

# **GRAPHIC TRAINING AID**

**GTA 07-01-005**

Supersedes GTA 9-6

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# **TARGET GRID METHOD OF FIRE CONTROL**

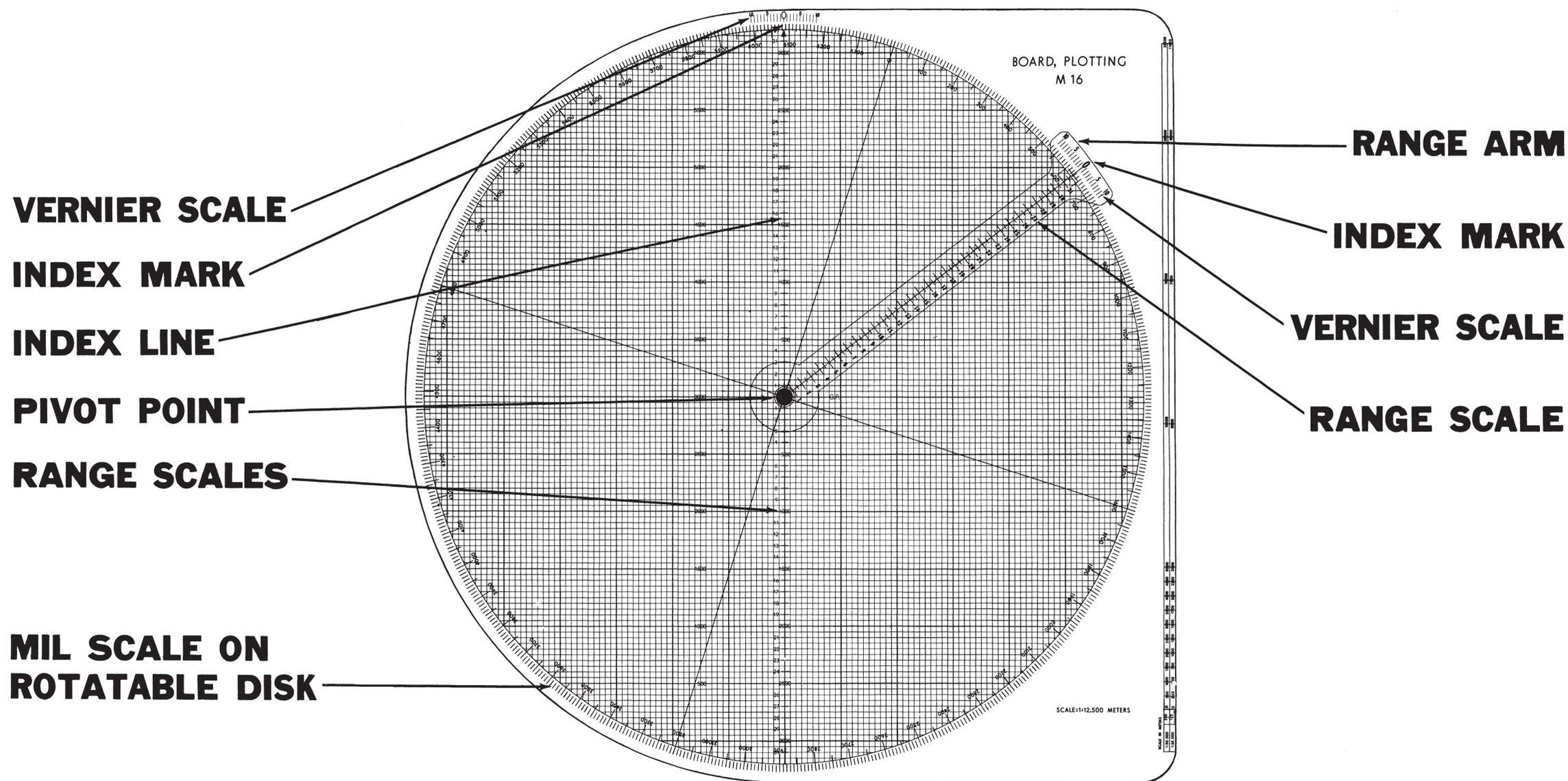
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**HEADQUARTERS, DEPARTMENT OF THE ARMY**

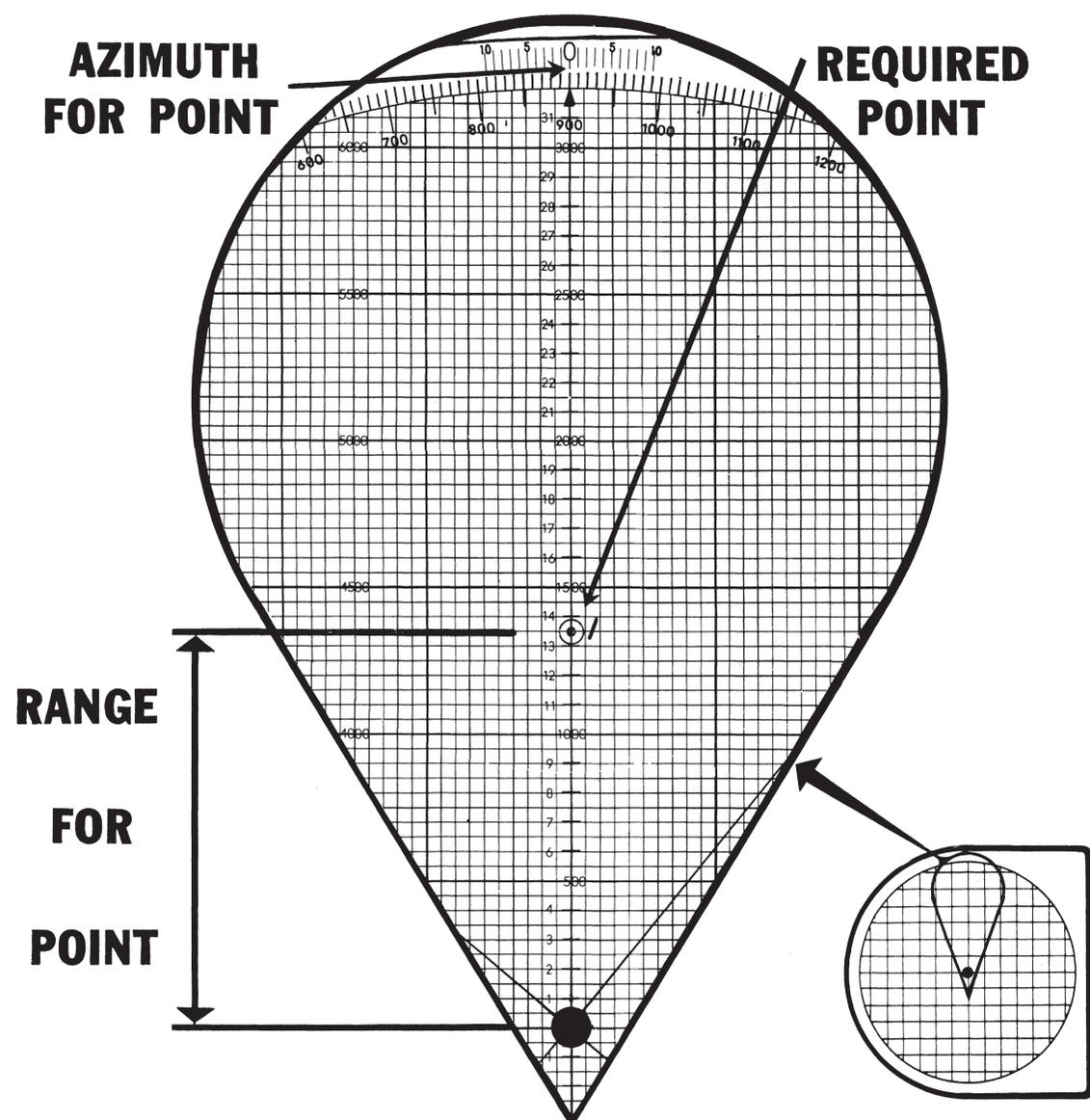
**JUNE 1965**

# TARGET - GRID CONTINUED WITH M - 16 PLOTTING BOARD



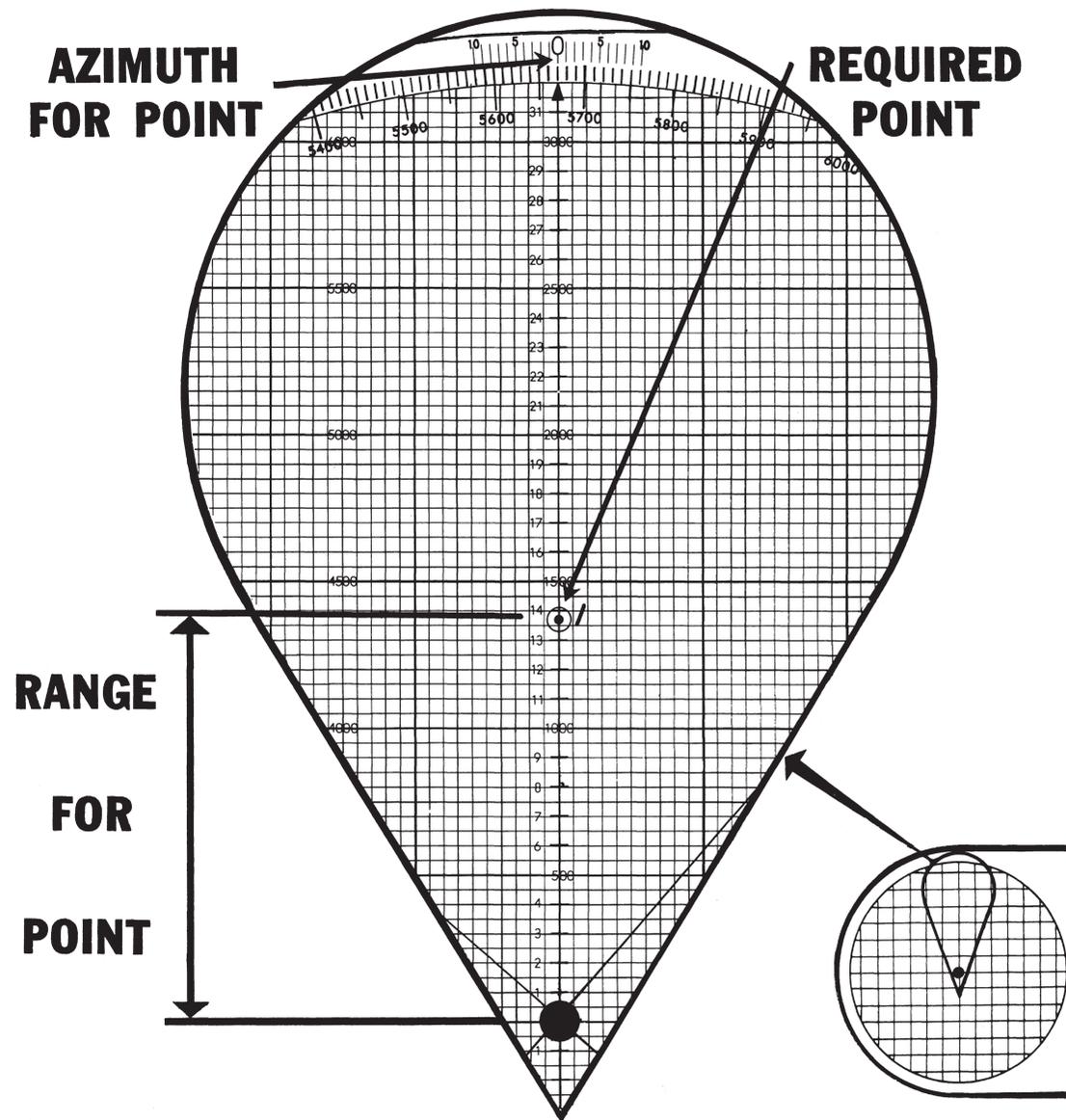
**THE M-16 PLOTTING BOARD IS A FIRING CHART WITH A ROTATING DISK AND RANGE ARM. THE COMPUTER DOES NOT NEED TO DRAW A GRAPHIC SKETCH SINCE THE BOARD REPRESENTS THIS SKETCH. THE FDC DOES NOT NEED TO KNOW THE OBSERVER'S LOCATION.**

# PLOTTING POINTS ON M-16 PLOTTING BOARD



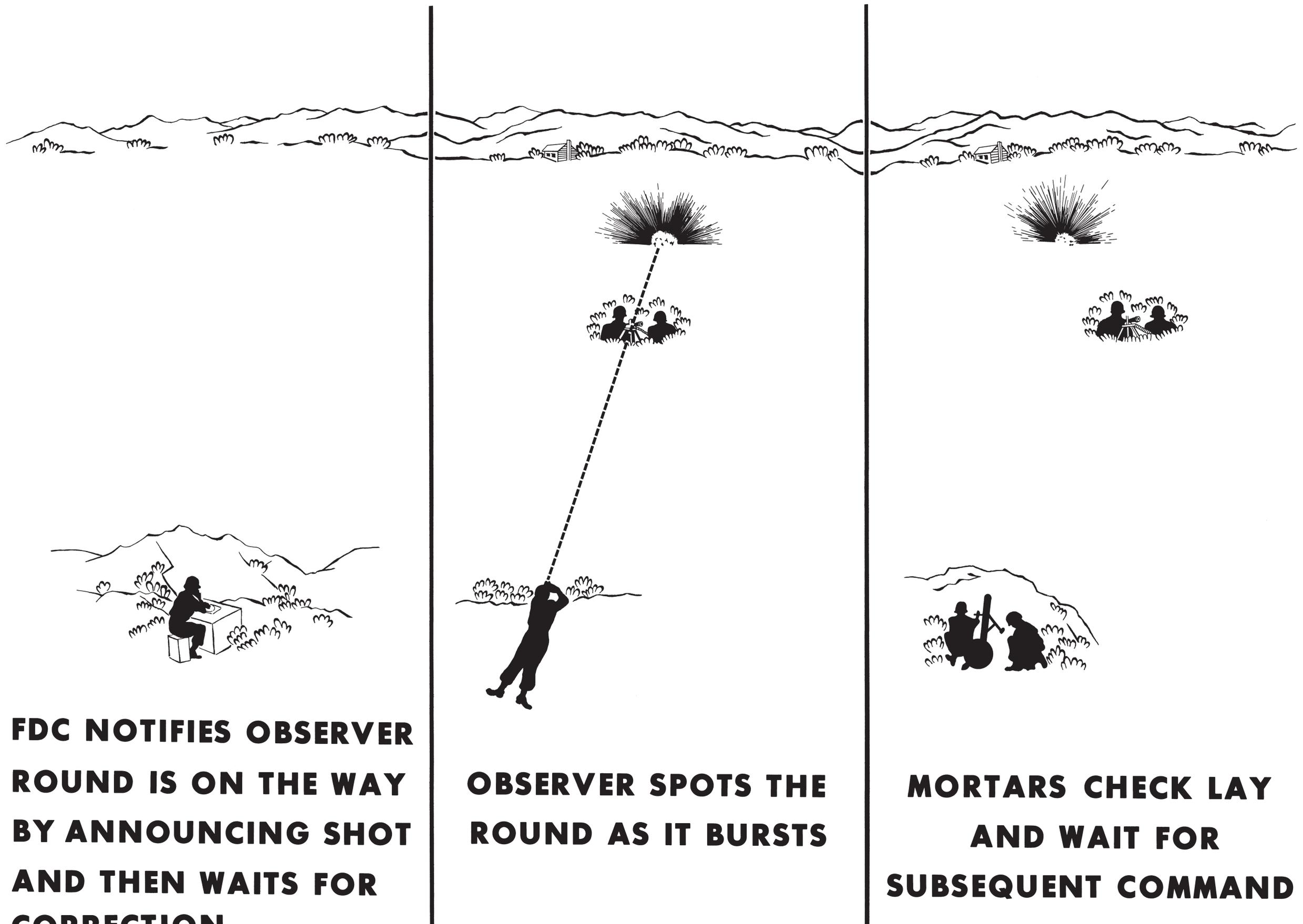
**TO PLOT A POINT ON AN AZIMUTH OF 900 MILS AND AT A RANGE OF 1350 METERS:**

- 1. TURN ROTATABLE DISK SO THE FIGURE 9 IS OPPOSITE INDEX MARK**
- 2. FROM PIVOT POINT MOVE UP INDEX LINE TO 1350 AND MAKE SMALL DOT**
- 3. CIRCLE DOT AND IDENTIFY IT (1)**

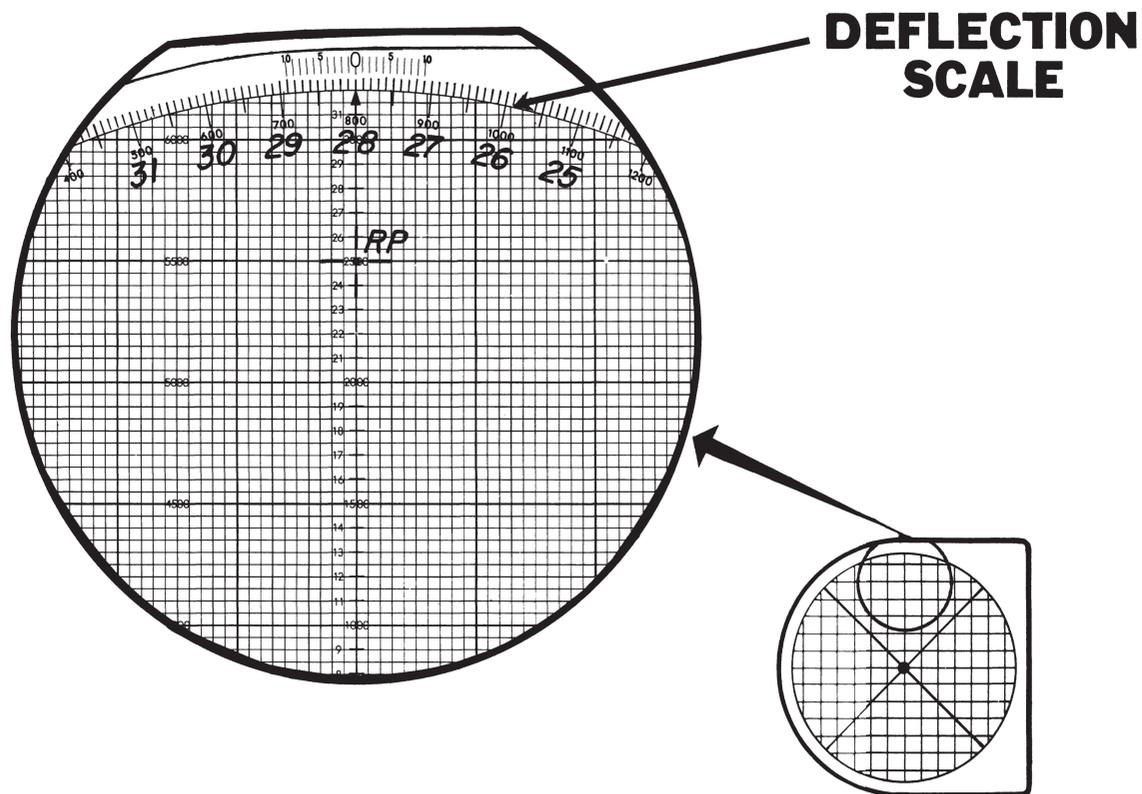


**TO PLOT A POINT ON AN AZIMUTH OF 5670 MILS AND AT A RANGE OF 1375 METERS:**

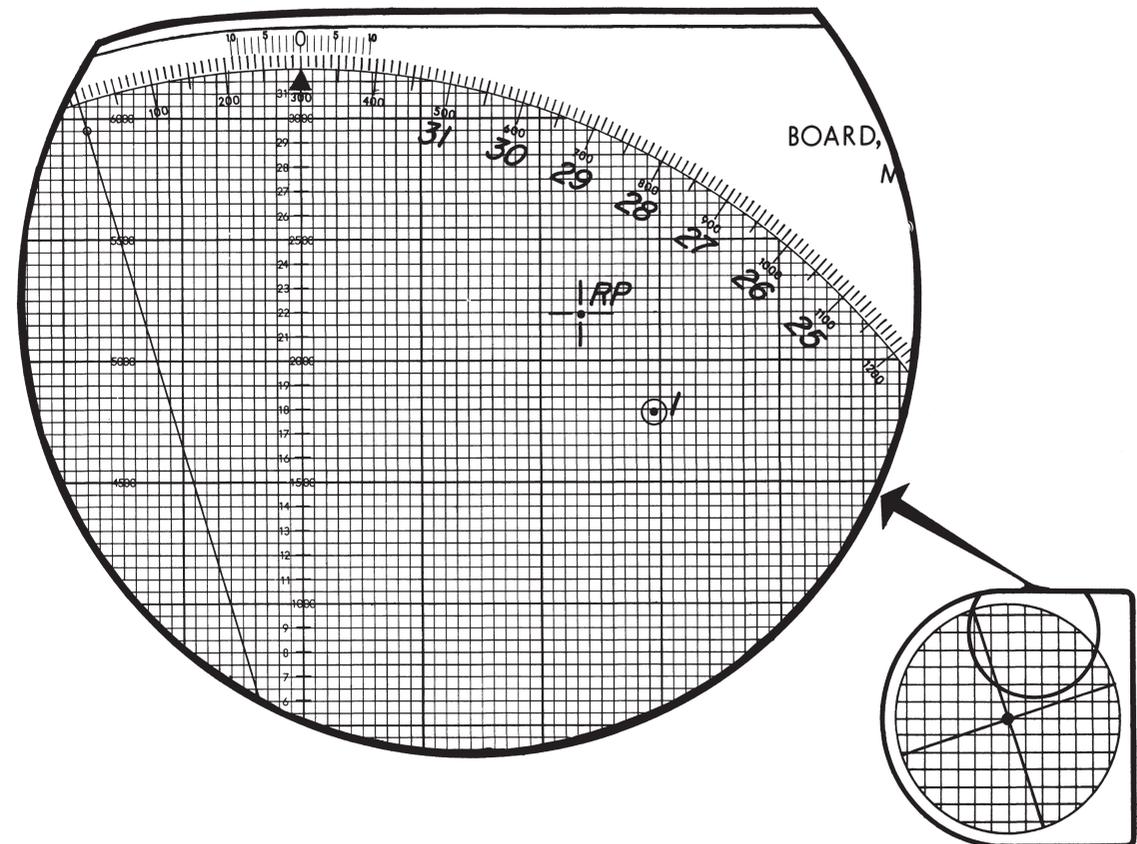
- 1. TURN ROTATABLE DISK UNTIL 5670 IS OPPOSITE INDEX MARK**
- 2. FROM PIVOT POINT MOVE UP INDEX LINE TO 1375 AND MAKE SMALL DOT**
- 3. CIRCLE DOT AND IDENTIFY IT (1)**



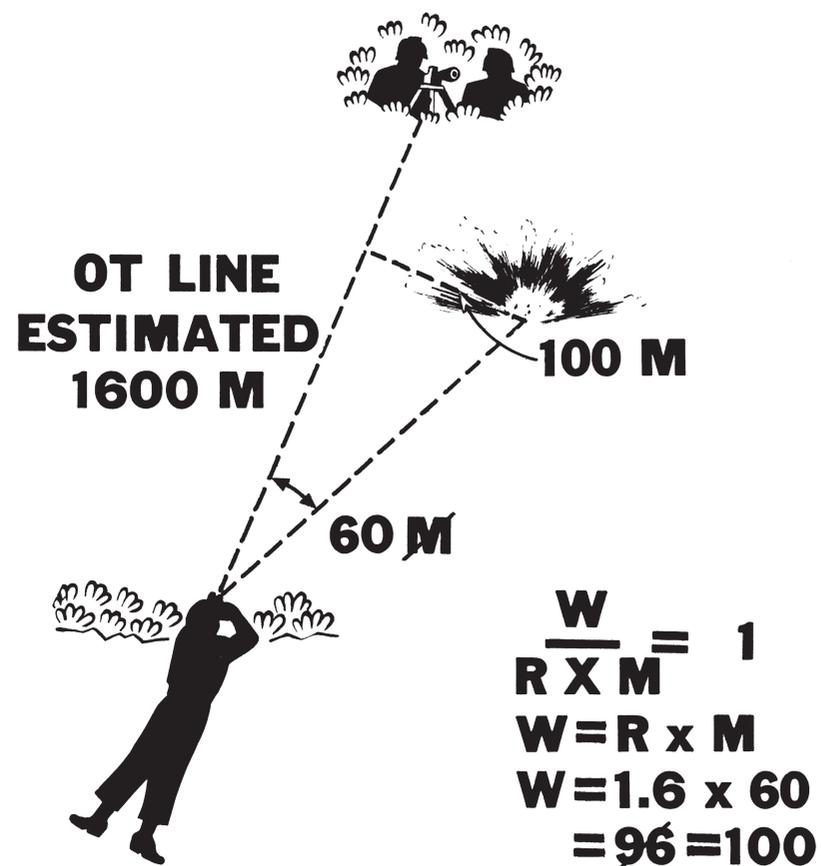
# PLOTTING POINTS ON OBSERVER'S AZIMUTH AND DETERMINING DATA FOR MORTARS



1. YOU HAVE A REGISTRATION POINT ON AZIMUTH 0800 MILS (MORTAR TARGET AZIMUTH) AND AT A RANGE OF 2500 METERS
2. TURN ROTATABLE DISK TO AZIMUTH 0800 AND FROM PIVOT POINT MOVE UP INDEX LINE TO 2500 METERS AND PLOT POINT
3. SUPERIMPOSE DEFLECTION SCALE ON PLOTTING BOARD. AIMING POSTS HAVE BEEN PLACED ON A REFERRED DEFLECTION OF 2800 M; THEREFORE, 28 IS PLACED DIRECTLY BELOW AZ 0800
4. OBSERVER-TARGET AZIMUTH IS 0300 MILS



5. NOW TURN ROTATABLE DISK UNTIL AZIMUTH 0300 IS OPPOSITE INDEX MARK
6. MAKE AN OBSERVER SYMBOL ( ) AT 0300 MILS
7. TO PLOT AN INITIAL ROUND WHICH IS FROM REGISTRATION POINT:
  - RIGHT 300
  - DROP 400
8. NUMBER POINT (1)



$$\frac{W}{R \times M} = 1$$

$$W = R \times M$$

$$W = 1.6 \times 60$$

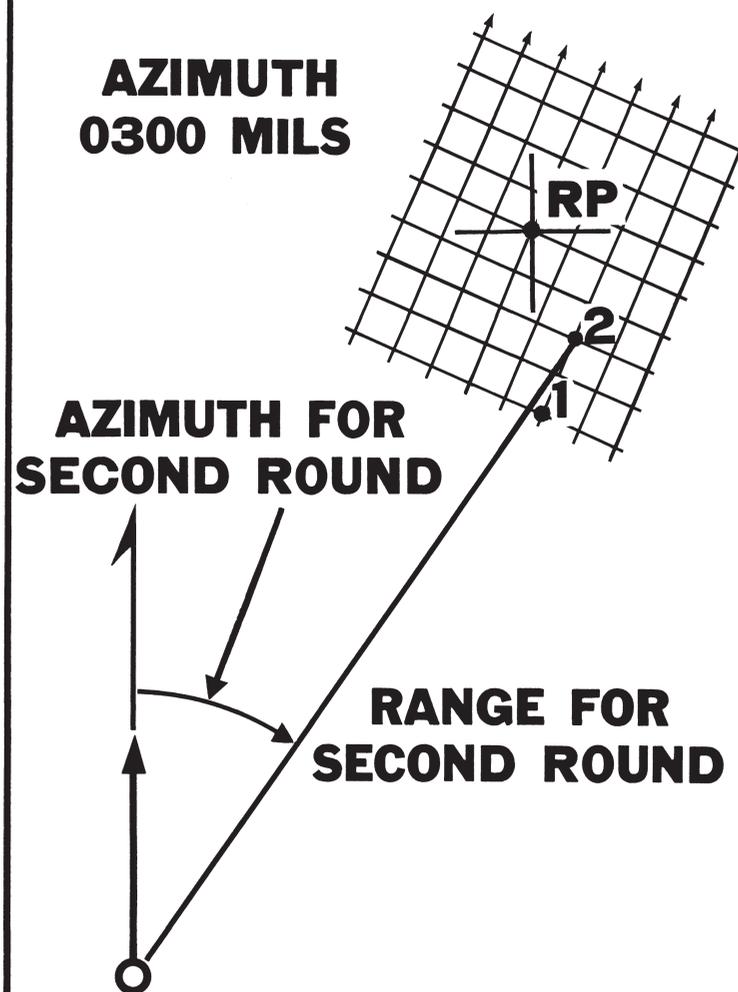
$$= 96 = 100$$

## OBSERVER'S

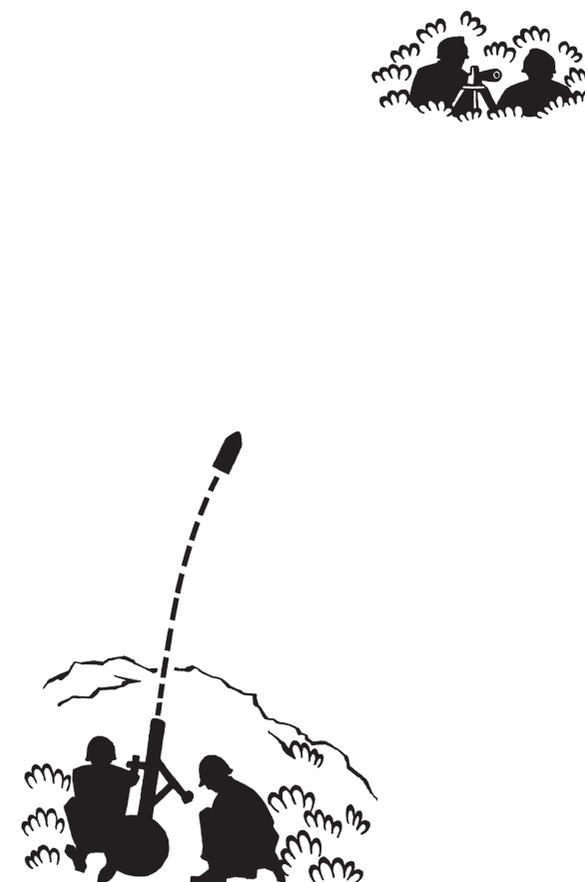
### SENSING CORRECTION

SHORT	LEFT 100
SIX-ZERO	ADD 200
RIGHT (MILS)	

**AZIMUTH  
0300 MILS**

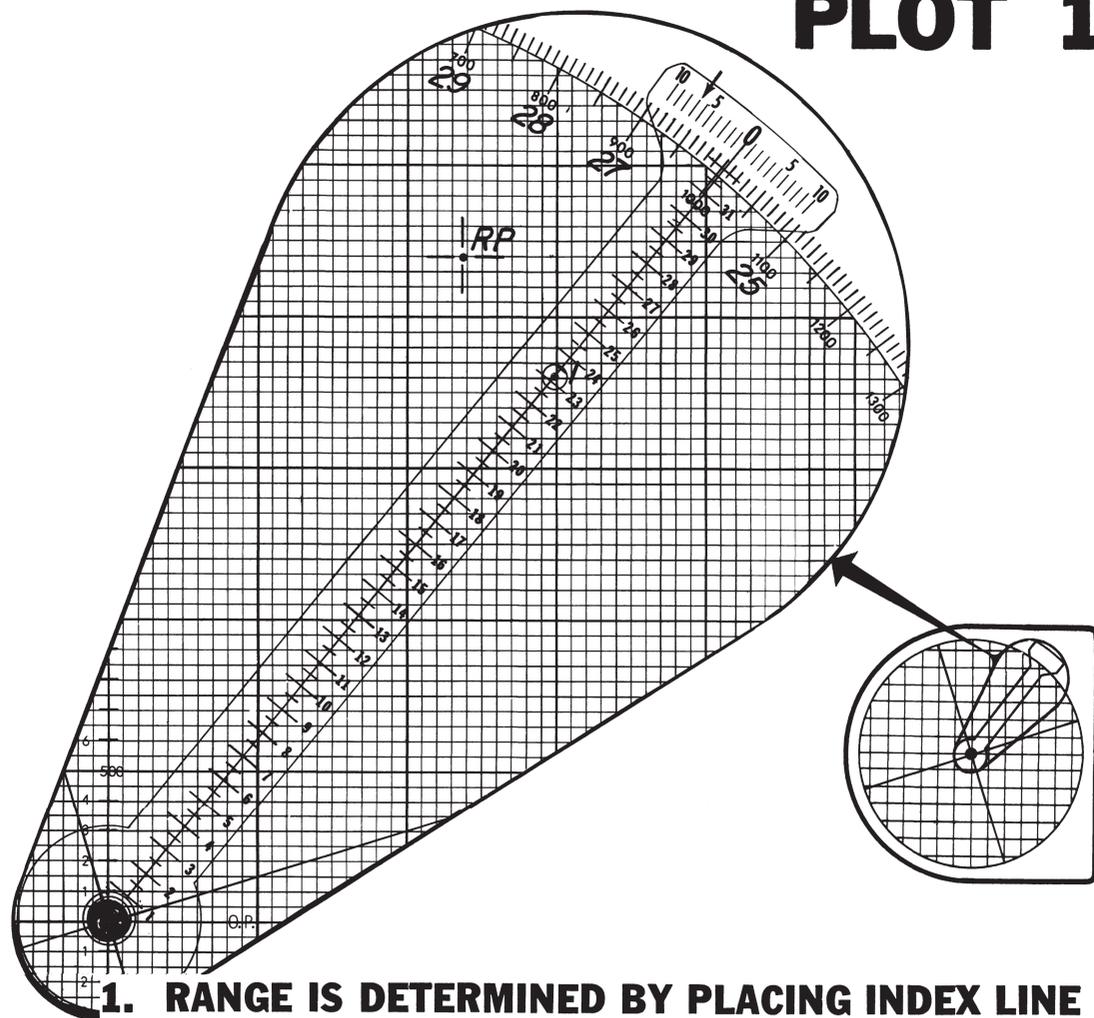


**COMPUTER DETERMINES  
AZIMUTH OF LINE AND MEASURES  
RANGE FOR SECOND  
ROUND. SENDS SUBSEQUENT  
COMMAND TO MORTARS**



**MORTARS RECEIVE FIRE  
COMMAND, FIRE, AND NOTIFY  
FDC ROUND ON THE WAY**

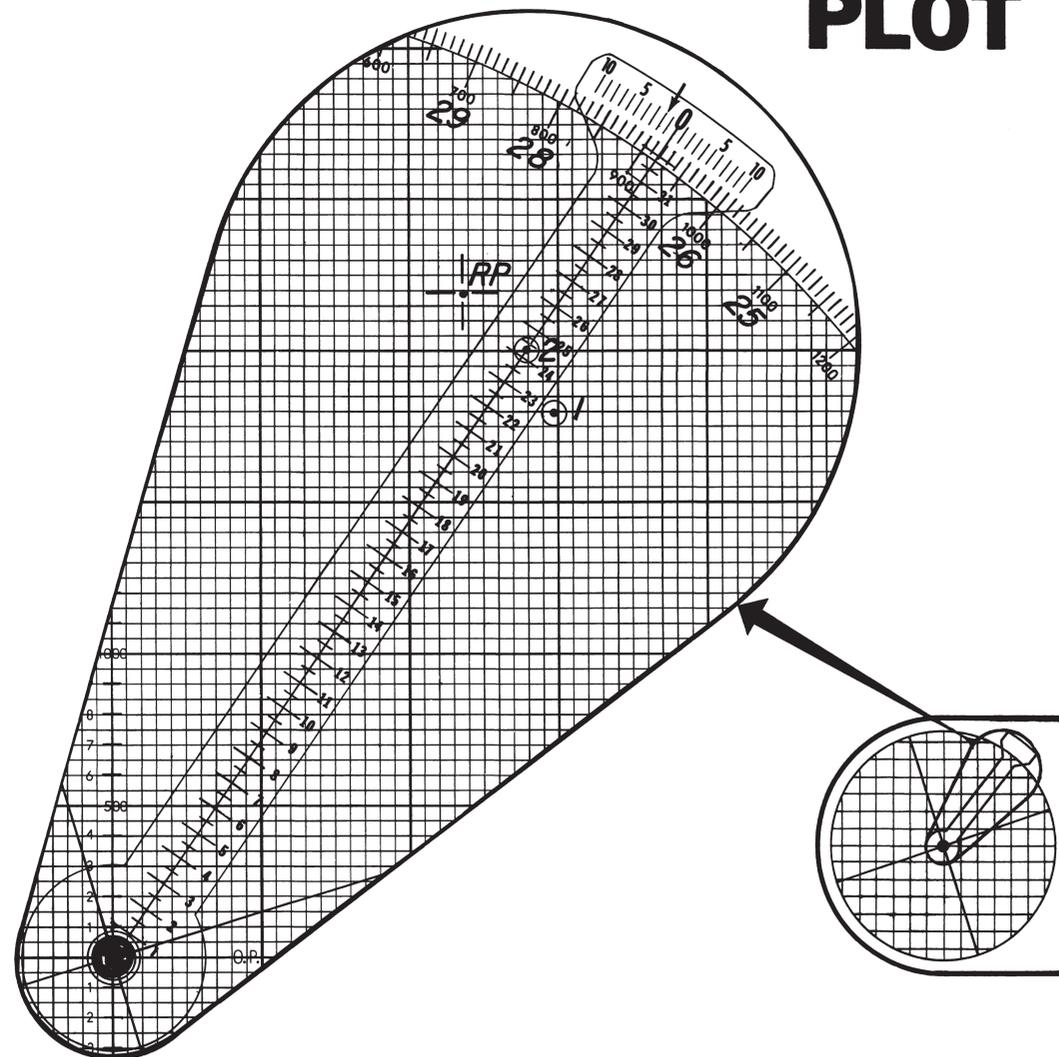
# DETERMINING DATA FOR PLOT 1



1. RANGE IS DETERMINED BY PLACING INDEX LINE OF RANGE ARM DIRECTLY OVER PLOT AND ESTIMATING TO THE NEAREST 25 METERS
2. DEFLECTION IS DETERMINED BY USING THE VERNIER SCALE ON THE RANGE ARM
3. DETERMINE NEAREST 10 M GRADUATION AT INDEX MARK ON RANGE ARM 2590
4. COUNT 1 M GRADUATION ON VERNIER SCALE UNTIL A VERNIER SCALE GRADUATION AND A DEFLECTION GRADUATION COINCIDE 2597

**DEFLECTION 2597**  
**ELEVATION 1146 (RANGE 2325)**

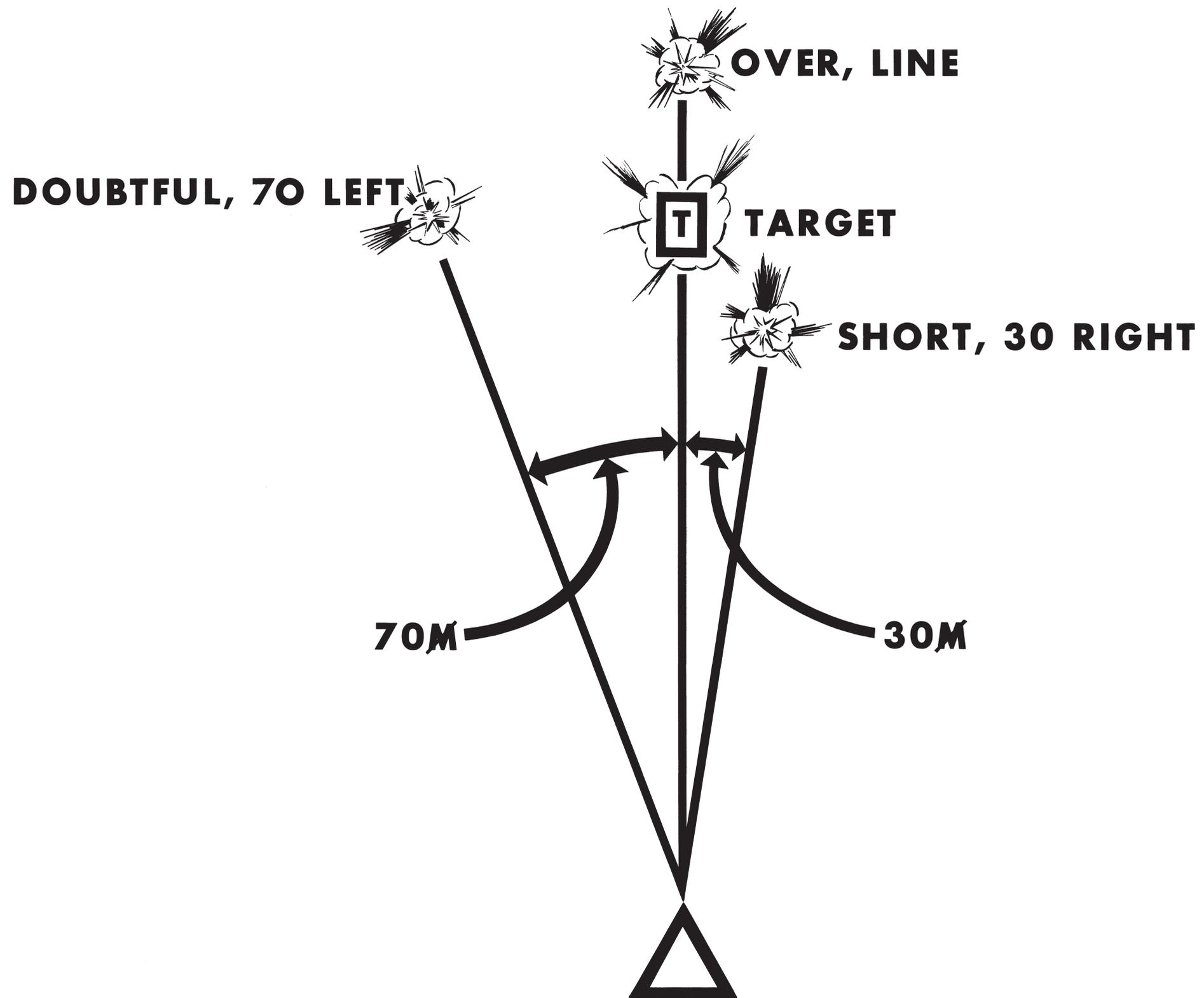
# DETERMINING DATA FOR PLOT 2



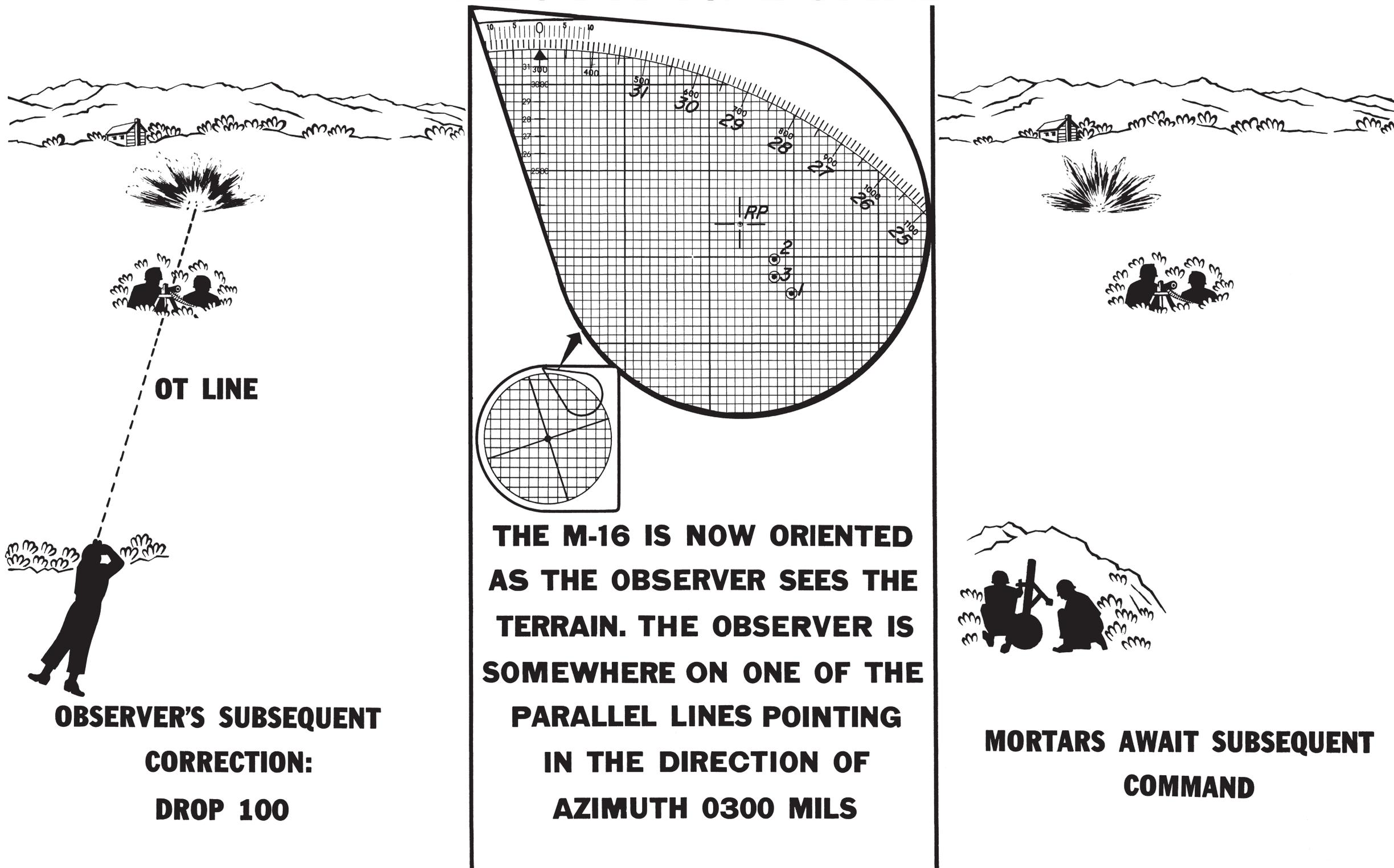
1. COMPUTER INSURES THAT DISK IS ORIENTED TO OT AZIMUTH
2. FROM PLOT NO. 1, COUNT LEFT 2 SQUARES AND UP 4 SQUARES
3. MAKE THE PLOT, CIRCLE AND LABEL IT NO. 2
4. USE THE RANGE ARM TO DETERMINE THE NEW DEFLECTION AND RANGE:

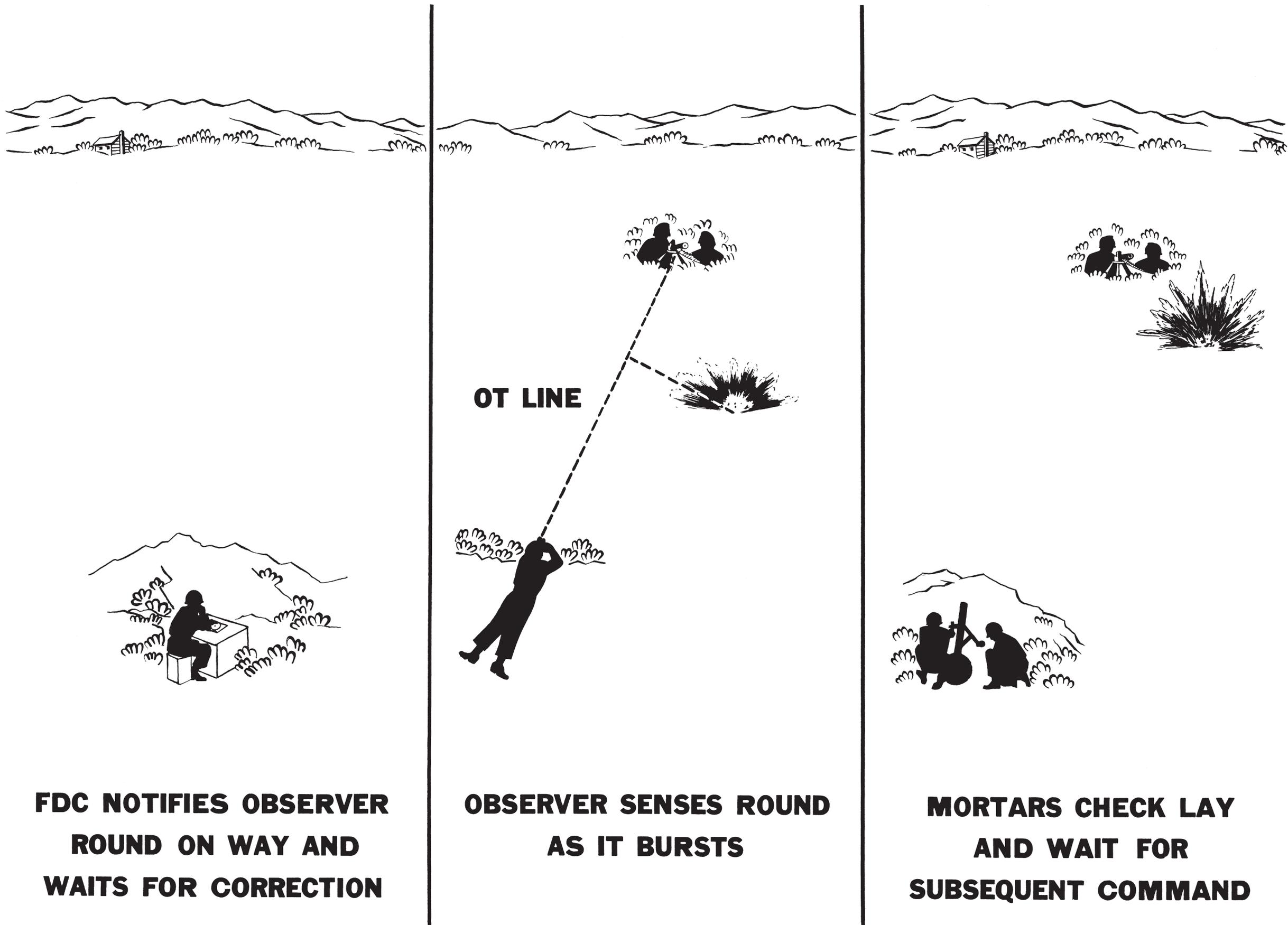
**DEFLECTION 2682**  
**ELEVATION 1117 (RANGE 2425)**

# SPOTTINGS IN RELATION TO O-T LINE



# MISSION CONTINUED USING M - 16 PLOTTING BOARD





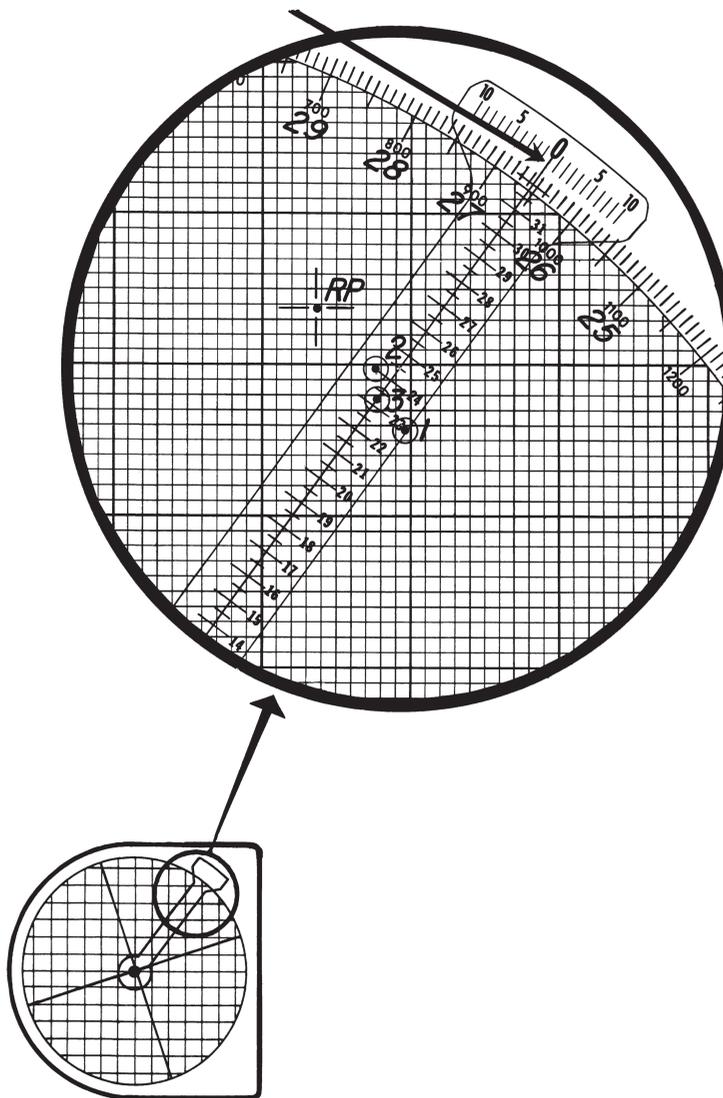


**OT LINE**



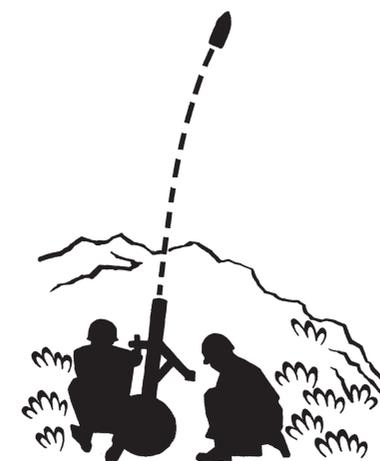
**OBSERVER WAITS FOR ROUND  
TO BE FIRED**

**DEFLECTION FOR  
THIRD ROUND**

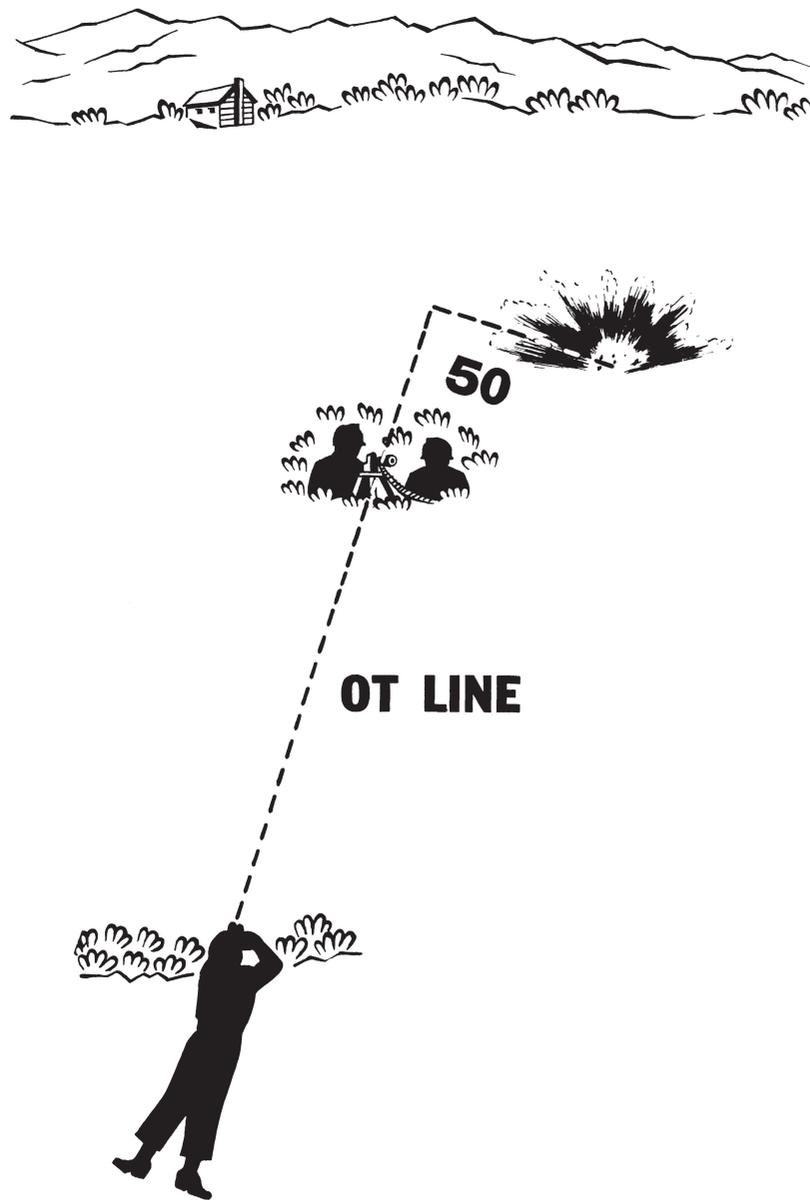


**FDC ORIENTS RANGE ARM  
OVER THE PLOT, DETERMINES  
THE DATA, AND SENDS  
SUBSEQUENT COMMAND:**

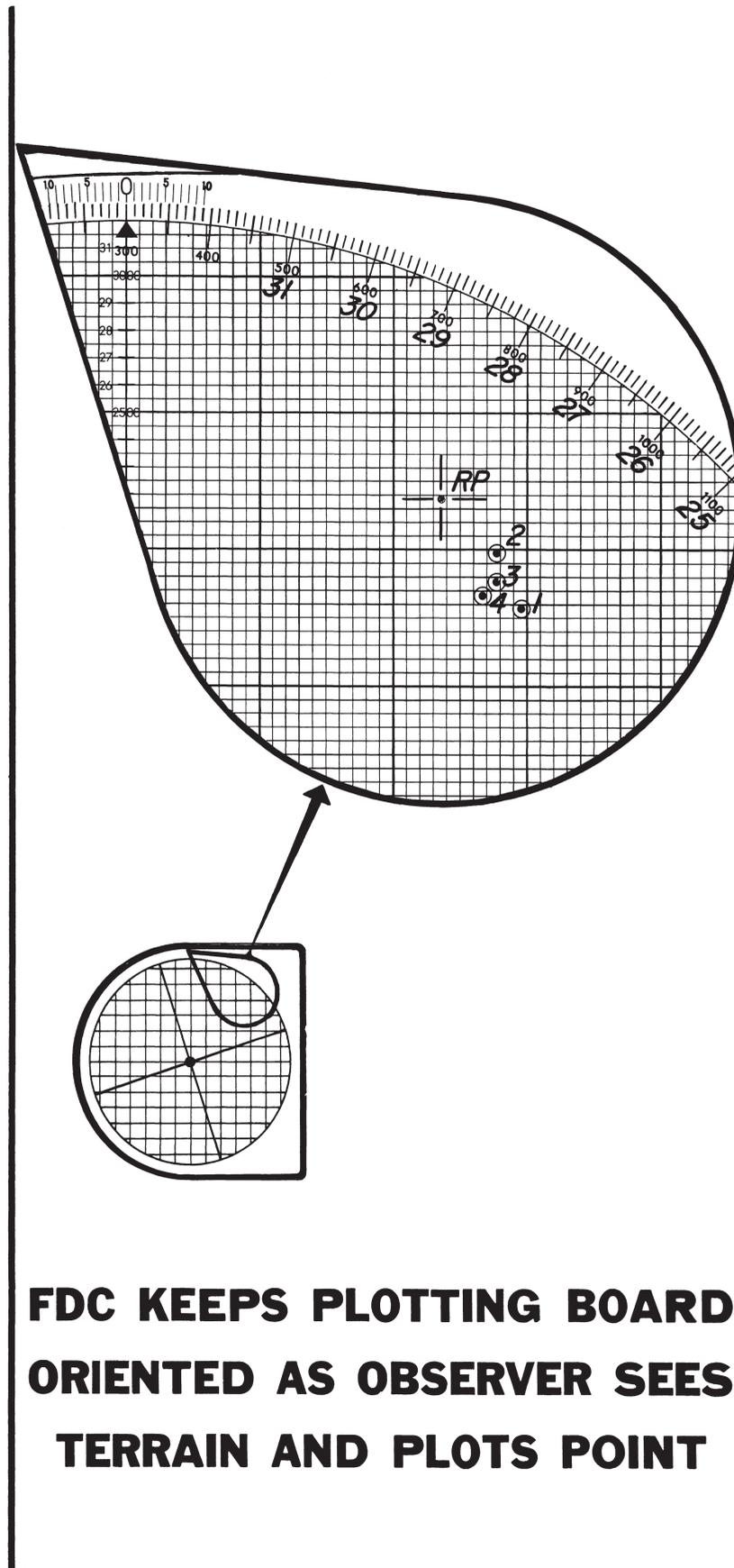
**DEFLECTION 2657  
ELEVATION 1146**



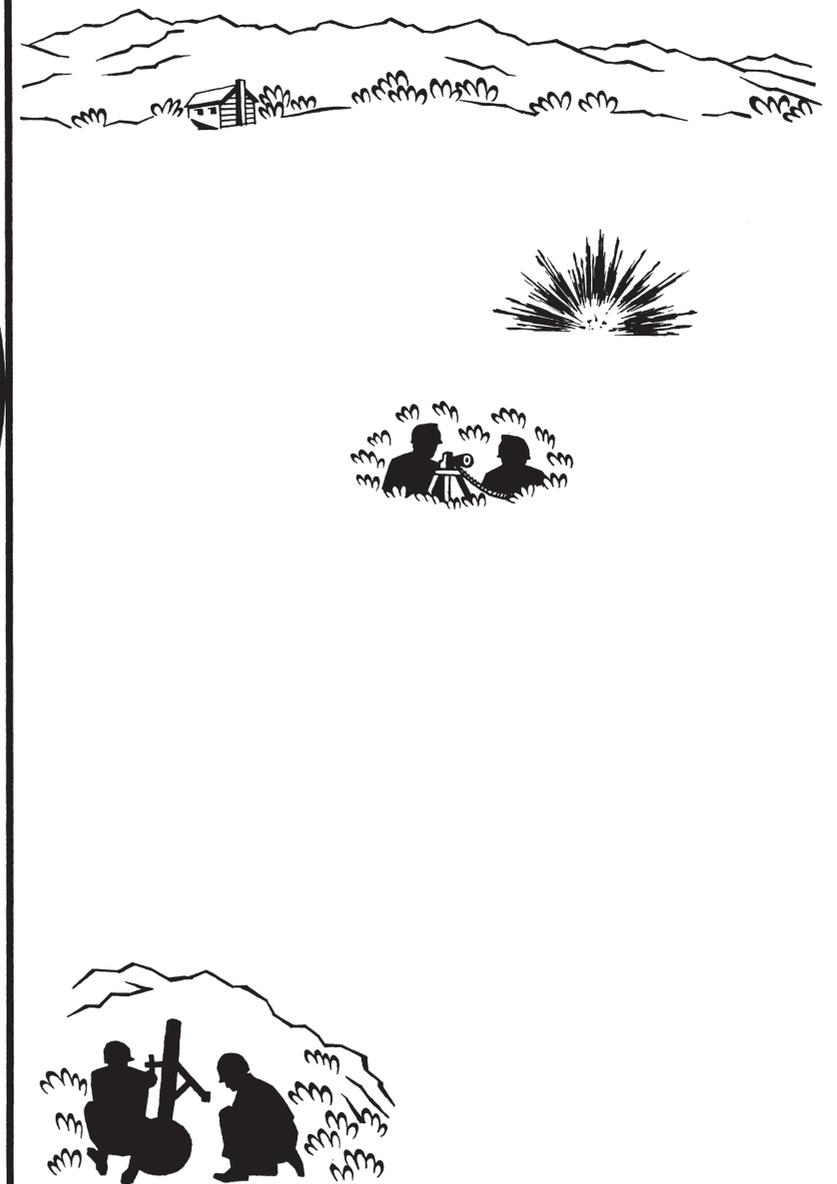
**MORTARS RECEIVE FIRE  
COMMAND, LAY, AND FIRE**



**OBSERVER SENSES BURST OF  
ROUND AND SENDS SUBSEQUENT  
CORRECTION:  
LEFT 50, DROP 50**



**FDC KEEPS PLOTTING BOARD  
ORIENTED AS OBSERVER SEES  
TERRAIN AND PLOTS POINT**



**MORTARS AWAIT SUBSEQUENT  
COMMAND**

# INITIAL FIRE COMMAND

- 1. MORTARS TO FOLLOW**
- 2. CARTRIDGE AND FUZE**
- 3. MORTAR TO FIRE**
- 4. METHOD OF FIRE**
- 5. DEFLECTION**
- 6. CHARGE**
- 7. TIME SETTING**
- 8. ELEVATION**

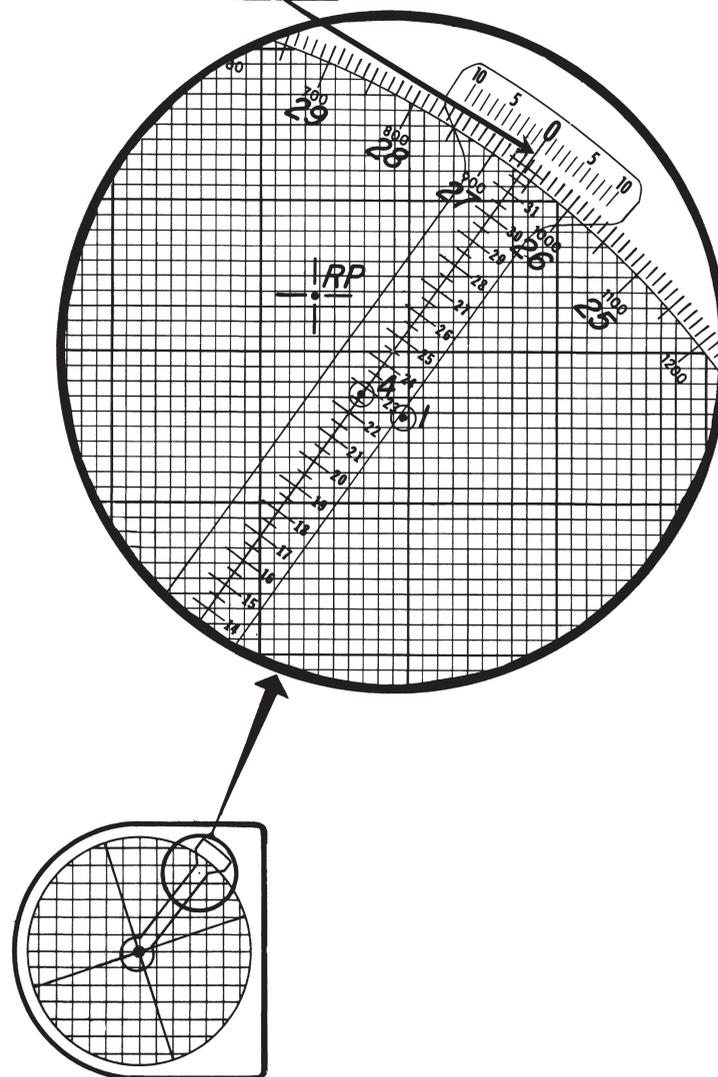


**OT LINE**

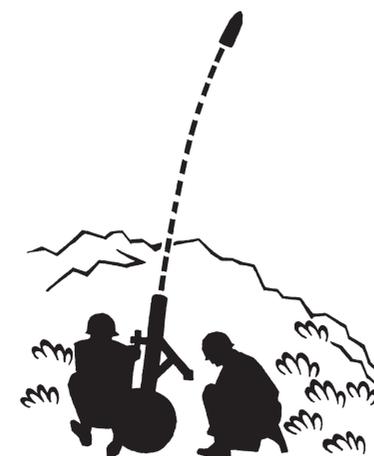


**OBSERVER WAITS  
FOR ROUND TO BE FIRED**

**DEFLECTION FOR  
FOURTH ROUND**



**FDC ORIENTS RANGE ARM  
OVER THE PLOT, DETERMINES  
THE DATA, AND SENDS  
SUBSEQUENT COMMAND:  
DEFLECTION 2662  
ELEVATION 1159**



**MORTARS RECEIVE FIRE  
COMMAND, LAY, AND FIRE**

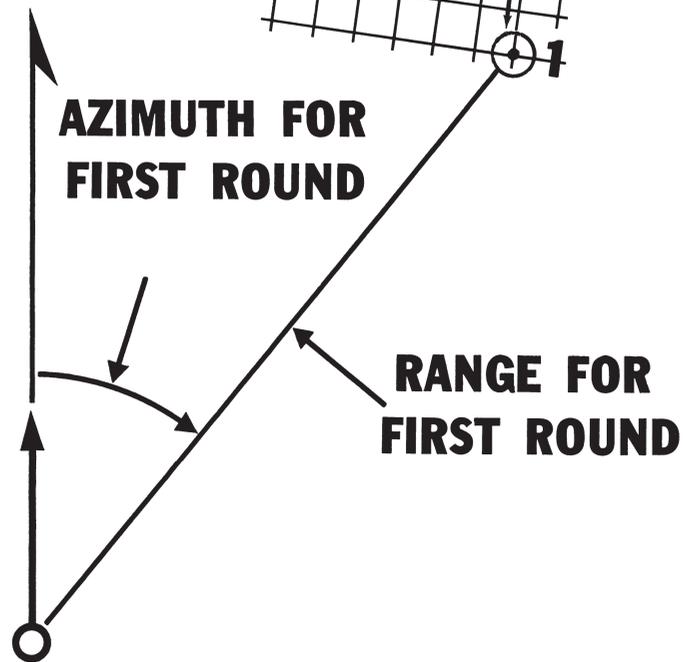
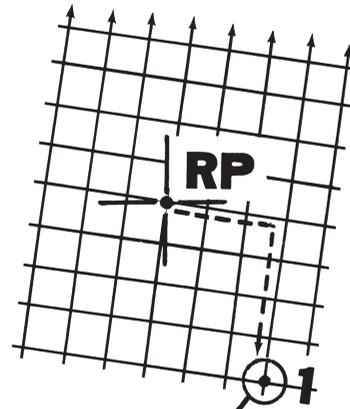


**OT LINE**



**OBSERVER WAITS FOR ROUND TO BE FIRED**

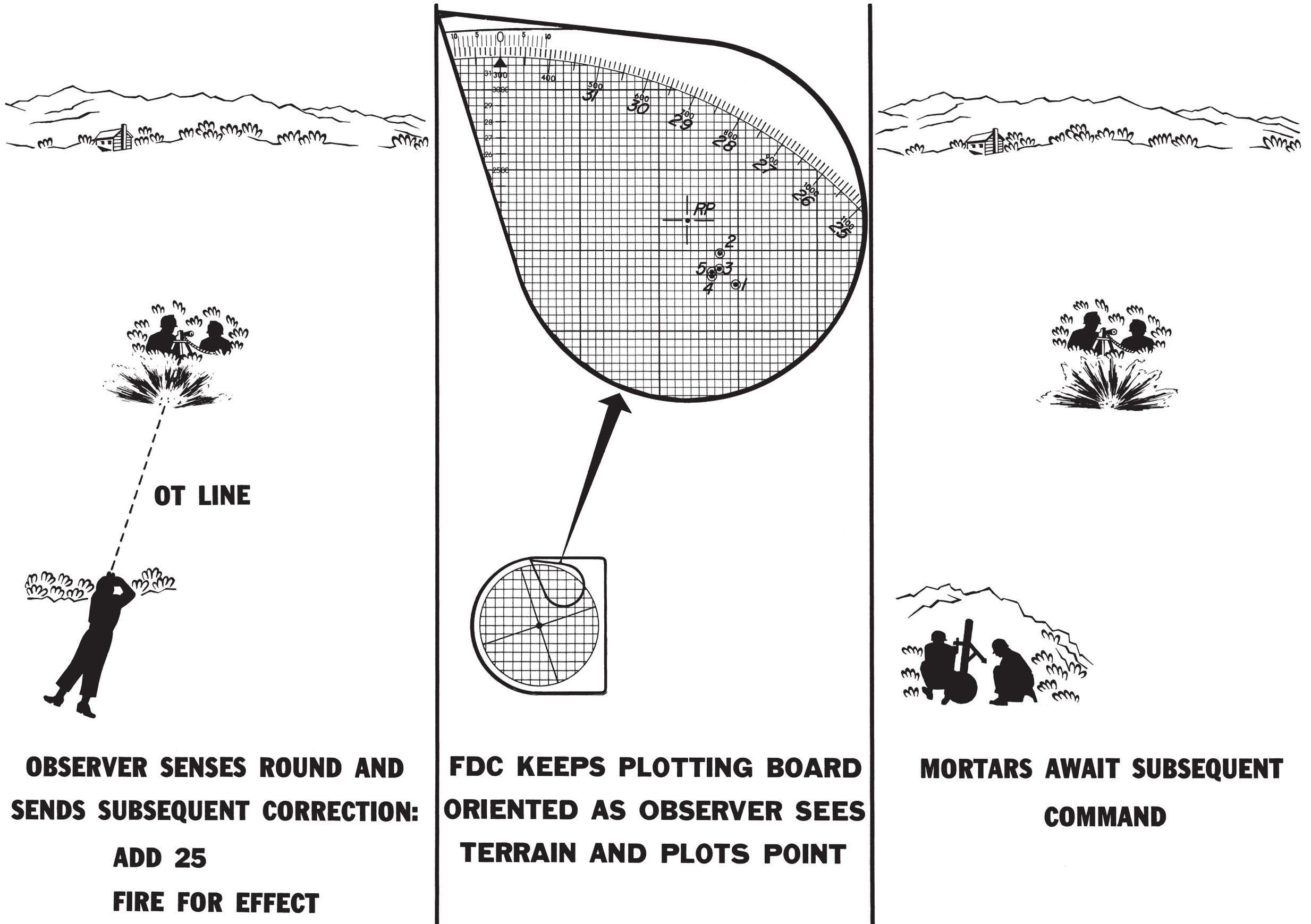
**AZIMUTH  
0300 MILS**



**AZIMUTH OF LINE AND MEASURES RANGE TO FIRST ROUND. SENDS COMMAND FORMULATED FROM THIS DATA TO MORTARS.**



**MORTARS RECEIVE FIRE COMMAND, LAY, AND FIRE. NOTIFY FDC ROUND ON THE WAY**



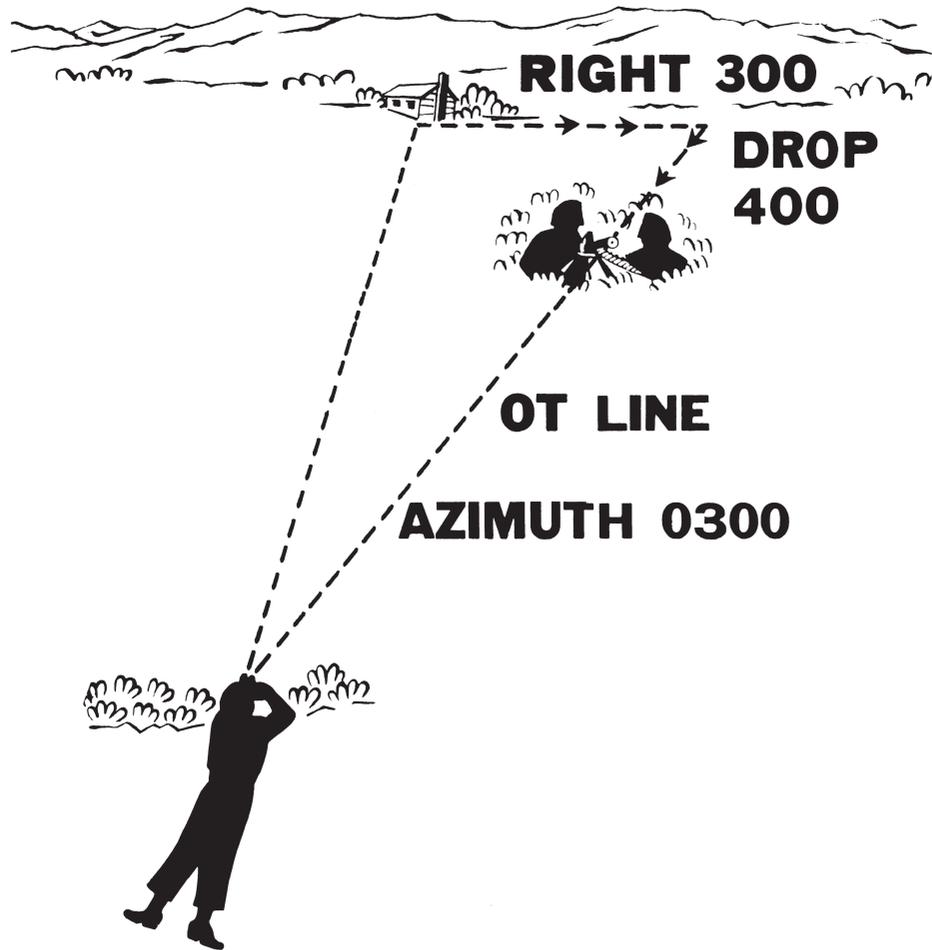
**OT LINE**

**OBSERVER SENSES ROUND AND  
SENDS SUBSEQUENT CORRECTION:  
ADD 25  
FIRE FOR EFFECT**

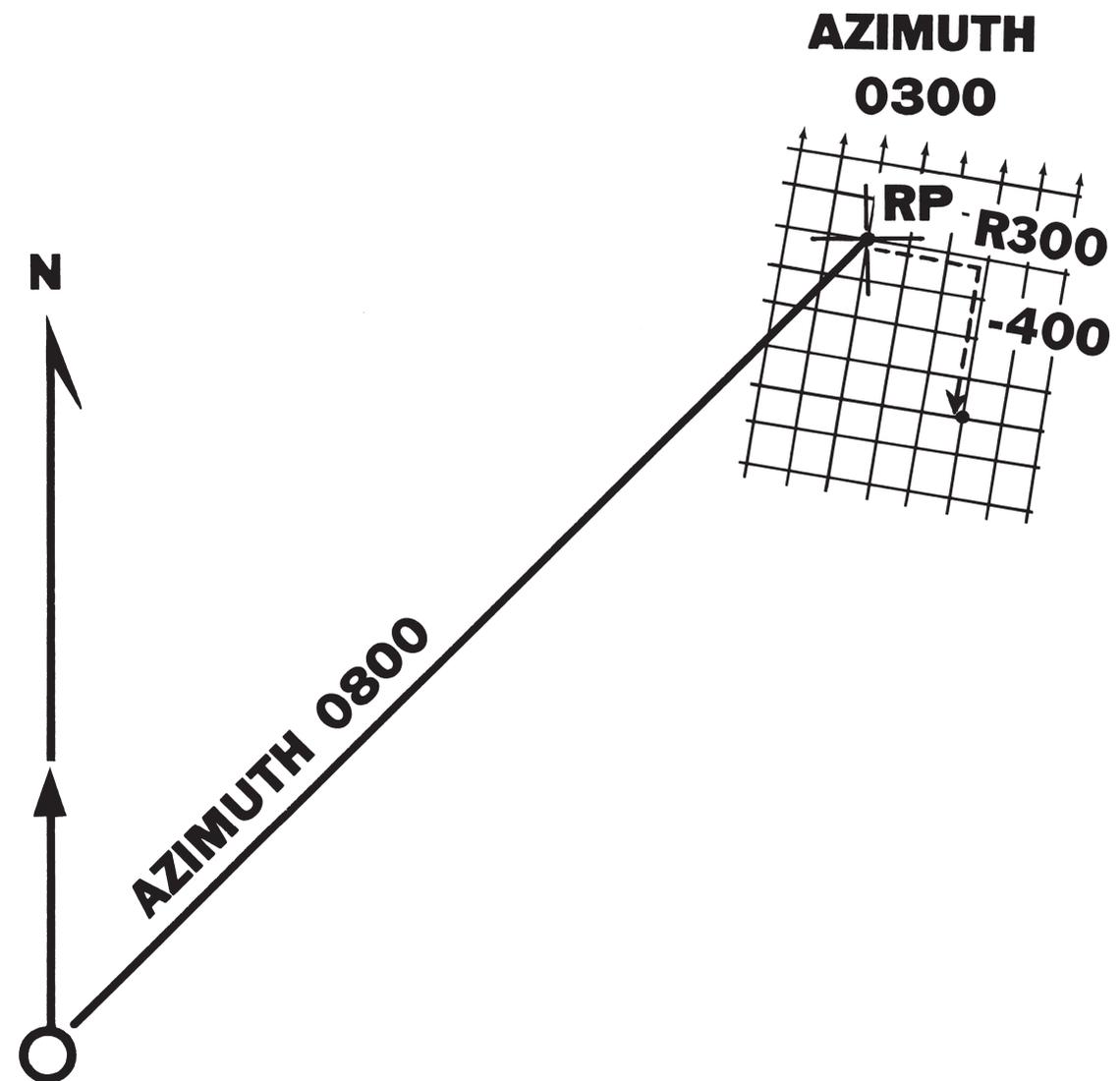
**FDC KEEPS PLOTTING BOARD  
ORIENTED AS OBSERVER SEES  
TERRAIN AND PLOTS POINT**

**MORTARS AWAIT SUBSEQUENT  
COMMAND**

# FIRE MISSION USING TARGET - GRID METHOD OF CONTROL



**OBSERVER SENDS FIRE REQUEST:  
THIS IS OP ONE  
FIRE MISSION  
FROM REGISTRATION POINT  
AZIMUTH 0300  
RIGHT THREE HUNDRED  
DROP FOUR HUNDRED  
MACHINEGUN  
WILL ADJUST**



**COMPUTER CONSTRUCTS TARGET-GRID ON GRAPHIC  
SKETCH AND PLOTS NEW POINT. NOTICE THAT THESE  
LINES POINT IN THE SAME DIRECTION THAT THE  
OBSERVER SEES THE TARGET.**

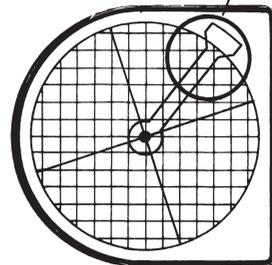
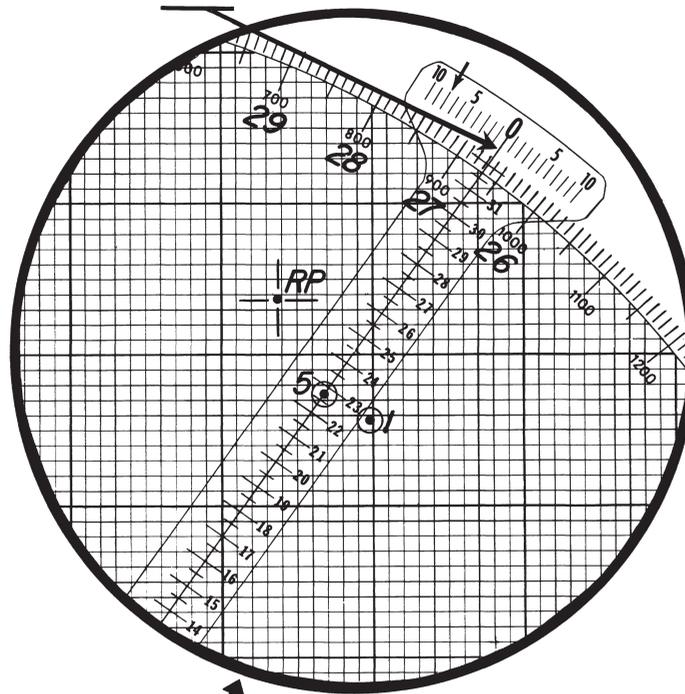


**OT LINE**



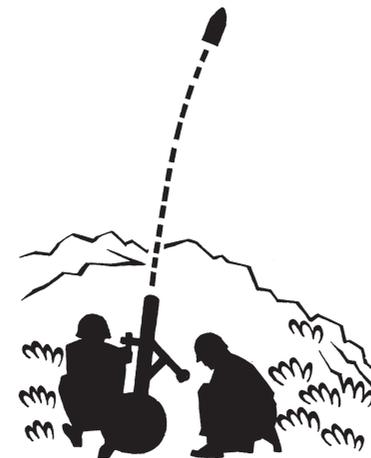
**OBSERVER WAITS FOR  
FIRE FOR EFFECT**

## DEFLECTION FOR FIRE FOR EFFECT



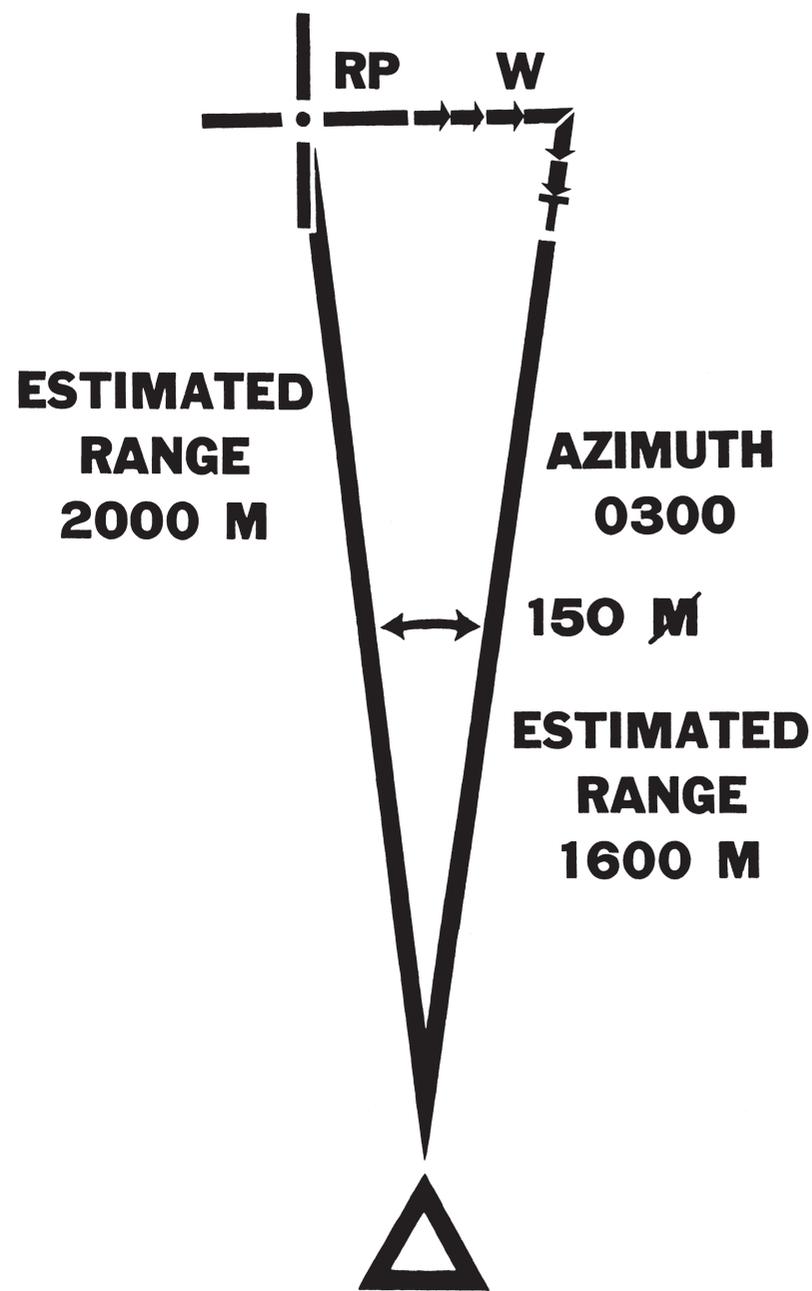
**FDC ORIENTS RANGE ARM  
OVER THE PLOT AND SENDS  
SUBSEQUENT COMMAND:**

**SECTION  
3 ROUNDS  
DEFLECTION 2668  
ELEVATION 1159**



**MORTARS RECEIVE FIRE  
COMMAND, LAY, AND FIRE.**

# SHIFT METHOD OF TARGET LOCATION



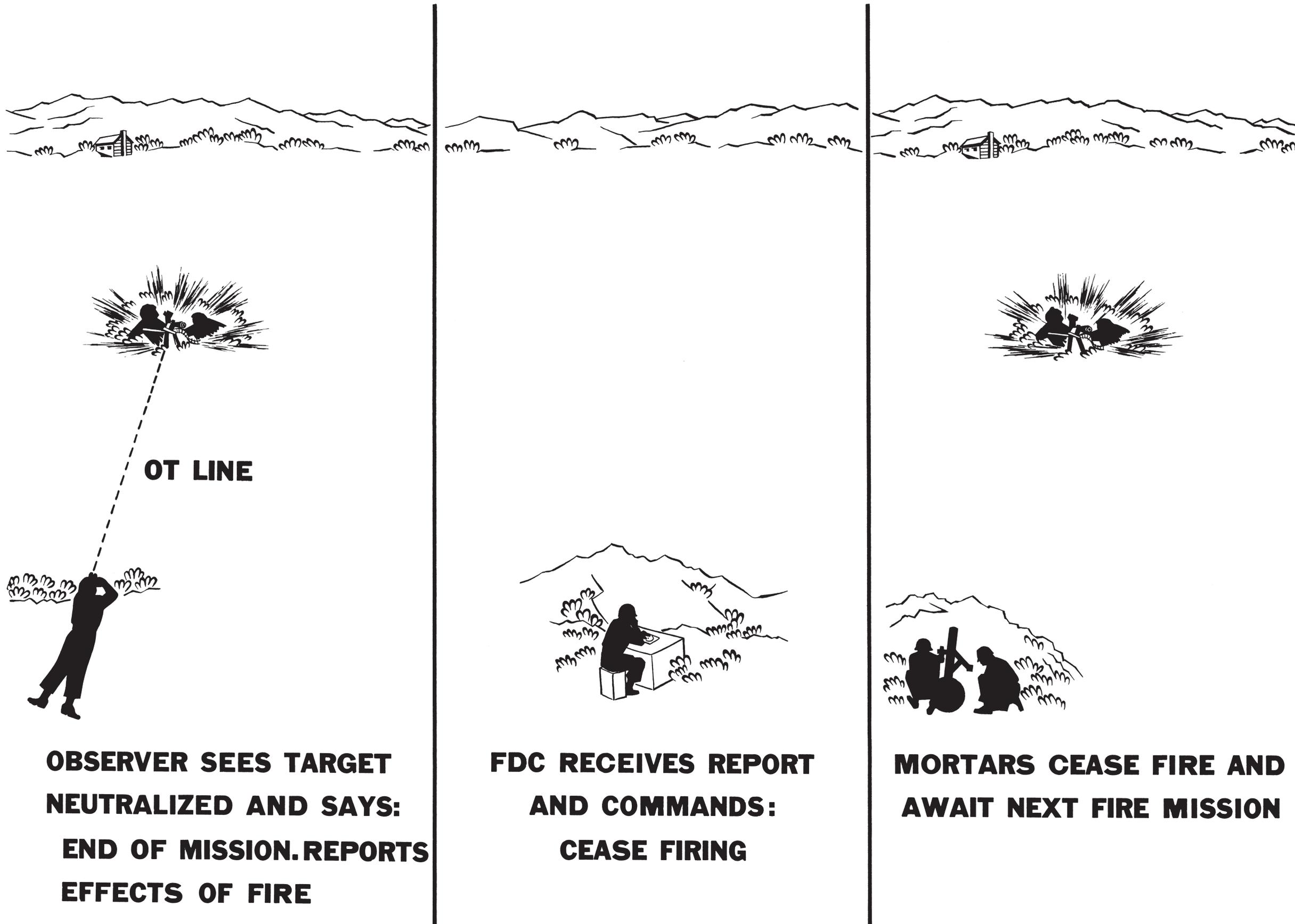
$$W = 2 \times 150 = 300 \text{ METERS}$$

$$2000 - 1600 = 400 \text{ METERS}$$

**FROM REGISTRATION POINT**

**RIGHT 300**

**DROP 400**



# INITIAL CALL FOR FIRE

**1- IDENTIFICATION OF OBSERVER.**

**2- WARNING ORDER .**

**3- LOCATION OF TARGET.**

**A. GRID COORDINATES: DIRECTION.**

**B. SHIFT FROM A KNOWN POINT: DIRECTION,  
LATERAL SHIFT, RANGE SHIFT, VERTICAL SHIFT.**

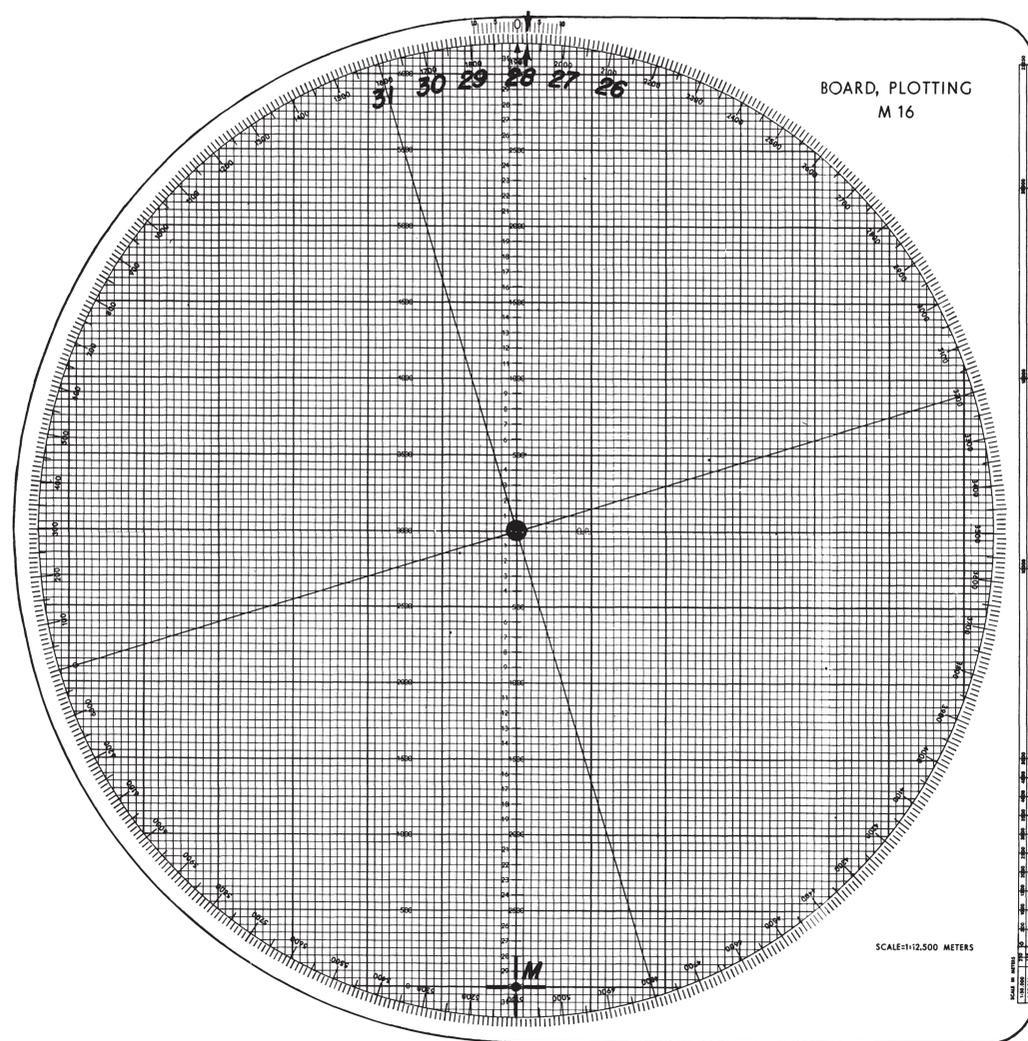
**C. POLAR COORDINATES: DIRECTION, DISTANCE,  
VERTICAL SHIFT FROM THE OP.**

**4- DESCRIPTION OF TARGET.**

**5- METHOD OF ENGAGEMENT.**

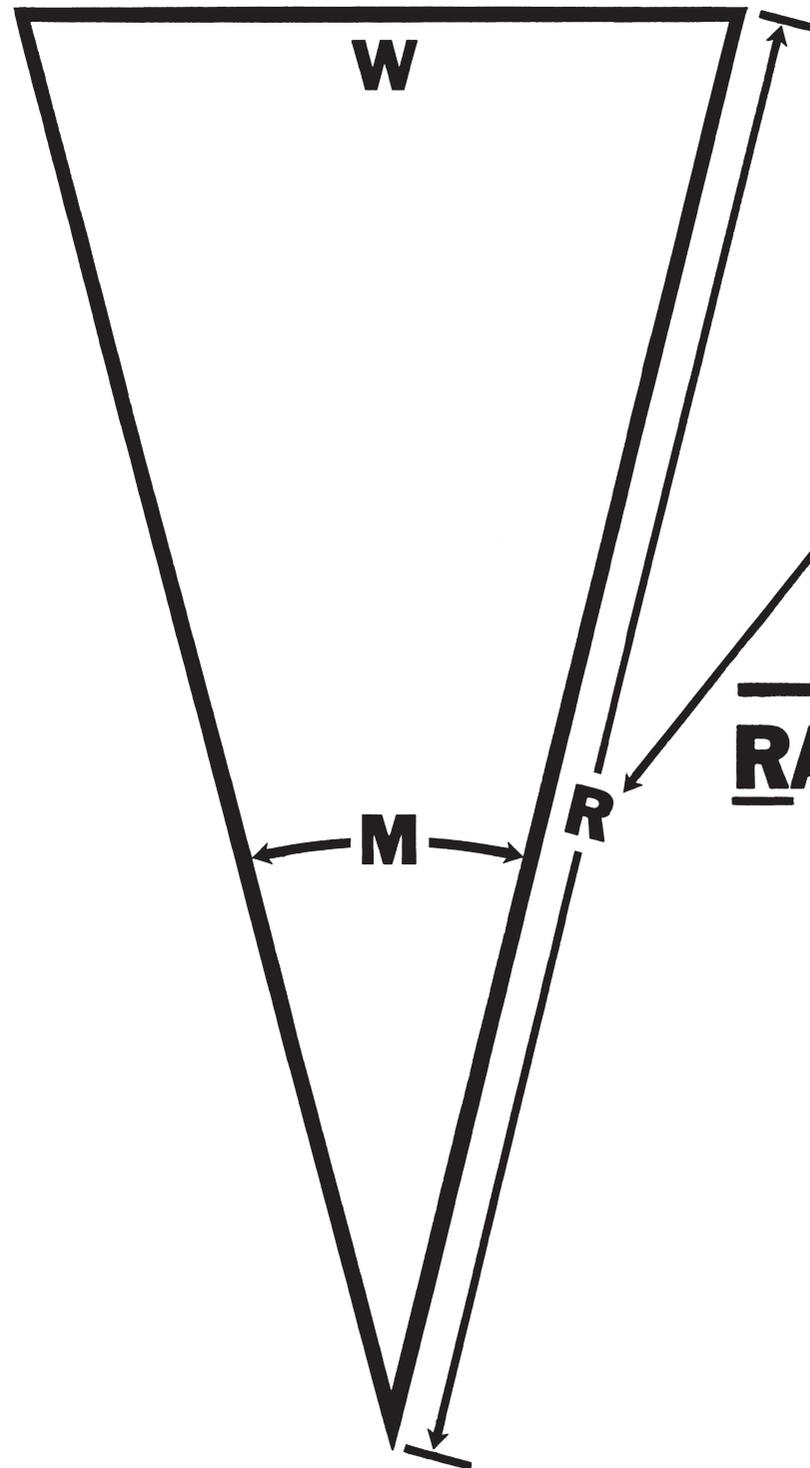
**6- METHOD OF FIRE AND CONTROL.**

# PARALLEL LINE METHOD OF PLOTTING



1. DETERMINE MOUNTING AZIMUTH, 1920  $\text{M}$
2. ROUND MOUNTING AZIMUTH OFF TO NEAREST 50  $\text{M}$  (1900  $\text{M}$ )
3. ROTATE DISK TO 1900  $\text{M}$
4. PLACE DEFLECTION SCALE ON DISK TO CORRESPOND TO MOUNTING AZIMUTH
5. PLOT MORTARS ON INDEX LINE ON AZIMUTH 1900  $\text{M}$ . USE RANGE SCALE ON LEFT
6. FIRST ROUND WOULD BE FIRED AT DEFLECTION 2780  $\text{M}$ , WHICH CORRESPONDS TO INITIAL AZIMUTH OF 1920  $\text{M}$

# THE MIL RELATION



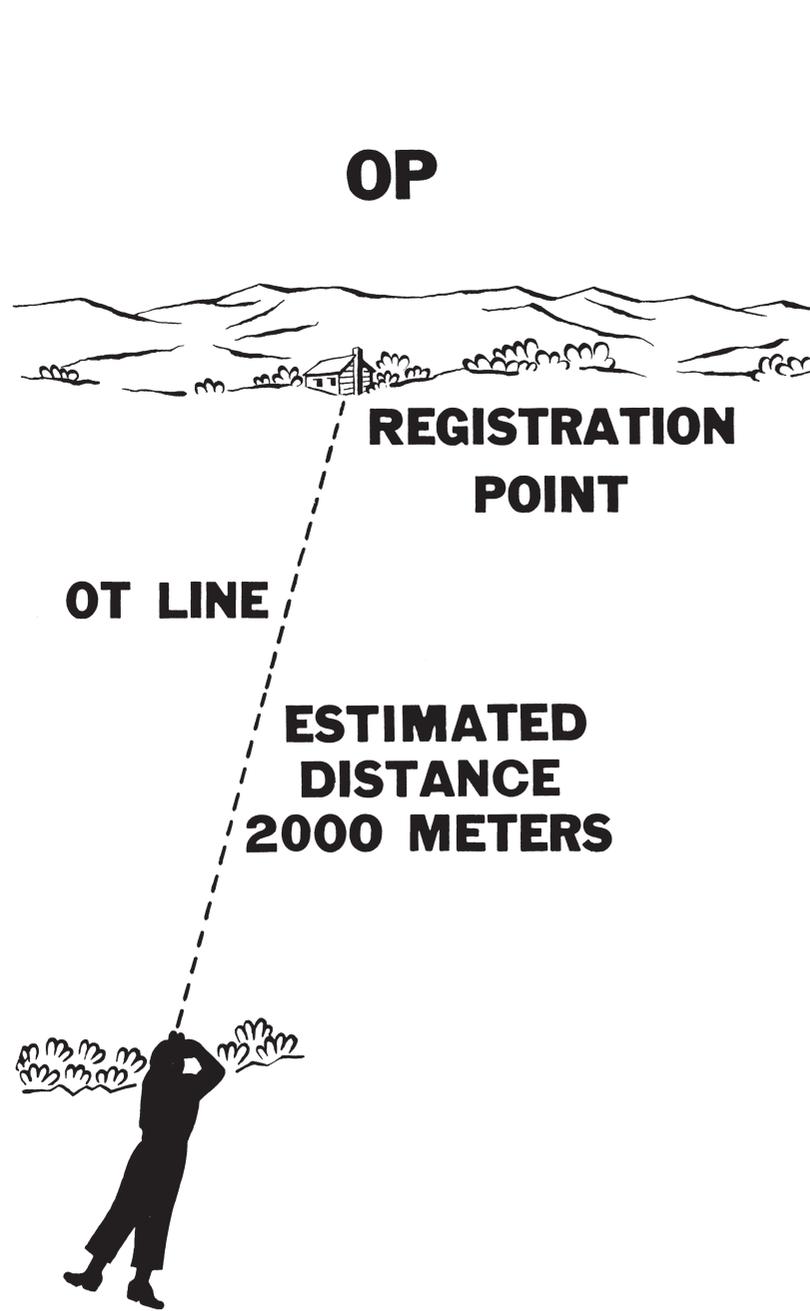
( IN THOUSANDS OF METERS )

$$\frac{\text{WIDTH IN METERS}}{\text{RANGE IN THOUSANDS OF METERS} \times \text{DEVIATION IN MILS}} = 1$$

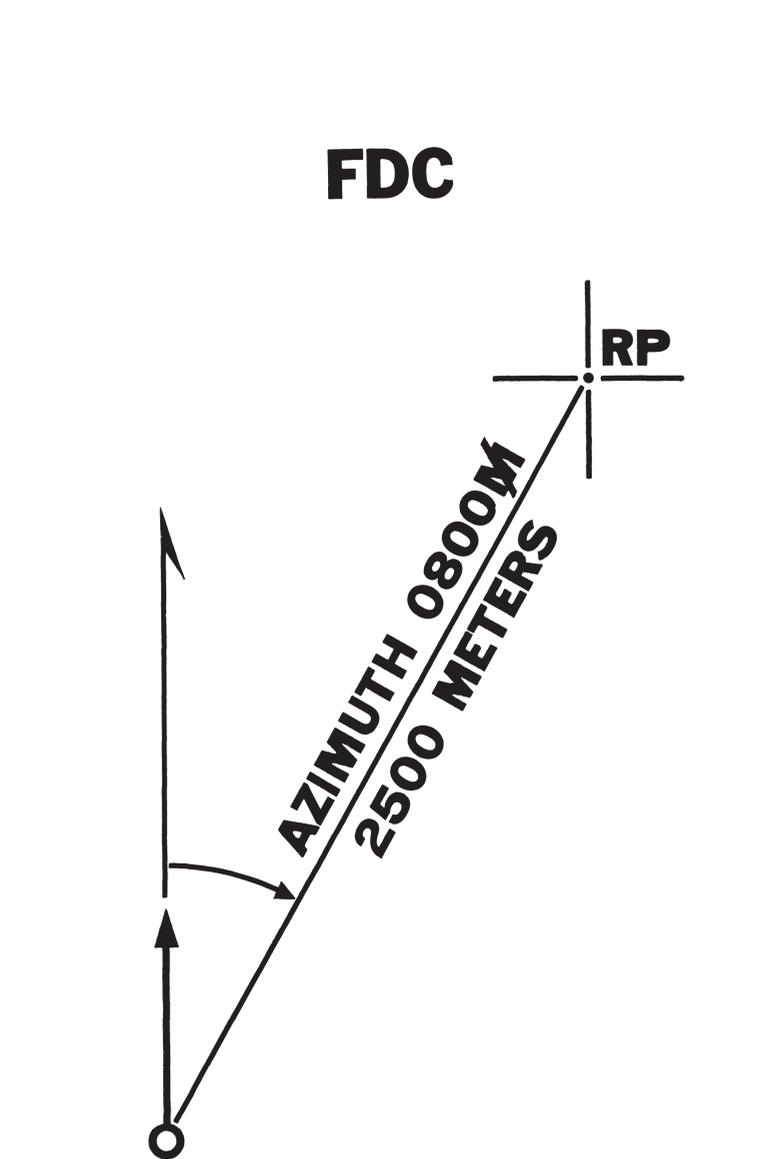
OR

$$\frac{W}{R \times M} = 1$$

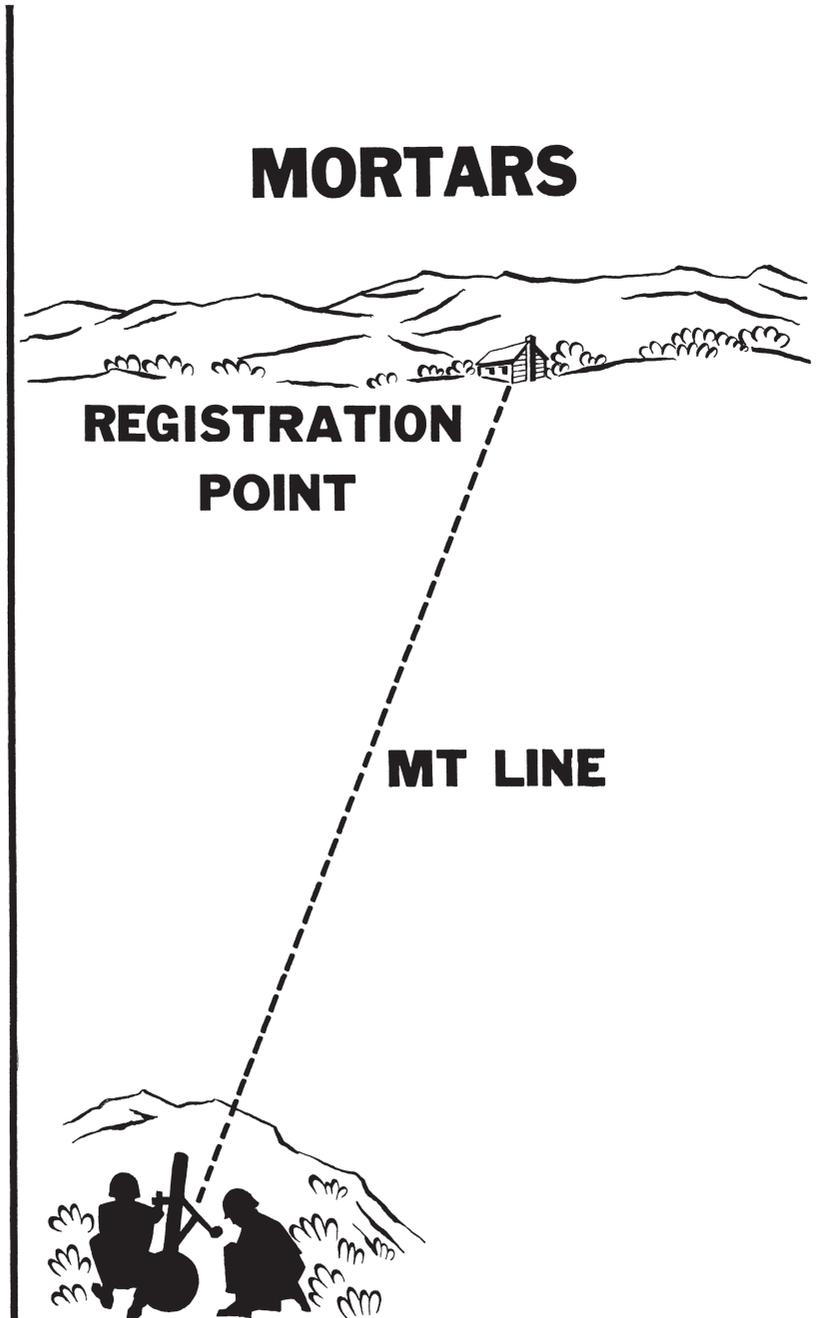




**FORWARD OBSERVER  
ADJUSTS MORTAR ON  
REGISTRATION POINT**

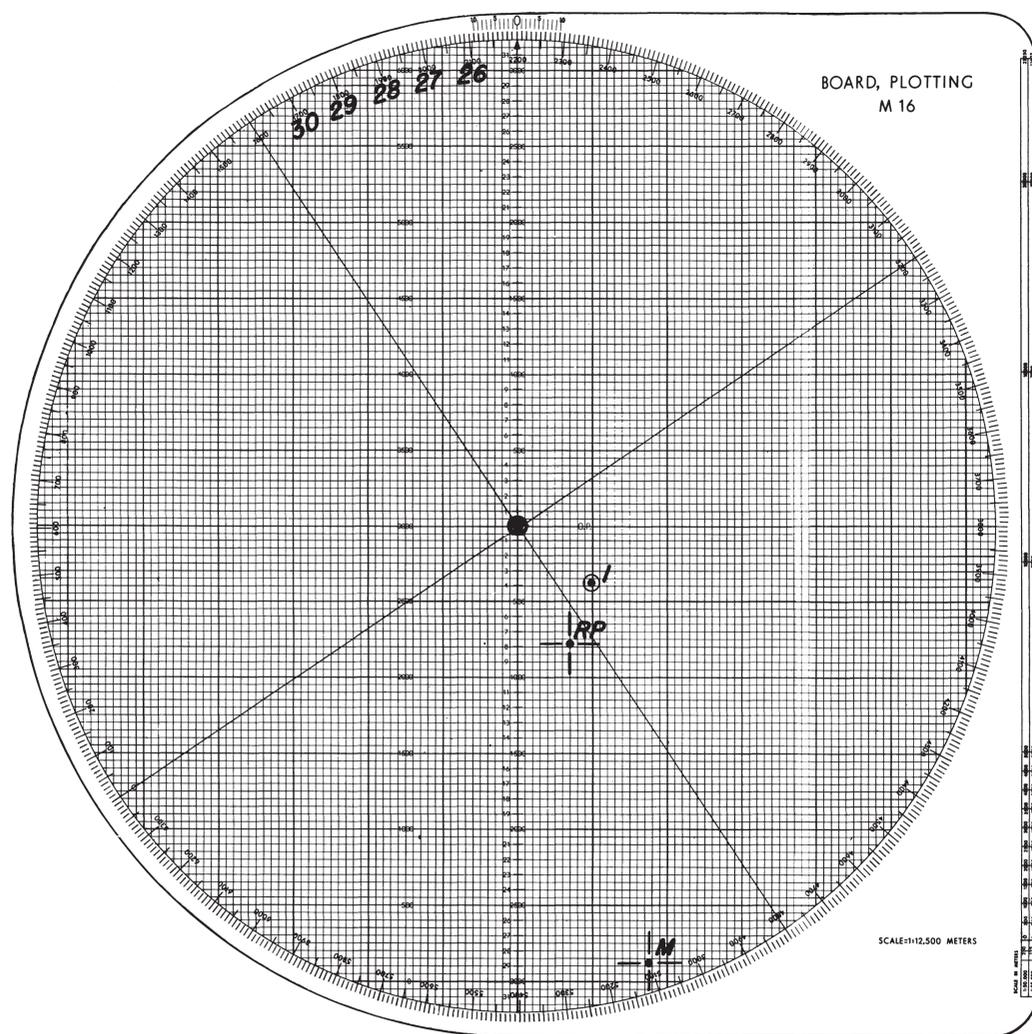


**THE COMPUTER DRAWS A  
GRAPHIC SKETCH TO SCALE  
OF THE MORTAR POSITIONS  
AND THE DIRECTION AND  
RANGE TO REGISTRATION  
POINT**

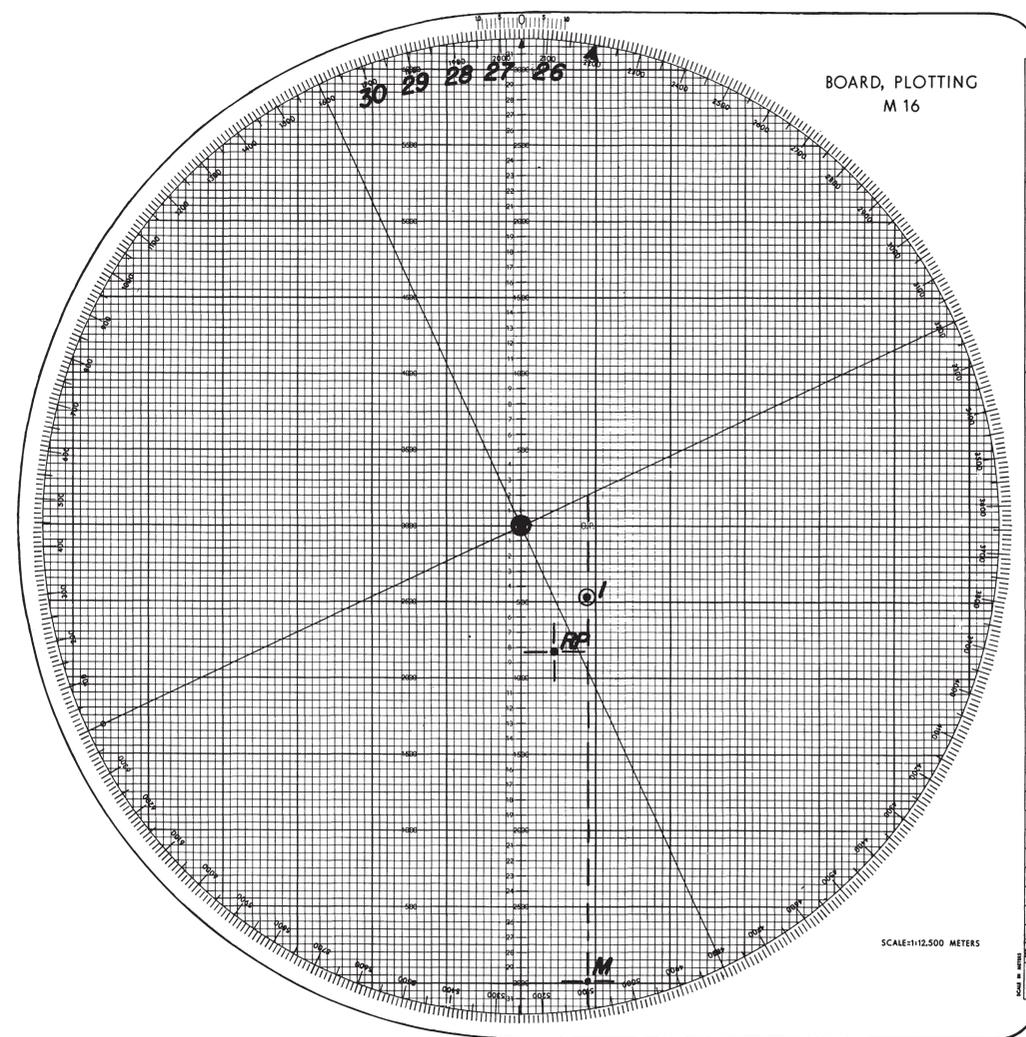


**MORTARS WAIT FOR THEIR  
COMMAND**

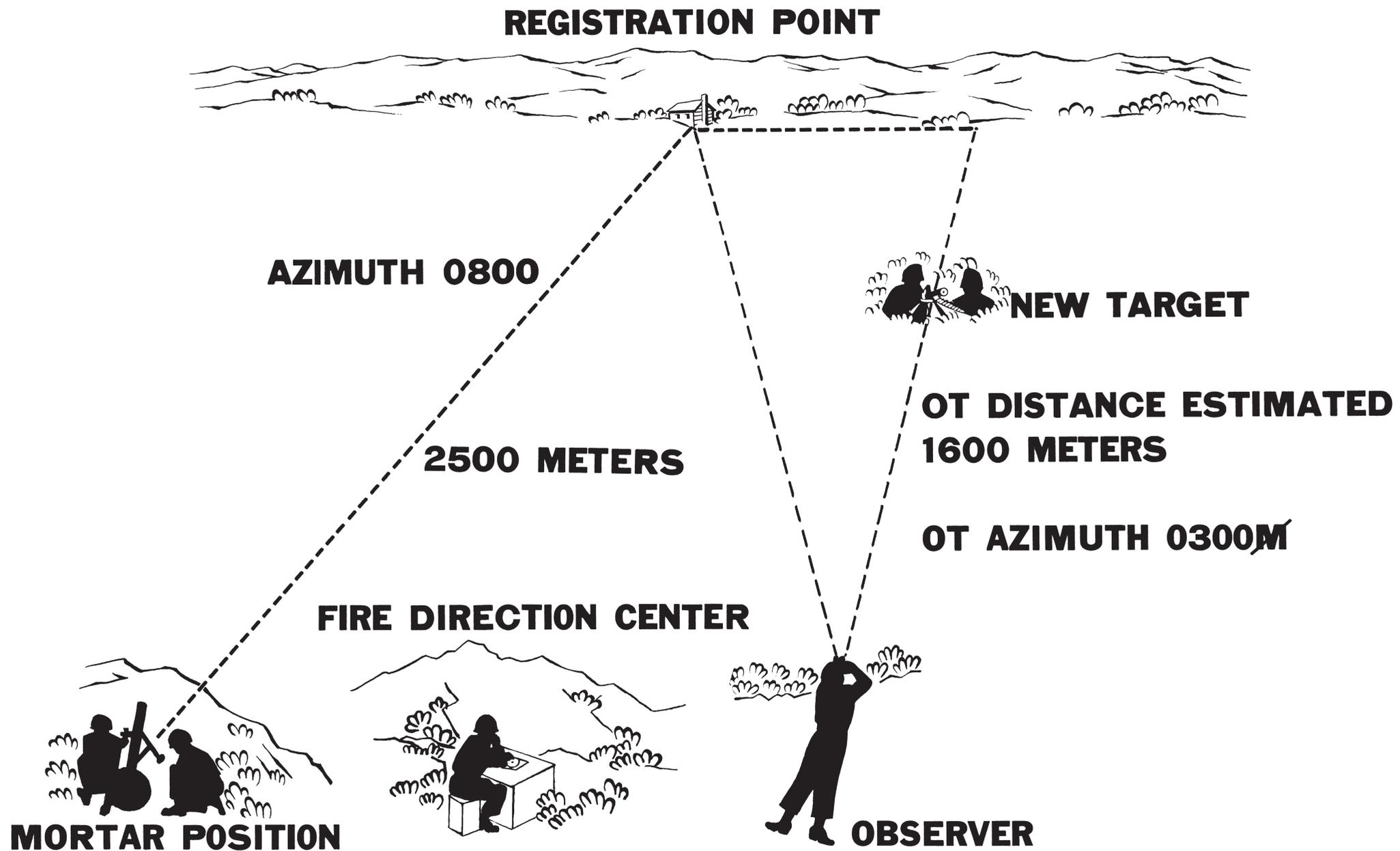
# PLOTTING MISSION, PARALLEL LINE METHOD



1. OT AZ 2200
2. FROM RP, R 150 + 400
3. ROTATE DISK TO OT AZIMUTH AND MAKE PLOT.



1. PARALLEL PLOT WITH NO. 2 MORTAR
2. DETERMINE DEFLECTION AT THE INDEX MARK 2654
3. DETERMINE RANGE BY USING LEFT RANGE SCALE 2525 M



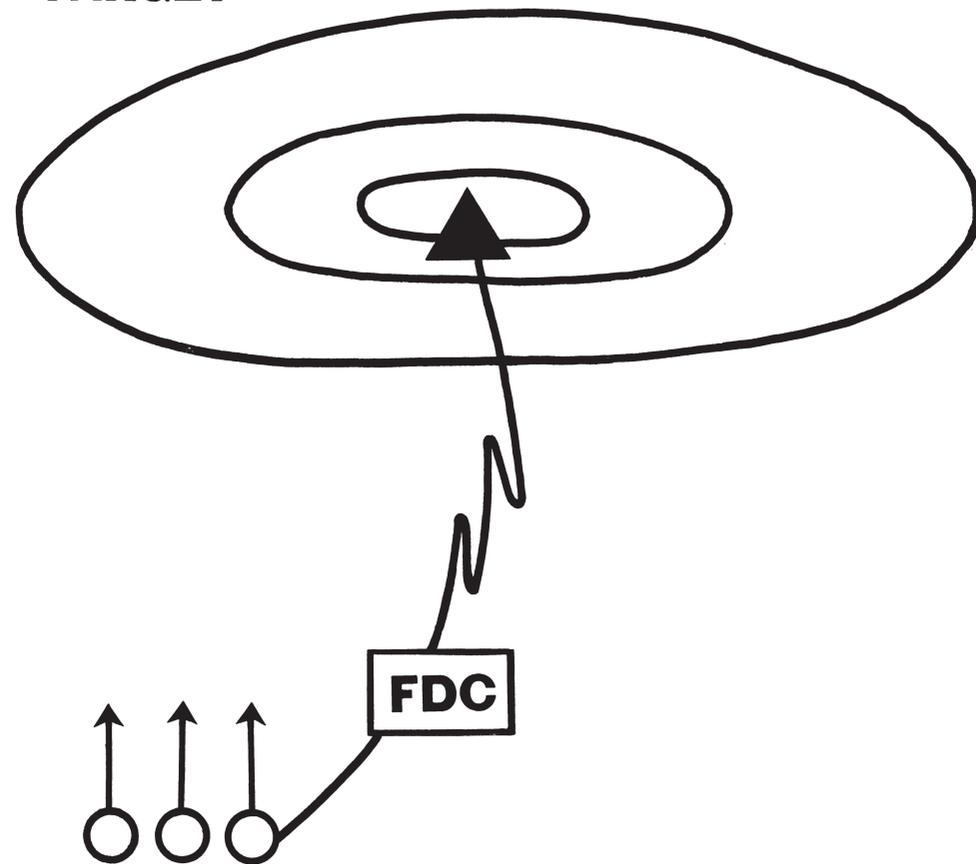
**THE OBSERVER REGISTERS ON A REGISTRATION POINT, AND USES IT AS A REFERENCE POINT IN SHIFTING TO NEW TARGETS. BY DRAWING A GRAPHIC SKETCH, THE COMPUTER CAN USE TARGET-GRID FOR ADJUSTING ON NEW TARGET.**

# TARGET - GRID METHOD OF FIRE CONTROL

## INDIRECT FIRE TEAM



**TARGET**



**AN OBSERVER, A FDC, AND A FIRING UNIT  
ARE THE BASIC ELEMENTS OF A MORTAR  
UNIT USING THE TARGET-GRID METHOD**

**TARGET**

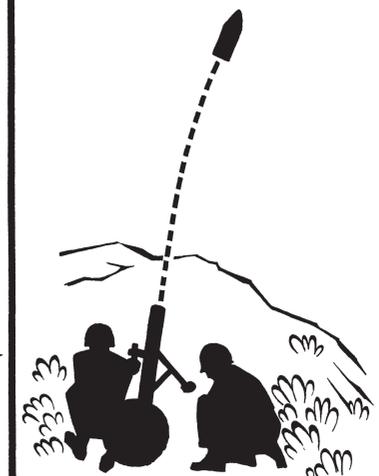


**FORWARD  
OBSERVER  
SENDS FIRE  
REQUEST TO FDC**



**FDC CONVERTS  
FIRE REQUEST  
TO FIRE  
COMMAND**

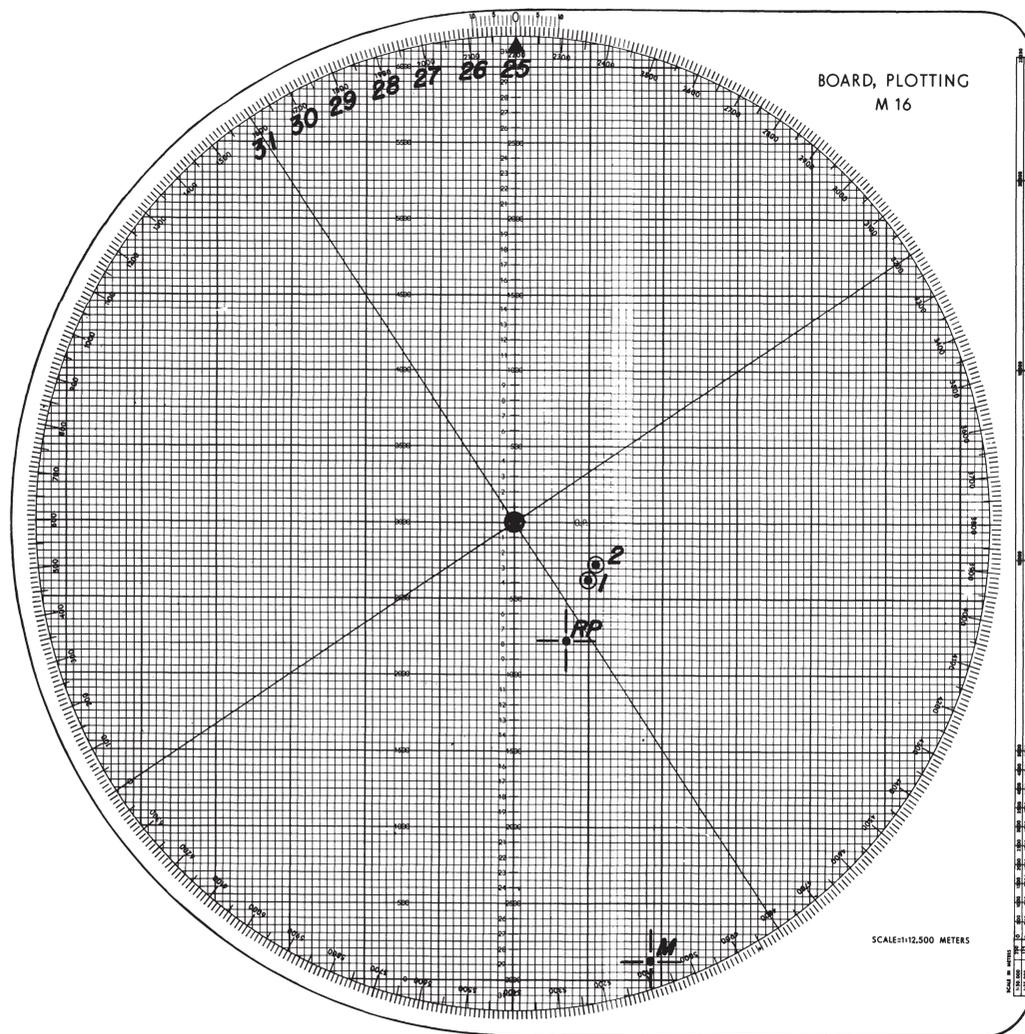
**TARGET**



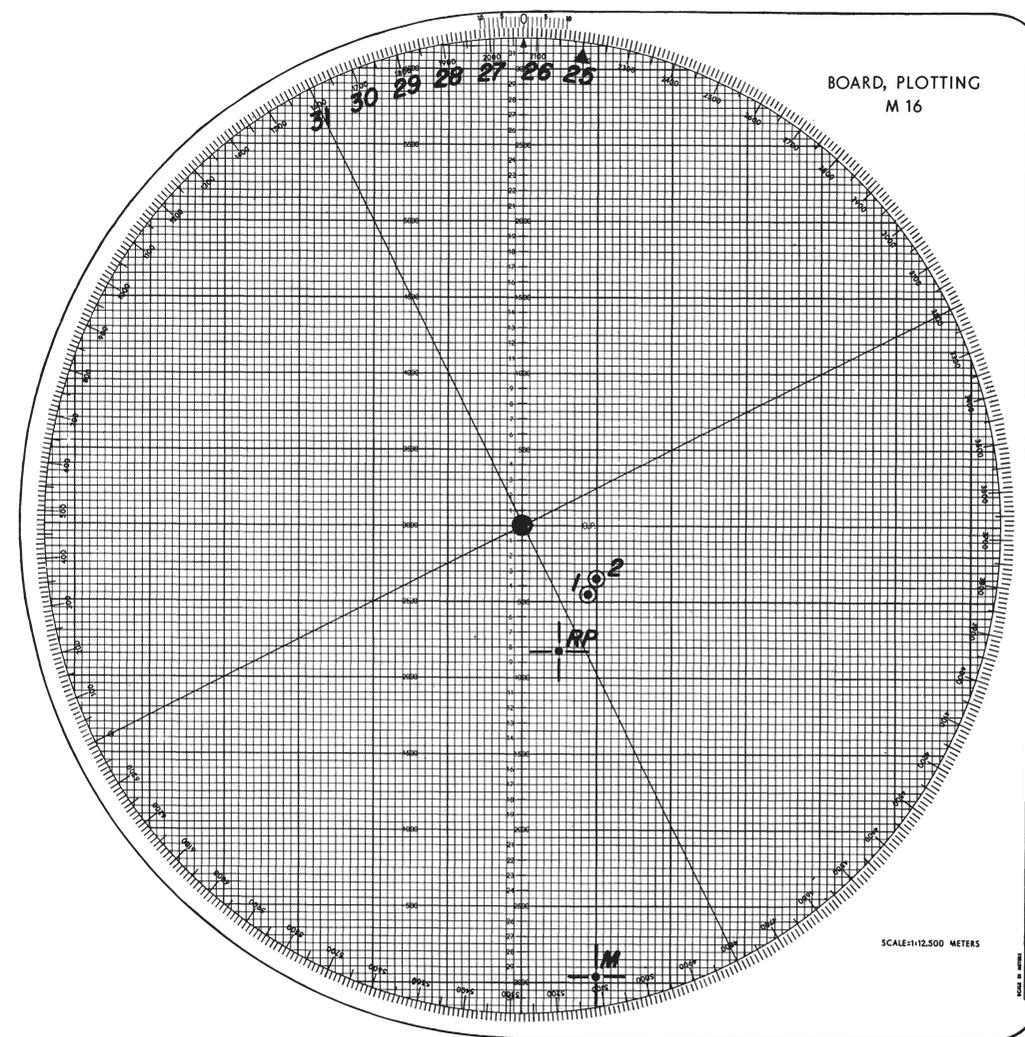
**MORTARS RECEIVE  
FIRE COMMAND  
FROM FDC,  
LAY MORTARS,  
AND FIRE**



# PARALLEL LINE METHOD - - CONTINUED



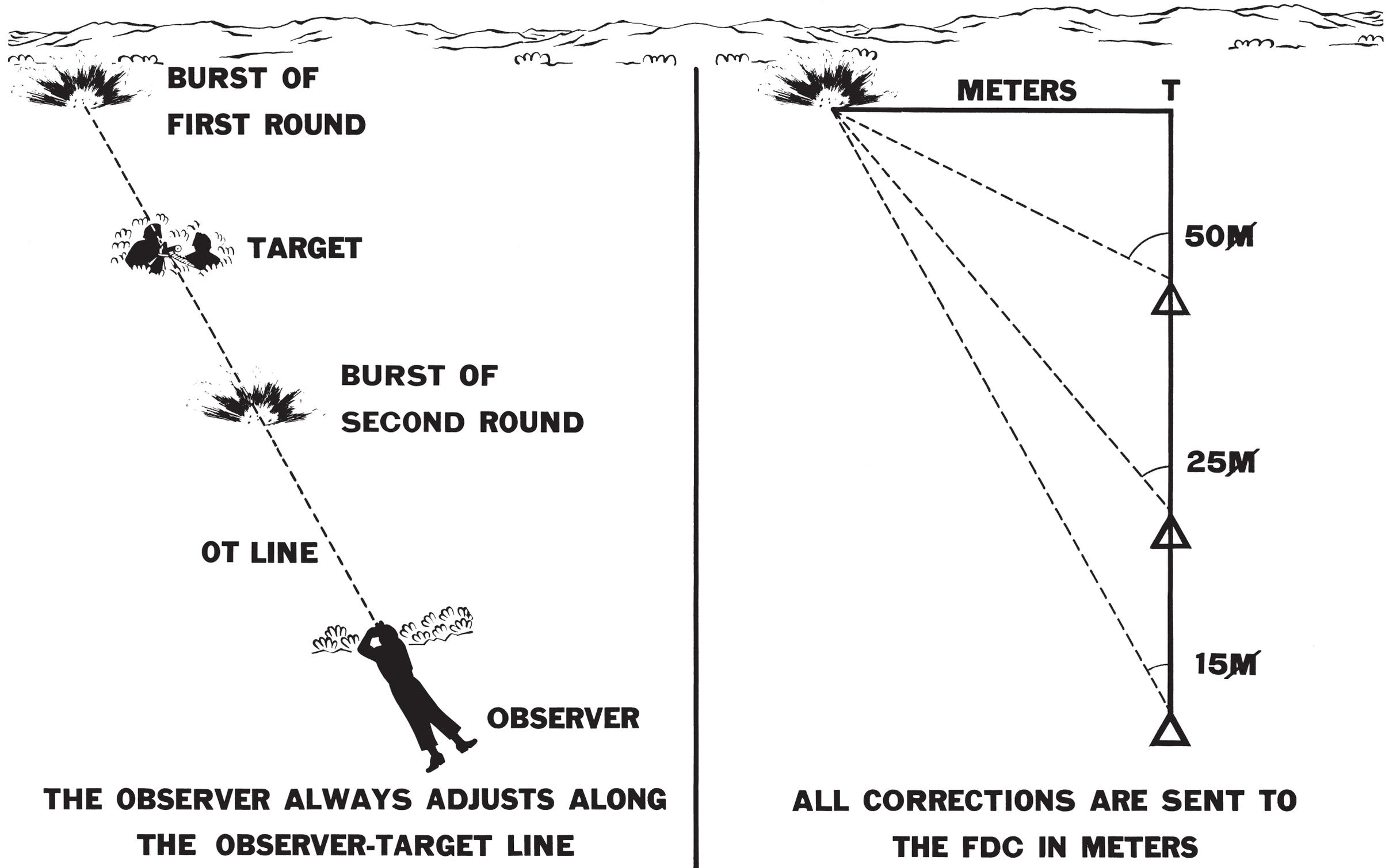
- 1. OBSERVERS CORRECTION:  
R 50  
+ 100**
- 2. ROTATE DISK TO OT AZIMUTH**
- 3. MAKE CORRECTION AS ANNOUNCED BY THE OBSERVER**



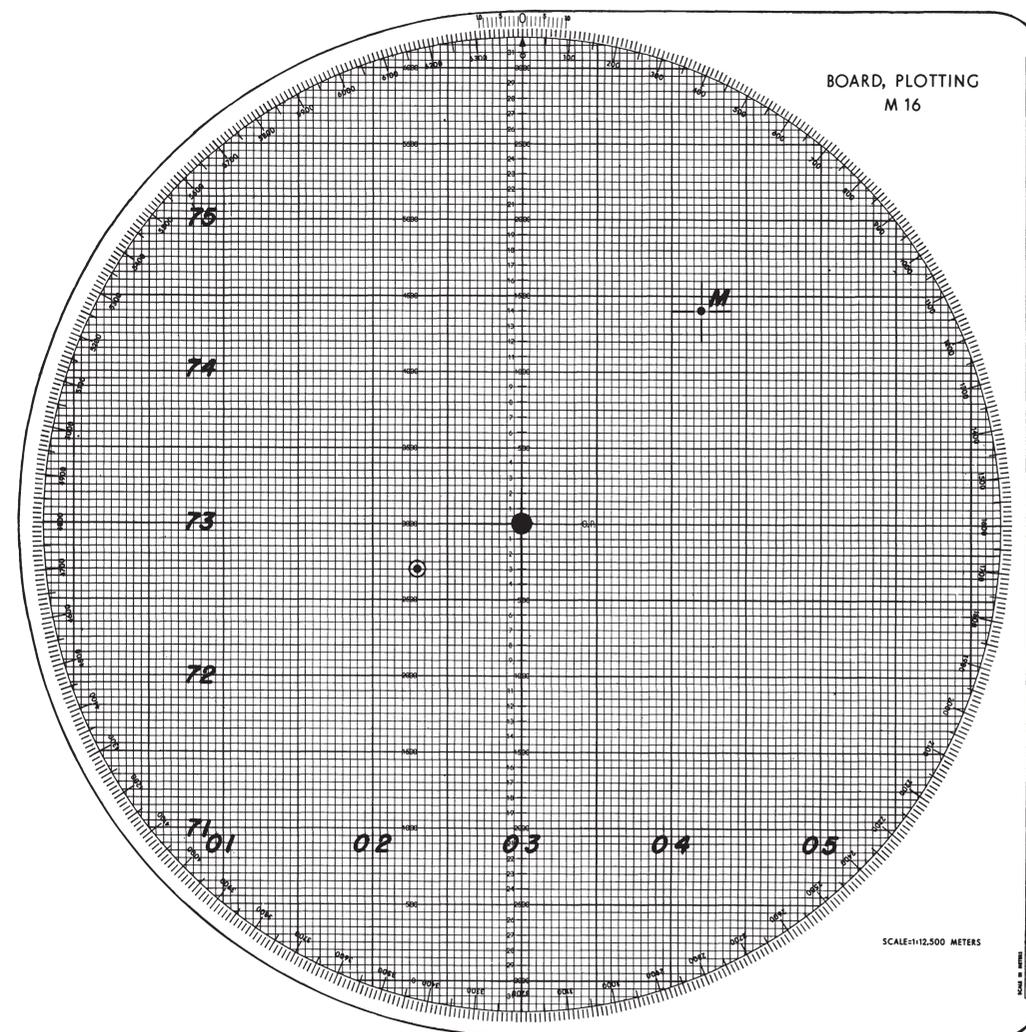
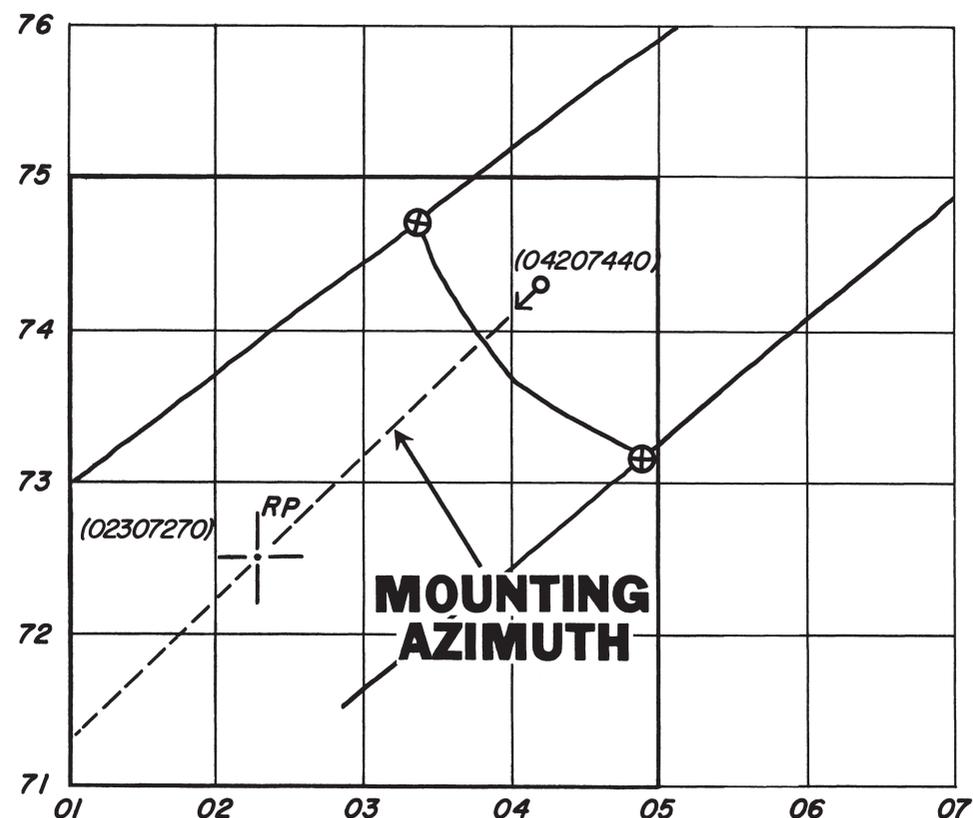
- 1. PARALLEL PLOT WITH NO. 2 MORTAR**
- 2. DETERMINE DEFLECTION AT THE INDEX MARK, 2628 M**
- 3. DETERMINE RANGE FROM LEFT RANGE SCALE, 2600 M**

# TARGET - GRID METHOD OF FIRE CONTROL

## PRINCIPLES



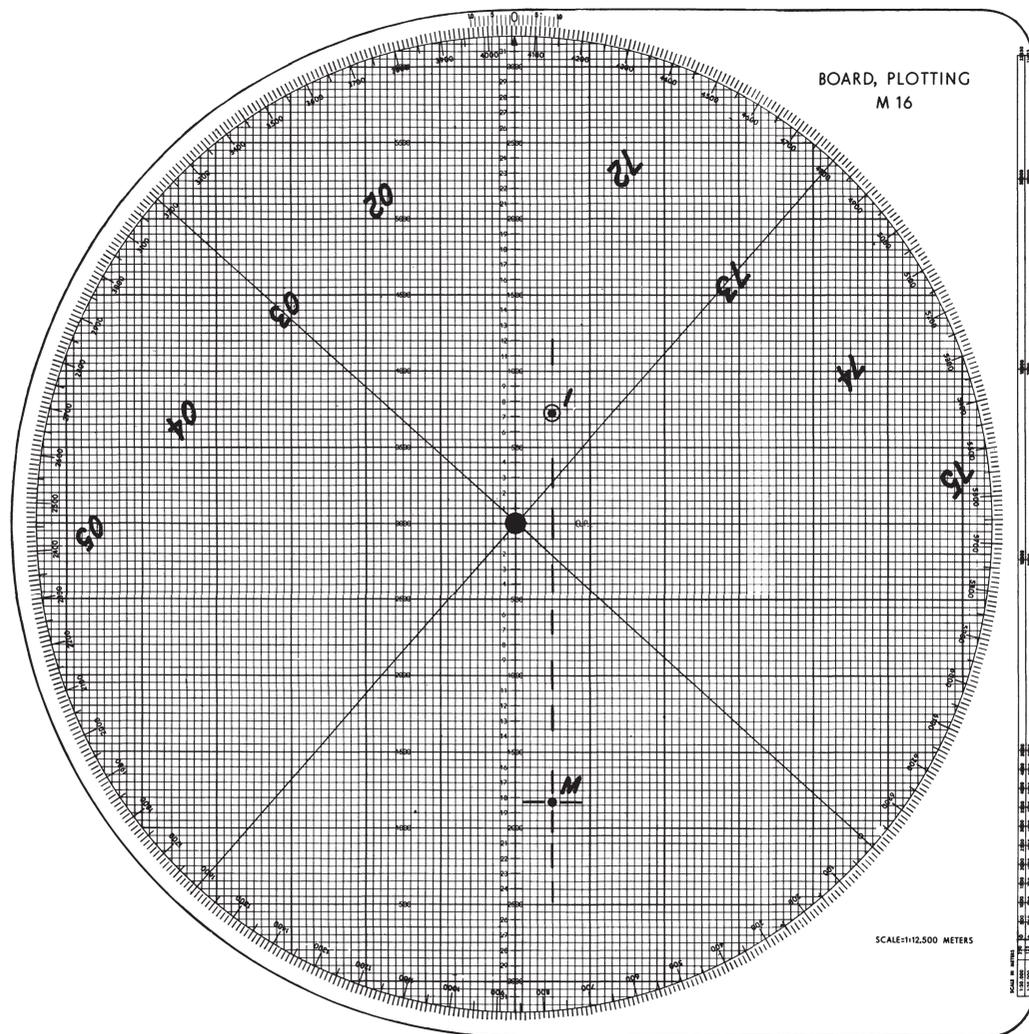
# PLOTTING USING COORDINATES



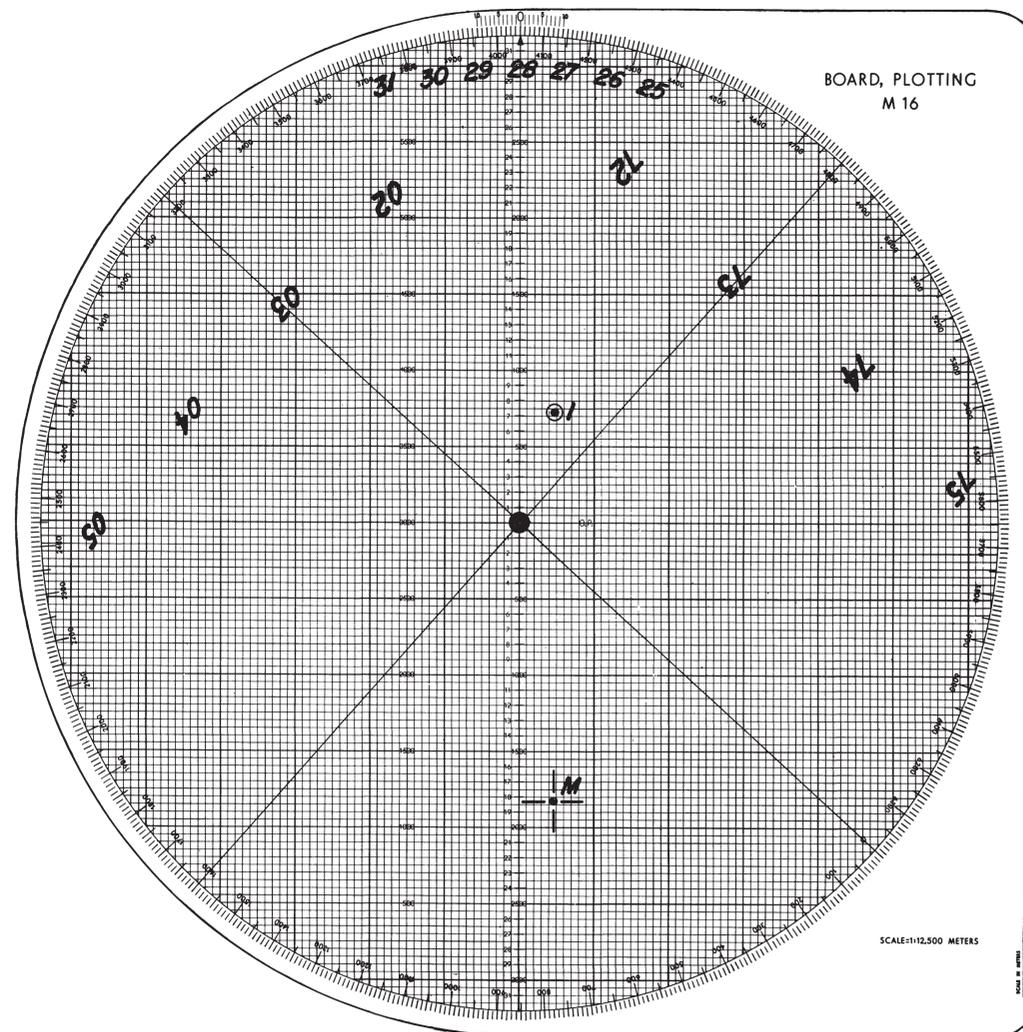
**DETERMINE AREA OF MAP IN WHICH  
OPERATIONS ARE EXPECTED TO BE  
CONDUCTED**

- 1. PLACE AZ 0 AT INDEX MARK**
- 2. PLACE COORDINATES ON DISK  
CORRESPONDING TO MAP**
- 3. PLOT MORTAR POSITION, RP,  
ETC., BY COORDINATES  
(DISK MUST ALWAYS BE ON AZ 0  
WHEN PLOTTING COORDINATES.)**

# PLOTTING USING COORDINATES-CONTINUED



**DETERMINE MOUNTING AZIMUTH AND  
RANGE BY PARALLELING MORTAR  
PLOT AND RP WITH INDEX LINE:  
RANGE 2550 M  
MT AZ 4056 M**



- 1. ROUND OF AZIMUTH OFF TO NEAREST 50 M 4050**
- 2. SUPERIMPOSE DEFLECTION SCALE WITH 2800 M BELOW 4050 M**
- 3. MOUNT MORTARS ON AZIMUTH 4050**
- 4. FIRST ROUND IN REGISTRATION IS FIRED AT DEFLECTION 2794, WHICH CORRESPONDS TO AZIMUTH 4056**
- 5. PARALLEL LINE METHOD IS USED FOR ALL PLOTS**