CHAPTER 9

SPECIAL PROCEDURES

Procedures for basic fire missions with the MBC are simple and require little coordination by the indirect fire team. The one element that is lacking in these procedures is accuracy, which the indirect fire team strives to improve. In-depth planning and prior coordination between elements of the indirect fire team help ensure the delivery of timely and accurate fires. This chapter discusses the special procedures needed to conduct registration missions, final protective fires, and quick or immediate smoke.

9-1. REGISTRATION AND SHEAF ADJUSTMENT

The firing of the registration is the first mission completed if time and the tactical situation permit. Two types of registration missions are coordinated and uncoordinated.

a. A *coordinated* registration is a planned mission using an available RP, known (surveyed) to at least an eight-digit grid coordinate. Firing corrections may be determined and applied after the registration mission is fired. The FDC usually initiates this mission.

b. An *uncoordinated* registration is not planned and may not have a surveyed RP to fire on. This registration is used mainly to adjust the sheaf and to establish a known point within the area of responsibility. If the RP is not surveyed, firing data corrections cannot be determined or applied. The FO usually initiates this mission.

c. When using the MBC for registration, the computer uses the same procedures as a grid mission until the FO determines the registration is complete. He adjusts the basepiece onto the registration point as in any standard adjust mission. Once the FDC receives "registration complete" from the FO, any refinement corrections received with the command must be computed. After this data are given to the mortars, the section fires either a section left or a section right. The basepiece does not fire. For example, the final correction sent by the FO is "Drop 25, registration complete."

(1) The computer uses the ADJ menu to enter the correction of -25. He presses the COMPUTE switch to process the refinement data.

(2) The computer presses the REG fire mission switch (coordinated registration only) once the refinement firing data are available.

(3) The registration number and FO identification (if the FO was entered with the call for fire) are displayed. The computer presses the —

(a) SEQ switch. The mission target numbers are displayed.

(b) SEQ switch. The FO’s direction to the target is displayed.

(c) SEQ switch. The RP grid is displayed. This grid is the initial grid used from the call for fire, not the adjusting point grid.

(d) SEQ switch. The altitude to the RP is displayed.

(e) SEQ switch. The weapon caliber and number of the adjusted piece are displayed.

(f) SEQ switch. The charge used to reach the RP is displayed.

(g) SEQ switch. The MBC requests the operator to push COMPUTE to determine the firing corrections.

(h) COMPUTE switch. The assigned RP number is displayed.

(i) SEQ switch. The type of MET used and the range correction factor (RCF) are displayed.

(j) SEQ switch. The type of MET used and the deflection correction are displayed.

(k) SEQ switch. **READY** is displayed.

d. The MBC has determined the firing corrections, but it will not apply them to any subsequent data during this mission. However, it automatically applies the correction factors to all following missions that are within the transfer limits of this RP. This does not preclude the FDC from copying this data to the appropriate spaces on the data sheet.

e. To prepare the MBC for sheaf adjustments, the computer uses the TFC menu to change control **CON:AF** to **CON:FFE.** After the control has been changed, he presses the COMPUTE switch.

NOTE: Changing **CON:AF** to **CON:FFE** and pressing COMPUTE are mandatory steps before adjusting individual guns.

f. The FDC initiates the adjustment of the sheaf. He tells the FO, "Prepare to adjust the sheaf." The FO responds with, "Section left/right." The section left/right is fired without the basepiece unless the FO specifies to fire the basepiece. The operator prepares to receive corrections for each mortar not firing within the sheaf. Then, he records the corrections and computes them separately.

NOTE: The MBC can only compute one correction at a time; therefore, if the computer records the corrections, he may compute for the corrections as he desires. The smaller corrections should be entered first since the mortars will not likely be fired again.

(1) Use the adjust menu (press ADJ) and sequence to **ADJ:AUF** (adjusting: adjusting unit of fire). Change the AUF to SHEAF.

(2) Sequence to **WPN:** and enter the weapon number to adjust and the correction.

(3) Compute the correction. The weapon number identified with the correction is the only weapon affected by the correction. The other weapons will still be on the last firing data.

(4) Use the adjust (ADJ) switch and sequence to **WPN:NXT CONT.** The WPN is for "weapon." The abbreviation NXT is for the "next" mortar to adjust. The CONT means "continue with the same mortar" identified in (2) above for more corrections.

NOTE: If a correction is over 50 meters (L/R) then that mortar will be refired. If the correction is less than 50 meters (L/R) the mortar is considered to be adjusted.

(5) Sequence to **WPN:** and enter the weapon to adjust and enter the correction.
(6) Compute the correction.
(7) Use the firing data menu to sequence through the data and record the new fire commands.

g. After the sheaf has been adjusted, the section/platoon must refer the sight and realign the aiming post on the last (hit) deflection of the basepiece used for the registration. The mission is ended using the EOM menu.

h. The computer uses the REG DATA (initialization switch) menu to store information concerning the RP and to update the RP. Then the MBC applies the correction factors to all subsequent fire requests that are within the transfer limits of the RF?

NOTE: The RP must be updated for any MET or reregistration conducted.

9-2. MEAN POINT OF IMPACT REGISTRATION

Special procedures permit registration under unusual conditions. This paragraph discusses one of the special procedures available — the *MPI registration*. Visual adjustment of fire on an RP at night cannot be performed without illumination. In desert, jungle, or arctic operations, clearly defined RPs in the target areas are not usually available.

a. In an MPI registration, two FOs are normally used. The computer must know the location and altitude of each FO to survey accuracy and then to enter them into the MBC in the FO LOC menu. The expected point of impact and mortar position must also be known to survey accuracy. To determine the initial firing data —

(1) Start the mission using the GRID menu and enter the expected burst point (as the grid to the target) and altitude.

NOTE: An FO ID and direction should not be entered in this menu.

(2) Use the WPN/AMMO menu to assign the mission to an adjusting piece.
(3) Press COMPUTE to determine the firing data and record the needed information to include the burst point to the target.

NOTE: The MBC does not allow access to the MPI menu under the ADJ (adjust) switch until a mission has been activated. This is done by using the GRID and WPN/AMMO menus.

b. After the locations of the FOs and target point are known, the FDC can compute and report the orienting data to the FOs. The FOs must be given their orienting data before firing. To determine the orienting data of the observer –

(1) Press the ADJ switch. Select **MPI:,** and **FILE CONT INIT** is displayed.
(2) Select **INIT** to initialize the MPI mission. **INIT YES NO** (for verification) is displayed.
(3) Select **YES.** The MBC prompts the operator for one of the FO's ID.
(4) Enter either one of the FO IDs.
(5) Press the SEQ switch. The orienting direction is displayed for the FO entered.
(6) Press the SEQ switch. The vertical angle is displayed for the FO entered.
(7) Press the SEQ switch. The target number is entered and displayed.

(8) Press the SEQ switch. The orienting data are ready to be transmitted to the FO. If the MBC is DMD-supported, select **YES** to transmit via digital. If the MBC is not DMD-supported, select **NO.** The MBC prompts the operator for the other FO's ID.

(9) Follow steps (4) through (8) for the other FO.

(10) If the MBC is not DMD-supported, transmit the orienting data to the FOS in the following format:

FDC: "PREPARE TO OBSERVE MPI REGISTRATION.
HOTEL 42 DIRECTION 2580 VERTICAL ANGLE + 40;
HOTEL 41 DIRECTION 2850 VERTICAL ANGLE + 10;
REPORT WHEN READY TO OBSERVE."

c. The FOs should announce "Ready to observe" after they have received the orienting data from the FDC and have set up their instruments.

d. The section leader/chief computer directs the firing of the orienting round using the computed firing data. The FOs use the round to check the orientation of their instruments. The orienting round should be within 50 mils of the expected point of impact.

(1) If the round lands 50 mils or more from the expected point of impact, the FO reorients his instrument and announces the new direction to the FDC. If one FO reorients his instrument, the spotting of the other FO is disregarded. When either of the FOs must reorient, the operator must enter the new direction by using the ADJ menu.

- Enter the ADJ menu. Press the ADJ switch.
- Select **MPI.**
- Select **INIT.**
- Reenter the FO's ID, when prompted.

(2) If the burst impacts less than 50 mils from the expected point of impact, the FO sends the FDC a spotting. The spotting contains the number of mils left or right of the expected point of impact.

(3) When both FOs report their instruments are ready, the adjusting mortar fires the number of rounds needed to get six usable spottings. To enter the spottings into the MBC –

(a) Press the ADJ switch and select **MPI.** The computer displays: **FILE CONT INIT.**

(b) Select **FILE** to enter the spottings. The MBC requests the sighting number.

(c) Enter the sighting (round) number.

(d) Press the SEQ switch. Determine the azimuth from the FO to the target using the RALS (right add, left subtract) rule. Add or subtract this correction from the FO's referred (orienting) direction. Enter the azimuth as the FO's direction.

(e) Press the SEQ switch. The MBC prompts for the vertical angle from the FO to the round. Enter the vertical angle, if any.

(f) Press the SEQ switch. The second FO's ID is displayed. Enter the sighting (round) number. Determine the azimuth from the FO to the target using the RALS rule. Add or subtract the correction from the FO's referred (orienting) direction. Enter the azimuth as the FO's direction.

NOTE: The MBC computes for only one vertical angle correction. This correction applies only to the first FO entry. When the vertical angle entry must be computed, the operator ensures the proper FO is entered.

(g) Press the SEQ switch. The MBC prompts the operator for the next sighting.

(h) Press the COMPUTE switch and enter the FO's sightings as described until all sightings have been entered. After the last sighting has been entered, select END on this display.

(i) Press the COMPUTE switch and sequence to view the RP corrections.

(j) Press the EOM switch to end the mission.

9-3. RADAR REGISTRATION

The radar registration requires only one OP, which is the radar. It requires less survey, fewer communications facilities, and less coordination. The radar registration can be conducted quickly and during poor visibility. This mission may be conducted as a grid or polar mission. The grid mission procedures are discussed below.

a. The radar registration mission is a coordinated mission and is conducted as a normal grid mission with the following exceptions:

(1) The FO will not send corrections. He will send grid coordinates to the impact of the rounds fired.

(2) The FDC, instead of the FOs, must convert spottings to corrections.

b. The procedure for radar registration is as follows:

(1) The FDC sends an MTO - for example, "Prepare to Register RP 1, Grid 03817158."

(2) The radar operator orients his radar set, then tells the FDC, "Ready to Observe."

(3) The first round is fired, and the radar operator sends a grid of the impact point of the round to the FDC.

(4) The FDC records the grid and compares it to the RP grid to deterrnine the spotting.

(a) Comparing the grid to grid, the FO sends a grid to the first round fired; that grid (in this example) is 03557120. By comparing the 2 eight-digit grids, the FDC determines the spotting.

NOTE: Use 10-digit grid coordinates; add a zero to the end of each casting or northing coordinate until there are 10 digits for each coordinate – for example, the grid 123456 becomes 1230045600.

	Easting	**Northing**
RP Grid	0381(0)	7158(0)
1st Round Grid	-0355(0)	-7120(0)
	26(0)	38(0)

(b) By using a piece of blank scrap paper, the FDC can draw a large square to represent a 1000-meter grid square.

(c) The FDC labels the bottom left-hand corner of the square with the grid intersection of the RP (03/71) (Figure 9-1, see page 9-6).

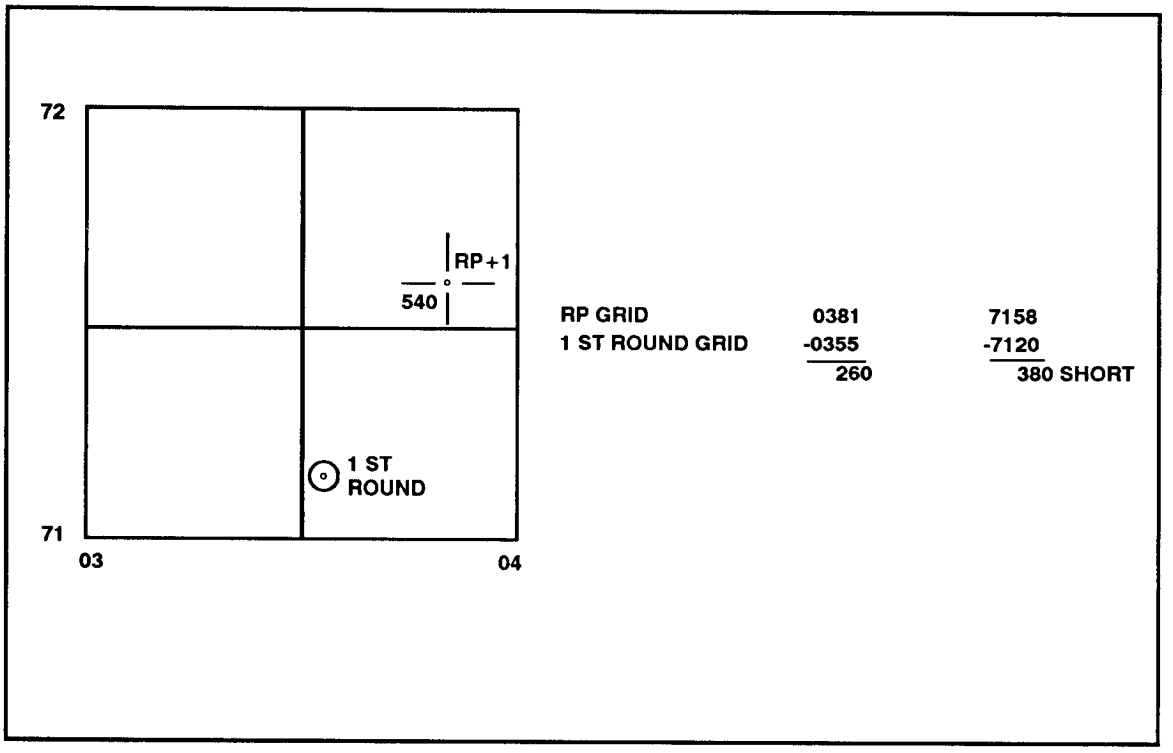

Figure 9-1. Determination of a spotting.

(d) He divides the large square into four smaller squares by drawing a line through the center of the box from top to bottom and from left to right.

(e) He estimates the location of both grid coordinates and plots them inside the box.

(f) By looking at these plots, the FDC can tell whether the round is left or right and whether it is over or short of the RP This is the spotting of the round. For this example, the spotting is left (260 meters) and short (380 meters).

(g) The spotting is then converted to a correction by converting the left spotting to a RIGHT (R)260 correction and the short spotting to an ADD (+)380 correction. Using the ADJ menu, the operator enters the corrections to apply.

- Change the direction to 6400 (or 0000).
- Enter R 0260 for the deviation correction.
- Enter + 0380 for the range correction.
- Sequence to **READY.**

The operator then computes for the firing data and sends it to the guns.

(5) The second round is fired, and the FO sends the grid 04007180. The same process is repeated as for the first correction.

(a) The grids are compared and the spotting is determined (RIGHT 190 and OVER 220).

(b) The corrections (LEFT [L] 190 and DROP [-] 220) are made in the ADJ menu, and the firing data are sent to the mortars.

(6) The computer repeats this procedure until the spotting is within 25 meters of the RP and until the FO has given "End of Mission, Registration Complete." The FDC –

(a) Enters the final correction through the ADJ menu and computes.

(b) Presses the REG switch and sequences through the REG menu. He ensures that the data pertaining to the RP are correct.

(c) Presses COMPUTE when indicated at the end of the REG menu to determine the RCF and deflection correction (DEFK).

(7) After the registration is completed, the FDC informs the FO (radar operator), "Prepare to Adjust the Sheaf." These procedures are continued until the sheaf is adjusted. To adjust the sheaf —

(a) The FDC converges the sheaf on the RP. Using the TFC switch, the operator changes sheaf parallel (PRL) to sheaf converge (CVG).

(b) The operator changes the method of control (CON) from adjust fire (AF) to fire for effect (FFE).

(c) The operator sequences through the rest of the menu, ensuring all data match with the FDC order. He presses the COMPUTE switch when the MBC reads PUSH COMPUTE.

(d) All mortars are fired (except the BP) at 10-to 20-second intervals.

(e) The radar operator sends the FDC the grid to the impact of each round fired.

(f) The FDC compares the grids to the impact of each round with the grid of the RP, and it determines the deviation corrections for each mortar. THE FDC DOES NOT USE RANGE CORRECTIONS. When adjusting for a parallel sheaf during a registration mission, the FDC disregards range corrections.

NOTES:

1. The operator compares the full grid for all rounds fired. Any extreme deviation or range spotting means there is a problem in the setup of that mortar position(s).

2. If the operator is using the MBC to apply these corrections, he must first enter and compute all corrections under 50 meters.

(g) All corrections more than 50 meters are refired, the new grids are compared to the RP grid, and new data are computed for those weapons.

(8) Once the sheaf is adjusted, the FDC must open the sheaf. Using the deflection conversion table (DCT), the FDC opens the sheaf mathematically the distance required based on the mortar system used.

(9) The FDC now has the mortars refer their sights to the HIT deflection of the basepiece and realign the aiming posts.

9-4. FINAL PROTECTIVE FIRES

FPF are the highest priority mission that the mortar section / platoon fires. They are prearranged barriers of fires designed to protect friendly troops and to stop the enemy advance. They are integrated with the other weapons of the unit being supported and cover dead space and likely avenues of approach. FPF involve an entire mortar section / platoon

that fires so that the rounds are delivered on line. Normally, FPF are placed not more than 200 meters in front of friendly forces. However, the exact location of FPF depends on the tactical situation and the size of the FPF depends on the weapon type (Table 9-1).

SIZE (MILLIMETERS)	TYPE OF MORTAR	NUMBER OF MORTARS	APPROXIMATE WIDTH (METERS)	APPROXIMATE DEPTH (METERS)
120	M285	6	480	60
	M285	3	300	60
107	M30	6	320	40
		4	240	40
		3	200	40
81	M29	4	210	40
		3	175	40
81	M252	4	240	50
		3	200	50
60	M224	2	120	30

Table 9-1. Size of FPF and mortar type.

a. **Precautions.** The target location given in the call for fire is not the location of the FPF. The FO must add a 200-meter to 400-meter safety factor to the location of the FPF. The FDC never adds a safety factor. Since the FPF is adjusted to within 200 meters of friendly forces —

- The adjustment is danger close.
- The creeping method of adjustment is used.

b. **Procedures.** FPF adjustments can be fired using one of two methods, which are discussed in order of preference.

(1) *Adjustment Mortar by Mortar.* In the call for fire, the FO may give a section left (SL) or section right (SR) to determine the danger-close mortar. The danger mortar is the one impacting closest to friendly forces. The operator uses the FPF switch to enter, compute, adjust, review, and delete data for FPF. Three FPF may be stored and identified as line 1, 2, or 3. The stored data include the line number and fire commands for each weapon assigned (up to six) for that FPF line. An FPF line is located by a set of grid coordinates, marking the left or right limit. Then the altitude, width, and attitude are entered. When the corrections for each adjusting weapon have been entered and recomputed, they are stored. The corrections made to each mortar are automatically applied to the next weapon to be adjusted. Further corrections are not applied after advancing to the next weapon.

NOTE: After entering the FPF line, a safety fan maybe entered. All adjusting rounds should be set for fuze delay to further reduce the danger to friendly forces.

(a) Press the FPF switch and select **INIT.** Enter the line number (1, 2, or 3) and the section/weapon number. The displays shows: **LINE: 1 WPN:A1.**

(b) Press the SEQ switch. (Shell/fuze combination [default entry by MBC is **HE PD]** is normally not changed.)

(c) Press the SEQ switch and select the GT or enter the FO direction to target.

(d) Press the SEQ switch and enter the FPF right or left limit.

NOTE: If the right limit grid is entered for the FPF, adjust the right flank mortar first. If the left limit grid is entered for the FPF, adjust the left flank mortar first.

(e) Press the SEQ switch and enter the FPF altitude (if known).

(f) Press the SEQ switch and enter the left or right limit and FPF line width in meters. The display shows: **L R WID: L350.** The coordinate point becomes the left or right limit.

NOTE The direction of the FPF should be *left* if the right flank mortar (No. 1) is adjusting, and *right* if the left flank mortar (No. 3 or No. 4) if the left flank mortar is adjusting.

(g) Press the SEQ switch and enter the attitude of the FPF. This is a MANDATORY ENTRY.

(h) Press the SEQ switch and follow the instruction by the MBC. Press the COMPUTE switch to receive firing data.

(i) Sequence through the firing data (record needed data) until the **ADJ *** is displayed.

NOTE: If the **ADJ *** selection is passed, the display shows: **READY.** To continue adjusting the FPF, press the FPF mission switch and select **ADJ.** Proceed to paragraph (k).

(j) Select the blue display key beneath the asterisk (*).

(k) Enter the weapon number to adjust. If another weapon is to be adjusted, select **NXT.**

NOTE: The MBC considers the previous weapon adjusted, and it saves the firing commands in the FPF data file. When the last weapon is adjusted, select **NXT** in this display to end the mission. The display shows: **FPF ADJUSTED.**

(l) Press the SEQ switch. The display shows the direction to the target.

(m) Press the SEQ switch and enter the deviation correction (if any) from the FO.

(n) Press the SEQ switch and enter the range correction, if any.

(o) Press the SEQ switch. (The operator may change the height corrections from the default given in meters to feet.)

(p) Press the SEQ switch and enter the vertical correction (if any) from the FO.

(q) Press the SEQ switch. The display shows: **PRESS COMPUTE.** Press the COMPUTE switch to receive the firing data.

(r) Repeat procedures in paragraphs (i) through (q) until each weapon in the section has been adjusted. Repeat procedures in paragraphs (i) through (k) to end the mission.

(2) *Adjustment of Danger-Close Mortar Only.* In the call for fire, the FDC is given the attitude of the target area. From this attitude, the FDC can determine the danger-close mortar.

(a) The operator uses the FPF menu to fire and adjust as with the mortar-by-mortar method.

(b) Once the danger-close mortar is adjusted, the other mortars involved in the FPF will have firing data already computed.

(c) The difference between this method and the mortar-by-mortar adjustment is that each mortar will not actually fire on the FPF. Rather, the firing data for the nonfiring mortars are calculated based on the firing data for the danger-close mortar and the attitude of the target area.

c. **Data Review.** The FPF data for the section may be reviewed at any time using the FPF menu switch.

(1) Press the FPF switch and select **DATA.**

(2) Press the SEQ switch and enter the line number of the FPF to be displayed.

(3) Sequence through the display to review each mortar's data.

d. **Safety Data.** After an FPF has been initiated, the operator may review the safety data at any time.

(1) Press the FPF mission switch. The sequence indicator should blink, indicating that another choice is available (for multiple entry).

(2) Press the SEQ switch. The fifth choice, **SFTY,** is displayed. Select the blue display key beneath the flashing cursor to select safety (SFTY).

(3) Press the SEQ switch, and enter the line number of the FPF safety data to be viewed.

(4) Press the SEQ switch. The display prompts the operator to press the SEQ switch to view the burst-point grid coordinate.

(5) Press the SEQ switch. The casting and northing are displayed.

(6) Press the SEQ switch. The maximum ordinate of the last round to its burst-point is displayed.

(7) Press the SEQ switch. The time of flight is displayed.

(8) Press the SEQ switch. **READY** is displayed.

9-5. IMMEDIATE SMOKE OR IMMEDIATE SUPPRESSION

When engaging a planned target or target of opportunity that has taken friendly forces under fire, the FO announces (in the call for fire) either 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.

a. The FO uses the immediate-smoke mission to obscure the enemy's vision for

short periods. This aids maneuver elements in breaking contact or evading enemy direct fire; it is not intended as a screening mission. The total area that can be covered is 150 meters or less.

b. The FO uses the immediate-suppression mission to indicate that his unit is receiving enemy fire. His request should be processed at once. These fires, planned and delivered to suppress the enemy, hamper enemy operation and limit his ability (in the target area) to perform his mission.

c. The procedures for firing an immediate-suppression or immediate-smoke mission are the same except for the ammunition used. HEQ is used for the immediate-suppression mission and WP or RP is used in the immediate-smoke mission.

(1) The FDC receives a call for fire from the FO. In the warning order, the word IMMEDIATE will precede either suppression or smoke.

(2) The target location is normally by grid coordinate. The FDC processes his call for fire as a normal grid mission using the GRID menu with one exception. After the WPN/AMMO menu, the FDC will immediately use the TFC switch and change the method of control (CON) from **AF** to **FFE.**

NOTE: The TFC menu maybe deleted from this procedure if the mortars to fire are in a straight line with the rest of the section and if they are all the same distance apart (a perfect parallel position).

(3) The entire section fires one or two rounds within 90 seconds of the FDC's receipt of the target location.

(4) If any adjustments are needed, the entire section conducts them, firing the same number of rounds each time as in the previous command.

9-6. QUICK SMOKE

The techniques used by the mortar unit in attacking targets with smoke are influenced by factors independent of the mission. These factors include weather, terrain, dispersion, adjustment, distribution of fire, and ammunition availability. Clearance to fire, ammunition requirements, and general considerations discussed in this chapter apply to all mortars.

a. The mortar unit establishes screening smoke between the enemy and friendly units or installations. It uses smoke to hamper observation, to reduce observed fire, to hamper and confuse hostile operations, and to deceive the enemy as to friendly operations.

b. The main consideration in planning for a smoke screen is that it must accomplish its purpose without interfering with the activities of friendly forces. This requires much planning. Authority to fire smoke missions rests with the highest commander whose troops will be affected. The unit commander must ensure that flank unit commanders who may be affected have been informed.

c. Normally, the section/platoon is given a smoke mission through command channels. The methods used to accomplish the mission are not usually prescribed but are developed by the section leader/chief computer and the FO who will conduct the

mission. The following factors help in deciding how to engage the target.

(1) *Ammunition.* The number of rounds required to establish and maintain a screen is based on the size of the target and the weather conditions affecting the dispersion of the smoke. The chief computer cannot accurately determine the weather conditions that will exist at the time the mission is fired. However, he does determine the amount of ammunition for the most unfavorable conditions that might be expected at that time and place.

(a) A quick-smoke mission is usually conducted in three phases. The first phase is the *adjustment phase.* The computer adjusts the upwind flank mortar to the upwind edge of the target area using HE ammunition. At the end of this phase, one round of WP is fired to see if it hits the desired location. The second phase is the *establishment phase.* The computer establishes the screen by firing twice the number of rounds required to maintain the screen for one minute, but not less than 12 rounds. These rounds are fired as quickly as possible (FFE phase for any other mission). The third phase is the *maintenance phase.* The computer maintains the screen by firing the determined number of rounds per minute (RPM), times the length of time the screen is to be in place.

(b) The computer uses the smoke chart (Figure 9-2) to compute the number of rounds needed to maintain a screen for one minute. This chart is prepared for various weather conditions and a screen 500 meters wide. Other widths are computed by scaling the values proportionally. To extract the proper value from the chart, the FDC must know wind speed (confirmed by the FO before firing), wind direction (confirmed by the FO before firing), relative humidity (obtained from the battalion S3 or by estimation), and temperature gradient (obtained from the battalion S3 or by estimation).

(c) The temperature gradient determines which line to use. It is a measure of how air temperature changes with altitude. Neutral is the most common condition. It occurs when there is no appreciable temperature change with an increase in altitude (midday). Lapse conditions exist when the temperature changes with increase in altitude (evening). Inversion conditions exist when the temperature rises with an increase in altitude (early morning).

(d) The wind speed in knots determines which column to use. The box where the proper row and column intersect contains the number of RPM needed to maintain a screen 500 meters wide for one minute with a flank wind.

EXAMPLE

For conditions of 60 percent humidity, a neutral temperature gradient, and a 4-knot wind, it would take 6 RPM to maintain a 500-meter screen with a flank wind. If the screen is to be only 400 meters wide, use the following procedure:

400 divided by 500 (or 400/500) = 4/5 = 0.8

0.8 x 12 (number of rounds x 2-minute duration for establishment phase)= 9.6
The result (9.6 in this case) is always rounded up (no less than 12 rounds will be

fired in the establishment phase). Each mortar fires (4.2-inch mortar platoon) 2 rounds each, (4.2-inch mortar section) 4 rounds each, (81-mm mortar platoon) 3 rounds each, and (81-mm mortar section) 6 rounds each.

(e) The total number of smoke rounds needed for the mission is computed as follows:

RELATIVE HUMIDITY (PERCENT)	TEMPERATURE GRADIENT	WIND SPEED, KNOTS 2	4	9	13	18	22	26
30	LAPSE	13	13	11	11	13		
	NEUTRAL	9	9	7	7	9	9	11
	INVERSION	6	6	4				
60	LAPSE	9	9	7	9	9		
	NEUTRAL	6	6	4	4	6	7	9
	INVERSION	3	3	3				
90	LAPSE	7	7	6	6	7		
	NEUTRAL	4	4	3	3	4	6	6
	INVERSION	3	3	3				

- FOR QUARTERING WINDS—MULTIPLY TABLE VALUES BY 2.
- FOR TAILWINDS—MULTIPLY TABLE VALUES BY 2.
- FOR HEADWINDS—MULTIPLY TABLE VALUES BY 2.5.
- FOR SHELL IMPACT ON LAND—USE TABLE QUANTITIES SHOWN.
- FOR WATER IMPACTS—MULITPLY TABLE VALUES BY 1.4.
- FOR CURTAINS GREATER OR LESS THAN 500 METERS IN WIDTH—SCALE THE TABLE VALUES UP OR DOWN PROPORTIONALLY.
- FOR ESTABLISHING A SMOKE CURTAIN—EMPLOY VOLLEY FIRE USING TWICE THE TABLE VALUE (BUT NOT LESS THAN 10 ROUNDS).

A. SMOKE CURTAIN. NUMBER OF WP ROUNDS PER MINUTE TO MAINTAIN A SMOKE CURTAIN ON A 500-METER FRONT IN FLANK WINDS (AS SHOWN IN THE CHART ABOVE).

B. OBSCURING SMOKE EFFECT. THE NUMBER OF ROUNDS PER MINUTE REQUIRED TO MAINTAIN AN OBSCURING SMOKE EFFECT ON A 100-METER FRONT (OBTAINED BY DOUBLING THE VALUES SHOWN IN THE CHART ABOVE).

Figure 9-2. Smoke chart.

Adjustment phase = 1 round (all missions)

Establishment phase = 2 x number of rounds to maintain for 1 minute; at least 12

Maintenance phase = Number of rounds to maintain for 1 minute x number of minutes

Total = (a) + (b) + (c)

NOTE: The time used during the establishment phase is not to be considered as

any part of the maintenance phase time of the mission.

(2) *Mortars required.* Under favorable conditions the 4.2-inch mortar platoon can screen an area about 800 meters wide and the 8 l-mm mortar platoon about 500 meters. The 60-mm mortar section does not fire a screening mission. A limitation, however, is their maximum and sustained rates of fire. For the entire platoon, these rates of fire are multiplied by the number of mortars firing. If the required number of RPM exceeds the rate of fire, the platoon must request supporting fire from flank units or artillery.

(3) *Effects desired.* If smoke is to be placed directly on the target for blinding or casualty-producing effects, the FO adjusts the center of impact of the rounds onto the center of the target. The number of RPM to produce this effect is twice that for a normal quick-smoke mission.

(4) *Ordering of ammunition.* When ordering ammunition for a mission, the FDC estimates what weather could exist, remembering that it is better to have too much ammunition than too little.

(5) *Briefing of the observer.* Due to the many clearances required to fire the mission, the FDC chief / section leader normally has ample time to brief the FO on the quick-smoke screen. This briefing should include a map reconnaissance of the area to be screened so that the FO will be able to identify it on the ground and to select an OP from which the screen can be observed.

(6) *Call for fire.* At the appointed time, usually 10 to 20 minutes before the mission is to be fired, the FO sends the call for fire. This allows the FDC to process the data in advance and to prepare the needed ammunition. The FO should have checked the wind so that the call for fire will specify the wind direction.

(7) *Exact ammunition requirement.* About the time the call for fire is received, the chief computer / section leader makes a final check on the weather and directs the computation of the exact ammunition requirements for the mission. The section / platoon has at least this amount of ammunition broken down and ready to fire.

(8) *Mission computation.* The chief computer / section leader issues the FDC order (Figure 9-3). The method of FFE is the number of rounds computed to establish the screen, divided by the number of mortars to FFE. The time of opening fire is at the chief computer / section leader's command. Once the first round of smoke is fired, all commands should be such that they can be applied with a minimum of reaction time.

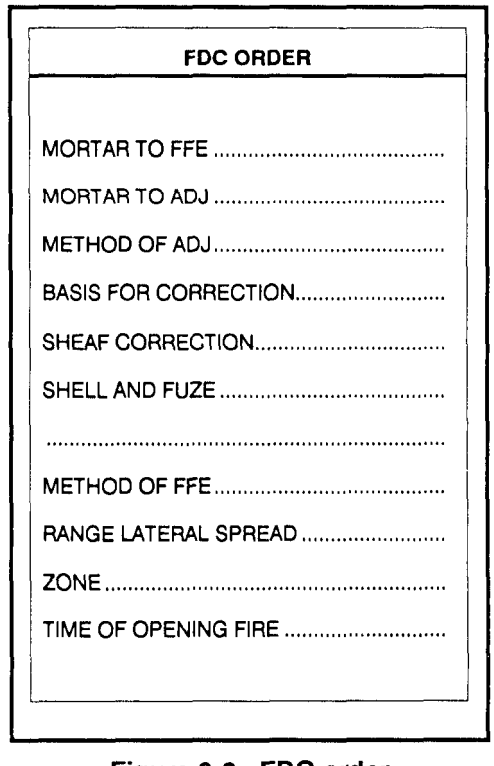

Figure 9-3. FDC order

(a) The MBC operator, upon receipt of the

FDC order, processes the fire commands as he would a normal grid mission until the final correction.

(b) HE is adjusted to within 100 meters of the adjusting point. The FO splits the 100-meter bracket and calls for one round of WP (in adjustment) to see if the WP will strike the adjusting point.

- The MBC operator uses the WPN / AMMO switch / menu to change the **SHELL/FUZE** combination.
- After the shell and fuze correction, the MBC operator computes the final adjustment and relays this information to the adjusting mortar.

(c) The FO makes corrections for the WP. When the FO requests FFE, the FDC tells the mortars how many rounds to fire (employing volley fire). The maintenance phase begins almost immediately after the establishment phase. If the FO notices the screen thinning in one place (usually the upwind end), the rate of fire maybe doubled for one or more mortars.

(9) *Four phases to screening mission.* When a standard sheaf will not cover the area, a screening mission is conducted in four phases.

PHASE 1. Using HE ammunition, the FO adjusts the upwind flank mortar to the upwind edge of the area to be screened.

PHASE 2. At the end of the adjustment phase, one round of smoke is fired to see if it hits the adjustment point.

PHASE 3. The FO calls for the sheaf to be opened (not to be confused with a normal open sheaf).

PHASE 4. The FDC presses the TFC switch and changes or selects the following information:

- Changes **SHEAF:PRL** to **SPECIAL**
- Selects **ADJ PT:FLANK**
- Enters the direction and size of the screen based on the adjusting (upwind) mortar. If number 1 is adjusting, selects **L** (left) and size of the area to be screened. If the number 3 (or 4) mortar is adjusting, selects **R** (right) and enters the size of the area to be screened.
- Enters the attitude of the target area.
- Changes **CON:AF** to **CON:FFE**
- Pushes compute and observes the firing data.

(10) *End of mission.* Control in ending the screening mission rests with the commander who ordered it established. Normally, screens are fired according to a time schedule; however, the commander may order the screen to be maintained beyond the scheduled termination time. In the absence of external control, the FDC controls the timing, ordering the section / platoon to cease fire. The squad leaders give the FDC a count of rounds expended (or remaining) at the end of the mission.

9-7. SPECIAL KEYS AND FUNCTIONS

This paragraph describes some of the functions of the following MBC special keys: MSG (message), REVIEW, SURV(survey), MSN(mission), XMIT(transmit), and SAFETY DATA.

a. **MSG (message) Menu.** A maximum of three incoming digital messages can be stored. Incoming messages are of two types: fire request and information only. When the message indicator is lit or the audio alarm sounds and the MSG switch is pressed, the first line of the first message received is displayed. When the message is a fire request, the MBC automatically assigns a mission and target number, unless there are already three active missions. Therefore, the MBC displays: **NO AVAIL MSN** and discards the message. Some of the abbreviations and their meanings are given as follows:

FR GRID, (SHIFT), (POLAR), or **(LASER).** Fire request using grid coordinates, shift from a known point, polar corrections, or laser data.

OBS LOC. FO location data.

SUBQ ADJ. Subsequent adjustment to a fire request.

SA COORDS. Subsequent adjustment using coordinates.

PREC ADJ. Precision adjustment.

SA LASER. Subsequent adjustment to a laser fire request.

EOM & SURV. End of mission and surveillance data.

FPF. Request for FPF.

QF KNPT or **QF TGT.** Quick fire request on a known point or known target.

ASKNPT. FO request to assign a known point number.

FO CMD. FO command message.

HB/MPI. High burst/mean point of impact.

FL TRACE. Front-line trace data.

RDR REG. Radar registration data.

FREE TEXT. Free text form messages.

b. **REVIEW Switch.** This switch returns the display to the first line of a message or to the beginning of the last main menu selected.

c. **SURV (Survey) Switch.** This switch is used to solve one of three survey problems:

- Resection (RES).
- Intersection (INT).
- Traverse (TRV).

(1) These functions are used to determine the coordinates and altitude of an unknown point using measurements from known point(s).

(2) These known points must be entered in the MBC under the KNPT/TGT menu

before using any of the SURV functions.

(3) Computed coordinates may be stored as a basepiece, FO, known point, or target.

d. **MSN (Mission) Switch.** This switch is used to review current active fire mission data and to specify which mission is operational. The MBC can store data for three active fire missions and compute fire commands for each of these missions one at a time.

(1) A mission and target number are computer-assigned to a mission each time the GRID, SHIFT, or POLAR switch is pressed. Use these switches only when starting a fire mission to avoid misuse of the target numbers from the target numbering block.

(2) Access fire mission data (active missions only) through the MSN switch.

NOTE: Only an operational mission allows entry or change of data for that mission. A mission must be active before input can be applied from the WPN AMMO, REG, TFC, SFTY DATA, EOM, and REPLOT switches.

e. **XMIT (Transmit) Switch.** This switch, in either manual or digital mode, is used to display or send message to observer and command messages. Some of the information in this menu is as follows:

(1) **NR VOL.** The number of volleys for the FFE.

(2) **NR UNITS.** The number of units to be used in the FFE.

(3) **PR ERR**:**NOTGVN.** The probable error entered by the computer (MBC); this example reads NOT GIVEN.

(4) **ADJ SF.** Adjusting shell/fuze entered by the computer.

(5) **1ST SF**:**NOPR.** Shell/fuze for the first round for FFE entered by the computer. NOPR means no preference.

(6) **SUBS SF.** Shell/fuze combination for subsequent rounds for FFE entered by the computer.

(7) **MOE.** Method of engagement. Use the default value.

(8) **CON**: **WR AF.** Method of control (WR = when ready, and AF = adjust fire). Use default shown.

(9) **TOF.** Time of flight for the next (or last) round.

(10) **ANG T.** Angle T entered by the computer.

f. **SFTY (Safety) DATA Switch.** This switch is used to review safety factors in effect for a current fire mission. Some of the data and information found in the safety menu are as follows:

(1) **RN: AZ.** Range and azimuth from the guns to the target (GT).

(2) **BURST POINT SEQF.** The coordinate of impact for the round fired can be found by sequencing forward (SEQF).

(3) **BP.** Burst point casting and northing grid coordinates.

(4) **MAX ORD.** The maximum ordinate (top of the trajectory) of the round fired, measured in meters from sea level.

(5) **SAFETY DIAGRAM.** Entries can be made to store up to three safety fans (one for each section / platoon in WPN DATA menu) identified as A, B, or C.

(a) **LLAZ:** Left limit azimuth in mils.

(b) **RLAZ:** Right limit azimuth in mils.

(c) **MAX RN:** Maximum range in meters.

(d) **MIN RN:** Minimum range in meters.

(e) **MIN: _ MAX: _** Minimum and maximum charges (except 4.2-inch mortar).