National Defence / Défense nationale

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INSERT – FIELD ARTILLERY
(English)

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TAM 803 – FIELD ARTILLERY

SECTION 1 – GENERAL

803.01 – STANDARD MOVEMENT ORDER FORM

	Notes
1. **Wng O:** a. Originator of order b. no move before/degree of notice to move c. new area d. order of march e. misc	
2. **Obsn Party:** a. new loc of OPs b. time of O Gp c. loc of O Gp d. loc of RV e. ln with_____at_____. f. time to move g. zones of obsn h. rte i. misc	
3. **Recce Party:** a. new area b. degree of preparation c. centre of arc and arcs of fire d. line to shoot down to (LTSDT) e. RV f. rte g. misc	
4. **Gun Gp:** a. new area b. mov now or mov at c. RV d. rte e. order of march f. time to be ready (TTBR) g. misc	

Figure 1: Std Mov Order Form

803.02 – ROYAL CANADIAN ARTILLERY YARDSTICKS

1. The times shown are a guide for planning purposes only. Actual circumstances, e.g. terrain, state of trg and freshness of tps, climate, etc. will obviously have considerable effect and will indicate that the figures shown are not true for all sit.

DEPLOYMENT

2. To prep area after arrival of full regt recce party:
   a. min: 30 min;
   b. normal: 1 ½ hrs;
   c. max: 3 hrs.
3. To move a bty off a main rte, into action, and report "READY":
   a. 105 mm How (towed): 15 min;
   b. 105 mm LG1 (towed): 15 min; and
   c. 155 mm How self-propelled (SP): 15 mins.
4. To dig a gun pit for a 105 mm How (by hand), in average grd, with seven detachment members working in shifts: 4 to 6 hrs.
5. To load an MLVW truck using six men with:
   a. 100 rds of 105 mm ammo: 20 mins; and
   b. 48 rds of 155 mm ammo: 30 mins.

LOCATING DEVICES

6. **Sound Ranging (SRG)**.

SRG BASE	NO. OF MIC	DISTANCE APART	TOTAL LENGTH	TIME TO DEPL INCL RECCE/ SVY/LAY LINE	TIME TO DEPL USING RAD LINK EQPT
Short	4	300 to 700 m	900 to 2100 m	1 ½ to 5 hrs	1 to 2 hrs
Long	9	1500 to 2000 m	12 000 to 16 000 m	6 to 8 hrs	3 to 4 hrs

Figure 2: Sound Ranging Depl Times

7. **Survey**. A survey (svy) tp can be expected to fix 12 to 16 survey control points (SCPs) a day.
8. **Radar**. To close down, come out of action, move 5 kms, and come into action again, incl recce: 30 to 45 mins.

AIR OBSERVATION

9. **Endurance**. The Tac Sp Flt of the Tac Hel Sqn can maint an ac on continuous watch throughout the hrs of daylight (if no other task). One sortie can remain in the air up to 2 hrs. Weather is the restricting factor.

FIRE PLANNING

10. **Attack**. Covering fire from fd guns, using impact fuzes, should be opened no closer than approx 400 m in advance of the line of departure (LD), whether the sp tps be on foot or in armd vehs. Fire can then dwell on the tgt until the tps on foot close to within 200 m of the covering fire, and armd vehs to within 100 m. The fire of med guns and mors should be lifted from the path of tps on foot when they are within 400 m of the fire.

11. **Defence**. The proximity of defensive fires (DFs) to our dug-in tps must be assessed by the arty observer bearing in mind prevailing conditions. The fol distances in metres are acceptable as a guide: (wartime, not with peacetime safety restr).

EQPT	PREDICTED DF		ADJUSTED DF	
	IMPACT FUZE	VARIABLE TIME FUZE (VT)	IMPACT FUZE	VARIABLE TIME FUZE (VT)
105 mm How	300 m	600 m	200 m	600 m
155 mm How	400 m	600 m	300 m	600 m

Figure 3: Impact and VT Ammo Safe Distance

12. **Response Times to Calls for Fire**.

Final Protective Fire (FPF)	30 sec plus Time of Flight (TOF)
Direct Support (DS) Arty	2 to 4 mins
Fire Mission (FM)	[redacted]
Div called for on:	
a. Regt Net	6 to 8 mins
b. Bty Net	9 to 12 mins

Figure 4: Response Times to Calls for Fire

13. **Work on the Gun (Full Det)**.
    a. to traverse 250 mils or more and relay on a new tgt (within traverse limits for 105 mm):
        (1) 105 mm How: 30 sec to 1 min;
        (2) 105 mm LG1: TBI; and
        (3) 155 mm (SP): 20 sec.

14. **To prep 20 rds**:

105 mm	FROM TUBES	FROM BOXES
High Explosive Point Detonating (HEPD) and White Phosphorous (WP)	5-10 mins	10-15 mins
HE VT, Time, Smk, Illum	10-15 mins	15-20 mins
155 mm	**From Tubes**	
HEPD and WP	15-20 mins	
High Explosive (HE) VT, Time, Smk, Illum	15-20 mins	

Figure 5: Time to Prepare 20 Rds

803.03 – ACCURACY/TOLERANCES

1. **Production Firing Data**.

SER	INSTRUMENT TO INSTRUMENT	TOLERANCE
1	Indirect Fire Control Computer System (IFCCS) - IFCCS	NONE
2	Battery Fire Control System (BFCS) – BFCS	1 mil/10 m
3	IFCCS/BFCS - MAPS	10 mils/100 m
4	maps – maps (b/w Tech)	10 mils/100 m
5	GPO's Check Map to All	20 mils/200 m

Figure 6: Production of Firing Data Accuracy/Tolerances

2. **Linear Measurement**.

SER	INSTRUMENT	ACCURACY/TOLERANCE
1	DI 1000	1/10 000 m
2	tp ranger	1/1000 m
3	laser rge finder ANV/GS-5A	(+) 10 m ALL RANGES
4	stadia rod	UP TO 200 m (+) 5 m 200 TO 400 m (+) 10 m
5	pacing	1/50 m

Figure 7: Linear Measurement Accuracy/Tolerances Orientation

3. **Orientation.**

SER	INSTRUMENT	ACCURACY/TOLERANCE
1	RSCP/SCP	(+) 0.6 mils
2	simo	(+) 2 mils (within 6000 m)
3	gyro	(+) 0.6 mils
4	aiming circle (compass)	(+) 5 mils
5	T-16 theodolite (compass)	(+) 5 mils
6	prismatic compass	(+) 20 mils

Figure 8: Orientation Accuracy/Tolerances

4. **Fixation**.

SER	INSTRUMENT	ACCURACY/TOLERANCE
1	map spot	200 m eastings & northings
2	resection 1/50 000	100 m eastings & northings
3	resection 1/25 000	50 m eastings & northings
4	survey control point (SCP)	(+) 2 m eastings, northings, & altitude
5	regt survey control point (RSCP)	(+)10 m eastings, northings & 1/2 contour
6	Precision Lightweight Global Positioning System Receiver (PLGR) + 96 Precision Positioning System (PPS)	(+) 10 m eastings & northings
7	PLGR+ 96 Standard Positioning System (SPS)	(+) 100 m eastings & northings

Figure 9: Fixation Accuracy/Tolerances

5. **Meterology.**

SER	INSTRUMENT	ACCURACY/TOLERANCE
1	computation - computation	1 mil / 1 m
2	IFCCS - IFCCS	TBD
3	BFCS - BFCS	1 mil / 10 m

Figure 10: Met Accuracy/Tolerances

803.04 – DEGREES OF PREPARATION

1. **Min**. The initial degree of readiness always includes:
   a. confirmation that the area is suitable;
   b. selection of gun, ech and CP areas;
   c. check of crest clearance;
   d. selection and map spot of pt of origin for bty svy; and
   e. rough sketch of bty layout.

2. **Normal**. Is the degree of preparation for daylight occupation, includes all min preparation plus:
   a. selection of posns for:
      (1) director(s);
      (2) gun platforms;
      (3) CP's; and
      (4) wagon line if applicable.
   b. markings, gun platforms;
   c. completion of bty svy;
   d. laying of line;
   e. formulating local def and trk plan;

f. recording of convergence position (CP) and fuze correction (FC) data; and
g. if time permits, any additional preparations for opening fire that can be made.

3. **Max**. Is the max degree for daylight occupation and the normal degree for night occupation. Includes all normal preparation plus:
a. recce of a prelim posn;
b. recording of night reference objects (ROs) and angles to gun markers from the director;
c. erection of night pickets and night directional signs;
d. additional preparations for orienting the guns as required;
e. laying of any line such as:
(1) from the director(s) to the CP;
(2) from the CP to the altn CP; and
(3) from the CP's to the local def outposts as required; and
f. laying of marking tape at last light to mark rtes as required.

803.05 – SURVEY STATES

1. **Survey States**. The state of survey is normally sent to higher HQ, RCPO and the BC along with the report "READY". They are as fol:
a. State A. All guns within the bty are not on common fixation and orientation.
b. State B. All guns within the bty are on common orientation and fixation.
c. State C. All guns within the bty are on common orientation and fixation and in sympathy with the regt.
d. State D. All guns within the bty are on common orientation and fixation and in sympathy with the div.

803.06 – ZONE TIME OF FLIGHT TABLES/CONVERSION TABLES

1. Zone TOF Tables: TBI
2. Conversion Table Mils/Degrees: TBI
3. Conversion Table Metres/Miles: TBI

SECTION 2 – OCCUPATION

803.07 – OBSERVATION POST

1. **Main Duties of the Forward Observation Officer (FOO)**:
a. act as fire sp advisor and coord to sp arm comd at Cbt Tm level;
b. est an OP and observe a zone or area as ordered by his BC;
c. engage tgts;
d. report tac info to his BC, Bty CP, and sp arm as required;
e. report hostile mortaring, shelling, bombing, and nuc strikes to his BC and Bty CP;

f. report the suitability of potential gun areas to his BC and Bty CP; and
g. perform all duties as detailed by his BC.

2. **Purpose of Arty OPs**:
   a. engagement of tgts by observed fire;
   b. battlefield surv;
   c. fire planning; and
   d. maint of ln with the tps being supported or in whose area the OP is situated.

3. **Selection of an OP**. The OP should be located to provide the best possible view of the zone or area to be observed. It should also provide:
   a. comd of the grd being occupied by the supported tps;
   b. cover from grd and air obsn, including a covered approach to the OP;
   c. high performance op of rad and other elec eqpt used by the party;
   d. conformity with the local def pattern of the supported tps;
   e. an OP base, i.e., a small area to serve as a maint base and vehicle park, close to the OP and hidden from en obsn; and
   f. it must be emphasized that a static OP is deployed as part of an overall obsn plan and the responsibility for its depl is the BC, not the supported arm comd.

4. **Occupation of an OP**. The method of occupying an OP varies considerably with the type of op. Whether the occupation is to be carried out hastily during mobile ops or deliberately during static ops, the following factors must be considered:
   a. the tac sit;
   b. the availability of a covered approach to the OP;
   c. the proximity to which vehs can be brought to the OP;
   d. the protection and mobility of APCs during mech ops must be fully exploited;
   e. occupation of a static OP should take place during pds of poor visibility or at night; and
   f. cam and concealment must be of a very high std.

5. **Initial Actions Upon Occupation**. As soon as he occupies an OP, the observer will:
   a. plot the OP and the zone of obsn on the map, send his loc to his BC, and to the gun posn;
   b. check his comms;
   c. select on the map one or two prominent pts visible from the OP and plot them to assist in orientation;
   d. set up the tgt map;
   e. conduct silent zone ident (confirm with tech);
   f. ensure that the OP Tech sets up the laser range finder (LRF) and orients it;
   g. ensure that all other target acquisition (TA) means are set up;
   h. begin prelim planning of a tgt list; and
   i. confirmation of tgt locs of previously issued tgts.

6. **Reporting and Recording of Info**. An important task of the arty observer is the prompt accurate reporting of tac info. Info of immed value is reported without delay; other info is recorded and reported at intervals as ordered. The following shall be reported as they occur:

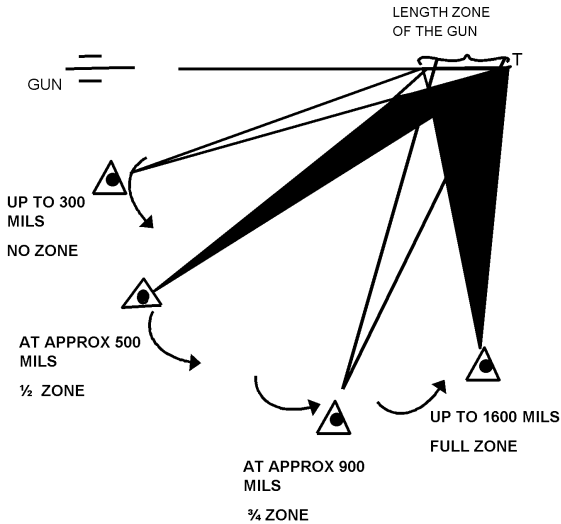
a. mov of own tps, so that safety may be ensured when tgts are engaged;
b. a description of each tgt engaged and the result of the engagement (both sent as parts of calls for fire);
c. hostile shelling, mortaring, air, nuc and toxic atk, by use of the appropriate report, i.e., SHELREP, MORTREP, BOMBREP, NUCREP, or TOXREP; and
d. any important or unusual en activity or mov.

7. All info obtained is recorded in the OP log. A sample extract from such a log is shown below:

DATE	TIME	EVENT	ACTION	REMARKS
6 Jul	1005	3 APCs moving west along rd 4467 - entered wood at 443673.	BC info.	
	1045	D Coy req wood 4567 blinded while 10 pl moves fwd 200 m.	Smk fired 1100 hrs. BC info.	Smk effective.
	1135	10 pl now at 451664	BC and CP info.	
	1205	Shelling 400 m WEST of OP.	SHELREP sent 1208 hrs.	

Figure 11: A Sample Extract from an OP Log

8. **Effect of Angle T on the Length of Zone**. Angle T is the angle enclosed by the line OT and the line GT. As 82% of all rds fall within 2 PEr plus and minus of the tgt (4 PEr total), this is used as a basis for calculation. The resulting effective length of zone is therefore 4 PEr.



AS ANGLE T, GUN-TARGET-OBSERVER, INCREASES THE APPARENT LENGTH OF THE ZONE INCREASES

Figure 12: Effect of Angle T on the Length of Zone

9. **Example.**

155 mm How M109 A1
Rge 9000 m charge 6 White Bag
Angle T = 500 mils
1 PEr = 24m
Therefore 82% zone = 4 X 24 = 96m
Apparent length of zone = ½ of 96m = 48m

Therefore any rds within 24m of each side of line OT should initially be considered on line. For convenience this width of 24 m can be converted to mils as read in binos or by any other method of angular measurement:The following formula is used:

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

Where W is width in meters;
Where R is the OT Factor; and
Where M is the angular measurement in mils.
Continuing with this example, if W=24, if R=3, then M is:

$$M = \frac{24}{3} = 8$$

Hence, all rds observed with binos that fall within 8 mils left and right of the tgt are considered on line.

10. **Measuring Angles Using the Hand**.

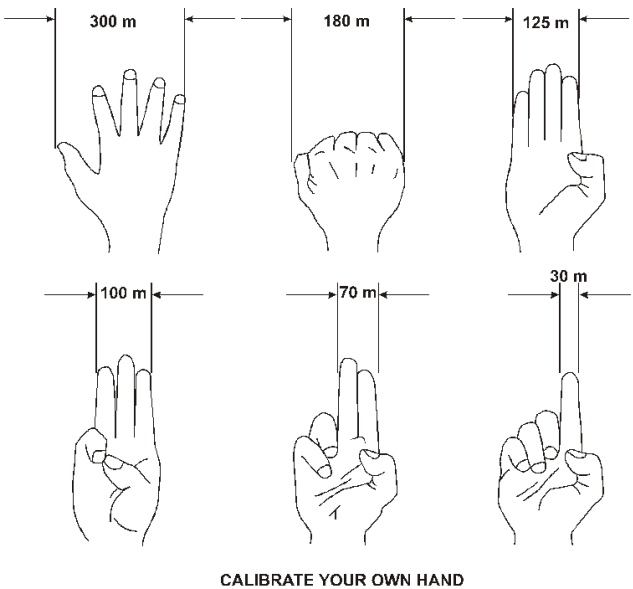


Figure 13: Measuring Angles Using the Hand

11. **Panoramas**. A panorama is a drawing of a view seen from an OP. Arty panoramas are useful for two purposes:

a. as an aid to an arty comd for briefing and indicating tgts for observed fire to his subordinates; and

b. as an aid to obsn during periods of reduced visibility as an alternative to the tgt map, and to assist in ident of features by moonlight and artificial means.

12. **Shooting Tips:**

a. Always have your OT factor ready before the first rd lands.

b. If first rd is likely to be lost, adjust original grid by a tgt grid correction so that the rd will be seen.

c. Rehearse lost drill with your tech.

d. One observer uses binos, and other members of the party use eyes alone (split tgt area up for initial rd).

e. Consider angle T.
f. Always give a tac description for each tgt.
g. Record all tgts likely to be re-engaged.
h. Do not change line OT (dir) after initial rd, if angle T is over 500 mils, unless a min of two adjusting rds are off line OT.
i. Always measure off line distance of initial rd as accurately as possible.
j. The no. of guns used and the duration of Fire For Effect (FFE) must be decided before the call for fire is made. When the aim is to neutralize with HE, the principles observed are:
   (1) an adequate no. of rds must fall in the tgt area;
   (2) to be most effective, FFE is applied in bursts at varying intervals with the max weight on the tgt during the first three minutes; and
   (3) whenever obsn of FFE is possible, it must be done carefully and every attempt made to render the fire more effective.
k. Observer goes into FFE:
   (1) at the split of the short bracket;
   (2) when he observes a tgt rd during adjustment; and
   (3) during a shoot with mechanical time Fuzes, when the Mean Pont of Burst (MPB) of three airbursts is adjusted to 20 m.
l. Short Brackets are as fol:

Bty	(+/-) 100 m
Regt	(+/-) 200 m
Div	(+/-) 400 m

Figure 14: Short Brackets

803.08 – GUNLINE

1. **Deployment**:
   a. Action on receipt of move orders (within 10 min):
      (1) Nominate the recce O, if not the GPO.
      (2) Give orders concerning:
         (a) composition of recce party (altn CP, guides, protection party);
         (b) extra eqpt to be taken (aiming posts, etc.);
         (c) loc of recce RV; and
         (d) loc of gun gp RV or bty release point (rel P).
      (3) Do a quick map recce of new area and rte ordered.
      (4) Brief recce party.
   b. En rte to new area:
      (1) Check suitability of rte ordered.
      (2) Report obstacles and rtes around them on regt net to DCO, RCPO and bty.
      (3) Report on regt net any suitable gun areas observed and likely ambush areas to bty CP.
      (4) Cfm suitability of bty gun gp.

c. Upon arrival in new area:
   (1) Conduct security sweep of area.
   (2) Verify centre of arc (C of A) and arcs of fire with compass.
   (3) Recce all areas allotted and check Crest Clearance and Line to Shoot Down To (LTSDT).
   (4) Posn a sentry to warn of air or grd atk.
   (5) Select posns for:
      (a) guns;
      (b) CP area;
      (c) A ech; and
      (d) wagon lines, if nec.
   (6) Call recce party fwd.
   (7) Formulate bty svy plan and method of orienting bty director.
   (8) Give dir to Battery Sergeant-major (BSM), PRONTO, Troop Sergeant-major (TSM) on:
      (a) loc of gun line, director, bty CP, A ech and wagon lines;
      (b) outline local def plan and trk plan;
      (c) laying of line;
      (d) confirm gun gp RV, bty rel P (if required); and
      (e) method of occupation.
   (9) Posn gun markers.
   (10) Check bty survey and bty director with compass (within 20 mils/100 m).
   (11) Obtain CP and FC data.
   (12) Report posn prepared with loc to Ops O, DCO, RCPO, BC and bty.
   (13) Select posns of assy for adv and wdr.
d. Upon arrival of the guns:
   (1) Supervise occupation of the bty posn.
   (2) Passage of line to the guns.
e. After occupation is completed:
   (1) Check each gun with compass.
   (2) Conduct check bearing and quick sight test.
   (3) Order recce stores loaded for next recce/or update svy if time permits.
   (4) Check that CP set-up is complete (i.e. tgt records, laying of line, tac map, etc.).
   (5) BK briefs GPO, TSM and Nos 1 on:
      (a) tac sit;
      (b) local def plan;
      (c) pri of work;
      (d) stand easy areas;
      (e) passwords; and
      (f) adm pts.
   (6) Recce of the alternative posn.

2. **Bty Survey**:
   a. **Orientation Only**. Compare old grid bg to RO with new grid bg to RO. The difference is the amount of change required to the orientation:
      (1) The change for the guns is equal to the old bg minus the new bg.
      (2) The change in RO's and tgt records is the same amount required for the guns but in the opposite dir.
      (3) The following example shows the computation required:
         (a) bg C of A – 0800 mils;
         (b) old bg to RO – 3201 mils;
         (c) new bg to RO – 3217 mils; and
         (d) change in orientation for the guns [(b) minus (c)] is – 16 mils or left 16 mils.
      (4) The GPO would order "BG 0784 RECORD AT 0800" to the guns.
      (5) He would order "AMEND RO'S AND OLD GRID TGT RECORDS RIGHT 16" to his CP Tech.
   b. **Fixation Only**. Deduce a new grid (GR) for the bty centre and compare to the old one as fol:
      (1) The orders for a change in fixation include the new GR and altitude (alt) of the bty centre.
      (2) The GPO would order "CHANGE TO REGT GR AT ____HRS, GR 12345678, ALT 311" to his CP Tech.
   c. **Orientation and Fixation**. If a change in both is required the steps detailed in both sub-paras a and b are required. The GPO would order "CHANGE TO REGT GR AT ____HRS, BG 0784 RECORD AT 0800, AMEND RO'S AND OLD TGT RECORDS RIGHT 16 MILS; GRID 12345678, ALT 311".
   d. **Simultaneous Obsn**:
      (1) All directors are levelled for Astral obsn.
      (2) Master station orients the instrument and orders outstations: "PREPARE TO TRACK THE __(SUN, MOON, ETC.)".
      (3) The outstations lay on the celestial body with 0000 mils on the horizontal scale and using the lower gear track the celestial body Outstations report "READY".
      (4) Master station, using upper gear, tracks the celestial body and orders "TRACKING 3-2-1 UP".
      (5) On "UP" all stations cease tracking and master station records the bearing to the celestial body.
      (6) If outstation tracked properly it will answer "ROGER OUT". If not the report "BAD TRACK OVER" will be made and the drill repeated.
      (7) Master station sends its bearing to the celestial body and the outstation reads back.

(8) The outstation, using the upper gear lays on the RO on the horizontal scale. This reading is added to the bg passed by the master station. The result is the bg to the RO.
(9) The outstations set the bg to the RO on the horizontal scale and lay on the RO. Using the upper gear swings onto the celestial body and reports "TRACKING, OVER".
(10) The master station has followed the celestial body during this interval and orders "TRACKING 3-2-1 UP, OVER".
(11) The outstations answer "ROGER OUT"(see sub-para (4)).
(12) The outstations report the recorded angle (bg to the celestial body) to the master station.
(13) If this bg agrees within 2 mils of the bg read by the master station, the master station will answer "CORRECT, OUT". If not, it will order "WRONG, REPORT WHEN READY, OVER" and the drill is repeated.
(14) Outstations will check the bearing to the RO with the Prismatic compass against gross error.

3. **Quick Actions**:
   a. **Preparation for Opening Fire**:
      (1) **GPO**: Plots tgt and own loc on map. Determines bg of fire. Roughly lines up guns by indicating line of fire. Orients first gun by compass.
      (2) **Tech WO**: Checks GPO's plots and bg of fire. Determines rge. Prepares engagement data for the initial rd.
      (3) **Tech (Director)**: Sets up director. Passes line from first gun to remaining guns.
   b. **Establishing Parallelism**:
      (1) **Modified Individual Method**:
         (a) GPO directs first gun on by compass;
         (b) after first rd fired orders "Aiming Point Director";
         (c) No.1 lays on director and reports reading;
         (d) GPO orders No.1 to record at nearest 100 mils to bg of fire;
         (e) line passed by director to other guns after setting angle passed by adjusting gun on director and laying on adjusting gun; and
         (f) other guns ordered to record at same bg as ordered to adjusting gun.
      (2) **Aiming Point Method**: (Quickest method if a distant aiming point can be located to a flank)
         (a) GPO determines bg to aiming pt;
         (b) GPO subtracts this bg from the bg to tgt; and
         (c) guns ordered to lay on aiming point, indicated by GPO at this angle.

4. **Change of Grid**. Is only nec when the new data differs from the old by more than 3 mils for orientation and/or 30 m for Easting or Northing and 5 m in alt. If required, fol procedure at para 2 (a), (b) and (c).

5. **Local Def of the Bty Posn**:
   a. Although local def is a resp of the BK, consideration begins with the initial recce and includes a hasty plan adopted on occupation, before a detailed plan can be developed and orders for its implementation given.
   b. The gun posn is laid out to meet the requirements for the provision of indirect fire, protection from CB, and to provide concealment against detection. These considerations normally conflict with the requirements of a def posn. The local def plan must provide: early wng of the threat, the capability of dealing with limited en forces while maintaining indirect fire sp, or the all-out def of the posn when movement to an alternative cannot be effected and a determined atk has been launched against the posn.
   c. The fol resources are normally aval:
      (1) guns of the bty;
      (2) small arms, MG's and AT wpns within the bty;
      (3) gren and def stores;
      (4) DF/FPF from regt/div; and
      (5) mutual sp from other posns deployed in the same area, once ln completed.
   d. The local def plan may be implemented in three basic stages. These stages may be stated in orders or found in unit SOP's. They are:
      (1) **Stage 1**: Normal air and grd sentries. LP's, and limited clearing patrols within bty area.
      (2) **Stage 2**: All pers not engaged in firing the guns man trenches; atk wpns deployed to primary posns.
      (3) **Stage 3**: All pers and wpns committed; may involve mov of gun(s) to prepared posns for the local def battle.

SECTION 3 – ENGAGEMENT OF TARGETS

803.09 – OPERATIONAL PLANNING

1. **Effects of Fire**. The desired effect of fire sp on a tgt has to be decided by the manoeuvre comd. There are three types of fire:
   a. suppression—limits the ability of en pers to perform their msn;
   b. neutralisation—knocks the tgt out of the battle temporarily; and
   c. destruction—puts the tgt out of action permanently.
2. **Categories of Tgts**. Tgts engaged by observed fire may be divided into five categories:
   a. fire msns against pers;
   b. fire msns against eqpt and fd def;
   c. illum msns;
   d. indication; and
   e. fire msns to obtain gun and survey data.
3. **Decisions/Factors to Consider**. The following table describes a number of decisions an observer has to make before conducting a msn, and the factors that must be considered.

DECISIONS TO MAKE	FACTORS
a. aim	a. time
b. nature and no. of guns	b. loc, size, nature of tgt
c. nature and amount of ammo	c. visibility
d. high or low angle	d. guns and ammo aval
e. distr of fire on tgt	e. posn of own tps
f. adjustment plan	f. degree of surprise required
g. whether to record	

Figure 15: Decision to Make/Factors Table

INDICATION OF TGTS TO GUNS

4. **Grid Ref**. A six-figure GR is used for observed fire. The loc of the tgt should be found either from the tgt map or by plotting in the following sequence:
   a. determine dir;
   b. plot dir on map;
   c. estimate distance OT and mark on map;
   d. relate map detail to grd detail in area of tgt; and
   e. make common sense check, e.g. is grid ref on reverse slope?

5. **Tgt No or Known Pt**. Best method when all CPs have recorded, e.g. ZR 1847, or Registration Point 1.

6. **Tgt Grid Correction From a Recorded Tgt**. New tgts must not be more than 500 mils from the recorded tgt. The following must be included in the call for fire:
   a. recorded tgt no;
   b. dir to NEW tgt;
   c. tgt grid correction; and
   d. vertical correction when difference in altitude is significant.

Ex.: "FROM ZP 1967, DIR 1340, RIGHT 100, ADD 400, UP 50."

7. **Polar Coordinates**. If the observer's loc is known by the CP, a tgt may be ordered to the guns by giving a dir (OT) and a distance. Included in the order to the guns must be:
   a. dir OT (nearest 10 mils);
   b. distance OT (nearest 1 m); and
   c. a vertical correction, if any.

8. **Observer's Sequence of Initial Orders.**

ORDER	EXAMPLE
Observer's Identification	**3 THIS IS 31**
Wng O	**FIRE MSN BTY**
Loc of Target	**GRID 385 145, ALT 140**
Dir	DIR 4960
Description of Target	**MORS IN RAVINE, RADIUS 50**
Type of Engagement	ADJUSTING ZR 1335
Trajectory	HIGH ANGLE
Ammo	VT IN EFFECT, 3 RDS
Distr of Fire	CONVERGE
At my Command	AT MY COMMAND
Method of Adjustment or Orders for FFE	**ADJUST FIRE**
NOTE: Boldfaced orders must be given in the initial sequence	

Figure 16: Observer's Initial Sequence of Orders

803.10 – GUNLINE

1. **GPO's Initial Sequence of Orders**.

ORDER	EXAMPLE
Wng O	FIRE MSN BTY
Type of Engagement	ADJUSTING ZT 2015
Trajectory	HIGH ANGLE
Ammo	HE, TIME, CHARGE 4 (PREP 3 RDS/GUN)
Converge (1)	CONVERGE NO. 1 LEFT 6…
Bearing	BEARING 0568
Quadrant Laying	QUADRANT LAYING
Gun Correction (1)	GUN CORRECTION NO.1 PLUS 4, …
Fuze Correction (1)	FUZE CORRECTION NO. 1 LENGTHEN 0.2,…
Fuze Setting	FUZE NO.1 26.2,…
Load (2)	NO. 1 LOAD
At My Comd	AT MY COMD
Elevation	ELEVATION 422
Method of Adjustment or Order for FFE	NO. 1 ADJUST FIRE
Description of Tgt	MACHINE GUNS
NOTES 1. Boldfaced orders must be given in the initial sequence. 2. For manual systems only 3. Load may be ordered at any time providing the nec ammo orders have been issued.	

Figure 17: GPO's Initial Sequence of Orders

2. **Tgt Engagement Report.**

ORDER	EXAMPLE
Identification	0, 95 THIS IS 1
Sub-unit Engaged	ENGAGED BTY
Tgt Loc	GR 123 456
Tgt Description	PL DUG IN RADIUS 50

Figure 18: Tgt Engagement Report

3. **Availability Report**.

ORDER	EXAMPLE
Identification	0, 95 THIS IS 1
Availability	AVAL
Tgt Results	PL NEUTRALIZED
Tgt Number (if applicable)	ZT 1240
Ammo expended	20
NOTE: In the example "20"refers to total ammo expended during this engagement. When different types of fuzes and propellants are used, they must be identified.	

Figure 19: Availability Report

803.11 – AREA NEUTRALIZATION WITH HIGH EXPLOSIVE IMPACT

1. **Example**.

	OP	GPO/CPO	
SER	**ORDERS TO THE CPs (BTY NET)**	**REPORTS TO THE OP (BTY NET)**	**ORDERS TO THE GUNS**
(a)	(b)	(c)	(d)
1	1 THIS IS 12 FIRE MSN BTY	(READ BACK ALL FIRE ORDERS)	
2			FIRE MSN BTY
3	COORDS 167321 ALTITUDE 350 DIR 2300 PL DIGGING IN RADIUS 80 7 RDS ADJUST FIRE		
4		(CP 1)	HE, QUICK, GREEN BAG, CHARGE 5, NUMBER 2 LOAD BEARING 2308 ELEVATION 532 NUMBER 2, ADJUST FIRE
5		SHOT 2, 34	

	OP	GPO/CPO	
SER	**ORDERS TO THE CPs (BTY NET)**	**REPORTS TO THE OP (BTY NET)**	**ORDERS TO THE GUNS**
(a)	(b)	(c)	(d)
6	RIGHT 70 ADD 400		
7			BEARING 2352 ELEVATION 532
8	(MSN CONTINUES)	SHOT	
9	1 RD FFE (OP 1)		
10			LOAD (CP 2)
11			BEARING NO 1 2362, NO 2 ...., NO 3 ...., NO 4 ...., NO 5 ...., NO 6 ....
12			ELEVATION NO 1 524, NO 2 ..., NO 3 ..., NO 4 ..., NO 5 ..., NO 6 ...
13			1 RD FFE
14		SHOT	
15		RDS COMPLETE	
16	FFE (OP 2)		
17			6 RDS FFE
18		SHOT	
19		RDS COMPLETE	
20	END OF MSN		
21	PL DISPERSING		
22		(CP 3)	END OF MSN PL DISPERSING
NOTES (OP) 1. FFE at split of short bracket or on tgt rd. 2. Adjust Mean point of impact (MPI) of fire unit as nec.		**NOTES (CP)** 1. Sends engagement report to 0 and 95. 2. Load may be ordered prior to the issue of bearing to speed up activity on the guns, however, this is not mandatory. 3. Sends availability report to RCPO.	

Figure 20: Example of an Area Neutralization Msn Using

2. **Procedure for High Angle Msns**. High angle fire may be required when firing from defiles, built-up area, rds, gullies, over high terrain features, or when tgts are located directly behind hills, crests, jungles, or ravines. The following procedures are followed for a call for fire:

a. order "HIGH ANGLE" as trajectory in initial call;
b. for airbursts use VT;
c. for LG1, or C3 guns, order "PREPARE FOR HIGH ANGLE AT GRID" should be sent well in advance so that recoil pits may be dug;

d. splash will be reported; and
e. met is not applied.

803.12 – AREA NEUTRALIZATION WITH HIGH EXPLOSIVE TIME

1. **Example**.

	OP	CPO	
SER	**ORDERS TO THE CPs (BTY NET)**	**REPORTS TO THE OP (BTY NET)**	**ORDERS TO THE GUNS**
(a)	(b)	(c)	(d)
1	1 THIS IS 11 FIRE MSN BTY	(READ BACK ALL FIRE ORDERS)	
2			FIRE MSN BTY
3	GRID 284 624 ALTITUDE 100 DIR 0620 MGS DUG IN RADIUS 100 TIME IN EFFECT, 5 RDS AT MY COMD ADJUST FIRE		
4		(CP 1)	
5			HE, QUICK, CHARGE 6 PREPARE 5 RDS TIME PER GUN BEARING 1420 AT MY COMD ELEVATION 400 NO 4 ADJUST FIRE MGS DUG IN
6		READY 24	(GUNS REPORT READY TO CP)
7	FIRE		FIRE
8		SHOT 4	
9	CANCEL AT MY COMD ADD 400		CANCEL AT MY COMD BEARING 1430 ELEVATION 382
10		SHOT	
11	TIME DROP 50 (OP 1 and CP 2)		

	OP	CPO	
SER	**ORDERS TO THE CPs (BTY NET)**	**REPORTS TO THE OP (BTY NET)**	**ORDERS TO THE GUNS**
(a)	(b)	(c)	(d)
12			TIME BEARING NO 3 1423, NO 4 1425, NO 5 1427 FUZE NO 3 16.0, NO 4 16.1, NO 5 16.2 AT MY COMD (CP 3) ELEVATION NO 3 389, NO 4 391, NO 5 393 NO 3, 4 AND 5 ADJUST FIRE (GUNS REPORT READY) FIRE
13		SHOT RDS COMPLETE	
14	UP 40 (OP 2,3)		
15			FUZE NO 3 15.7, NO 4 15.8, NO 5 15.9 ELEVATION NO 3 389, NO 4 391, NO 5 393 (GUNS REPORT READY) FIRE
16		SHOT	
17	FFE (OP 4)		BEARING NO 1 1419, NO 2 1421 ... FUZE NO 1 15.5 ... CANCEL AT MY COMD ELEVATION NO 1 393 ... 5 RDS FFE
18		SHOT	
19		RDS COMPLETE	
20	RECORD AS ZP 3762 END OF MSN, MGS NEUTRALIZED		

	OP	CPO	
SER	**ORDERS TO THE CPs (BTY NET)**	**REPORTS TO THE OP (BTY NET)**	**ORDERS TO THE GUNS**
(a)	(b)	(c)	(d)
21			RECORD AS ZP 3762, END OF MSN, MGS NEUTRALIZED
22		ZP 3762 RECORDED	
23		(CP 4)	

NOTES (OP)

1. Order "TIME" at the split of the short bracket or at a tgt rd with a correction if nec. E.g. "TIME, DROP 50".
2. Corrections to height of burst (HOB) (optimum 20 m) ordered in multiples of 10, e.g. "UP 40"
3. If initial rds of time burst on impact "UP 40"will be ordered.
4. A normal tgt grid correction should be used at FFE if rds are at correct HOB but MPB is incorrect.

NOTES (CP)

1. Sends engagement report to RCPO.2.By convention three guns shall be used in adjustment.
2. The CPO shall control the moment of firing when more than one gun is used in adjustment.
3. Sends availability report to RCPO.

Figure 21: Example of an Area Neutralization Msn Using HE Time

803.13 – AREA NEUTRALIZATION WITH HIGH EXPLOSIVE VARIABLE TIME FUZE

1. **Example**.

	OP	CPO	
SER	**ORDERS TO THE CPs (BTY NET)**	**REPORTS TO THE OP (BTY NET)**	**ORDERS TO THE GUNS**
(a)	(b)	(c)	(d)
1	1 THIS IS 11 FIRE MSN BTY	(READ BACK ALL ORDERS)	
2			FIRE MSN BTY

	OP	CPO	
SER	**ORDERS TO THE CPs (BTY NET)**	**REPORTS TO THE OP (BTY NET)**	**ORDERS TO THE GUNS**
(a)	(b)	(c)	(d)
3	FROM ZP 1738 DIR 1220 RIGHT 400 DROP 200 MORTARS DUG IN RADIUS 100 VT IN EFFECT (OP 1) 6 RDS ADJUST FIRE	(CP 1)	
4			HE, QUICK, GREEN BAG, CHARGE 4 NO 3 LOAD PREPARE 6 RDS VT PER GUN BEARING 6101 ELEVATION 468 NO 3 ADJUST FIRE MORTAR POSN
5			
6		SHOT 3, 24	
7	LEFT 200 ADD 400		
8			BEARING 6010 ELEVATION 453
9	(MSN CONTINUES)	SHOT	
10	DROP 50 1 RD FFE	(OP 2)	VT
11			BEARING NO 1 6015, NO 2 ... FUZE: NO 1, 2 AND 3 23.0; NO 4, 5 AND 6, 24.0 ELEVATION NO 1 457, NO 2 ... 1 RD FFE
12		SHOT	
13		RDS COMPLETE	

	OP	CPO	
SER	**ORDERS TO THE CPs (BTY NET)**	**REPORTS TO THE OP (BTY NET)**	**ORDERS TO THE GUNS**
(a)	(b)	(c)	(d)
14	FFE (OP 3)		
15			5 RDS FFE
16		SHOT	
17		RDS COMPLETE	
18	END OF MSN MORTARS STOPPED FIRING		
19		(CP 2)	END OF MSN MORTARS STOPPED FIRING

NOTES (OP)	**NOTES (CP)**
1. Normally HE quick used in adjustment 2. HOB approx 7 m above tgt. 3. When using vt, if rds burst on impact at ffe, observer should order "shorten 1.0" and continue to shorten fuze by one sec increments until airbursts are achieved.	1. Sends engagement report to RCPO. 2. Sends availability report to RCPO.

Figure 22: Example of an Area Neutralization Msn Using HE VT

803.14 – ENGAGEMENT USING POLAR COORDINATES

1. **Example**.

	OP	CPO	
SER	**ORDERS TO THE CP**	**REPORTS TO THE OP**	**ORDERS TO THE GUNS**
(a)	(b)	(c)	(d)
1	FIRE MSN BTY	(READ BACK ALL ORDERS)	
2			FIRE MSN BTY
3	DIR 1510(4) DISTANCE 4600 DOWN 20 (CP/OP1) PL DIGGING IN RADIUS 100 VT IN EFFECT 5 RDS ADJUST FIRE		

	OP	CPO	
SER	ORDERS TO THE CP	REPORTS TO THE OP	ORDERS TO THE GUNS
(a)	(b)	(c)	(d)
4		(CP 2)	HE QUICK, GREEN BAG, CHARGE 5, BEARING 2901, ELEVATION 335 NUMBER 1, ADJUST FIRE PREPARE 5 RDS VT PER GUN
5		SHOT 1, 26	
6	DIR 1520 DISTANCE 4550 FFE	(OP 2,3)	
7			VT BEARING NO 1 2919, NO 2 FUZE SETTING NO 1 26.0, NO 2 LOAD ELEVATION NO 1 320, NO 2…5RDS FFE
8		SHOT	
9		RDS COMPLETE	
10	PL WITHDRAWING NW INTO DEFILE TGT (CP 3) DIR 0220 DISTANCE 3800 UP 15 SECTION POSN WITH 2 HMGS RADIUS 70, ADJUSTING ZP 4820 ADJUST FIRE		
11		(CP 4)	HE QUICK, GREEN BAG, CHARGE 5, BEARING 3390, ELEVATION 285, NUMBER 2, ADJUST FIRE

NOTES (OP)	NOTES (CP)
1. Convention is mils unless ordered otherwise. 2. The observer lases the burst of adj rds and sends corrections. 3. The observer may revert to tgt grid procedure at any time during the msn. The CP will use the initial dir ordered to compute subsequent corrections. 4. Dir 6400 is to be used for MSTAR	1. When polar co-ordinates are used in adj the change in altitude will be mils by convention. 2. Sends engagement report to RCPO. 3. Observer acquired a new tgt and has commenced adjustment of it. 4. The adjustment/msn continued.

Figure 23: Example of Engagement Using Polar Coordinates

803.15 – ENGAGEMENT OF LINEAR TARGETS

1. **Example**. Used only if aim cannot be achieved by another method, as linear msns are slow. Used against tgts with length and attitude but little width.
2. The following planning figures should be used for linear target lengths:
   a. 105 mm Bty: 200 m or less; and
   b. 155 mm Bty: 300 m.
3. The OP will determine how many btys are required to engage the linear tgt by dividing the length of the linear tgt by the linear length coverage of a bty. The RCPO will provide each bty with an aim point.
4. **Example.**

	OP	CPO	
SER	**ORDERS TO THE CPs (BTY NET)**	**REPORTS TO THE OP BTY NET)**	**ORDERS TO THE GUNS**
(a)	(b)	(c)	(d)
1	1 THIS IS 11 FIRE MSN BTY	(READ BACK ALL ORDERS)	
2			FIRE MSN BTY
3	GRID 124 836 ALT 180 DIR 1380 ATK POSN 200 ATTITUDE 1850 8 RDS LINEAR (OP 3) ADJUST FIRE	(OP 1) (OP 2) (OP 5)	

	OP	CPO	
SER	**ORDERS TO THE CPs (BTY NET)**	**REPORTS TO THE OP BTY NET)**	**ORDERS TO THE GUNS**
(a)	(b)	(c)	(d)
4		(CP 1)	HE, QUICK, WHITE BAG, CHARGE 5, PREPARE 8 RDS PER GUN BEARING 2193. ELEVATION 362 NO 3 ADJUST FIRE
5		SHOT 3, 24	
6	DROP 400		
7			BEARING 2183 ELEVATION 358
8		SHOT	
9	(MSN CONTINUES) AT MY COMD FFE	(CP 2)	
10			BEARING NO 1 2179, NO 2 .... NO 3 .... AT MY COMD ELEVATION NO 1 354, NO 2 ... 8 RDS FFE
11		READY	
12	FIRE		
13			FIRE
14		SHOT	
15		RDS COMPLETE	
16	END OF MSN EN DISPERSING		
17		(CP 3)	END OF MSN, EN DISPERSING

NOTES (OP)	**NOTES (CP)**
1. Tgt loc is at centre of tgt. 2. Length to nearest 100 m, attitude to nearest 50 mils. 3. Order "LINEAR" as distr of fire. 4. Use "AT MY COMD" for best effect on the tgt 5. Adj centre point of linear.	1. Sends engagement report to RCPO. 2. In this case the observer has ordered AT MY COMD to control the time of arrival of the rds. 3. Sends availability report to RCPO.

Figure 24: Example of Engagement of a Linear Tgt

803.16 – ENGAGEMENT OF MOBILE TARGETS

1. **Example**.

	OP	CPO	
SER	**ORDERS TO THE CP**	**REPORTS TO THE OBSERVER**	**ORDERS TO THE GUNS**
(a)	(b)	(c)	(d)
1	1 THIS IS 11 FIRE MSN BTY	(READ BACK ALL ORDERS)	
2			FIRE MSN BTY
3	DIR 1510 DISTANCE 4600 TP OF TANKS MOVING EAST AT MY COMD 5 RDS FFE	(OP 1)	
4		(OP 2) (CP 1)	HE CHARGE 5, QUICK, GREEN BAG, BEARING NO 1 2921, NO 2, 2926, NO 3 ....
5			AT MY COMD
6			ELEVATION NO 1 394, NO 2 397, NO 3 ... 5 RDS FFE
7		READY 24	
8	FIRE		
9			FIRE
10		SHOT	
11		RDS COMPLETE	
12	TGT DIR 1720 DISTANCE 3600 UP 20 AT MY COMD 5 RDS FFE	(CP 2) (OP 3)	
13			LOAD BEARING NO 1, 3162, NO 2 3165, NO 3
14			ELEVATION NO 1 362, NO 2 367, NO 3
15			5 RDS FFE
16		READY 20	
17	FIRE		
18		SHOT	
19		RDS COMPLETE	

	OP	CPO	
SER	**ORDERS TO THE CP**	**REPORTS TO THE OBSERVER**	**ORDERS TO THE GUNS**
(a)	(b)	(c)	(d)
20	END OF MSN 2 TANKS DESTROYED REMAINDER WITHDRAWING INTO WOODLINE		
21		(CP 3)	END OF MSN, 2 TANKS DESTROYED; REMAINDER WITHDRAWING INTO WOODLINE

NOTES (OP)

1. Speed is important. Normal adj may not be possible. Use HEPD or VT. Avoid mechanical time super quick (MTSQ) fuze or CONVERGE msns, or other orders likely to cause delay.
2. Tgts likely to move:

a. Carefully predict grid of tgt and open one rd FFE from as many guns as possible. Be prep to follow with max weight of fire or quick correction ASAP.

b. Adj off the tgt to avoid alerting it, then give accurate correction to tgt and max fire at an intense rate.

3. Moving Tgts:

a. If tgt is approaching recorded tgt or pt accurately loc on map, give call for fire with AT MY COMD and order fire TOF minus of tgt arrival at desired pt.

b. If "a." is not possible, open with 1 rd FFE in path of tgt and correct boldly with FFE.

4. When dir changes by more than 500 mils order a new dir.

NOTES (CP)

1. Sends engagement report to RCPO.
2. Since the tgt is still mobile, the prefix of tgt to a new dir, distance and angle of sight indicate to the CPO that the observer is ordering a new tgt loc.
3. Sends availability report to RCPO.

Figure 25: Example of Engagement of a Mobile Tgt

2. **Calculation**. The distance a moving tgt will travel depends upon its speed. At a speed of 10 mph (16 kph) a vehicle will travel 5 m in one second. The formula to be used, expressed graphically at Figure 26, is shown below in its two most useful versions:

a. $\frac{\text{DISTANCE (m) X 2}}{\text{TIME (SEC)}} + 10\ \% = \text{SPEED (mph)}$

b. $\frac{\text{TIME (SEC) SPEED (mph)}}{2} - 10\ \% = \text{DISTANCE (m)}$

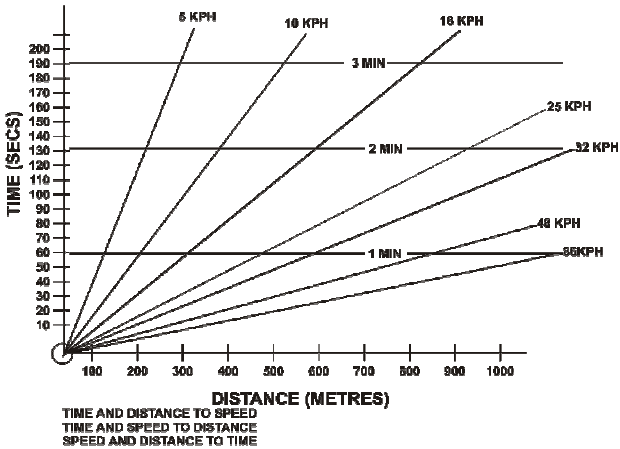


Figure 26: Moving Tgt Travel, Graphical Solution

803.17 – REGIMENTAL AND HIGHER MISSIONS

1. **General**. The procedure for a regimental or higher msn is similar to that for a bty fire msn. The differences for these higher msns lie in:
   a. the auth, or lack of it, of the observer to order the engagement and the weight of fire;
   b. the weight of fire; and
   c. the procedures for controlling the fire of several independently deployed fire units.

2. **Priority of Fire**. An observer who has been granted pri of fire is treated like an auth observer. If the observer is a BC, the FOOs working for him are also treated as auth.

SER	OBSERVER'S ORDERS	RCPO ORDERS	REMARKS
1	0, CC 1 THIS IS 11 FIRE MSN REGT	(READ BACK ALL ORDERS)	0 reads back

SER	OBSERVER'S ORDERS	RCPO ORDERS	REMARKS
2	GRID 452 362 DIR 1220 COY POSN RADIUS 200 DELAY IN EFFECT 10 RDS AT MY COMD ADJUST FIRE		(Note 1)
3		11, CC 1 THIS IS 0 REGT 10 RDS ZT 1230	0 sends to observer and batteries
4	REGT 10 RDS ZT 1230		FOO reads back
5		2 - READY 28	2 - reports "READY" then 0 sends to FOO
6	2 READY 28 CANCEL AT MY COMD 2 ADJUST FIRE 2 FIRE	CANCEL AT MY COMD 2 – ADJUST FIRE 2 - FIRE	

NOTES
1. RCPO is responsible for putting "AT MY COMD" into effect, if not done so by the observer, and sending message to the observer.
2. Message to observer indicates Guns or Btys to fire, projectile and fuze combination if different than that ordered by the observer, no of rds to be applied at FFE, and tgt number.

Figure 27: Example of a Regimental Msn—Ordinary Observer

3. **Authorized Observer**. An auth observer directs his orders to the RCPO. He can select the adjusting bty, if desired. If the observer does not designate the adjusting bty, it will be designated by the RCPO. This procedure permits the RCPO to co-ordinate the fire msn, permitting the observer more of an opportunity to observe and advise.

803.18 – ADJUSTMENT FOR FUTURE ENGAGEMENT

1. **General**. Adjustment for future engagement is undertaken so that subsequent FFE may be more accurately applied than by unobserved predicted fire.
2. Two situations may arise that will determine the procedure to be used:
   a. **Adjustment to Determine Current Gun Data**. This procedure is carried out to determine, by firing, the gun data nec to engage the tgt within the current meteorological period.

b. **Adjustment to Determine Coordinates**. This procedure is carried out to determine, by firing, the coordinates of the tgt for circulation to other fire units.

3. **Gun Data.**

SER	SIZE OF FIRE UNIT TO ENGAGE AT FFE	NUMBER OF GUNS TO BE USED DURING ADJUSTMENT			
		ADJUSTING BTY		OTHER FIRE UNITS	
		OPT	MIN	OPT	MIN
(a)	(b)	(c)	(d)	(e)	(f)
1	bty	6	3	-	-
2	regt, or two or	6	3		
3	div or above	6	3	One bty from each regt	3 guns from one bty from each regt

Figure 28: Guide for Determining the Number of Guns for Adj for Gun Data

4. **Conduct of Adjustment**. The adjustment shall be carried out in the normal manner until a suitable short bracket or tgt rd is obtained. The observer shall then order each participating fire unit to fire one rd in adjustment or FFE depending upon the nature of the tgt and the number of guns required from each unit. When adjusting with more than one fire unit, each fire unit, in sequence, shall be adjusted onto the tgt, ordered to record the tgt and then given END OF MSN. If the fire units are being adjusted onto different points in the tgt area, a different tgt number will be assigned to each point.

5. **Example**.

SER	OBSERVER'S ORDERS	RCPO'S REPORTS	NOTES
(a)	(b)	(c)	
1	0, CC1 THIS IS 19 FIRE MSN REGT 2 AND 3, THREE GUNS	(1)	1. The msn is being conducted by an auth observer with a three-bty regt. He requires six guns from the adjusting bty and three guns from each of the other batteries.
2	GRID 452 362, ALTITUDE 320, DIR 1220		
3	COY POSN, RAD 200		
4	ADJUSTING ZT 5621	(2)	2. The observer gives the tgt number to be used when the tgt is recorded.
5	1 ADJUST FIRE	1 SHOT 2,23	

SER	OBSERVER'S ORDERS	RCPO'S REPORTS	NOTES
(a)	(b)	(c)	
6	ADD 200	1 SHOT	
7	DROP 100, 1 ONE RD FIRE FOR EFFECT	1 SHOT RDS COMPLETE	
8	1 RECORD AS TGT, 1 END OF MSN	(3)	3. All rds land in the tgt area.
9	2 ONE RD FIRE FOR EFFECT	2 SHOT,31 (3)	3. All rds land in the tgt area.
10	2 RECORD AS TGT, 2 END OF MSN		
11	ONE RD FIRE FOR EFFECT	SHOT,28 (4)	4. C/S 3 is the only fire unit remaining on the msn.
12	ADD 100, REPEAT	SHOT,ROUNDS COMPLETE (5)	5. All rds land in the tgt area.
13	RECORD AS TGT, END OF MSN		

Figure 29: Example of a Regimental Fire Msn, Adjustment for Gun Data

6. **Coordinates—Conduct of Adjustment**. The observer shall use one gun for adjustment until a 100 m bracket or a tgt rd is obtained, and then use the remaining guns to adjust the MPI employing registration procedures. The tgt will be recorded at a correction of ADD/DROP 25.

SER	OBSERVER'S ORDERS	GPO's REPORTS	NOTES
(a)	(b)	(c)	(d)
1	1 THIS IS 11 FIRE MSN THREE GUNS GRID 7651 4314 ALTITUDE 200 DIR 4820 ADJUSTING ZT 1364 CONVERGE, ADJUST FIRE		1. 3 guns are used because MPI can be more readily adj 2. Order "CONVERGE" in initial sequence of orders
2		SHOT 2, 26	3. One gun adjusts fire
3	RIGHT 50 DROP 400	SHOT	
4	ADD 200	SHOT	
5	DROP 100	SHOT	

SER	OBSERVER'S ORDERS	GPO's REPORTS	NOTES
(a)	(b)	(c)	(d)
6	ADD 50, 1 RD FIRE FOR EFFECT	SHOT, RD COMPLETE	4. All rds plus
7	DROP 50, REPEAT	SHOT, RD COMPLETE	5. All rds minus
8	RECORD AS TGT AT ADD 25, END OF MSN		

Figure 30: Example of a Fire Msn to Determine Coordinates

803.19 – ILLUMINATION MISSIONS

1. The illuminating projectile is a carrier type, fitted with a time fuze and containing an illuminating canister attached to a parachute. The shell is activated at the optimum HOB and under ideal conditions. The effects are as fol:

SER	CHARACTERISTIC	105 mm	155 mm	81 mm
(a)	(b)	(c)	(d)	(e)
1	HOB	750 m	600 m	250 m
2	BURNING TIME	60 secs	120 secs	35 secs
3	RATE OF DESCENT	10 m/s	5 m/s	2.5 m/s
4	ILLUMINATING DIAMETER	800 m	1000 m	600m

Figure 31: Illuminating Shell Characteristics

2. **The Illum Msn**. Purely illum msns shall follow the std format. Adjustment is carried out using a single gun firing illuminating ammo. The following methods may be ordered for distr of fire:

a. **Lateral Spread**. Two guns are fired simultaneously with a lateral spread left and right of the tgt, in relation to the gun line.

b. **Rge Spread**. Two guns are fired simultaneously at a rge spread plus and minus of the tgt, in relation to the gun line

c. **Diamond Illum**. Four guns are fired simultaneously (two at a rge spread, and two at a lateral spread).

d. **One or Two Gun Illum**. One or two guns are directed at a single point of origin. The observer adjusts onto the centre of the area to be illuminated.

e. **Example**.

OBSERVER'S ORDERS	NOTES
1 THIS IS 12 FIRE MSN FOUR GUNS GRID 128346, ALT 500, DIR 4820 SUSPECTED ASSEMBLY AREA. ILLUM, 12 RDS. DIAMOND ILLUM. ADJ FIRE.	1. The number of rds is only an estimate; it is based on the burning time and the length of time illum is required.
RIGHT 200. ADD 400. UP 50.	2. **Tgt Grid Corrections**. Due to the characteristics of illum, corrections of less than 200 m are not worthwhile. 3. **HOB**. The proper HOB will allow the illuminating flare to stop burning just before it strikes the grd. When the HOB is too low, the correction is determined from the length of time (in sec) that the flare burned on the grd, multiplied by the rate of descent in metres per second. Up or Down corrections for HOB are ordered to the nearest 50 m.
AT MY COMD. CONTINUOUS FIRE 30 SECONDS.	4. Both rge and lateral rge spread are applied
FIRE	
CEASE LOADING.	5. This ensures that the guns are not left loaded with illuminating ammo if all 12 rds are not needed to be fired.
END OF MSN. ILLUM EFFECTIVE. NO VISIBLE TP MOVEMENT.	

Figure 32: Example of a Diamond Illum Msn

3. **Co-ordinated Illum**. The co-ordinated illum procedure is used to illuminate a tgt so that it may be engaged with other types of ammo. It is usually conducted with one gun firing illuminating ammo while another gun is adjusting with HE. The gun firing the illuminating ammo is normally fired at an ordered interval ahead of the gun firing HE so that the tgt will be illuminated when the HE rd bursts. On occasion, the observer may order the illuminating gun to provide continuous illum.

4. **Example**.

	OP	CPO	
SER	**ORDERS TO THE CP**	**REPORTS TO THE OP (BTY NET)**	**ORDERS TO THE GUNS**
(a)	(b)	(c)	(d)
1	1 THIS IS 11 FIRE MSN BTY	(READ BACK ALL ORDERS)	
2			FIRE MSN BTY
3	GRID 245 361 ALT 100 DIR 1210 MGS DUG IN RADIUS 50 ILLUM IN ADJUSTMENT VT IN EFFECT 10 RDS ADJUST FIRE	(OP 1)	
4		(CP 1)	NO 1 ILLUMINATING, GREEN BAG, CHARGE 4 PREPARE 8 RDS (CP 2) NO 2, 3, 4, 5 AND 6 HE, QUICK, GREEN BAG, CHARGE 4 PREPARE 10 RDS VT PER GUN BEARING 1281 (CP 3) NO 2, 3, 4, 5 AND 6 REST FUZE 25.7 ELEVATION 560 NO 1 ADJUST FIRE
5		SHOT 1, 26	
6	LEFT 400 UP 50		
7			BEARING 1202 FUZE 25.2 ELEVATION 555
8		SHOT	
(ADJUSTMENT WITH ILLUMINATING SHELLS CONTINUES)			
9	DROP 200 COORD ILLUM 60 SECONDS	(OP 2,3) (CP 4)	

	OP	CPO	
SER	ORDERS TO THE CP	REPORTS TO THE OP (BTY NET)	ORDERS TO THE GUNS
(a)	(b)	(c)	(d)
10			BEARING 1236 FUZE 24.6 CANCEL REST AT MY COMD ELEVATION NO 1 560 COORD ILLUM ELEVATION 275 NO 2 ADJUST FIRE (CP 5 AND 6) (NO 1 AND 2 REPORT READY) NO 1 FIRE
11		SHOT	
12			(60 second interval) (CPO will control fire or issue interval)
13		SHOT	
14	1 RD FFE		
15			VT BEARING NO 2 1248, NO3 .... FUZE NO 2 24.6, NO 3 ELEVATIONS NO 2 560, NO 3 1 RD FFE (GUNS REPORT READY)
16		SHOT	
17			(60 second interval) (CPO will control fire or issue interval)
18		SHOT	
19		RDS COMPLETE	
20	CANCEL COORD ILLUM RIGHT 50 ADD 50 FFE		

	OP	CPO	
SER	**ORDERS TO THE CP**	**REPORTS TO THE OP (BTY NET)**	**ORDERS TO THE GUNS**
(a)	(b)	(c)	(d)
21			CANCEL COORDINATED ILLUM NO 1 VT, GREEN BAG, CHARGE 4 BEARING NO 1 1293, NO 2 .... FUZE NO 1 23.0, NO 2 .... CANCEL AT MY COMD ELEVATION NO 1 382, NO 2 ... 9 RDS FFE
22		SHOT	
23		RDS COMPLETE	
24	END OF MSN MGS STOPPED FIRING		
25		(CP 7)	END OF MSN MGS STOPPED FIRING

NOTES (OP)

1. If the observer desires the initial rd of illiminating ammo to be fired at a point different from the grid reference ordered, he shall include a tgt grid correction in his initial sequence e.g. "GR 139 459, DIR 1400, ILLUMINATING A 800".
2. By convention, the order "COORD ILLUM" is the executive order to commence HE adjustment.
3. The interval is calculated by subtracting the HE TOF from the time elapsing between the illuminating gun report or shot and effective illum.

NOTES (CP)

1. Sends engagement report to RCPO.
2. CPO prepares sufficient illuminating rds required for msn.
3. This negates the requirement to take post to lay later in the msn.
4. By convention the initial rd in the adjustment shall be HE unless otherwise ordered and will be fired at the grid ordered in the initial orders unless specifically directed otherwise.
5. By convention, after the order "COORD ILLUM" has been issued, all further tgt grid corrections apply only to HE unless specifically directed otherwise.
6. Following the order "COORD ILLUM", the illuminating gun ignores all orders not prefixed by his number.
7. Sends availability report to RCPO.

Figure 33: Example of a Co-ordinated Illum Msn

803.20 – LASER POINT MSN

1. **General**. A Laser Point (LP) msn is conducted to determine corrections for non-std conditions to be applied to a specific tgt fired by the same observer using polar co-ordinates that meet registration criteria, less projectile and propellant types. It is a similar form of the laser registration procedure except that the target loc is not as accurately known and is used to produce an LP correction. Normally one gun is used in the initial adjustment but three guns must be used to confirm the LP MPI. Three guns can be used throughout depending on the observer's decision based on terrain, visibility and zone.

2. If more than one fire unit is to be used, it may be conducted as fol:
   a. If all batteries are within registration parameters, one bty adjusts onto the LP, and then circulates the data. The observer can then call for check rds from the other fire units.
   b. Each bty is adjusted and recorded individually onto the LP. This requires more time, but gives a greater guarantee of accuracy.
3. The area of validity of LP data is limited to:
   a. bearing of 500 mils left and right of the LP as measured from the OP's loc;
   b. normal registration limits if OP and guns are on the same grid; and
   c. a period of validity equal to the current met message.
4. **Example of Regimental Laser Pt Msn**.

	OP	CPO
SER	**ORDERS TO THE CP**	**REPORTS TO THE OBSERVER**
(a)	(b)	(c)
1	FIRE MSN REGT, 3 GUNS DIR 1080 DISTANCE 3870, UP 30 COY DUG IN RADIUS 200 ADJUSTING LP ZT 4600 1 ADJUST FIRE	(OP 1) (CP 1) (CP 2)
2		1 SHOT 1, 34 (CP 3)
3	1 DIR 1090, 1 DISTANCE 3800, 1 ONE RD FEE	
4		1 SHOT, RD COMPLETE (CP 4)
5	1 RECORD AS LP ZT 4600, 2 ADJUST FIRE	
6		2 SHOT 1,24
7	2 RECORD AS LP ZT 4600, 3, BTY RIGHT, ADJUST FIRE	

	OP	CPO
SER	**ORDERS TO THE CP**	**REPORTS TO THE OBSERVER**
(a)	(b)	(c)
8		3 SHOT 1, 31, 3 SHOT 2, 3 SHOT 3
9	3 DIR 1070, 3 DISTANCE 3760, 3, ONE RD FEE	
10		3 SHOT, RD COMPLETE
11	3 RECORD AS LP ZT 4600, 4 ADJUST FIRE	
12		4 SHOT, 1, 26
13	4 RECORD AS LP ZT 4600	
14	ADOPT LP FOR IRON LUNG, END OF MSN	(OP 2)

NOTES (OP)

1. Min of three guns per Call Sign should be used to allow adjustment of MPI.
2. At this point laser point correction will be applied to all targets on IRON LUNG. All targets can be engaged with predicted fire with a high degree of first rd accuracy. If guaranteed fire is required, then check rds should be fired on those targets that require it.

NOTES (CP)

1. When polar co-ordinates are used in adjustment the change in altitude will be mils by convention.
2. Observers may use one or three guns in adjustment and will specifically state this in the method ordered.
3. The observer can adjust the LP with three guns depending on the conditions stated in para 3 of this section.
4. Observer lases MPI of the three rds.

Figure 34: Example of a Regimental Laser Point Msn

5. **Example of a Bty Laser Point Msn**.

	OP	CPO
SER	**ORDERS TO THE CP**	**REPORTS TO THE OBSERVER**
(a)	(b)	(c)
1	FIRE MSN BTY, 3 GUNS DIR 1080 DISTANCE 3870, UP 30 COY DUG IN RADIUS 200 ADJUSTING LP ZP 1260 ADJUST FIRE	
2		SHOT 1, 34

	OP	CPO
SER	**ORDERS TO THE CP**	**REPORTS TO THE OBSERVER**
(a)	(b)	(c)
3	DIR 1090, DISTANCE 3800, BTY RT 1 RD FFE (OP 2)	
4		SHOT, RD COMPLETE (CP1)
5	RECORD AS LP ZP 1260	(OP 3)
6		LP ZP 1260 RECORDED
7	ADOPT LP FOR IRON LUNG, END OF MSN	

NOTES (OP)	NOTES (CP)
1. Bty right may be ordered to allow tech to lase each individual rd.	1. Bty right fired with std interval between guns.
2. Target and LP are recorded.	

Figure 35: Example of a Bty Laser Point Msn

803.21 – REGISTRATION

1. **General**. The aim of registration is to determine by shooting, the corrections required to map bearing and map rge to compensate for the total effects of non-std conditions, i.e., weather, eqpt, ammo and survey errors.

2. **Registration Limits**. Under normal climatic and terrain conditions in the temperate zone, a registration is valid for approximately two hrs and may be transferred throughout the regt for use on tgts along the same general line of fire within registration limits.

3. The following limits should be used in the application of corrections from the registration for the engagement of tgts:

   a. **Range.** 2,000 m plus and minus of the map rge to the registration point.

   b. **Bearing**. 500 mils left and right of the bearing of the adjusting gun to the registration point.

   c. **Altitude**. Between the registration point and the tgt, no limit.

4. Corrections determined from a registration carried out by one fire unit may be used by other fire units provided that the following conditions are satisfied in relation to the adjusting gun:

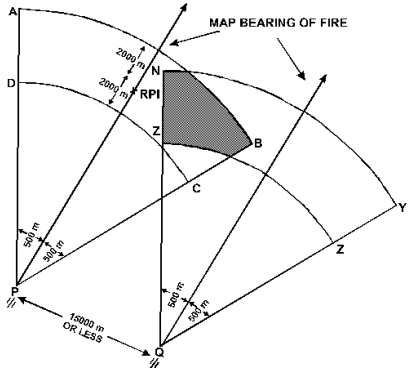
   a. the guns must be of the same type, i.e., using the same firing tables;

   b. the same type of propellant of the same lot and charge must be used;

   c. the guns must be on the same grid;

   d. the altitude of the guns must be within 200 m; and

   e. the guns must be within 15 000 m.



1. P battery adjusted RP1 and may use the registration results in the area ABCD (within 500 mils right and left of map bearing of fire, 2000 metres plus and minus of the map horizontal distance, at that charge and for that type of equipment.
2. Q battery, of the same regiment and on the same grid, is within 1500 metres of p battery and its altitude is within 200 metres and may use the registration results in the area NXYZ.
3. Only the shaded area can be engaged by both P and Q batteries using these registration results.
4. The results of the registration mission would not be applicable to batteries which are more that 15000 metres from P battery.

Figure 36: Registration Limits

5. **Control of Registration**. The RCPO shall normally control the implementation of the registration policy within the regt, detailing to the batteries the:

a. loc of the registration point or points;
b. time at which registration will take place;
c. method of registration; and
d. charges, propellant, lot, and the types of ammo to be used.

6. The CPO shall inform the BC of the requirement for registration. The BC shall then order one of his observers to conduct the registration.

7. When insufficient met or registration data are aval to ensure accurate fire during a fire plan, an arty comd may decide to carry out a registration. He shall then specify the:

a. observer;
b. loc of the registration point;
c. time of the fire msn;
d. method of registration;
e. charges and types of ammo to be used; and
f. type of guns to be used.

8. **Time Registration**. Occasionally, it may be nec to conduct a time registration. The following factors must be considered:

a. the limited amount of time ammo aval; and

b. the fact that the fuze correction of the moment (C of M) is adjusted automatically based on the results of each time msn engaged.

9. **Example**.

	OP	CPO	
SER	**ORDERS TO THE CP (BTY NET)**	**ORDERS TO THE OP (BTY NET)**	**ORDERS TO THE GUNS**
1	1 THIS IS 11 FIRE MSN 3 GUNS	(READ BACK ALL ORDERS)	
2		(CP 1)	FIRE MSN NO 1, 2 AND 3
3	GRID 6392 4786 ALTITUDE 150 DIR 4790 REGISTRATION HE FOLLOWED BY TIME ADJUST FIRE	(OP 1)	
4			REGISTRATION HE, QUICK, GREEN BAG, CHARGE 5 PREP 3 RDS TIME/GUN BG 4985 ELEV 461 NO 2 ADJUST FIRE
5		SHOT 2, 24	
6	RIGHT 70 ADD 200		
7			BG 4981 ELEV 501
8		SHOT	
MSN CONTINUES			
9	ADD 50 1 RD FFE		
10			BG NO 1 4995, NO 2 .... NO 3 .... AT MY COMD ELEV NO 1 488, NO 2 ... NO 3 ... 1 RD FFE (GUNS REPORT READY) FIRE
11		SHOT, RDS COMPL	

	OP	CPO	
SER	**ORDERS TO THE CP (BTY NET)**	**ORDERS TO THE OP (BTY NET)**	**ORDERS TO THE GUNS**
12	DROP 50 REPEAT (OP 2, CP 2)		
13			BG NO 1 4989, NO 2 .... ELEV NO 1 484, NO 2 ... 1 RD FFE FIRE
14		SHOT, RDS COMPL	
15	RECORD AS REGISTRATION POINT ONE AT A25	(OP 3,4, CP 3)	
16			RECORD AS REGISTRATION POINT ONE
17	TIME, REPEAT		
18			TIME FUZE NO 1 29, NO 2 ... ELEV NO 1 484, NO 2 ... 1 RD FFE FIRE
19		SHOT, RDS COMPL	
20	UP 40, REPEAT	(OP 5)	
21			FUZE NO 1 29.2, NO 2 ...., NO 3 .... ELEV NO 1 494, NO 2 ..., NO 3 ... 1 RD FFE FIRE
22		SHOT, RDS COMPLETE	
23	RECORD AS TIME REGISTRATION PT 1 END OF MISSION	(OP 6, CP 4,5)	

NOTES (OP)

1. The grid ref must be as accurate as possible (8 fig min).
2. Rds all impacted plus of the registration point.

NOTES (CP)

1. Sends engagement report to RCPO.
2. The FFE all impacted plus of the registration point.

3. The FFE all impacted minus of the registration point. 4. The tgt is recorded at the split of the 50 m bracket or at the "ADD/DROP FFE" if the registration point is obviously closer to one end of the bracket 5. Correction to HOB was ordered. 6. The recording is ordered at a correction between the MPB and the optimum HOB (20 m).	3. OP had indication of all minus rds. It is only required to record gun data as registration point if using manual means, otherwise record gun data as time registration point One. 4. CPO passes registration data to the RCPO and other batteries as applicable. 5. The observer may give a tgt number to the registration point.

Figure 37: Example of a Registration Msn with HEPD and HE Time

10. **Laser Registration Msns**. Registration msns are conducted to determine by firing, the total correction for non-std conditions. The guns and laser must be on common grid. The following procedure is to be used:

a. An initial adjusting rd is fired and lased.
b. The correction is ordered, "BTY RIGHT/LEFT ONE RD FFE" and an interval as a method. Each rd is then lased.
c. If the distance from tgt centre to the computed, mean MPI of the three rds is greater than 25 m, a correction coupled with "REPEAT" is ordered.
d. The tgt shall be recorded when the MPI is within 25 m of the registration point.

OBSERVER'S ORDERS
1 THIS IS 11, FIRE MSN 3 GUNS DIR 1510, DISTANCE 4650, UP 20 MILS REGISTRATION POINT 1, ADJUST FIRE
DIR 1530, DISTANCE 4690, BTY RIGHT, 10 SECONDS, 1 RD FFE
RECORD AS REGISTRATION POINT 1 END OF MSN

Figure 38: Example of Laser Registration Msn

803.22 – SMOKE MISSION

1. **General**. Smoke is used primarily for the neutralisation of posns by blinding the en and screening the activities of our own tps. WP may be used for inflicting casualties or starting fires.

2. Smoke (coloured or white) may also be used:
   a. for marking;
   b. as an aid to obsn; and
   c. to enhance the neutralising effect of HE.

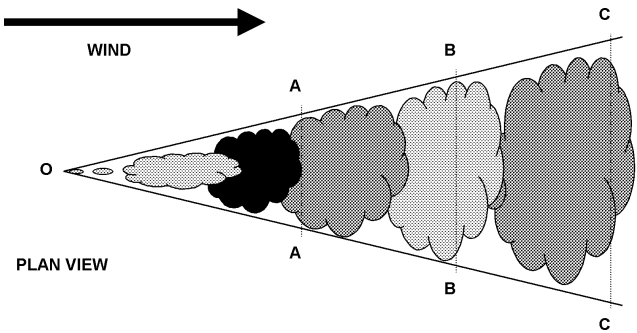
3. Of the two types of smoke shell, base ejection (BE) and WP, BE normally produces the more effective smoke screen after the initial build-up of smoke. WP may be the best choice when quick results are required.

4. **Types of Smoke Fire Msns**. There are two separate procedures used for smoke msns:

a. the quick smoke procedure; and

b. the deliberate smoke procedure.

5. **Characteristics**. For both BE and WP shells, the smoke emitted produces a dense and narrow stream of cloud. The stream flows downwind and, as it moves, spreads out in height and width as shown in the diagram below:



DETAIL	DIMENSIONS			
	105 mm AMMO		155 mm AMMO	
	BE	WP	BE	WP
OA - Point of origin to point where smoke is effective.	75 m	50 m	75 m	50 m
AC - Length of effective cloud.	300 m	200 m	400 m	300 m
Widths of cloud at B at distance OB.	50 m at 250 m	30 m at 200 m	75 m at 400 m	50 m at 200 m
Time to form an effective cloud.	1-2 min	1 min	1-2 min	1 min
Total duration of burning.	3 min	30 secs	4 min	30 secs

Figure 39: Detail and Dimension for a Cloud Produced by a Single Rd of BE and WP Smoke Ammo

6. **Effects of Weather**. The effects of weather on the performance of smoke are similar in nature, though different in magnitude, for both BE and WP smoke. Their principal influence is on the rate of fire needed to ensure continuous screening. The following factors should be considered:

a. **Wind Strength**. A strong wind disperses the smoke quickly, and therefore entails a high rate of fire. Little or no wind may cause the smoke to thin out naturally before it can be carried downwind thus reducing the effective length of the screen. The best wind is a steady one of about 5 to 9 knots. Weather conditions can be estimated by

the observer from the behaviour of the dust and smoke within his zone of obsn. The table below can be used as an aid in estimating wind strength.

DESCRIPTIVE TERM	SPEED RANGE		SPECIFICATION FOR ESTIMATING SPEED
	MPH	KNOTS	
(a)	(b)	(c)	(d)
Calm	less than 1	less than 1	Smoke rises vertically.
Light Air	1-4	1-3	Dir of wind shown by smoke drift but wind vanes do not move.
Light Breeze	4-7	4-6	Wind felt on face; leaves rustle, ordinary vane moved by wind.
Gentle Breeze	8-12	7-10	Leaves and small twigs in constant motion; wind extends light flag.
Moderate Breeze	13-18	11-16	Raises dust and loose paper; small branches are moved.
Fresh Breeze	19-24	17-21	Small trees in leaf begin to sway; crested wavelets form on inland water.
Strong Breeze	25-31	22-27	Large branches in motion; whistling heard in telegraph wires.
Near Gale	32-28	28-33	Whole trees in motion; inconvenience felt in walking against wind.
Gale	39-46	34-40	Breaks twigs of trees; generally impedes progress.
Strong Gale	47-54	41-47	Slight structural damage occurs, e.g., to roofing shingles, TV antennae, etc.
Storm	55-63	48-55	Seldom experienced inland; trees uprooted; considerable structural damage occurs.
Violent Storm	64-72	56-63	Very rarely experienced, accompanied by wide-spread damage.
Hurricane	Above 72	Above 64	

Figure 40: The Beaufort Scale of Winds

b. **Wind Dir**. Only affects the positioning of the points of origin of the smoke.

c. **Humidity of the Atmosphere**. Smoke disperses more rapidly in a dry atmosphere, therefore, low humidity entails a high rate of fire.

d. **Turbulence of the Atmosphere**. Turbulence is caused by hot air rising from the grd and disturbing the atmosphere. It causes smoke to

drift irregularly, “windows” develop, and when it is severe, causes pillaring. The following chart relates required rates of fire to various weather conditions.

EQPT	WIND SPEED (KNOTS)		RAINY			OVERCAST			DRY/SUNNY		
			3	9	15	3	9	15	3	9	15
105 mm	WP	RATE OF FIRE	3	4.5	6	3	6	7.5	9	18	9
	HC		1	1.5	2	1	2	2.5	3	6	3
155 mm	WP	(RDS PER GUN) PER MINUTE	1.5	1.5	3	1.5	3	4.5	4.5	9	4.5
	HC		0.5	0.5	1	0.5	1	1.5	1.5	3	1.5

Figure 41: Rates of Fire Required for Smoke Engagement Under Various Weather Conditions

7. **Positioning the Point(s) of Origin**. Careful positioning of the points of origin of the smoke is nec if full advantage is to be taken of the amount of effective smoke which each gun can produce. The factors which determine the positioning of the point(s) of origin are:

a. the area to be blinded, i.e., the grd occupied by the en from whom our own activities are to be hidden;
b. the area to be screened, i.e., the posns or area of ops of our own tps; and
c. the dir of the wind (the strength of the wind only affects the rate of fire).

8. The areas to be blinded and screened will be indicated on the grd or map by the supported arm comd or by the arty comd ordering the msn. The dir of the wind is obtained by the observer.

9. Using the diagram below as an example, it can be seen that the belt of smoke must extend across DE and FG and be effective between X and Y. Normally XY should be positioned close to the area to be blinded, so that the smoke causes max inconvenience to the en and min inconvenience to our own tps.

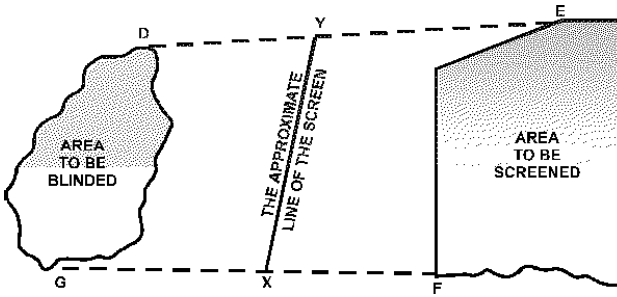


Figure. 42: Diagram of Areas to be Blinded and Screened

10. The following diagram illustrates how the dir of the wind affects the positioning of the point(s) of origin.

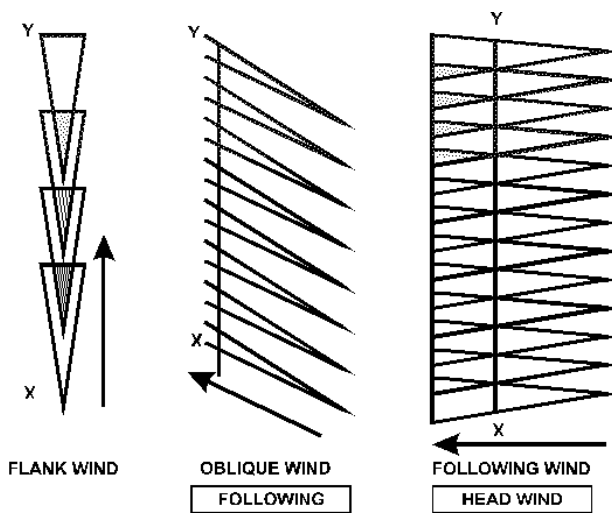


Figure 43: Diagram Showing the Posn of the Points of Origin for Various Wind Directions

PLANNING THE ENGAGEMENT

11. The principles of planning the use of smoke described in the following paragraphs refer in detail to the deliberate smoke engagement. Planning for the quick smoke engagement fol similar, although simpler lines.

12. **Info Required**. When planning a smoke screen, the observer must obtain the following info:

a. From the supported arms comd:
   (1) the area to be blinded;
   (2) the area to be screened;
   (3) the time at which the screen is to be effective - in order to build up, FFE must be ordered to start up to two minutes before the screen is to be effective, and this must be made clear to the supported arm;
   (4) the duration of the screen;
   (5) whether the supported arms comd agrees to testers being fired;
   (6) the alternative HE task and whether it is the arty officer or the supported arms comd who will make the decision to adopt this alternative, should the need arise; and
   (7) the loc of the supported arms comd.

b. From local obsn or arty sources:
   (1) the strength of the wind;
   (2) the dir of the wind; and
   (3) other atmospheric conditions.

13. **Adjustment**. The observer shall adjust onto the up-wind point of the screen. No great accuracy is required, provided he is satisfied that the subsequent screen will be at the required distance up-wind and will blind the desired area. Corrections of less than 100 m should not be used. Adjustment shall normally be carried out using HE quick in order to conserve smoke ammo, to achieve surprise, and to avoid prematurely obscuring the area.

14. **Testers**. The use of smoke testers will jeopardise surprise and possibly have an adverse effect on the success of the tactical op, their use must be cleared with the supported arms comd. When testers are used, the observer shall specify the gun to be fired, e.g., NUMBER 4 ONE RD FIRE FOR EFFECT.

15. **Procedures**. The observer must first decide whether the screen is technically possible and whether sufficient guns and ammo are aval. The plan is carried out as fol:

a. observer draws a diagram and marks the dir of the wind, the up-wind point of origin, and the line representing the length and dir of the smoke screen;
b. from the sketch the observer decides how many points or origin are required;
c. using the table below (fig. 44), the no. of guns required are determined: (refer to fig. 40)

TYPE OF WIND (mils)			LENGTH REQR = NO. OF GUNS	
FLANK	0	500	AC	
OBLIQUE/ FOLLOWING	501	900	2/3 X AC	
	901	1300	1/4 X AC	
HEAD	1301	1600	B	

Figure 44: No of Guns Calculation Table

16. Considering the prevailing weather, estimate the rate of fire and the resulting ammo expenditure with table in fig. 45.

PLANNING TABLE		
a.	Diagram	
b.	Wind Dir	
c.	Wind Speed	
d.	Ammo	
e.	Wpn Type(guns/mors)	
f.	Distance OA	
g.	Distance AC	
h.	Number of Guns	
i.	Length	
j.	Attitude	
k.	Met Conditions	

Figure 45: Planning Table

17. The required duration of the screen is multiplied by the rate of fire in RPG/min plus 2 additional rds/gun for build-up. The result is the number of RPG required for the screen, and is the number that will be ordered in the initial orders for the fire msn. Number of RPG required for screen:

No. RPG reqr for screen = Duration of screen (mins) X Rate of fire (RPG/min) + 2RPG

18. **Example of Quick Smoke**.

OBSERVER'S ORDERS
1 THIS IS 12 FIRE MSN FOUR GUNS GRID 126374, ALTITUDE 500, DIR 1280 BLINDING TPS IN BUILDINGS, RADIUS 200 WP, EIGHT RDS, ADJUST FIRE (NOTE 1) L200, A200 (NOTE 2) AT MY COMD 2 RDS FOL BY 6 RDS FFE,30
SEC (NOTE 3) FIRE END OF MISSION, BLINDING EFFECTIVE (NOTE 4)

NOTES

1. Observer may wish to adjust with HE.
2. Accurate adj will rarely be nec. One or two rds will usually be sufficient to est the area where the smoke rds are to be placed.
3. If the screen is eff and can be maintained with a small expenditure of ammo the observer can alter the interval or order "CEASE LOADING" to some of the guns in the engagement or adjust the rate.
4. Remember the alternative HE task

Figure 46: Example of Quick Smoke

19. **Deliberate Smoke**. The deliberate smoke procedure is used when the area to be blinded has a longer frontage than can be covered by the fire of a bty using the quick smoke procedure. Guns are directed at different points of origin that are placed in line.

20. **Procedure**:

a. The procedure for conducting a deliberate smoke engagement is similar to that used for a quick smoke engagement, except that the observer must give orders for the distr of fire. This shall be done by ordering, in the call for fire:
   (1) the number of guns to take part, i.e., the number of points;
   (2) the order "DELIBERATE SMOKE";
   (3) the length of the screen; and
   (4) the attitude of the screen to the nearest 50 mils.

b. Adjustment is carried out onto Point One, i.e., the up-wind point of origin. Again, no great accuracy is required.

c. As with quick smoke msns, orders for FFE must include an interval except for the first two rds.

d. For long screens requiring more than one bty, the RCPO shall assign points to the individual batteries.

e. When engaging with BE smoke:
   (1) for grd burst, order "UP 100" until proper ejection is achieved; and
   (2) if ejection of canisters is overly high causing canisters to fall short, order "DOWN 50".

f. When the rate of fire required exceeds the max rate of the guns, two or more guns will be directed at each point of origin.

21. **Example.**

SER	OBSERVER'S ORDERS	REPORT TO OBSERVER	ORDERS TO GUNS
(a)	(b)	(c)	(d)
1	1 THIS IS 11 FIRE MSN FOUR GUNS		
2			FIRE MSN NO. 1, 2, 3 AND 4

SER	OBSERVER'S ORDERS	REPORT TO OBSERVER	ORDERS TO GUNS
(a)	(b)	(c)	(d)
3	GRID 123 456 ALTITUDE 120 DIR 5240 SCREENING WITHDRAWAL SMOKE IN EFFECT 15 RDS DELIBERATE SMOKE 300 ATTITUDE 1250 ADJUST FIRE	(OP 1)	
4		(CP 1)	HE QUICK CHARGE 5 PREPARE 15 RDS SMOKE PER GUN BEARING 2342 ELEVATION 342 NO 1 ADJUST FIRE
5		SHOT 1, 24	SCREENING WITHDRAWAL
6	LEFT 100, DROP 200 AT MY COMD 2 RDS FOLLOWED BY 13 RDS FFE, 20 SECONDS		
7			SMK, BG NO.1 2336, NO.2 2334, NO.3 2330, NO.4 2328 FUZE NO.1 14.8, NO.2 14.6, NO.3 14.4, NO.4 14.2 AT MY COMD, ELEV NO.1 338, NO.2 336, NO.3 335, NO.4 331 2 RDS F/B 13 RDS FFE 20 SECS
8		READY	
9	FIRE		
10			FIRE
11		SHOT	
12		RDS COMPLETE	
13	END OF MSN SCREEN EFFECTIVE		
14		(CP 2)	END OF MSN SCREEN EFFECTIVE

NOTES (OP)	NOTES (CP)
1. This is the grid of the upwind pt of origin. The adj gun is directed at this point.	1. Sends engagement report to RCPO. 2. Sends availability report to RCPO.

Figure 47: Example of Deliberate Smoke Msn

803.23 – DESTRUCTION

1. The destruction of a tgt by arty fire is normally accomplished through the use of med or hy guns firing HE with a delay, concrete piercing fuze or copperhead. The tgt is usually small, e.g., a pillbox, bunker, small bldg, or dug-in tk. This method is both time consuming and demanding on ammo.
2. When using the destruction procedure only one gun is employed. Adjustment is carried out until a verified short bracket (VSB) is achieved, and then FFE is applied in small gps until the tgt is destroyed.

VERIFIED SHORT BRACKET (VSB)

3. The VSB is a small rge bracket that has been verified by the obsn of two pluses and two minus rds. The VSB is 25 m unless the Probable error in range (PEr) is over 25 m, in which case the VSB is 50 m. The GPO shall report to the observer when 1 PEr is greater than 25 m.
4. Whenever a tgt rd or contradiction is obtained it must be supported by a plus and minus rd separated by not more than twice the verified short bracket:
   a. A tgt rd counts as a plus and a minus rd.
   b. A contradiction occurs when a plus rd and a minus rd are produced using the same gun data. For example, a rd lands just short of the tgt, the observer orders REPEAT to attempt to verify the short bracket. If the rd lands plus of the tgt this would be considered a contradiction.

OBTAINING A VSB USING A DIR OTHER THAN GUN TO TARGET

5. When the angle T (see Fig. 12) is under 300 mils, normal adjustment procedure is used to obtain a verified short bracket.
6. When the angle T is over 300 mils, and the 100 m bracket has been split, adjustment for line is ordered when three rds indicate a bias and normal procedure is used to adjust the rge for a verified short bracket.

OBTAINING A VSB USING DIR GUN TO TARGET

7. If the tgt is very small it may be desirable to obtain the VSB using dir Gun to Target (GT). This method is an alternative to the normal method and may be used at the discretion of the observer.
8. When the angle T is under 300 mils normal adjustment procedure is used and DIR GT is ordered after the split of the 100 m bracket.
9. When the angle T is over 300 mils the observer shall bracket for both line and rge using the following procedure:
   a. Order “DIR GUN TO TARGET” after the split of the 100 m bracket.
   b. Obtain a 40 m line bracket.
   c. Split the 40 m line bracket progressively until:

(1) a tgt rd is obtained, or
(2) a contradiction is obtained on the line GT, or
(3) the size of the bracket is the amount one mil subtends at the rge GT.

d. Bracket for rge until a verified short bracket is obtained.

10. **Example.**

SER	OBSERVER'S ORDERS	CPO	
		REPORTS TO OBSERVER	ORDERS TO GUNS
(a)	(b)	(c)	(d)
1	1 THIS IS 11 FIRE MSN, 1 GUN	(READ BACK ALL ORDERS)(OP 1)	
2			FIRE MSN NUMBER 4
3	GRID 723 459, ALTITUDE 120 DIR 1680 BUNKER DESTRUCTION ADJUST FIRE	(CP 1)	
4			DESTRUCTION HE, QUICK, WHITE BAG, CHARGE 5 BEARING 0993, ELEVATION 357, ADJUST FIRE
5		SHOT 4, 20 (CP 2)	
6	RIGHT 40, ADD 200		
7			BEARING 1078, ELEVATION 388
8		SHOT	
9	DROP 100		
10			BEARING 1057, ELEVATION 362
11		SHOT	
12	ADD 50		
13			BEARING 1068, ELEVATION 375
14		SHOT	
15	DROP 25 (CP 3)		
16			BEARING 1062, ELEVATION 368
17		SHOT	
18	REPEAT		
19			ELEVATION 368
20		SHOT	

SER	OBSERVER'S ORDERS	CPO	
		REPORTS TO OBSERVER	ORDERS TO GUNS
(a)	(b)	(c)	(d)
21	ADD 25		
22			BEARING 1068 ELEVATION 375
23		SHOT	
24	DROP 10 DELAY THREE RDS FFE, 20 SECONDS (CP 4)		
25			DELAY BEARING 1065, ELEVATION 372 THREE RDS FFE, 20 SECONDS
26		SHOT RDS COMPLETE	
27	LEFT 10. REPEAT		
28			BEARING 1063, ELEVATION 373 THREE RDS FFE, 20 SECONDS
29		SHOT RDS COMPLETE	
30	REPEAT		
31			ELEVATION 373 THREE RDS FFE, 20 SECONDS
32		SHOT RDS COMPLETE	
33	END OF MSN BUNKER DESTROYED		
34		(CP 5)	END OF MSN BUNKER DESTROYED

NOTES (OP)

1. The destruction of tgts by indirect fire is slow and expensive in ammo and may not achieve the aim. One gun is used.

NOTES (CP)

1. Sends engagement report to RCPO.

2. The observer should advise the sp arm comd on the use of other weapon systems to achieve his aim.	2 If one PEr is greater than 25 m, it should be reported at this point. 3 The observer verifies the short bracket. 4. FFE is applied in three rd gps with an interval to allow for the proper lay of the gun. 5. Sends availability report to RCPO.

Figure 48: Example of a Destruction Msn

803.24 – DANGER CLOSE MISSIONS

1. **General**. By definition, a close tgt is any tgt within 600 m of our own tps. See figure 49.

2. The observer must be prepared to advise the supported arms comd on the danger from engaging any tgt based on the following considerations:

a. loc and nature of tgt;
b. time aval;
c. disposn and protection of friendly forces;
d. zone of the guns;
e. ammo aval;
f. splinter distance;
g. state of survey; and
h. availability of corrections for non-std conditions.

3. If the friendly forces are within the min safe distance of the tgt as described in paragraph 4, the msn cannot be completed until the supported arms comd, advised by the observer, has decided on one of the following courses:

a. Withdraw the tps to a safe posn.
b. Accept the risk of rds landing on his posn.
c. Have the observer adjust the MPI onto a point near the tgt, relying on the zone of the gun to cause some rds to fall on tgt during FFE. The point chosen should be on the line GT and must be within 2 PEr of the tgt.

4. **Min Safe Distances-Guns**. The zone of the gun combined with the shape of the splinter zone normally forms an ellipse lying across the line of fire (see figures 49 and 50). The width of the ellipse is caused by the splinters and is usually greater than the length caused by the zone of the gun. The length, along the line of fire varies with the rge. The min safe distance is the combination of this ellipse plus a buffer zone of not less than 25 metres. It can be calculated as fol:

a. **Tps at Right Angles to Line of Fire**. In this case (or within 200 mils of being at right angles) the safe distance is 25 m plus 8 PEr (Z + A in Figure 49).
b. **Tps Parallel to Line of Fire**. In this case (or within 200 mils of being parallel) the safe distance is 25 m plus the splinter distance (S + A).
c. **Tps Oblique to Line of Fire**. The safe distance in this case is the larger of the two figures calculated above

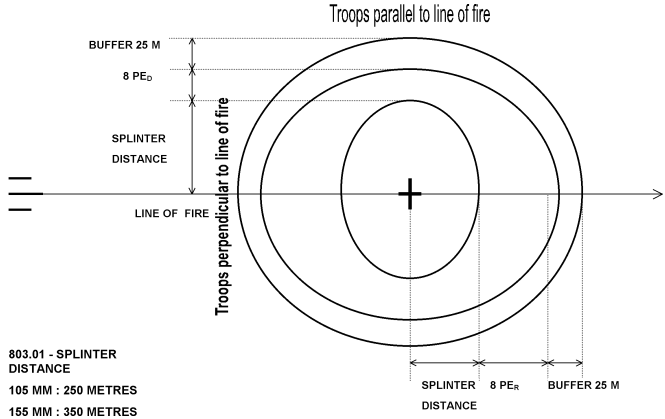


Figure 49: Illustration of Safe Distances Splinter Distances.

5. **Splinter Distances.**

SER	EQPT	SPLINTER DISTANCE
(a)	(b)	(c)
1	105 mm	250 m
2	81 mm and 4.2 in Mor	250 m
3	155 mm	350 m
4	175 mm	700 m
NOTE: These splinter distances may be halved when firing close to protected tps.		

Figure 50: Splinter Distances

6. **Example.**

SER	OBSERVER'S ORDERS	CPO	
		REPORTS TO OBSERVER	ORDERS TO GUNS
(a)	(b)	(c)	(d)
1	1 THIS IS 11 FIRE MSN BTY GRID 123 456 ALT 150 DIR 3200 ADJUSTING ZP1240 ADD 400 DANGER CLOSE ADJUST FIRE	(READ BACK ALL ORDERS) (OP 1, CP 1,7) (OP 2) (CP 2)	
2			FIRE MSN BTY ADJUSTING ZP 1240 DANGER CLOSE HE QUICK GREEN BAG CHARGE 5 NO 3 LOAD BG 4521, ELEV 430 NO.3 ADJUST FIRE
3		SHOT 3, 28	
4	RIGHT 50, DROP 200 BTY RIGHT, 1 RD FFE	(OP 3) (CP 3)	
5			LOAD BG: NO 1 4267, NO 2 4259… AT MY COMD ELEV NO.1 435, NO.2 440… BTY RIGHT 1 RD FFE FIRE
6		SHOT 1, SHOT 2, SHOT 3, ETC	
7	NO 1 RIGHT 20, NO 2 LEFT 50, DROP 50, NO 5 ADJUST FIRE	(OP 4,5) (CP 4,5,8)	
8		SHOT,5	
9	(MSN CONTINUES)		

SER	OBSERVER'S ORDERS	CPO REPORTS TO OBSERVER	ORDERS TO GUNS
(a)	(b)	(c)	(d)
10	DROP 50		NO 5 LOAD BG 4260, ELEV 445
11	DROP 50		NO 5 LOAD BG 4266 CANCEL AT MY COMD ELEV 441
12	DROP 50 1 RD FFE		
13			LOAD BG NO 1 443, NO.2 457… 1 RD FFE
14		SHOT, RDS COMPL	
15	RECORD AS TGT END OF MSN	(CP 6)	
16			RECORD AS TGT END OF MSN

NOTES(OP)

1. The tgt loc is always sent with an accurate grid ref, but with a tgt grid correction to a min of 600 m out from own tps.
2. "DANGER CLOSE" is sent as type of engagement.
3. When rds are within 400 m of our own tps, use 50 m correction unless sp arm comd orders otherwise. Adj with the closest gun.
4. Individual gun correction may be given as required.
5. The obs will not attempt to bracket the tgt, but will creep towards it. He will then cont adj in 50 m increments using the gun whose fall of shot is closest to friendly tps.
6. VT should not be fired over friendly tps. When time fuzes are used the obs should adj for fuze length at a dist no closer than 400 m to friendly tps.

NOTES(CP)

1. The tgt loc grid is always sent with an accurate grid ref, but with a tgt grid correction to a min of 600 m from own tps.
2. Engagement report is sent to 0 and 95.
3. Distr of fire CIRCULAR RADIUS unless otherwise ordered.
4. When rds are within 400 m of own tps, the OP will use 50 m correction unless sp arm comd orders otherwise.
5. The OP will not bracket, but will creep towards the tgt. He will continue the adjustment using the most dangerous gun.
6. Availability report is sent to 0 and 95.
7. GPO selects the charge with the smallest PEr.

7. When using DPICM, the obs must take into consideration the dir and speed of the wind. A rd of FFE should be seen at 600 m and subsequent adj made from the near edge of the effects pattern.	8. The GPO cannot, without auth from the observer: a. change the charge, propellant lot, or projectile weight; or b. change the adj gun.

Figure 51: Example of a Danger Close Msn

803.25 – WITNESS POINT

1. **General**. Witness point procedures may be used to determine differences which have occurred in met conditions. The procedure entails the re-engagement of a point which has been previously engaged. On completion of the first engagement, the tgt and its associated gun data are recorded. On completion of the second engagement, the gun data are again recorded. The differences in gun data between the two engagements represent the changes which have occurred in met conditions since the first engagement. The change in gun data can be applied to any tgt which was also engaged at the time of the first engagement of the witness point, provided it is within registration limits.
2. In effect, the witness point procedure is a modified form of registration. It is used for the re-engagement of previously adjusted tgts when it is desired to achieve surprise or to determine changes in met which have occurred.

PROCEDURE
3. Immediately after the original engagement of a tgt, a separate point, known as the witness point, is adjusted. When several tgts are being adjusted, e.g., a fire plan, or a gp of DF tgts, the adjustment of the witness point should be carried out midway in the adjustment of the tgts, in order to minimize the effects of changing meteorological conditions. The fired data of the tgts and of the witness point are recorded. The term WITNESS POINT is included in the call for fire under type of engagement and again in the orders for the recording of the tgt, e.g., "RECORD AS WITNESS POINT ZT 5362".
4. As closely as possible in time before the re-engagement of the tgt(s), fire is again adjusted onto the witness point. The fired data of the second engagement is then compared with those of the first.

LIMITATIONS
5. The tgt(s) and witness point must be adjusted and subsequently re-engaged by the same bty from the same posn using the same charge and ammo.
6. Witness point data may be circulated to, and used by guns on a common grid only and the witness point corrections can only be used by these guns.

803.26 – MARK MISSIONS

1. **General**. The mark msn procedure shall be used to indicate tgts to the land force or to facilitate the acquisition of tgts by Close Air Support (CAS).
2. Two types of procedures shall be used for the marking of tgts:
   a. mark msns utilizing smoke (BE/WP); and

b. mark msns utilizing illum.

3. Regardless of the type of msn, there is no change to the drills used in the CP or on the guns from normal msns.

4. Given the timeliness of most CAS msns, once the mark rd is adjusted, it is best to let the Forward Air Controller (FAC) control the moment of fire. It should therefore be included in the fire plan as an "on-call" tgt rather than as a scheduled timing. In most fire plans, the CAS tgt will also be engaged by arty and/or mortars firing HE (or other munitions). In order to prevent confusion in the arty CP, separate tgt numbers should be assigned to the area neutralisation and mark data.

5. **Example of a Smoke Mark Msn**.

SER	OBSERVER ORDERS	REMARKS
1	FIRE MSN ONE GUN GR 123 456, ALT 100 DIR 4800 PL DIGGING IN RADIUS 75 MARK WP IN EFFECT ADJUST FIRE	
2	LEFT 100, ADD 100, 1 RD FFE	
3	RECORD AS TGT ZT 1234	MARK MSN TO BE INCLUDED AS AN ON-CALL TGT ON THE FIRE PLAN

Figure 52: Example of a Smoke Mark Msn

ILLUMINATION MARK MISSIONS

6. The call for fire is similar to that of other illum msns. Where possible, the tgt should be adjusted and recorded using HE followed by illum.

7. The HOB of 300 m for 155 mm projectiles and 200 m for 105 mm projectiles achieves the best accuracy while maintaining max burn time on the grd. This may have to be adjusted somewhat depending on local meteorological and terrain conditions. Corrections to the HOB of less than 50 m shall not be ordered.

8. **Example**.

SER	OBSERVER ORDERS	REMARKS
1	FIRE MSN ONE GUN	
2	ZT 1234, DIR 1600	FOO has already engaged and recorded the tgt with HE.
3	DOWN 300	To adjust HOB to 300 m for 155 mm (adjust HOB to 200 m for 105 mm)
4	PL DIGGING IN RADIUS 75 MARK ILLUM ADJUST FIRE	

SER	OBSERVER ORDERS	REMARKS
5	LEFT 100, DOWN 50	
6	RECORD AS TGT ZT 2135	Mark msn may be included as an on-call tgt on the fire plan

Figure 53: Example of an Illum Mark Msn

803.27 – FIELD ARTILLERY-DELIVERED SCATTERABLE MINES

1. **General**. Field arty-delivered scatterable mines can play an important part in denying the en mobility on certain areas of the battlefield. Of the three categories of msns - planned, opportunity or in conjunction with other munitions - the BC and his observers should only be concerned with the tgt of opportunity msns. These msns will be fired using short self-destruct mines of the Remote Anti-Armour Mine System (RAAMS). Rapid response is vital. Based on current US practice, opportunity minefields are fired in a std 400 x 400 m module (high angle) or a 200 x 200 m module (low angle) at a single aim point. (The aim point is the centre point of the proposed minefield).
2. Employment auth of scatterable mines with short self-destruct times (24 hrs or less) is normally held at the divisional or bde level. Auth to engage tgts of opportunity with scatterable mines should be addressed in the fire sp annex to the fmn ops order.

ACTION BY THE OBSERVER

3. The procedure includes:
   a. **Ammo**. RAAMS with short or long fuze will be ordered as the ammo.
   b. **Adjustment**. The adjustment is usually carried out with HEPD until the short bracket is achieved. During adjustment with a bty or a regt, the short bracket is 200 m. Due to the size of the effect pattern, line corrections of less than 50 m and rge corrections of less than 100 m should not be made. Once the short bracket has been achieved, "ONE RD FFE" is ordered using Dual Purpose Improved Conventional Munition (DPICM). The observer can make the required corrections to the fall of shot and go into FFE using RAAMS. DPICM is used during the final stages of adjustment since the projectiles are ballistically similar. Furthermore, registration data derived from a DPICM registration can be used in firing RAAMS.
   c. **FFE**. The observer will order sufficient rds of FFE to achieve the required density. Tables will be issued indicating the number of rds nec to achieve the required density.

4. **Example**.

	OP	CPO	
SER	**ORDERS TO THE CP (BTY NET)**	**REPORTS TO THE OP (BTY NET)**	**ORDERS TO THE GUNS**
(a)	(b)	(c)	(d)
1	1 THIS IS 11 FIRE MSN BTY	(ALL ORDERS READ BACK)	
2			FIRE MSN BTY
3	DIR 1230 DISTANCE 2630 DOWN 10		
4	COY ADVANCING RADIUS 200 HIGH ANGLE		
5	4 RDS RAAMS SHORT FFE		
6		(NOTE 1, 2)	HIGH ANGLE RAAMS SHORT GREEN BAG, CHARGE 5 PREPARE 4 RDS RAAMS, SHORT PER GUN
7			BEARING NO 1 1293, NO 2 1297, NO 3 ....
8			FUZE NO 1 23.1, NO 2 23.3, NO 3 ....
9			ELEV NO 1 455, NO 2 458, NO 3 ...
10			4 RDS FFE
11			COY ADV RADIUS 200
12		SHOT 23	
13		RDS COMPL	
14	END OF MSN COY ADV STOPPED		
15		(NOTE 3)	END OF MSN COMPANY DESTROYED

NOTES
1. Sends engagement report to 0 and 95.
2. Tgts of opportunity minefields are normally fired with short self-destruct times.
3. Sends availability report to RCPO.

Figure 54: Example of a Msn Using RAAMs

SECTION 4 – FIRE PLANNING

803.28 – INTRODUCTION

1. **Fire Planning**. Fire planning is the continuing process of analysing, allocating, and scheduling fire sp. It determines how fire sp resources will be used, what types of tgts will be attacked, and with what means.
2. Fire planning is a deliberate process starting at the highest level (usually div or bde) working its way down to the BC and finally, the FOOs allocated to combat teams. The FOOs then begin the process of refinement back up to the originating level.
3. There are two basic types of fire plans, offensive and defensive, each of which can be made in either a quick or deliberate manner.
    a. **Offensive Fire Plans**. These plans are designed to sp offensive ops. For large, complex actions, normally at bde gp level and above, such plans involve the firepower of several units, and need to be very carefully and closely co-ordinated.
    b. **Defensive Fire Plans**. These plans are used at all levels to co-ordinate indirect fire sp for the protection of the supported arm in defensive situations.
4. **Factors**. The main factor in arty fire planning is the supported arm comd's requirements. The arty comd must do all in his power to meet these demands or to provide satisfactory alternatives.
5. The factors which influence meeting the requirements of the supported arm comd are:
    a. the time aval to prepare the fire plan;
    b. the amount and types of ammo aval;
    c. the max rate of fire of the guns to be used;
    d. the number and types of guns aval;
    e. the accuracy with which tgt locs can be determined;
    f. the number of observers aval to adjust;
    g. the state of survey and meteorology;
    h. the communications aval; and
    i. degree of surprise desired.

803.29 – FIRE PLAN TERMS

1. **Tactical Classification of Fire**:
    a. **Preparatory Fire**. Preparatory fire is undertaken to:
        (1) weaken the en by inflicting casualties to personnel and damage to his eqpt, destroying his defensive works and disrupting his communications; and
        (2) demoralise the en so that he will offer little or no resistance to our ops.
    b. **Covering Fire**. Covering fire is delivered to neutralize the en's direct fire weapons that can engage our assaulting tps in an atk or counter-atk.
    c. **Defensive Fire (DF):**

(1) **DF**. DF is delivered to assist and protect a unit engaged in a def action. DF tgts may be in depth with the object of disorganising en preparations for atk and the mov of his res, or they may be close tasks designed to engage and destroy the en at relatively close rge when the atk is launched. DF tasks must be sited to cover possible en approaches, fire orders must be brief, and the response rapid. Std responses will be detailed in fmn and unit SOPs.

(2) **Final Protective Fire (FPF)**. Those close DF tasks that cover the most likely and dangerous en approaches are nominated as FPF. Guns will normally be laid on these tasks when not otherwise engaged.

(3) **DFs In The Atk**. In the atk, the DF tgts required to cover the period of reorganization on the objective must form part of the planning for the op. After the objective has been captured, additional DF tgts may be selected and the locs of the original ones confirmed.

d. **Counter-bty Fire**. Counter-bty msns are undertaken to destroy or neutralize the en's indirect fire weapon systems (arty) and are normally co-ordinated at Div Arty HQ. Counter-mortar fire is undertaken to destroy or neutralize the en mortars. This is normally co-ordinated by the CO of the DS arty regt.

e. **Harassing Fire**. Harassing fire is delivered to curtail the freedom of en movement, disturb his rest and, by threat of losses, to lower morale.

2. **Classification of Tgts**:

a. **Planned Tgts**. A planned tgt is one on which fire is pre-arranged. It includes the fol:

(1) **Scheduled Tgts**. Tgt on which fire is to be delivered at a specific time.

(2) **On Call Tgts**. Tgts other than scheduled tgts on which fire is delivered when requested.

b. **Tgts of Opportunity**. A tgt of opportunity is one that has not been considered, analyzed or planned.

3. **Combination of Tgts**:

a. **Gp of Tgts**. A gp of tgts consists of two or more tgts on which fire is desired simultaneously. Each tgt in a gp will have a fire unit allotted to fire on it. A gp of tgts is designated by an alphanumeric combination, e.g. (D9B).

b. **Series of Tgts**. A series of tgts is a number of tgts, gps of tgts, or both, that are likely to be fired in succession. A series of tgts is not engaged simultaneously. When a series of tgts is adopted, the CPO prepares map data for all of the tgts contained in the series. A series of tgts is indicated by a nickname, e.g. MAD HATTER.

4. **Superimposed Arty**. A term used in fire planning to indicate that an arty unit is augmenting fire of other units on a tgt, and that its fire may be lifted from that tgt and applied elsewhere by the auth implicit in its allotment.

803.30 – COMMAND AND CONTROL TERMS

1. **Command**. Within the arty, a special implication of command is that the officer, in whom it is vested, has auth to move the guns and to indicate where they will be deployed.
2. **Control**. Con in the arty sense means con of fire by the issue of technical orders which can be implemented at the guns and which do not entail movement of the guns. Control is exercised by:
    a. pre-planned or impromptu changing of the pri in calls for fire;
    b. orders concerning the level at which fire plans are to be prepared and issued; and
    c. any special auth to order concentrations of fire.
3. **Tactical Tasks**. The assigning of tac tasks is the process of placing arty fire power at the disposal of a unit/fmn without changing the gping for comd. (See Figure 55).
4. **Affiliation**. It is generally desirable that an arty unit be assigned as the DS arty of a given fmn or supported arm unit on as continuous a basis as possible. This is advantageous, not only from the point of view of development of personal understanding and team spirit, but also because battle procedures often vary between different fmns and supported units. This relationship is referred to as an affiliation, a term which in itself has no precise tactical implications.

ARTY WITH A TACTICAL MSN OF:	ANSWERS CALLS FOR FIRE IN PRI FROM:	ESTB LN WITH:	ESTB COMMS WITH:	HAS AS ITS ZONE OF FIRE:	FURNISHES FWD OBSERVERS	IS POSN BY:	HAS ITS FIRE PLANNED BY:
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
General Support (GS)	1. Force Arty HQ.	No inherent reqr.	No inherent reqr.	Zone of sp unit/fmn.	No inherent reqr.	Force Arty HQ.	Force Arty HQ.
General Support Reinforcing (GSR)	1. Force Arty HQ. 2. Reinforced arty unit. 3. Own observers.	Reinforced arty unit.	Reinforced arty unit.	Zone of sp unit/fmn to incl zone of reinforced arty unit.	Upon req of reinforced arty unit, subj to prior approval of Force Arty HQ.	Force Arty HQ or, subj to approval, the reinforced arty units.	Force Arty HQ.
Reinforcing (R)	1. Reinforced arty unit. 2. Own observers. 3. Force Arty HQ.	Reinforced arty unit.	Reinforced arty unit.	Zone of fire of reinforced arty unit.	Upon req of reinforced arty unit.	Reinforced arty unit or ordered by Force Arty HQ.	Reinforced arty unit.

ARTY WITH A TACTICAL MSN OF:	ANSWERS CALLS FOR FIRE IN PRI FROM:	ESTB LN WITH:	ESTB COMMS WITH:	HAS AS ITS ZONE OF FIRE:	FURNISHES FWD OBSERVERS	IS POSN BY:	HAS ITS FIRE PLANNED BY:
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
Direct Support (DS)	1. Sp unit. 2. Own observers. 3. Force Arty HQ.	Sp unit (down to bn level).	Sp unit.	Zone of sp unit.	To (each)* coy size manoeuvre elm of sp unit.	Unit comd, as deemed nec, or ordered by Force Arty HQ.	(Dev own fire plan.)
NOTE* "Each" applicable to US only (QSTAG 217).							

Figure 55: Field Arty Tactical Tasks Table

5. **Priority of Fire**. Each tactical task has a different pri of fire associated with it. Generally, BCs and FOOs work within a regt that is in DS to a fmn (usually a bde). The pri of fire is controlled by the Ops O. He allocates the pri of fires to the BCs/observers for a period of time or phase of op. If the BC is allocated the pri of fires by the Ops O, any FOOs working for that BC are allocated the same pri by convention. The BC is responsible to either parcel out the pri of fire or sort out calls for fire from his observers.

803.31 – SIMPLE FIRE PLANS

1. **Procedure**. Fire plans, which involve no more than three to six tgts and only the batteries of one regt, may be arranged simply by an offr to offr conversation without using the quick arty fire plan table. Fire plans at cbt tm level usually take this form. When using this method, the following essential info should be sent and acknowledged by offrs:
   a. tgt numbers, locs, and pri;
   b. allotment of fire units, ammo, and weights of fire;
   c. H-hr, and other timings;
   d. all timings and instructions on the firing of planned tgts;
   e. DFs and restrictions on adjustment;
   f. method of engagement and distr of fire, if nec; and
   g. any other info essential to the guns.
2. Adjustment continues while orders are passed.
3. Adjust tgts in reverse order of engagement, i.e., last to be adjusted is first to be fired. Adjust two tgts simultaneously when nec.
4. Work out DF grids while adjustment in progress.
5. Ensure time check is correct, especially with sp arm.
6. Use TOT when possible.
7. Before an atk the FOO must get the fol info from the BC or sp arms comd:
   a. **Plan**.
      (1) LD, obj, and bdrys;
      (2) outline plan;
      (3) rtes and bounds;
      (4) H-hour and synchronized time; and
      (5) auth to modify.
   b. **Fire Plan**.
      (1) the timed programme;
      (2) all recorded and on call tgts, incl DFs;
      (3) arty allotted for the fire plans;
      (4) ammo restrictions;
      (5) tasks on the obj and priorities;
      (6) known en locs; and
      (7) responsibility for mod.
   c. **Ground**.
      (1) likely OP areas and dead grd;
      (2) details of obj; and

(3) possible obstacles enroute.

d. **General**.
   (1) code names, freqs; and
   (2) any anchor OP.

e. **Hints**. The following hints can be useful:
   (1) keep plan simple;
   (2) remember to allow at least one min between serials;
   (3) plan modification drill; keep it simple;
   (4) be prepared to assist in adj or change from adj to prediction; and
   (5) degree of adj may require change if time is short.

803.32 – ARTY FIRE PLAN TABLE

1. The Arty Fire Plan Table gives the tgt engagement orders for a timed programme of fire. It specifies:
   a. timings for all scheduled tgts;
   b. total ammo expenditure by each fire unit on each tgt or rates of fire for each tgt in rds per gun per minute;
   c. the type of ammo to be fired for each tgt;
   d. on call tgts; and
   e. any special instructions.

803.33 – THE QUICK ARTY FIRE PLAN TABLE

1. This table combines the info from the arty fire plan table and a tgt list into one. It is used for quickly arranged fire plans at lower levels using fewer batteries and guns. Greater use is made of verbal rather than written orders.

803.34 – MODIFICATION OF FIRE PLANS

1. **"MODIFY" (name of fire plan) or "REQUEST MODIFY" (name of fire plan**). These terms are used to indicate that a modification is being ordered or requested. Only the originator or a person authorised by him may order or approve modifications to a fire plan. Anyone may request a modification.

2. **"AMEND TO READ"**. This term is used when a simple modification is to be made to a fire plan. Examples are as fol:
   a. "MODIFY FAT CHANCE, 2, ZT 1285, AMEND TO READ RATE FOUR". (Rate Two had previously been ordered.)
   b. "MODIFY SLAM DUNK, AMEND TO READ H-HR 1530".
   c. "REQUEST MODIFY TOY STORY, ZT 3331, AMEND TO READ (BRAVO) 28123420, (CHARLIE) DF, PREDICT".

3. **"CHECK FIRING"**. This order is used to stop firing on all or part of a fire plan, e.g., "CHECK FIRING RUSTY DAGGER". On receipt of this order firing is stopped on the whole fire plan. "CHECK FIRING ZT 1469". On receipt of this order firing is stopped only on ZT 1469. The fire plan timings and fire continue with the exception of firing on ZT 1469.

4. **"CEASE LOADING"**. This order is used to stop the guns from further loading with the bores clear. It can be used to stop loading on all or part of a fire

plan, e.g., “CEASE LOADING JUMP-START” or “CEASE LOADING ZT 1764”. The fire plan timings and fire continue with the exception of loading as indicated.

5. **“DWELL AT (ON)”**. This order is used when a fire unit is required to continue the engagement for an unspecified length of time. The planned number of rds lapses and the FFE ordered is substituted. This order may include a change in the rate of fire. A reference must be made to either the tgt number or to the timing as shown in the examples below:
   a. “2, MODIFY COMMON SENSE, DWELL ON ZT 1764”.
   b. “MODIFY MAPLE LEAFS, DWELL AT PLUS ONE ZERO”.

6. **“ADD (SUBTRACT) MINUTES TO (FROM) ALL TIMINGS”**. This order is used when a uniform amendment to all timings is required, e.g., “MODIFY ZULU WARRIOR, ADD FIVE MINUTES TO ALL TIMINGS”. It is normally coupled with an order to dwell or restart, “RESTART AT __ “and fol the order “CEASE LOADING”, “CHECK FIRING” or “DWELL AT/ON” if the programme is to continue. It can be used in two ways. e.g., “MODIFY ZULU WARRIOR, ADD FOUR MINUTES TO ALL TIMINGS, RESTART AT PLUS TWO ZERO”, (the four minutes does not apply to H-Hr or tgts already engaged during the fire plan) or “MODIFY BIG TOP, RESTART AT PLUS EIGHT AT 1130 HRS”. (The fire plan will recommence at 1130 hrs on the tgts scheduled to be fired at the +8 timing and will continue as if the fire plan was never modified.)

803.35 – COMMAND POST DUTIES DURING A FIRE PLAN

1. The GPO/CPO is responsible for:
   a. copying the fire plan when sent by radio;
   b. on receiving orders for a fire plan, send a wng O to the guns so that preparation of ammo can commence;
   c. controlling the fire plan ensuring that:
      (1) modification orders are implemented properly; and
      (2) fire commences and ends at the right time;
   d. reporting to the RCPO when the first and last rds of the fire plan or any phase of it, have been fired.

2. **Gun Programmes**. The GPO/CPO will produce gun programmes if required. If they are used, they should be issued in sufficient time for det comds to brief their pers.

3. **Ammo**. All ammo to be used during the fire plan should be prepared before the fire plan starts.

4. **Sight Testing and Check Bearing**. Tests shall be carried out as fol:
   a. prior to the fire plan;
   b. during lulls in the fire plan; and
   c. during long fire plans, sights of each guns must be checked periodically to ensure that the guns are laid on the correct ser at the correct data.

5. **Implementation of the DF Plan**. On receipt of the DF tgt list, the GPO/CPO shall:

a. acknowledge receipt;
b. determine GPO Tech proforma/printout for all DF tgts that he has been ordered to adopt;
c. FPF tasks shall be kept up to date and may be issued as gun programmes;
d. determine whether his bty can engage each tgt;
e. maintain an up-to-date list of all DF tgts, including alterations to grid ref resulting from adjustment; and
f. report to the RCPO those tgts out of rge.