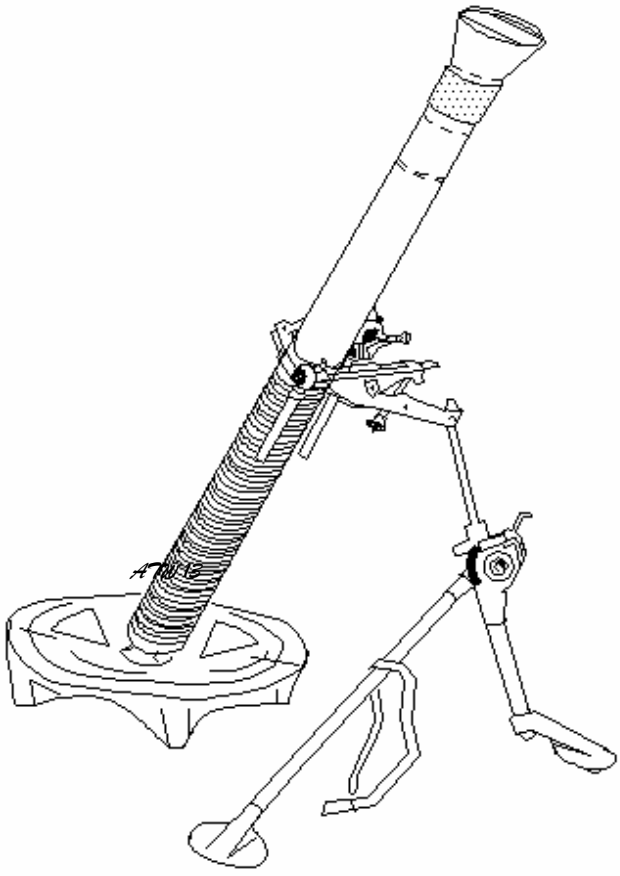
FDC FORMS



M16 PLOTTING BOARD

UNITED STATES ARMY INFANTRY SCHOOL
INFANTRY MORTAR LEADER COURSE
MTR CO 1ST BATTALION 19TH INFANTRY REGIMENT
FT. BENNING, GEORGIA 31905
AUGUST 2021

DATA SHEET

For use of this form, see TC 3-22.91. The proponent agency is TRADOC.

INTRODUCTION

SETUP		WEAPON DATA		FO DATA		
TIME OUT:	UNIT:	WPN:	WPN:	FO	ALT	GRID
TGT PRFX:		DIR:	DIR:			
TGT NO:	mm CAR: ☐ YES	DIS:	DIS:			
ALARM: ☐ ON ☐ OFF	☐ NO					
MIN E:	BP:	WPN:	WPN:			
MIN N:		DIR:	DIR:			
GD: ☐ E ☐ W	E:	DIS:	DIS:			
LAT: ☐ + ☐ -	N:					
LISTEN: ☐ ON ☐ OFF	ALT:	WPN:	WPN:			
BIT RATE:	AZ:	DIR:	DIR:			
KEY TONE:	DEF:	DIS:	DIS:			
BLK: ☐ SNG ☐ DBL	ELE:					
OWNER ID:						

AMMUNITION DATA

TEMPERATURE _____ **TYPE:** ☐ HE ☐ WP ☐ ILL ☐ CS ☐ TNG

LOT NUMBER									
WEIGHT									
ON HAND									
RECEIVED									
TOTAL									
ROUNDS EXPENDED									
ROUNDS REMAINING									

TARGET DATA

TARGET ID			CHART DATA		FIRING CORRECTIONS				FIRING DATA				INTELLIGENCE				ROUNDS	
TGT NO.	GRID	ALT	DEFL	RG / CHG	DEFL CORR	RANGE CORR	ALT / VI	ALT CORR	DEFL	RG / CHG	FUZE TIME SETTING	ELEV	TIME FIRED	TARGET DESCRIPTION	METHOD OF ENGAGEMENT	SURVEILLANCE	EXP	REM

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____
☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	_____
_____	RANGE CORRECTION	DEFLECTION _____	TOF
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	_____
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	MARK TIME
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	_____
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS							
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV	

BATTLE DAMAGE ASSESSMENT (BDA): AIM POINT GRID:

DA FORM 2399, MAY 2017 PREVIOUS EDITIONS ARE OBSOLETE. APD LC v1.00

BASIC PROCEDURES
OBSERVED FIRING CHART

These are the basic procedures that are used on the M16 plotting board when in the **OBSERVED CHART.**

1. Determine the direction and distance from the mortar position to the target.

2. Index the initial direction and plot the first round over the vertical center line at the range determined.

3. Determine the Mounting Azimuth. Round Off Rule. The initial direction of fire must be rounded off to the nearest 50mils. 1420mils = 1400mils, 1430mils = 1450mils, 1450mils = 1450mils.

4. Superimpose the referred deflection scale directly under the Mounting Azimuth

5. Determine the deflection. Rotate disk until the plot is over the vertical centerline.

6. Determine the lowest charge. Use the charge tables. Find part 1 and turn back one page. Use the Charge vs. Range Chart

7. To plot the observer's corrections, index the observer's azimuth/direction and make corrections from the last plot.

8. Determine the new deflection, range, and charge. Rotate the disk until the new plot is over the vertical centerline.

Note: The observed chart is used for fast and emergency types of missions. You will not use VI, Range Corrections, or any other Corrections to change the Chart Data.

CHART DATA **IS** COMMAND DATA

Command Data is sent to the guns in order for them to fire.

DATA SHEET

For use of this form, see TC 3-22.91. The proponent agency is TRADOC.

SETUP	WEAPON DATA			FO DATA		
				FO	ALT	GRID
TIME OUT:	UNIT:	WPN:	WPN:			
TGT PRFX:		DIR:	DIR:			
TGT NO:	mm CAR: ☐ YES	DIS:	DIS:			
ALARM: ☐ ON ☐ OFF	☐ NO					
MIN E:	BP:	WPN:	WPN:			
MIN N:		DIR:	DIR:			
GD: ☐ E ☐ W	E:	DIS:	DIS:			
LAT: ☐ + ☐ -	N:					
LISTEN: ☐ ON ☐ OFF	ALT:	WPN:	WPN:			
BIT RATE:	AZ:	DIR:	DIR:			
KEY TONE:	DEF:	DIS:	DIS:			
BLK: ☐ SNG ☐ DBL	ELE:					
OWNER ID:						

AMMUNITION DATA

TEMPERATURE _____ **TYPE:** ☐ HE ☐ WP ☐ ILL ☐ CS ☐ TNG

LOT NUMBER									
WEIGHT									
ON HAND									
RECEIVED									
TOTAL									
ROUNDS EXPENDED									
ROUNDS REMAINING									

TARGET DATA

TARGET ID			CHART DATA		FIRING CORRECTIONS				FIRING DATA				INTELLIGENCE				ROUNDS	
TGT NO.	GRID	ALT	DEFL	RG / CHG	DEFL CORR	RANGE CORR	ALT / Vi	ALT CORR	DEFL	RG / CHG	FUZE TIME SETTING	ELEV	TIME FIRED	TARGET DESCRIPTION	METHOD OF ENGAGEMENT	SURVEILLANCE	EXP	REM

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____
☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN _____
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	
_____	RANGE CORRECTION	DEFLECTION _____	TOF
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	MARK TIME
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS							
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV	

BATTLE DAMAGE ASSESSMENT (BDA): AIM POINT GRID:

DA FORM 2399, MAY 2017 PREVIOUS EDITIONS ARE OBSOLETE. APD LC v1.00

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____

☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN _____
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	
_____	RANGE CORRECTION	DEFLECTION _____	TOF
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	MARK TIME
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS							
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV	

BATTLE DAMAGE ASSESSMENT (BDA): AIM POINT GRID:

DA FORM 2399, MAY 2017 PREVIOUS EDITIONS ARE OBSOLETE. APD LC v1.00

DATA SHEET

For use of this form, see TC 3-22.91. The proponent agency is TRADOC.

SETUP	WEAPON DATA			FO DATA		
				FO	ALT	GRID
TIME OUT:	UNIT:	WPN:	WPN:			
TGT PRFX:		DIR:	DIR:			
TGT NO:	mm CAR: ☐ YES ☐ NO	DIS:	DIS:			
ALARM: ☐ ON ☐ OFF						
MIN E:	BP:	WPN:	WPN:			
MIN N:		DIR:	DIR:			
GD: ☐ E ☐ W	E:	DIS:	DIS:			
LAT: ☐ + ☐ -	N:					
LISTEN: ☐ ON ☐ OFF	ALT:	WPN:	WPN:			
BIT RATE:	AZ:	DIR:	DIR:			
KEY TONE:	DEF:	DIS:	DIS:			
BLK: ☐ SNG ☐ DBL	ELE:					
OWNER ID:						

AMMUNITION DATA

TEMPERATURE _____ **TYPE:** ☐ HE ☐ WP ☐ ILL ☐ CS ☐ TNG

LOT NUMBER									
WEIGHT									
ON HAND									
RECEIVED									
TOTAL									
ROUNDS EXPENDED									
ROUNDS REMAINING									

TARGET DATA

TARGET ID			CHART DATA		FIRING CORRECTIONS				FIRING DATA				INTELLIGENCE				ROUNDS	
TGT NO.	GRID	ALT	DEFL	RG / CHG	DEFL CORR	RANGE CORR	ALT / VI	ALT CORR	DEFL	RG / CHG	FUZE TIME SETTING	ELEV	TIME FIRED	TARGET DESCRIPTION	METHOD OF ENGAGEMENT	SURVEILLANCE	EXP	REM

OBSERVED CHART
"BELOW THE PIVOT POINT"

1. If the range to the target is 2900 meters or more, index the DOF.
2. Drop below the pivot point 2000 meters for 60mm and 81mm. (3000m for 120mm)
3. Go to the left or right 500 meters from the vertical center line and plot the mortars.
4. Keeping the DOF indexed, plot the first round at the range determined.
5. Apply the "Round-Off" rule and superimpose the referred deflection under the mounting azimuth.
6. Determining data and applying FO corrections is the same as the pivot point method, **but** you must use the Parallel Line Method to obtain your deflection and initial azimuth.

MCS NOTES

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____

☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	_____
_____	RANGE CORRECTION	DEFLECTION _____	TOF
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	_____
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	MARK TIME
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	_____
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS							
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV	

BATTLE DAMAGE ASSESSMENT (BDA): AIM POINT GRID:

DA FORM 2399, MAY 2017 PREVIOUS EDITIONS ARE OBSOLETE. APD LC v1.00

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____

☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	_____
_____	RANGE CORRECTION	DEFLECTION _____	TOF
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	_____
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	MARK TIME
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	_____
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS							
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV	

BATTLE DAMAGE ASSESSMENT (BDA): AIM POINT GRID:

DA FORM 2399, MAY 2017 PREVIOUS EDITIONS ARE OBSOLETE. APD LC v1.00

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____

☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN _____
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	_____
_____	RANGE CORRECTION	DEFLECTION _____	TOF
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	_____
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	MARK TIME
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	_____
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS						
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV

BATTLE DAMAGE ASSESSMENT (BDA):

AIM POINT GRID:

DA FORM 2399, MAY 2017 PREVIOUS EDITIONS ARE OBSOLETE. APD LC v1.00

RESECTION

1. Two points (targets) must be known and on the chart.

2. Index the observers azimuth/direction to the two points and draw a line straight down the board.

3. Where the lines from the two points intersect is the location of the FO.

NOTES

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____

☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	_____
_____	RANGE CORRECTION	DEFLECTION _____	TOF
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	_____
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	MARK TIME
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	_____
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS							
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV	

BATTLE DAMAGE ASSESSMENT (BDA): AIM POINT GRID:

DA FORM 2399, MAY 2017 PREVIOUS EDITIONS ARE OBSOLETE. APD LC v1.00

BASIC PROCEDURES

Modified Observed Firing Chart

1. Determine "Grid Intersection" to represent the pivot point.
2. Index 0/6400 mils on the plotting board.
3. Superimpose the Grid system:
   A. Drop 2000 meters below the pivot point and on the vertical center line place the Easting indicator. Number every other grid line left and right of the vertical centerline. (Remember that the map's numbers increase as you go to the right and decrease as you go to the left.)
   B. Move left 2000 meters from the pivot point and place the Northing indicator. (Remember that a map's numbers increase as you go up and decrease as you move down.)
4. Read the M16 plotting board as you would a map (right and up). Plot the mortar's position.
5. Round DOF to the nearest 50 mils to determine the MAZ. Superimpose the referred deflection scale at the MAZ.
6. Determine the deflection using the Parallel Line method.
7. Observer corrections, range, charge, and elevation data is acquired the same way as with the observed chart.
8. Altitude:
   A. VI (Vertical Interval): VI is the altitude difference between the mortars and the target that is being fired upon. If the mortars are higher than the target, then the corrections will be a -, if the target is higher than the mortars, then the corrections will be a +.
   B. Altitude Correction: The altitude correction is ½ of the VI. This correction must be applied to each and every chart range to get command range.

Note #1: Always determine the altitude correction to the nearest meter and if the VI is less than 50 meters, an altitude correction doesn't exist.

Note #2: If the VI cannot be determined, assume the target altitude is the same as the mortars.

A. Shift Missions: The target is assumed to be the same altitude as the point being shifted from. If the observer sends a vertical shift, then the shift is applied to the point being shifted from and that is the new altitude to the target.

B. Polar Missions: The altitude of the target is the same as the observer if no vertical shift is given. If one is given then apply the vertical shift from the observer's location and that is the new altitude to the target.

ARTILLERY/MORTAR SAFETY RECORD
For use of this form, see USAIC Regulation 210-4; the proponent is DPTM, Range Control.

DATE: 10 SEP 07 (Date Approved by Rg Ctrl)

FIRING POINT #	**WEAPONS:**
COORDINATES:	**ELEV** / **FUSE: PD VT MO**

Weapon Projectile	Left Limit Mils	Right Limit Mils	Minimum Range Meters	Maximum Range Meters	Minimum Charge	Maximum Charge	Maximum Ordnance Meter or Feet

SPECIAL INSTRUCTIONS:

a. This FB Form 210-4-2R must accompany the corresponding FB Form 210-4-3R.

b. All roadblocks must be emplaced prior to firing. (See Roadblock Map Annex A)

c. Mandatory cease fire time is 1200-1300 for downrange maintenance.

U.B. SAFE/CPT, IN /COMMANDING	**NCOIC/GS11/RG CONTROL**
NAME/RANK/SIGNATURE OF REQUESTING OFFICER	**APPROVED BY:**

FB Form 210-4-2R

Notes

TO DETERMINE THE DIRECTION OF FIRE

WHEN THE RIGHT LIMIT IS LARGER THAN THE LEFT LIMIT

ADD THE LEFT AND RIGHT AZIMUTHS AND DIVIDE BY 2.
LEFT LIMIT AZIMUTH _____+ RIGHT LIMIT AZIMUTH _____ =THE SUM _____ DIVIDED BY 2 = _____DOF

TO GET THE MOUNTING AZIMUTH, THE DOF IS ROUNDED OFF TO THE NEAREST 50 MILS.

WHEN THE RIGHT LIMIT IS SMALLER THAN THE LEFT LIMIT

ADD 6400 TO THE RIGHT LIMIT. SUBTRACT THE LEFT LIMIT FROM THE RIGHT LIMIT AZIMUTH AND DIVIDE BY 2, TAKE THAT REMAINDER AND ADD IT TO YOUR LEFT LIMIT TO DETERMINE THE DOF.

RIGHT LIMIT AZIMUTH _____ + 6400 = _____ - LL/AZ= _____ DIVIDED BY 2= _____(s)

(s) _____+ LL/ AZ (-RL/AZ) = ____ DOF

TO GET THE MOUNTING AZIMUTH, THE DOF IS ROUNDED OFF TO THE NEAREST 50 MILS.

TO DETERMINE THE LEFT AND RIGHT LIMIT DEVIATIONS

COMPARE THE LEFT AND RIGHT LIMIT AZIMUTHS TO THE MOUNTING AZIMUTH. SUBTRACT THE SMALLER FROM THE LARGER.

IF MAZ IS SMALLER THAN THE LL/AZ ADD 6400 TO MAZ

MAZ _____ RL/AZ _____

LL/AZ _____ MAZ _____

LL/DEV_____ RL/DEV_____

IF RL/AZ IS SMALLER THAN THE MAZ ADD 6400 TO RL/AZ

TO DETERMINE THE LEFT AND RIGHT LIMIT DEFLECTIONS

LARS

REFERRED DEFLECTION _____

LEFT DEVIATION + _____ = _____ LEFT LIMIT DEFLECTION

REFERRED DEFLECTION _____

RIGHT DEVIATION -_____ = _____ RIGHT LIMIT DEFLECTION

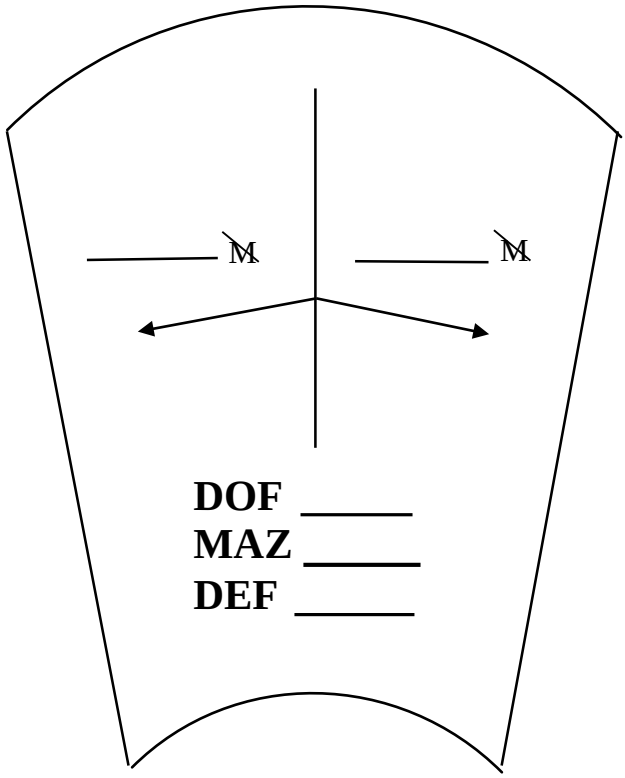
SAFETY DIAGRAM _____

MAX CHARGE:_____

CHG	MIN ELEV
____	_____
____	_____
____	_____

60MM - 81MM - 120MM
(CIRCLE MORTAR FIRED)

MAX RANGE: _____



LEFT LIMIT
AZ _____
DEF _____

RIGHT LIMIT
AZ_____
DEF _____

DOF _____
MAZ _____
DEF _____

MIN RANGE _____

MIN CHARGE _____

CHG	MAX ELEV	TIME	FUZE
_____	_____	_____	
_____	_____	_____	
_____	_____	_____	

FIRING POSITION COORDINATES _____
MOUNTING AZIMUTH _____

***NOTE: A SEPARATE SAFETY FAN WILL BE PREPARED FOR EACH FIRING POSITION AND TYPE OF MORTAR AND AMMUNITION, UNLESS THE BALLISTICS OF THE ROUNDS ARE COMPATIBLE.**

DATA SHEET

For use of this form, see TC 3-22.91. The proponent agency is TRADOC.

SETUP	WEAPON DATA			FO DATA		
TIME OUT:	UNIT:	WPN:	WPN:	FO	ALT	GRID
TGT PRFX:		DIR:	DIR:			
TGT NO:	mm CAR: ☐ YES	DIS:	DIS:			
ALARM: ☐ ON ☐ OFF	☐ NO	WPN:	WPN:			
MIN E:	BP:	DIR:	DIR:			
MIN N:		DIS:	DIS:			
GD: ☐ E ☐ W	E:	WPN:	WPN:			
LAT: ☐ + ☐ -	N:	DIR:	DIR:			
LISTEN: ☐ ON ☐ OFF	ALT:	DIS:	DIS:			
BIT RATE:	AZ:	WPN:	WPN:			
KEY TONE:	DEF:	DIR:	DIR:			
BLK: ☐ SNG ☐ DBL	ELE:	DIS:	DIS:			
OWNER ID:						

AMMUNITION DATA

TEMPERATURE _____ **TYPE:** ☐ HE ☐ WP ☐ ILL ☐ CS ☐ TNG

LOT NUMBER									
WEIGHT									
ON HAND									
RECEIVED									
TOTAL									
ROUNDS EXPENDED									
ROUNDS REMAINING									

TARGET DATA

TARGET ID			CHART DATA		FIRING CORRECTIONS				FIRING DATA				INTELLIGENCE				ROUNDS	
TGT NO.	GRID	ALT	DEFL	RG / CHG	DEFL CORR	RANGE CORR	ALT / VI	ALT CORR	DEFL	RG / CHG	FUZE TIME SETTING	ELEV	TIME FIRED	TARGET DESCRIPTION	METHOD OF ENGAGEMENT	SURVEILLANCE	EXP	REM

NOTES

A. GRID

1. INDEX “0”.
2. PLOT GRID.
3. DETERMINE DATA.

B. SHIFT

1. INDEX OBSERVERS AZIMUTH/ DIRECTION.
2. APPLY OBSERVERS CORRECTIONS TO KNOWN POINT.
3. DETERMINE DATA.

C. POLAR

1. PLOT THE OBSERVERS POSITION.
2. INDEX THE OBSERVERS AZIMUTH/ DIRECTION.
3. PLOT THE ROUND AT THE GIVEN RANGE FROM THE OBSERVERS POSITION.
4. DETERMINE THE DATA.

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____
☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	_____
_____	RANGE CORRECTION	DEFLECTION _____	TOF
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	_____
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	MARK TIME
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	_____
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS							
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV	

BATTLE DAMAGE ASSESSMENT (BDA): AIM POINT GRID:

DA FORM 2399, MAY 2017 PREVIOUS EDITIONS ARE OBSOLETE. APD LC v1.00

MODIFIED OBS CHART (1st GRID MISSION)

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____
☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN _____
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	
_____	RANGE CORRECTION	DEFLECTION _____	TOF
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	MARK TIME
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS							
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV	

BATTLE DAMAGE ASSESSMENT (BDA): AIM POINT GRID:

DA FORM 2399, MAY 2017 PREVIOUS EDITIONS ARE OBSOLETE. APD LC v1.00

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____
☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	_____
_____	RANGE CORRECTION	DEFLECTION _____	TOF
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	_____
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	MARK TIME
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	_____
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS							
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV	

BATTLE DAMAGE ASSESSMENT (BDA): AIM POINT GRID:

DA FORM 2399, MAY 2017 PREVIOUS EDITIONS ARE OBSOLETE. APD LC v1.00

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____

☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN _____
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	_____
_____	RANGE CORRECTION	DEFLECTION _____	TOF
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	_____
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	MARK TIME
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	_____
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS							
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV	

BATTLE DAMAGE ASSESSMENT (BDA): AIM POINT GRID:

DA FORM 2399, MAY 2017 PREVIOUS EDITIONS ARE OBSOLETE. APD LC v1.00

DATA SHEET

For use of this form, see TC 3-22.91. The proponent agency is TRADOC.

SETUP	WEAPON DATA			FO DATA		
TIME OUT:	UNIT:	WPN:	WPN:	FO	ALT	GRID
TGT PRFX:		DIR:	DIR:			
TGT NO:	mm CAR: ☐ YES	DIS:	DIS:			
ALARM: ☐ ON ☐ OFF	☐ NO	WPN:	WPN:			
MIN E:	BP:	DIR:	DIR:			
MIN N:		DIS:	DIS:			
GD: ☐ E ☐ W	E:	WPN:	WPN:			
LAT: ☐ + ☐ -	N:	DIR:	DIR:			
LISTEN: ☐ ON ☐ OFF	ALT:	DIS:	DIS:			
BIT RATE:	AZ:	WPN:	WPN:			
KEY TONE:	DEF:	DIR:	DIR:			
BLK: ☐ SNG ☐ DBL	ELE:	DIS:	DIS:			
OWNER ID:						

AMMUNITION DATA

TEMPERATURE _____ **TYPE:** ☐ HE ☐ WP ☐ ILL ☐ CS ☐ TNG

LOT NUMBER									
WEIGHT									
ON HAND									
RECEIVED									
TOTAL									
ROUNDS EXPENDED									
ROUNDS REMAINING									

TARGET DATA

TARGET ID			CHART DATA		FIRING CORRECTIONS				FIRING DATA				INTELLIGENCE				ROUNDS	
TGT NO.	GRID	ALT	DEFL	RG / CHG	DEFL CORR	RANGE CORR	ALT / VI	ALT CORR	DEFL	RG / CHG	FUZE TIME SETTING	ELEV	TIME FIRED	TARGET DESCRIPTION	METHOD OF ENGAGEMENT	SURVEILLANCE	EXP	REM

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____

☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	_____
_____	RANGE CORRECTION	DEFLECTION _____	TOF
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	_____
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	MARK TIME
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	_____
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS						
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV

BATTLE DAMAGE ASSESSMENT (BDA): AIM POINT GRID:

DA FORM 2399, MAY 2017 PREVIOUS EDITIONS ARE OBSOLETE. APD LC v1.00

SURVEYED FIRING CHART

1. Two surveyed points: ONE BEING A MORTAR POINT AND A REGISTRATION POINT

2. Most accurate chart in mortars.

FIRING: Firing of this chart is the same as with the other charts only we must have two surveyed points. They will not move, so after firing on the registration point, we will have correcting data to apply for better accuracy.

SET UP OF THE CHART:

1. Same as with the modified.

2. Direction of fire is determined by aligning the mortars and registration point. Apply round off rule (nearest fifty) and superimpose refered deflection scale.

3. Fire mission as before.

4. Determine corrections.

DEFLECTION CORRECTION

DEFLECTION CORRECTION: Is the number of mils needed to correct the deflection to hit the target, since nonstandard conditions caused the hit deflection to the RP to be left or right of the initial chart deflection to the RP. Compare the initial chart deflection and the final chart deflection and subtract the smaller from the larger.

RULE: Final chart deflection larger, correct LEFT; final chart deflection smaller, correct RIGHT.

IF THE INITIAL CHART DEFLECTION IS LARGER:

INITIAL CHART DEFLECTION _____ - (MINUS) THE FINAL CHART

DEFLECTION _____ = A RIGHT CORRECTION R_____

IF THE INITIAL CHART DEFLECTION IS SMALLER:

FINAL CHART DEFLECTION _____- (MINUS) THE INITIAL CHART

DEFLECTION _____= A LEFT CORRECTION L_____

This deflection correction **must be** applied **to all** chart deflections processed for targets that are within the transfer limits of the RP.

RANGE CORRECTION

RANGE CORRECTION: Is the number of meters needed to correct the range to hit the target, since nonstandard conditions caused the hit range to the RP to be over or short of the initial chart range to the RP. Compare the initial chart range and the hit range (final chart) to determine the range correction. **RULE:** Initial chart range larger, correction will be - (minus); Initial chart range smaller, correction will be + (plus).

1. If the initial chart range is larger:

Initial chart range _____

Final chart range - _____

Range correction = - _____

2. If the initial chart range is smaller:

Final chart range _____

Initial chart range - _____

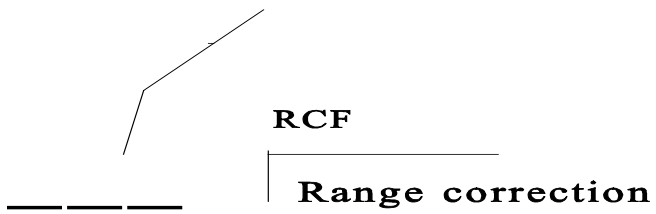
Range correction = + _____

This is used for determining the range correction for the INITIAL REGISTRATION ONLY!

RANGE CORRECTION FACTOR

RANGE CORRECTION FACTOR (RCF): Is the number of meters per thousand to be added to or subtracted from the chart range to hit a target within the transfer limits of the RP.
DETERMINING THE RCF: First determine the range correction for the RP. Then take the initial chart range and round off to the nearest hundred, then express it in thousands. Divide that number into the range correction. Round the answer to the nearest whole meter and use the sign of the range correction for the sign of the RCF.

1. Initial chart range _____
   Round off to nearest 100 _____
   Expressed in 1000 _____



APPLYING REGISTRATION CORRECTIONS

Once the registration has been completed and the corrections determined, we must apply these corrections to all chart data for all targets within the transfer limits of the RP. This gives us COMMAND DATA which we send to the guns to obtain improved first round accuracy.
RULE: Left add, Right subtract. (LARS)

1. If the deflection correction is a RIGHT,
Initial chart deflection _____ -R DEF CORR _____ = Command deflection _____.

2. If the deflection correction is a LEFT,
Initial chart deflection _____ +L DEF CORR _____ = Command deflection _____.

TOTAL RANGE CORRECTION
(TRC)

INITIAL CHART RANGE:

ROUNDED TO THE NEAREST 100:

EXPRESSED IN 1000'S:

RCF: **X**

RANGE CORRECTION:

ALT CORRECTION (+ OR -):

TRC:

EXAMPLE

INIT CHT RNG EXP IN 1000'S	X	RCF	=	RANGE CORR.	+	ALT CORR.	=	TOTAL RNG CORR.
3.1	X	+39	=	+121	+	+400	=	+521

TRC is the total number of meters that must be applied to the chart range to get the command range for entering the firing tables for the lowest charge and corresponding elevation.
You must apply this to each and every chart range to get the command range for firing each round.

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____

☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN _____
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	_____
_____	RANGE CORRECTION	DEFLECTION _____	TOF
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	_____
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	MARK TIME
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	_____
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS							
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV	

BATTLE DAMAGE ASSESSMENT (BDA):

AIM POINT GRID:

DA FORM 2399, MAY 2017

PREVIOUS EDITIONS ARE OBSOLETE.

APD LC v1.00

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____
☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN _____
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	_____
_____	RANGE CORRECTION	DEFLECTION _____	
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	TOF
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	_____
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	MARK TIME
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		_____
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS							
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV	

BATTLE DAMAGE ASSESSMENT (BDA): AIM POINT GRID:

DA FORM 2399, MAY 2017 PREVIOUS EDITIONS ARE OBSOLETE. APD LC v1.00

DEFLECTION CORRECTION
(RE-REGISTRATION)

IF THE INITIAL CHART DEFLECTION IS LARGER:
INITIAL CHART DEFLECTION _____
FINAL COMMAND DEFLECTION - _____
RIGHT CORRECTION **R**_____

IF THE INITIAL CHART DEFLECTION IS SMALLER:
FINAL COMMAND DEFLECTION _____
INITIAL CHART DEFLECTION - _____
LEFT CORRECTION **L**_____

RANGE CORRECTION
(RE-REGISTRATION)

IN ORDER TO DETERMINE THE RANGE CORRECTION FOR THE RE-REGISTRATION, WE MUST FIRST DETERMINE THE ADJUSTED COMMAND RANGE, WHICH IS THE FINAL COMMAND RANGE, WITH ALTITUDE CORRECTION DELETED.

FINAL COMMAND RANGE_____
REVERSE THE SIGN OF THE ALT. CORR. AND APPLY +/- _____
FINAL ADJUSTED COMMAND RANGE_____

COMPARE THE ADJUSTED COMMAND RANGE TO THE INITIAL CHART RANGE AND SUBTRACT THE SMALLER FROM THE LARGER.

IF INITIAL CHART RANGE IS LARGER:
INITIAL CHART RANGE_____
FINAL ADJUSTED COMMAND RANGE_____
RANGE CORRECTION - _____

IF INITIAL CHART RANGE IS SMALLER:
FINAL ADJUSTED COMMAND RANGE_____
INITIAL CHART RANGE_____
RANGE CORRECTION +_____

RANGE CORRECTION FACTOR
(RCF)

THE RANGE CORRECTION FACTOR IS DETERMINED IN THE SAME MANNER AS WITH THE INITIAL REGISTRATION.

DATA SHEET

For use of this form, see TC 3-22.91. The proponent agency is TRADOC.

SETUP		WEAPON DATA			FO DATA		
TIME OUT:	UNIT:	WPN:		WPN:	FO	ALT	GRID
TGT PRFX:		DIR:		DIR:			
TGT NO:	mm CAR: ☐ YES	DIS:		DIS:			
ALARM: ☐ ON ☐ OFF	☐ NO						
MIN E:	BP:	WPN:		WPN:			
MIN N:		DIR:		DIR:			
GD: ☐ E ☐ W	E:	DIS:		DIS:			
LAT: ☐ + ☐ -	N:						
LISTEN: ☐ ON ☐ OFF	ALT:	WPN:		WPN:			
BIT RATE:	AZ:	DIR:		DIR:			
KEY TONE:	DEF:	DIS:		DIS:			
BLK: ☐ SNG ☐ DBL	ELE:						
OWNER ID:							

AMMUNITION DATA

TEMPERATURE _____ **TYPE:** ☐ HE ☐ WP ☐ ILL ☐ CS ☐ TNG

LOT NUMBER									
WEIGHT									
ON HAND									
RECEIVED									
TOTAL									
ROUNDS EXPENDED									
ROUNDS REMAINING									

TARGET DATA

TARGET ID			CHART DATA		FIRING CORRECTIONS				FIRING DATA				INTELLIGENCE				ROUNDS	
TGT NO.	GRID	ALT	DEFL	RG / CHG	DEFL CORR	RANGE CORR	ALT / VI	ALT CORR	DEFL	RG / CHG	FUZE TIME SETTING	ELEV	TIME FIRED	TARGET DESCRIPTION	METHOD OF ENGAGEMENT	SURVEILLANCE	EXP	REM

BALISTIC MET MESSAGE

FOR USE OF THIS FORM, SEE FM 6-15: THE PROPONENT AGENCY IS TRADOC

IDENTIFICATION METB	TYPE MSG K	OCTANT Q	LOCATION $L_AL_AL_A$ $L_OL_OL_O$ OR OR XXX XXX	DATE YY	TIME (Gmt) $G_AG_AG_A$	DURATION (HOURS) G	STATION HEIGHT (10's M) hhh	MDP PRESSURE % STD $P_dP_dP_d$

ZONE HEIGHT (METERS)	LINE NUMBER ZZ	WIND DIRECTION (100's M) dd	WIND SPEED (KNOTS) ff	TEMPERTURE (% STD) TTT	PRESSURE (% STD) PPP
SURFACE	00				
200	01				
500	02				
1000	03				
1500	04				
2000	05				
3000	06				
4000	07				
5000	08				
6000	09				
7000	10				

FROM TO	DATE & TIME (GMT)	DATE & TIME (LST)
MESSAGE NUMBER	RECORDER	CHECKED

DA 3675

MET DATA CORRECTION SHEET FOR MORTARS

FOR USE OF THIS FORM, SEE FM 23-91, THE PROPONENT AGENCY IS US CONTINENTAL ARMY COMMAND

COMMAND DATA			MET MESSAGE			
CHARGE	COMMAND RANGE	ELEVATION	TYPE	STATION	DATE	
ALT OF MORTARS (m)			TIME	ALT MDP	LINE NUMBER	
ALT OF MDP			WIND DIRECTION	WIND VELOCITY	AIR TEMP	AIR DENSITY
SECTION ABOVE + MDP ▲ H BELOW -	+ -		▲ **H CORRECTIONS**		▲ T + -	▲ D + -

WIND COMPONENTS AND DEFLECTION CORRECTION

WHEN DIRECTION OF WIND IS LESS THAN DIRECTION OF FIRE ADD	6400
DIRECTION OF WIND	
DIRECTION OF FIRE	
CHART DIR OF WIND	

CROSS WIND _____ (VELOCITY) X L R_____ (COMPONENT) = L R_____ (LATERAL WIND) KNOTS X _____ (CORR FACTOR) = _____ (DEFL CORR)

RANGE WIND _____ (VELOCITY) X T H_____ (COMPONENT) T H_____ (RANGE WIND) KNOTS

MET RANGE CORRECTIONS

	KNOWN VALUE	STANDARD VALUES	VARIATION FROM STANDARD	UNIT CORRECTIONS	PLUS	MINUS
POWDER TEMP	▲ V_	0	D I			
RANGE WIND	T H	0	T H			
AIR TEMP		100	D I			
AIR DENSITY		100	D I			
WT OF PROJECTILE	☐	2 ☐	D I			
MET CORRECTION TO APPLY				TOTAL		
				RANGE CORR		

	DEFL	RANGE
LAST MESSAGE	L R	+ -
THIS MESSAGE	L R	+ -
CORR TO APPLY	L R	+ -

CONCURRENT MET MESSAGE

METB31 344983
121450 037988
002109 029977
012205 029976
022318 033974
032419 039974
042620 039976
051811 050977
063123 050979

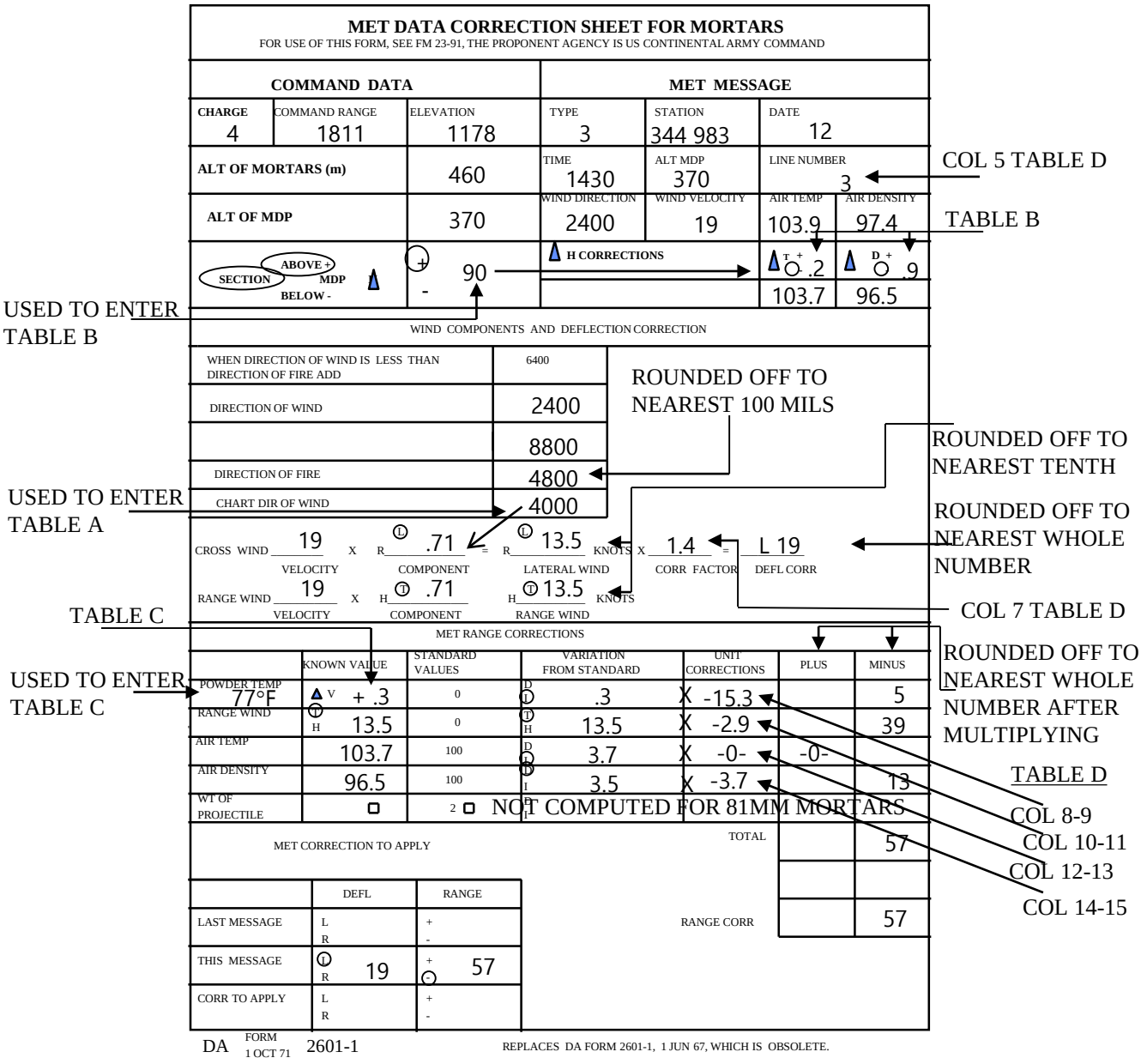
BALISTIC MET MESSAGE
FOR USE OF THIS FORM, SEE FM 6-15: THE PROPONENT AGENCY IS TRADOC

IDENTIFICATION	TYPE MSG	OCTANT	LOCATION $L_AL_AL_A$ OR XXX	$L_OL_OL_O$ OR XXX	DATE YY	TIME (Gmt) $G_AG_AG_A$	DURATION (HOURS) G	STATION HEIGHT (10's M) hhh	MDP PRESSURE % STD $P_dP_dP_d$
METB	K	Q							
METB	**3**	**1**	**344**	**983**	**12**	**145**	**0**	**037**	**988**

ZONE HEIGHT (METERS)	LINE NUMBER ZZ	WIND DIRECTION (100's M) dd	WIND SPEED (KNOTS) ff	TEMPERTURE (% STD) TTT	PRESSURE (% STD) PPP
SURFACE	00	**21**	**09**	**029**	**977**
200	01	**22**	**05**	**029**	**976**
500	02	**23**	**18**	**033**	**974**
1000	03	**24**	**19**	**039**	**974**
1500	04	**26**	**20**	**039**	**976**
2000	05	**18**	**11**	**050**	**977**
3000	06	**31**	**23**	**050**	**979**
4000	07				
5000	08				
6000	09				
8000	10				

FROM TO	DATE & TIME (GMT)	DATE & TIME (LST)
MESSAGE NUMBER	RECORDER	CHECKED

DA 3675



MET DATA CORRECTION SHEET FOR MORTARS

FOR USE OF THIS FORM, SEE FM 23-91, THE PROPONENT AGENCY IS US CONTINENTAL ARMY COMMAND

COMMAND DATA			MET MESSAGE			
CHARGE	COMMAND RANGE	ELEVATION	TYPE	STATION	DATE	
4	1811	1178	3	344 983	12	
ALT OF MORTARS (m)		460	TIME 1430	ALT MDP 370	LINE NUMBER 3	
ALT OF MDP		370	WIND DIRECTION 2400	WIND VELOCITY 19	AIR TEMP 103.9	AIR DENSITY 97.4
SECTION ABOVE + / MDP / BELOW -		+ 90	H CORRECTIONS		T + .2	D + .9
					103.7	96.5

WIND COMPONENTS AND DEFLECTION CORRECTION

WHEN DIRECTION OF WIND IS LESS THAN DIRECTION OF FIRE ADD	6400
DIRECTION OF WIND	2400
	8800
DIRECTION OF FIRE	4800
CHART DIR OF WIND	4000

CROSS WIND VELOCITY 19 X R (L) COMPONENT .71 = R (L) LATERAL WIND 13.5 KNOTS X CORR FACTOR 1.4 = DEFL CORR L 19

RANGE WIND VELOCITY 19 X H (T) COMPONENT .71 = H (T) RANGE WIND 13.5 KNOTS

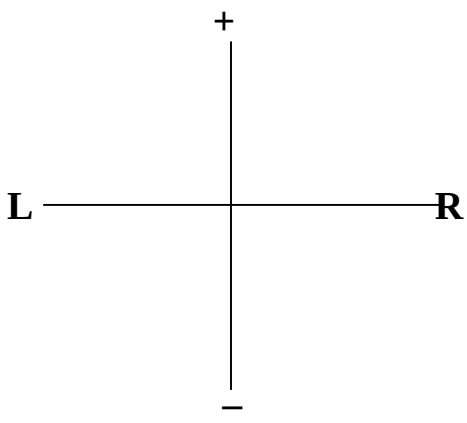
MET RANGE CORRECTIONS

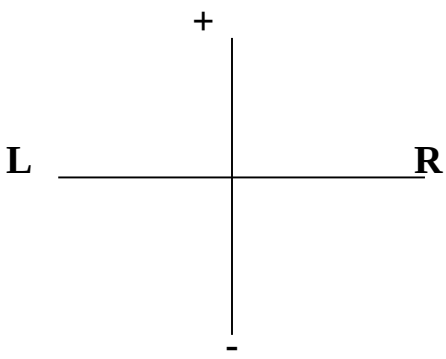
	KNOWN VALUE	STANDARD VALUES	VARIATION FROM STANDARD	UNIT CORRECTIONS	PLUS	MINUS
POWDER TEMP	77°F	V + .3	0	D (T) .3	X -15.3		5
RANGE WIND	T H 13.5	0	T H 13.5	X -2.9		39
AIR TEMP	103.7	100	D (T) 3.7	X -0-	-0-	
AIR DENSITY	96.5	100	D (T) 3.5	X -3.7		13
WT OF PROJECTILE	☐	2 ☐	NOT COMPUTED FOR 81MM MORTARS			
MET CORRECTION TO APPLY				TOTAL		57

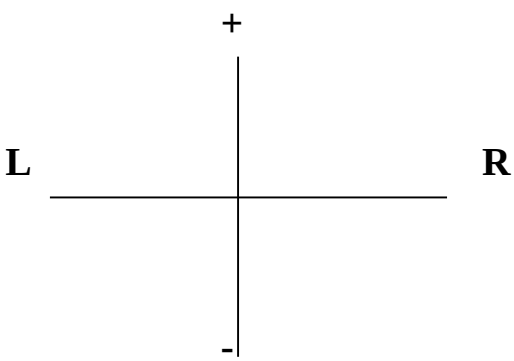
	DEFL	RANGE
LAST MESSAGE	L R	+ -
THIS MESSAGE	T R 19	+ - 57
CORR TO APPLY	L R	+ -
		RANGE CORR 57

DA FORM 1 OCT 71 2601-1 REPLACES DA FORM 2601-1, 1 JUN 67, WHICH IS OBSOLETE.

MET CROSS







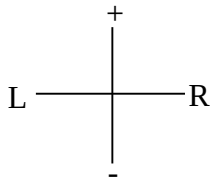
DETERMINATION AND APPLICATION OF MET

During the registration we shot out all of the known and unknown factors that effect the round as it goes down range. Now, with the new type of war that we have, we must be able to up date our equipment without firing. For this we will use the MET message

DETERMINING CORRECTIONS FROM MET

Along with the registration, you should get a met message. You must have two METs to compare to get the corrections to up date. Once you have worked the two METs, you have two sets of data; this is what you will use to get the corrections. The procedures to get the data are:

A. The MET Cross
B. "Where you are, Where are you going"

A. MET Cross: 

Use by placing the two met message data on.

B. "Where you are, where are you going": After placing the data from the met, use the statement.

APPLYING AND UP DATING

After determining the corrections from the met you then apply them by:
A. Determining a new RNG CORR
B. Determining a new RCF
C. Determining a new DEF CORR

Remember that the met is based on the registration point and as with the first correction, we must use the same procedures.

A. Determining the new RNG CORR:

1. We already have a rng corr from the initial registration and to determine the new rng corr, you would either add or subtract the rng corr from the METs.

B. Determining the new RCF:

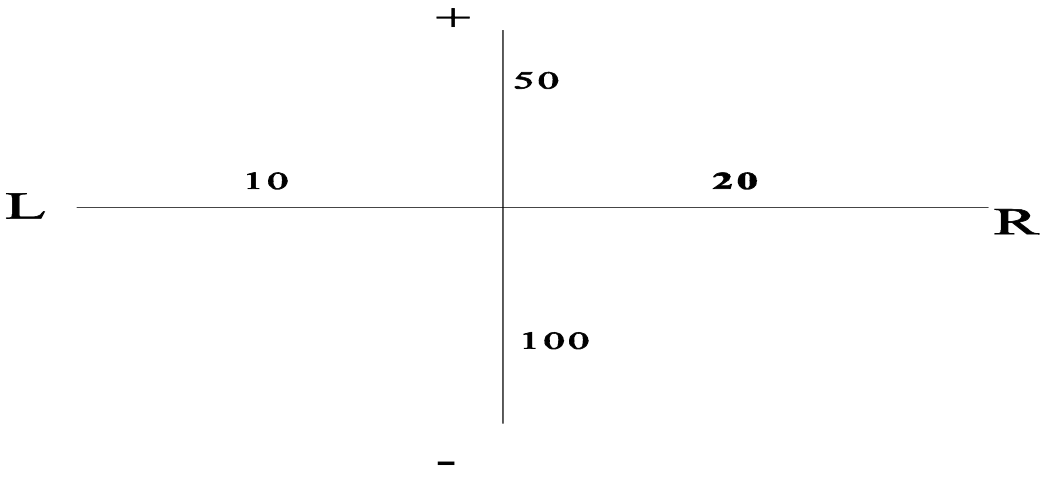
1. As before, once we have the rng corr, we must again: take the initial chart rng (Registration point), nearest 100, express in 1000's and divide that into the new rng corr.

C. Determining the new DEF CORR:

1. By applying the def corr from the METs to the def corr from the registration.

Once you have all the new corrections, you apply them as you did the first time. First up date the RP then the other targets.

MET 1 R20 -100
MET 2 L10 +50



Where are you? R20 -100
Where are you going? L10 +50

How will you get there? L30, +150

Def Corr: You must go from a R20 to a L10. First you have to go L20 in order to cover the R20 and then L10 more.
RNG Corr: You must first move from a -100 to a +100 and then +50 more.

A. RNG CORR: Range correction from the initial registration +75.
Range correction from the two METs +150
New range correction +75
+150
=225

B. RNG CORR FACTOR:
New Range correction +225
Initial Chart Range 3050, nearest 100=3100, expressed in thousands =3.1
+225 ÷ 3.1 = 72.5 = +73

C. Deflection Correction:
Def Corr from initial registration L10
Def Corr from two mets L30
New Def corr L40

Opposite signs: L30
Smaller than larger R10
use sign of larger L20

DATA SHEET

For use of this form, see TC 3-22.91. The proponent agency is TRADOC.

SETUP	WEAPON DATA			FO DATA		
TIME OUT:	UNIT:	WPN:	WPN:	FO	ALT	GRID
TGT PRFX:		DIR:	DIR:			
TGT NO:	mm CAR: ☐ YES	DIS:	DIS:			
ALARM: ☐ ON ☐ OFF	☐ NO	WPN:	WPN:			
MIN E:	BP:	DIR:	DIR:			
MIN N:		DIS:	DIS:			
GD: ☐ E ☐ W	E:	WPN:	WPN:			
LAT: ☐ + ☐ -	N:	DIR:	DIR:			
LISTEN: ☐ ON ☐ OFF	ALT:	DIS:	DIS:			
BIT RATE:	AZ:	WPN:	WPN:			
KEY TONE:	DEF:	DIR:	DIR:			
BLK: ☐ SNG ☐ DBL	ELE:	DIS:	DIS:			
OWNER ID:						

AMMUNITION DATA

TEMPERATURE _____ **TYPE:** ☐ HE ☐ WP ☐ ILL ☐ CS ☐ TNG

LOT NUMBER									
WEIGHT									
ON HAND									
RECEIVED									
TOTAL									
ROUNDS EXPENDED									
ROUNDS REMAINING									

TARGET DATA

TARGET ID			CHART DATA		FIRING CORRECTIONS				FIRING DATA				INTELLIGENCE				ROUNDS	
TGT NO.	GRID	ALT	DEFL	RG / CHG	DEFL CORR	RANGE CORR	ALT / VI	ALT CORR	DEFL	RG / CHG	FUZE TIME SETTING	ELEV	TIME FIRED	TARGET DESCRIPTION	METHOD OF ENGAGEMENT	SURVEILLANCE	EXP	REM

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____

☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN _____
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	_____
_____	RANGE CORRECTION	DEFLECTION _____	TOF
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	_____
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	MARK TIME
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	_____
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS							
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV	

BATTLE DAMAGE ASSESSMENT (BDA): AIM POINT GRID:

DA FORM 2399, MAY 2017 PREVIOUS EDITIONS ARE OBSOLETE. APD LC v1.00

SEARCH MISSION FORMULA

NUMBER OF ROUNDS: 1 RD COVERS 30M, 4 RDS COVER 100M

NUMBER OF TURNS:
ENTER THE FIRING TABLE AT THE FINAL CHT RNG. _____
GO TO COLUMN 4 FOR THE NUMBER OF TURNS PER 100M.
AREA TO BE COVERED (EXPRESSED IN 100ths), FROM THE CALL FOR FIRE. _____

NUMBER OF TURNS PER 100M. X _____

TOTAL NUMBER OF TURNS PER GUN. _____

NUMBER OF INTERVALS:
NUMBER OF INTERVALS IS ONE LESS THAN THE NUMBER OF RDS IN THE FFE.

FFE RDS_____- 1 = _____INTERVALS

NUMBER OF TURNS BETWEEN ROUNDS:
DIVIDE TURNS, _____
BY INTERVALS _____= ____ROUND TO THE NEAREST 1/2 TURN, EQUALS TURNS BETWEEN ROUNDS _____ .

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____
☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN _____
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	_____
_____	RANGE CORRECTION	DEFLECTION _____	
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	TOF
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	_____
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	MARK TIME
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		_____
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS							
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV	

BATTLE DAMAGE ASSESSMENT (BDA): AIM POINT GRID:

DA FORM 2399, MAY 2017 PREVIOUS EDITIONS ARE OBSOLETE. APD LC v1.00

TRAVERSE MISSION

AREA PER GUN:

1. Divide width (actual length) of target_____meters by number of guns_____= number of meters each gun has to cover.

NUMBER OF INTERVALS:

1. The number of rounds for FFE is determined by the area each gun has to cover.(1 round per 30 meters, 4 rounds per 100 meters.)
2. One less than the number of rounds to be fired in FFE_____rds.
   - 1 = _____intervals.

MILS PER GUN:

1. Round final chart range to nearest 100 meters_____.
2. Enter D/C table at the rounded final chart range_____.
3. Go across the top of D/C to the number of meters each gun has to cover and go down to the rounded range, where they intersect is the number of mils each gun has to traverse._____

   NOTE:

   When entering the D/C table at number of meters each gun has to cover, if the number is not present enter at the closest one.. I.E. 80 meters, enter at 75 meters.

NUMBER OF TURNS PER GUN:

1. One turn of the traverse hand crank = 10 mils.
2. Number of mils _____ divided by 10 mils = _____(round off to the nearest whole number) = _____= turns per gun.

TURNS BETWEEN ROUNDS:

1. Divide turns _____by intervals _____(round off to nearest 1/2 turn) = _____ turns between rounds.

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____
☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN _____
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	_____
_____	RANGE CORRECTION	DEFLECTION _____	
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	TOF
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	_____
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	MARK TIME
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		_____
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS							
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV	

BATTLE DAMAGE ASSESSMENT (BDA): AIM POINT GRID:

DA FORM 2399, MAY 2017 PREVIOUS EDITIONS ARE OBSOLETE. APD LC v1.00

ILLUMINATION

1. Entering the Firing Tables is at even 50 meters. Always round to the nearest 50 meters.
2. Everything is in relationship to the HOB (Height of Burst).
3. UP's and DOWN's (The FO will always send up's and down's to the nearest 50 meters)
   a. Columns 2 & 3 is basic data for 600 meter height of burst.
   b. Columns 4 & 5 is the data to change the height of burst 50 meters

NOTE: IF ABOVE H.O.B. USE THE SIGNS IN COLUMNS 4 & 5
IF BELOW H.O.B. REVERSE THE SIGNS IN COLUMNS 4 & 5

4. Range and deviation changes are plotted as with all other missions.
   a. The FO will always send these corrections in 200 meter changes.

5. All previous corrections (up, down, range, deviation) must be applied to the new data.

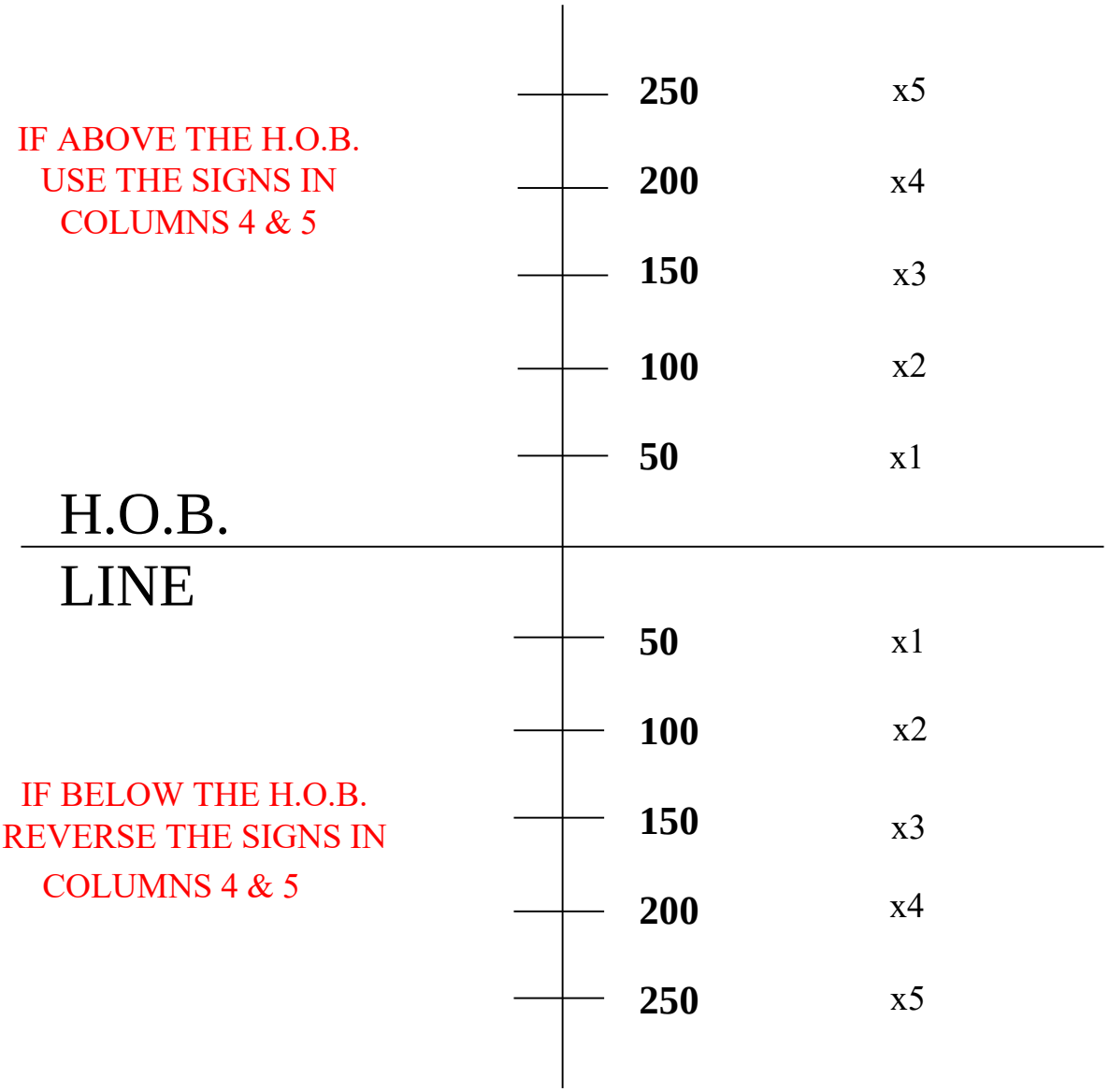
ILLUMINATION MARK

1. Control of firing the illumination and HE are done by the FDC.

2. The FDC will time the flight of the illumination round and compare that to the time of flight for the HE and fire the HE at that time difference. (Ill mark is when the FO has the best light for the target, the HE is fired at the difference so that it will impact at the best light). EXP: Ill T/F=63 seconds, HE T/F=23 seconds. Smaller from the larger, 63-23=40 seconds. Fire Ill and 40 seconds, later you would fire the HE.

3. T/F for HE must be determined each round to insure that it will impact at the best light. Enter the Firing tables at chart range to get T/F for HE.

ILLUMINATION CROSS



COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____
☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN _____
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	_____
_____	RANGE CORRECTION	DEFLECTION _____	TOF
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	_____
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	MARK TIME
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	_____
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS							
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV	

BATTLE DAMAGE ASSESSMENT (BDA): AIM POINT GRID:

DA FORM 2399, MAY 2017 PREVIOUS EDITIONS ARE OBSOLETE. APD LC v1.00

SPLIT SECTION

1. MORTARS AT DIFFERENT POSITIONS:

    a. Use a different deflection scale for each mortar position (This causes less problems when deflections and elevations are sent to the guns).

    b. Firing at the same target:
        1. Use one section to adjust then engage with all.
        2. Commo is the most important consideration when in the split section operation

NOTE: To determine the mounting azimuth for each section:

1. Align each with a known target (RP) if you are within the same area of operation.

2. Outside of AO you will have to determine a DOF as with other charts.

SIMO MISSION

1. Mortars at the same position:
    a. Firing at two targets:
        1. Check the map before deciding which gun to use for the missions
        NOTE: (You do not want to cross fire within the section).

DATA SHEET

For use of this form, see TC 3-22.91. The proponent agency is TRADOC.

1 & 2

SETUP		WEAPON DATA			FO DATA		
TIME OUT:	UNIT:	WPN:	WPN:		FO	ALT	GRID
TGT PRFX:		DIR:	DIR:				
TGT NO:	mm CAR: ☐ YES	DIS:	DIS:				
ALARM: ☐ ON ☐ OFF	☐ NO	WPN:	WPN:				
MIN E:	BP:	DIR:	DIR:				
MIN N:		DIS:	DIS:				
GD: ☐ E ☐ W	E:	WPN:	WPN:				
LAT: ☐ + ☐ -	N:	DIR:	DIR:				
LISTEN: ☐ ON ☐ OFF	ALT:	DIS:	DIS:				
BIT RATE:	AZ:	WPN:	WPN:				
KEY TONE:	DEF:	DIR:	DIR:				
BLK: ☐ SNG ☐ DBL	ELE:	DIS:	DIS:				
OWNER ID:							

AMMUNITION DATA

TEMPERATURE _____ **TYPE:** ☐ HE ☐ WP ☐ ILL ☐ CS ☐ TNG

LOT NUMBER									
WEIGHT									
ON HAND									
RECEIVED									
TOTAL									
ROUNDS EXPENDED									
ROUNDS REMAINING									

TARGET DATA

TARGET ID			CHART DATA		FIRING CORRECTIONS				FIRING DATA				INTELLIGENCE				ROUNDS	
TGT NO.	GRID	ALT	DEFL	RG / CHG	DEFL CORR	RANGE CORR	ALT / VI	ALT CORR	DEFL	RG / CHG	FUZE TIME SETTING	ELEV	TIME FIRED	TARGET DESCRIPTION	METHOD OF ENGAGEMENT	SURVEILLANCE	EXP	REM

DATA SHEET

For use of this form, see TC 3-22.91. The proponent agency is TRADOC.

3 & 4

SETUP		WEAPON DATA			FO DATA		
TIME OUT:	UNIT:	WPN:	WPN:		FO	ALT	GRID
TGT PRFX:		DIR:	DIR:				
TGT NO:	mm CAR: ☐ YES	DIS:	DIS:				
ALARM: ☐ ON ☐ OFF	☐ NO	WPN:	WPN:				
MIN E:	BP:	DIR:	DIR:				
MIN N:		DIS:	DIS:				
GD: ☐ E ☐ W	E:	WPN:	WPN:				
LAT: ☐ + ☐ -	N:	DIR:	DIR:				
LISTEN: ☐ ON ☐ OFF	ALT:	DIS:	DIS:				
BIT RATE:	AZ:	WPN:	WPN:				
KEY TONE:	DEF:	DIR:	DIR:				
BLK: ☐ SNG ☐ DBL	ELE:	DIS:	DIS:				
OWNER ID:							

AMMUNITION DATA

TEMPERATURE _____ **TYPE:** ☐ HE ☐ WP ☐ ILL ☐ CS ☐ TNG

LOT NUMBER									
WEIGHT									
ON HAND									
RECEIVED									
TOTAL									
ROUNDS EXPENDED									
ROUNDS REMAINING									

TARGET DATA

TARGET ID			CHART DATA		FIRING CORRECTIONS				FIRING DATA				INTELLIGENCE				ROUNDS	
TGT NO.	GRID	ALT	DEFL	RG / CHG	DEFL CORR	RANGE CORR	ALT / VI	ALT CORR	DEFL	RG / CHG	FUZE TIME SETTING	ELEV	TIME FIRED	TARGET DESCRIPTION	METHOD OF ENGAGEMENT	SURVEILLANCE	EXP	REM

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____

☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	_____
_____	RANGE CORRECTION	DEFLECTION _____	TOF
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	_____
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	MARK TIME
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	_____
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS							
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV	

BATTLE DAMAGE ASSESSMENT (BDA): AIM POINT GRID:

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DATA SHEET

For use of this form, see TC 3-22.91. The proponent agency is TRADOC.

SIMO

SETUP		WEAPON DATA			FO DATA		
TIME OUT:	UNIT:	WPN:	WPN:		FO	ALT	GRID
TGT PRFX:		DIR:	DIR:				
TGT NO:	mm CAR: ☐ YES	DIS:	DIS:				
ALARM: ☐ ON ☐ OFF	☐ NO	WPN:	WPN:				
MIN E:	BP:	DIR:	DIR:				
MIN N:		DIS:	DIS:				
GD: ☐ E ☐ W	E:	WPN:	WPN:				
LAT: ☐ + ☐ -	N:	DIR:	DIR:				
LISTEN: ☐ ON ☐ OFF	ALT:	DIS:	DIS:				
BIT RATE:	AZ:	WPN:	WPN:				
KEY TONE:	DEF:	DIR:	DIR:				
BLK: ☐ SNG ☐ DBL	ELE:	DIS:	DIS:				
OWNER ID:							

AMMUNITION DATA

TEMPERATURE _____ **TYPE:** ☐ HE ☐ WP ☐ ILL ☐ CS ☐ TNG

LOT NUMBER									
WEIGHT									
ON HAND									
RECEIVED									
TOTAL									
ROUNDS EXPENDED									
ROUNDS REMAINING									

TARGET DATA

TARGET ID			CHART DATA		FIRING CORRECTIONS				FIRING DATA				INTELLIGENCE				ROUNDS	
TGT NO.	GRID	ALT	DEFL	RG / CHG	DEFL CORR	RANGE CORR	ALT / VI	ALT CORR	DEFL	RG / CHG	FUZE TIME SETTING	ELEV	TIME FIRED	TARGET DESCRIPTION	METHOD OF ENGAGEMENT	SURVEILLANCE	EXP	REM

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____

☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	_____
_____	RANGE CORRECTION	DEFLECTION _____	
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	TOF
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	_____
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	MARK TIME
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		_____
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS							
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV	

BATTLE DAMAGE ASSESSMENT (BDA): AIM POINT GRID:

DA FORM 2399, MAY 2017 PREVIOUS EDITIONS ARE OBSOLETE. APD LC v1.00

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____
☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	_____
_____	RANGE CORRECTION	DEFLECTION _____	TOF
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	_____
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	MARK TIME
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	_____
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS							
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV	

BATTLE DAMAGE ASSESSMENT (BDA): AIM POINT GRID:

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DATA SHEET

For use of this form, see TC 3-22.91. The proponent agency is TRADOC.

FPF DATA SHEET

SETUP	WEAPON DATA			FO DATA		
TIME OUT:	UNIT:	WPN:	WPN:	FO	ALT	GRID
TGT PRFX:		DIR:	DIR:			
TGT NO:	mm CAR: ☐ YES	DIS:	DIS:			
ALARM: ☐ ON ☐ OFF	☐ NO	WPN:	WPN:			
MIN E:	BP:	DIR:	DIR:			
MIN N:		DIS:	DIS:			
GD: ☐ E ☐ W	E:	WPN:	WPN:			
LAT: ☐ + ☐ -	N:	DIR:	DIR:			
LISTEN: ☐ ON ☐ OFF	ALT:	DIS:	DIS:			
BIT RATE:	AZ:	WPN:	WPN:			
KEY TONE:	DEF:	DIR:	DIR:			
BLK: ☐ SNG ☐ DBL	ELE:	DIS:	DIS:			
OWNER ID:						

AMMUNITION DATA

TEMPERATURE _____ **TYPE:** ☐ HE ☐ WP ☐ ILL ☐ CS ☐ TNG

LOT NUMBER									
WEIGHT									
ON HAND									
RECEIVED									
TOTAL									
ROUNDS EXPENDED									
ROUNDS REMAINING									

TARGET DATA

TARGET ID			CHART DATA		FIRING CORRECTIONS				FIRING DATA				INTELLIGENCE				ROUNDS	
TGT NO.	GRID	ALT	DEFL	RG / CHG	DEFL CORR	RANGE CORR	ALT / VI	ALT CORR	DEFL	RG / CHG	FUZE TIME SETTING	ELEV	TIME FIRED	TARGET DESCRIPTION	METHOD OF ENGAGEMENT	SURVEILLANCE	EXP	REM

FPF

1. ADJUSTMENT:

a. Firing all guns and adjusting each to it's final location.

b. Attitude (both guns and target) FDC determines the dange close gun and adjust that one only and then the attitude is applied and a confirming round for each gun fired.

c. Attitude for guns and target FDC applies the data but does not fire.

NOTE: If the mission is danger close, 200-400 meters of troops, each gun should be adjusted onto the FPF using HED (D/C), and creeping adjustments.

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____
☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN _____
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	_____
_____	RANGE CORRECTION	DEFLECTION _____	TOF
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	_____
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	MARK TIME
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	_____
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS							
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV	

BATTLE DAMAGE ASSESSMENT (BDA): AIM POINT GRID:

DA FORM 2399, MAY 2017 PREVIOUS EDITIONS ARE OBSOLETE. APD LC v1.00

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____
☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	_____
_____	RANGE CORRECTION	DEFLECTION _____	TOF
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	_____
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	MARK TIME
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	_____
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS							
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV	

BATTLE DAMAGE ASSESSMENT (BDA): AIM POINT GRID:

DA FORM 2399, MAY 2017 PREVIOUS EDITIONS ARE OBSOLETE. APD LC v1.00

COMPUTER'S RECORD

For use of this form, see TC 3-22.91; the proponent agency is TRADOC

ORGANIZATION	DATE	TIME	OBSERVER ID	TARGET NUMBER

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID _____
OT DIRECTION _____
ALTITUDE _____

SHIFT FROM _____
OT DIRECTION _____ ALTITUDE _____

☐ LEFT / ☐ RIGHT _____
☐ ADD / ☐ DROP _____
☐ UP / ☐ DOWN _____

POLAR
OT DIRECTION _____ ALTITUDE _____
DISTANCE _____
VERTICAL INTERVAL
☐ UP / ☐ DOWN
VERTICAL ANGLE
☐ + ☐ _____

TARGET DESCRIPTION

METHOD OF ENGAGEMENT

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUNDS EXPENDED
MORTAR TO FFE _____	DEFLECTION _____	MORTAR TO FOLLOW _____	
MORTAR TO ADJ _____	DEFLECTION CORRECTION	SHELL AND FUZE _____	
METHOD OF ADJ _____	☐ L ☐ R	_____	
BASIS FOR CORRECTION _____	RANGE _____	MORTAR TO FIRE _____	
SHEAF CORRECTION _____	VI/ALT CORRECTION	METHOD OF FIRE _____	MAX ORD
SHELL AND FUZE _____	☐ + ☐ -	_____	_____
_____	RANGE CORRECTION	DEFLECTION _____	TOF
METHOD OF FFE _____	☐ + ☐ -	CHARGE _____	_____
RANGE LATERAL SPREAD _____	CHARGE _____	ELEVATION _____	MARK TIME
TIME OF OPENING FIRE _____	RANGE _____	TIME SETTING _____	_____
MOC TYPE WR ☐ AMC ☐ TOT ☐ OTH ☐	AZIMUTH _____		
	ANGLE T _____		

OBSERVER CORRECTION			CHART/SAFETY DATA		SUBSEQUENT COMMANDS							
DEV	RANGE	TIME (HEIGHT)	DEF/ AZ	RANGE	MORTAR FIRE	METHOD FIRE	AIM AZIMUTH	DEFLECTION	CHARGE	TIME	ELEV	

BATTLE DAMAGE ASSESSMENT (BDA): AIM POINT GRID:

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QUICK SMOKE WORKSHEET

WIND SPEED _____
WIDTH _____
CONDITION _____
HUMIDITY _____
DURATION _____

1. ADJUSTMENT PHASE: ____ RDS

After HE is adjusted, confirm with 1 RD Smoke

2. Determine # Rounds for 1 MIN:

TGT WIDTH _____ **(EXPRESS in 100's of meters)**

X 0.2 **(Scaling Factor)**

X _____ ← **Number from Smoke Card**

_____ **RDS for 1 MIN**

(_____) _____

(Round up to whole #)

3. RDS TO ESTABLISH THE SCREEN

RDS for 1 MIN _____ **X 2** _____ **(Minimum 12 rounds)**

4. DIVIDE ROUNDS TO ESTABLISH BY # OF GUNS FOR INITIAL FFE.

(Number must be divisible by guns. Round up.)

_____ **(EST) ÷** _____**(#GUNS) =**_____ **RDS**

5. RDS FOR MAINTENANCE PHASE

(DURATION)

RDS for 1 MIN _____ **X** _____ **=**_____ **(Maint Total)**

6. DIVIDE 60 BY ROUNDS FOR 1 MIN FOR SECONDS BETWEEN ROUNDS.

RDS for 1 MIN _____) **60** **(** _____ **)=** _____ **SECS**

Round down to whole #

ADJUSTMENT PHASE *(Block 1):* 1 +
ESTABLISHMENT PHASE *(Block 3):* _____ +
MAINTAINING PHASE *(Block 5):* _____ =

TOTAL SMOKE RDS FOR MISSION :____

SMOKE AMMUNITION REQUIREMENTS FOR
4.2 inch Mortars

A. SMOKE CURTAIN

NUMBER OF WP ROUNDS PER MINUTE REQUIRED TO MAINTAIN A SMOKE CURTAIN ON A 500 METER FRONT IN FLANK WINDS 1 2 3

Relative Humidity (percent)	Temperature gradient 4	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				

B. OBSCURING SMOKE EFFECT

THE NUMBER OF ROUNDS PER MINUTE REQUIRED TO MAINTAIN AN OBSCURING SMOKE EFFECT ON A 500 METER FRONT IS OBTAINED BY DOUBLING THE VALUES IN A ABOVE.

1. TO ESTABLISH A SMOKE CURTAIN, EMPLOY VOLLEY FIRE, USING 2 MINUTES AMMUNITION REQUIREMENT (BUT NOT LESS THAN 12 ROUNDS) EQUALLY SPACED ROUNDS ON THE FRONT TO BE CURTAINED.

2. FOR QUARTERING WINDS, MULTIPLY TABLE VALUES BY 2; FOR TAIL WINDS, BY 2; FOR HEAD WINDS, BY 2 1/2. VALUES FOR HEAD AND QUARTERING WINDS ARE BASED ON CURTAIN IMPACT LINE OF 500 METERS IN ADVANCE OF ENEMY LINE.
WIND DIRECTIONS ARE WITH RESPECT TO ENEMY TARGET OR SMOKE SCREEN. IF CURTAIN IMPACT LINE IS CLOSER THAN 500 METERS, AMMUNITION REQUIREMENTS WILL BE CONSIDERABLY LARGER. **CONTROLLED FIRE BY OBSERVERS IS NECESSARY AT ALL TIMES.**

3. TABLE QUANTITIES ARE FOR SHELL IMPACT ON LAND. FOR WATER IMPACTS, MULTIPLY TABLE VALUES BY 1.4.

4. SEE PARAGRAPH 39 FOR AN EXPLANATION OF TEMPERATURE GRADIENT CONDITIONS.

REF: FM 3-50

Smoke Ammunition Requirements for 120mm M929 WP

Number of M929 WP rounds per minute to maintain a smoke curtain on a 500 meter front in flank winds (1)(2)(3)

Relative Humidity	**Temperature Gradient (4)**	Wind Speed (knots)						
%		**2**	**4**	**9**	**13**	**18**	**22**	**26**
30	LAPSE	12	6	6	6			
	NEUTRAL	12	6	4	4	6	8	12
	INVERSION	6	6	3				
60	LAPSE	12	4	4	6			
	NEUTRAL	12	4	3	4	6	6	8
	INVERSION	6	6	3				
90	LAPSE	8	4	3	4			
	NEUTRAL	8	3	3	3	4	6	6
	INVERSION	6	4	3				

(1) Fire a volley of 12 M292 cartridges with fuzes set " 120mm PROX" to establish a smoke curtain. Equally space rounds on the front to be curtained.

(2) For quartering winds, multiply table values by 2; for tail winds, by 2; for head winds, by 2 ½. Values for head and Tail winds are based in curtain impact line of 500 meters in advance of enemy line. Wind directions are with respect to Enemy target or smoke screen. If curtain impact line of 500 meters in advance of enemy line. Wind directions are with respect to enemy target or smoke screen. If curtain impact line is closer than 500 meters, ammunition requirements will be considerably larger. **CONTROLLED FIRE BY OBSERVERS IS NECESSARY AT ALL TIMES.**

(3) Upwind adjustment point is 100 meters.

(4) Reference FM 3-50 appendix F or FM 6-30 Chapter 6 Section IV for an explanation of temperature gradient conditions

Smoke Ammunition Requirements for 81mm M819 RP

Number of M819 RP rounds per minute to maintain a smoke curtain on a 500 meter front in flank winds

RELATIVE HUMIDITY (%)	TEMPERATURE GRADIENT	Wind Speed (knots)						
		2	4	9	13	18	22	26
30	LAPSE NEUTRAL INVERSION	6 2 2	6 4 3	12 8 8	12 8	16 16	24	24
60	LAPSE NEUTRAL INVERSION	6 2 2	6 3 2	8 6 6	8 8	16 12	16	24
90	LAPSE NEUTRAL INVERSION	2 2 1	3 2 2	8 6 4	8 8	12 8	12	16

RANGE IN METERS	DEFLECTION IN METERS														
	1	10	20	30	40	50	75	100	125	150	175	200	300	400	500
500	2	20	41	61	81	102	152	201	250	297	343	388	551	687	800
600	2	17	34	51	68	85	127	168	209	250	289	328	472	599	708
700	1	15	29	44	58	73	109	145	180	215	250	284	412	529	632
800	1	13	25	38	51	64	95	127	158	189	219	250	365	472	569
900	1	11	23	34	45	57	85	113	141	168	196	223	328	426	517
1000	1	10	20	31	41	51	76	102	127	152	176	201	297	388	472
1100	1	9	19	28	37	46	69	92	115	138	161	183	271	355	435
1200	1	8	17	25	34	42	64	85	106	127	148	168	250	328	402
1300	1	8	16	24	31	39	59	78	98	117	136	156	231	304	374
1400	1	7	15	22	29	36	55	73	91	109	127	145	215	284	349
1500	1	7	14	20	27	34	51	68	85	102	118	135	201	265	328
1600	1	6	13	19	25	32	48	64	79	95	111	127	189	250	309
1700	1	6	12	18	24	30	45	60	75	90	105	119	178	235	291
1800	1	6	11	17	23	28	42	57	71	85	99	113	168	223	276
1900	1	5	11	16	21	27	40	54	67	80	94	107	160	211	262
2000	1	5	10	15	20	25	38	51	64	76	89	102	152	201	250
2100	0	5	10	15	19	24	36	48	61	73	85	97	145	192	238
2200	0	5	9	14	19	23	35	46	58	69	81	92	138	183	228
2300	0	4	9	13	18	22	33	44	55	66	77	88	132	175	218
2400	0	4	8	13	17	21	32	42	53	64	74	85	127	168	209
2500	0	4	8	12	16	20	31	41	51	61	71	81	122	162	201
2600	0	4	8	12	16	20	29	39	49	59	68	78	117	156	194
2700	0	4	8	11	15	19	28	38	47	57	66	75	113	150	187
2800	0	4	7	11	15	18	27	36	45	55	64	73	109	145	180
2900	0	4	7	11	14	18	26	35	44	53	61	70	105	140	174
3000	0	3	7	10	14	17	25	34	42	51	59	68	102	135	168
3100	0	3	7	10	13	16	25	33	41	49	57	66	98	131	163
3200	0	3	6	10	13	16	24	32	40	48	56	64	95	127	158
3300	0	3	6	9	12	15	23	31	39	46	54	62	92	123	153
3400	0	3	6	9	12	15	22	30	37	45	52	60	90	119	149
3500	0	3	6	9	12	15	22	29	36	44	51	58	87	116	145
3600	0	3	6	8	11	14	21	28	35	42	49	57	85	113	141
3700	0	3	6	8	11	14	21	28	34	41	48	55	82	110	137
3800	0	3	5	8	11	13	20	27	33	40	47	54	80	107	133
3900	0	3	5	8	10	13	20	26	33	39	46	52	78	104	130
4000	0	3	5	8	10	13	19	25	32	38	45	51	76	102	127

RANGE IN METERS	DEFLECTION IN METERS														
	1	10	20	30	40	50	75	100	125	150	175	200	300	400	500
4100	0	2	5	7	10	12	19	25	31	37	43	50	74	99	124
4200	0	2	5	7	10	12	18	24	30	36	42	48	73	97	121
4300	0	2	5	7	9	12	18	24	30	36	41	47	71	94	118
4400	0	2	5	7	9	12	17	23	29	35	40	46	69	92	115
4500	0	2	5	7	9	11	17	23	28	34	40	45	68	90	113
4600	0	2	4	7	9	11	17	22	28	33	39	44	66	88	110
4700	0	2	4	7	9	11	16	22	27	33	38	43	65	86	108
4800	0	2	4	6	8	11	16	21	27	32	37	42	64	85	106
4900	0	2	4	6	8	10	16	21	26	31	36	42	62	83	104
5000	0	2	4	6	8	10	15	20	25	31	36	41	61	81	102
5100	0	2	4	6	8	10	15	20	25	30	35	40	60	80	100
5200	0	2	4	6	8	10	15	20	24	29	34	39	59	78	98
5300	0	2	4	6	8	10	14	19	24	29	34	38	58	77	96
5400	0	2	4	6	8	9	14	19	24	28	33	38	57	75	94
5500	0	2	4	6	7	9	14	19	23	28	32	37	56	74	92
5600	0	2	4	5	7	9	14	18	23	27	32	36	55	73	91
5700	0	2	4	5	7	9	13	18	22	27	31	36	54	71	89
5800	0	2	4	5	7	9	13	18	22	26	31	35	53	70	88
5900	0	2	3	5	7	9	13	17	22	26	30	35	52	69	86
6000	0	2	3	5	7	8	13	17	21	25	30	34	51	68	85
6100	0	2	3	5	7	8	13	17	21	25	29	33	50	67	83
6200	0	2	3	5	7	8	12	16	21	25	29	33	49	66	82
6300	0	2	3	5	6	8	12	16	20	24	28	32	48	65	81
6400	0	2	3	5	6	8	12	16	20	24	28	32	48	64	79
6500	0	2	3	5	6	8	12	16	20	24	27	31	47	63	78
6600	0	2	3	5	6	8	12	15	19	23	27	31	46	62	77
6700	0	2	3	5	6	8	11	15	19	23	27	30	46	61	76
6800	0	1	3	4	6	7	11	15	19	22	26	30	45	60	75
6900	0	1	3	4	6	7	11	15	18	22	26	30	44	59	74
7000	0	1	3	4	6	7	11	15	18	22	25	29	44	58	73
7100	0	1	3	4	6	7	11	14	18	22	25	29	43	57	72
7200	0	1	3	4	6	7	11	14	18	21	25	28	42	57	71

MATH METHOD

(Observed Firing Chart)

Step 1- Take Mortar Position (MP) Grid and Forward Observer (FO) / Target (TGT) Grid and label them by Easting and Northing

Step 2- Covert all Grids to 10 digit Grids by adding a "0" to the Eastings and Northings.

Step 3- Individually compare TGT/FO Easting to MP Easting, Subtract the **SMALLER** from **LARGER**. Repeat with Northings.

Step 4- Determine Direction and Distance based of results from Step 3.
YOU WILL ALWAYS COMPARE FROM MORTAR POSITION

EX: MP Easting: 23450 - LARGER
TGT Easting: 21450 - SMALLER
2000(m) – Since the Mortar Position Easting is larger than the TGT Easting the direction you will move from the MP, on your plotting board, **WILL** be Left (map eastings ascend from Left to Right). Left 2000 meters

Ex: TGT Northing: 95120 - LARGER
MP Northing: 94150 – SMALLER
970(m) - Since the TGT Position Northing is larger than the MP Northing the direction you will move from your location (Left/Right), on your plotting board, **WILL** be Up (map Northings ascend from Bottom to Up). Up 970 meters

Combined it will look like: Right 2000m, Up 970m, **FROM THE MORTAR POSITION.**

When applying the "Math Method" to an Observed Firing Chart, Pivot Point method, you must index "0" and then move the distance you determined with your math. Your MP for Pivot Point will be the Pivot Point.

Ex: If I use the answers above I will be moving Right 2000m, Up 970m. First I will index "0" and then move Right 2000, Up 970 from the Pivot Point and plot my TGT. Once it is plotted, I will then parallel plot utilizing the Vertical Center Line with Range Scale just like a normal setup. I can then pull my Azimuth (DOF) and superimpose my Referred Deflection Scale.

The same process applies for an Observed Firing Chart, Below Pivot Point, except for now you can place your MP anywhere on the board as long as you can manipulate the distances to your FO/TGT.

Ex: If I am moving Right 2000, Up 970, I would place my MP in the left lower quadrant of the plotting board with "0" indexed to ensure I can apply the appropriate distance. One I have made my plot I would then parallel plot like I would when using the Modified Observe Firing Chart.