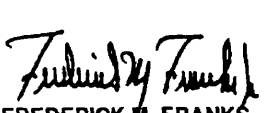
FOREWORD

This publication has been prepared under our direction for use by our respective commands and other commands as appropriate.



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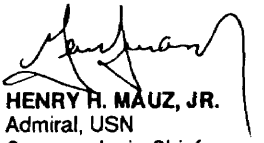

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FM 90-20/FMFRP 2-72/ACCP 50-28
USAFEP 50-9/PACAFP 50-28
CINCLANTFLTINST 3330.5

COMBAT AIR FORCES AUTHORIZATION

The procedures in this publication are authorized for use throughout the Air Forces as indicated below.

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Norfolk, Virginia

11 FEBRUARY 1994

J-Fire

Multi-Service Procedures for Joint Application of Firepower

* This publication supersedes FM 90-20, FMFRP 2-72, TACP 50-28, USAFEP 50-9, PACAFP 50-28, and AACP 50-28, 25 July 1989.

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PREFACE

PURPOSE

J-Fire provides a pocket-sized, quick reference guide for requesting fire support. *J-Fire* contains calls for fire, a format for joint air strike requests, a format for briefing pilots who provide close air support and close-in fire support, structures of communication nets, and data on weapons.

SCOPE

J-Fire applies to the tactical operating forces of the Army, Marine Corps, Navy, and Air Force. It is a US unilateral-only document, but it includes NATO formats where appropriate. Information in *J-Fire* has been extracted from existing applicable service directives. It is intended primarily for use by members of battalion-level combat units. Naval and Marine information has been coordinated with Headquarters, Atlantic Fleet and the Marine Corps Combat Development Command (MCCDC), respectively.

IMPLEMENTATION PLAN

Participating major Service command offices of primary responsibility (OPRs) will review this publication for joint procedural information. Once they validate the information, they should reference and incorporate it into the appropriate Service manuals, regulations, and curricula.

Army

The doctrine and procedures contained herein will be incorporated into Army field manuals, training circulars, and curricula as directed by the Commander, US Army Training and Doctrine Command (TRADOC).

Marine Corps

The doctrine and procedures contained herein will be incorporated in Marine Corps doctrinal and training publications as directed by the Commanding General, Marine Corps Combat Development Command.

Air Force

Air Combat Command (ACC) will incorporate procedures according to HQ ACC OI 5-1 (OPR: HQ ACC/XPJ). United States Air Forces Europe (USAFE) and Pacific Air Forces (PACAF) will validate and incorporate appropriate procedures in accordance with applicable major command (MAJCOM) and other governing directives. Possible places for inclusion are—

- Air-Ground Operations School (AGOS) curricula.
- FM 100-26/AFM 2-XX, *Army-Air Force Joint Air-Ground Operations.*
- MCM 3-1, *Mission Employment Tactics* (S-NF), Volume I, *Tactical Employment, General Planning, and Employment Considerations.*
- MCM 3-1, *Mission Employment Tactics* (S-NF), Volume III, *Tactical Employment, A-10.*

- MCM 3-1, *Mission Employment Tactics* (S-NF), Volume VIII, *Tactical Employment, Forward Air Controller.*
- MCM 3-1, *Mission Employment Tactics* (S-NF), Volume V, *Tactical Employment, F-16.*
- ACCP 55-51, *Tactical Air Control Party Handbook.*

USER INFORMATION

The Air Land Sea Applications (ALSA) Center developed this publication with the participation of the approving Service commands. ALSA will review and update this publication as necessary. Send comments and recommendations directly to—

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Quantico, VA 22134-5001

Commander
Air Combat Command
ATTN: XPJ
Langley AFB, VA 23665-2778

Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

ARTILLERY/MORTAR FIRE

COMMUNICATIONS

Agencies:	Observer to artillery/mortars
Nomenclature:	Fire direction net/fire control net (USA) Conduct of fire net (USMC)
Frequency:	30.00 to 75.95 Mhz, VHF-FM
Compatible Equipment:	USA: PRC-77, VRC-46, GRC-160 USMC: PRC-77, VRC-12 USAF: PRC-77, PRC-119, VRC-46

ARTILLERY/MORTAR SUPPORT PLANNING

Supporting unit: _____

If this unit or direct communications are unavailable, indicate the unit through which support will be requested: _____

_____

Call sign: _____

Frequency: _____

Period effective from: _____ to: _____

Table 1. Artillery Weapons Capabilities

Weapon	Model	Maximum Range (m)	Range of RAP (m)	Sustainment Rate (RPM)	Ammo	Fuzes
105-mm	M101A1 (USMC)	11,600	14,500	3	HE, WP, ILLUM, HEP, HC, AP, ICM, CHEM, RAP	PD, MT MTSQ VT, CP
105-mm	M102	11,500	15,100	3	HE, WP, ILLUM, HEP, HC HEAT, ICM, CHEM, RAP, APERS-T	PD, VT, BD, MT, MTSQ CP
105-mm	M119	14,000	23,5000	3	HE, WP, ILLUM, HEP, HC, AP, ICM, CHEM, RAP	PD, VT, BD, MT, MTSQ, CP
155-mm	M109A3	18,100	19,300	1	RAP, ICM HC, ILLUM, CPHD, CHEM, WP, HE, DPICM, ADAM, RAAM	PD, VT, MTSQ, CP, MT
155-mm	M114A2	14,600	30,000	1	HE, RAP, CHEM, ILLUM, ICM, ADAM, RAAM, WP, CPHD, DPICM, HC	PD, VT, MTSQ, CP, MT

Table 1. Artillery Weapons Capabilities (continued)

Weapon	Model	Maximum Range (m)	Range of RAP (m)	Sustainment Rate (RPM)	Ammo	Fuzes
155-mm	M198	24,000	30,000	2	HE, RAP, ICM, CPHD, HC, CHEM, DPICM, ILLUM, WP, ADAM, RAAM	PD, VT, MTSQ, CP, MT
203-mm	M110A2	22,900	30,000	0.5	HE, HES, ICM, CHEM, DPICM, RAP	PD, VT, CP, MT, MTSQ
MLRS	M207	30,000	NA	12	DPICM	TI
ATACMS	M207	100+ /-KM	NA	2	APAM	TI

Table 2. Mortar Weapon Capabilities

Gun/ Mortar	Maximum Range (m)	Minimum Range (m)	Maximum Rate of Fire (RPM)	Sustainment Rate (RPM)	Ammo	Fuzes
60-mm	3,500	50	30	15	HE, WP, ILLUM,	Multioption
81-mm	4,789	70	20	8	HE, WP, ILLUM	PD, VT
107-mm	5,650	920	18	3	HE, WP, ILLUM, CHEM	VT, PD, TI

Table 3. Frequently Used Ammunition and Suggested Targets

Shell/Fuze	Targets	Remarks
ICM	Personnel Light vehicles	Massing TOT
HE/Q	Covered positions Heavy vehicles	Massing
HE/MT/VT	Vehicles, Personnel	Suppression
HE/CP	Bunkers	Destruction
Copperhead [1]	Armor, Bunkers	Destruction

ARTILLERY/MORTAR CALL FOR FIRE [2]

(Give in three separate transmissions)

1. Observer: "_____ (artillery/mortar), ***this is*** _____ (observer's ID)"

   Warning order: "_____ (such as adjust fire, fire for effect)"

NOTE: Copperhead is fired as an FFE mission.

2. Locations of target: Select the appropriate method.

☐ **Grid coordinates:**

"Grid _____"

"Direction _____" in mils/degrees

NOTE: Send after receipt of message to observer.

---

[1] Copperhead requires compatible laser designation of the target.

[2] Communication formats show all spoken words in bold italics.

☐ **Polar plot:**

"Direction _____ " in mils/degrees

"Distance _____ " in meters

"Up/down _____ " in meters

☐ **Shift from known point:**

"Shift _____ "
(target/known point number)

"Direction _____ " in mils/degrees

"Left/right _____ " in meters
(lateral shift)

"Add/drop _____ " in meters
(range shift)

"Up/down _____ " in meters

NOTE: Minefield location is center of target area. Minefield point must be at least 425 meters from friendly troops for adjust-fire missions and 700 meters for FFE missions.

3. Target description: " _____ "

4. Method of engagement.

Type of adjustment: " _____ "
(such as ***danger close, destruction***)

Trajectory: " _____ "
(high/low angle)

Ammunition: "_____"
(such as ***HE, WP, ICM***)

Distribution of fire: "_____"

NOTE: Control Copperhead by individual round at a minimum of 30 seconds apart. If the FDC controls firing, rounds will be at 30-second intervals.

5. Method of fire and control: "_____"
(such as ***at my command, when ready, TOT***)

6. Observer: ***"Direction _____ over."***

NOTE: Transmit as required; must be transmitted prior to sending any corrections.

FIELD ARTILLERY AERIAL OBSERVER CALL FOR FIRE

1. Observer: "_____, ***this is*** _____,
(artillery/mortar) (observer's ID)
adjust fire, over."

2. Target location: ***"Grid _____ over."***
(coordinates)

3. Target description: "_____"
"_____"

NOTE: Observer may request ranging rounds, TOT, and splash. For adjustments, observer may use gun target line (from ranging rounds), observer target line (aircraft heading indicator), cardinal direction (given in mils), or reference to a readily identifiable terrain feature.

MESSAGE TO OBSERVER

Units to fire: "_____"

Changes to call for fire: "_____"

Number of rounds: "_____"

Target number: "_____"

ARTILLERY/MORTAR QUICK SMOKE REQUEST

1. Observer: "_____, ***this is*** _____, ***adjust fire***"
   (artillery/mortar) (observer's ID)
2. ***"Grid*** _____"
   (coordinates)
3. Target description: "_____"

   _____ ***smoke/WP in effect***"
   (include target length, wind direction, desired smoke duration; for example, 300 m, crosswind, 10 min)
4. Adjust fire up/down.

   For ground burst: ***"up 100"***

   For canisters bouncing: ***"up 50"***

   For canisters spread out: ***"down 50"***

ARTILLERY/MORTAR ILLUMINATION REQUEST - CALL FOR FIRE

WARNING: Use of illumination requires care and adequate coordination to avoid adverse impact on adjacent and supporting units using night-vision devices.

1. Observer: "_____ *this is* _____"
   (artillery/mortar) (observer's ID)
2. Warning order: "_____, *over.*"
   (such as ***adjust fire, fire for effect***)
3. Target location: "_____, *over.*"
   (such as ***grid, polar, plot***)
4. Target description: "_____
   _____"
5. Method of engagement: "_____"
   (illumination)
6. Method of fire control: "_____, *over.*"
   (such as ***by shell, at my command,*** etcetera)
7. Adjustment of illumination:

   "***Direction,*** _____, *over.*"

   Corrections include—

   "***Right/left*** _____" in 200-m increments

   "***Add/drop*** _____" in 200-m increments

   "***Up/down*** _____" in 50-m increments

When target is verified, adjust illumination over adjusting point and transmit:

"Coordinated illumination."

Call for fire for target attack, such as HE, ICM, etcetera.

When maximum target illumination is obtained, the observer transmits—

"Illumination mark"

and adjusts and fires for effect with the attack munitions.

NOTE: Coordinated illumination directs the FDC to calculate and direct the firing of the illumination and the attack munitions at a time that should result in the attack munitions impacting when the target is at maximum illumination. Observers desiring to control the firing of both the illumination and the attack munitions should transmit—

"By shell, at my command"

To receive two-or four-gun illumination at any time during the illumination mission, transmit—

For two-gun illumination: ***"Range spread"*** or ***"Lateral spread"***

For four-gun illumination: ***"Range and lateral spread"***

Table 4. Artillery/Mortar Illumination Factors
(Danger-close distance is 600 meters for all rounds)

Weapon	Shell Type	HOB (m)	Burn Time (sec)	Rate of Fall (m/sec)
60-mm	M83A1	160	25	6
60-mm	M83A2	160	32	6
60-mm	M83A3	160	32	6
81-mm	M301A3	600	60	6
105-mm	M314A2	750	60	10
105-mm	M314A3	750	70-75	10
107-mm	M335	700	60	10
107-mm	M335A1	700	70	10
107-mm	M335A2	400	90	5
155-mm	M118	750	60	10
155-mm	M485A	600	120	5
203-mm (8-in)	NA	NA	NA	NA

ARTILLERY COUNTERFIRE INFORMATION FORM

1. SHELREP, MORTREP, BOMREP.

   a. Unit of origin:_____
   (call sign)

   b. Position of observer:_____
   (encoded UTM grid coordinates)

   c. Direction: _____ ; angle of fall: _____
   (flash, sound, or groove)

   d. Time from: _____

   e. Time to: _____

   f. Area shelled:_____
   (encoded UTM grid coordinates)

   g. Number/nature of delivery:_____

   _____

   h. Nature of fire:_____
   (such as ***adjust fire, fire for effect***)

   i. Number, type, and caliber of shells: _____

   _____

   j. Flash-to-bang time:_____ seconds
   (elapsed time between impact and sound)

(Flash-to-bang time in sec X 350-m = distance in meters)

   k. Damage: _____
   (encoded as required)

l. Remarks: _____

2. Location report.

m. Serial number: _____

NOTE: Each location produced by a locating unit is given a serial number.

n. Target number: _____
(if target number has already been assigned)

o. Position of location: _____
(grid reference or grid bearing of located weapon)

p. Accuracy: _____

q. Time of location: _____

r. Target description: _____

3. Counterfire action.

s. Time fired: _____

t. Fired by: _____

u. Number of rounds, type of projectile, and fuze: _____

_____

CLOSE AIR SUPPORT

REQUEST COMMUNICATIONS

Agencies:	TACP to ASOC (USAF), DASC/FSCC, TACC/SACC (USMC/USN)
Nomenclature:	Tactical air request net (USMC/USN) Air Force air request net (USAF)
Frequency:	2 to 30 Mhz, HF
Secondary:	30.00 to 75.95 Mhz, VHF-FM
Compatible Equipment:	USA-GRC-106, PRC-77, PRC-104, GRC-193 USMC-PRC-104, GRC-193, MRC-110, VRC-12 MRC-138, PRC-77 USAF-PRC-104/119, VRC-46, PRC-77, GRC-206, MRC-107/108/144

CONTROL COMMUNICATIONS

Agencies: ALO/AO/FAC to fighter/attack aircraft

Nomenclature: Tactical air direction net

Frequency: 225.0 to 399.975 MHz, UHF

Secondary: 30.00 to 75.95 MHz, FM
(Unusable by F-111, A-6, USN F-14)

Secondary: 121 to 143.95 MHz, VHF
(Usable by OV-10, A/OA-10, F-16, F-18)

Compatible Equipment: USA aviation unit - VRC-12, PRC-77, VRC-24

USMC - PRC-75, PRC-77, PRC-113, VRC-12/83/85

USAF - PRC-66, MRC-107/108/144, PRC-77, GRC-119, PRC-113, VRC-46

CLOSE AIR SUPPORT PLANNING

Supporting TACP: _____

NOTE: If this TACP or direct communications are unavailable, indicate the unit through which support will be requested:

Call sign: _____

Frequency: _____

Period effective from: _____ to: _____

IMMEDIATE CLOSE AIR SUPPORT REQUEST

(This format is also used to request USMC close-in fire support and may be used to request USAF AC-130 gunship support.)

1. TACP: "_____ (ASOC/DASC/AOC/SACC), ***this is*** _____ (TACP's ID) ***with an immediate CAS request.***"

NOTE: Await acknowledgment.

2. ***"Immediate."***
3. Target description: "_____"
4. Target location:[3] "_____ (UTM grid coordinates), elevation _____ feet"
5. Time on target: "_____"
6. Desired ordnance/results: "_____"

[3] USMC/USN A-6 aircraft require latitude and longitude coordinates for target location.

NOTE: When identifying position coordinates for joint operations, include the map data that location coordinates are based on. Desert Storm operations have shown that simple conversion to latitude/ longitude is not sufficient. The location may be referenced on several different data bases, for example, land-based versus sea-based data).

7. Final control.

   "Call sign: _____ *"*

   "Frequency: _____ *"*

   "Contact point or IP: _____ *"*

8. Remarks, such as—

   "Friendly location _____ *"*

   "Weather _____ *"*

   "Threats _____ *"*

NOTE: The appropriate agency will approve or disapprove as well as request additional data required to execute the mission.

US AIRCRAFT CHECK-IN BRIEFING

(Aircraft transmits to controller)

Aircraft: "_____ (controller call sign), *this is* _____ (aircraft call sign)"

1. Identification/mission number: "_____"

NOTE: Authentication and appropriate response suggested here.

2. Number and type of aircraft "_____"
3. Ordnance: "_____"
4. Play time: "_____"
5. Abort code: "_____"
(from applicable communications authentication tables)

US FORWARD-AIR-CONTROLLER-TO-ATTACK AIRCRAFT BRIEFING (9-Line)

(Omit data not required; do not transmit line numbers. Units of measure are standard unless otherwise specified.)

US FAC: "_____ (aircraft call sign), *this is* _____ (US FAC call sign)"

1. Initial point (IP)/attack point (AP):[4] "_____"

[4] Minimum essential in limited communications environment .

2. Heading:[4] "_____" *(magnetic).*
(IP to target)
"Offset _____ *feet"*
(left/right)

3. Distance:[4] "_____"
(IP to target in nautical miles/AP to target in meters)

4. Target elevation:[4] "_____" in feet—MSL

5. Target description:[4] "_____"

6. Target location:[4] "_____"
(latitude and longitude or grid coordinates or offsets or visual)

(See note on page 24.)

7. Type mark: "_____" Code: "_____"
(WP, beacon, laser) (actual code)

(For USAF laser target marking, include laser-to-target line.)

"_____ *degrees"*

(For USMC laser procedures, include laser-to-target information in the Remarks section.)

Remarks: "_____"

[4] Minimum essential in limited communications environment .

NOTE: USMC laser target-marking operations require the laser-to-target line to be the first item passed to the aircrew.

8. Location of friendlies: "_____"

9. ***"Egress*** _____"

> In the event of a beacon bombing request, insert beacon bombing chart line numbers here. (See pages 28 and 29.)

Remarks: _____"
(such as attack clearance, J-SEAD, threats,

_____"
restrictions, abort codes, hazards)

Time on target: ***"TOT*** _____"

or

Time to target (TTT): ***"Stand by*** _____

plus _____***hack."***

BEACON BOMBING CHART

Different aircraft require different information on beacon bombing. Select the appropriate line numbers. Transmit only after confirming the aircraft type. Follow this information with TOT or TTT.

☐ **A-6 (USMC, USN) Line Numbers**

10. *"Bearing* _____ (beacon to target) *"* magnetic or
"Beacon grid _____ (coordinates) *"*

11. *"Range* _____ (beacon to target) *"* in feet or
"Target grid _____ (coordinates) *"*

12. *"Beacon elevation* _____ *"* in feet—MSL

☐ **F-111 Line Numbers**

F-111A/E requires lines 10 and 11.[5]

F-111D/F requires lines 10, 11, and 14 or lines 12, 13, and 14.

10. *"Bearing* _____ *"* true (beacon to target)

11. *"Range* _____ *"* in feet (beacon to target)

[5] F-111A/E (Avionics Modification Program [AMP]) requires offsets from target to beacon.

12. *"Beacon grid* _____ *"* (latitude, longitude)
(See note on page 24)

13. *"Target grid* _____ *"* (latitude, longitude)
(See note on page 24)

14. *"Beacon delay* _____ *"* (in milliseconds)

15. *"Beacon elevation* _____ *"* (feet MSL)

16. *"Target elevation* _____ *"* (feet MSL) *"* _____ *"*

☐ F-16 Line Numbers

10. *"Bearing* _____ *"* (true)
(beacon to target)

11. *"Range* _____ *"* (feet)
(beacon to target)

12. *"Beacon Elevation* _____ *"* (feet-MSL)

13. *"Target Elevation* _____ *"* (feet-MSL)

14. *"Beacon Time Delay* _____ *"* (milliseconds)

NATO FORMATS

NATO Fighter Check-In Briefing

(Use this format with NATO forces only.)

Aircraft transmits to controller

1. FAC/controller call sign: "_____ *this is* _____"
2. Fighter call sign/mission number: "_____"
3. Authentication: "_____"
4. FAC authentication response: "_____"

The following may be requested after initial check-in.

a. Number and type of aircraft: "_____"
b. Armament: "_____"
c. Position and altitude: "_____"
d. Time on station: "_____"
e. Target allocation: "_____"
f. Additional information: "_____
_____"

NATO Format Only

NATO Forward-Air-Controller-to-Attack Aircraft Briefing

(Use this format with NATO forces only.)

Controller transmits to aircraft.

1. Initial point (IP):[6] "_____"
2. Target location:[6] (See note on page 24)
   a. If requested, 6-digit UTM grid coordinates: "_____"
   b. Latitude/longitude: "_____"
   c. Bearing: "_____" magnetic
      (IP/offsets to target)
   d. Distance: "_____ ***nautical miles***"
      (IP/offsets to target)
3. Target description:[6]
   a. Description: "_____"
   b. Best attack heading : "_____" magnetic
   c. Weather (if clearly a factor): "_____"
4. Friendly forces:[6] ***"Nil"*** or ***"Within*** _____" in meters

Attack aircraft will read back IP and target location.

[6] Minimum essential in a limited communications environment.

NATO Format Only

5. Attack clearance:[6]
   a. *"ASAP"* or *"TOT in* _____ *minutes"*
   b. *"Hold at* _____ *"*
   c. *"Cleared hot."*

Add the following information as required.

6. Navigation details:
   a. Bearing: " _____ " magnetic
   b. Distance: " _____ *nautical miles"*
   c. Elevation: " _____ *feet-MSL"*
7. Target indication/identification: " _____ "
   (such as smoke, light, laser)
8. Threats: *"None"* or " _____ "
9. Hazards: *"None"* or " _____ "
10. Local altimeter setting, wind:
    a. " _____ *millibars"* or " _____ *inches"*
    b. " _____ / _____ *knots"*
       (wind direction) (velocity)
11. Other items as required.

[6] Minimum essential in a limited communications environment.

NATO Format Only

NOTE: Read-backs of additional items not required; pilot acknowledges with "Roger."

NATO Fighter Departing Initial Point
(Information sent to coordinating element as a one-line transmission)

"_____ *departing IP,* _____"
(mission number) (abort code)

NATO Format Only

JOINT AIR ATTACK TEAM

Communications

Nomenclature:	FM 1 - Ground to air FM 2 - Air to air UHF - Air to air AM - Air to air[7]
Agencies:	30.00 to 75.95 MHz, VHF-FM
Frequency:	121 to 143.95 MHz, VHF-AM 225 to 400 MHz, UHF
Compatible Equipment:	USA - PRC-77, VRC-12, VRC-24 USMC - PRC-77, VRC-12, PRC-75, PRC-113 USAF - PRC-77/119, VRC-46, PRC-66, PRC-113, MRC-107/106/144

Briefings

JAAT AMC to the TACP/FAC/TAC-A

(Omit data not required; do not transmit line numbers.)

JAAT AMC: "_____ (FAC call sign), ***this is*** _____ (JAAT AMC call sign)"

1. Target description: "_____"

[7] Not all Army helicopters have two FM radios.

2. Target location: "_____"
(grid coordinates [See note on page 24])

3. Type mark: "_____" Code: "_____"
(WP, beacon, laser) (beacon, laser)

For laser target marking, include laser-to-target line.

4. Location of friendlies: "_____"

5. Time over target: "*TOT*_____"
or
Time to target (TTT): "***Hack time will be***_____"

6. Attack sectors/timing: "_____"

7. Threats: "_____"
(type and location)

8. Restrictions: "_____"

After initial contact with the attack aircraft, the TACP/FAC/TAC-A will brief the flight lead using the appropriate standardized J-Fire briefing format (9-line or NATO). In the Remarks section of the brief, the TACP/FAC/TAC-A will provide the AMC's call sign and radio frequency, then direct the flight lead to contact the AMC.

JAAT AMC to the Attack Aircraft Flight Lead

(Format is flexible and depends on TACP/FAC/TAC-A availability)

JAAT AMC: "_____ , ***this is*** _____"

1. Target description: "_____"
2. Target location: "_____"
   (grid coordinates and visual reference, if possible)
3. Threats: "_____"
   (type and location)
4. Attack sectors/timing: "_____"
5. Time over target: "***TOT*** _____"
   or
   Time to target (TTT): "***Stand by*** _____
   (minutes)
   plus _____ , ***hack.***"
   (seconds)
6. Restrictions: "_____"
7. Coordination call: "***Call*** _____ ***seconds.***"
8. Remarks: "_____"
   (specific attack roles, laser codes)

Attack Aircraft Flight Lead to JAAT AMC

1. Departing IP: "_____, ***departing IP.***"

2. Coordination/weapon call: "_____,
(aircraft call sign)
_____ *seconds,* _____"
(ordnance)

3. J-Laser[8] calls: *"10 seconds"*
"Laser on"
"Spot"
"Shift"
"Terminate"

Table 5. Attack Helicopter Weapons Capabilities AC-130 CALL FOR FIRE

Weapon	Effective Maximum Range (m)	Maximum Load (rounds)
2.75RX, 10-LB	9,300	76
2.75RX,17-LB	5,500	62
7.62-mm minigun	1,100	4,000
20-mm cannon	1,500	750
30-mm cannon[9]	3,000	1,200
40-mm grenade launcher[9]	1,600	265
TOW	3,750	8
Hellfire	5,000	16
5.00RX[10]	7,200	8
CBU-55FAE[10]	NA	4

[8] J-Laser calls should be prefaced with the appropriate call signs. The "Lock-Launch" advisory call indicates that standoff ordnance is in-bound.

[9] USA only.

[10] USMC only.

1. AC-130 call sign: "_____"
2. Friendly location: "_____"
3. Friendly location marked by: "_____"
4. Threats: "_____"
5. Target elevation (optional): "_____" in feet.
6. Beacon type and code (if used): "_____"
7. Magnetic bearing from your position to TGT: "_____"
8. Distance in meters from your position to TGT: "_____"
9. Target description: "_____"

Table 6. AC-130 Data

Recommended Safe Distance (Peacetime)	AC-130 Available Radios	Armament-AC-130 (Refuelable)
20-mm-500 meters	Two UHFs	Two 20-mm miniguns - HE, HEI, mesh, metal
40-mm-500 meters	Two HFs	One 40-mm gun - HE, mesh, metal
105-mm-650 meters	Two FMs	One 105-mm howitzer - WP, HE, VT
	One VHF AM	
	One SATCOM	

Table 7. Risk-Estimate Distance for Aircraft-Delivered Ordnance

WARNING: See pages 54 through 56 for factors in determining these distances.

Item	Description	Risk-Estimate 10 % PI	Distance 0.1 % PI
MK-82 LD	500-lb bomb	250	425
MK-82 HD	500-lb bomb (retarded)	100	375
MK-82 LGB	500-lb bomb (GBU-12)	250[11]	425[11]
MK-83 HD	1,000-lb bomb	275	475
MK-83 LD	1,000-lb bomb	275	475
MK-83 LGB	1,000-lb bomb (GBU-16)	275[11]	475[11]
MK-84 HD/LD	2,000-lb bomb	325	500
MK-84 LGB	2,000-lb bomb (GBU-10/22)	225[11]	500[11]
MK-20[12]	Rockeye (antiarmor CBU)	150	225
MK-77	500-lb napalm (FAE)	100	150
CBU-55/77[12]	Fuel-air explosive (FAE)	[11]	[11]
CBU-52[12]	CBUs (all types)	275	450
CBU-58/71[12,13]	CBUs (all types)	350	525
CBU-87[12]	CBUs (all types)	175	275
CBU-89/78[14]	CBUs (all types)	175	275
2.75 FFAR	Rocket with various warheads	160	200

[11] Risk-estimate distances are to be determined. For LGBs, the values shown are for weapons that do not guide and that follow a ballistic trajectory similar to GP bombs.

[12] Not recommended for use near troops in contact.

[13] CBU-71/CBU-84 bombs contain time-delay fuzes that detonate at random times after impact. CBU-89 bombs are antitank and antipersonnel mines and are not recommended for use near troops in contact.

Table 7. Risk-Estimate Distances for Aircraft-Delivered Ordnance (continued)

Item	Description	Risk-Estimate 10 % PI	Distance 0.1 % PI
5.00 FFAR	Zuni with various warheads	150	200
SUU-11	7.62-mm minigun	11	11
M4, M12 SUU-23, M61	20-mm Gatling gun	100	150
GAU-12	25-mm gun	100	150
GPU-5A GAU-8	30-mm Gatling gun	100	150
AGM-65[14]	Maverick (TV, IIR, laser-guided)	25	100
MK-1/MK-21	Walleye II (1,000-lb TV-guided bomb	275	500
MK-5/MK-23	Walleye II (2,400-lb TV-guided bomb)	11	11
AGM-123A	Skipper (1,000-lb laser-guided, rocket-booster bomb	275[11]	500[11]
AC-130	105-mm cannon	500[15]	500[15]

[14] The data listed applies only to AGM-65A, B, C, and D models. AGM-65E and G models contain a larger warhead and risk-estimate distances are not currently available.

[15] This distance is used for all AC-130 engagements as it has the largest fragmentation pattern for the largest weapon system on board.

NAVAL SURFACE FIRE SUPPORT

COMMUNICATIONS

Agency:	Observer to ship
Nomenclature:	Naval surface fire ground spot net, HF Air spot net, UHF
Frequency:	2 to 30 Mhz, HF
Compatible Equipment:	USA - GRC-106, GRC-193 USMC - PRC-104, GRC-193, MRC-138, PRC-77, PRC-75, PRC-41 USAF - PRC-104, MRC-107/108/144, GRC-206

PLANNING

Supporting ship: _____
(include gun type and number of guns)

If this unit is unavailable or direct communications are unavailable, indicate the unit through which support will be requested: _____

_____

Call sign: _____

Frequency: _____

Ship: _____

Gun type : _____

Number of guns : _____

Period effective from : _____ to _____

CALL-FOR-FIRE

(Give in three separate transmissions)

Observer transmits to ship.

1.[16] "_____ ***this is*** _____"
(ship ID) (observer ID)

2.[16] ***"Fire mission"*** and, if known, ***"target number*** _____"
(provided by field artillery FSO, USMC FSCC, or USN SACC)

NOTE: Wait for read-back.

3.[16] Location of target. Select the appropriate method.

☐ **Grid coordinates:**

"Grid _____"

"Altitude _____" in meters

"Direction _____" in mils/grid
(Mils are in relation to grid north. Any other combination may be used but must be specified; for example, *"Direction 180 degrees magnetic."* [See note on page 24.])

[16] Required only for air spotters.

☐ **Polar plot:**

"Direction _____ " in mils/degrees

"Distance _____ " in meters

"Up/down _____ " in meters
(vertical shift)

☐ **Shift from known point:**

"From _____ "
(target number/reference point)

"Direction _____ " in mils/degrees
(from observer to target)

"Spotter-TGT Line _____ " in mils/degrees

"Left/right _____ " i n meters
(lateral shift)

"Add/drop _____ " in meters
(range shift)

"Up/down _____ " in meters
(vertical shift)

4. Target description:[17] " _____ "
(type, size, cover)

[17] Mandatory elements.

5. Method of engagement: " _____ "

danger close
fuse
number of salvos
armament
reduced charge (ammunition)
number of guns

special instructions such as—

continuous/coordinated illuminator
internal, sustained fire
time on target

6. Method of control:[17] " _____ "

fire for effect
ship adjust
spotter adjust (specific adjustment) [18]
cannot observe
at command (can apply to each of the four methods above)

[17] Mandatory elements.

[18] Spotter adjust is standard information and does not need to be included for brevity. However, if the observer desires something other than this standard spotter adjustment, he must be specific in the correction.

MESSAGE TO OBSERVER

"Gun target line _____ "
(direction from gun to target)

"Ready _____ " in seconds
(time of flight)

"First salvo at _____ "
(danger-close missions only)

"Summit[19] _____ " in feet or meters
(in feet, if air spotter; in meters, if ground spotter)

Table 8. Naval Surface Fire Support Capabilities

Weapon	Full Charge Max Range (m)	Reduced Charge Max Range (m)	Fire Rate /Tube (max/sust)	Ammo	Fuzes
5"/54 MK 45	23,100	12,200	20/20	HE, ILLUM, WP	Q, MT, CVT, VT, DEL
76-MM[20]	12,700	NA	80/NA	WP	PD

[19] Required only for air spotters.

[20] Units equipped with 76-mm weapons are not normally assigned naval surface fire support missions except in extraordinary circumstances.

Table 9. Naval Surface Fire Support Illumination Factors

Weapon	Shell Type	HOB (m)	Burn Time (sec)	Rate of Fall (m/sec)
5"/54	MK 88/91	500	45/72	10/2

Table 10. Naval Surface Fire Support Danger-Close Distances

Weapon	Distance (m)
5"/54	750

LIAISON ELEMENTS

ARMY FIRE SUPPORT ELEMENTS

Mission

Responsibility for command, control, and coordination of fire support begins with the force commander. From the corps down to the company and team, all levels have fire support elements (FSEs). The FSEs assist the maneuver commander in the decision and execution process, advise on fire support capabilities, and assist in the planning and coordination of fire support.

Organization

FSEs have a fire support coordinator (FSCOORD) and a supporting staff but will otherwise vary according to the available fire support assets. An FSE will usually include an air liaison officer (ALO); representatives from such elements as the air and naval gunfire liaison company (ANGLICO); Army aviation units, and electronic warfare support elements (EWSEs); mortars; and other assets required by the force commander.

Echelons Above Corps. The battlefield coordination element (BCE) is the major Army organization involved in coordinating fire support. Its primary responsibility is allocating resources, especially air support assets, and the corresponding requirements for joint suppression of enemy air defenses (J-SEAD).

Corps and Division. The FSEs provided at the corps and division levels are similar in structure. Both are

located in the main and tactical command posts and in the rear tactical operations centers.

Brigade and Battalion. The FSCOORD at brigade level is usually the commander of the direct support battalion. The brigade FSCOORD establishes fire support organizations in each maneuver battalion and company. The FSEs at brigade and battalion levels are located in the maneuver tactical operations center (TOC).

Company. The fire support organization at company level is the fire support team (FIST). The FIST is headed by the company FSO, who is also the company FSCOORD. The field artillery and mortars provide the primary fire support to the company. The FIST coordinates these assets and, when available, coordinates CAS and naval resources through the appropriate agencies. The FIST also provides forward observer capabilities to the company.

MARINE CORPS TACTICAL AIR CONTROL PARTY

Mission

The Marine TACP establishes and maintains facilities for liaison and communications between supported units and appropriate control agencies. The TACP is led by the air officer (AO), who informs and advises the ground unit commander on the employment of supporting aircraft and requests and coordinates air support missions.

Organization

The battalion TACP has two forward air control (FAC) parties, while the regimental and division TACPs have none.

Division. The division TACP has 2 officers and 11 enlisted communications personnel. They assist the division AO by monitoring all immediate air support requests from supporting units, by supervising the operation of aviation nets in the division fire support coordination center (FSCC), and by keeping the fire support coordinator (FSC) advised of the general air situation and specific requests of subordinate units.

Regiment. The regimental TACP has one regimental air officer (RAO) and four enlisted communications personnel. The RAO advises and assists the regimental commander regarding all aviation matters, consolidates all preplanned and support requests from subordinate units, coordinates with the regimental FSC, functions as the air representative with the regimental FSCC, and facilitates the disposition of immediate air support requests if necessary.

Battalion. The battalion TACP has 3 officers and 12 enlisted communications personnel. The senior naval aviator/naval flight officer functions as the battalion air officer, and each of the other two officers is the leader of a FAC party.

AIR AND NAVAL GUNFIRE LIAISON COMPANY

Mission and Employment

The ANGLICO supports a US Army or allied division, or elements thereof, by providing the control and liaison agencies for the employment of naval surface fire and naval air support in amphibious assault or other operations. The ANGLICO is normally attached to the supported force for a joint or combined operation in which US fleet assets are employed. The ANGLICO can provide fleet firepower to help offset the lack of heavy combat support initially available in most expeditionary environments. To support airborne and special operations forces, the ANGLICO maintains an airdrop capability.

Organization

The ANGLICO maintains a high degree of organizational flexibility and can task-organize to meet the needs of the supported force. A company, if fully committed, can support an entire US Army division of three maneuver brigades. An ANGLICO consists of a company headquarters and three brigade air/naval gunfire liaison platoons. The ANGLICO headquarters performs command and staff functions necessary to administer, plan, direct, and supervise the execution of assigned missions and to advise the supported commander on the employment of the company.

The company headquarters can form a task-organized division air/naval gunfire liaison team as necessary to support a division or comparable-sized allied unit. Each

platoon has one brigade liaison team to effect fire support coordination at the US Army combat brigade or equivalent level, two supporting arm liaison teams (SALTs) to effect fire support at the maneuver battalion level, and four firepower control teams (FCTs) to provide control of naval surface support, naval air support, and artillery support at the company level.

Division Air and Naval Gunfire Liaison Team. The division air and naval gunfire liaison team is task-organized to provide support to an Army division or comparable-sized allied unit. The division team usually attaches to the supported division headquarters FSCC, FSE, or a comparable agency for planning, liaison, control, coordination, and employment of supporting arms.

Brigade Air and Naval Gunfire Team. The brigade air and naval gunfire team provides support to a maneuver brigade. The air and naval gunfire teams are task-organized to support an Army maneuver battalion or comparable-sized allied unit. The brigade team usually attaches to the supported brigade TOC or comparable supporting arms for an Army brigade or comparable-sized allied unit.

Battalion Supporting Arms Liaison Team. SALTs provide the capability to support a battalion. They are task-organized to support an Army maneuver battalion or a comparable-sized allied unit. The SALT usually attaches to a supported battalion TOC or a comparable agency for planning, requesting, coordinating, and controlling supporting arms for an Army battalion or comparable-sized allied unit, as well as for liaison.

Firepower Control Team. FCTs provide terminal control of naval gunfire and USN and USMC CAS to a supported maneuver company. They are task-organized to support an Army maneuver company or a comparable-sized allied unit. Company commanders employ FCTs much as they would TACPs, FISTs, or comparable agencies– to plan, request coordinate, and provide terminal control of supporting arms for an Army maneuver company or comparable-sized allied unit-as well as for liaison.

AIR FORCE TACTICAL AIR CONTROL PARTY

Mission

The Air Force TACP is a control element stationed with and supporting an Army combat unit. The TACP provides the interface between the Army unit it supports and the combat Air Force unit that provides combat air support. The TACP advises the ground commander on the capabilities and limitations of combat aircraft and weapons and assists in planning for combat air support. The airborne forward air controller (AFAC), the air liaison officer (ALO), and the enlisted terminal attack controller (ETAC) in the TACP provide final attack control for CAS missions.

Organization

TACPs are located at corps, division, brigade, and battalion levels and are tailored in reaming and skills to the Army unit they support. While employed, TACPs are under the operational control of an air support

operations center (ASOC) or the senior TACP element deployed.

Corps and Division. At corps and division levels and sometimes at the field army level, the TACP has a senior ALO, plus the fighter and airlift liaison officers and tactical air command and control specialists (TACCSs).

Brigade. The brigade TACP has a brigade ALO, fighter and airlift liaison officers, and TACCs.

Battalion. The battalion TACP has one ALO and two TACCSs assigned. At least one TACCS will also be ETAC-qualified.

RISK-ESTIMATE DISTANCES

Risk-estimate distances are based on the following assumptions. Any changes to the assumptions will increase the risk-estimate distances from those given in Table 6. Risk-estimate distances allow the ground forces commander or combat air commander to estimate the risk in terms of the percent of friendly casualties that may result from an air strike against an enemy threat along the forward line of own troops (FLOT). Risk-estimate distances are based on fragmentation patterns.

COMPUTATIONS

All attacks are parallel to the FLOT. Distances are computed from the intended impact point of the center of a stick of bombs or a pod of rockets. Deflection distance (from the aiming point toward the friendly troops) is built into the risk-estimate distance. The deflection distance equals the distance from the aircraft centerline to the farthest outboard station, plus the lateral distance that a weapon travels because of rack-ejection velocity. **Risk-estimate distances are for combat use and are not minimum safe distances for peacetime training use.**

RELATIONSHIPS BETWEEN WEAPON IMPACT AND POINT OF INTERSECTION

For all determinations in Table 6, the position of a prone man was assumed to be on a line perpendicular to the line of flight (or line of weapon impacts) at the midpoint of the line (stick) of weapons. For all sticks of weapons, a weapon was assumed to impact at the point

of intersection of these two lines. Thus, for the weapons evaluated, the following relationships between weapon impact and the point of intersection were assumed:

- GP bombs - center bomb of stick impacts at point of intersection.
- Rockets - center rocket.
- Cluster weapons - pattern center of the center dispenser.
- Guns - center of pattern.
- Maverick - single-weapon delivery impacting at point of intersection.

WEAPON RELIABILITY AND DELIVERY PARAMETERS

A weapon reliability of 1.0 was used for all weapons evaluated. Delivery parameters and considerations for specific weapons are in (C) FM 101-50-3 l/TH 61A1-3-9/FMFM 5-2G-6/NAVAIR 00-130ASR-9 [21].

CASUALTY CRITERION

The casualty criterion is the 5-minute assault criterion for a prone soldier in winter clothing and helmet. The probability of incapacitation (PI) means a soldier is physically unable to function in an assault within a 5-minute period after an attack. The 0.1 percent PI value can be interpreted as being less than or equal to one chance in one thousand.

[21] *Joint Munitions Effectiveness Manual/Air-to-Surface (JMEM/AS): Risk Estimates for Friendly Troops.* 19 December 1980.

TROOPS IN CONTACT

The FAC should regard friendlier within 1 kilometer of targets as a *troops-in-contact* situation and advise the ground commander accordingly. The ground commander must accept responsibility for friendly risk when targets are inside 0.1 percent PI. The passing of the ground commander's initials indicates his acceptance of the risk for intentional ordnance delivery inside the 0.1 percent PI distance.

FIRE SUPPORT AND AIRSPACE COORDINATION

FORMAL COORDINATION

The FSCOORD establishes fire support and airspace coordination, with input from his ALO counterpart at the appropriate level of command and control. Formal measures are usually published in the fire support plan and the airspace coordination order (ACO). Formal coordination can be either permissive or restrictive.

Permissive

Permissive coordination consists of the following:

Coordinated Fire Line. A line beyond which conventional or improved conventional indirect fire weapons (mortars, field artillery, and naval gunfire) may fire at any time within the zone of the establishing headquarters without additional coordination.

Fire Support Coordination Line. A line beyond which any weapon system may attack targets without endangering troops or requiring additional coordination with the establishing headquarters.

Free-Fire Area. A designated area in which any weapon system can fire conventional or improved munitions without additional coordination and is normally established on identifiable terrain.

Restrictive

Permissive coordination consists of the following:

No-Fire Area. An area in which no fires or the effects of fires are allowed without prior clearance from the establishing headquarters, except if the commander's force must defend against an engaging enemy force within the no-fire area.

Restrictive Fire Area. An area in which specific restrictions are imposed and in which fries that exceed those restrictions are prohibited without prior coordination from the establishing headquarters.

Restrictive Fire Line. A line established between converging forces. It prohibits fires or the effects of fires across the line without coordination from the establishing headquarters.

Airspace Coordination Area. A three-dimensional block of airspace in which friendly aircraft are reasonably safe from friendly surface fires.

INFORMAL COORDINATION

Informal coordination consists of procedures to deconflict aircraft from other fire support assets, primarily artillery. The terminal air controller (FAC, ALO, ETAC) establishes informal measures in response to the FSCOORD's fire support plan and implements them for a short period of time to permit CAS operations. Informal measures are heavily dependent upon good FSCOORD-ALO interface.

Heading Offset

The terminal air controller selects an IP and specifies a lateral offset from the IP-to-target run-in to deconflict fighters from other supporting fires. Item 2 of the J-Fire 9-line must include the words *"offset left/right"* as appropriate after the magnetic heading so that fighters understand the offset is a restriction. A distance to offset may be included, for example, "270 *degrees, offset left,* 2 *kilometers."*

Heading Direct

The terminal air controller selects an IP so that the IP-to-target run-in is deconflicted from other supporting fires by at least 2 nautical miles either side of the centerline. Item 2 of the J-Fire (-line must include the word "*direct*" after the magnetic heading so that fighters understand the heading is a restriction, for example, *"270 degrees direct."*

Informal Airspace Coordination Area

The terminal air controller establishes a two-dimensional area where fighters can operate and be reasonably safe from friendly surface fires. While the area should be established along easily identifiable terrain features, it can be established using grid lines. The Remarks section of the J-Fire 9-line must include ACA boundaries and effective times, for example,*"No arty fires south of the Green River; ACA in effect UFN"* or *"No arty fires west of the 20 or south of the 14 grid lines; ACA in effect for 10 minutes."*

Maximum Ordinate

The terminal air controller obtains the maximum ordinate of supporting fires and provides the fighters with an altitude mean sea level (MSL) to work above. The maximum ordinate can only be used for deconfliction when the artillery is firing low angle and threats or weather permit medium-altitude operations. The Remarks section of the J-Fire 9-line must include a maximum ordinate if used, for example, "*Max ord is* 6000' *MSL; work above.*"

Target-to-Gun Line

The terminal air controller provides the fighters with both the artillery impact area and the target-to-gun line TGL). Fighters are deconflicted from other supporting fires if they avoid both the artillery target and the TGL. The Remarks section of the J-Fire 9-line must include both the artillery impact coordinates and the TGL, for example, *"Arty impact at NK 414678; TGL is 100 degrees."*

Gun-to-Target Line

The terminal air controller provides the fighters with both the artillery location and the gun-to-target line (GTL). Fighters are deconflicted from other supporting fires if they avoid both the firing location and the GTL. The Remarks section of the J-Fire 9-line must include both the artillery location, via authentication tables or secure voice, and the GTL, for example, *"Arty location. . . in the clear, NK. . . I set AB . . . I send JOELDB; GTL is 100 degrees."*

Shift/Check Fire

The terminal air controller works with the FSCOORD to shift supporting fires for a short time to another area so that CAS operations can occur and be reasonably safe from friendly surface fires. Although uncommon, supporting fries may also be checked in order to permit cyclical operations between artillery and CAS assets, for example, "*C Battery, check fire. . . fighters inbound.*"

GLOSSARY

AAGS	army air-ground system
ABCCC	airborne battlefield command and control center
ACA	airspace coordination area
ACC	air component commander
ACE	air command element
ACIF	artillery counterfire information form
ADA	air defense artillery
ADAFCO	air defense artillery fire control officer
ADAM	area-denial artillery munitions
ADCOORD	air defense coordinator
AFAC	airborne forward air controller (USAF)
ALO	air liaison officer
AMC	air mission commander
AMLS	airspace management liaison section
ANGLICO	air and naval gunfire liaison company
AO	air officer (USMC)
AOC	air operations center (USAF)
AP	attack position/antipersonnel
APAM	antipersonnel antimateriel
APERS-T	antipersonnel-tracer
ARLO	air reconnaissance liaison officer
arty	artillery
ASOC	air support operations center

ATACMS	Army Tactical Missile System
ATK	attack
AWACS	airborne warning and control system
A^2C^2	army airspace command and control
	B
BCE	battlefield coordination element
BD	base detonating
BOMREP	bombing report
	C
CAS	close air support
CBU	cluster bomb unit
CCT	combat control team
CFL	coordinated fire line
CHEM	chemical
COC	combat operations center (USMC)
CP	concrete-piercing; command post
CPHD	copperhead
CRC	control and reporting center
CRP	control and reporting post
CVT	controlled variable time
	D
DASC	direct air support center (USMC)
DEL	delay
DIR	direction
DPICM	dual-purpose improved conventional munitions

DTACC	deployed tanker/airlift control center
	E
ET	electronic time
ETAC	enlisted terminal attack controller
EWSE	electronic warfare support element
	F
FA	field artillery
FAC	forward air controller, forward air control
FACP	forward air control post
FAE	fuel-air explosive
FCT	firepower control team
FDC	fire direction center
FFA	free fire area
FFAR	folding-fin aerial rocket
FFE	fire for effect
FIST	fire support team
FLOT	forward line of own troops
FSC	fire support coordinator (USMC)
FSCC	fire support coordination center
FSCL	fire support coordination line
FSCOORD	fire support coordinator (USA)
FSE	fire support element
FSO	fire support officer
FTR	fighter

	G
GLO	ground liaison officer
GP	general
GTL	gun to target line
	H
HC	smoke
HD	high drag (also snakeye and air-inflatable retarded (AIR)
HE	high explosive
HEAT	high explosive, antitank
HEP	high explosive, plastic
HES	high-explosive, spotting
HOB	height of burst
	I
ICM	improved conventional munitions
IIR	imaging infrared
ILLUM	illuminating
IP	initial point
	J
JAAT	joint air attack team
JOC	joint operations center
J-SEAD	joint suppression of enemy air defenses
	L
LAT	latitude
LCC	land component commander
LD	low drag

LGB	laser guided bomb (GBU-10/12/24)
LONG	longitude
	M
m	meter
MAG	magnetic
MAGTF	Marine air-ground task force
max	maximum
MCC	Marine component commander
MLRS	multiple-launched rocket system
mm	millimeter
MORTREP	mortar bombing report
MSL	mean sea level
MT	mechanical time
MTSQ	mechanical time, superquick
	N
NA	not applicable
NAO	naval aviation observer
NAVAIR	naval air
NCC	naval component commander
NFA	no fire area
NM	nautical mile
NSFS	naval surface fire support
	P
PD	point detonating/delay
PI	probability of incapacitation

	Q
Q	quick
	R
RAAM	remote antiarmor mine system
RAO	regimental air officer
RAP	rocket-assisted projectile
RECCE	reconnaissance
RFA	restricted fire area
RFL	restricted fire line
RPM	revolutions per minute
	S
SACC	supporting arms coordinating center
SALT	supporting arms liaison team
sec	second
SHELREP	shelling report
sust	sustained
	T
T	tracer
TAC (A)	tactical air coordinator (airborne)
TACC	tactical air control center(USN)/ tactical air command center (USMC)
TACCS	tactical air command and control specialist
TACP	tactical air control party
TACS	theater air control system
TALCE	theater airlift coordination element
TALO	theater airlift liaison officer

TAOC	tactical air operations center (USMC)
TAR	tactical air reconnaissance
TGL	target to gun line
TGT	target
TI	time
TOC	tactical operations center
TOT	time on target
TOW	tube-launched, optically tracked, wire-guided missile
TTT	time to target
TV	television
	U
UFN	until further notice
USA	United States Army
USAF	United States Air Force
USMC	United States Marine Corps
USN	United States Navy
UTM	universal transverse mercator (grid)
	V
VT	variable time
	W
WOC	wing operations center
WP	white phosphorus

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