square can shift by 10 letters when switching between regional and world datums.)
Minimum Miss Distance	The smallest range or slant range to a waypoint that can be obtained with the current track.
Mixed Code	Use any combination of Y-code, P-code or C/A-code in the GPS PVT solution.
	N
Nautical Mile	A unit of range; the length of one minute of any great circle of earth, the meridian being the great circle most commonly used.
Netherlands East Indies Equatorial Zone (NEI)	A grid coordinate system that uses a metric scale grid square specific to the area around the island of Borneo. A position is described by a distance to the east followed by a distance to the north; both measured from a reference point.

GLOSSARY

Term	Definition
New Zealand Map Grid (NZMG)	A grid coordinate system that uses a metric scale grid square specific to the area around New Zealand. A position is described by a distance to the east followed by a distance to the north; both measured from a reference point.
Non-Volatile Data	Information in the DAGR that is preserved when the receiver is turned off and cleared when the receiver is emergency zeroized, reprogrammed, or experiences a total loss of power.
Nord Algerie Grid (NAlgerie)	A grid coordinate system that uses a metric scale grid square specific to the area around Northern Algeria. A position is described by a distance to the east followed by a distance to the north; both measured from a reference point.
Nord Maroc Grid (NMaroc)	A grid coordinate system that uses a metric scale grid square specific to the area around Northern Morocco. A position is described by a distance to the east followed by a distance to the north; both measured from a reference point.
Nord Tunisie Grid (NTunisie)	A grid coordinate system that uses a metric scale grid square specific to the area around Northern Tunisia. A position is described by a distance to the east followed by a distance to the north; both measured from a reference point.
Northing	Northerly (that is bottom to top) reading of grid values on a map.
	P
P Code	A code used by navigation sets to perform precise navigation calculations.
Page	A page is a collection of related data elements. Pages are displayed in the page window. Move to the next page by pushing the PAGE key. A page number appears next to the page title.
Page Set	A page set is a collection of related pages based on relationships between data within the pages.
Pause Scenario	An pause in the rehearsal mode of operation when commanded by the operator. During the rehearsal mode of operation, the operator can command a pause scenario to stop the rehearsal mode in time, then resume the rehearsal mode when selecting the continue scenario.
Persistence	Persistence allows the operator to repeat actions quickly. The last selection from a menu or list is the highlighted selection the next time the menu or list is accessed. Persistence is not maintained when unit is turned Off.
Platform	A platform (or host platform) is some type of vehicle (aircraft, ship, motor vehicle, etc.) where the DAGR unit can be physically mounted to instead of being handheld. External connections are normally used with the DAGR mounted in a host platform.
Poor Satellite Geometry	Vertical Dilution of Precision (VDOP) greater than 6.
Position Dilution of Precision	Position error that degrades position accuracy when satellites are being tracked.
Precise Positioning Service	Encoded GPS information broadcast that contains corrections to remove intentional Selective Availability (SA) errors.
Pulse Per Second	A specified signal pulse per second rate.
	R
RT90	See Swedish National Grid System.
Range	The horizontal distance between any given point and an object or target. Horizontal Range is the same as Great Circle Distance.

GLOSSARY

Term	Definition
Rate Of Progress	An indication of average speed along a course applicable to route legs (excluding leg 0). It is computed as the range made good along the route leg divided by the time since the route leg was selected. For example, if the range made good is 100 m and the time since the route leg was started is 1 minute, ROP indicates 100 m/min.
Reacquisition	REAC applies to unintentional loss of all satellites being tracked. REAC is the time from the return of normal satellite coverage after the unintentional loss of all signals in a tracking mode to the reacquisition of the signals necessary to output a stable and valid position, date and time information and, ground speed and track, if available.
Remote Antenna	An antenna that is mounted in a location other than where a unit is operated.
Route Navigation	A series of Course To navigation methods linked together.
	S
Scroll	Scrolling navigated through selections for the field. A page or field is scrolled using the cursor control keys.
Selected Field	The selected field is the field that is currently selected and is displayed in reverse video.
Selective Availability	A security technique that limits the accuracy of a DAGR by broadcasting GPS information that contains built in errors.
Slant Range	The line-of-sight range between two points not at the same level relative to a specified datum.
Spoofing	Generation of satellite signals to cause errors in navigation and position information.
Standard Positioning Service	GPS information broadcast in the clear, and is available to anyone in the world.
Steering (left, right, up, or down)	Specifies the direction to steer to navigate to the waypoint. Direction is referenced to the current course track of the user.
Steering Angle	Specifies the angle to steer to the right or left (and up/down in 3-D homing) to navigate to the waypoint. Angle is referenced to the current course track of the user.
Steering Correction	A directive indicator. If Track is different from the Azimuth to the TO WP, STR indicates "< turn left (arrow) or > turn right (arrow) xx degrees" to align Track with the Azimuth to the TO WP.
Streck	An angular unit of measure.
Sud Algerie Grid (SAlgerie)	A grid coordinate system that uses a metric scale grid square specific to the area around Southern Algeria. A position is described by a distance to the east followed by a distance to the north; both measured from a reference point.
Sud Maroc Grid (SMaroc)	A grid coordinate system that uses a metric scale grid square specific to the area around Southern Morocco. A position is described by a distance to the east followed by a distance to the north; both measured from a reference point.
Sud Tunisie Grid (STunisie)	A grid coordinate system that uses a metric scale grid square specific to the area around Southern Tunisia. A position is described by a distance to the east followed by a distance to the north; both measured from a reference point.
Swedish National Grid System (RT 90)	A grid coordinate system that uses a metric scale grid square specific to the area around Sweden. A position is described as a series of concentric squares defined by mapping conventions.
Swiss National Coordinate System (SNCS)	A grid coordinate system for use in and around Switzerland. A position is described by a distance to the east followed by a distance to the north; both measured from a reference point.
Sys42 Grid	Refer to Gauss Krassovsky System 1942 Grid

GLOSSARY

Term	Definition
	T
Time Figure of Merit	The amount of time error that can exist when satellites are being tracked.
Time to First Fix	Time required to obtain a first or initial position fix (location).
Time To Go	Estimated time to reach a selected waypoint from the current position given the current speed.
Time to Subsequent Fix	Time required to obtain a subsequent position fix (location), after a first or initial position fix.
Total Loss of Power	A total loss of power is defined as the loss of external power, primary power and memory battery power.
Track	The projection on the surface of the earth of the present path of a vehicle, the direction of which path at any point is expressed in degrees from North (true, magnetic, or grid).
Track Speed	The actual line of movement and speed of an aircraft over the surface of the earth; it is the projection of the history of the flight path on the surface.
True Heading	Direction of the vehicle measured from true north.
True North	Direction of the north geographical pole.
	U
Underdetermined	Navigating with less than four satellites.
Universal Polar Stereographic Grid (UPS)	A military grid prescribed for joint use in operations in limited areas and used for operations requiring precise position reporting. It covers areas between N 84 - N 90 and S 80 - S 90 parallels and the poles. Grid Zone Easting (e) / Northing (n) e.g., L NNNNNNNe / NNNNNNNn. This format provides a position resolution of one meter square.
Universal Time Coordinated	The coordinated time kept by a uniformly running clock.
Universal Transverse Mercator Grid (UTM)	A grid coordinate system based on the transverse mercator projection applied to maps of the earth's surface extending to 84 degrees north to 80 degrees south latitudes. A position is defined by a series of numbers and a letter to describe a Grid Zone and a distance to the east followed by a distance to the north where each distance is preceded by the coordinates of a larger grid than was used in MGRS. Grid Zone Easting (e) / Northing (n) e.g, NNL NNNNNNe / NNNNNNNn. This format provides a position resolution of one meter square.
User-Defined Datum	A datum stored in the DAGR that is defined by the user.
User-Defined Grid	A grid coordinate system stored in the DAGR that is defined by the user.
United States National Grid (USNG)	A grid coordinate system created for developing location-based services within the United States. It defines how to present Universal Transverse Mercator (UTM) coordinates at various levels of precision, and specifies the use of those coordinates with the grid system defined by the Military Grid Reference System (MGRS).
	V
Velocity	Ground speed
	W
Waypoint	A point along the desired path of travel (i.e., position coordinates and height of a point you are going to or are passing through).

GLOSSARY

Term	Definition
Warm Start	Assisted start. A warm start applies to a DAGR that has been provided estimates of local position, date and time information and, ground speed and track, if available, and noncurrent satellite vehicle (SV) information.
Warning	Operating/maintenance procedures, techniques, etc, which could result in personal injury or loss of life if not carefully followed.
West Malaysian Rectified Skew Orthomorphic Grid (MalayRSO)	A grid coordinate system that uses a metric scale grid square specific to the area around Western Malaysia. A position is described by a distance to the east followed by a distance to the north; both measured from a reference point.
Wide Area GPS Enhancement	A means of improving GPS PVT by adding corrections to the navigation message broadcast from the GPS satellites.
Y	
Y Code	An encrypted P code when crypto/keys are loaded (installed); used by navigation sets to perform precise navigation calculations.
Z	
Zulu Time	Also called Coordinated Universal Time (UTC). Formerly called Greenwich Mean Time. (JCS) Military time using the 24-hour clock.

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RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is OAASA	Use Part II *(reverse)* for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
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