Part Six

Lightweight Handheld Mortar Ballistic Computer

Chapter 17

Introduction

The LHMBC is a lightweight ruggedized personal digital assistant (RPDA) that has replaced the M23 MBC in IBCTs. It provides the essential functions of the MFCS with similar software in a portable package and allows the operator to quickly calculate accurate ballistic solutions for all current US Army mortar cartridges. The basic model of the LHMBC can be expanded to include global positioning system (GPS) and digital communications.

SECTION I. INITIALIZATION AND CONFIGURATION

This section discusses the introduction, initialization, and configuration of the LHMBC.

DESCRIPTION

17-1.   The LHMBC (Figure 17-1) is an automated fire control system designed to improve the command and control of mortar fires and the speed of employment, accuracy, and survivability of mortars. The system is comprised of the LHMBC software package installed in an RPDA. The LHMBC software can be easily upgraded or reinstalled from either a secure digital (SD) card or the onboard system ROM. System accuracy can be increased through the use of a GPS and digital MET messages. The LHMBC allows for self-surveying mortars, digital CFF exchange, and automated ballistic solutions.

> **NOTE:** See TM 9-1220-252-12 & P for additional operator instructions on the LHMBC.
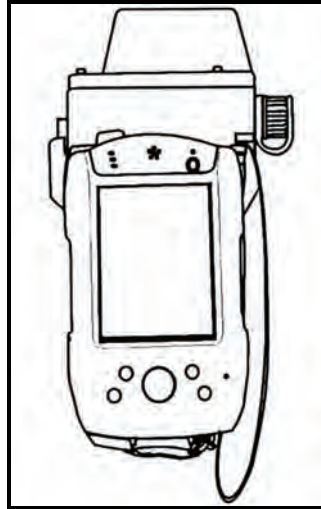
Figure 17-1. Lightweight handheld mortar ballistic computer.

MANUAL ENTRY BUTTONS

17-2.   The manual entry buttons for the LHMBC include the—

- Manual Missions button.
- Mission Solution button.
- Mission Gun Select button.
- Mission Subsequent Adjust button.
- CFF button.
- Sleep button (Power button).

17-3.   See Figure 17-2 for the corresponding buttons.

Manual Missions Button

17-4.   The Manual Missions button (1, Figure 17-2) allows the operator to sequence through active missions.

Mission Solution Button

17-5.   The Mission Solution button (2, Figure 17-2) displays the solution for the active mission. If multiple missions are active, the Solution/Gun Orders screen displays.

> **NOTE:** This button is inactive when no missions are active.

Mission Gun Select Button

17-6.   The Mission Gun Select button (3, Figure 17-2) displays the Gun Select screen for the active mission. If multiple missions are active, the Gun Select screen displays.

> **NOTE:** This button is inactive when no missions are active.

Mission Subsequent Adjust Button

17-7.   The Mission Subsequent Adjust button (4, Figure 17-2) displays the Subsequent Adjust screen for the active mission.

> **NOTE:** This button is inactive when no missions are active.

Call for Fire Button

17-8.   If Commo is enabled, the CFF button (5, Figure 17-2) displays the CFF screen.

Sleep Button (Power Button)

17-9.   The Sleep button (6, Figure 17-2) puts computer in sleep mode or toggles backlight on and off.

DISPLAY SCREEN

17-10.   The LHMBC (7, Figure 17-2) display screen is a touch-sensitive, transflective, thin-film transistor (TFT) liquid crystal display (LCD) screen. The display is equally readable in low light and sunlight. Objects displayed on the screen may be selected, opened, launched, or depressed by tapping directly on the screen with the stylus.

NOTE: See TM 9-1220-252-12&P for a complete description of controls and indicators.
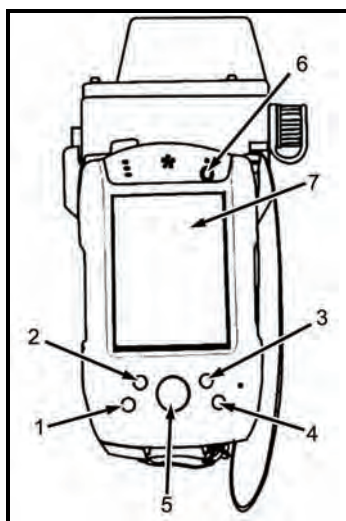

Figure 17-2. Lightweight handheld mortar ballistic computer interface.

CAPABILITIES

17-11.   The LHMBC's design allows the system to be upgraded to match future system demands. Currently, the system can—

- Store 24 gun positions.
- Store 3 FPFs.
- Store a combined total of 100 targets and known points.
- Store 16 RPs.
- Store 25 FO locations.
- Accept 100 digital messages.
- Handle the full range of current mortar ammunition.
- Conduct registration missions and automatically apply all registration corrections.
- Receive, compute, and automatically calculate all applied MET corrections.
- Store 1 safety fan, with up to 10 separate fan segments.
- Provide a ten-digit grid to impact for all rounds.
- Connect to radio or wire for digital communications.

BATTERY LIFE

17-12.   Table 17-1 illustrates projected battery life for the M32 LHMBC based on continuous operations. The actual battery life varies greatly depending upon M32 usage, age, and temperature of the batteries; it will be significantly greater if the unit is not used continuously.

Table 17-1. Battery life expectancy.

M32 LHMBC					
GPS OFF	COMMO OFF	Approximately 25 hours of continuous use.			
		AA = 15 hrs	Main = 10 hrs / Extended = 8 hrs	Standby 12/72 Hrs	Dormant
GPS ON	COMMO OFF	Approximately 18 hours of continuous use.			
		AA = 10 hrs	Main = 8 hrs / Extended = 7 hrs	Standby 12/72 Hrs	Dormant
GPS ON	COMMO ON	Approximately 16 hours of continuous use.			
		AA = 8 hrs	Main = 8 hrs / Extended = 6 hrs	Standby 12/72 Hrs	Dormant
Basic LHMBC					
	AA = 15 hrs	Main = 8 hrs	Standby 12/72 Hrs	Dormant	

NOTE: In the M32 configuration, the extended battery in the expansion pack will charge the main battery, as the main battery powers the LHMBC. The main battery will power the LHMBC for approximately one to two hours after the power of the extended battery falls below 3.2 volts and the extended battery stops charging the main battery.

GRAPHIC USER INTERFACE

17-13.   The LHMBC's graphic user interface (GUI, Figure 17-3) allows the operator to use menus, windows, and icons, rather than complicated commands.
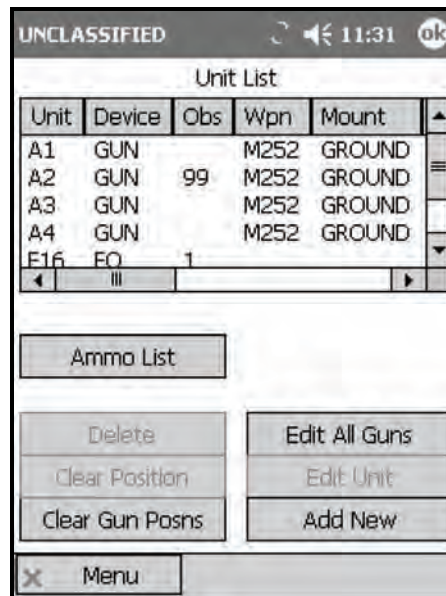
Figure 17-3. Lightweight handheld mortar ballistic computer graphic user interface.

SCREEN AREA

17-14.   The LHMBC's screen area displays buttons, tabs, fields, and menus.

Desktop

17-15.   The desktop (Figure 17-4) consists of various pull-down menus, the Start button, a time display, a volume control, and a New button. The stylus is used to access all functions from this screen.
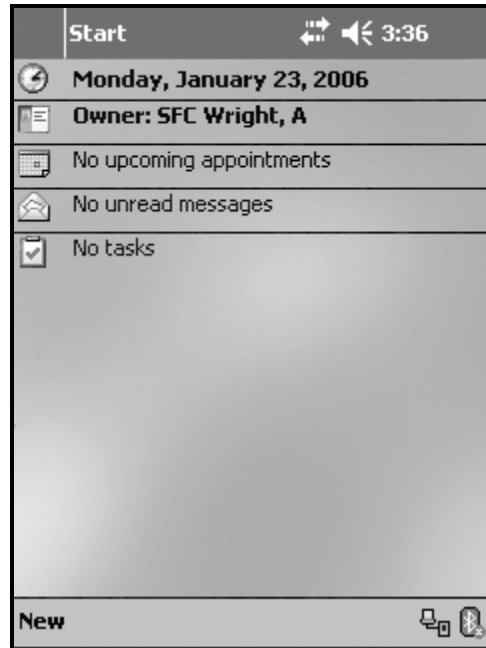

Figure 17-4. Desktop.

Action Buttons

17-16.   The operator accesses these buttons to add, edit, clear, delete, view, or acknowledge data.

> **NOTE:**   These buttons are active only when required fields are filled. Grayed buttons are inactive.

Scroll Bars

17-17.   The operator accesses the scroll bars to view data that does not fit on the screen.

Data Lines

17-18.   Data lines display data particular to the screen. The operator adjusts the columns using the stylus to increase or decrease the field area.

17-19.   To display the details of each data line, the operator selects a line with the stylus, drags it to the bottom of the screen, and lifts the stylus. The data will replace the action buttons at the bottom of the screen. Then, the operator taps the stylus in the data field to close the details and return action buttons to the bottom of the screen.

17-20.   For a quick reference, the operator presses the stylus on the data line. The details display at the bottom of the screen until the operator lifts the stylus.

Screen Title

17-21.   The screen title displays at the top center of each screen.

Classification

17-22.   The classification displays in the upper left corner of the screen.

X or OK

17-23.   X or OK displays in the upper right corner. This button has no function in the LHMBC software.

Time

17-24.   The time displays in the upper right corner.

Tabs

17-25.   Tabs display at the top of the screen after the operator selects a control button.

Pull-Down Menus

17-26.   The operator activates pull-down menus by clicking buttons or icons to display a selection of operations or programs.

COMMON ACTIONS

17-27.   When using the LHMBC, the operator repeatedly uses the same commands to perform actions, such as acknowledging receipt (OpACK), accepting or denying the messages to observer (MTOs), selecting the guns to fire the mission, confirming gun orders, and accepting or modifying data. The operator can quickly access these commands by tapping the stylus on a button on the screen or in response to a query in a message box.

Recording Data

17-28.   Data is transcribed onto DA Form 2399-R or DA Form 2188-R throughout the process to maintain a record and to preserve data should the LHMBC fail. The phrase "record data" is used throughout the chapter to indicate this action.

Process or Message to Observer Deny

17-29.   To accept and process a mission, the operator selects "Process;" to refuse a mission, the operator selects "MTO Deny." This chapter uses these terms to describe these processes.

17-30.   If the operator selects the MTO Deny button, the Delete button displays and, when tapped, deletes the mission. If there is an error beyond FDC control, the only choice is MTO Deny.

Select Action Button/Data Line

17-31.   Selecting a button or data field line with the stylus is the equivalent of clicking a button or data field line on a personal computer with a mouse; therefore, the actions "select and hold" and "select and drag" are equivalent to "click and hold" and "click and drag" with a standard computer mouse.

MESSAGE ICONS

17-32.   The LHMBC alerts the operator to warnings, messages, and processing statuses through message icons and audio alarms. Table 17-2 lists all message icons and their definitions.

Table 17-2. Message icons.

ICON	DEFINITION	ICON	DEFINITION
C_F	Check Fire	NEW	New
✕	Error	P	Priority Priority
!	Exclamation	PRC	Processed
F	Flash Priority	⬕	Processing Wheel
I	Immediate Priority	R	Routine Priority
📁	Low Battery/No External Power Attached	⚠	Warning
		ⓘ	Information

MESSAGE PRIORITIES

17-33.   Table 17-3 indicates the priorities of messages received by the LHMBC.

Table 17-3. Message priorities.

Message Type	Message Precedence	
Plain Text Message (PTM)	Routine	R
Check Fire C_F	Flash	F
Fire Support Meteorological Message	Routine	R
Call for Fire	Immediate	I
Observer Mission Update	Priority	P
Ammunition Inventory	Routine	R
Command to Fire	Priority	P
Message to Observer	Immediate	I
Fire Support Coordination Measures	Routine	R
End of Missions and Surveillance	Immediate	I
Fire Unit Status	Routine	R
Subsequent Adjust	Immediate	I
Observer Status	Immediate	I

ENTERING **D**ATA

17-34.   When selecting a field, an alphanumeric or a numeric keyboard that corresponds to the type of data that may be entered will display. To remove the keyboard from the screen, tap the screen outside of the keyboard.

17-35.   An arrow next to an entry box indicates that a selection list is available. Select the arrow to display the selection field. Selections also may be made by selecting checkboxes or circles.

17-36.   All gray data is read-only and cannot be directly changed.

POSITION **E**NTRY

17-37.   The LHMBC offers four methods for locating a position:

- Universal Transverse Mercator (UTM) grids.
- Polar plot.
- Military Grid Referencing System (MGRS).
- Latitude and longitude coordinates.

17-38.   To select a method from any Position Edit screen, select the tab that corresponds to the desired method of location.

Universal Transverse Mercator Grids

17-39.   UTM grids consist of ten-digit grid coordinates and an altitude with a range of -400 to 9999 meters.

Polar Plot

17-40.   Polar plot defines a position as seen from a previously determined position that is already entered in the unit list.

Military Grid Referencing System

17-41.   Similar to UTM grids, MGRS consists of a position entered with its zone; 100,000-meter grid square identifier; grid coordinates; and altitude.

Latitude and Longitude Coordinates

17-42.   Latitude and longitude coordinates may also be used for location.

NOTE: See FM 3-25.26, Map Reading, for more information.

STARTUP

17-43.   Two internal batteries power the RPDA:

- The main internal battery is a 3.2v lithium ion battery capable of powering the unit for approximately 5 hours.

NOTE: Before starting the LHMBC, ensure that the main internal battery is charged.

- The backup battery, a smaller 3.2v lithium ion battery, maintains the LHMBC software and data for short periods of time while the main internal battery is being replaced.

NOTE: The backup battery will not run the LHMBC.

17-44.   The RPDA can also accept external power from a variety of conventional power sources, ranging from 11V-36VDC to 100-240VAC.

NOTE: See TM 9-1220-252-12&P for complete power capabilities/modes and usage.

SLEEP BUTTON

17-45.   Press the Sleep button (Power button) to power up the RPDA. The password screen (Figure 17-5) is displayed. The user password must be entered each time the unit powers on or comes out of sleep mode.

17-46.   LHMBC passwords must be six digits long, with no digit used more than twice consecutively. The default password is 112233.

NOTE: See TM 9-1220-252-12&P, WP 0006, and WP 0004 for complete password software usage.
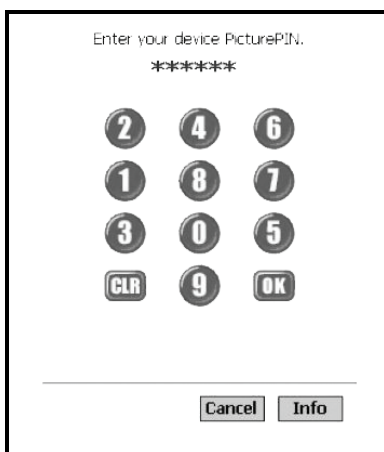

Figure 17-5. Password screen.

START BUTTON

17-47.   After entering the proper password, the desktop will display. To start the LHMBC software—

    (1) Select the Start button at the upper left of the display.

    (2) Select LHMBC from the pull-down menu.

USE ALL BUTTON

17-48.   Read the DOD security message, and then select Use All.

DATA INITIALIZATION AND CONFIGURATION

17-49.   The following procedures describe the process for initializing and configuring the LHMBC.

SYSTEM STARTUP SETTINGS SCREEN

17-50.   When the DOD security message is closed, the System Startup Settings screen displays. To initialize the LHMBC in the basic configuration—

    (1) Select Commo Off and GPS Off.

        ■   If Commo is on, digital communication will be possible through two-wire (landline) communication or FM transmission.

        ■   If GPS is on, the LHMBC can auto-fill its position as a gun, FDC, FO, etc.

NOTE: See 17-6 for GPS setup.

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    (2) Select Use All to continue.

SETUP GEOGRAPHICAL REFERENCE SCREEN

17-51.   To access the Setup Geographical Reference screen (Figure 17-6)—

(1) Select Menu.

(2) Select Setup.

(3) Select Geo Ref.

NOTE: The Setup Geographical Reference screen automatically displays if no Geo Ref was previously set.

Figure 17-6. Setup Geographical Reference screen.

Ellipsoid Field

17-52.   The ellipsoid (spheroid) of the map sheet displays in the marginal information. The default ellipsoid is World Geodetic System (WGS) 1984. Use the Ellipsoid pull-down menu to change the default setting.

Datum Field

17-53.   The default datum is WE – WGS 1984. When the ellipsoid is set, the corresponding default datum automatically displays.

Minimum Easting and Northing Fields

17-54.   The minimum easting and northing are entered in the 13-digit format – 6 digits for easting, 7 digits for northing. This information is located in the bottom left corner of the map sheet. The western-most grid line is labeled as the minimum easting (1, Figure 17-7), and the southern-most grid line is labeled as the minimum northing (2, Figure 17-7). Figure 17-7 has a minimum easting of 87000 and a minimum northing of 3569000.

NOTE: The Maximum Easting and Maximum Northing fields are automatically filled.
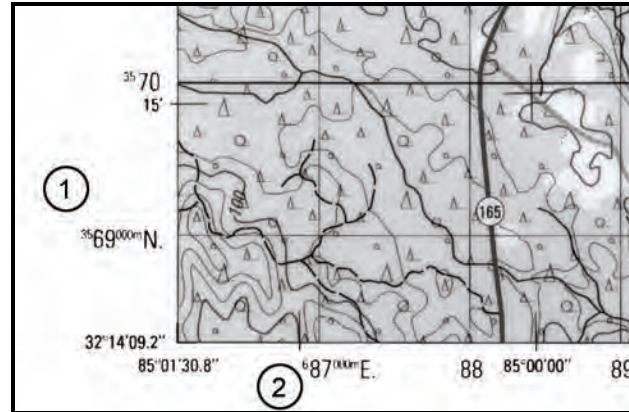
Figure 17-7. Minimum easting and northing.

> **NOTE:** If the correct number of digits are not entered in the Minimum Easting or Minimum Northing fields, an SMI error message will appear (Map Mod ERROR min Easting must be >= 0100000). Select OK, and enter the correct values.

Minimum Zone Field

17-55.   The minimum zone must be between 1 and 60 and can be found in the map marginal information centered at the bottom of the map sheet (Figure 17-8). The grid zone designator consists of two digits and one letter. The LHMBC does not use the letter.

> **NOTE:** If an invalid Map Mod (Zone) is entered, an SMI error message will appear. Select OK, and enter the correct values.

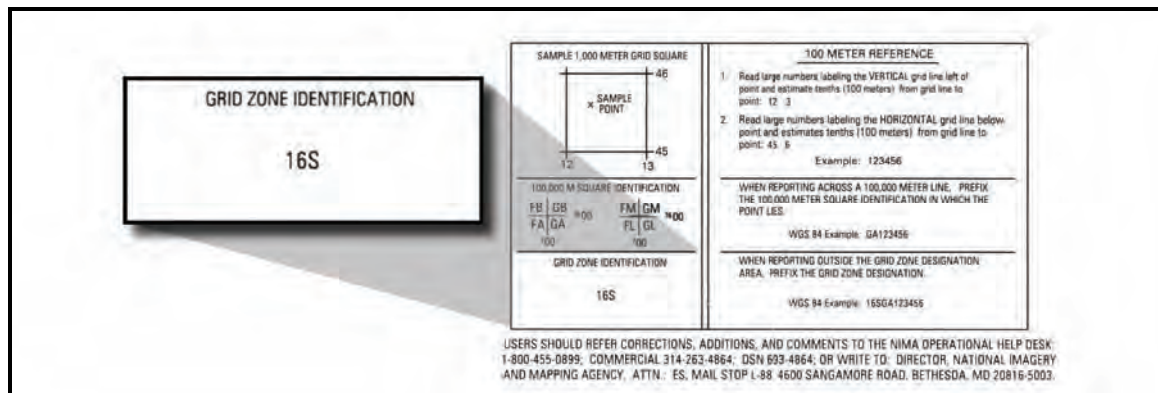**Figure 17-8. Locating minimum zone.**

17-56.   Figure 17-6 has a minimum zone of 16S, which is entered into the LHMBC as 16.

> **NOTE:** The Maximum Zone field is automatically filled.

Hemisphere Field

17-57.   Enter north or south in the Hemisphere field to indicate if your unit is operating in the northern or southern hemisphere.

> **NOTE:** The Hemisphere field is automatically filled.

UNIT LIST SCREEN

17-58.   The Unit List screen (Figure 17-9) lists all of the units assigned or used by the FDC. It allows the operator to view, enter, edit, or delete the unit name, the device, the observer number, and additional required entries for specific devices.

> **NOTES:** 1.   This screen automatically displays if no devices were previously entered.
>
> 2.   The FDC is automatically on the list and cannot be deleted.

17-59.   This screen is comprised of two areas:
- The upper half of the screen contains the Unit List field. This field displays information by unit designation for GUN, FDC, FO, FSE, OR STA, and OTHER.
- The bottom half of the screen contains seven action buttons:
    - Ammo List displays the Ammunition screen.
    - Delete is used to delete the selected unit.
    - Clear Position is used to clear the position of a selected unit.
    - Clear Gun Posns is used to clear the positions for all the guns at the same time.
    - Edit All Guns allows the operator to enter the data for all guns at the same time.
    - Edit Unit is used to edit the fields of a selected unit.
    - Add New is used to add a new unit.

17-60.   To display the Unit List screen—
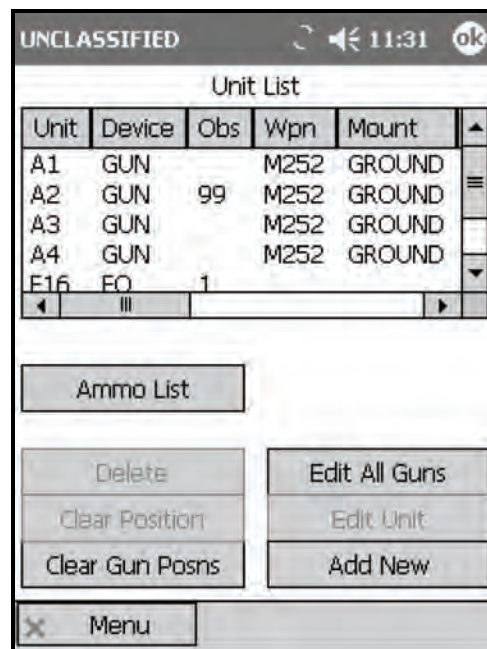(1) Select Menu.
(2) Select Unit List.

Figure 17-9. Unit List screen.

Unit List Add/Edit Screen

17-61.   To add a unit from the Unit List screen (Figure 17-10), select the Add New button. To edit a unit that is already entered—

(1) Select the appropriate unit data line.

(2) Select Edit Unit.

NOTE: Only the Unit Name, Obs Num, and Device fields will be available until a device is selected.

Figure 17-10. Unit List Add/Edit screen.

Unit Name Field

17-62.   Unit names must be two to four characters in length, and the first character must be a letter. There is a limit of 100 unit entries.

Device Field

17-63.   The available devices are—

- GUN.
- FDC.
- FO.
- FSE.
- OR STA.
- OTHER.

17-64.   The required entries change depending on the device selected. When GUN is selected, entry boxes are displayed for weapon type, mounting azimuth (Mnt Az), referred deflection (Ref), propellant temperature (Prop Tmp), and position (Pos). Later, the operator may add this information for all guns using the Edit All Guns menu.

Position

17-65.   To fill the Position field, use one of the three methods listed:

- Enter the position manually in the form of 10-digit grid coordinates.
  - (1) Below the Position field, select Edit. The default positioning mode is UTM grid.
  - (2) Enter the easting, northing, and altitude of the unit.
  - (3) Select Use All.
- Enter the position as a polar plot from a previously entered unit.
  - (1) Below the Position field, select Edit.
  - (2) Select the Polar tab.
  - (3) Select a unit from the Unit pull-down menu.
  - (4) Enter the direction, distance, and vertical interval from the plotting unit to the unit to be located.
  - (5) Select Use All.
- Auto-fill the position based on satellite information.
  - (1) If the GPS is installed and on, the GPS Control button will display below the Position field. Select GPS.
  - (2) After entering the appropriate information for each unit, select Use All.

NOTE: GPS survey must be conducted at the location of the baseplate for each gun position.

Edit All Guns

17-66.   To edit gun setup information for all guns from the Unit List screen, select the Edit All Guns button. From this menu, you may set the weapon type, mounting azimuth (Mnt Az), referred deflection (Ref), and propellant temperature (Prop Tmp) for all guns.

AMMUNITION SCREEN

17-67.   In the Ammunition screen, the LHMBC tracks ammunition by unit (gun) number.

17-68.   To display the Ammunition screen (Figure 17-11), use one of the two methods listed:

- Select the Ammo List button from the Unit List screen.
- Access the Ammunition screen using the main menu.
  - (1) Select Menu.
  - (2) Select Ammo.
  - (3) Select Ammo List.

17-69.   To add or edit ammunition, use one of the two methods listed:

- Select Add New for an initial entry.
- Select Edit Ammo to update the ammunition quantities.

Figure 17-11. Ammunition screen.

ADD/EDIT SCREEN

17-70.   To add ammunition—

(1)   Select Add/New. The Ammunition Add/Edit screen (Figure 17-12) appears.

(2)   Select the weapon you would like to modify using the Unit field pull-down menu. This menu displays all weapons that have been entered into the LHMBC.

(3)   Select the Lot field to enter the lot letter. Letters range from A to Z.

(4)   Select the appropriate ammunition using the Shell - Fuze field pull-down menu. Ammunition is arranged alphabetically by type – HE, IL, IR, RP, TRN, and WP.

(5)   Enter the lot number in the Lot Number field. Lot numbers contain as many as 16 characters.

(6)   In the Quantity field, enter the quantity of the lot allocated to the current weapon.

(7)   Repeat steps 2 through 6 for the remaining types and quantities of ammunition for each gun.

Figure 17-12. Ammunition Add/Edit screen.

AMMUNITION ROLL-UP SCREEN

17-71.   The Ammunition Roll-Up screen (Figure 17-13) lists the total quantity of ammunition by lot. To display this screen—

    (1)   Select Menu.

    (2)   Select Ammo.

    (3)   Select Ammo Roll-up.

17-72.   If Commo is enabled, the Send to FSE action button will display. Select Send to FSE to send the ammunition roll-up to the controlling FC.

Figure 17-13. Ammunition Roll-Up screen.

SETUP DATA SCREEN

17-73.   The Setup Data screen (Figure 17-14) allows the operator to set the system clock, security mode, target block, and splash time (if using Commo), and to enable/disable the audio alarm. To display this screen—

    (1)   Select Menu.

    (2)   Select Setup.

    (3)   Select Data.

Date and Time Fields

17-74.   If the GPS is enabled, the GPS Time button will display. Select the GPS Time button to auto-fill the Date and Time fields.

17-75.   If operating in the manual mode, use the stylus to select the portion of the date or time that requires adjustment, and then use the up or down arrows to adjust the selected portion.

Security Mode Field

17-76.   If sensitive information, such as actual target locations or friendly positions, will be received through the built-in Commo, set the security mode according to the security setting of the sending unit. The default security setting is unclassified.

Target Block

17-77.   These fields contain the unit's assigned target block. The target block contains a two-letter prefix, a number between 0 and 9999 for the target block minimum, and a number between 1 and 9999 for the target block maximum. The Target Block Next field contains a number between 0 and 9999. This does not prevent other targets from being entered with a different block sequence; it only sets the default target-labeling sequence.

Send Splash Message Field

17-78.   The default splash message time is five seconds.

Figure 17-14. Setup Data screen.

METEOROLOGICAL DATA

17-79.   The LHMBC uses a computerized MET message to correct for changes in the atmospheric condition as they apply to ballistic calculation. When no MET is available, the LHMBC uses the standard MET that is stored in the LHMBC.

17-80.   When a new MET message is received and stored, it becomes the current MET and is applied to all firing data. The computer MET message may be received digitally or entered manually.

NOTE: Ballistic MET is not compatible with the LHMBC.

APPLYING METEOROLOGICAL DATA

17-81.   If the MET is sent digitally, an alert displays to confirm receipt of the MET message. After confirming receipt, you must apply the MET:

    (1) Select Menu.

    (2) Select Met.

    (3) Select Messages.

    (4) Select the most recent message.

    (5) Select Process. This message becomes the current MET.

ENTERING MANUAL METEOROLOGICAL DATA MESSAGES

17-82.   To enter the MET message, manually record it on DA Form 3677-R (Figure 4-15). Chapter 4 gives a complete overview of meteorological messages.

17-83.   To input a new manual MET message—

> (1) Select Menu.

> (2) Select Met.

> (3) Select New. The Met New screen (Figure 17-15) displays.

Figure 17-15. Met New screen.

> (4) Select Edit Station. The Met Edit Station screen (Figure 17-16) displays.

> (5) Fill in the data entry fields using the information received in the computer MET message. The first two data entry fields, Station Name and Octant, refer to Group 1 of the computer MET message. The next two fields, Station Height and MDP Pressure, refer to Group 4. Latitude and Longitude refer to Group 2. Group 3 is not used in the LHMBC.

Figure 17-16. Met Edit Station screen.

(6) Select Use All. The LHMBC returns to the Met New screen.

(7) Enter surface zone information by selecting line 0 in the data field and selecting Edit Line. The Met New Edit Lines screen (Figure 17-17) displays.

Figure 17-17. Met New Edit Lines Screen.

(8) Enter surface and zone MET data (Direction, Speed, Temp, and Pressure fields).

(9) Select Next Line to proceed to the next surface zone line. Complete all applicable lines. At a minimum, the first eight lines must be completed in order to apply MET data.

(10) Select Use All to return to the Met New screen. Any abnormalities in the MET message will be highlighted in orange. If abnormalities are displayed, validate the MET with the FC.

NOTE: Orange fields only indicate that the MET has an abnormal trend, not that the MET message is invalid.

(11) Select Apply New Met to use the new MET.

SWITCH BETWEEN METEOROLOGICAL DATA MESSAGES

17-84.   To toggle between the current MET and the standard MET from the Met Current screen—
    (1) Select Use Standard. The Met Standard screen displays.
    (2) Select Use Current. The Met Current screen (Figure 17-18) displays.

Figure 17-18. Met Current screen.

SAFETY FAN

17-85.   A safety fan is a restrictive firing measure used during training to ensure that the firing unit does not process data located outside of the safe zone of impact. Firing units calculate safety fans in accordance with the Mortar Surface Danger Area (Appendix C).

17-86.   The LHMBC stores 1 safety fan with as many as 10 segments (Figure 17-19). Each fan segment is defined by left and right limits, minimum and maximum ranges, and minimum and maximum charges. Targets outside of these limits are considered unsafe.

17-87.   A safety fan violation cannot be overridden, and data for engagement will not display. If a violation occurs or if the solution endangers any stored friendly locations, a warning message will display. Friendly positions are protected by a buffer zone known as the boundary outer limit alert distances (BOLAD). Firing data that impacts inside of a BOLAD will not be processed, and an error message will display on the Mission Solution screen for each gun that impacts inside of the BOLAD. The buffer radii are as follows:

- 60-mm   –   100 meters
- 81-mm   –   150 meters
- 120-mm –   200 meters
- 120-mm –   250 meters (firing M91 Illum)

Figure 17-19. Safety Fan Segment screen.

ENTER SAFETY FAN INFORMATION

17-88.   To enter a safety fan into the LHMBC—

    (1) Select Menu.

    (2) Select Setup.

    (3) Select Safety Fan.

    (4) Select Add New. The Add New Safety Fan Segment screen (Figure 17-20) displays.

    (5) Enter segments, beginning with the left-most fan segment. Each additional fan segment uses the previous fan segment's right azimuth as its left azimuth.

    (6) After entering the azimuths and the minimum and maximum ranges, determine the minimum and maximum charges that may be fired.

Figure 17-20. Add New Safety Fan Segment screen.

DELETE SAFETY FAN INFORMATION

17-89.   To delete a specific segment—

(1)   Select the bottom (right-most) fan segment from the Safety Fan Segments menu.

(2)   Select Delete.

(3)   Select Confirm.

(4)   Continue deleting segments from the bottom of the Safety Fan Segments menu until the desired segment has been deleted. For example, to delete the left-most safety fan segment, all fan segments must be deleted.

17-90.   To delete the entire fan, select Delete All and Confirm from the Safety Fan Segments menu.

CHECK FIRE

17-91.   To immediately cease fire and preserve data for all missions or for a single target, the mortar section/platoon implements a check fire. The FO will receive a digital message informing him of the unit's check fire status. If the FO initiates a check fire, the LHMBC will receive a digital notification and the alarm will sound, if enabled.

INITIATE

17-92.   To initiate a check fire of all targets—

(1)   Select Menu.

(2)   Select Check Fire.

(3)   Select ChkFire All.

NOTE: All active fire missions will be halted, and all inactive missions will remain inactive until the check fire is cancelled. A (!) indicator will display, along with a mission number for every mission.

17-93.   To initiate a check fire by target number—

(1)   Select Menu.

(2)   Select Check Fire.

(3)   Select ChkFire Tgt.

NOTE: The selected mission will be halted. All other missions will remain active, and new missions may be initiated. A (!) indicator will display, along with the target number for the specified mission.

CANCEL

17-94.   To cancel a check fire—

(1)   Select Menu.

(2)   Select Check Fire.

(3)   Select the mission to be removed from check fire status.

(4)   Select Cancel ChkFire.

(5)   A "Confirm Cancel Check Fire" message will display. Select OK.

NOTE: All selected missions will now be available for mission processing.

SECTION II. COMMUNICATION

The LHMBC is capable of communicating on the fire support network with the Advanced Field Artillery Tactical Data System (AFATDS, with PKG11), Forward Observer System (FOS, Version 12 or later), and legacy systems to integrate mortar fires into the digital fire support network. Digital communication eliminates the need for voice communications and reduces the risk of human error.

CABLE CONNECTION

17-95.   To enable digital communications, select Commo On during initial startup (see 17-51). The LHMBC can utilize two-wire (landline) or FM communication.

17-96.   To install the two-wire connector or the radio cable (Figure 17-21)—

(1) Remove the connector covers from the communications connector on top of the LHMBC (1) and the cable connector on the two-wire or radio connector (2).

(2) Insert the appropriate cable into the communications connector (1), and twist the cable connector (2) back and forth while pushing the cable in until it clicks into place.

(3) Turn the communications connector knob (3) clockwise to secure the cable.

(4) Attach the radio cable connector (4) to the audio data connector on the radio set, or connect the two-wire connector to the communications loop.

NOTES: 1.   For more setup information for FM communications, see the appropriate TM for your radio set.

2.   The two-wire connector will communicate with any other LHMBC or supported digital device connected in the communications loop.
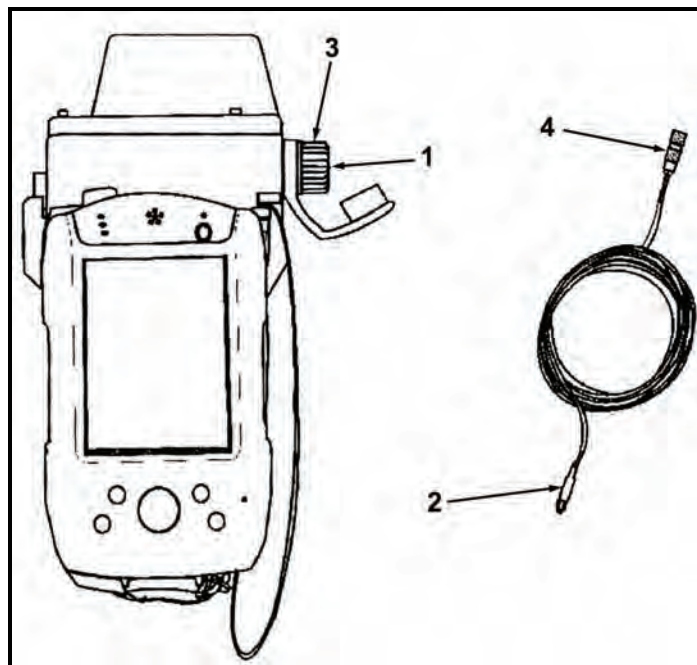

Figure 17-21. Lightweight handheld mortar ballistics computer communications connector.

PARAMETER SETUP

17-97.   To set up parameters—

   (1) Select Menu.

   (2) Select Commo.

   (3) Select Channel Params. The Setup Commo Parameters screen (Figure 17-22) displays.

   (4) Select the appropriate device type in the Dev Type field, or enter the default settings by selecting the Radio or Wire default buttons. The LHMBC and the sending device (FOS, AFATDS, etc.) must have identical setup in the fields outlined in Table 17-4.

Figure 17-22. Setup Commo Parameters screen.

Table 17-4. Parameter Setup fields and settings.

FIELD	SETTING AND RELATED INFORMATION
Dev Type	2 Wire or SINCGARS
Comsec Mode	Plain Text for 2 Wire
	Plain Text or Cipher Text for SINCGARS
Network Access Delay (Nad) Method	RANDOM, HYBRID, PRIORITY, DAPNAD, or RROBIN
	NOTE: The Network Access Delay ensures that multiple users on a single network all have transmission opportunities.
Modulation	FSK-188C (default; must be used with the FOS) or NRZ (non-return-to-zero interface)
	NOTE: The NRZ interface is used primarily with digital equipment.
Fh Mode	Single channel or frequency hop mode
	NOTE: This setting allows the operator to communicate in single channel or frequency hop mode when the LHMBC is connected through an FM device.
Net Usage	Data or Data and Voice
	NOTE: The Data setting is preferable, since it eliminates voice interruptions that take precedence over data communications.
Data Rate	A baud rate of 600 or 1200 bps for wire communications
	A baud rate of 2400 or 4800 bps for FM communications
Num Stations	The total number of units using the network, including the operator
Error Detection and Correction (Edc) Mode	Double_FEC_TDC, FEC_ONLY, FEC_Scrambling, FEC_TDC, FEC_TDC_Scrambling, NO_EDC, or Scrambling_Only
	NOTE: Error Detection and Correction compensates for errors in transmission.

UNIT PRIORITIES

17-98.   Rank determines a unit's priority on the network. This is the only field that will not be identical to the channel parameters of other units operating on the network. Each rank is a unique identifier for that unit. Common priorities for rank are as follows:

- FSE – 01
- FO1 – 02
- FO2 through FO'X' – 3 - 'X + 1'
- FDC – 'X' + 2

EXAMPLE

For one FC, three FOs, and one FDC, the standard labeling convention will be:

- FSE   –   Rank = 1
- FO1   –   Rank = 2
- FO2   –   Rank = 3
- FO3   –   Rank = 4
- FDC   –   Rank = 5

SET UP A UNIT ADDRESS

17-99.   To set up a unit address—

(1) Display the Setup Commo Addresses screen (Figure 17-23) by:

- Selecting Use All.
- Selecting Menu, Commo, and then Channel Addrs.

NOTE: All units on the Unit List are listed, except guns.

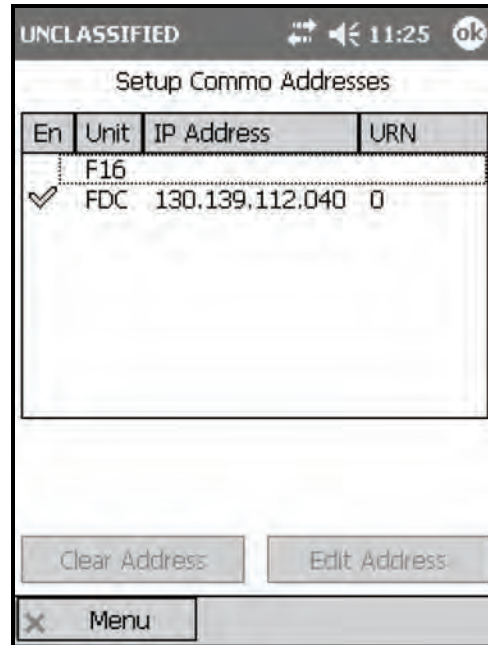(2) Enter the FDC address, and then the addresses of other units.

Figure 17-23. Setup Commo Addresses screen.

EDIT A UNIT ADDRESS

17-100. To edit a unit—

(1) Select a unit from the list of units.

(2) Select Edit Address. The Edit Commo Address screen (Figure 17-24) displays.

(3) Enter the proper Commo address values.

17-101. Select Use All.

NOTE: If the unit is an FDC, the channel will be enabled, and a checkmark will appear in the En field of the Setup Commo Address screen.

Figure 17-24. Edit Commo Address screen.

UNIT NAME FIELD

17-102. The unit name is listed at the top of the Edit Commo Address screen.

EN FIELD

17-103.   If the channel has been enabled, the En field will be checked. This field is read-only for FDCs; all other units may be enabled for communications by selecting this field.

IP ADDRESS FIELD

17-104. The IP address is supplied through the unit Information Manager's Office.

MODEM ADDRESS FIELD

17-105. The modem address is the last three digits of the IP address and is filled automatically. The number can range from 040 to 095.

URN FIELD

17-106. The URN identifies the specific LHMBC on the network and has a range from 0 to 16777215.

ENABLE OR DISABLE A CHANNEL

17-107. To enable or disable a channel—

    (1) Select Menu.

    (2) Select Commo.

    (3) Select Enable Channel.

NOTE: A message confirming the channel's status appears. This message only confirms that the channel is enabled or that there was an error enabling the channel, not that the network is working.

SEND STATUS SCREEN

17-108. If a channel is enabled, Send Status becomes functional. To display the Send Status screen (Figure 17-25)—

    (1) Select Menu.

    (2) Select Commo.

    (3) Select Send Status.

17-109. Once a message has been sent, the Send Status screen automatically displays.
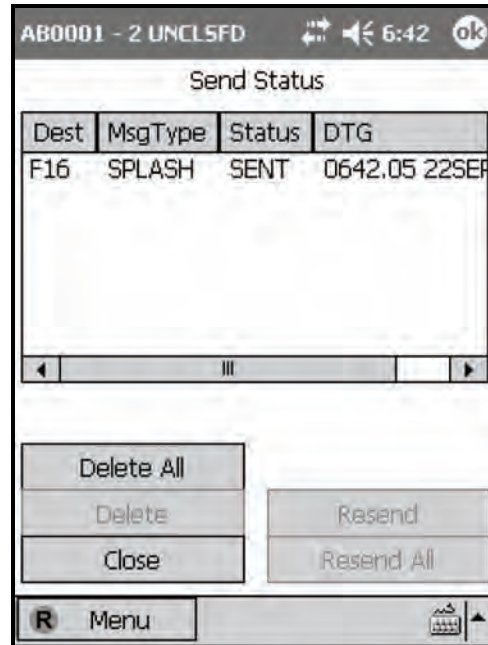
Figure 17-25. Send Status screen.

PLAIN TEXT MESSAGING

17-110. The LHMBC's plain text messaging (PTM) function allows all units, except guns, to communicate via text messaging. Two screens, PTM Send and PTM Read, are available for text messages. Upon receipt of a PTM, the routine priority icon will display on the left side of the Menu button.

PLAIN TEXT MESSAGING READ SCREEN

17-111. The PTM Read screen consists of a message log and a message log box. To display the PTM Read screen—

    (1) Select Menu.

    (2) Select Commo.

    (3) Select PTM Read.

17-112. Select a message from the log to display the message in the Message Log box. The Reply button allows the operator to reply to the message sender by displaying the PTM Send screen.

PLAIN TEXT MESSAGING SEND SCREEN

17-113. The PTM Send screen contains a message box for typing messages. To display the PTM Send screen—

- Select Menu, Commo, and then PTM Send.

                    OR

- Select the Reply button on the PTM Read screen.

17-114. To send a message to a specific unit—

(1) Select the unit name from the Unit Name box.

NOTES: 1.   If the PTM Send screen was displayed via the Reply button, the sending unit's name will be selected in the Unit Name box.

2.   To send a message to all units in the Unit Name box, select Check All.

3.   To clear units that have been checked, select Check None.

---

(2) Type your message. To clear a message, select the Clear button.

(3) Select Send. The Send Status screen displays.

SECTION III. GLOBAL POSITIONING SYSTEM

The LHMBC expansion pack contains a built-in GPS receiver. If the LHMBC detects the expansion pack, the GPS can be enabled from the System Startup Settings screen. An external GPS antenna may be connected to the LHMBC using the external GPS connector located on the right side of the expansion pack.

NOTES: 1.   See TM 9-1220-252-12&P, WP 0034 00 for ordering info.

2.   The correct Map Mod (Geo Ref) must be entered to obtain a GPS position (Figure 17-6).

SETUP AND INITIALIZATION

17-115. To display the GPS Status screen—

(1) Select Menu.

(2) Select Setup.

(3) Select GPS.

17-116. The GPS Status screen (Figure 17-26) displays the following fields:

- 000State.
- 001Position.
- 002GPS Accuracy.
- 003.
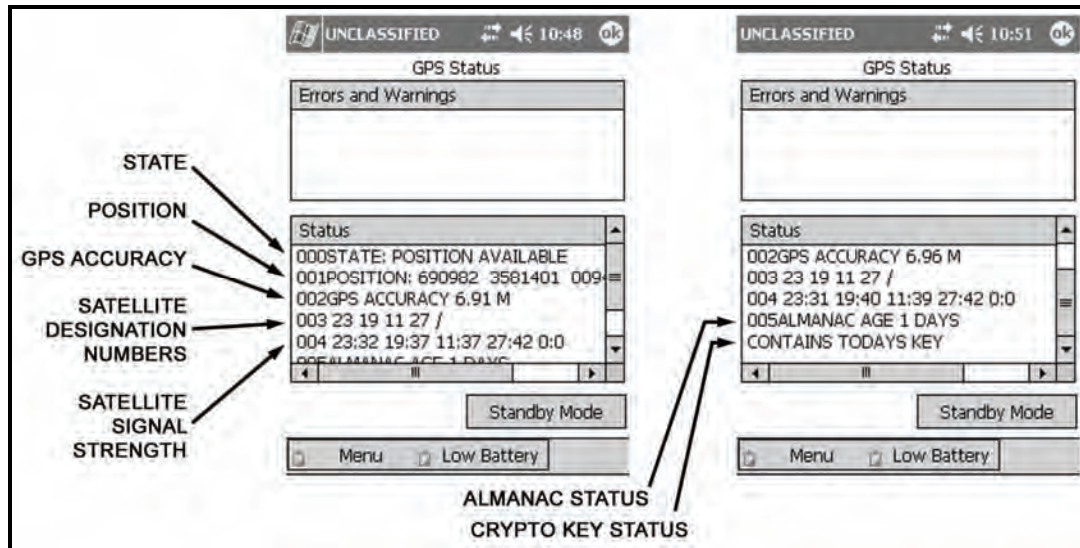- 004.
- 005ALMANAC AGE or 005NO ALMANAC.
- 006.

Figure 17-26. Global Positioning System Status screen.

00STATE

17-117. This field displays the following:

- Initialize.
- Searching.
- Position Available.
- Unknown.

001POSITION

17-118. This field displays the present position only when the State field displays "Position Available."

002GPS ACCURACY

17-119. This field indicates the accuracy of Position. The LHMBC requires the accuracy to be 25 meters or less before displaying the position.

003

17-120. This field indicates the five satellite designation numbers that the LHMBC is tracking and the good/weak signal indicator. A slash serves as the good/weak indicator; satellites to the right of the slash have weak signal strength. For example, 003 4 13 11 / 10 20 indicates that satellites 4, 13, 11, 10, and 20 are the five satellites currently being tracked by the LHMBC. Satellites 4, 13, and 11 have good signal strength; satellites 10 and 20 have weak signal strength.

004

17-121. This field indicates the strength of a satellite signal. For example, 004 4:36 13:42 11:32 10:12 20:0 indicates that satellite 4 has a signal strength of 36, satellite 13 has a signal strength of 42, and so on.

17-122. Signal strength ranges from 0 (no signal) to 50 (max signal). A signal strength of 30-40 is usually strong enough for the GPS to receive data.

005ALMANAC AGE OR 005NO ALMANAC

17-123. This field indicates the age of the almanac in days. When the GPS is using NO ALMANAC or an almanac that is more than a few days old, it will take longer to acquire a position.

006

17-124. This field displays the crypto key status. The status displayed are shown in Table 17-5. GPS keys are required if satellite signals are scrambled.

Table 17-5. Global Positioning System crypto key status and meaning.

CRYPTO KEY STATUS	MEANING
Not Keyed	No key has been loaded.
No Key for Today	The key loaded is invalid or expired.
Contains Todays Key	The key is in use.
Todays Key Incorrect	The group unique variable (GUV) crypto key is invalid.
Waiting for SV Data	The LHMBC is waiting for the satellite vehicle; the crypto key may be installed, but is too old.
CV Zeroize Successful	The crypto variable and almanac have been zeroized.
CV Zeroize Failed	The GPS has failed to zeroize. Perform a soft reset, and then attempt to zeroize the GPS. If problem continues, perform a hard reset. Attempt to zeroize the GPS again. If problem persists, evacuate the LHMBC to unit maintenance. NOTE: See TM 9-1220-252-12&P WP 0040 00 for soft and hard reset procedures).
Key Loaded	This message is displayed for approximately 2 seconds when loading the key.

STANDBY MODE

17-125. Use standby mode to turn the GPS off and save power. The initial position will be available within 20 minutes of being switched back to continuous mode.

GLOBAL POSITIONING SYSTEM COMSEC KEY

17-126. To fill the LHMBC—

    (1) Select Menu.

    (2) Select Setup.

    (3) Select GPS. The GPS Status screen displays.

17-127. The LHMBC does not require the operator to be on the GPS Status screen to receive the fill, but this will enable the operator to verify that the LHMBC has received the crypto key and confirm its status.

ZEROIZING THE GLOBAL POSITIONING SYSTEM CRYPTO KEY

17-128. The GPS crypto key may be zeroized from the Maintenance screen. This process will also zeroize the GPS almanac. To launch the LHMBC Maintenance screen from the desktop—

    (1) Select Start.

    (2) Select Maintenance.

    (3) Select Zeroize GPS.

    (4) A call box will display to confirm zeroizing the GPS. Select *Yes*. The GPS key and almanac are now zeroized.

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Chapter 18

Fire Missions

The LHMBC provides a standard set of steps and screens to view the fire mission data for grid, polar plot, laser polar, shift from a known point, quick fire, direct lay, and hipshoot missions. The sequence of actions from the initial CFF to the end of mission (EOM) is standard for all CFFs, although some steps may be omitted or repeated. This chapter consists of three sections: manual fire missions, digital fire missions, and special fire missions. The LHMBC can handle up to six active missions at a time.

SECTION I. MANUAL FIRE MISSIONS

Manual missions are fire missions that the FDC does not receive digitally from the FC or FO. A fire mission can be received from the FO by radio or any other form of verbal communication.

> **NOTE:** Chapter 17 describes the steps required to initialize the LHMBC. Initialization must be performed before processing most fire missions.

All manual missions are initiated from the Manual Missions menu (Figure 18-1). To access this menu, select Menu, and then Manual Missions. The Manual Missions submenu is displayed. This menu lists the method of target location for all manual missions. These methods include—

- Grid.
- Polar plot.
- Laser polar.
- Shift from a known point.
- Quick fire.
- Direct lay.
- Hipshoot.

> **NOTE:** The following LHMBC grid mission screens depict an actual fire mission. This example uses no sheaf corrections (Reg/MET).
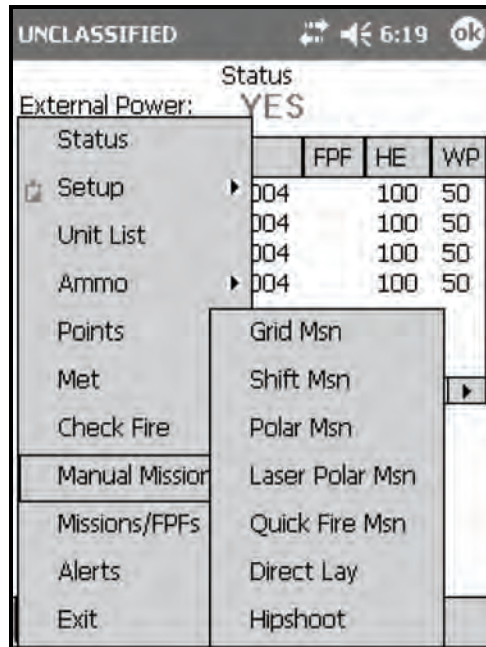
Figure 18-1. Manual Missions menu.

GRID MISSIONS

18-1.   After recording the CFF on DA Form 2399-R—

(1) Select Menu.

(2) Select Manual Missions.

(3) Select Grid Msn.

(4) The Grid Mission screen (Figure 18-2) displays.
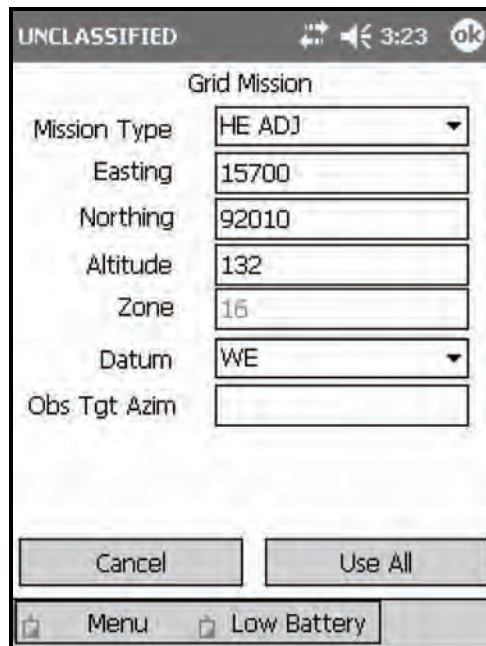
Figure 18-2. Manual grid mission entry.

(5) Enter all required information in the Grid Mission screen fields (Table 18-1).

Table 18-1. Grid Mission screen fields and related information.

FIELD	RELATED INFORMATION
Mission Type	The Mission Type field defaults to HE ADJ. The options for this field include: • High-explosive adjustment (HE ADJ). • High-explosive FFE (HE FFE). • Illumination adjustment (ILL ADJ). • Illumination FFE (ILL FFE). • Suppression (SUPPRESS). • Immediate smoke (IM SMOKE). • Registration. • FPF.
Easting	Easting must be entered in a five-digit format.
Northing	Northing must be entered in a five-digit format.
Altitude	The altitude is not required, but is entered if given. If the altitude is not entered, the target altitude will be calculated at the same altitude as the firing unit.
Zone	The Zone field displays the zone entered in the Geo Ref setup and is read-only.
Datum	The Datum field is auto-filled by the Geo Ref. Although a different datum may be selected, it will not be saved for future missions.
Observer-Target Azimuth (Obs Tgt Azim)	The observer-target azimuth must be entered prior to making the first adjustment, or the LHMBC will default to the gun-target (GT) line.

(6) Select Use All.
(7) The Mission Data screen (Figure 18-3) displays. The Mission Data screen allows the operator to enter the method of control and gun/sheaf refinements.
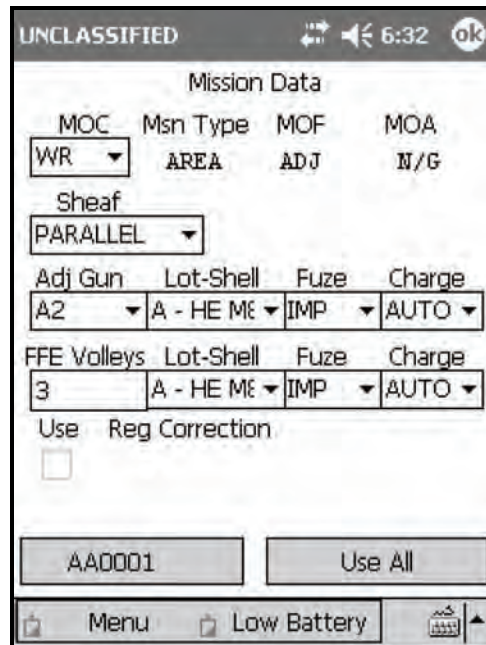
Figure 18-3. Mission Data screen.

(8) Use the fields outlined in Table 18-2 to enter and view information.

Table 18-2. Mission Data screen fields and related information.

FIELD	RELATED INFORMATION
Method of control (MOC)	The options for the MOC field include— • When ready (WR). • At my command (AMC). • Do not load (DNL)/ Do not Fire.
Mission type (Msn Type) Method of fire (MOF) Method of adjustment (MOA)	Msn Type, MOF, and MOA fields are read-only. They are displayed for an operator's reference only. Each field is set according to the mission type selected.
Sheaf	The operator must use the ammunition available to determine the mission to be fired and the target description to choose the appropriate sheaf. The options for the Sheaf field include— • LINEAR. • OPEN. • CONVERGED. • SPECIAL. • PARALLEL (default). • Search and traverse (SRCH/TRAV). NOTE: SPECIAL and SRCH/TRV sheaves will display additional fields for required entries. These fields are described in detail later in this chapter.
Adjusting gun (Adj Gun)	The adjusting gun defaults to the gun nearest to the center of the firing unit. The FDC operator must ensure that the proper adjusting gun is used for calculations.
Lot, Shell, and Charge	These fields allow the operator to designate the ammunition to be fired during the adjustment phase (from available lots) and the fuze setting, and enable the operator to force the charge, if so desired. If the mission is an FFE, there will be no adjustment phase, and these fields will be read-only.
FFE Volleys	These four fields designate the number of rounds to be fired during the FFE phase. The LHMBC defaults to three rounds. NOTES: 1. There must be enough ammunition entered for the number of volleys selected. The Lot-Shell field will only display the appropriate ammunition available from the Ammunition List. 2. The available fuze settings will correlate with the mission type selected (i.e., illumination missions will include MTSQ). 3. See Appendix B of FM 7-90, Tactical Employment of Mortars, for joint munitions effectiveness manuals (JMEMS), charts, and additional engagement criteria.
Use Registration Correction (Use Reg Correction)	If an RP is recorded, the Use Reg Correction box will be checked. To process a mission without the registration corrections, deselect the checkbox.

(9) Select Use All.

(10) If there are no errors or warnings, the Solution/Gun Orders screen (Figure 18-4) displays. Table 18-3 outlines all Solution/Gun Orders screen fields and buttons, and related information.

NOTES: 1. If there are errors or warnings, they will be displayed on an Errors and Warnings screen. This screen warns the FDC operator of a possible danger or an actual firing violation.

2. The Solution/Gun Orders screen may also be accessed from the active mission menu by selecting Solution. The active mission menu (labeled with the mission number) can be accessed by selecting Menu, Missions, FPFs, and then the mission number.
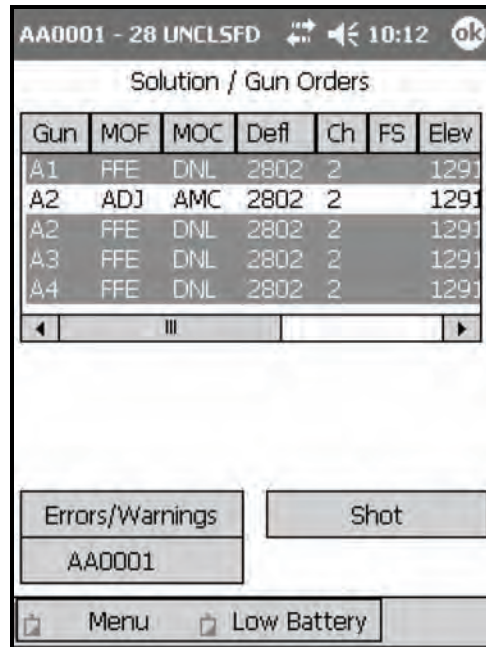
Figure 18-4. Solution/Gun Orders screen.

Table 18-3. Solution/Gun Orders screen fields and buttons, and related information.

FIELD/BUTTON	RELATED INFORMATION
Shot button	The shot clock is displayed in the top left corner (with the mission number) and counts down from the time of flight to 0. The Shot button acts as a shot clock in the manual mode and will notify the observer of a shot in the digital mode. This button also acts as an accumulator for the rounds fired for the mission.
Gun Data field	In this field, FFE data will display for all guns in red during the adjustment phase. This allows non-firing guns to follow the adjustment more accurately. The adjusting round will display with black lettering on a white background. Gun data may display at the bottom of the screen by selecting the desired line with the stylus and dragging it to the bottom of the screen. NOTE: To display the action buttons, tap anywhere outside of the displayed gun data.
Errors/Warnings button	This button displays the Errors/Warnings screen.
<Target> button	The <Target> button (labeled AA0001 in Figure 18-5) displays the <Target> screen.

(11) Select the Shot button.

(12) Select the <Target> button.

(13) The <Target> screen (Figure 18-5) displays. The <Target> screen allows the operator to review, verify, and adjust fires; and modify or end the active mission; and provides access to all mission functions of the active mission. The target number is displayed at the top of the screen (AA0001 in the example). Table 18-4 outlines all <Target> screen buttons and related information.

NOTE: The <Target> screen can be accessed by selecting Menu/Missions/FPFs/<target number>, or by selecting the <Target> button from any mission screen.
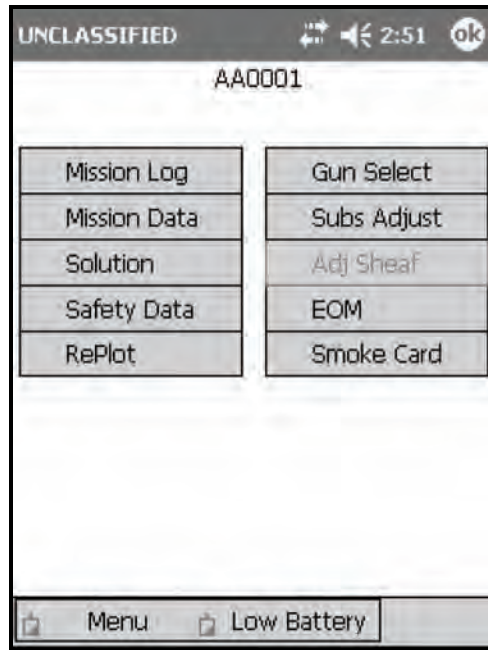
Figure 18-5. <Target> screen.

Table 18-4. <Target> screen buttons and related information.

BUTTON	RELATED INFORMATION
Mission Log	The Mission Log stores a chronological history of all information entered for the active mission.
Mission Data	This button displays the Mission Data screen.
Solution	This button displays the Solution/Gun Orders screen.
Safety Data	This button displays the Safety Data screen.
RePlot	This button displays the Mission RePlot screen. This function is used to designate the altitude of a previously processed target. This will adjust the burst point grid to that of the corrected target height and trajectory.
Gun Select	This button displays a screen used to designate guns to support the active mission. To process two simultaneous missions, for instance, this screen would be used to designate which guns fire each mission.
Subsequent Adjustments (Subs Adjust)	This button displays a screen used to input subsequent adjustments.
Adjust Sheaf (Adj Sheaf)	This button displays the Adjust Sheaf screen. This screen is read-only until the FFE phase. The Adjust Sheaf screen enables the operator to make adjustments to any gun that is used in the active mission. NOTE: Section III covers registration and sheaf adjustment.
End of Mission (EOM)	This button displays the EOM screen.
Smoke Card	This button displays the Smoke Card screen. This function is available from the <Target> screen. NOTE: Section III covers smoke missions and the use of the smoke card.

(14) Select Solution.

(15) Select <Target>.

(16) Select Safety Data.

(17) The Safety Data screen (Figure 18-6) displays. This screen allows the operator to review and verify the safety data for each gun in the active mission. All guns used in the mission are displayed on the left side of the screen. Data for each gun is listed to the right. Table 18-5 displays the data fields for this screen.
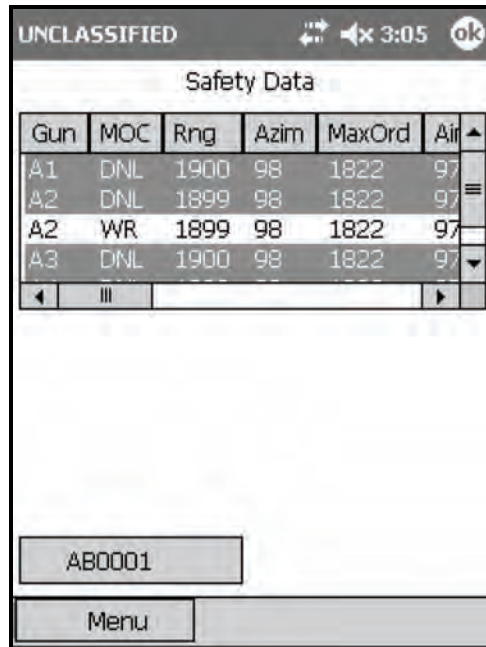
Figure 18-6. Safety Data screen.

Table 18-5. Safety Data screen fields and related information.

FIELD	RELATED INFORMATION
Method of Control (MOC)	The options for the MOC field include— • At my command (AMC). • Do not load (DNL). • Fire for effect (FFE). • When ready (WR).
Range (Rng)	This field contains the range to the target, expressed as a linear horizontal distance to the target. Differences in altitude (slope range) are not included.
Azimuth (Azim)	This field contains the grid azimuth to the target.
Maximum Ordnance (MaxOrd)	This field contains the maximum ordnance, expressed as the actual height of the round at its summit. NOTE: The maximum ordnance takes into account the actual station height.
Aiming Point Azimuth	This field contains the direction the mortar must be aimed to hit the target. This direction takes into account the total correction from exterior ballistics, such as registration and MET.
Aiming Point	This field contains the grid location for the specified gun to impact at its correct location in the sheaf.
Burst Height	This field contains the calculated height at which the round will burst.
Burn Time	This field contains the amount of time the round will burn before burning out.
Canister Easting	This field contains the easting to where the canister will impact if the round malfunctions.
Canister Northing	This field contains the northing to where the canister will impact if the round malfunctions.
Grid Declination	This field contains the grid declination constant for the area of operations. The grid declination constant accounts for the difference between grid north and magnetic north.

(18) Select the <Target> button.

(19) The <Target> screen displays.

(20) Select Subs Adjust.

(21) The Subsequent Adjust screen displays. The Subsequent Adjust screen (Figure 18-7) enables the operator to make gun adjustments. Table 18-6 displays the data fields for this screen.

NOTES: 1. Adjustments may be made using the observer-target azimuth (OTAzim) or, if made from the gun position, using the gun-target line (GTL). If using the observer-target (OT) azimuth, the observer must give his azimuth to the target prior to the first correction. This may be either a part of the initial CFF or the first part of the initial adjustment transmission.

2. The following LHMBC Subsequent Adjust screen depicts an actual fire mission. This example uses no sheaf corrections (Reg/MET). It also uses the following FO call to show the appropriate positioning of information:

FO Call: Dir 100. Left 100. Drop 100.
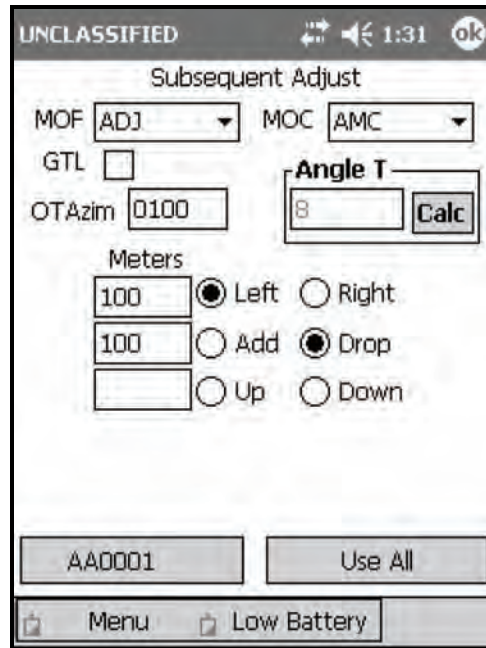
Figure 18-7. Subsequent Adjust screen.

Table 18-6. Subsequent Adjust screen fields and related information.

FIELD	RELATED INFORMATION
Method of Fire (MOF)	MOF options are— • ADJ. • CONT. • FFE. • Repeat FFE (RFFE).
Method of Control (MOC)	MOC options are— • AMC. • WR. • DNL.

(22) Select Use All.

(23) The Solution/Gun Orders screen displays.

(24) Select Shot.

(25) Select the <Target> button.

(26) The <Target> screen displays.

(27) Select Subs Adjust.

(28) Change MOF from Adjust to FFE.

(29) Select Use All.

(30) The Solution/Gun Orders screen displays.

(31) Select Shot.

(32) Select the <Target> button.

(33) The <Target> screen displays.

(34) Select EOM.

(35) The End of Mission screen (Figure 18-8) displays. The EOM screen enables the operator to end the active mission and to discard the data or save it as a target or a known point.
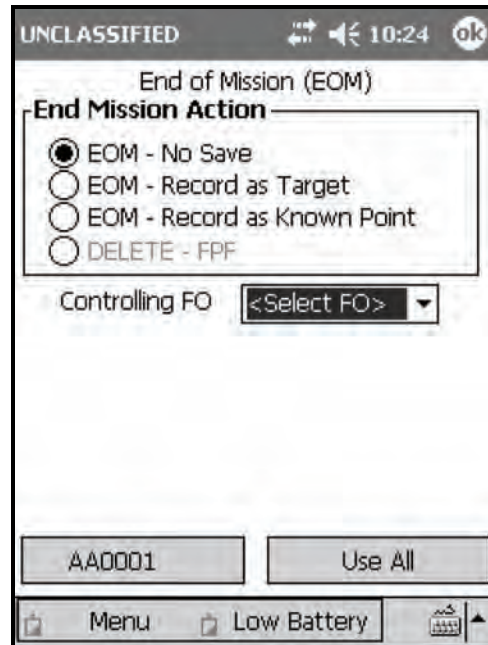
Figure 18-8. End of Mission screen.

(36) Choose one of the selections outlined in Table 18-7.

Table 18-7. End of Mission screen selections and related information.

BUTTON	RELATED INFORMATION
EOM - No Save	Choose this option to display the Status screen without recording the known point data.
EOM - Record as Target	If the mission is saved as a target, it will be saved as the target number used to fire the mission.
EOM - Record as Known Point	If the mission is saved as a known point, a controlling FO must be selected when saving the mission. After selecting Use All, the Select Known Point Number screen displays. The Known Point pull-down menu displays a list of known point numbers, defaulting to the next available known point number. Known point numbers in use will display, with the words "In Use" next to the known point number. If the operator picks a known point number currently in use, the previously stored data for that number will be overwritten, and the Save As KP# control button will display Overwrite KP#. When a known point is entered with a target number, the target also appears on the target screen.
DELETE - FPF	The DELETE - FPF option is active only during an FPF mission and will end the mission without storing or applying FPF corrections.

(37) Select Use All.

(38) The Ammunition Expended screen (Figure 18-9) displays. The Ammunition Expended screen enables the operator to view or edit the number of rounds that have been expended by each gun used in the active mission.

NOTE: The ammunition is displayed as a number of rounds used of each lot by each gun.
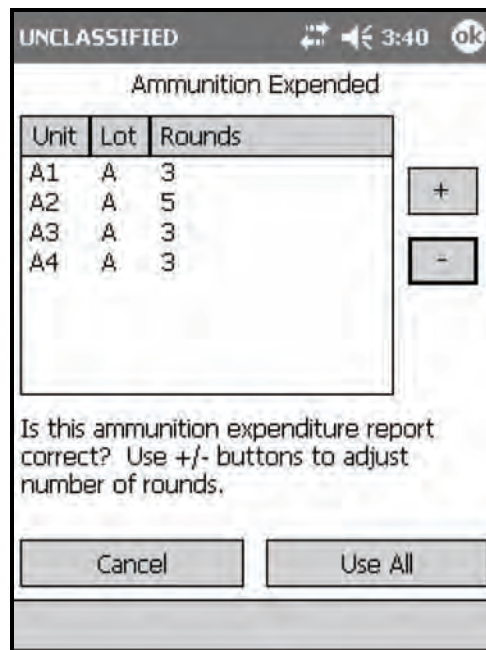
Figure 18-9. Ammunition Expended screen.

(39) Increase or decrease the number of rounds per gun by selecting the gun number, and then using the plus and minus signs to adjust the number of rounds for the selected gun.

(40) Select Use All to update the ammunition inventory.

NOTE: If Cancel is selected, the message "Ammo expended for mission must be adjusted manually in inventory" displays.

SHIFT FROM A KNOWN POINT MISSIONS

18-2.   Prior to calling a shift from a known point mission, both the observer's position and the location of the known point must be entered into the LHMBC. After recording the CFF on DA Form 2399-R—

(1) Select Menu.
(2) Select Manual Missions.
(3) Select Shift Msn.
(4) The Shift Mission screen (Figure 18-10) displays.

Figure 18-10. Shift Mission screen.

(5) Set the mission type (HE ADJ, HE FFE, ILL ADJ, ILL FFE, or FPF).
(6) Enter the observer name and the number of the known point to be shifted from.
(7) The known point position displays.
(8) Enter the initial shift data in the appropriate fields.

NOTE: If no modification is entered into a field, the modification is assumed to be the same as the known point. For instance, if there is no up or down given, the altitude for the target will be the same as the known point.

(9) Enter the OT azimuth.
(10) Select Use All to process the mission.

NOTE: After the initial method of target location is given, the mission is completed in the same manner as a basic grid mission.

POLAR PLOT MISSIONS

18-3.   After recording the CFF on DA Form 2399-R—

(1) Select Menu.

(2) Select Manual Missions.

(3) Select Polar Msn.

(4) The Polar Mission screen (Figure 18-11) displays.

(5) Select the mission type.

(6) Enter the unit name and the direction, distance, and VI from the observer's location.

NOTE: After the initial method of target location is given, the mission is completed in the same manner as a basic grid mission.

Figure 18-11. Polar Mission screen.

LASER POLAR PLOT MISSIONS

18-4.   The laser polar plot mission differs from the standard polar plot mission in that the laser takes into account the full range to the target including the altitude change (slant range). The altitude correction is expressed as a vertical angle, expressed in mils. After recording the CFF on DA Form 2399-R—

(1) Select Menu.

(2) Select Manual Missions.

(3) Select Laser Polar Msn.

(4) The Manual Laser Polar Mission screen (Figure 18-12) displays.

NOTE: After the initial method of target location is given, the mission is completed in the same manner as a basic grid mission.

Figure 18-12. Laser Polar Mission screen.

QUICK FIRE MISSIONS

18-5.   The quick fire mission is used to fire a previously engaged target. After recording the CFF on DA Form 2399-R—

    (1) Select Menu.

    (2) Select Manual Missions.

    (3) Select Quick Fire Msn.

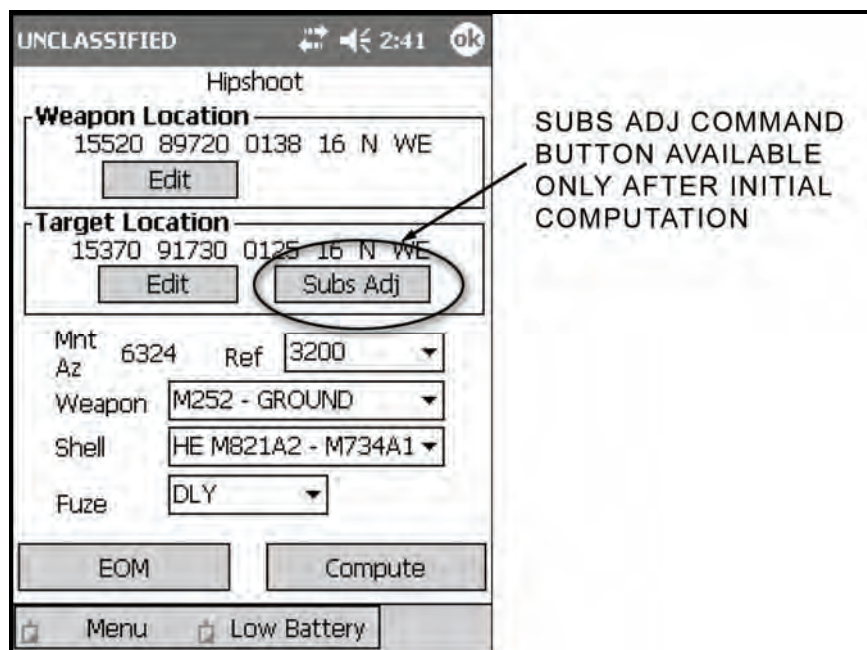   (4) The Quick Fire Mission screen (Figure 18-13) displays.

    (5) Set the mission type (HE FFE, ILL FFE, SUPPRESS, IM SMOKE, or FPF).

    (6) Select the target to be fired from the pull-down menu.

    (7) Verify the target grid displayed in the Target Position field.

NOTE: After the initial method of target location is given, the mission is completed in the same manner as a basic grid mission.
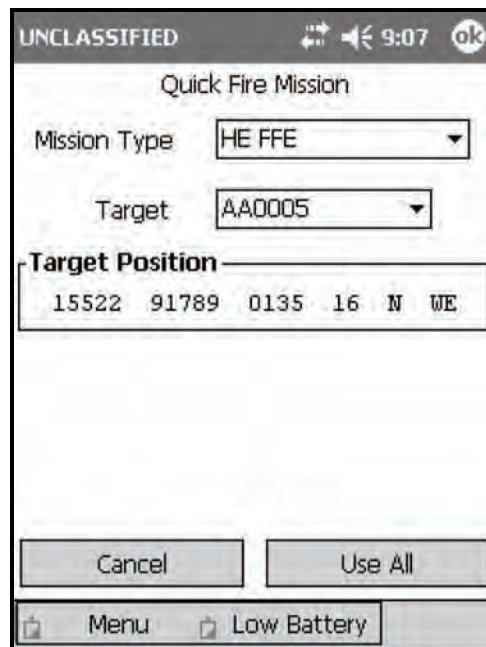
Figure 18-13. Quick Fire Mission screen.

DIRECT LAY MISSIONS

18-6.   The direct lay mission generates the proper charge, elevation, fuze setting, and time of flight (TOF) to engage a target at a designated range. In the direct lay method, the gunner sees the target through the mortar sight. No directional posts, aiming posts, FOs, or FDCs are used. The LHMBC includes the direct lay mission as an automated firing table/ballistic calculator. To fire a direct lay mission—

(1) Select Menu.

(2) Select Manual Missions.

(3) Select Direct Lay.

(4) The Direct Lay Mission screen (Figure 18-14) displays.

(5) Enter the range to the target and the vertical interval (VI) between the target and the mortar position (optional). If the target is above the mortar position, select Up. If the target is below the mortar position, select Down.

(6) Enter the appropriate weapon type from the pull-down menu.

(7) Enter the proper charge from the pull-down menu.

(8) Enter the proper fuze from the pull-down menu.

(9) Select Calculate.

(10) The LHMBC displays the proper charge, elevation, fuze setting (when applicable), and TOF.

(11) Enter subsequent range corrections in the Adj field.

(12) If the target's estimated range has increased, select Add; if it has decreased, select Drop.

18-7.   Figure 18-14 shows the Direct Lay Mission screen before and after the Calculate button has been selected. Figure 18-15 depicts a correction being entered. After the correction has been entered by selecting Calculate, the Display field and the radio button are cleared. The new charge, elevation, fuze setting, and TOF are displayed.

NOTE: For more information about the procedures used to conduct a direct lay mission, see Fire without a Fire Direction Center in FM 3-22.90.

Figure 18-14. Direct Lay Mission screen.
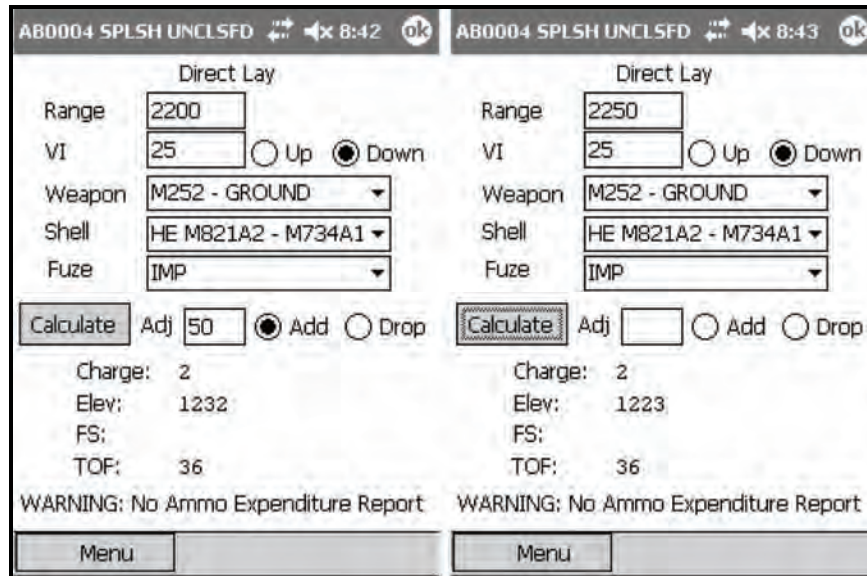
Figure 18-15. Direct Lay: first adjustment.

HIPSHOOT MISSIONS

18-8.   Hipshoot missions provide a means to obtain firing data when the firing unit is on the move. When firing a hipshoot mission, the only setup information required prior to entering the mission is the geographical reference.

18-9.   After recording the CFF on DA Form 2399-R—

(1) Select Menu.

(2) Select Manual Missions.

(3) Select Hipshoot.

(4) The Hipshoot Mission screen (Figure 18-16) displays.

Figure 18-16. Hipshoot Mission screen.

(5) Enter your location, the target location, and the proper weapon, shell, and fuze type.

(6) Select a referred deflection from the quick-fill values (0700, 2800, or 3200), or enter a value between 0000 and 6399 manually.

(7) Select a fuze. The available fuze options will correspond to the shell and fuze selected. For example, the M734A1 multi-option fuze may be set to Delay (DLY), Impact (IMP), or Proximity (PRX).

NOTE: Unlike other basic missions, there is no target screen for the hipshoot mission, nor is the ammunition list updated when the mission is completed.

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(8) Select Compute to process the mission.

(9) The Hipshoot Solution screen (Figure 18-17) displays. All solution and safety data for the hipshoot mission is displayed on the Hipshoot Solution screen.
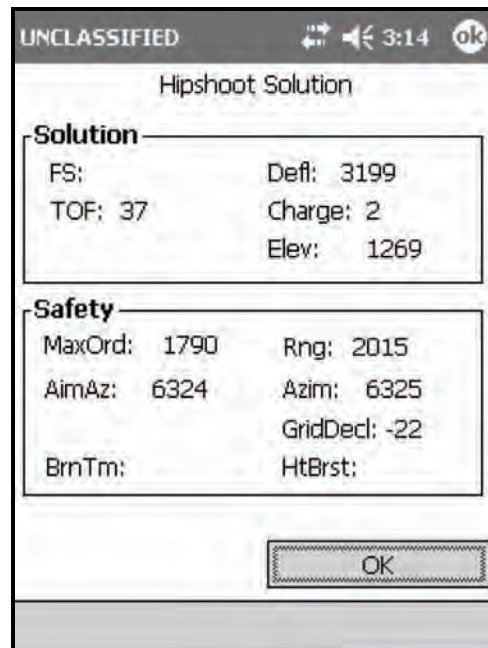
Figure 18-17. Hipshoot Solution screen.

(10) Select OK.

(11) The Hipshoot Mission screen displays.

18-10.   To process observer corrections on the Hipshoot Mission screen—
    (1) Select Subs Adjust in the Target Location field.
    (2) The Hipshoot Subsequent Adjust screen (Figure 18-18) displays.

Figure 18-18. Hipshoot: Subsequent Adjustment screen.

NOTE: This screen is identical to the Subsequent Adjust screen used for grid missions, except the <Target> control button has been replaced with the Cancel button. Select Cancel to return to the Hipshoot Mission screen without processing data.

    (3) Make the appropriate adjustments.
    (4) Process the adjustments by selecting Use All.
    (5) The Hipshoot Solution screen displays.

18-11.   After EOM has been announced by the FO—
   (1) Select EOM from the Hipshoot screen.
   (2) The Hipshoot EOM screen (Figure 18-19) displays.
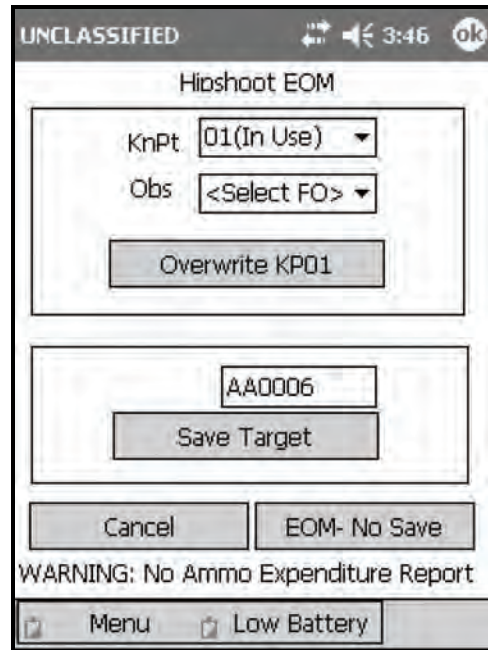
Figure 18-19. Hipshoot End of Mission screen.

   (3) Save the target as a known point or a target, or end the mission without saving by selecting the EOM-No Save control button.

NOTE: To save a mission as a known point, the FO who called the mission must be recorded in the Obs field.

TARGETS/KNOWN POINTS

18-12.   The LHMBC provides the means to view, add, edit, and delete targets and known points. There are 99 available slots for a combination of targets and known points. When a known point is entered with a target number, the target also appears on the Targets screen. To view the Targets screen—

(26) Select Menu.

(27) Select Points.

(28) Select Targets.

(29) The Targets screen displays (Figure 18-20).
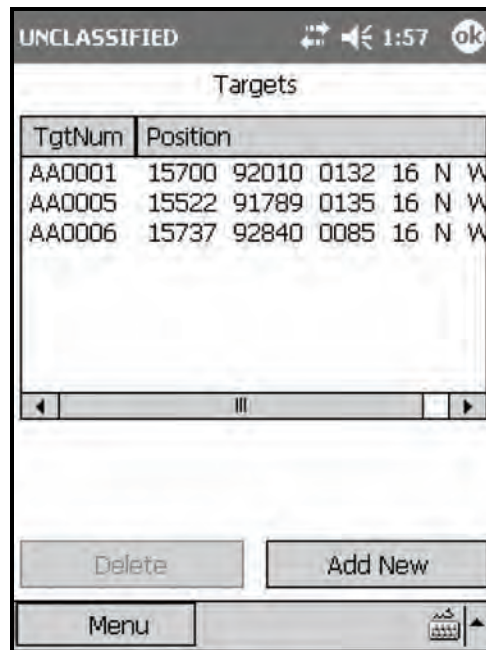
Figure 18-20. Targets screen.

SECTION II. DIGITAL FIRE MISSIONS

Like manual missions, digital missions generally have the same sequence of screens for processing a mission. The LHMBC automatically processes the proper method of target location. The FDC operator must read the initial CFF and ensure that he records the method of target location on DA Form 2399-R.

RECEIPT OF THE MESSAGE

18-13.   When operating digitally, notification of a message is made both audibly, through the audio alarm (if set to ON), and visibly, using a mission priority icon displayed on the Menu button (Figure 18-21).
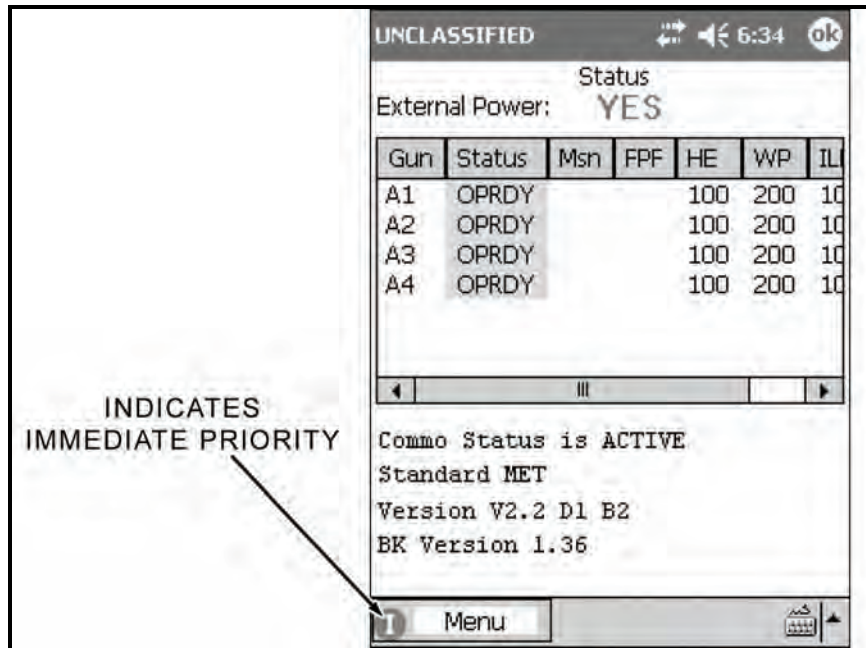
Figure 18-21. Mission priority icon displayed on the Menu button.

18-14.   To follow the priority message icons through the menu—
   (1) Select Menu.
   (2) Select Call For Fire (Figure 18-22).
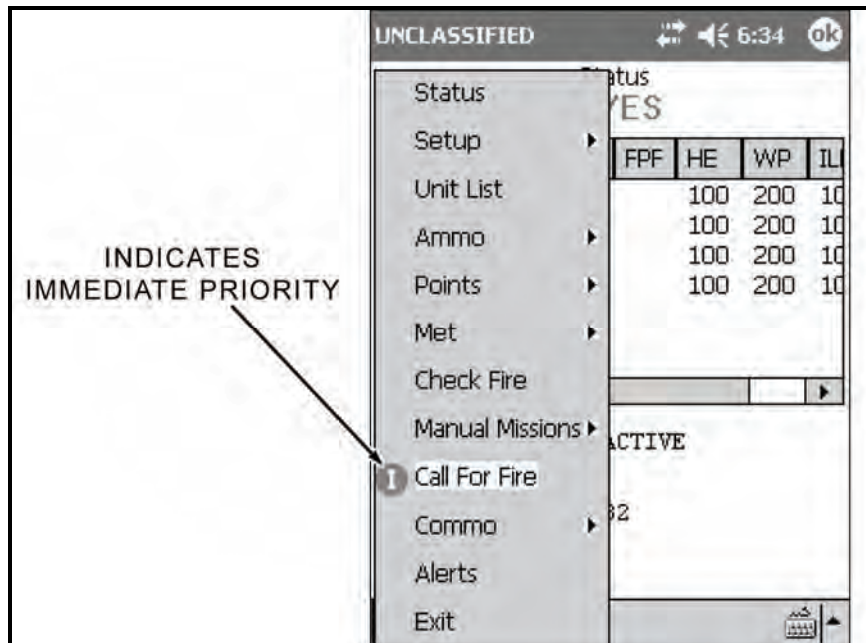
Figure 18-22. Call for fire menu selection.

(3) The New Call For Fire screen (Figure 18-23) displays. The New Call For Fire screen is comprised of four control buttons (Table 18-8), the Message window and its seven fields (Table 18-9), and the Message Log window.
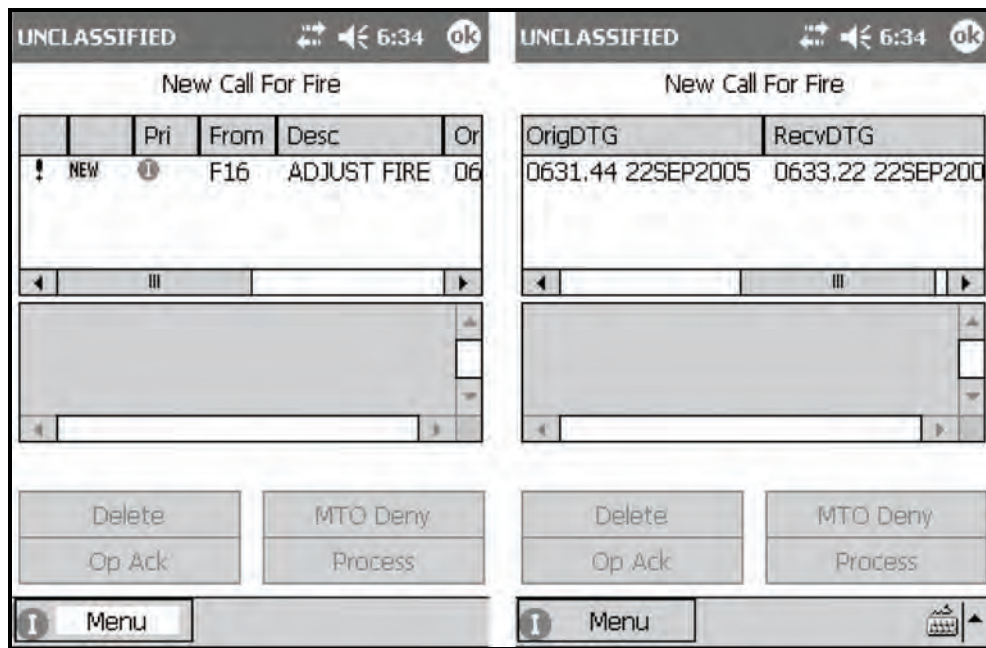
Figure 18-23. Digital Fire Mission: New Call For Fire screen.

Table 18-8. Digital Fire Mission: New Call For Fire screen control buttons and related information.

BUTTON	RELATED INFORMATION
Delete	Delete button allows for the manual deletion of messages.
Operator Acknowledge (OpAck)	OpAck button acknowledges receipt of the MTO.
Message to the Observer Deny (MTO Deny)	MTO Deny button sends an MTO that the mission must be denied.
Process	Process button is used to accept and process the mission.

Table 18-9. Digital Fire Mission: Message box fields and purposes.

FIELD	PURPOSE
Unlabelled	This field serves as a message indicator.
Unlabelled	This field serves as a message status.
Pri	This field lists the priority of the message received. The priorities are (in order of precedence)— • Flash Priority (🇫). • Immediate Priority (🛈). • Priority Priority (P). • Routine Priority (ℝ).
From	This field identifies the sending unit.
Desc	This field identifies the type of mission.
OrigDTG	This field notes the date and time group of the sending unit's transmission.
RecvDTG	This field notes the date and time group of the receiving unit upon receipt.

(4) Select a message from the Message window to view the message.

(5) The message displays in the Message Log window.

(6) If the mission is acceptable, record this information on DA Form 2399-R.

(7) Select OpAck.

NOTE: An exclamation point displays next to the mission (Figure 18-23) until it is acknowledged by selecting OpAck. This action also disables the audio alarm if the alarm is set to ON.

(8) Select Process.

NOTE: The NEW icon displays to the left of the message until it has been processed (Figure 18-23).

(9) The Mission Data screen (Figure 18-24) displays.
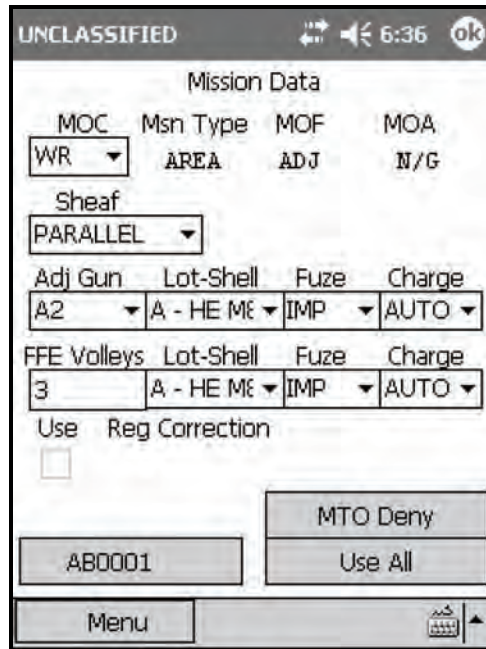
Figure 18-24. Digital Fire Mission: Mission Data screen.

(10) Review the Mission Data screen to ensure that all of the information is correct.

NOTE: Use the MTO Deny control button to send an MTO if the mission cannot be fired.

(11) If the data is correct, select Use All.

(12) The Solution/Gun Orders screen (Figure 18-25) displays.
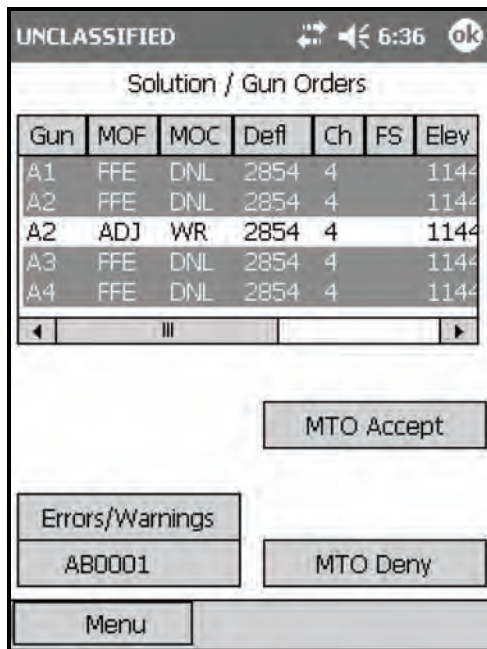
Figure 18-25. Digital Fire Mission: Solution/Gun Orders screen.

NOTE: If an Errors and Warning screen displays, correct any solution errors or warnings. If the errors or warnings cannot be corrected, select MTO Deny.

---

(13) If there are no Errors or Warnings, record the gun and safety data on DA Form 2399-R.

(14) Select MTO Accept.

(15) The Send Status screen (Figure 18-26) displays.
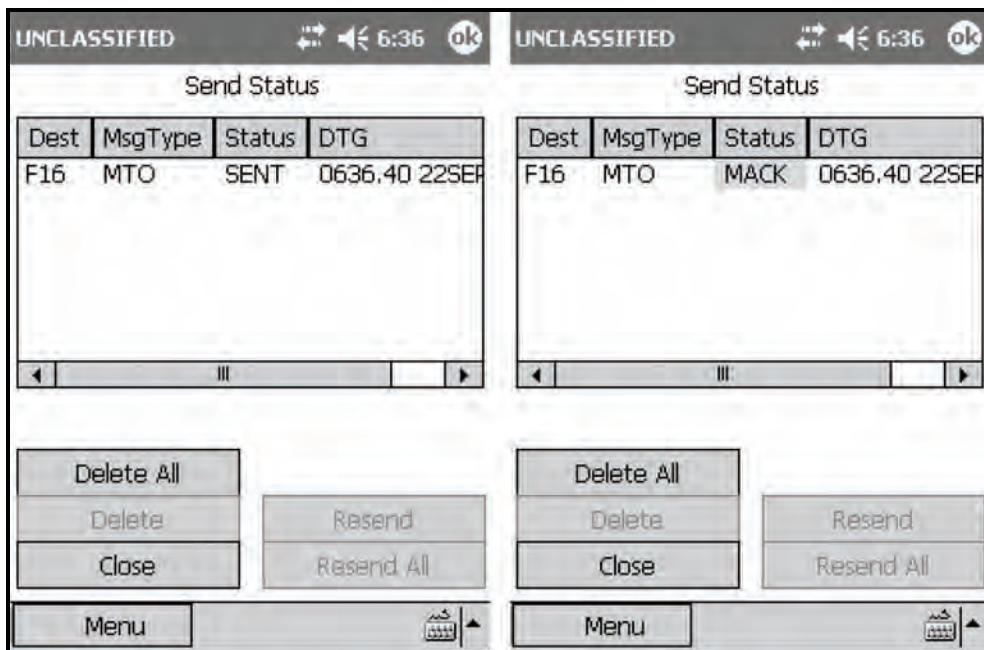
Figure 18-26. Digital Fire Mission: Message Send Status screens.

(16) Review the information in the four fields displayed in the Message window (Table 18-10).

Table 18-10. Digital Fire Mission: Send Status screen Message window fields and purposes.

FIELD	PURPOSE
Destination (Dest)	This field displays the unit ID of the recipient.
Message Type (Msg Type)	This field displays the category of message. The message categories include— • MTO. • PTM. • FUC (Fire Unit Center). • AMMO – INV. • OBS NOTIFICATION.
Status	This field displays the status of the message transmittal. The statuses include— • SENT – The message has been received, but has not been read (Figure 18-26). • MACK (Machine Acknowledgement) – The message has been received and read (Figure 18-26). • RETRY – The message is being resent. The LHMBC will attempt to resend the message twice before displaying a fault status of FAILED. • FAILED – The message failed to reach the intended unit. To resend the message, select it in the Message window, and then select RETRY. • QUEUED – The LHMBC will attempt to send the message after the currently transmitting message has been sent or fails.
Date and Time Group (DTG)	This field displays the date and time group of the message transmission.

(17) Select Close.

(18) The Solution/Gun Orders screen displays.

(19) Select the <Target> button.
(20) The <Target> screen (Figure 18-27) displays.

NOTE: When operating in the digital mode, the <Target> screen displays two additional control buttons, Msn Status and Msn Messages (Figure 18-27).
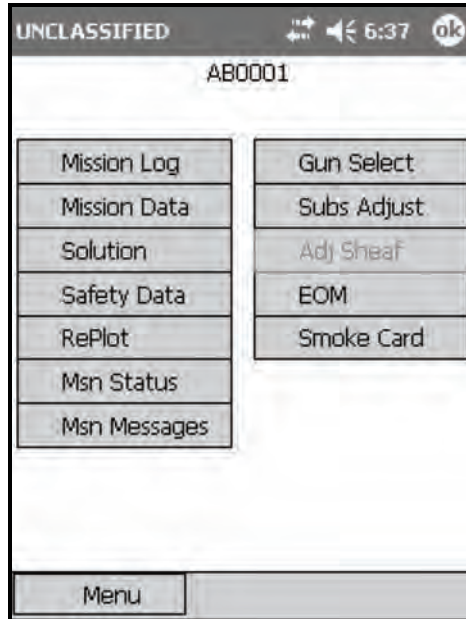
Figure 18-27. Digital Fire Mission: <Target> screen.

(21) Select the Msn Status button.
(22) The Mission Status screen (Figure 18-28) displays. The Mission Status screen is only available for digital messaging. This screen contains a Status window and five control buttons (Table 18-11).
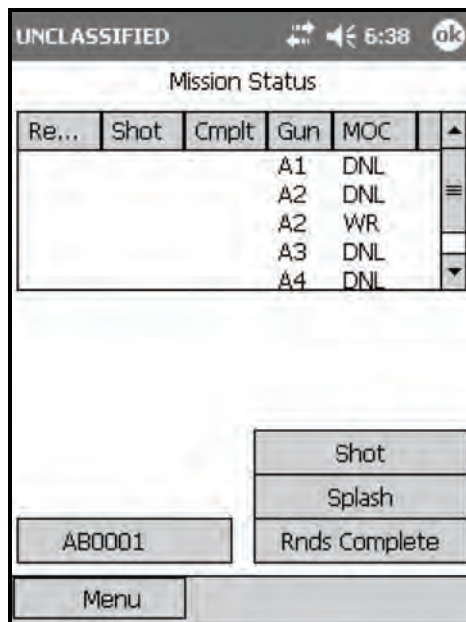
Figure 18-28. Digital Fire Mission: Mission Status screen.

Table 18-11. Digital Fire Mission: Mission Status screen fields and buttons, and purposes.

FIELD/BUTTON	PURPOSE
Status window	The Status Window contains a list of guns active in the mission with four additional fields: • Ready – This field displays a green checkmark when the guns have been reported ready, when the MOC is AMC, or after Shot or Rounds Complete has been transmitted. • Shot – This field displays a green checkmark when the Shot has been transmitted. • Cmplt – This field displays a green checkmark when Rounds Complete has been sent. • Method of Control – This field displays the MOC for each solution calculated.
Shot button	When selected, this button sends a message to the FO that shots were fired, and the shot clock begins to count down from the time of flight to 0. When the countdown reaches the predefined splash time, splash is transmitted to the FO automatically.
Splash button	This button sends a splash message to the FO without displaying the shot clock.
Rounds Complete button (Rnds Complete)	This button calculates the number of rounds fired during the mission. It is used after the FFE is complete and notifies the observer that the last round has been fired.
Ready button	This button displays only when the MOC is AMC. When all guns are up and ready to fire, selecting this button will notify the FO that the section is ready to fire. A green checkmark appears in the Ready column of all guns active in the mission.
<Target> button	This button displays the <Target> screen.

(23) After sending a message to the FO by selecting one of the mission status buttons, select OK in the call box that displays.

(24) The Send Status screen displays.

(25) The Send Status screen now displays the message and its current status.

(26) Select the Close control button.

(27) The Mission Status screen displays.

NOTE: The Ready and Shot fields both display a green checkmark for the guns used during this shot.

(28) Select the <Target> button.

(29) The <Target> screen displays.

(30) Select the Msn Messages button to await the first/next adjustment.

(31) The Mission Messages screen (Figure 18-29) displays.

NOTE: The Mission Messages screen will display the ! and NEW icons in the same manner as the New Call For Fire screen (Figure 18-23). The two screens are essentially the same, except that the MTO Deny button of the New Call For Fire screen has been replaced with the <Target> command button to return to the <Target> screen.
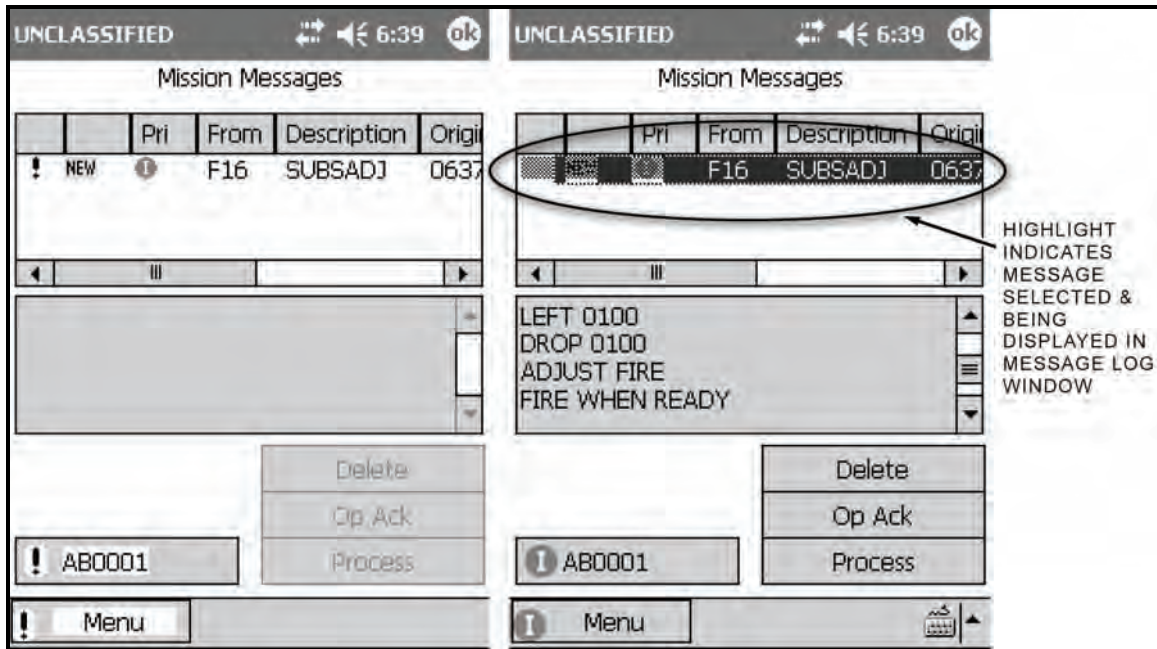
Figure 18-29. Digital Fire Mission: Mission Messages screens.

(32) Review and record this information as described for the New Call For Fire screen.

(33) Select Process.

(34) The Solution/Gun Orders screen (Figure 18-30) displays.
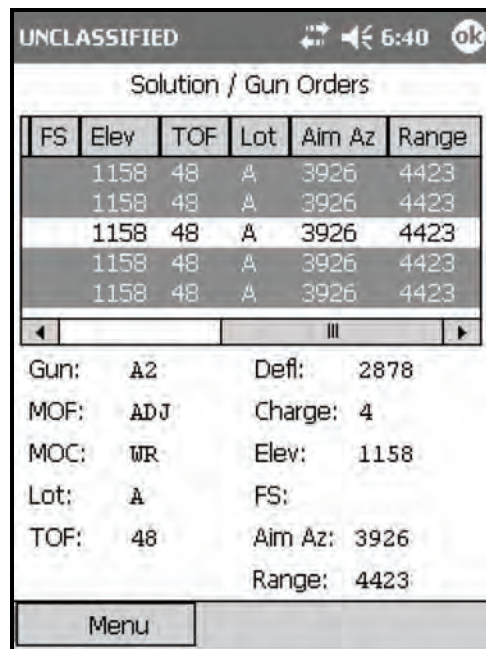
Figure 18-30. Digital Fire Mission: first adjustment.

(35) Record all information from the Solution/Gun Orders screen on DA Form 2399-R.

(36) Select the <Target> control button.

(37) The Target screen displays.

(38) Select Msn Status.

(39) Select Shot to transmit the shot to the FO.

(40) Select OK when the shot confirmation call box appears.

(41) The Send Status screen displays.

(42) Confirm the information displayed.

(43) Select the Close control button.

(44) Continue to process the mission as described in the steps above.

(45) When the FO transmits the final adjustment (Figure 18-31) and requests an FFE, review and record the message.

(46) Select Process.
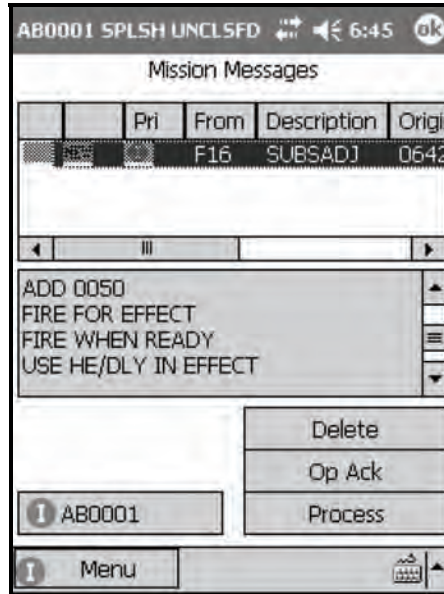
Figure 18-31. Digital Fire Mission: final adjustment.

(47) The Solution/Gun Orders screen (Figure 18-32) displays.
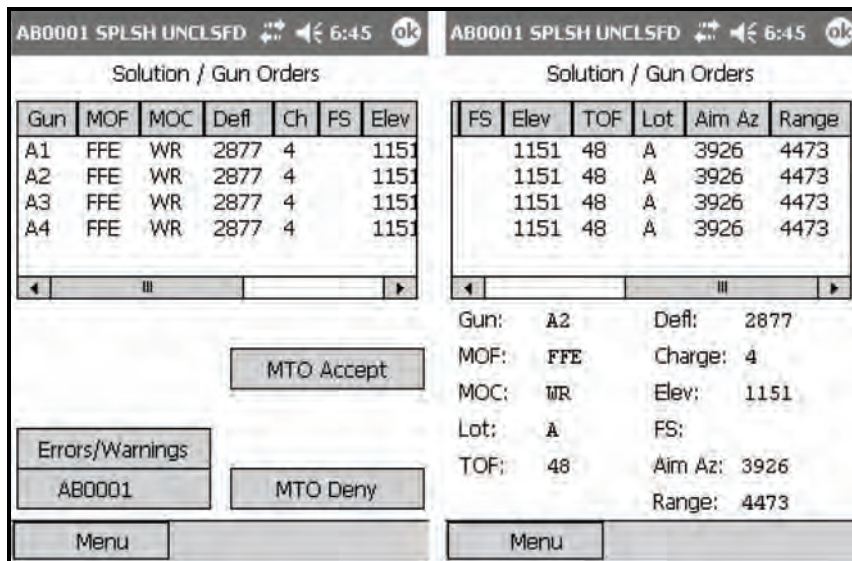
Figure 18-32. Digital Fire Mission: Fire for Effect Solution screen.

NOTE: When the MOF is FFE, the LHMBC displays data for each gun. In Figure 18-32, the sheaf is parallel so all solutions are the same. In all other instances, each gun will have unique data.

(48) Review and record the data.

(49) Select MTO Accept.

(50) Select the <Target> control button.

(51) The <Target> screen displays.

(52) Select the Msn Status button.

(53) Select Shot.

(54) When the call box displays, select OK to notify the observer that the first round has been fired.

(55) The Send Status screen displays.

NOTE: The message and its current status are listed.

(56) Navigate to the Mission Status screen.

(57) When the last round has been fired, select Rnds Complete (Figure 18-33).

Figure 18-33. Digital Fire Mission: selecting Rnds Complete.

(58) Select the <Target> control button.

(59) The <Target> screen displays.

(60) Select the Msn Message button.

(61) The Msn Message screen (Figure 18-34) displays. The screen shot on the left depicts the mission message before it is acknowledged. The screen shot on the right depicts the mission message after it is acknowledged.
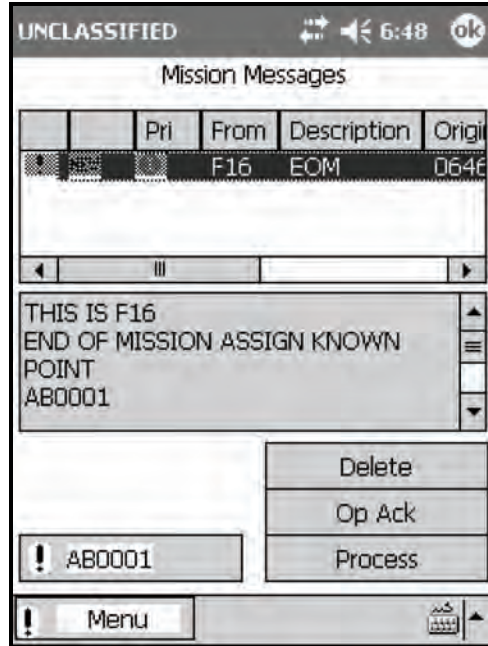
Figure 18-34. Digital Fire Mission: end of mission message.

(62) Await the next message.

(63) Select the message to review it.

(64) Select OpAck to acknowledge receipt of the message and turn off the audio alarm.

(65) Select the message again.

(66) Select Process.

(67) The Select Known Point Number screen displays (Figure 18-35).
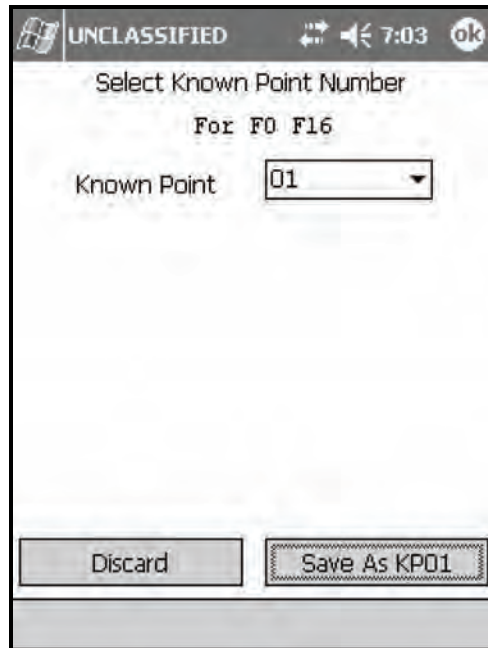
Figure 18-35. Digital Fire Mission: Select Known Point Number screen.

(68) From the pull-down menu, select a known point to save (Save as KP [number of known point]) or discard (Discard). Select the Save As KP# control button.

NOTES: 1. The Known Point pull-down menu displays a list of known point numbers, defaulting to the next available known point number.

2. Known point numbers that are in use display "In Use" next to the known point number. If the operator picks a known point number that is currently in use, the previously stored data for that number will be overwritten, and the Save As KP# control button will read Overwrite KP#.

3. If Discard is tapped, the Status screen will be displayed without recording the known point data.

(69) The Ammunition Expended screen displays. The Ammunition Expended screen enables the operator to view and edit the number of rounds that have been expended by each gun used in the active mission.

NOTE: The ammunition is displayed as a number of rounds used of each lot (by alpha number).

(70) To increase or decrease the number of rounds per gun, select the gun number, and then use the plus and minus signs to adjust the number of rounds for the selected gun.

NOTE: If Cancel is selected, the message "Ammo expended for mission must be adjusted manually in inventory" displays.

(71) Select Use All. The ammunition inventory will be updated accordingly.
(72) The Status screen displays.
(73) Update DA Form 2188-R using the information listed on DA Form 2399-R. Verify that the ammunition amounts are correct and that the proper target numbers have been assigned.

SECTION III. SPECIAL MISSIONS

In addition to the basic fire missions covered in the previous section, the LHMBC includes special missions that allow the mortar section to correct for interior/exterior ballistic variances and engage unique targets. Depending upon the method of target location, each special mission is available from the Mission Type pull-down menu on the Mission screen. These missions are—

- Registration.
- Illumination.
- Coordinated illumination.
- FPF.
- Smoke.
- Search and traverse.

REGISTRATION MISSIONS

18-15.   If time and the tactical situation permit, registration will be the first mission fired. A registration mission requires surveyed target and mortar positions. It follows the steps of a normal grid mission until the FFE stage.

NOTES: 1.   For a complete overview of registration, see Chapter 14.

2.   This chapter illustrates an LHMBC manual registration mission.

(1) Select Menu.
(2) Select Manual Missions.
(3) Select Grid Msn. The Grid Mission screen (Figure 18-36) displays.

Figure 18-36. Registration: Mission Initialization screen.

(4) Change Mission Type from HE ADJ to REGISTRATION.
(5) Select Use All.
(6) The Mission Data screen displays.
(7) Verify that the Mission Data information is correct.
(8) If the mortar section is not set up in a linear formation, change Sheaf from PARALLEL to LINEAR.
(9) Select Use All.

(10) The Solution/Gun Orders screen (Figure 18-37) displays.

Figure 18-37. Registration: Solution/Gun Orders screen.

(11) Select Shot.

(12) The Shot Clock displays.

NOTES: 1. The Shot Clock counts down to zero.

2. If operating digitally, the FO receives both shot and splash notifications.

---

(13) Select the <Target> button (AA0006 in the example).

(14) The <Target> screen displays.

(15) Enter corrections by selecting Subs Adjust.

(16) The Subsequent Adjust screen displays.

(17) Make the appropriate adjustments using the Left, Right, Add, Drop, Up, and Down buttons in the Meters field.

(18) Select Use All.

(19) The Solution/Gun Order screen displays.

(20) Continue adjusting in this manner until the adjusting gun is adjusted.

(21) When the adjusting gun is adjusted, change the MOF field to FFE.

(22) Select Use All.

(23) The Solution/Gun Order screen displays.

(24) Record the Solution/Gun Orders Data.

NOTES: 1. If corrections exceed 50 meters (deviation left or right only), the mortar must be refired.

2. Range corrections are ignored if they are less than 50 meters.

---

(25) Enter the appropriate information in the proper fields on DA Form 2399-R.

EXAMPLE

FO Call: Left 100 (Figure 18-38).   FO Call: Right 50 (Figure 18-39).
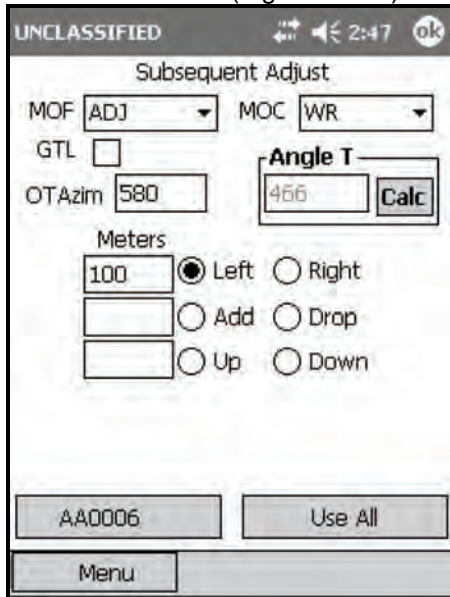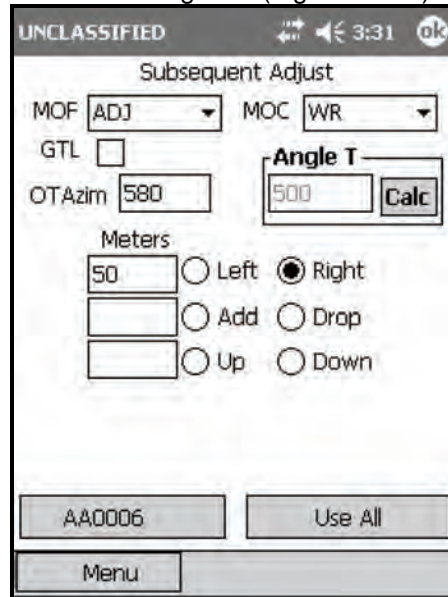
Figure 18-38. Registration: first subsequent adjustment.

Figure 18-39. Registration: second subsequent adjustment.

FO Call: Left 25. Registration complete.

To enter the fire for effect stage, MOF must be changed to FFE. As an example—

   (1) From the Subs Adjust screen, change MOF to FFE and input Add 25.

   (2) Select Use All.

   (3) The Solution/Gun Order screen displays (Figure 18-40).
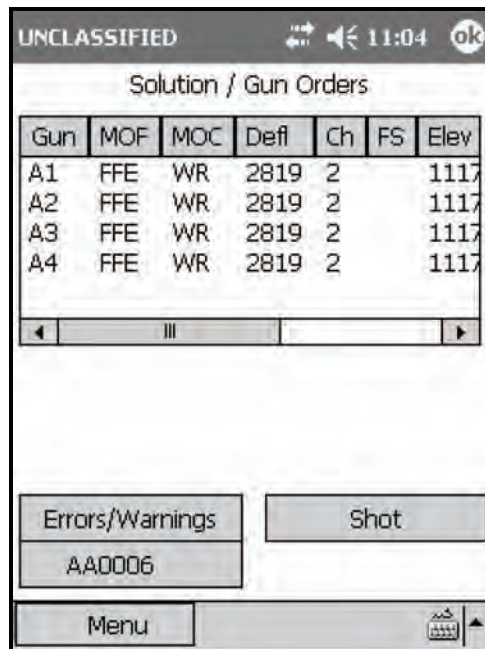
Figure 18-40. Registration: Fire For Effect Solution screen.

(4) Record the Solution/Gun Orders data.

NOTE: A2's last deviation correction was "left 25." This gun will not fire when the sheaf is adjusted.

---

(5) In the Mortar to Fire and Method of Fire columns of DA Form 2399-R, enter SEC S/R 1RD #2 DNF (Section – Section Right, 1 Rd, #2 Gun Do Not Fire).

NOTE: The sheaf must now be adjusted to ensure that the mortars are firing parallel to each other. The FDC coordinates with the FO to determine the method of fire. If the FO requests, for example, section right, the mortars will fire the sheaf, starting from the right (#1 Gun), with a set interval (normally 5 seconds) between the rounds. If the angle T is greater than 499 mils, the sheaf is converged, and the mortars are adjusted onto the RP.

---

(26) Select the <Target> button.

(27) The <Target> screen displays.

(28) Select Adj Sheaf.

(29) The Adjust Sheaf screen (Figure 18-41) displays.
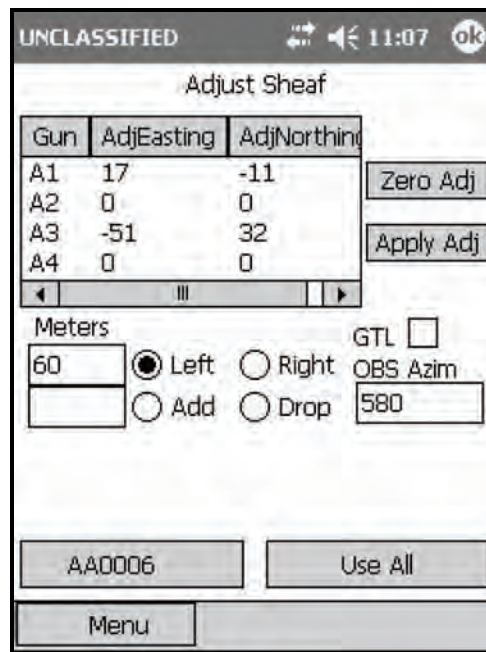
Figure 18-41. Registration: Adjust Sheaf screen.

(30) Enter the corrections for each gun, as described in the <Target> screen summary (see paragraph 18-13).

(31) Select Use All.

(32) The Mission Data screen displays.

(33) Verify the information, and select Use All.

NOTE: A warning (Figure 18-42) displays if the calculated impact point of the guns does not conform to the requirements of a linear sheaf. This message is normal.
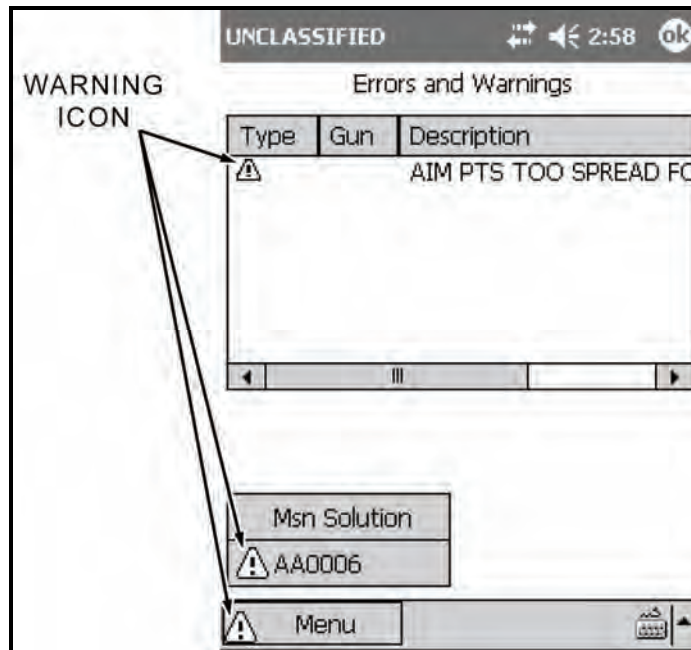
Figure 18-42. Registration: Error and Warnings screen.

(34) Select Msn Solution.

(35) The Solution/Gun Orders screen displays, and the firing data is recorded.

(36) Announce new data, such as deflections and methods of fire.

(37) If the adjustment is more than 50 meters, the mortar must be refired.

(38) Select Shot.

(39) Select the <Target> button.

(40) The <Target> screen displays.

(41) Select EOM.

(42) Select Discard, or if the RP is to be recorded as a known point, select EOM – Record as Known Point.

(43) Select the controlling FO from the pull-down menu.

(44) Select Use All.

(45) The Save Registration Point screen (Figure 18-43) displays. This screen displays the range correction factor (RngCF) and the azimuth correction factor (AzCF).
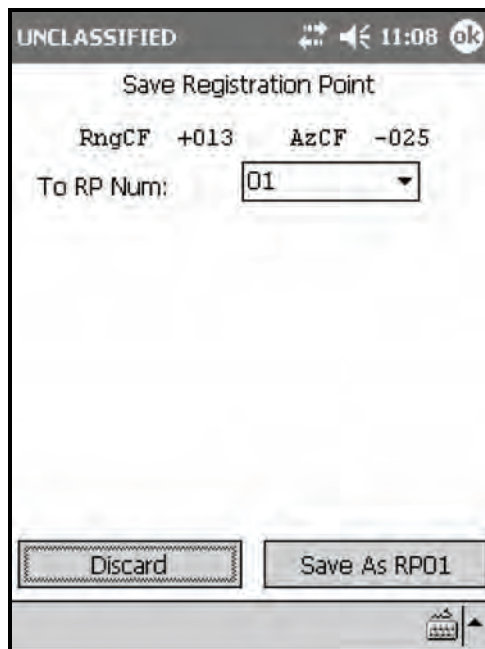
Figure 18-43. Registration: Save Registration Point screen.

(46) Record this information on DA Form 2399-R.

(47) Select Save As RP01.

(48) The Ammunition Expended screen displays.

(49) Ensure that the number of rounds expended for each gun is correct.

(50) Select Use All.

(51) The Status screen displays.

(52) Update DA Form 2188-1-R accordingly.

ILLUMINATION MISSIONS

18-16.   Illumination missions are used to reveal the location of enemy forces hidden by the cover of darkness. Digital missions are processed as described in Section II, with the addition of fuze time settings and vertical adjustments (up or down) as listed in this section.

NOTES: 1.   A mark time must be recorded for illumination, and is discussed in detail in the example.

2.   This paragraph uses a grid mission to illustrate the process of receiving, adjusting, saving, and firing an illumination mission. Missions using polar plots or shifts from a known point are conducted in the same way.

18-17.   Upon receipt of a CFF, record the information and initiate the illumination mission using the following procedures:

(1)   Select Menu.

(2)   Select Manual Missions.

(3)   Select Grid Msn.

(4) The Grid Mission screen (Figure 18-44) displays.

Figure 18-44. Illumination: Mission Initialization screen.

(5) Fill out this screen as described in paragraph 18-2. The mission type will be Ill Adj.

(6) Select Use All.

(7) The Mission Data screen is displayed.

(8) Set the Sheaf field to the number of guns firing the illumination mission.

NOTE: The guns selected must match this number.

(9) Select Use All.

(10) The Solution/Gun Orders screen displays.

(11) Select the <Target> button.

(12) The <Target> screen displays.

(13) Select the Gun Select button.

(14) The Gun Select screen displays.

(15) Deselect guns A2, A3, and A4 by clearing the appropriate checkboxes.

(16) Select Use All.

(17) The Mission Data screen displays (Figure 18-45).

Figure 18-45. Illumination: Targets screen.

(18) Choose the adjusting gun.

NOTE: Using a flank gun to fire illumination enables the normal adjusting piece to focus on the task of engaging possible targets. For this example, we will adjust illumination with A1.

(19) Choose a type of sheaf.

NOTE: In addition to all of the normal sheaves available for HE, illumination makes use of 5 additional sheaves: 1 GUN Il, 2 GUN Il, 2 GUN L, 2 GUN R, and 4 GUN Il. The differences in sheaves are indicated in Table 18-12.

Table 18-12. Illumination: additional sheaves and related information.

BUTTON	RELATED INFORMATION
1 GUN Il	This type of sheaf utilizes one gun firing illumination rounds.
2 GUN Il	This type of sheaf utilizes two mortars to provide greater illumination for a point or area target. The LHMBC will provide fire orders for two guns, with calculated burst points for each round (separated by the distances): • 120-mm: 105 meters. • 81-mm: 60 meters. • 60-mm: 45 meters.
2 GUN Il L (Lateral)	This type of sheaf utilizes two mortars to provide greater illumination for a linear or area target. The LHMBC will calculate different deflections for each gun, thus producing illumination perpendicular to the gun-target line with the resulting calculated burst points centered around the target location, perpendicular to the gun-target line. See Table 18-13 for distance between rounds.
2 GUN Il R (Range)	This type of sheaf utilizes two mortars to provide greater illumination for a linear/area target. The LHMBC will calculate different elevations for each gun, thus producing illumination along the adjusting gun's gun-to-target line with the resulting calculated burst points centered around the target's location. See Table 18-13 for the distance between rounds.
4 GUN Il	This type of sheaf utilizes four mortars to combine both range and lateral spread to provide illumination over a large area. The flank mortars will fire the lateral spread rounds. The two center guns will fire the near- and far-ranging rounds. The LHMBC will select which gun fires which round, ensuring that the rounds do not cross.

Table 18-13. Illumination: two-gun range and lateral spread distances.

GUN SYSTEM	ROUND	FUZE	DISTANCE BETWEEN BURST POINTS (METERS)
M224 60-mm	ILL M721	MTSQ M776	800
M224 60-mm	ILL M83A3	TIME M65A1	300
M224 60-mm	IR XM767	MTSQ M776	500
M252 81-mm	ILL M301A3	TIME M84A1	500
M252 81-mm	ILL M853A1	MTSQ M772	500
M252 81-mm	IR XM816	MTSQ M772	500
M303 81-mm	ILL M301A3	TIME M772	500
M120 120-mm	ILL M930	MTSQ	1500
M120 120-mm	IR M983	MTSQ	1500

EXAMPLE

Change Sheaf to 1 GUN IL, and select A1 as the adjusting gun. Change Lot-Shell to illumination. Change FFE Volleys to 2.

NOTE: Registration corrections are not applied to illumination missions. The Use Reg Correction box is deselected and cannot be enabled.

---

(20) Select Use All.

(21) The Solution/Gun Orders screen is displayed.

(22) Read and record the data on DA Form 2399-R.

NOTES: 1. Do not read the fuze setting from the data window. When displayed in the Gun Solution data line, only the integer part of the fuze setting is listed. Select the A1 ADJ data line, and drag the stylus to the bottom of the screen to read the proper fuze setting. Select the fuze setting again before performing the next step. (See Figure 18-46)

2. The Solution/Gun Orders screen is read and recorded for illumination the same as with a standard HE mission.
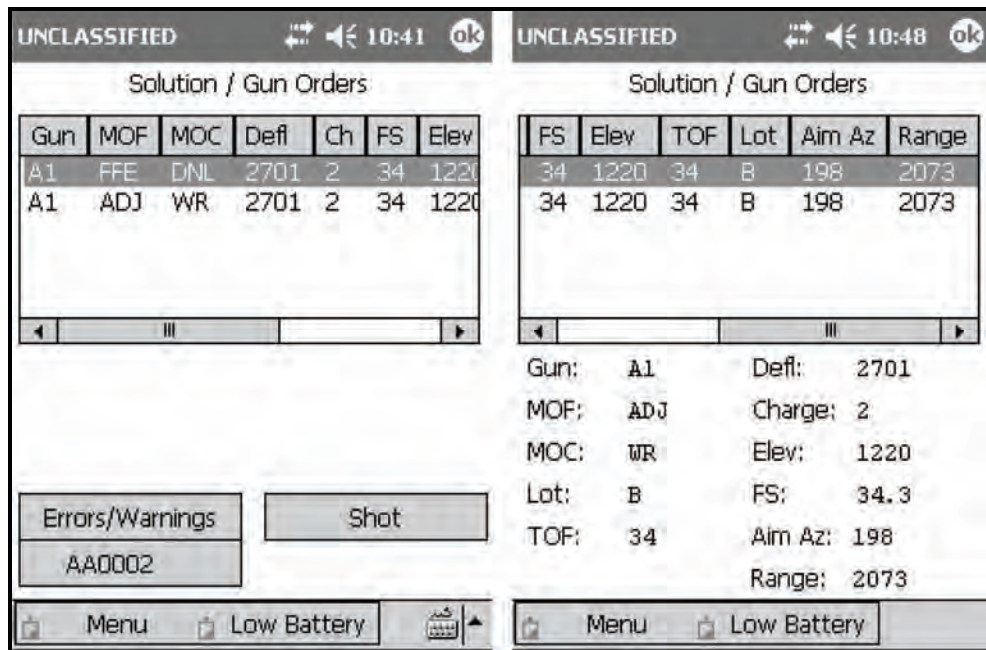
Figure 18-46. Illumination: solution and display of fuze setting.

(23) Select Shot to start the clock and, if operating digitally, to notify the FO that the adjusting gun has fired.

(24) To record the canister impact grid, navigate to the Safety Data screen (Figure 18-47).

Figure 18-47. Illumination: Safety Data screen.

(25) Select the adjusting gun's data line, and drag the stylus to the bottom of the screen to read the complete safety data.

NOTE: The canister easting and northing coordinates (CnEst: and CnNrt:) are displayed at the bottom of the screen. If the solution produces a canister impact grid outside of a safety fan or in a BOLAD, no solution will be produced, and a warning message describing the violation will be displayed on the Errors/Warnings screen.

---

(26) Navigate to the Subsequent Adjust screen to await the first adjustment.

(27) Process illumination subsequent adjustments in the same manner as HE adjustments with the addition of the up/down adjustments.

(28) Ensure that the OT azimuth has been entered before applying any adjustments. If not, the LHMBC will revert to the GT line for all corrections.

EXAMPLE

FO Call: Left 300. Drop 200. Down 100. (Figure 18-48)
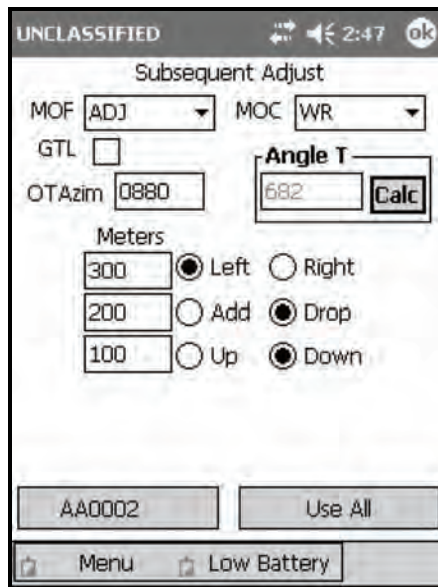
Figure 18-48. Illumination: first subsequent adjustment.

EXAMPLE

FO Call: Up 50. Prepare to mark illumination. (Figure 18-49)
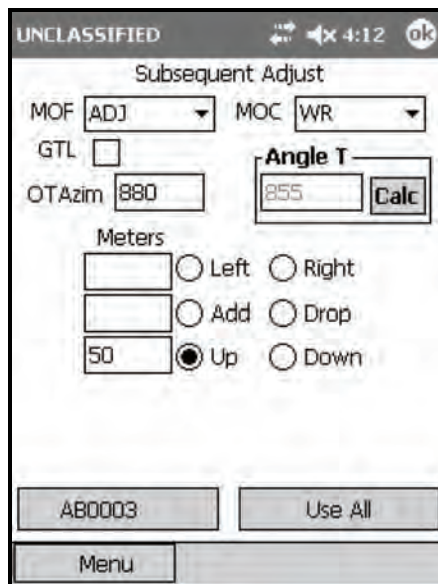
Figure 18-49. Illumination: second subsequent adjustment.

NOTE: Mark time represents the length of time after the illumination is fired that the FO wants effects on the target. If the FO simply wants to illuminate an area, a mark time is not necessary. If a mark time is used, the FDC operator will time each illumination round from the time it is fired until it has completely burned out. When the illumination reaches the height of optimal illumination, the FO will call "Mark." After establishing a mark time, the mark is recorded on DA Form 2399-R, along with the FFE data (Figure 18-50). This computer record will continue to be used to record illumination rounds fired during firing the coordinated illumination. A separate DA Form 2399-R will be initiated for HE/WP.

Figure 18-50. One-gun Illumination Fire For Effect Solution screen.

COORDINATED ILLUMINATION MISSIONS

18-18.   Illumination missions are often coordinated with other suppressive fires. The illumination exposes possible targets, which are then engaged with HE. The FDC operator alternates between the illumination fire mission and the HE fire mission.

18-19.   The illumination portion of the mission is identical to a standard illumination mission, but once the FFE has been initiated for the illumination mission, HE adjustment begins. During the HE adjustment and FFE, the operator receives subsequent messages from the FO to fire illumination in coordination with the HE. He alternates between the illumination mission (<AA0002>, in the illumination mission example) and the HE mission (in the example, <AA0003>). After the illumination is adjusted, the method of command for both fires is changed from WR to AMC.

NOTE: The adjustment of the HE is identical to a standard fire mission.

EXAMPLE

To navigate to the illumination mission—
      (1) Select Menu.
      (2) Select Missions.
      (3) Select FPFs.
      (4) Select AA002.
■   To navigate to the HE mission—
      (1) Select Menu.
      (2) Select Missions.
      (3) Select FPFs.
      (4) Select AA003.

Upon receipt of a fire mission, the FDC operator initiates the appropriate fire mission by selecting the proper method of target location. For this example, we will locate our target using grid coordinates and fire HE in both the adjustment and in the FFE (Figure 18-51).

Figure 18-51. Coordinated Illumination: Mission Initialization screen.

18-20. To conduct a coordinated illumination mission—
    (1) From the Grid Mission screen, verify all target location information, and select Use All.
    (2) The Mission Data screen displays.

NOTE: Now that HE is being fired again, the Use Reg Correction box is enabled and selected (Figure 18-52).
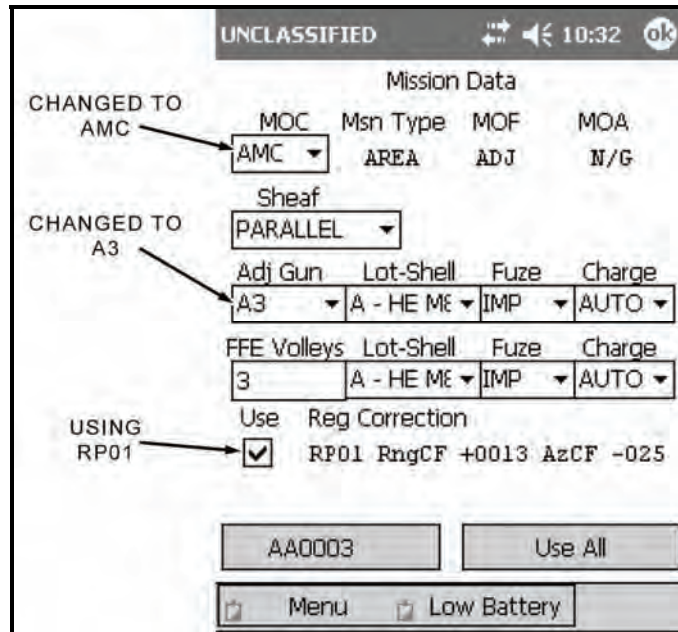
Figure 18-52. Coordinated Illumination: Mission Data screen.

    (3) Confirm that all mission data is correct, and select Use All.
    (4) The Solution/Gun Orders screen (Figure 18-53) displays.
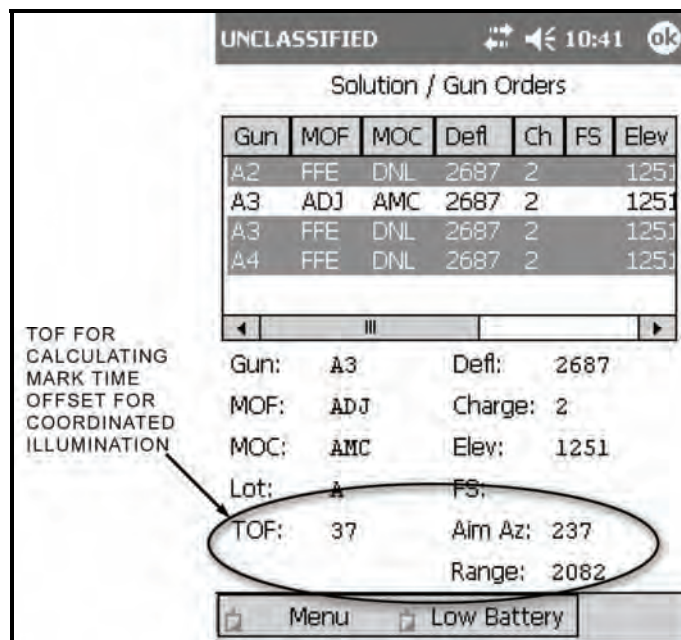
Figure 18-53. Coordinated Illumination: High-Explosive Solution screen.

(5) Calculate the firing times for the HE and WP. In the example, the mark time for the illumination mission is 52 seconds, and the TOF for the HE is 37 seconds. This means the delay between the firing of the illumination and the HE is 15 seconds (52 – 37 = 15). This way, the illumination will be at its optimum height when the HE impacts.

(6) Fifteen seconds after "Shot" is announced to the illumination gun, "Shot" will be given to the HE adjusting gun.

(7) Navigate to the illumination mission by—
   ■ Selecting Menu.
   ■ Selecting Missions.
   ■ Selecting FPFs.
   ■ Selecting the target number.
   ■ Selecting Solution.

(8) Select Shot.

(9) Navigate to the HE mission by—
   ■ Selecting Menu.
   ■ Selecting Missions.
   ■ Selecting FPFs.
   ■ Selecting the target number.
   ■ Selecting Solution.

(10) After the delay time has elapsed (15 seconds, in the example), select Shot.

NOTE: To perform this procedure when operating digitally, the FDC operator must navigate to the Mission Status screen to select Shot for each mission.

(11) Navigate to the HE Subsequent Adjust screen to await the FO's adjustment.

EXAMPLE

FO Call: Continuous illumination. HE. Left 50. Fire for effect.

NOTE: The request for continuous illumination indicates that the FO wants the target illuminated during the fire for effect and afterward so he can make his surveillance which will be reported back to the FDC.

(12) Record the FO's surveillance on DA Form 2399-R.

(13) End both missions, and update the ammunition expenditure as described in paragraph 18-2.

FINAL PROTECTIVE FIRES

18-21. An FPF is an immediately available, prearranged barrier of fire designed to impede enemy movement across defensive lines or areas. The LHMBC can store up to three FPFs at a time. If an active mission is in progress and an FPF order is received, the FPF mission has the higher priority.

18-22. To initiate the FPF—
   (1) Select Menu.
   (2) Select Manual Missions.
   (3) Select Grid Msn.
   (4) The Grid Mission screen is displays.
   (5) Change the mission type to FPF (Figure 18-54).

NOTE: The following LHMBC FPF mission screens depict an actual fire mission. This example includes the registration corrections from the example registration mission (RP01). This example uses a grid mission to illustrate the process of receiving, adjusting, saving, and firing an FPF. Polar plot or shift from a known point missions are conducted in the same manner.

Figure 18-54. Manual Grid Final Protective Fire: Mission Initialization screen.

(6) Complete the screen.

(7) Select Use All.

(8) The Mission Data screen (Figure 18-55) displays.

Figure 18-55. Final Protective Fire: Mission Data screen.

NOTE: The MOC for FPF remains AMC during the adjustment phase. The sheaf is set to Special and cannot be changed.

(9) Enter the length, width, and attitude of the FPF.

NOTE: Since this mission is danger close, the default fuze setting for both the adjustment and the FFE of the FPF is DLY, but the standard fuze setting for an FPF FFE is IMPACT.

(10) Change the fuze setting for the FFE to IMP.
(11) Ensure that all other data is correct, and select Use All.
(12) The Solution/Gun Orders screen (Figure 18-56) displays.
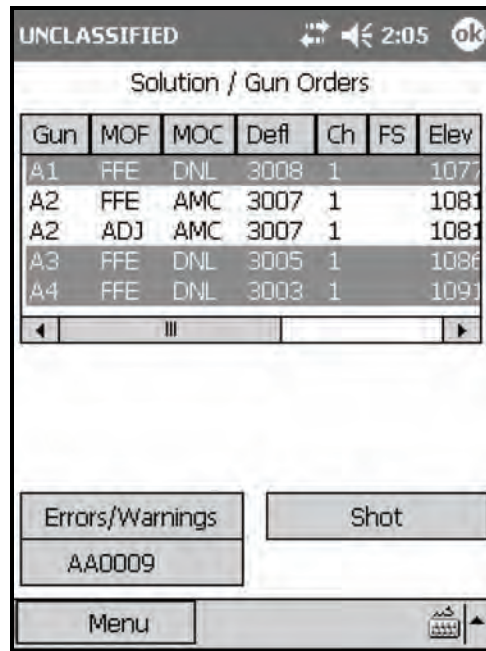
Figure 18-56. Final Protective Fire: Initial Solution screen.

NOTE: The LHMBC displays the adjusting solution for the adjusting piece and FFE data for all guns. In the example, the adjusting piece is A2. The entire section should fire in the initial adjustment so the FO can determine which gun is impacting the closest to the friendly forces (the danger gun). This is accomplished by firing either a section right (SR) or a section left (SL). For this example, a section right is used. The FO determines that A1 is the danger gun.

(13) Record the solution and safety data on DA Form 2399-R.
(14) When the first gun fires, select Shot to start the shot clock.
(15) Select the <Target> button.
(16) The <Target> screen displays.

NOTE: The target location given in the CFF is not the location of the FPF. The FO must add a 200- to 400-meter safety factor to the location of the FPF. The FDC never adds a safety factor.

EXAMPLE

The FO has determined that A1 is the danger gun and sends the following:

FO Call: #1 Danger close. Right 100. Drop 25.

Record this adjustment on DA Form 2399-R.

NOTE: The type of adjustment is danger close. The FO must use the creeping fire method of adjustment. The fuze setting for all adjustments is set to DELAY to reduce the risk of injury to friendly Soldiers while adjusting the FPF.

---

(17) Select Mission Data.
(18) The Mission Data screen displays.
(19) Change Adj Gun from the original choice to the danger gun (Figure 18-57).

Figure 18-57. Final Protective Fire: changing the adjusting gun.

(20) Select Use All.
(21) The Solution/Gun Orders screen is displayed.

NOTE: The adjustment still must be entered, so disregard this solution.

---

(22) Select the <Target> button.
(23) The <Target> screen displays.
(24) Select Subs Adust.

(25) The Subsequent Adjust screen displays (Figure 18-58).
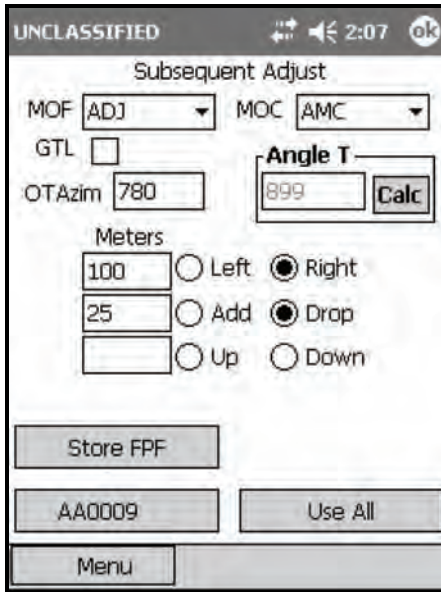
Figure 18-58. Final Protective Fire: first adjustment.

(26) Enter the subsequent adjust as described for a manual grid mission (paragraph 18-2, Basic Manual Missions).

NOTE: If the FO did not send the OT azimuth in the initial CFF, he must send the OT azimuth before the FDC can process any subsequent adjustments. If the OT azimuth is entered from the Subsequent Adjust screen, select Calc to display the new angle T. If the angle T is more than 499 mils but less than 2700 mils, the FDC must send an MTO stating that angle T is in effect.

---

(27) Select Use All.

(28) The Solution/Gun Orders screen (Figure 18-59) displays.
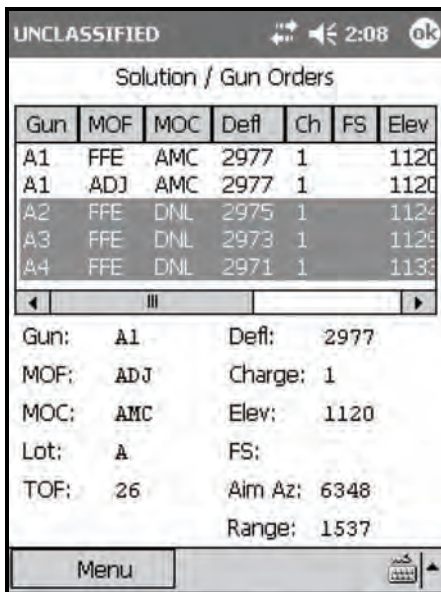
Figure 18-59. Final Protective Fire: A1's initial adjustment.

(29) Record the solution safety data for A1 on DA Form 2399-R.

(30) Send the data to the guns.

(31) Select Shot.

(32) The shot clock displays.

(33) Select the <Target> button.

(34) Select Sub Adjust.

(35) The Subsequent Adjustment screen displays.

(36), Wait for the next adjustment.

EXAMPLE

FO Call: Left 50. Drop 25.

NOTE: Unlike a normal HE mission where only adjustments of 50 meters or more are fired, adjustments in the FPF will be fired until they are within 25 meters of the proper FPF location (Figure 18-60).
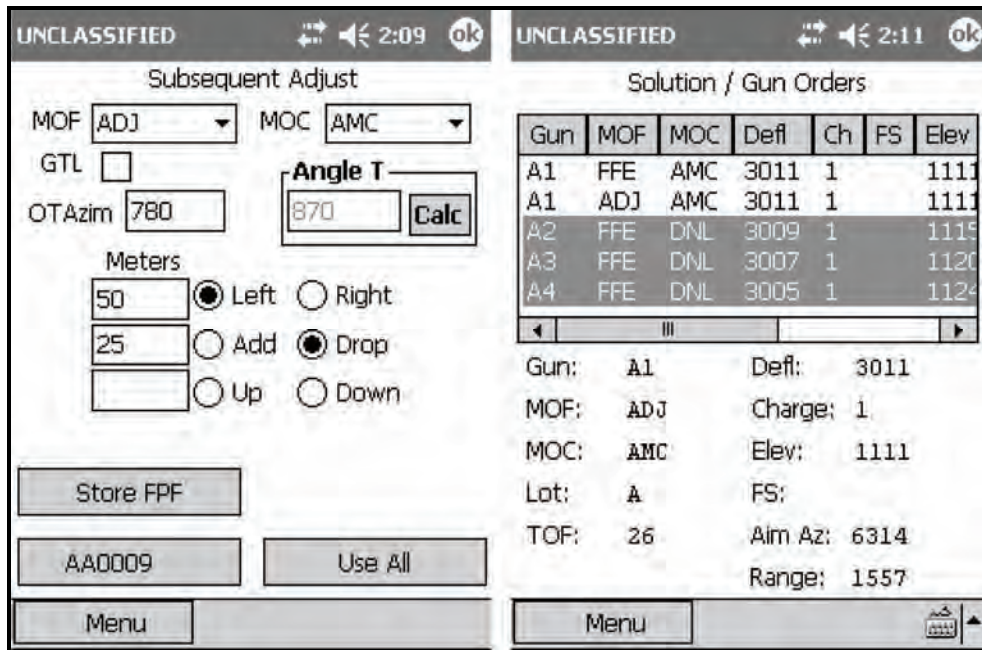
Figure 18-60. Final Protective Fire: A1's second adjustment and solution.

EXAMPLE

FO Call: A1 adjusted. Prepare to adjust sheaf.

(37) To adjust the sheaf, change the MOF from ADJ to FFE on the Subsequent Adjust screen (Figure 18-61).

Figure 18-61. Final Protective Fire: preparing to adjust the sheaf.

(38) There were no further adjustments given, so in the example, A1 is considered adjusted.

(39) Select Use All.

(40) The Solution/Gun Orders screen displays.

(41) Record the solution and safety data for A2 (in the example) before issuing gun orders.

EXAMPLE

FO Call: A2 right 10. Gun adjusted. Repeat A3.

---

(42) To modify the sheaf, from the <Target> screen, select Adj Sheaf.

(43) The Adjust Sheaf screen (Figure 18-62) displays.

Figure 18-62. Final Protective Fire: adjusting A2.

(44) Select the Right radio button.

(45) Enter the number of meters (10, in the example) in the corresponding Meters field.

(46) Highlight A2 (in the example), and select Apply Adj.

NOTE: The modification is now displayed in the Adjustment window with the corresponding easting and northing corrections displayed.

(47) Select Use All.

(48) The Mission Data screen displays.

NOTE: Corrections are entered in the form of a direction (left or right of the OT azimuth) and distance (farther or nearer along the OT azimuth). The adjustments displayed in the Adjustment window refer to the modifications of the calculated burst point grid coordinate.

(49) The Mission Data screen is displayed by default.

NOTE: When in the sheaf adjustment phase, the adjusting gun listed is irrelevant.

(50) Select Use All.

(51) The Solution/Gun Orders screen displays (Figure 18-63).

Figure 18-63. Final Protective Fire: A3's solution.

(52) Record A2 and A3's (for this example) firing and safety data before sending it to the guns.

EXAMPLE

FO Call: A3 adjusted. Repeat A4.
Record A4's firing/safety data from the Solution/Gun Orders screen.
FO Call: A4 left 10. Sheaf adjusted. EOM RAT 09.

(53) Navigate to the Adjust Sheaf screen, and enter A4's correction as previously described (Figure 18-64).

Figure 18-64. Final Protective Fire: A4's adjustment solution.

(54) Select Use All.

(55) The Mission Data screen displays.

(56) Select Use All.

(57) The Solution/Gun Orders screen displays (Figure 18-65).

(58) Record the solution/safety data on DA Form 2399-R.

(59) Select the <Target> button.

(60) The <Target> screen displays.
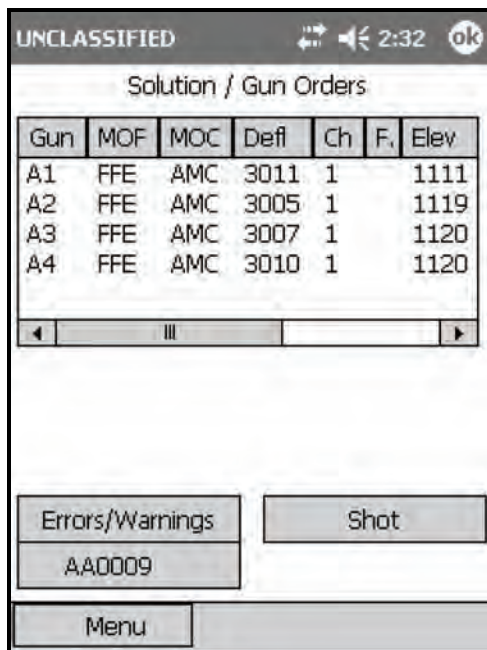
Figure 18-65. Final Protective Fire: section solution.

(61) Select Mission Data.

(62) The Mission Data screen displays (Figure 18-66).
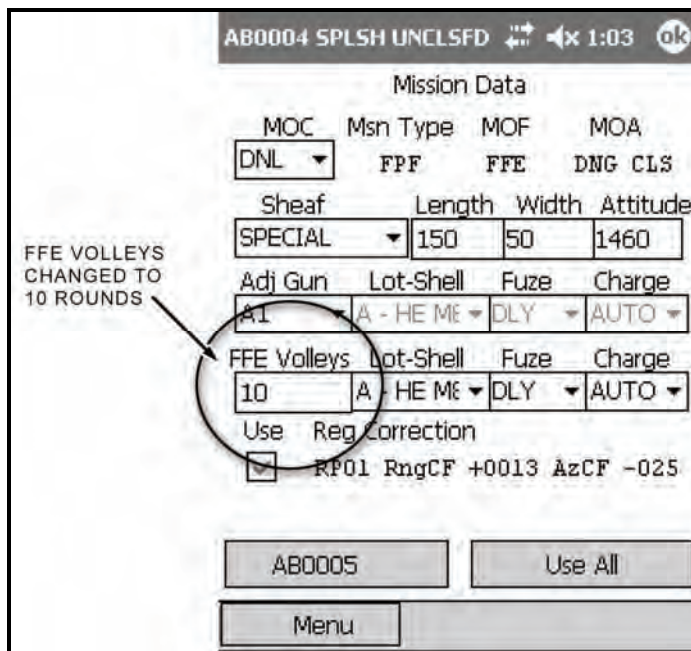
Figure 18-66. Final Protective Fire: changing the fire for effect volleys.

(63) Change the number of FFE Volleys from 1 to a predetermined number of rounds to be set aside for the FFE (10 rounds in the example).

> **NOTE:** When an FPF is fired, the section/platoon will continue firing until all rounds are expended or a cease fire command is given.

(64) Select Use All.

(65) The Solution/Gun Orders screen displays.

(66) Navigate to the Subsequent Adjust screen (Figure 18-67).
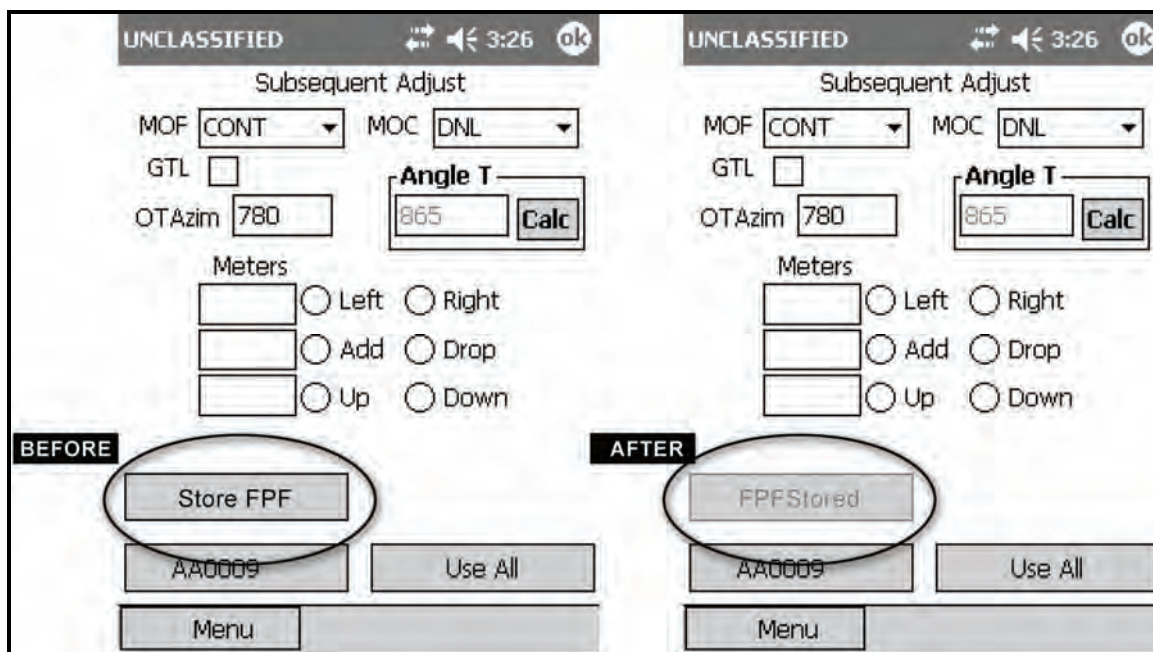
Figure 18-67. Final Protective Fire: storing the final protective fires.

(67) Select Store FPF.

> **NOTE:** The MOF is automatically changed to CONT, and the MOC is automatically changed to DNL. The Store FPF button is now shaded and reads "FPF Stored."

(68) Select Use All.

(69) The Solution/Gun Orders screen displays.

(70) Record one copy of each gun's firing data, the trigger (such as Budweiser), and a specific number of rounds to be set aside for the FPF.

> **NOTES:** 1. Each gun must post the FPF data on or near the gun to be fired so that it is visible at all times.
>
> 2. The FPF is left as an active mission until the platoon/section displaces or the FPF is no longer valid (troops moved, change in mission, etc.). The FPF may now be accessed through the Missions/FPFs menu using the following path: Menu/Missions/FPFs/AA0009.

(71) Select the <Target> button.

(72) Select the Mission Data button.

(73) The Mission Data menu displays.

(74) Fire the FPF by performing the following steps:
- Change the MOC from DNL to WR.
- Select Use All.
- The Solution/Gun Orders screen is displayed.
- Select Shot.
- The Shot Clock is displayed, and the LHMBC records the number of rounds fired.

(75) Select the <Target> button.

(76) The <Target> screen displays.

(77) Select EOM.

(78) The EOM screen displays.

(79) Delete FPF is selected, and all other EOM options are shaded.

(80) Select Use All.

(81) The Ammunition Expended screen displays.

(82) Adjust the total number of rounds fired.

(83) Select Use All.

(84) The Status screen displays.

SMOKE MISSIONS

18-23. Smoke missions are used to conceal ground maneuver, obstacle breaching, and recovery operations, as well as key assembly areas, supply routes, and logistical facilities. There are two types of smoke missions: quick and immediate.

QUICK SMOKE MISSIONS

18-24. The standard smoke mission covers a 500-meter front for a predetermined amount of time. This 500-meter front can be scaled up or down using a scaling factor. Quick smoke missions are considered smoke screening missions.

WARNING

Phosphine is highly toxic; it can easily kill in relatively low concentrations. Be cautious when handling red or white phosphorous munitions.

18-25. A quick smoke mission can be initiated using any of the methods of target location.

NOTE: See Chapter 9 for further quick smoke information.

18-26. To initialize a quick smoke mission—
(1) Select Menu.
(2) Select Manual Missions.
(3) Select Grid Mission.

(4) Complete the target location information (Figure 18-68).

Figure 18-68. Quick Smoke: target location information.

(5) Select Use All.

(6) The Mission Data screen (Figure 18-69) displays.

Figure 18-69. Quick Smoke: Mission Initialization screen.

(7) Change the sheaf to SPECIAL.

(8) Three additional fields for target length, width, and attitude display.

(9) Use these fields (outlined in Table 18-14) to enter and view information.

Table 18-14. Quick Smoke: Mission Data screen fields and related information.

FIELD	RELATED INFORMATION
Length	The long edge of the target
Width (depth)	The short edge of the target
Attitude	Read along the target's long edge

EXAMPLE

In this example, change FFE Volleys from 3 to 1, and the FFE Lot-Shell to the RP/WP lot.

---

(10) Select Use All.
(11) The Solution/Gun Orders screen displays.
(12) Continue to process the mission as a standard grid mission, as shown in the following example (Figures 18-70 to 18-76).

NOTE: See paragraph 18-2 for more information about processing a grid mission.

EXAMPLE

In this example, the adjusting gun will be the upwind gun. The flank wind is blowing from left to right (from #4 gun to #1 gun) across the gun line. # 4 is the upwind gun.
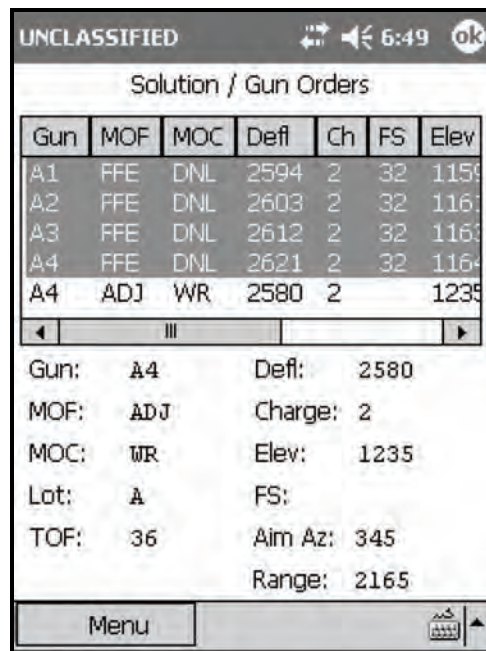
Figure 18-70. High-Explosive Adjustment Phase – first solution.

FO Call: Left 150. Drop 100. (Figures 18-71 and 18-72)
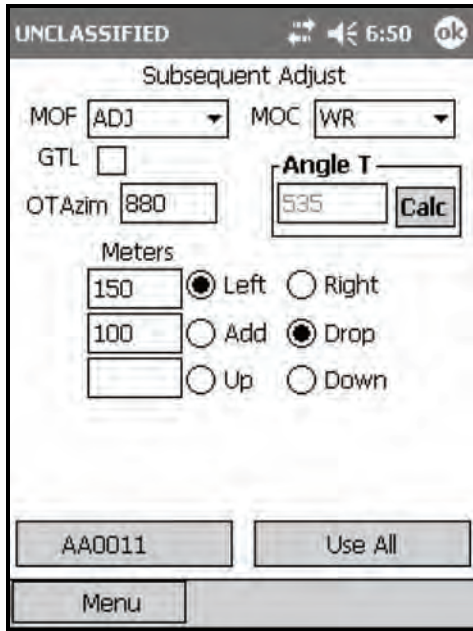
Figure 18-71. High-Explosive Adjustment

Phase: first adjustment.
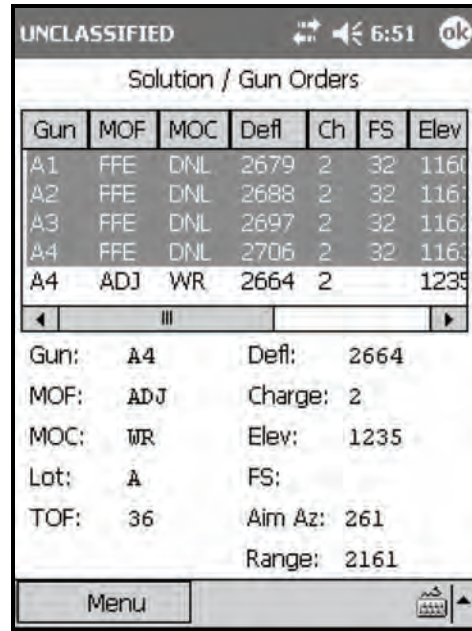
Figure 18-72. High-Explosive Adjustment

Phase: first adjustment solution.

FO Call: Right 50. Add 50. (Figures 18-73 and 18-74)
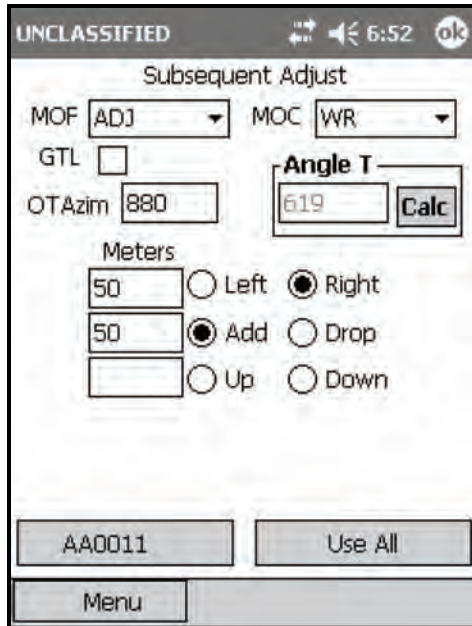
Figure 18-73. High-Explosive Adjustment

Phase: second adjustment.
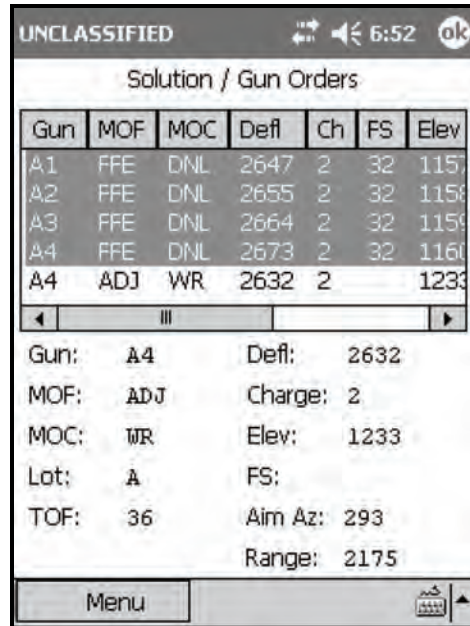
Figure 18-74. High-Explosive Adjustment

Phase: second adjustment solution.

FO Call: Repeat WP.

When the HE has been adjusted, the FO will call for a round of smoke to confirm that the smoke lands in the proper location and with the desired effects. Then—

    (1) From the Subsequent Adjust screen, change the MOF from ADJ to FFE (Figure 18-75).

    (2) Select Use All.

    (3) The Solution/Gun Orders screen displays.

Firing data is displayed for all guns; however, A4 is the only gun that will fire the confirmation (Figure 18-76). If the smoke is satisfactory, the adjustment phase is complete.
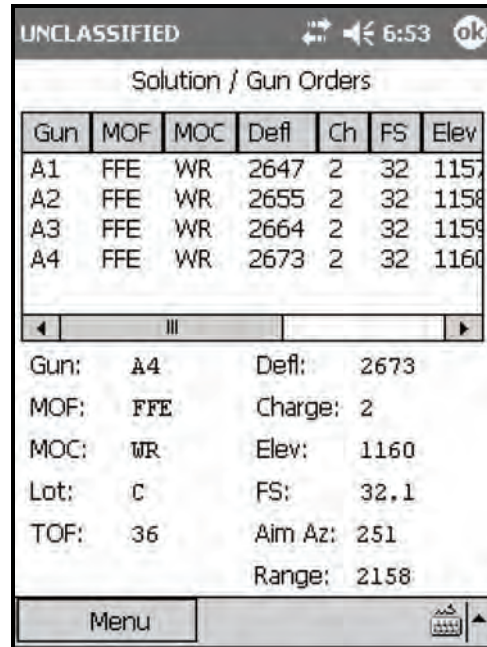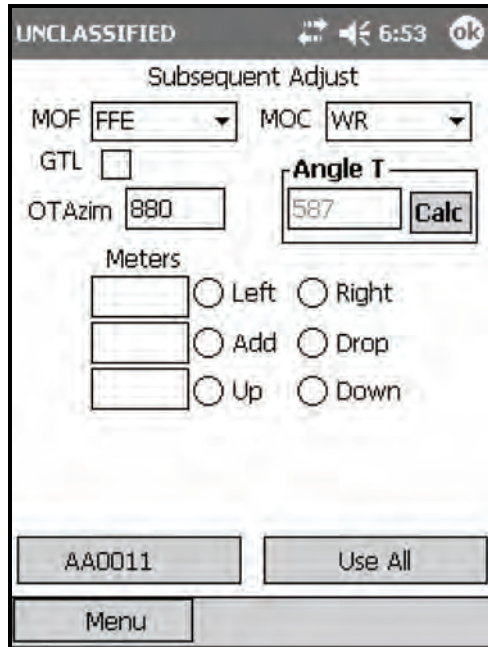
Figure 18-75. High-Explosive Adjustment Phase: change the method of fire from adjust to fire for effect.

Figure 18-76. High-Explosive Adjustment Phase: first confirmation round.

(13) Calculate the number of rounds for the establishment and maintenance phases from the <Target> screen by selecting Smoke Card.

(14) The Smoke Card screen displays (Figure 18-77). The smoke card uses weather and target width information to calculate the number of rounds required to provide adequate smoke for the given target area. The weather conditions originate from the meteorological data station or can be extracted from the current MET message. If using conditions from the current MET message, humidity will need to be estimated.

Figure 18-77. Smoke Card screen.

NOTE: It is the responsibility of the coordinating FSO to supply weather conditions a minimum of 20 minutes before firing a coordinated quick smoke mission. This affords the FDC and gun crew time to process the mission ammunition requirements and prepare the ammunition for the mission.

(15) After calculating the total number of smoke rounds for the quick smoke mission, divide the number of rounds necessary for establishment by the number of guns.

EXAMPLE

In the example shown in Figure 18-78, the LHMBC calculates that 10 rounds will be necessary to establish the initial smoke screen.
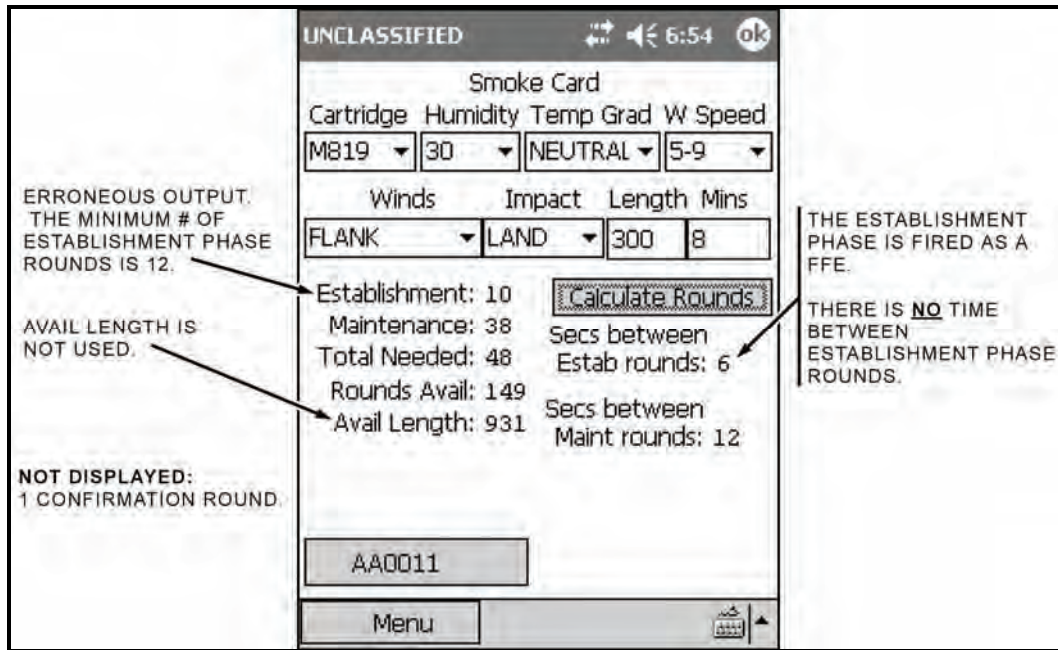
Figure 18-78. Smoke Card example with solution.

NOTE: All smoke screens are established with a minimum of 12 rounds. If the number for the establishment phase is not divisible by the number of guns, round up to the next number that is divisible by the number of guns. For example—

Establishment = 10

Number Guns = 4, round up to 12 rounds

12/4 = 3 rounds per gun

The LHMBC erroneously displays an interval between rounds for establishment (Figure 18-50). There is NO interval between rounds during the establishment phase. The FDC will control all guns after the first round of the maintaining phase.

---

(16) When the last round of the establishment phase has been fired, the section will continue firing the maintaining rounds at the predetermined interval.

NOTE: Individual gun squad leaders will be responsible for ensuring that their guns fire in the proper sequence, at the proper interval.

EXAMPLE

For this example (Figure 18-79), #4 gun is the upwind gun, so the section will fire a section left with a 12-second interval between rounds.
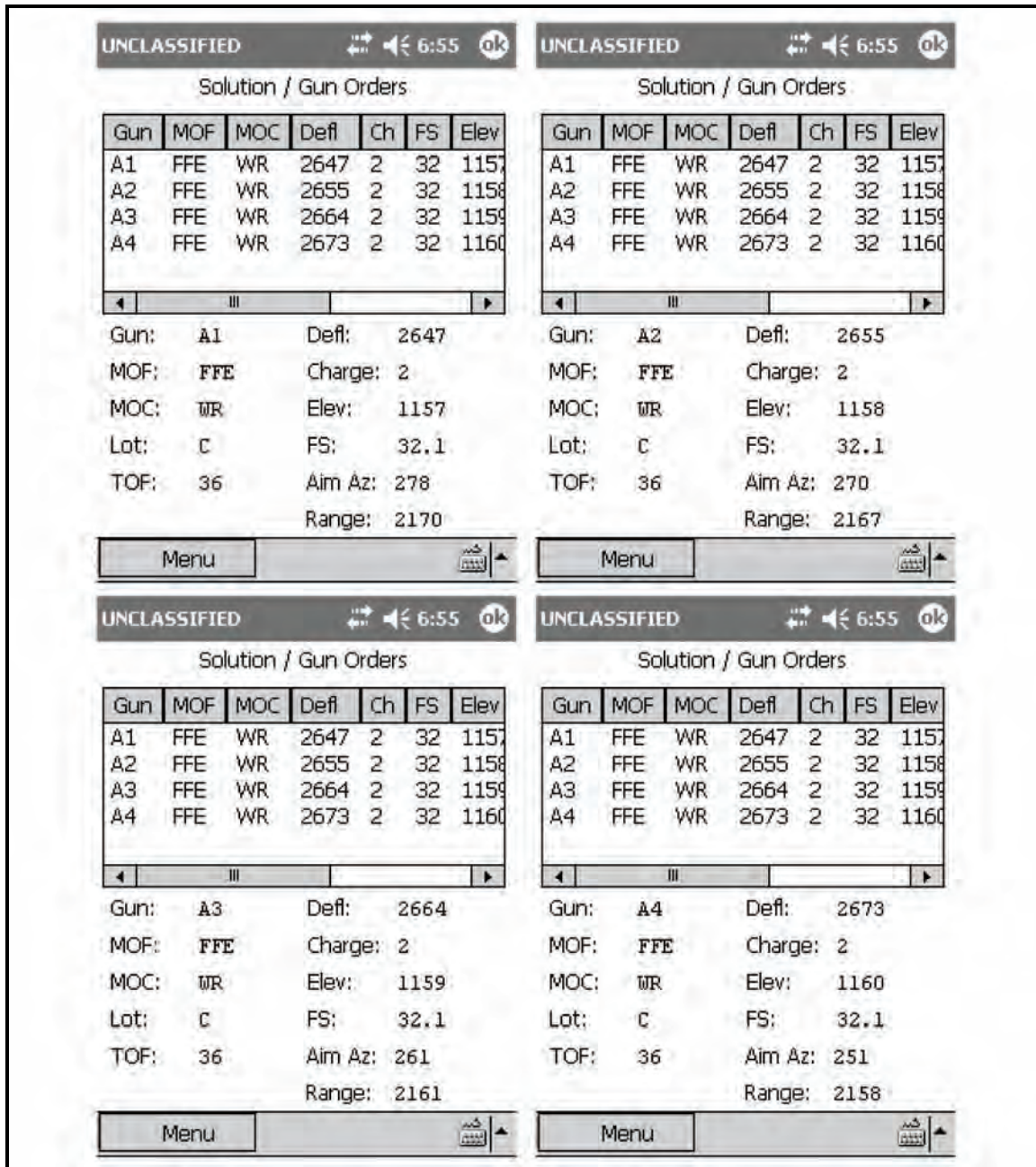
Figure 18-79. Quick Smoke: guns A1, A2, A3, and A4 solutions for the maintaining phase.

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(17) After the section announces, "All rounds complete," the FDC sends an MTO of "All rounds complete."

(18) Navigate to the EOM screen (Figure 18-80).
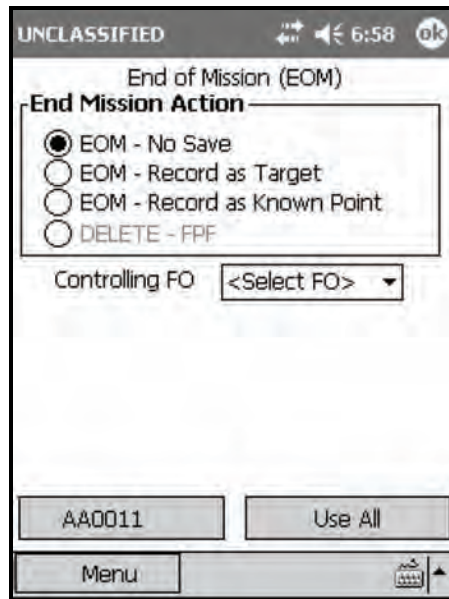
Figure 18-80. Quick Smoke: End of Mission screen.

(19) Select EOM – No Save, EOM – Record as Target, or EOM – Record as Known Point.

(20) Select Use All.

(21) The Ammunition Expended screen displays (Figure 18-81).
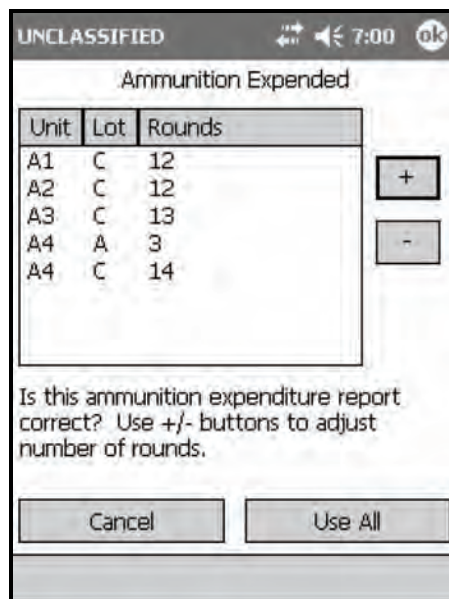
Figure 18-81. Quick Smoke: Ammunition Expended screen.

(22) Update the ammunition manually.

NOTE: The quick smoke card is not integrated with the actual mission, so the ammunition must be updated manually.

---

(23) Select Use All.

(24) The Status screen displays.

IMMEDIATE SMOKE AND IMMEDIATE SUPPRESSION MISSIONS

18-27.   When engaging a planned target or a target of opportunity that has taken friendly forces under fire, the FO announces (in the CFF) immediate smoke or immediate suppression. The delivery of fires is performed as quickly as possible. Immediate response is more important than the accuracy of these fires.

Immediate Smoke Missions

18-28.   The FO uses immediate smoke to obscure the enemy's vision, allowing friendly forces to disengage. It is not intended as a screening mission.

18-29.   To initialize an immediate smoke mission—

(1) Select Menu.

(2) Select Manual Missions.

(3) Select Grid Msn.

(4) Change the Mission Type to IM SMOKE, and complete the rest of the target location information (Figure 18-82).
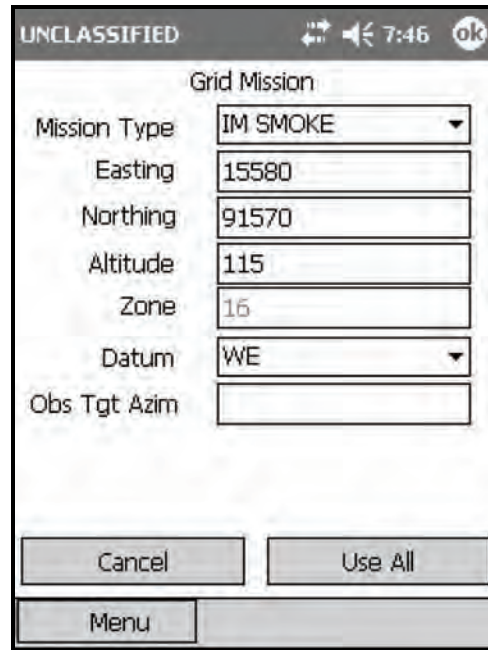
Figure 18-82. Immediate Smoke: Mission Initialization screen.

(5) Select Use All.

(6) The Mission Data screen displays with a default FFE Volleys of 2 rounds. The Lot-Shell will default to RP/WP (Figure 18-83).
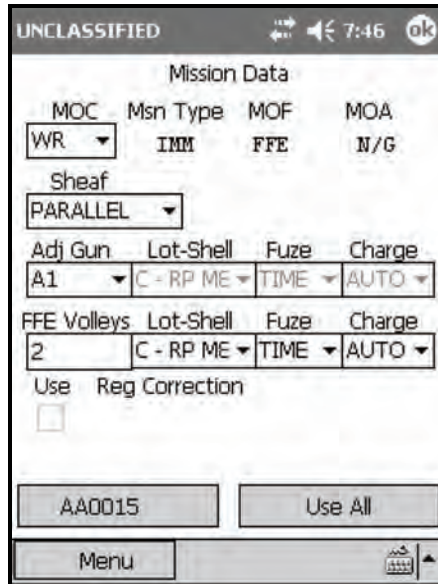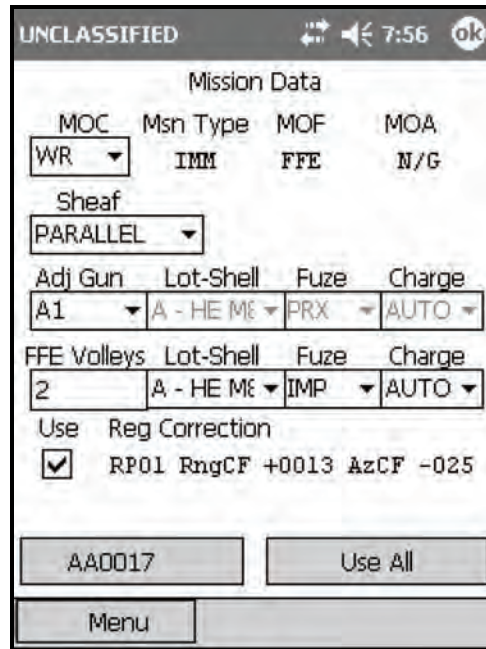

Figure 18-83. Immediate Smoke: Mission Data screen.

NOTES: 1. The adjusting gun is irrelevant. If adjustments are necessary, all guns included in the mission will fire each adjustment.

2. The default number of guns that are included is two, A1 and A2 (Figure 18-84). This may be scaled up or down depending on the target description. The number of guns to be included in the mission may be changed from the Gun Select screen.
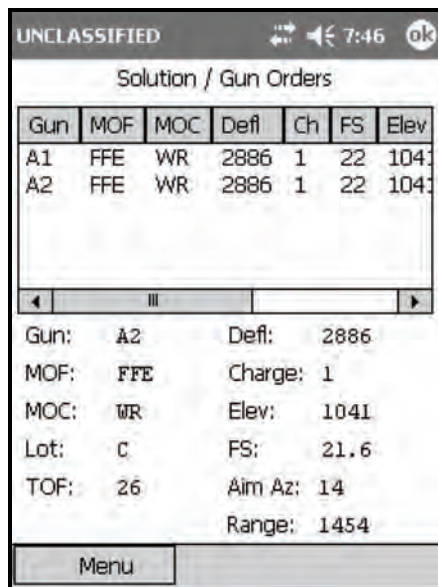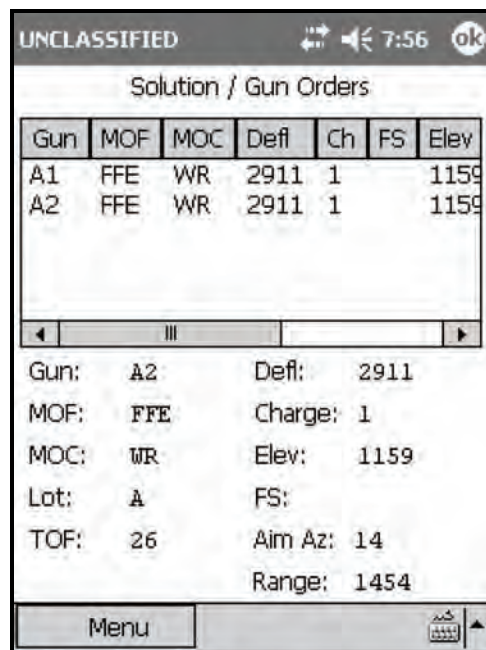

Figure 18-84. Immediate Smoke: Solution/Gun Orders screen.

(7) Upon receipt of an EOM from the FO, end the mission via the EOM screen (See paragraph 18-2).

Immediate Suppression Missions

18-30.   The FO uses immediate suppression to indicate that his unit is receiving enemy fire. His request should be processed at once. These fires are used suppress the enemy and limit his ability to perform his mission.

18-31.   To initialize an immediate suppression mission—

(1) Select Menu.

(2) Select Manual Missions.

(3) Select Grid Msn.

(4) Change the Mission Type to SUPPRESS, and complete the rest of the target location information (Figure 18-85).

Figure 18-85. Immediate Suppression: Mission Initialization screen.

(5) Select Use All.

(6) The Mission Data screen displays with a default FFE Volleys of 2 rounds. The Lot-Shell defaults to HE (Figure 18-86).

Figure 18-86. Immediate Suppression: Mission Data screen.

NOTES: 1. The adjusting gun is irrelevant. If adjustments are necessary, all guns included in the mission will fire each adjustment.

2. The default number of guns that are included is two, A1 and A2 (Figure 18-87). This may be scaled up or down depending on the target description. The number of guns to be included in the mission may be changed from the Gun Select screen.

Figure 18-87. Immediate Suppression: Solution/Gun Orders screen.

(7) Upon receipt of an EOM from the FO, end the mission via the EOM screen (see paragraph 18-2).

SEARCH AND TRAVERSE MISSIONS

18-32.   Mortars use searching and traversing fire when target areas cannot be completely engaged with linear or open sheaves. To increase the depth of a target area, mortars employ searching fire. To increase the breadth of a target area, mortars employ traversing fire. Search and traverse may be employed simultaneously to engage a target that is deeper and wider than a linear sheaf.

NOTES: 1. The example is given for a basic traverse mission, but search missions employ similar procedures.

2. The LHMBC issues a warning when the gun-target line between individual guns exceeds 300 mils and when the target is too wide.

3. Due to the angular difference between guns as they search or traverse across the target area, the LHMBC limits the difference between gun-target lines for individual guns to 300 mils. This restriction prevents the impact of rounds from diverging as the guns fire subsequent rounds.

4. A warning will display if the difference in gun-target lines between guns exceeds 150 mils.

18-33.   To initialize a traverse mission—
(1) Select Menu.
(2) Select Manual Missions.
(3) Select Grid Msn.
(4) The Grid Mission screen (Figure 18-88) displays.

Figure 18-88. Search and Traverse: Mission Initialization screen.

(5) Enter the grid mission initialization data as described in paragraph 18-2.

(6) Select Use All.
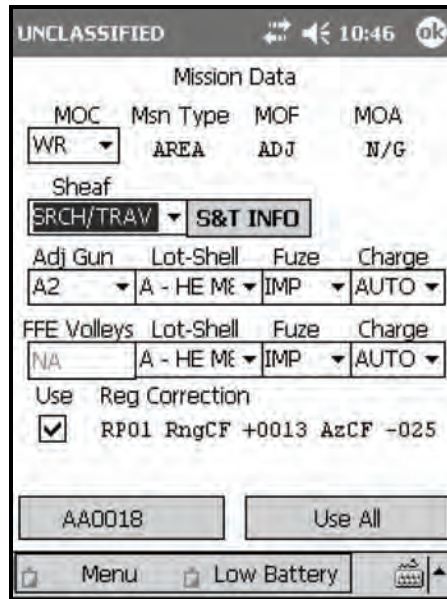
(7) The Mission Data screen (Figure 18-89) displays.

Figure 18-89. Search and Traverse: Mission Data screen.

(8) In the Sheaf field, change the sheaf to SRCH/TRAV.

(9) Select S&T INFO. The Search/Traverse Sheaf Information screen displays. The Search/Traverse Sheaf Information screen (Figure 18-90) enables the FDC operator to define the target attitude, the location of the adjusting point, and the size of the target area.
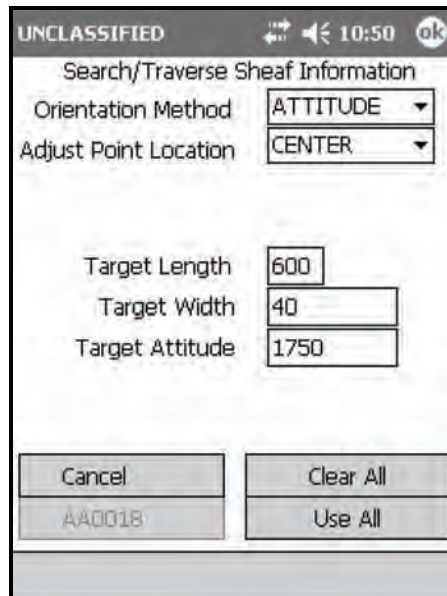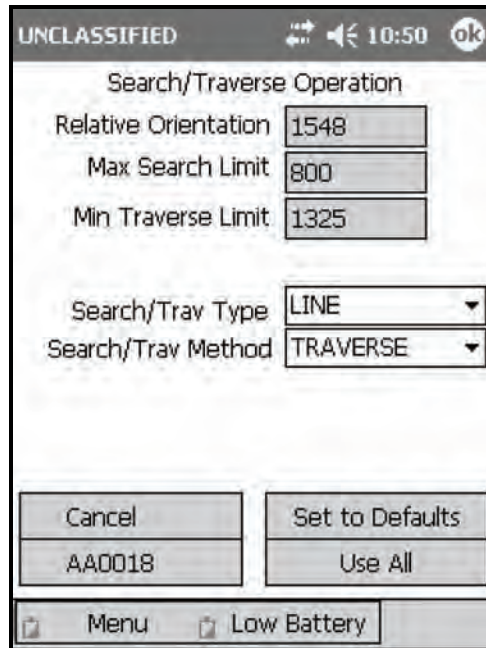

Figure 18-90. Search and Traverse Sheaf Information screen.

(10) Use the fields outlined in Table 18-15 to enter and view information.

Table 18-15. Search and Traverse Sheaf Information screen fields and related information.

FIELD	RELATED INFORMATION
Orientation Method	This field can be set to use a second point (in addition to the initial point called in the CFF) to determine the attitude of the target, or the actual attitude of the target may be used.
Adjust Point Location	The FO must specify the adjusting point location to the controlling FDC. This field may be set to FLANK or CENTER. • If the method selected is CENTER, the Target Length, Target Width, and Target Attitude fields will display. • If FLANK is selected, two additional fields, Reference Direction and Reference Azimuth, will display. • The Reference Direction defaults to GUN-TGT Line. This field may be changed to OTHER to use, for instance, the OT azimuth.

(11) Select Use All.

(12) The Mission Data screen displays.

(13) Select Use All.

(14) The Search/Traverse Operation screen (Figure 18-91) displays. The Search/Traverse Operation screen provides the FDC operator with—

■   Relative Orientation.

■   Max Search Limit.

■   Max Traverse Limit.

■   Search/Trav Type.

■   Search/Trav Method.

Figure 18-91. Search and Traverse Operation screen.

(15) Use the fields outlined in Table 18-16 to enter and view information.

NOTE: See Table 18-17 for more information about the types and methods outlined in these fields.

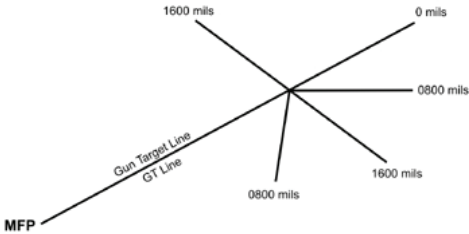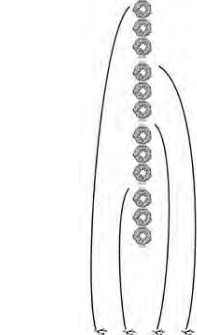**Table 18-16. Search and Traverse Sheaf Operation screen fields and related information.**
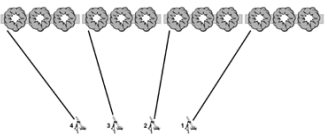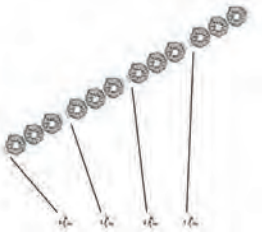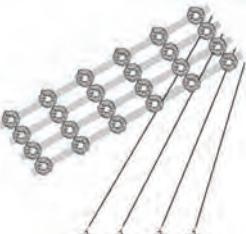
FIELD	RELATED INFORMATION
Relative Orientation	The relative orientation is the angular difference, in mils, between the gun-target line and the target's attitude. The relative orientation will always be measured between 0 mils (in-line with the gun-target line) and 1600 mils (perpendicular to the gun-target line). The LHMBC will recommend— • SEARCH when the relative orientation is nearly 0 mils. • TRAVERSE when the relative orientation is nearly 1600 mils. • COMBINED search and traverse when the burst radius of the round is not sufficient to cover the target area using strictly search or traverse. Although the LHMBC recommends a search and traverse method, the LHMBC operator may change to a method he deems appropriate.
Max Search Limit	This field displays the maximum relative orientation for a search mission to cover the target area effectively, based on segment length and burst radius.
Max Traverse Limit	This field displays the minimum relative orientation for a traverse mission to cover the target area effectively, based on segment width and burst radius.
Search/Trav Type	This may be either LINE or AREA. • A line mission is used to engage a target that does not exceed the burst diameter of the ammunition being used to engage the target. The LHMBC has the ability to calculate both search and traverse missions using the line method. • An area mission is used to engage a target that exceeds the burst diameter of the ammunition being used to engage the target. The LHMBC has the ability to calculate both search and traverse missions using the area method.
Search/Trav Type	This field may be set to SEARCH, TRAVERSE, or COMBINED (Table 18-17). The LHMBC operator may change to a method he deems appropriate.

Table 18-17. Search and Traverse types and methods.

Search and Traverse Type / Search and Traverse Method	LINE	AREA
Search		
Traverse		
Combined Search and Traverse		

(16) Select Use All.

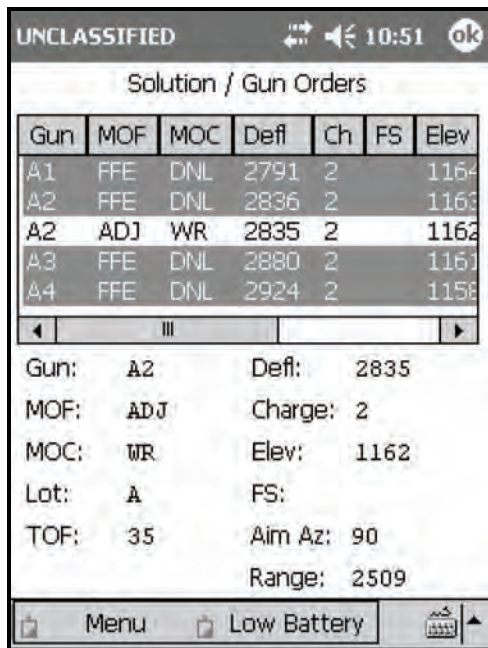(17) The Solution/Gun Orders screen (Figure 18-92) displays.

Figure 18-92. Search and Traverse: initial solution.

(18) Conduct the adjustment phase of the mission in the same manner as a conventional manual mission (Figures 18-93 and 18-94).
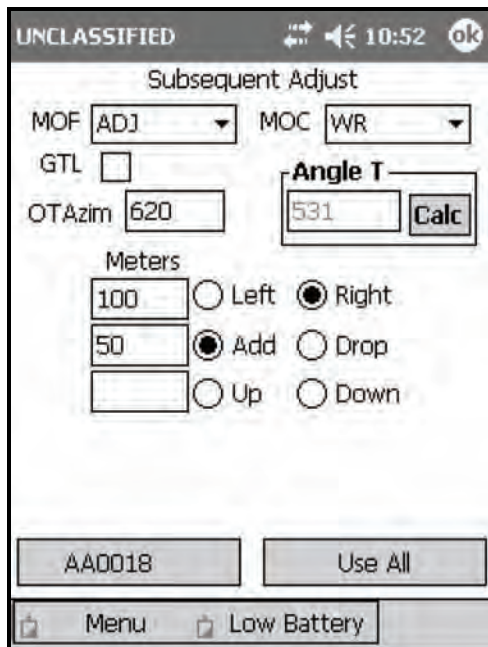
Figure 18-93. Search and Traverse: first adjustment.

Chapter 18

Figure 18-94. Search and Traverse: second solution.

(19) Upon receipt of the FFE command from the FO, from the Subsequent Adjust screen (Figure 18-95), change the MOF to FFE, and enter any last refinements.

Figure 18-95. Search and Traverse: final adjustment.

(20) Select Use All.

(21) The Solution/Gun Orders screen (Figure 18-96) displays.

Figure 18-96. Search and Traverse: fire for effect solution.

(22) Select Srch/Trav Data.

(23) The S/T Round and Hand Wheel Fire Data screen (Figure 18-97) displays. This screen is comprised of the following fields:
- Rounds per Weapon.
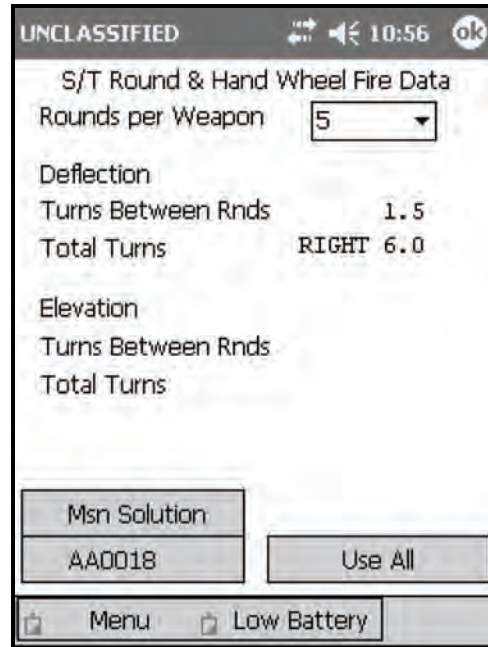- Deflection.
- Elevation.

Figure 18-97. Search and Traverse Round and Hand Wheel Fire Data screen.

(24) Use the fields outlined in Table 18-18 to enter and view information.

Table 18-18. Search and Traverse Round and Hand Wheel Fire Data screen fields and related information.

FIELD	RELATED INFORMATION
Rounds per Weapon	This field defaults to the number of rounds required to properly engage the target area depending upon the burst radius of the given munitions. This field may be changed to a lesser number of rounds, which will decrease the effectiveness of the engagement, but will conserve ammunition.
Deflection	These two fields correspond to traversing across the target area. • Turns Between Rnds: This field is read only. The number of turns between rounds will be adjusted according to the number of rounds to be fired. • Total Turns: The total number of turns and the direction to be traversed. This is calculated by subtracting one from the number of rounds per weapon, multiplied by the deflection turns between rounds.
Elevation	These two fields correspond to searching across the target area. • Turns Between Rnds: This field is read only. The number of turns between rounds will be adjusted according to the number of rounds to be fired. • Total Turns: The total number of turns and the direction to be traversed. This is calculated by subtracting one from the number of rounds per weapon, multiplied by elevation turns between rounds.

(25) Record this data on DA Form 2399-R.

(26) Select Use All.

(27) The Solution/Gun Orders screen displays.

(28) End the mission, and record the ammunition expenditure in the same manner as a standard manual mission (paragraph 18-2, Basic Manual Missions) (Figure 18-98).
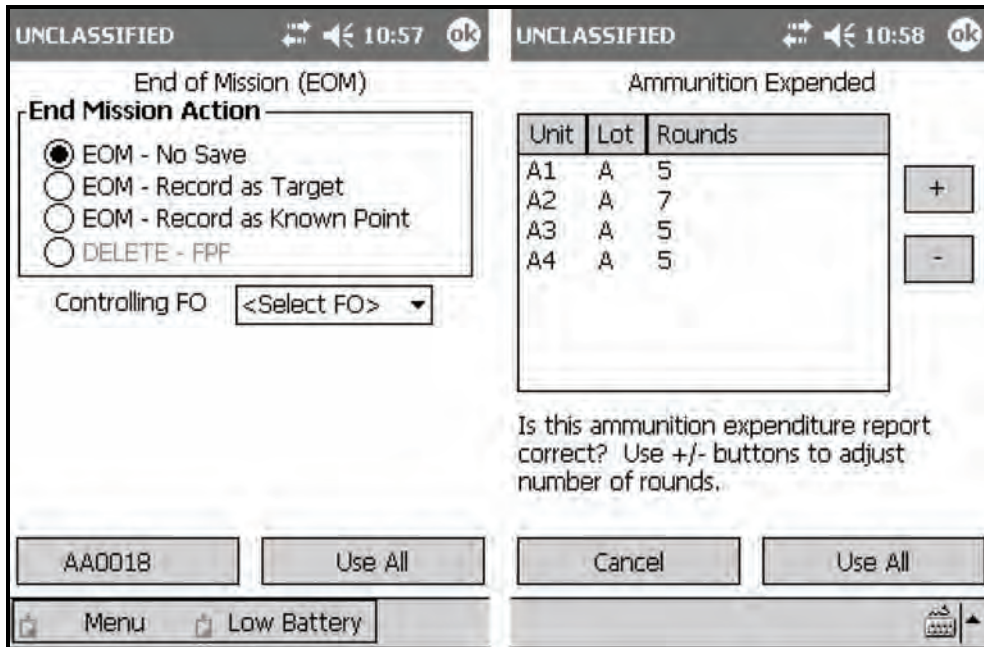

Figure 18-98. Search and Traverse: End of Mission and Ammunition Expended screens.

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