

**MCWP 3-25.7**

**TACTICAL AIR OPERATIONS CENTER  
HANDBOOK**

**U.S. Marine Corps**

**PCN 143 000012 00**

**MCWP 3-25.7 Tactical Air Operations Center Hand book**

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FOREWORD

The Marine air command and control system (MACCS) provides the Marine aviation combat element (ACE) commander with the means to exercise control of those organic and nonorganic aviation assets necessary to support Marine air-ground task force (MAGTF) operations. Marine Corps Warfighting Publication (MCWP) 3-25, *Control of Aircraft and Missiles*, addresses basic planning considerations for MACCS operations, employment, and inter-operability among MACCS and joint Service agencies.

MCWP 3-25.7, *Tactical Air Operations Center Handbook*, complements and expands on the information in MCWP 3-25 by focusing on the details of the tactical air operations center (TAOC) operations and the role the TAOC plays in integrated MAGTF, joint, and multinational operations. Designated for MAGTF, naval expeditionary force, and joint force commanders and staffs, MCWP 3-25.7 highlights TAOC—

- Organization
- Equipment
- Planning considerations
- Operational fundamentals
- Employment options

MCWP 3-25.7 provides the requisite information needed by commanders and staffs to understand and evaluate the operational principles and capabilities of various TAOC employment options.

Recommendations for improving this publication are invited from commands as well as directly from individuals. Forward suggestions using the User Suggestion Form format to—

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Reviewed and approved this date.

BY DIRECTION OF THE COMMANDANT OF THE MARINE CORPS

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# CHAPTER 1

## FUNDAMENTALS

114

115

116 The tactical air operations center (TAOC) is the Marine air command and control system's (MACCS's)  
117 principal airspace control and management agency. Personnel and equipment are provided by the Marine  
118 air control group's (MACG's) Marine air control squadron (MACS).

119 Through radar inputs from its organic sensors and data link information from other military radar units  
120 (MRU), the TAOC provides real-time surveillance of assigned airspace in addition to air direction,  
121 positive aircraft control, and navigational assistance to friendly aircraft. Its primary function, to conduct  
122 and coordinate anti-air warfare (AAW), is accomplished through the direction, coordination, and  
123 employment of various air defense weapons systems which include interceptor aircraft and ground-based  
124 air defense (GBAD) weapons.

### 125 FUNCTION

126 The TAOC provides air surveillance and control of aircraft and surface-to-air weapons (SAWs) for AAW  
127 in support of the Marine air-ground task force (MAGTF).<sup>5</sup>

### 128 ROLE

129 The TAOC—

- 130 • Provides airspace control, management, and surveillance for its designated sector or area of interest  
131 (AOI).
- 132 • Provides navigational assistance, including itinerant air traffic control, to friendly and neutral aircraft.
- 133 • Detects, identifies, and controls the intercept of hostile aircraft and missiles.
- 134 • Deploys early warning and control (EW/C) sites to supplement or enhance the TAOC's radar  
135 coverage.
- 136 • Assumes agency coordination functions of the alternate tactical air command center (Alt TACC) or  
137 alternate tactical air direction center (Alt TADC) for limited or specified periods when required or  
138 directed.

### 139 TASKS

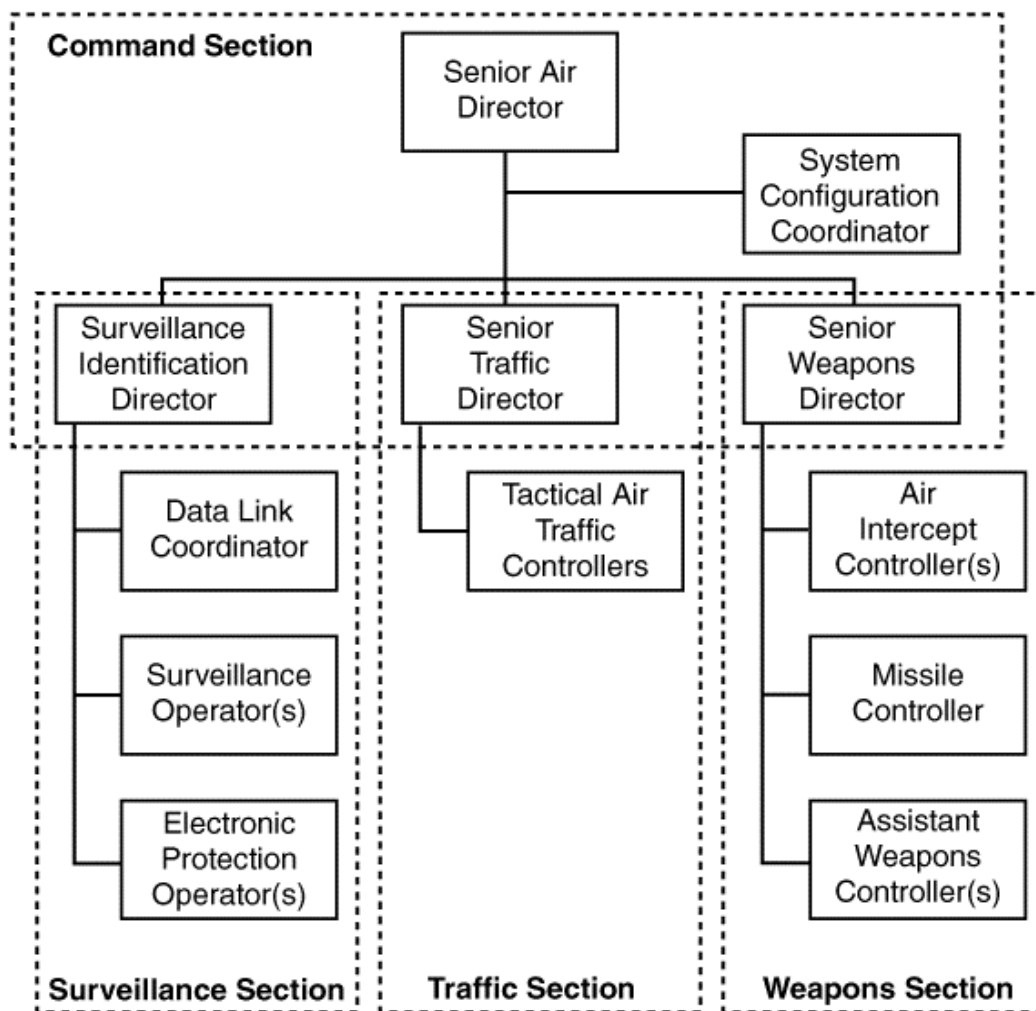
140 The TAOC—

- 141 • Recommends employment of assigned weapons and surveillance means.
- 142 • Recommends air defense sectors, subsectors, and weapon engagement zones (WEZ) for itself and  
143 component elements.
- 144 • Deploys sensors and communications systems to provide air surveillance.
- 145 • Detects, identifies, and classifies all aircraft and missiles within its assigned sector.
- 146 • Displays and disseminates appropriate air/ground information to designated adjacent, higher, and  
147 subordinate agencies; such as the Marine tactical air command center (TACC), another TAOC, the

- 148 direct air support center (DASC), Marine air traffic control detachments (MATCDs), Ground Based  
 149 Air Defense (GBAD) units, and aircraft.
- 150 • Selects and assigns appropriate weapons to engage and destroy the enemy air threat.
  - 151 • Controls fires of subordinate air defense elements.
  - 152 • Functions as an Alt TACC/Alt TADC when directed for limited or designated periods of time.
  - 153 • Interfaces with adjacent and higher air defense agencies.
  - 154 • Manages air defense resources.
  - 155 • Coordinates and executes emission control (EMCON) conditions in its assigned sector.
  - 156 • Conducts itinerant air traffic control and provides navigational assistance to friendly aircraft.

157 **TAOC ORGANIZATION**

158 The TAOC crew is the heart of its air defense operations. TAOC crews are task-organized to meet  
 159 specific mission requirements. A notional TAOC crew is functionally divided into four sections:  
 160 command, surveillance, traffic, and weapons (see fig. 1-1).



161

162

**Figure 1-1. Notional TAOC Crew Organization.**

## 163 **Command Section**

164 The command section supervises the functioning of the surveillance, traffic, and weapons sections. The  
165 command section includes the senior air director (SAD), surveillance identification director (SID), senior  
166 traffic director (STD), senior weapons director (SWD), and the system configuration coordinator (SCC).

### 167 **Senior Air Director**

168 The SAD is responsible for the TAOC's detailed operations. The SAD ensures that proper coordination  
169 occurs among the various TAOC sections, directs ongoing maintenance through the SCC, and assigns  
170 casualty roles to crew members.

### 171 **Surveillance Identification Director**

172 The SID is responsible to the SAD for the detection, identification, and classification of all radar inputs  
173 within the TAOC's assigned sector and for coordinating electronic protection (EP) within the sector. The  
174 SID also supervises the exchange and correlation of aircraft position and identification information with  
175 other control agencies and coordinates all TAOC data link operations.

### 176 **Senior Traffic Director**

177 The STD is responsible to the SAD for the coordination and routing of all air operations in the TAOC's  
178 assigned sector. The STD assumes responsibility for the control of aircraft not engaged in air defense and  
179 conducts aircraft handovers with other agencies as required.

### 180 **Senior Weapons Director**

181 The SWD is responsible to the SAD for the proper employment of air defense weapons. The SWD  
182 evaluates the threat and, in accordance with the aviation combat element (ACE) commander's AAW plan  
183 and rules of engagement (ROE), assigns weapons to negate the threat. As the SWD directly supervises  
184 engagements, the SWD effects the coordination of threat engagements between and across multiple  
185 weapons engagement zones (WEZs) (i.e., assignments, disengagements, reengagements).

### 186 **System Configuration Coordinator**

187 The SCC is responsible to the SAD for equipment readiness and ongoing maintenance efforts. When  
188 required, the SCC conducts manual reconfiguration of computer and communications equipment to  
189 optimize TAOC operations or in response to equipment failures.

## 190 **Surveillance Section**

191 The surveillance section detects, identifies, and classifies all targets within the TAOC's assigned sector.  
192 Headed by the SID, this section correlates air tracks reported from all sources and also manages the air  
193 picture developed within the TAOC and transmitted via data links or voice cross tell nets. The section  
194 employs EP and supervises the EMCON conditions set by the TACC. The section consists of the data link  
195 coordinator (DLC), surveillance operators (SOs).

### 196 **Data Link Coordinator**

197 The DLC is responsible to the SID for the TAOC's data link configuration. The DLC manages data link  
198 configuration by initiating directed changes to degraded links with subordinate agencies and  
199 recommending changes to degraded links to adjacent and senior agencies.

### 200 **Surveillance Operator**

201 The SO, under the direction of the SID, monitors radar inputs, initiates or monitors the acquisition of air  
202 tracks, performs preliminary identification, and updates track data as required.

## 203 **Traffic Section**

204 The STD supervises the traffic section. The traffic section provides airspace management for enroute,  
205 itinerant, and orbiting aircraft such as airborne warning and control system (AWACS) aircraft; airborne  
206 command posts; transiting or orbiting close air support (CAS)/deep air support (DAS); and aerial  
207 refueling (AR) missions. The section also consists of one or more tactical air traffic controllers (TATCs).  
208 The TATC is responsible to the STD for detailed airspace management within the TAOC's assigned  
209 sector for all missions not controlled by the weapons section. Cognizance begins when aircraft enter the  
210 TATC's assigned area or are handed over to the TAOC by another agency and continues until the aircraft  
211 exit the assigned area or are handed off to another enroute or terminal control agency. In addition to  
212 providing navigational assistance, the TATC transmits friendly and threat situational awareness  
213 information to aircraft entering or transiting through the assigned sector. The TATC also initiates tactical  
214 digital information link (TADIL) C data links with all appropriately equipped aircraft and maintains track  
215 symbology on all aircraft under TATC control.

## 216 **Weapons Section**

217 The weapons section, under the supervision of the SWD, makes weapons assignments in accordance with  
218 the ROE and the AAW plan. The section provides for control of all aircraft on AAW missions and the  
219 management of surface-to-air weapons (SAWs) in the TAOC's assigned sector. In addition to the SWD,  
220 one or more air intercept controllers (AICs), a missile controller (MC), and one or more assistant weapons  
221 controllers (AWCs) form the weapons section.

### 222 ***Air Intercept Controller***

223 The AIC is responsible for the control of AAW missions from the point the aircraft is handed off from the  
224 traffic section until that mission is returned to the traffic section. The AIC is responsible for the successful  
225 intercept of hostile airborne targets assigned by the SWD. The AIC controls combat air patrol (CAP)  
226 aircraft and augments surveillance efforts in his assigned zone with CAP aircraft radar.

### 227 ***Missile Controller***

228 The MC controls applicable SAW engagements within the TAOC's sector. The MC usually coordinates  
229 and operates Army tactical data link 1 (ATDL-1) data links with surface-to-air missile (SAM) assets.

### 230 ***Assistant Weapons Controller***

231 The AWC provides assistance to the AIC and/or MC, including entering data on aircraft tracks,  
232 monitoring tracks, monitoring radio nets, and maintaining aircraft missile control logs. The AWC  
233 operates TADIL-C data links with appropriately equipped aircraft as directed by the AIC. During the  
234 conduct of hostile target intercepts, the AWC provides the AIC/MC information about the heading,  
235 altitude, and speed of the hostile target.

## 236 **EW/C Crew Configuration**

237 The EW/C crew is task-organized as directed by the TAOC. The EW/C crew will normally be capable of  
238 limited air surveillance and weapons control.



**239 CREW BRIEFINGS**

240 TAOC crew briefs are adapted to mission requirements and are normally conducted before crew members  
241 assume duty. Appendix A outlines the minimum contents of a brief as required by Marine Corps Order  
242 (MCO) 3501.9B, *Marine Corps Combat Readiness Evaluation System (MCCRES)*.

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## CHAPTER 2

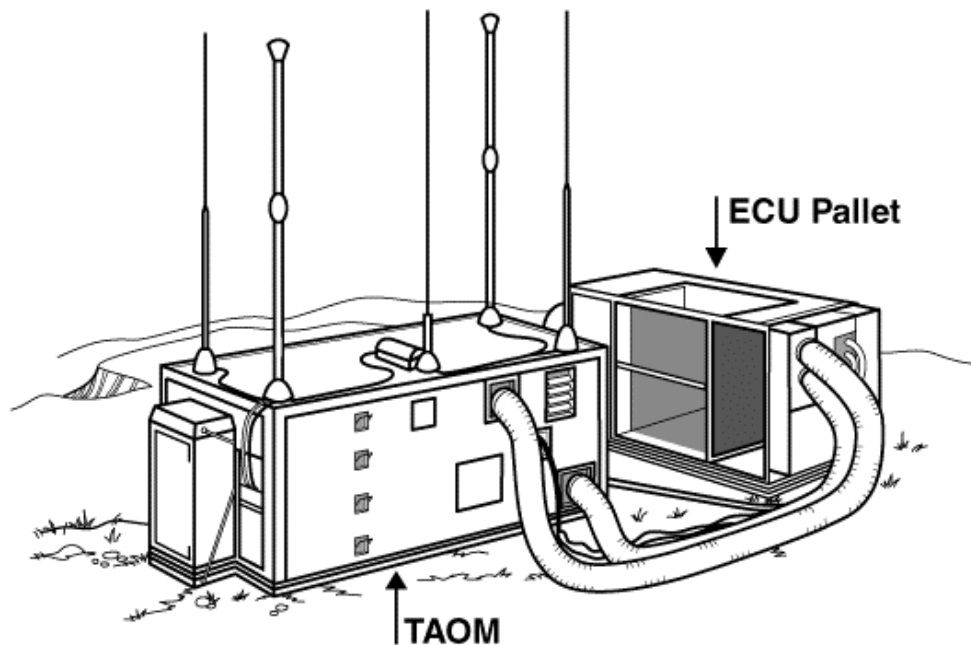
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# SYSTEM DESCRIPTION

245 The TAOC consists of operator shelters, air surveillance radars, communications equipment, and mobile  
246 electric power (MEP) (i.e., generator) equipment. This equipment allows air defense control officers,  
247 tactical air defense controllers, and air control electronics operators to maintain air situational awareness  
248 and to effectively control, coordinate, and manage air defense employment within the TAOC's assigned  
249 sector.

## 250 TACTICAL AIR OPERATIONS MODULES

251 The hub of the TAOC is the AN/TYQ-23V4 tactical air operations module (TAOM) (fig. 2-1). Each  
252 TAOC has four TAOMs. *A subset of the TAOC is the early warning and control (EW/C) site and it will*  
253 *have one or two TAOMs.* The TAOM is a transportable, modularized, automated command and control  
254 shelter designed to conduct AAW control, tactical air traffic control, surveillance and identification  
255 functions for the MAGTF. The TAOC's modular concept allows TAOMs to operate in stand-alone  
256 configuration or to be combined with other TAOMs to increase system capability and redundancy. Each  
257 TAOM contains the mission-essential equipment (i.e., computers, operator positions, and digital and  
258 voice communications) required to provide limited command and control (C<sup>2</sup>) functions. TAOMs can be  
259 dispersed up to 500 meters apart from one another and functionally connected over fiber-optic cables.  
260 Fiber-optic cables allow dispersing TAOC radars up to two kilometers from a TAOM. Radars can also be  
261 remoted up to 40 kilometers from the TAOC and interfaced to the *TAOM* over remote radar data links.



262

263

Figure 2-1. TAOM with ECU Pallet.

264 The TAOC's modularity concept allows the build-up or scale-down of system capacity without disrupting  
 265 C<sup>2</sup> air command and control operations. It also allows echeloning C<sup>2</sup> air defense command and control as  
 266 the battle progresses. TAOM shelter and environmental control unit (ECU) pallet data are shown in tables  
 267 2-1 and 2-2.

## 268 **Transportability**

269 The TAOM's transportability permits deployment of an air control capability that can manage a wide  
 270 variety of air situations. The TAOM may be transported by commercial or military air, land, or sea  
 271 vehicles or it may be towed using a M-1022 mobilizer. The TAOM travels with most of its equipment  
 272 packaged inside the shelter (module), including antennae and some power cables.

Length	20 feet
Width	8 feet
Height	8 feet
Square	160 square feet
Cube	1,280 cubic feet
Weight	16,500 pounds (approximately)
Power requirements	120/208 volts, 60 hertz, 23 kilowatts, 3 phase, 4 wire

273 **Table 2-1. TAOM Shelter Specifications**

274 The ECU pallet houses the remainder of the equipment including the B0007 heating and air conditioning  
 275 units; chemical, biological and radiological [CBR] protection equipment; and the fiber optic and power  
 276 cables.

## 277 **Versions**

278 The AN/TYQ-23 is operated in two versions: The US Marine Corps operates Version (4) called the  
 279 TAOM. The US Air Force operates Version (3) or P3I (pre-planned product improvement) called  
 280 modular control equipment [MCE]. Actually, the term "TAOM" applies to either version of the AN/TYQ-  
 281 23, as dictated by common usage. A shortened acronym, "OM," is also commonly used to refer to a  
 282 module or shelter in either service. The two versions respond to the different tactical requirements of the  
 283 US Marine Corps and US Air Force. These different requirements are satisfied with TAOM hardware,  
 284 which, for the most part, is the same for both Services. US Air Force software is the baseline version and  
 285 mostly common to both systems. *Deadlining criteria is covered in appendix E.*

## 286 **Differences**

287 The major differences between the two versions of the TAOM are the display symbols on the operator  
 288 console units (OCUs) and the method by which the radar data is processed. The US Marine Corps version  
 289 employs an upgraded TAOM interface group (TIG) at each radar site. The addition of Modern Tracking  
 290 System (MTS) software and a high-speed processor into the TIU now enable radar track processing to be  
 291 performed at the TIU (local) prior to transmission to the TAOM. The TAOM combines radar data from  
 292 all local (organic) radars into tracks. Radar video and sweep data are still forwarded via 2km fiber optic  
 293 and shared over the existing radar data bus; however, the processed track package is delivered via a 2km

294 Fiber-Channel cable that terminates at the Radio/LAN Demarcation Panel where it is routed by the Fiber-  
 295 Channel switch (FCS) to the active radar tracker software segment. The US Air Force version employs a  
 296 MCE interface group (MIG) located at the radar site. The MIG preprocesses the radar data and generates  
 297 tracks. The tracks are then sent to the TAOM, where they are combined into system tracks.

Length	12 feet
Width	7 feet
Height	8 feet
Square	86 square feet
Cube	688 cubic feet
Weight	6,500 pounds (approximately)
Power requirements	120/208 volts, 60 hertz, 30 kilowatts, 3 phase, 4 wire

298 **Table 2-2. ECU Pallet Specifications.**

## 299 IMPROVEMENTS

### 300 Theater Missile Defense

301 Various modifications have been made to TAOC equipment to upgrade its theater missile defense (TMD)  
 302 capabilities. Concentrating on the theater missile (TM) threats most likely to influence a MAGTF (i.e.,  
 303 shorter-range theater ballistic missiles [TBMs] and cruise missiles [CMs]), TAOC modifications ~~will~~ are  
 304 primarily focused on the TAOM and the AN/TPS-59(V)3.

### 305 TAOM Modifications

306 The TAOM has been modified to receive, process, and distribute, and/or forward TBM target data to  
 307 AAW and GBAD units capable of engaging and destroying the target and other C<sup>2</sup> agencies via digital  
 308 data communications.

309 The TAOM (V)4 processes TADIL-J information, operates in TADIL-J voice, and additionally has a laser  
 310 printer, Fibre Channel switch, LAN ports, two AN/VRC-89D SINCGARS VHF radios, and firmware  
 311 reconfigurable modems in the DCU. The OCUs have been upgraded to 26" monitors, keyboard and  
 312 trackball. The operator display is Windows NT.

### 313 Functions

314 The TAOM provides a full range of air command, control, and communications (C<sup>3</sup>) capabilities  
 315 necessary to conduct air defense including—

- 316 • Air surveillance.
- 317 • Weapons control.
- 318 • Tactical air traffic control.
- 319 • Electronic warfare (EW).
- 320 • Communications.

- 321 • Simulation and training.
- 322 • Monitoring and testing.

## 323 OPERATOR INTERFACE

324 Each TAOM contains four OCUs. Each OCU is the primary operator-to-TAOM interface. The OCU  
325 provides the operator with the means to display radar surveillance data from up to four sensors; activate  
326 and perform digital data link operations with surface, shipborne, and airborne data link platforms; conduct  
327 AAW control of interceptor aircraft and GBAD units by either voice or data communication; and conduct  
328 tactical air traffic control for friendly aircraft.

## 329 Voice Communications

330 Each TAOM contains internal radio equipment (IRE) to support voice and data communications. In  
331 addition to its internally housed ultra high frequency (UHF), very high frequency (VHF), and high  
332 frequency (HF) radios, the TAOM has the capability to introduce externally controlled radios and point-  
333 to-point circuitry from outside the TAOC to augment the TAOC's communication requirements. Each  
334 TAOM also internally houses the required cryptographic instruments needed to encrypt its radios.  
335 Additionally, each TAOM contains secure voice telephone capability and has the capability to introduce  
336 both two-wire analog and four-wire digital telephonic communications devices. The TAOC's voice  
337 capabilities depend on the number of TAOMs deployed and the external communications support  
338 available. Table 2-3 lists specific TAOM voice communications capabilities.

## 339 Data Communications

340 The TAOC can exchange surveillance data with data link-equipped agencies such as the US Air Force's  
341 control and reporting centers (CRC); US Army Patriot systems; US Navy airborne tactical data systems  
342 (ATDS) and naval tactical data systems (NTDS) units; AWACS aircraft; GBAD units; and appropriately  
343 equipped interceptor aircraft over TADILs. The TAOC can also interface with North Atlantic Treaty  
344 Organization (NATO) ground-based agencies over the NATO air defense ground environment (NADGE)  
345 data link, known as NATO Link 1. Interface modes and capabilities are—

346

346

Item	Quantity
KY-58 (external)	14
ANDVT.KY-75 with RCU	4 (internal/external)
HYX/HYP-57	12
KG-84A,	13
KG/KGX-40	1
AN/VRC-89D (VHF)	2
External Radios*	10
AN/GRC-171V4 (UHF)	4
Harris HF Radio	2/1**
Ky-68 Secure Telephone	1
Telephone	4
Direct Access Trunks	4

\* Refers to the number of external radios which may be added to the 3 VHF, 4 UHF, and 2 HF radios internal to each TAOM.

\*\* One HF radio can be removed and replaced with a third computer during single OM EW/C ops. Five computers provide maximum system capability.

347

**Table 2-3. TAOM Voice Communications Capabilities.**

348 TADIL-A (Link 11) is a netted, half-duplex (poll-response), digital data link normally used for  
 349 connectivity between ATDS and NTDS platforms. TADIL-A requires a net control station (NCS) which  
 350 is a machine function designed to synchronize the track reporting of TADIL-A participating units (PUs).  
 351 TADIL-A data is encrypted through a KG-40A encryption device. The carrier for TADIL-A data is HF  
 352 and/or UHF communication media.

353 TADIL-B (Link 11B) is a point-to-point, full duplex data link conducted between two reporting units  
 354 (RUs) which include appropriately equipped MRUs and GBAD systems. TADIL-B data is  
 355 simultaneously received and transmitted between RUs. TADIL-B operations are normally conducted over  
 356 multi-channel radio (MUX), satellite communication, telephone lines, or cables and are generally limited  
 357 to providing connectivity between ground-based units. TADIL-B is encrypted by a KG-84A/C encryption  
 358 device.

359 TADIL-C (Link-4A) is a data link conducted between the TAOC, F-14 and F/A-18 aircraft. TADIL-C  
 360 data links can be configured for one-way, limited two-way, and full two-way. TADIL-C data links are  
 361 conducted over UHF radio and are unencrypted.

362 TADIL-J (Link-16) is the DoD primary tactical data link for all Service and Defense Agency Command  
 363 and Control (C2), Intelligence (I), and, where practical, weapon system applications. It is a secure, jam-

364 resistant, digital signal, nodeless data link which uses the joint tactical information distribution system  
 365 (JTIDS) Class 2 and MIDS TDMA terminals over UHF radio and a **KGV8** encryption device, and the J-  
 366 Series Message Standard, defined by MIL-STD 6016.

367 ATDL-1 data links are point-to-point, digital data links established between the TAOC and firing units.  
 368 ATDL-1 links operate and are encrypted in the same manner as TADIL-B links.

369 NATO Link 1 is a point-to-point, data link which functions similarly to TADIL-B links except that Link 1  
 370 is not encrypted, and does not transmit digital orders.

371 The TAOC can conduct a point-to-point Theater Force Management System (TFMS) data link. TFMS  
 372 links options are multi-speed variant (MSV)1, AUTODIN I, and AUTODIN VI. A given TAOC can only  
 373 run one of these options at a time. Selectable by Firmware Reconfigurable Modem (FRM) when building  
 374 data link data base.

375 The TAOC's data link capabilities are determined by the number of TAOMs operating as part of the  
 376 TAOC. See table 2-4.

# TAOMs	1	2	3	4
* Point to Point Data Links	9	11	13	13
TADIL-A	1	1	1	1
TADIL-C	1 (1 WAY-60 A/C, 2 WAY-12A/C)	1 (1 WAY-60 A/C, 2 WAY-12A/C)	1 (1 WAY-60 A/C, 2 WAY-12A/C)	1 (1 WAY-60 A/C, 2 WAY-12A/C)
TADIL-J	1	1	1	1
* Point-to-point data links include TADIL-B, ATDL-1, and NATO Link 1 links				

377 **Table 2-4. TAOC Data Link Capabilities**

378 **Automated Functioning**

379 The TAOM provides certain automated functioning capabilities which significantly enhance the  
 380 operator's ability to conduct surveillance, traffic, and weapons functioning. Two of the primary  
 381 automated functions include aircraft identification and weapons control modes.

382 **Automated Aircraft Identification Modes**

383 Identification of friendly aircraft can be assisted through automatic identification, friend or foe (IFF)  
 384 correlations. Operators enter friendly Mode I, II, and/or III information into the TAOC data base. The  
 385 data base will make a correlation between the ATO-entered information and the squawks reported by  
 386 aircraft. If a correlation is made between the Mode I/III tables and/or the Mode II ATO data, the air track  
 387 will be classified as designated in the ATO file.

388 Mode IV responses are also used in the identification process through automatically performed Mode IV  
 389 tests. When the TAOC is operating in the low threat mode, Mode IV interrogations are not performed  
 390 automatically. In the medium threat mode, a track's recommended identity (based on automatic  
 391 identification) is compared to its current identity. If a high or low confidence Mode IV response is  
 392 received after a manual Mode IV interrogation and the track's identity is unknown, assumed friend, or  
 393 assumed enemy, the track's identification will automatically be changed to unknown/assumed friend.  
 394 When operating in the high threat mode, automatic Mode IV interrogation is performed on all tracks with

395 an identification of unknown/assumed friend. A track with an identity of unknown is automatically  
396 updated to a friend when a high confidence Mode IV response is received or unknown/assumed friend  
397 when a low confidence response is received.

398 Additional automated identification capabilities are available through execution of a series of parameters  
399 entered into the TAOC's data base. The identification/classification subprogram will track recommend  
400 classification based on the results of up to 10 different tests including aircraft profile, IFF, and proximity  
401 to designated vital area(s).

### 402 **Automated Weapons Control Modes**

403 The TAOC's automated weapons control modes can provide significant assistance to the TAOC crew  
404 regarding threat ranking and intercept feasibility. The TAOC has three weapons control modes: manual,  
405 semiautomatic, and automatic.

406 In the manual mode, the TAOC will not conduct automatic weapons trials or engagements. Trial and  
407 weapons assignments are conducted by the operator.

408 In the semiautomatic mode, the system acts in an advisory capacity. Tracks are threat-ranked based on  
409 their proximity to vital areas, speed/heading, and their assigned identity. All available weapons systems  
410 are trialed against hostile or faker tracks, beginning with the highest-ranked threat. The system will  
411 display the three shortest time-to-intercept (TTI) solutions based on available GBAD, airborne  
412 interceptor, or alert interceptor availability. The operator may then choose to accept or reject the  
413 recommended action. In the semiautomatic mode, the TAOC will continue to try all hostile and faker  
414 tracks until they are engaged or until no other weapons are available to intercept the threat.

415 The automatic mode functions similarly to the semiautomatic mode except that when the TTIs are  
416 compared, the system will automatically assign the weapon with the shortest TTI to engage the target.  
417 Multiple weapons will be assigned to raid-sized groups. Two weapons will be engaged against raid sizes  
418 of few; four weapons will be assigned against raid sizes of many. When the raid size is designated as few  
419 or many, GBAD assets may be the preferred weapon based on TTI and hot missile inventories. Dissimilar  
420 weapons will not be simultaneously engaged against the same target, thus reducing the chance of  
421 fratricide.

### 422 **Countermeasures**

423 The TAOC has several automatic capabilities designed to enhance its survivability against electronic and  
424 direct attack. These capabilities include automatic activation of an EMCON plan and identification and  
425 threat ranking of antiradiation missiles (ARMs). The EMCON capabilities allow the TAOC operator to  
426 enter protective measures into the TAOC data base should an ARM threat be detected. When a track is  
427 identified as a probable ARM threat, the TAOC will automatically initiate the predetermined EP measures  
428 plan entered into the data base. This EP plan may include radar blinking and blanking and activation of  
429 ARM decoys. The system's data base also provides operators with the opportunity to designate  
430 operational parameters to assist in identifying possible ARMs. These tests are based on speed and time-to-  
431 go thresholds and the missile's heading angle (the angle between the missile's heading and a line from the  
432 missile's heading to a TAOC radar). Tracks meeting the designated criteria are classified as ARMs.

### 433 **JTIDS Module (JM)**

434 Each MACS has one Joint Tactical Information Distribution System (JTIDS) module (JM) to exchange  
435 information with joint service air C<sup>2</sup> agencies through operation on the TADIL-J digital data network. The  
436 JM (radio terminal set AN/TSC-131) is a standard integrated command post shelter which contains a  
437 JTIDS 2H (class 2) terminal, multiplexer, and associated equipment (including antennas and



438 cryptographic equipment) required to remote the JM. The JM is a mobile and rapidly deployable system  
439 that can be collocated with the TAOC or operated in a stand-alone mode to rebroadcast received messages  
440 to other JTIDS-capable command, control, communications, computers, and intelligence (C<sup>4</sup>I) platforms.  
441 **Deadlining criteria is covered in appendix E.**

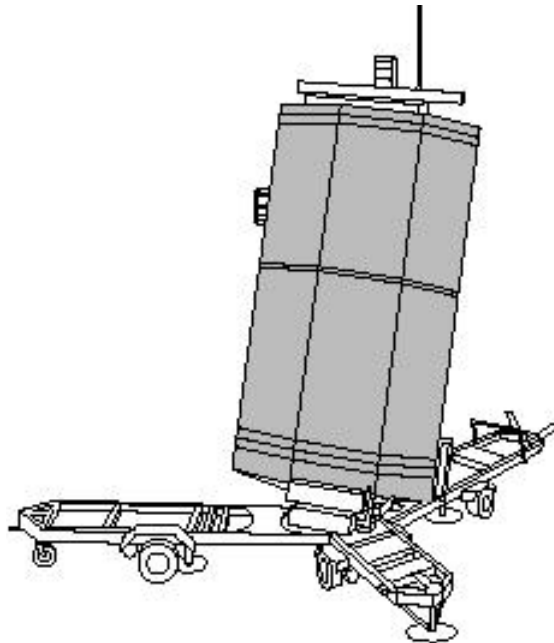
## 442 **Air Defense Communications Platform**

443 The AN/MSQ-124 Air Defense Communications Platform (ADCP) provides a single shelter for receiving  
444 and transmitting tactical data within the Marine Air Command and Control System (MACCS). The  
445 ADCP has a JTIDS terminal and interfaces with a TADIL-J Network. The TADIL-J equipped ADCP  
446 receives tactical data and transmits this data to short-range Air Defense (SHORAD) units via the Ground  
447 Based Data Link (GBDL). The ADCP also provides immediate translation of TBM data from the  
448 AN/TPS-59(V)3 radar via a point to point data link (PPDL). The ADCP consist of radio and computer  
449 equipment housed in a Lightweight Multi-purpose Shelter (LMS) mounted on a M1097 High Mobility  
450 Multi-Purpose Wheeled Vehicle (HMMWV). **Deadlining criteria is covered in appendix E.**

451 The ADCP-EP is a specially modified version that provides the interface to the CLAWS air defense  
452 missile launcher.

## 453 **RADARS**

454 The TAOC's organic radars provide the air picture necessary to efficiently control and manage air  
455 defense within its assigned sector. The TAOC can accept data from four radars and process data from as  
456 many as three radars at a time. However, each TAOC has a mix of two AN/TPS-59(V)3 and AN/TPS-  
457 63B radars.



458

459

**Figure 2-2. AN/TPS-59(V)3 Radar.**

460 **AN/TPS-59 Radar Set**

461 The AN/TPS-59(V)3 (fig. 2-2) is a solid state radar designed to provide long-range air surveillance. The  
 462 AN/TPS-59(V)3 is a three-dimensional (bearing, range, and target altitude), linear-phased array radar  
 463 which operates in the D band (1215-1400 megahertz [MHz]). The radar set consists of two shelters and an  
 464 antenna which is transported on three single-axle trailers. Specifications are shown in table 2-5. The radar  
 465 control shelter has two position display console which are capable of providing a planned position  
 466 indicator (PPI) display, range height indicator (RHI) display, or both displays simultaneously. The radar's  
 467 54 transmitters are arranged in 54 rows and operated independently of each other. It is recommended that  
 468 the radar should be deadlined if it is unable to detect or track (1) Air Breathing Targets (ABT) or (2)  
 469 Theater Ballistic Missiles (TBM). **A more detailed explanation of deadlining criteria is covered in**  
 470 **appendix E.** The AN/TPS-59(V)3 also has the capability of operating in the two-dimensional mode  
 471 should its general purpose computer fail. The AN/TPS-59(V)3 radar suite includes four ARM decoy  
 472 pallets. Theater missile defense (TMD) enhancements to the AN/TPS-59(V)3 radar improve its range and  
 473 altitude detection capabilities to 400 nautical miles and 500,000 feet respectively against ballistic missile  
 474 targets.

475 **AN/TPS-59(V)3 Radar.** The radar has been modified to provide increased ability to detect, track, and  
 476 process TBM targets and distribute those targets to the ADCP and TAOM.

477 The AN/TPS-59(V)3 is connected to a TAOM via two fiber optic cable for passing air breathing target  
 478 (ABT) information and to the air defense communications platform (ADCP) via a point-to-point data link  
 479 for passing TBM tracks. When the AN/TPS-59(V)3 is connected to the ADCP, three TBM messages are  
 480 passed via TADIL-J:

- 481 • The ballistic missile message: Contains vector and other descriptive data and covariance data.
- 482 • The reference point message: Contains launch point and impact point data.
- 483 • The data update request message: Contains multiple missile update capability and data selection
- 484 capability.

	Length (in feet)	Width (in feet)	Height (in feet)	Square Feet	Cubic Feet	Weight in pounds (approx)
(2) Radar Control Shelter, ea.	12	8	8	89	629	6000
(2) Antena Trailer "A", ea.	22.5	8	8	180	1395	9000
(1) Antena Trailer "B"	18	8	7	147	978	9000
System Power Requirements: 120 volts, 400Hertz, 50 kilowatts, 3 phase						

485 **Table 2-5. AN/TPS-59(V)3 Radar**

486 **AN/TPS-63B Radar Set**

487 The AN/TPS-63B radar (fig. 2-3) is a transportable, lightweight radar designed to provide short to  
 488 medium range, two-dimensional (bearing and range) air surveillance information to the TAOC.

489

**Figure 2-3. AN/TPS-63B Radar.**

490 The AN/TPS-63B radar is also a D band emitter (1250-1350 MHz) and has a selectable search range of  
 491 80, 120, or 160 nautical miles up to 40,000 feet in altitude. Because of its single shelter design, the  
 492 AN/TPS-63B is considered the TAOC's primary assault radar. The radar contains a single display console  
 493 and can be employed in a stand-alone mode to provide early warning information. The radar should be  
 494 considered deadlined if it is unable to perform its basic mission of detecting and tracking ABTs. **A more**  
 495 **detailed explanation of deadlining criteria is covered in appendix E.**

Length	10 feet
Width	8 feet
Height	8 feet
Square	80 sqft
Cube	640 cuft
Weight	7800 pounds (approx
Power requirements	120/208 volts, 60 hertz, 30 kilowatts, 3 phase

496

**Table 2-6. AN/TPS-63 Shelter Specifications****497 COMMUNICATIONS**

498 The MACS table of equipment (T/E) provides UHF, VHF, and HF communications capabilities in  
 499 addition to those located internally to the TAOM. The TAOC is also supported through the MACS's wire,  
 500 telephonic, and switchboard assets.

**501 MOBILE ELECTRIC POWER**

502 The MACS provides its own 60 and 400 Hz mobile electric power (MEP) to support TAOC operations.

**503 FUTURE EQUIPMENT**

504 The TAOM will be replaced with the common aviation command and control system (CAC2S) beginning  
 505 in FY2008. The AN/TPS-63 will be replaced with the ground/air task oriented radar (G/ATOR) beginning  
 506 in FY2010.

**507 TAOC CAPABILITIES****508 System Redundancy**

509 The TAOC has the capability to automatically reconfigure its system operations should one of the  
 510 TAOMs become inoperative. This redundancy is accomplished through designation of primary and

511 secondary main computer systems, redundant data and voice control buses, and passive electro-optical  
512 relays located at the radar ports.

### 513 **Echelon Capability**

514 The TAOC can move to alternate locations with uninterrupted operations. During such movements, the  
515 TAOC usually delegates increased responsibilities to its EW/C site to maintain agency connectivity and  
516 continue to provide medium-range surveillance and limited control of aircraft and missiles.

## 517 **TAOC LIMITATIONS**

### 518 **Electronic Signature**

519 The TAOC has a large electronic signature generated by its air surveillance radars and voice and data  
520 communication equipment. Effective planning and employment of EMCON measures are paramount to  
521 maximizing survivability.

### 522 **Low Altitude Air Surveillance**

523 Because the TAOC employs ground-based radar systems, its radar coverage is susceptible to line of site  
524 (LOS) limitations. This occurs from curvature of the earth and terrain features within the radar's search  
525 range and can preclude effective low-altitude coverage. Use of high ground for radar emplacement,  
526 airborne sensors, dispersion of sensors, incorporation of other radar units' air picture, and visual  
527 observation can be used to minimize terrain masking affects on the TAOC.

## 528 **TRANSPORTABILITY**

529 Transportability of the TAOC will be vastly improved with the fielding of CAC2S and the G/ATOR.

530 The MACS T/E provides for organic motor transport capability required to employ the TAOC but the  
531 assets are limited. Materials handling equipment (MHE) is required for emplacement unless the shelters  
532 remain mobile loaded.

533 TAOMs may be mobile loaded on a M4818 LVS with the addition of corner mods. MARCORSYSCOM  
534 is conducting the testing necessary to determine the maximum height and maximum weight at a  
535 maximum speed at which a TAOM may be secured to a M4818 LVS using the corner mods. The corner  
536 mods bolt into existing holes on the corners of the TAOM.

### 537 **M-1022A1 Mobilizer**

538 To alleviate mobility problems associated with the TAOC, actions are underway to procure the M-  
539 1022A1 mobilizer for the MACS. The M-1022A1 consists of a pair of dollies which are bolted to the ends  
540 of the TAOM shelter, thus allowing the TAOM to be towed behind a 5-ton truck. Designed to operate on  
541 improved surfaces (i.e., paved or gravel roads), the mobilizer incorporates a hydraulic lift system capable  
542 of lifting the TAOM 10-18 inches off the deck. The mobilizer can also be used to facilitate TAOM  
543 loading/offloading from aircraft and shipping. Each MACS is scheduled to receive five M-1022A1  
544 mobilizers.

545

## 545 **THEATER BATTLE MANAGEMENT CORE SYSTEMS**

546 Theater Battle Management Core Systems (TBMCS) is an Air Force developed system architecture  
547 designed to provide the automated tools necessary to manage tactical air operations, execute area air  
548 defense and airspace management in the tactical area of operation, and to coordinate operations with  
549 components of other military services. Specifically, the TBMCS software provides the automated  
550 capability to generate, disseminate and execute the Air Tasking Order (ATO). The TAOC's terminal will  
551 be located in the Sector Air Defense Facility (SADF).

## 552 **TAOC SYSTEM UPGRADES**

### 553 **Cooperative Engagement Capability**

554 The TAOC's TPS-59(V3) radar will be upgraded to incorporate the Navy Cooperative Engagement  
555 Capability (CEC). The CEC system is designed to fuse data from multiple sensors to provide near-  
556 continual tracking and fire quality control data to air C<sup>2</sup> and GBAD units. This capability will  
557 significantly enhance both Navy and Marine capabilities to track both ABT and TBM targets and engage  
558 these targets at maximum range.

### 559 **MODIFIED ADCP (MADCP)**

560 The MADCP will have a fiber optic data and voice link to the TAOM. It is designed to provide the  
561 MACSs with a multi-functional JTIDS platform capable of performing four mutually exclusive missions.  
562 These missions are: (1) Provide TBM target data for TBMD from the AN/TPS-59(V)3 radar via PDDL  
563 and/or TADIL-J, and transmit that data to a TADIL-J Network, (2) Provide early warning capability of  
564 ABTs to SHORAD units via GBDL, (3) JTIDS relay, and (4) JTIDS capability with the integrated  
565 TAOM (V)4.

566

566

## CHAPTER 3 PLANNING

567

568 Planning responsibilities for providing air defense within the MAGTF Area of Operations (AO) and for  
569 the TAOC's employment are generally divided between the Tactical Air Command Center, Sector Air  
570 Defense Facility staff and TAOC crew members. However, because these functions closely parallel one  
571 another, efforts are usually combined. MCO 3501.9B, *MCCRES*, outlines specific planning requirements  
572 for these two agencies. Although the planning phases outlined below may occur in sequence, most steps  
573 will be conducted con-currently.

### 574 INITIAL PLANNING

575 After receipt of an initiating directive from the MAGTF commander (in situations involving amphibious  
576 operations) or after receiving an operation plan's (OPLAN's) initiating order, the TACC, SADC and  
577 TAOC staff will begin the initial planning phase. Considerations for the initial planning phase include—

- 578 • Establishing early liaison and initiating coordination efforts with amphibious task force (ATF) and  
579 joint force planners and coordinating with adjacent and subordinate units for operational execution.
- 580 • Identifying communications requirements to subordinate, adjacent, and higher-level circuits with the  
581 ACE/MAGTF communications planners. These requirements should include identification of desired  
582 connectivity, encryption hardware and software, and authentication materials.
- 583 • Coordinating all frequency requirements (voice, data, radars) for subordinate, adjacent, and higher  
584 level circuits with the ACE/MAGTF communications planner.
- 585 • Providing input to the initial estimate of landing force aviation requirements. This initial estimate  
586 should include the number and type of aircraft available, the control agencies necessary, and the  
587 logistic support required. Some of the air defense allocations can be deduced from the aviation  
588 capabilities of the force involved, estimates of enemy air threat, and the general mission of the  
589 landing force (LF).
- 590 • Providing air defense missile and aircraft control specialist input to the aviation estimates of  
591 supportability for all assigned operations. This input should summarize significant aviation aspects of  
592 the situation as they might influence any course of action (COA) proposals and should evaluate and  
593 determine how aviation units can best be employed to support the contemplated LF COAs. The  
594 estimate is prepared by the ACE commander assisted by his staff and subordinate elements. The end  
595 product of the aviation estimates of supportability will include recommending a COA to the ACE  
596 commander. At a minimum, the aviation estimates of supportability will include—
  - 597 ♦ The contemplated COA(s) that can best be supported by the ACE.
  - 598 ♦ Disadvantages of less desirable COAs.
  - 599 ♦ Significant aviation (to include C<sup>3</sup>) limitations and problems of an operational or logistic nature.

### 600 INTELLIGENCE PLANNING

601 TAOC and SADC intelligence planning focuses on ascertaining enemy orders of battle (EOB) and  
602 capabilities. Intelligence planning considerations will include—

- 603 • Obtaining preliminary aviation intelligence estimates and detailed aviation intelligence estimates.

- 604 • Developing essential elements of information (EIs) in the form of simple, concise requests. EIs
- 605 should be forwarded in three parts: positive requests, qualifying questions and statements, and
- 606 prioritization of submitted requests.
- 607 • Determining the TAOC and SADC staffs' requirements for maps, charts, photographs, and other
- 608 graphic aids.
- 609 • Obtaining a complete EOB which includes information regarding the threat's missiles, aviation
- 610 assets, EW, naval, and ground force capabilities.
- 611 • Establishing intelligence collection and dissemination procedures to include timeliness, usability of
- 612 form, pertinence, and security of gathered information.
- 613 • Preparing a detailed rear area assessment for the TAOC and any deployed sites within its sectors.

## 614 **ELECTRONIC WARFARE PLANNING**

615 When the enemy has a known EW and electronic intelligence (ELINT) capability, the unit EW officer  
616 will assume an active role in EW planning for the TAOC. Planning considerations may include—

- 617 • Requesting a detailed assessment of the enemy's electronic order of battle to include communications
- 618 and radar jamming capabilities and ARM capabilities and profiles.
- 619 • Considering the EW threat when determining the locations of TAOC radars to include employment of
- 620 ARM decoy equipment.
- 621 • Providing input to the MAGTF command and control warfare (C<sup>2</sup>W) plan.
- 622 • Maximizing employment of secure communications and data links in the control and coordination of
- 623 weapons platforms.
- 624 • Ensuring that planners, operators, and users of electronic equipment thoroughly understand the EW
- 625 threat and the EMCON/EP techniques used to counter that threat.
- 626 • Submitting recommendations for EMCON and radiation control (RADCON) standards within the
- 627 TAOC's assigned sector. The EMCON and RADCON plans should incorporate all ground-based
- 628 sensors operating within the sector and consider the ARM threat with due regard to maintaining
- 629 effective sector surveillance. EMCON and RADCON planning considerations should address—
- 630 ♦ Minimum communications (MINCOMM) procedures.
- 631 ♦ Use of brevity codes and authentication devices.
- 632 ♦ Use and security of communications security (COMSEC) materials.
- 633 ♦ Delegation of EMCON authority.
- 634 ♦ Signals security (SIGSEC).
- 635 ♦ Beadwindow calls (when it is believed that someone has committed a security breach over the
- 636 net).
- 637 ♦ Gingerbread procedures (an intruder on the net).
- 638 ♦ Employment of directional antennas.
- 639 ♦ Circuit discipline.
- 640 ♦ Appropriate radio wattage.
- 641 ♦ Radar blinking and blanking.
- 642 ♦ Use of frequency diversity and frequency agile radios.
- 643 ♦ Physical dispersion and appropriate siting of communication emitters (to include radars, radios,
- 644 and navigation aids [NAVAIDs]).

645

## 645 **SITE SELECTION PLANNING**

646 The site selection process begins once the TAOC's sector is addressed. During site selection planning, the  
647 planners must ensure that adequate space for site establishment, access to the site, and radar coverage of  
648 the sector are maximized. Further discussion of site selection planning and occupation is located in  
649 chapter 4. The site selection planning process includes—

- 650 • Conducting surveys using maps, aerial photos, charts, and other graphic aids to identify candidate  
651 sites in concert with established air defense priorities.
- 652 • Producing/obtaining radar coverage diagrams from the tactical aviation mission planning system  
653 (TAMPS), Electromagnetic Compatibility Analysis Center (ECAC) studies, or manual computations.
- 654 • Determining optimum siting locations for communications connectivity with higher/adjacent and  
655 subordinate agencies using applicable computer programs, LOS diagrams, and HF propagation  
656 predictions.
- 657 • Establishing a phased plan of equipment arrival at the site to facilitate rapid commencement of  
658 operational capabilities and communications.
- 659 • Selecting an advanced party to conduct a physical reconnaissance, locate positions for equipment, and  
660 stake out specific equipment sites.
- 661 • Preparing site diagrams or models, which depict equipment locations and are the basis for setup crew  
662 briefings.
- 663 • Ensuring site plans consider maximum dispersal and remoting of equipment to reduce EW/infrared  
664 (IR) signatures.
- 665 • Designating alternate TAOC locations, which may be used if required.
- 666 • Planning for additional EW/C sites, which may be used at short notice and with minimal prior  
667 preparation to support various tactical situations.

668 Submitting a list of candidate sites to the ACE commander based on map surveys and other studies. The  
669 siting considerations for the TAOC or EW/C should encompass all task-organized equipment and  
670 personnel in both movement and physical requirements. Site characteristics to be considered include—

- 671 • Ground that is level within  $\pm 10$  degrees.
- 672 • Spatial requirements (e.g., antennas, radio frequency [RF] hazards). Note: ensure minimum of 300'  
673 separation when siting multiple sensors.
- 674 • Logistic supportability.
- 675 • Camouflage and concealment.
- 676 • Trafficability and access.
- 677 • Emergency destruction and/or movement.
- 678 • Drainage.
- 679 • Defendability.
- 680 • Radar coverage of the assigned airspace/sector/vital area.

## 681 **AIR DEFENSE-SPECIFIC PLANNING**

682 The TAOC will augment the air defense specialists in preparing the MAGTF operations order. Critical  
683 decisions, including air defense apportionment and planning to achieve air superiority, must be addressed  
684 and answered during this phase. Preliminary site selections for air defense agencies are also finalized.  
685 Other planning efforts include—

- 686 • Recommending/determining the identification of critical assets, vital areas, and air defense priorities.



- 687 • Establishing coordination for and preparation of the ACE surveillance plan. The ACE surveillance
- 688 plan provides the foundation for all subsequent air defense operations and should consider all
- 689 available means (electronic or visual) to detect, identify, and track air vehicles in the MAGTF's area
- 690 of operations (AO). While the location of individual elements of the surveillance system radars,
- 691 CAPs, airborne early warning [AEW], Stinger teams, etc.) will be influenced by many operational
- 692 and topographical factors, every effort should be made to provide detection capabilities at all altitudes
- 693 throughout the AO, with particular emphasis on likely threat avenues of approach. Overlapping and
- 694 redundant surveillance coverage should be achieved where possible and a reliable, swift, and
- 695 redundant communications plan should also be devised to ensure rapid dissemination of detections.
- 696 • Establishing and coordinating air defense communications requirements with the ACE planners to
- 697 ensure continuous AAW information flow.
- 698 • Determining the operational procedures used to integrate AEW into the overall air defense system
- 699 (e.g., orbit areas, crosstell procedures, data links, or communications).
- 700 • Recommending air defense control measures including WEZs and return to force (RTF) procedures
- 701 for inclusion in the MAGTF operations order.
- 702 • Recommending employment options for air defense weapons platforms (radar/nonradar fighters, and
- 703 Stinger) to the ACE.
- 704 • Ascertaining the availability of air-to-air missiles (AAMs) and SAMs and the development of specific
- 705 requirements for a resupply plan.
- 706 • Coordinating with MAGTF/ATF/joint planners on establishing airspace management and control
- 707 procedures.
- 708 • Planning for the tactical redeployment/alternate siting of AAW assets in response to changes in the
- 709 surveillance plan, the threat, or the ground force positions.
- 710 • Identifying the need for AEW platforms to supplement radar coverage.
- 711 • Recommending tanker routing and orbit locations and assisting in developing AR requirements.
- 712 • Participating in the preparation of the air defense appendix to the operations order based on an
- 713 analysis of the enemy air order of battle and own systems' capabilities and limitations. The air
- 714 defense appendix should include—
- 715     ♦ Centralized/decentralized operations procedures.
- 716     ♦ Autonomous operations procedures.
- 717 • ROE.
- 718 • Air defense warning conditions.
- 719 • Air defense states of alert (SOA).
- 720 • Air defense weapons control status.
- 721 • Air defense identification procedures.
- 722 • C<sup>2</sup> agency casualty plans/procedures.
- 723 • WEZ configuration (missile engagement zone [MEZ]/ fighter engagement zone [FEZ] layouts).
- 724 • Methods of coordination/deconfliction.
- 725 • RTF procedures.
- 726 • EMCON measures.
- 727 • Track telling/cross tell procedures.
- 728 • Data link configuration, connectivity, and priority.
- 729 • Communications prioritization.
- 730 • Control procedures.
- 731 • Agency casualty plans.

## 732 **ALTERNATE TACC/TADC PLANNING**

733 Continuation of operations depends on established detailed agency plans. Although the TAOC is  
734 responsible for assuming the role of the Alt TACC/TADC should the TACC/TADC become a casualty,  
735 the SADC and his staff will usually assume this function. Planning considerations for assumption of  
736 alternate TACC/TADC functions should include—

- 737 • Identification of those specific tasks the SADC, and staff, are capable of assuming. Obviously, the  
738 SADC staff will be unable to assume the future operations functions of the TACC. Likewise, the  
739 DASC may be better suited to assume certain TACC functions relative to OAS and Assault Support.
- 740 • Predetermining procedures to initiate assumption of the Alt TACC role should the TACC become a  
741 casualty.
- 742 • Establishing procedures and delineating functions to be performed by various MACCS agencies in  
743 the event of a TACC casualty.
- 744 • Designating an Alt TACC facility.
- 745 • Determining additional communications nets required by the Alt TACC.
- 746 • Establishing predetermined SADC staff and TAOC crew responsibilities for assumption of the Alt  
747 TACC role.
- 748 • Ensuring adequate situation displays are available should the TAOC assume the Alt TACC role.

## 749 **EXTERNAL SUPPORT PLANNING**

750 The TAOC's transportability is limited by amount and type of organic transportation assets available at  
751 the MACS. Unit planners should specify their desires concerning whether or not the TAOC or elements  
752 of the TAOC will remain mobile-loaded throughout the operation. If the decision is made not to mobile-  
753 load the TAOC or if assets are not available, sufficient transportation and MHE must be available to  
754 rapidly emplace the TAOC.

755 MHE must be able to access the TAOC's site and must be capable of lifting the TAOM shelter.  
756 Transportation assets should be of sufficient dimensions to hold the TAOM shelter. International  
757 Standards Organization (ISO) extenders are available from the TAOC should logistics vehicle system  
758 (LVS) assets be used.

## 759 **JOINT/MULTINATIONAL PLANNING**

760 The MAGTF must ensure its operations are integrated and coordinated with joint or multinational forces.  
761 A MAGTF representative must be included during the planning of joint operations (e.g., development of  
762 a joint air operations plan, airspace control plan (ACP), or an area air defense plan). The MAGTF's AAW  
763 capabilities and requirements must be addressed during planning to ensure the joint force's support and  
764 accomplishment of the MAGTF's mission.

765 The ACE commander, his staff, and the MACCS, as the MAGTF's air operations and AAW experts,  
766 provide joint or multinational force planners with the MAGTF's AAW capabilities and requirements.  
767 They also identify MAGTF capabilities and requirements relative to airspace control and air defense  
768 operations. Specifically, joint and multinational operational plans must—

- 769 • Integrate and complement the mission of the joint force.
- 770 • Ensure the interoperability of equipment and personnel.
- 771 • Ensure the common use and understanding of terminology.
- 772 • Allow responsiveness and the massing of firepower whenever and wherever needed.

- 773 • Identify the proper liaison and staff/agency representation between joint force components.  
774 (Representatives from each component must enable and improve the information flow and provide  
775 expertise.)
- 776 • Outline procedures for airspace control and air defense degradation.
- 777 • Facilitate transition from peacetime conditions to hostilities.
- 778 Air operations, airspace, and air defense planning are integrated with the joint force's planning cycle.  
779 Input from all components must be consolidated and integrated into the joint air operations plan, the ACP,  
780 and the air defense plan.
- 781 The airspace control order (ACO) is published and disseminated based on guidelines established in the  
782 ACP. The ACO may be issued as part of the joint ATO or as a separate document. The ACO normally  
783 covers 24 hours. The TACC generally prepares the MAGTF ACO, whether it is published as part of a  
784 Joint ACO or separately. The TAOC provides input to the Future Operations section of the TACC on  
785 issues that should be considered for the next ACO.
- 786

786

## CHAPTER 4 OPERATIONS

787

788 The MAGTF commander uses Marine aviation to assist MAGTF efforts in support of the commander,  
789 amphibious task force (CATF), the naval expeditionary force (NEF) commander, the joint task force  
790 (JTF) commander, or the joint force commander (JFC) in preparing and defending the battlefield. In its  
791 most common employments, the TAOC will operate in support of amphibious or joint force operations.  
792 Through its support of these operations, the TAOC will manage the MAGTF's integrated air defense  
793 system (IADS).

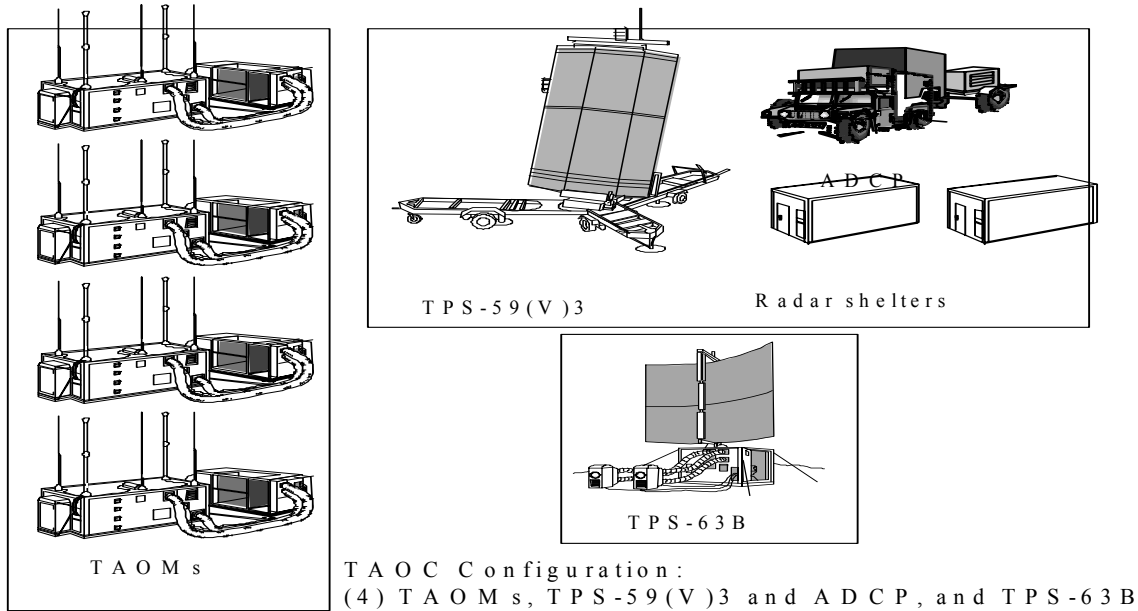
### 794 **EMPLOYMENT OPTIONS**

795 The MACS's TAOC detachment will task-organize a system to meet the required capabilities needed to  
796 support its designated mission. This task organization may be as small as a single gap filler radar  
797 detachment or as large as the entire TAOC. Examples of TAOC employment options are described below.

### 798 **TAOC**

799 As the MAGTF's AAW and surveillance/data link facility, this configuration provides the operational  
800 capability to perform all air C<sup>2</sup> tasks associated with the TAOC as outlined in chapter 1. The TAOC site is  
801 normally employed for operations requiring high intensity levels of AAW, surveillance-identification, and  
802 airspace management activities.

803 A TAOC consists of four TAOMs, AN/TPS-59(V)3 radar with ADCP, and an AN/TPS-63 radar.  
804 TAOMs may disperse to the maximum practical extent afforded by their 500 meter fiber-optic cables. The  
805 AN/TPS-59(V)3 and AN/TPS-63B can disperse up to 2 kilometers from the TAOC while interfacing with  
806 the TAOC via a fiber-optic cable. Survivability is enhanced through employment of the AN/TPS-  
807 59(V)3's ARM decoys. Circuits and needlines required for coordination with higher, subordinate, and  
808 adjacent units will terminate at the TAOC. The TAOC will exercise aircraft control and supervision and  
809 coordination of air defense employment within its assigned sector.



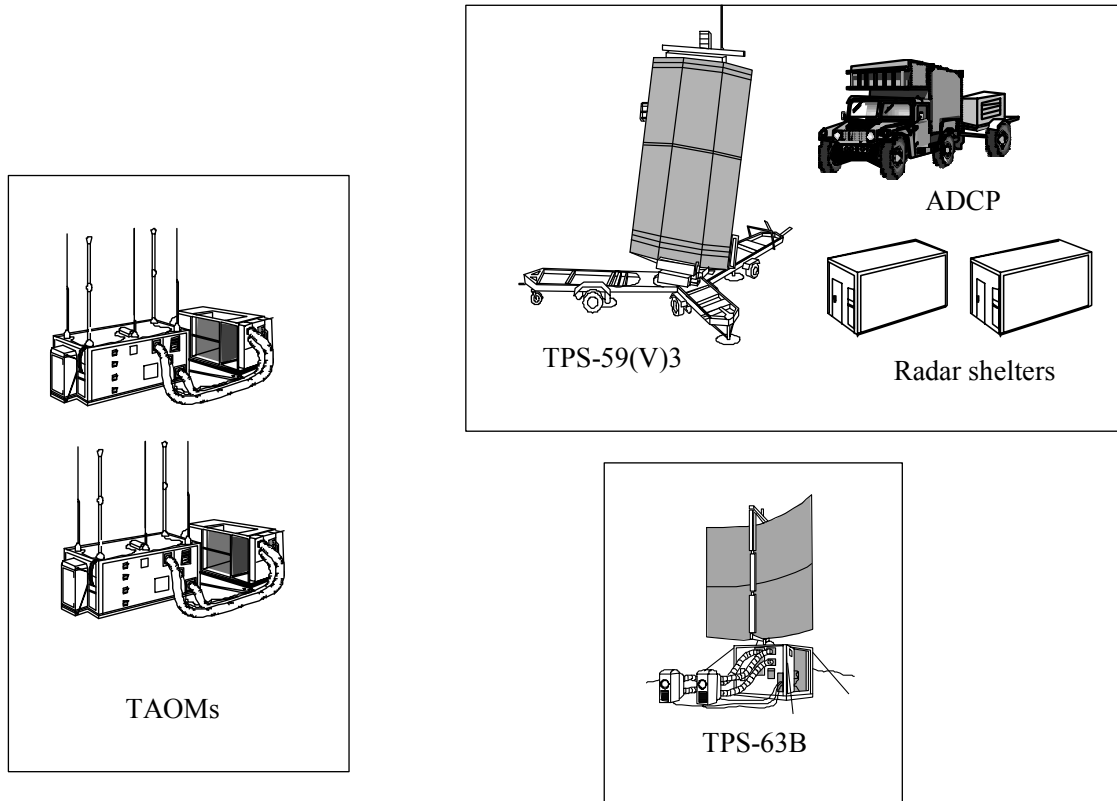
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**Figure 4-1. TAOC configuration**

812 **EARLY WARNING AND CONTROL SITE**

813 An operational site capable of performing the majority of TAOC tasks, the EW/C site is primarily  
 814 designed to perform air surveillance and aircraft and missile control. This site is not configured to  
 815 perform the senior supervisory and coordination functions provided by a TAOC site. The EW/C site is  
 816 employed for operations requiring medium intensity levels of airspace management and/or air defense  
 817 control; or as a subordinate agency to a TAOC during high level AAW and airspace management control  
 818 operations.

819 An EW/C site consists of one or two TAOMs and either one or both, AN/TPS-59(V)3 and AN/TPS-63B  
 820 radars. It will be forward deployed to augment surveillance coverage of the TAOC's assigned sector  
 821 and/or to act as an echelon platform for subsequent TAOC operations. The EW/C's primary responsibility  
 822 is surveillance, but it may also be assigned limited CAP or GBAD control functions. Either radar may be  
 823 deployed as an early warning radar site to augment the TAOC's surveillance coverage. This site may  
 824 digitally link its radar picture to the TAOC over a single or multichannel remote radar link (often referred  
 825 to as a remote radar site in this configuration).



EW/C Configuration: (2) TAOMs and either one or both radars

826  
827

**Figure 4-2. EW/C site configuration**

828 **EARLY WARNING RADAR SITE**

829 An operational site capable of performing a minimal number of TAOC tasks, the early warning site is  
 830 usually limited to providing air surveillance information. This site consists of one radar and support  
 831 equipment (no TAOM) and is employed for operations requiring low levels of airspace management and  
 832 minimal air defense control or as a subordinate agency to a TAOC or EW/C in higher intensity  
 833 operations. The site is used mainly to provide surveillance cueing, early warning, and/or to fill  
 834 surveillance gaps. When the radar picture is electronically transferred to a TAOC or EW/C, the site is  
 835 often referred to as a remote radar site. Because the early warning site does not include a TAOM, it does  
 836 not provide a data link picture to other air C<sup>2</sup> agencies.

837 Either radar may be deployed as an early warning radar site to augment the TAOC's surveillance  
 838 coverage. This site may digitally link its radar picture to the TAOC over a single or multi-channel remote  
 839 radar link (often referred to as a remote radar site in this configuration).

840

## 840 THEATER MISSILE DEFENSE (TMD) DETACHMENT

### 841 Alternate Tactical Air Command Center Site

842 The TAOC has the capability of performing many of the TACC's current operations section's (COS's)  
843 functions for a limited time (24 hours or less). With the fielding of CAC2S, common software and  
844 hardware will allow MACCS agencies to better serve as alternate sites in the event of degradation of the  
845 primary sites.

### 846 TAOC Configuration

847 The TAOC's modularity and flexibility affords planners a myriad of configuration options. A typical  
848 configuration is—

- 849 • A TAOC consists of four TAOMs, an AN/TPS-59(V)3 three-dimensional radar and an AN/TPS-63  
850 two-dimensional radar. TAOMs will disperse to the maximum practical extent afforded by their 500  
851 meter fiber-optic cables. The AN/TPS-59(V)3 can disperse up to 2 kilometers from the TAOC while  
852 interfacing with the TAOC via a fiber-optic cable. Survivability is enhanced through employment of  
853 the AN/TPS-59(V)3's ARM decoys. Circuits and needlines required for coordination with higher,  
854 subordinate, and adjacent units will terminate at the TAOC. The TAOC will exercise aircraft control  
855 and supervision and coordination of air defense employment within its assigned sector.
- 856 • An EW/C site consisting of two TAOMs and either one or both, AN/TPS-59(V)3 and AN/TPS-63B  
857 radars will be forward deployed to augment surveillance coverage of the TAOC's assigned sector  
858 and/or to act as an echelon platform for subsequent TAOC operations. The EW/C's primary  
859 responsibility is surveillance, but it may also be assigned limited CAP or GBAD control functions.
- 860 • Either radar may be deployed as an early warning radar site to augment the TAOC's surveillance  
861 coverage. This site may digitally link its radar picture to the TAOC over a single or multi-channel  
862 remote radar link (often referred to as a remote radar site in this configuration).

## 863 OPERATIONAL PRINCIPLES

864 The enemy's air and missile threat to the MAGTF air defense system includes aircraft and TMs. In  
865 combating this threat, the MAGTF's air defense plan is based on employment of three key principles.

### 866 Destruction in-depth

867 Destruction in-depth is based on threat detection and destruction beginning as far away from the vital area  
868 as possible and continuing as long as the threat exists. The area required to ensure destruction in-depth is  
869 referred to as the destruction area.

### 870 Mutual Support

871 Mutual support stresses that AAW weapons are employed and/or located in a manner that ensures  
872 continuity of engagement. Therefore, air defense units increase the probability of preventing the  
873 penetration of the AAW vital area by hostile aircraft and missiles.

## 874 **Centralized Command and Decentralized Control**

875 Coordinated operations and economy of force require centralized command. However, to achieve a  
876 system that has minimum reaction time and maximum damage resistance, the system requires a capability  
877 to function under decentralized control.

## 878 **CONCEPT OF EMPLOYMENT**

879 The TAOC task organizes its capabilities to meet air defense and airspace management needs for any  
880 MAGTF. It can support operations across the spectrum of MAGTF operations including operational  
881 maneuver from the sea, sustained operations ashore, and other expeditionary operations.

## 882 **Marine Expeditionary Force**

883 One TAOC is employed to support air operations for a Marine expeditionary force (MEF). The TAOC  
884 can be task-organized to meet the MEF's specific air defense requirements. The TAOC may be organized  
885 and equipped to operate independently in support of a variety of contingencies. Control of MEF AAW  
886 assets is coordinated with the TAOC under the cognizance of the TACC. In amphibious operations, an  
887 EW/C site can be established ashore initially and eventually built-up into a full TAOC. Each TAOC is  
888 established where it can best provide air surveillance, airspace management, and control of aircraft and  
889 missiles in its assigned sector.

## 890 **Marine Expeditionary Brigade (MEB)**

891 A Marine expeditionary brigade is supported by an EW/C site consisting of two TAOMs and either one  
892 or both, AN/TPS-59(V)3 and AN/TPS-63B. In amphibious operations, the TAOC is established ashore.

## 893 **Marine Expeditionary Unit**

894 The reduced level of air activity normally associated with a Marine expeditionary unit (MEU) normally  
895 does not require TAOC services. Air control and airspace management functions are typically performed  
896 by US Navy air C<sup>2</sup> agencies. However, TAOC personnel can be deployed with a MEU to assist in  
897 airspace management planning and execution functions.

## 898 **INTERAGENCY RELATIONS**

### 899 **TAOC and TACC**

900 The TAOC is subordinate to the TACC and provides decentralized control functions for air defense and  
901 airspace management for the ACE commander. In high-threat scenarios, the ACE commander may  
902 delegate authority to the SADC to divert/launch on-call air defense aircraft to meet the threat. The SADC  
903 may, in turn, delegate this authority to watch standers within the TAOC. This serves to minimize the  
904 response time to react to the threat. The TAOC is responsible for keeping the TACC informed of the  
905 current status of air defense and other AAW missions within its assigned sector, the status of AR aircraft,  
906 status of GBAD units, and portraying a timely air situation picture. In turn, the TACC provides the TAOC  
907 with the status of aircraft scheduled to support air defense missions.



## 908 **TAOC and SADC (or RADC)**

909 The SADC is the MAGTF's air defense battle manager. The SADC is responsible to the ACE commander  
910 through the TACC for the conduct of AAW within the MAGTF's AO. The TAOC is the SADC's  
911 principal agent for implementing his near term air defense plan. The TAOC provides the SADC with the  
912 current status of air defense and AR missions, status of GBAD units, the current threat situation, and other  
913 pertinent data necessary for the to effectively manage MAGTF, and attached, air defense assets. The  
914 SADC provides the TAOC with information regarding his intentions and management of air defense  
915 assets.

916 Assuming the MAGTF is designated a SADC/RADC within the MAGTF AO, the TACC and  
917 SADF/TAOC will normally split the execution and planning tasks as listed below:

### 918 **TACC**

- 919 • Publish and disseminate DIM
- 920 • Plan tactics to cover threat
- 921 • Coordinate training
- 922 • Coordinate Joint/Allied sea/land TAMDM
- 923 • Accept TACON of regional AD forces
- 924 • Respond to intelligence cueing
- 925 • Direct weapon system firing policy
- 926 • Direct/coordinate AD attack operations
- 927 • Direct/coordinate passive AD operations
- 928 • Coordinate with higher AD units (AADC)
- 929 • Integrate AD efforts with other ACM's (ADCM)
- 930 • ACE CTP Manager
- 931 • Regional ICO (RICO)
- 932 • Designate the Executive Agent
- 933 • Disseminate ROE
- 934 • Coordinate AEW integration

### 935 **SADF/TAOC**

- 936 • Develop surveillance plan
- 937 • Monitor/coordinate engagements
- 938 • Direct/redirect engagements (as required)
- 939 • Evaluate threat
- 940 • Respond to intelligence cueing
- 941 • Coordinate RADCON
- 942 • Direct/coordinate active AD operations
- 943 • Coordinate with other AD units
- 944 • Coordinate with adjacent non-AD units
- 945 • Set ADWC/WCS/SOA/SOE
- 946 • Provide summary of AD activity for ACE/MAGTF OPSUM
- 947 • Disseminate ROE
- 948 • Regional TDC
- 949 • ID Authority (if applicable)

## 950 **TAOC and DASC**

951 The DASC disseminates air defense control measures received from the TAOC to applicable MAGTF  
952 elements, Stinger units, and aircraft under the DASC's control. The DASC provides friendly aircraft  
953 information to the TAOC to assist in the aircraft identification process. The DASC also coordinates the  
954 RTF of aircraft under its control with the TAOC.

## 955 **TAOC and MATCD**

956 The TAOC and MATCD coordinate aircraft departure and RTF information to assist in the aircraft  
957 identification and recovery process. The TAOC advises the MATCD on the current air threat situation  
958 and provides air warning data for the MATCD activation and control of the base defense zone (BDZ).  
959 The MATCD disseminates air defense control measures received from the TAOC to applicable MAGTF  
960 elements and aircraft under the MATCD's control.

## 961 **TAOC IN AMPHIBIOUS OPERATIONS**

962 Amphibious operations combine ships, aircraft, weapons, and landing forces (LF) into a united military  
963 effort against a hostile or potentially hostile shore. During the assault phase, air defense capabilities must  
964 be established and built-up ashore. These capabilities include LAAD, aircraft, surveillance assets, and air  
965 C<sup>2</sup> agencies. After MAGTF LF assets and units are established ashore, the CATF may transfer control of  
966 specified operations to the commander, landing force (CLF). As the MACCS becomes functional, the  
967 CATF may transfer control of all or various portions of amphibious objective area (AOA) air operations  
968 to the CLF.

## 969 **Initial Air Defense Capability Ashore**

970 Initially, ATF aircraft operating from supporting aircraft carriers provide airborne air defense ashore.  
971 Stinger teams (initially in direct support of the ground combat element [GCE]) represent the first  
972 dedicated, operational shore-based air defense capability responsible for low altitude threats.

## 973 **Air Defense Build-up Ashore**

974 As the LF's follow-on ACE, GCE, and combat service support element (CSSE) resources build-up  
975 ashore, additional air defense assets also phase ashore. During the build-up of MAGTF air defense ashore,  
976 Marine wing communications squadron (MWCS) detachments, Marine wing support squadron (MWSS)  
977 detachments, and MATCDs establish and operate forward operating bases (FOBs). FOBs allow MAGTF  
978 aircraft (including AAW capable platforms) to establish forward bases ashore. As FOBs are established  
979 ashore and LF aircraft begin using the FOB, GBAD assets must provide air defense. The early  
980 introduction of EW/C radar/control elements ashore extends shipboard weapons employment, radar  
981 surveillance, identification, and coordination/control capabilities. The EW/C site provides engagement  
982 and early warning, cueing, and surveillance capabilities against the enemy air and missile threat  
983 (including TBMs). General support Stinger platoon commander(s)/section leader(s) may collocate with  
984 the EW/C to facilitate the exchange of surveillance/identification information with the EW/C, landward  
985 SADC/RADC (Navy or Marine), and air warfare commander (AWC). The ACE commander (normally  
986 through the TAOC, via the SADC/RADC) activates MEZs and FEZs. The TAOC must coordinate flight  
987 paths to prevent landing force aircraft from penetrating a MEZ unless absolutely necessary. Typically, the  
988 activation of a MEZ changes the RTF/ROE procedures used during the initial assault phase. All control  
989 agencies, controllers, and aircrews must adhere to the new RTF/ROE procedures. As additional general

990 support Stinger assets move ashore, the remainder of the TAOC's equipment and personnel also phases  
991 ashore. Liaison is established with the landward sector SADC/RADC to coordinate MAGTF AAW  
992 operations. Once the TAOC and other GBAD assets are operational, they establish and maintain the  
993 required voice and digital information links with the landward sector SADC/RADC.

## 994 **Transfer of Control Ashore**

995 The CLF establishes air control facilities ashore as soon as possible. These facilities provide increased  
996 surveillance and quicker response and extend the ATF's weapons control capabilities. Initially, air control  
997 agencies ashore operate as an adjunct to agencies afloat. The TAOC and/or EW/C agencies ashore assist  
998 as needed and monitor air control aspects (including communication circuits) directly related to their  
999 tasking. The CATF decides when to pass authority from agencies afloat to ashore. Control agencies afloat  
1000 continue to monitor communications and serve as a backup to shore-based air C<sup>2</sup> agencies in the case that  
1001 the shore-based units become casualties.

## 1002 **Surveillance**

1003 Before transferring control of air operations to the MACCS units ashore, the ACE commander must  
1004 establish an integrated and comprehensive surveillance plan for the MAGTF. Surveillance resources are  
1005 employed ashore based on their capability and coverage. Therefore, the ACE commander, staff, and  
1006 subordinate commanders must thoroughly analyze the surveillance requirements for the MAGTF's  
1007 assigned sector addressing issues which include terrain and its masking effects, threat axis of attack, and  
1008 available surveillance resources. Other factors to consider are—

- 1009 • The location of the TAOC and EW/C.
- 1010 • The ability of MATCDs to augment the surveillance system.
- 1011 • The location of Stinger/Avenger sections/teams (in general support/direct support).
- 1012 • FEZ(s) orientation.

1013 ACE planners must also identify any other specific requirements for aircraft surveillance capabilities  
1014 (e.g., AWACS or AEW) to the ACE commander. Once the surveillance system is established, the  
1015 TAOC's surveillance section coordinates input from the TAOC's sensors and all other surveillance  
1016 sources. Through this compilation of air track information, the TAOC is able to effectively identify  
1017 detected air tracks and build a comprehensive air picture.

## 1018 **Control**

1019 As MACCS agencies are established ashore and become operational, tactical control of various portions  
1020 of the air operation may be transferred ashore. WEZs are established and GBAD units are assigned  
1021 specific MEZs. As the MAGTF's IADS of interlocking engagement zones is established, changes to  
1022 RTF/ROE procedures may occur. Once the TAOC is ashore and operational, tactical control of landward  
1023 sector air defense (including TMD) may be phased ashore to the LF (Marine) SADC. Once all MAGTF  
1024 resources are operational, successful execution of the MAGTF air defense plan addresses asset  
1025 apportionment/allocation, coordination, C<sup>2</sup>, and management.

## 1026 **Post-Assault Operations**

1027 Once the amphibious assault operation ends and the ATF dissolves, the CLF begins post-assault  
1028 operations. AAW operations conducted during the post-assault are similar to those performed during the  
1029 assault. MAGTF aviation continues to support the LF and can also coordinate with other Service air  
1030 components.

## 1031 **Communication Nets**

1032 The MACCS's AAW assets (including aircraft) are communications dependent. An extensive  
1033 communications network is required to handle the volume and time sensitive nature of the information  
1034 involved in aviation operations.

1035 AAW's communications with the ATF is through the ATF AAW control and reporting (AAWC&R) nets.  
1036 The Navy tactical air control center (TACC) and Marine TACC, TADC, and TAOC are included on these  
1037 nets. The TAOC will use fighter air direction (FAD) nets for CAP control, tactical air traffic control  
1038 (TATC) nets for control of all other aircraft, anti-air intelligence (AAI) and antiair control (AAC) nets for  
1039 GBAD control, and various command nets for coordination with the MACCS to include tactical air  
1040 command (TAC), air operations control (AOC), and hand-over/ cross tell communications nets.

1041 Marine Aviation communicates with the other services through the MACCS. The MACCS provides voice  
1042 and data connectivity between Marine Aviation and joint services. The MACCS operates on all joint  
1043 doctrinal communication nets and Tactical Digital Information Links (TADILs). The TAOC operates on:  
1044 Air Defense Command and Control Net (ADCCN), Track Supervision Net (TSN), Data Link  
1045 Coordination Nets (DCNs), Voice Product Net (VPN) and is a contributing participating unit in the data  
1046 link architecture (TADIL-A, B, or J).

## 1047 **JOINT AND MULTINATIONAL OPERATIONS**

1048 The MAGTF may operate as part of a joint or multinational force. If the MAGTF is supporting joint or  
1049 multinational operations, the MAGTF is assigned an AO by the JFC. The JFC should assign airspace  
1050 control and air defense sector(s) that coincide with the MAGTF's air defense and airspace control assets  
1051 and capabilities. Sector(s) normally include the MAGTF's zone of action and assigned objectives. The  
1052 joint force's surveillance and AAW operations are conducted under the guidance of and in accordance  
1053 with the objectives of the JFC. The JFC may designate an area air defense commander (AADC) to  
1054 coordinate and integrate the joint force's entire air defense efforts and an airspace control authority  
1055 (ACA) responsible for the overall operation of the airspace control system. The MAGTF should be  
1056 assigned as SADC/RADC within the MAGTF AO. It is likely there will be attached air defense forces  
1057 from other service components, allies, or coalition partners assigned TACON to the MAGTF within, or  
1058 adjacent to, the AO.

## 1059 **Surveillance/Data Link Interoperability**

1060 As the primary surveillance agency in the MACCS, the TAOC will integrate its effort with the other  
1061 Service/country's air C<sup>2</sup> agencies in joint or multinational operations. The TAOC facilitates the TAOC's  
1062 interoperability with the joint force air C<sup>2</sup> agencies through the employment of various digital data links.  
1063 The interface coordination responsibilities of the TAOC will be delineated in the OPTASKLINK. The  
1064 TAOC surveillance section manages the surveillance and data link operations of the TAOC under the  
1065 direction of the TACC ICO/RICO.

## 1066 **Antiair Warfare**

1067 The TAOC will perform its AAW mission under the direction of the SADC/RADC, who will coordinate  
1068 MAGTF air defense operations with the AADC. The TAOC weapons section may be controlling both  
1069 Marine and joint/multinational interceptors and SAW assets. The TAOC's air defense responsibilities will  
1070 be outlined in the TACOPDAT message and/or RADC Daily Intentions Message (DIM).

## 1071 **Airspace Control**

1072 The TAOC will serve as the primary airspace control agency of the MAGTF and will coordinate its  
1073 efforts under the ACA. The TAOC's airspace responsibilities are also delineated in the TACOPDAT.

## 1074 **JOINT THEATER MISSILE DEFENSE OPERATIONS**

1075 Traditionally, AAW (including offensive anti-air warfare [OAAW] and air defense) is focused on  
1076 attacking enemy aircraft (before and after launch), airfields, air defense systems, and radars. Since  
1077 evolving technology has expanded the threat to include TMs (TBMs and CMs) the role of AAW and the  
1078 MAGTF IADS also must expand. The Marine Corps will conduct TMD as a subset of AAW. MAGTF  
1079 TMD operations fall under MAGTF AAW operations in naval expeditionary, amphibious, and joint  
1080 operations. Joint Theater Missile Defense (JTMD) is the integration of joint force capabilities to destroy  
1081 enemy TMs before or after they launch. JTMD also includes the disruption of enemy TM operations  
1082 through mutually supporting passive missile defense, active missile defense, attack operations, and C<sup>4</sup>I  
1083 measures.

## 1084 **Joint Theater Missile Defense Operational Elements**

### 1085 ***Passive Defense***

1086 Passive defense measures reduce the vulnerability and minimize the effects of damage caused by enemy  
1087 TM attack. They include TM early warning; nuclear, biological, and chemical (NBC) protection; and  
1088 counter surveillance. Passive defense also includes such measures as deception, camouflage and  
1089 concealment, hardening, EW, mobility, dispersal, redundancy, recovery, and reconstitution. Passive  
1090 defense is the responsibility of unit commanders at all echelons. Within the MAGTF AO, passive defense  
1091 operations within the SADC/RADC realm of authority will normally be coordinated within the TACC.

### 1092 ***Active Defense***

1093 Active defense operations protect against a TM attack by destroying TM airborne launch platforms and/or  
1094 destroying TMs in flight. These operations include multi-tiered defense-in-depth against enemy TMs  
1095 through multiple engagements. Air, land, sea, space, and special operations assets are used to conduct  
1096 multiple engagements. Active defense operations also include active EW that disrupts the enemy's remote  
1097 or on board guidance systems. The JFC normally assigns overall responsibility for JTMD active defense  
1098 operations to the AADC. Active defense forces are under the operational control of their component  
1099 commanders. MAGTF active defense operations will normally be directed by the SADC/TAOC.

### 1100 ***Attack Operations***

1101 Attack operations destroy, disrupt, or neutralize TM launch platforms and communications. Attack  
1102 operations also destroy, disrupt, or neutralize TM logistics structures and reconnaissance, surveillance,  
1103 and target acquisition (RSTA) platforms. TMD attack operations also include offensive actions taken by  
1104 air, land, sea, space, and special operations forces. The JFC normally tasks component commanders to  
1105 conduct JTMD attack operations within their assigned AOs. The TACC will normally coordinate attack  
1106 operations with the MAGTF COC.

### 1107 ***Command, Control, Communications, Computers, and Intelligence***

1108 C<sup>4</sup>I for JTMD operations must use existing joint and Service C<sup>4</sup>I systems and resources. TMD C<sup>4</sup>I is an  
1109 integrated system of doctrine, procedures, organizational structures, facilities, communications,

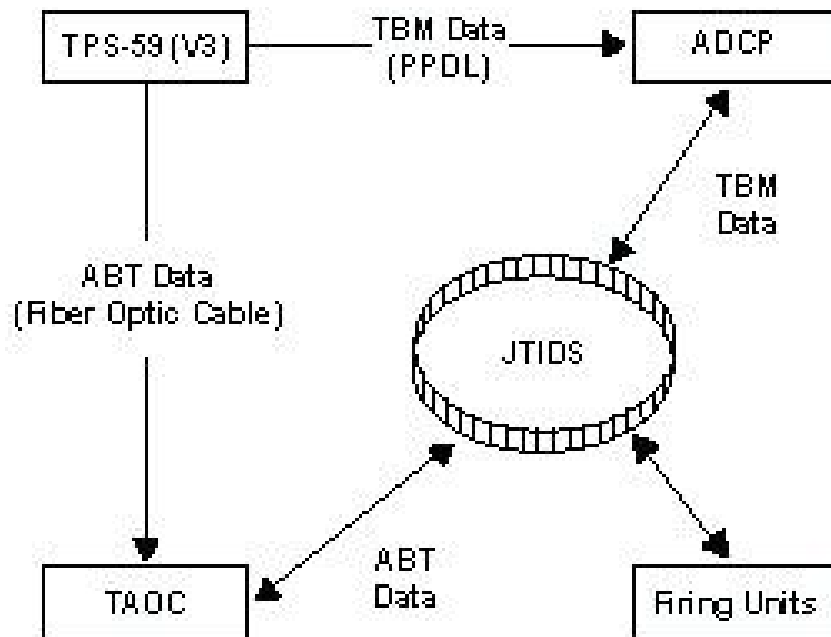
1110 computers, and supporting intelligence. TMD C<sup>4</sup>I includes missile warning and cueing of defense systems  
 1111 by missile warning sensors and ground stations. C<sup>4</sup>I provides command authorities at all levels with  
 1112 timely and accurate data and systems to plan, direct, and control TMD operations.

### 1113 Doctrinal and Operational Parallel

1114 JTMD operations parallel and fit within the existing doctrinal framework of AAW. JTMD active defense  
 1115 operations fall under active air defense. JTMD passive defense measures fall under passive air defense  
 1116 measures. JTMD attack operations fall under OAAW (US Marine Corps). JTMD C<sup>4</sup>I uses existing joint  
 1117 and Service C<sup>4</sup>I systems and resources. The MACCS provides C<sup>2</sup> for MAGTF AAW and TMD  
 1118 operations.

## 1119 THEATER MISSILE DEFENSE

1120 The TPS-59(V)3 is capable of detecting and tracking theater ballistic missiles (TBMs). Cueing  
 1121 information is sent to the ADCP via point-to-point data link (PPDL). The ADCP transmits the TBM  
 1122 information over JTIDS. The TAOC is unable to process the AN/TPS-59(V)3 TBM data but displays the  
 1123 information throughout the system received from JTIDS.



1124

1125

Figure 4-3. TMD Information Flow

## 1126 TAOC SITING CONSIDERATIONS

1127 The TAOC plays a crucial role in MAGTF air defense and anti-air warfare operations. Proper TAOC  
 1128 siting plays a major role in the TAOC's operational effectiveness.

### 1129 Basic Site Considerations

1130 The initial step in selecting a site for tactical command and control units equipped with TAOMs involves  
 1131 a detailed study of the area in which the mission is to be accomplished. This study is needed to determine

1132 the most advantages locations for radar and communications equipment to accomplish the unit's mission.  
1133 The site must lend itself to rear area security.

1134 MCO 3501.9B lists the following considerations:

- 1135 • Level ground within 10 degrees.
- 1136 • Spatial requirements (e.g., antennas, RF hazards).
- 1137 • Logistics supportability.
- 1138 • Camouflage and concealment.
- 1139 • Trafficability and access.
- 1140 • Emergency destruction and/or movement.
- 1141 • Drainage.
- 1142 • Defendable.
- 1143 • Radar coverage of assigned airspace/vital area.

## 1144 **Specific Siting Requirements**

1145 Once all of the general site considerations have been examined, specific requirements for particular  
1146 equipment configuration must be examined.

### 1147 ***Minimum Area Requirements***

1148 The amount of area required for a TAOC is based on how many TAOMs are to be collocated. The  
1149 horizontal plane (footprint) of a single TAOM is 8 feet by 20 feet. In addition to the physical dimensions  
1150 of the shelter, horizontal and vertical accesses must be considered for cable access, ducting, cable runs,  
1151 etc. A clearance of 4 feet is needed on each side of the shelter, and 10 feet is needed on each end.  
1152 Therefore, the minimum area required for a single shelter is 16 feet by 40 feet.

1153 In addition to the TAOM ISO shelter area, the pallet assembly's area requirements must be considered.  
1154 The minimum area required to contain a TAOM with its pallet assembly situated perpendicular to and the  
1155 TAOM at the end opposite the TAOM's door is 16 feet by 47 feet.

1156 If the TAOM is to be mobile-loaded during operation, additional area must be added to the area  
1157 calculations to allow for prime mover maneuvering.

### 1158 ***Antenna Area Requirements***

1159 The TAOM can be employed with ground or roof-mounted antennas. Since roof-mounted antennas do not  
1160 increase the footprint, they are not addressed here. As ground mounted antennas must be placed within a  
1161 finite distance from their associated TAOM, each antenna's specific area requirements must be closely  
1162 considered when selecting a TAOM site. Specific area requirements for each of the TAOM's antennas in  
1163 a ground-mounted configuration are—

- 1164 • HF Whip. The space required to install the HF whip antenna with guide lines is 30 feet in diameter.  
1165 The overall height of the antenna assembly is 27.2 feet.
- 1166 • UHF Antenna. The assembled UHF antenna's height is 22 feet, 6 inches. The recommended  
1167 minimum installation area for the UHF antenna is 32 feet in diameter.
- 1168 • VHF Antenna. The overall height of the assembled antenna is 21 feet, 10 inches. The recommended  
1169 minimum installation area for the VHF antenna is 32 feet in diameter.
- 1170 • HF Sloping Dipole. The erected antenna assembly is 21 feet tall and occupies an area 260 feet in  
1171 diameter.

### 1172 ***Radar Area Requirements***

1173 Care must be taken when emplacing radars to ensure no physical masking degrades radar coverage.  
1174 Specific space requirements for the AN/TPS-63B are 30 by 30 feet to set-up. The AN/TPS-59(V)3  
1175 requires 100 by 200 feet to set-up.

## 1176 **Equipment Separation Requirements**

### 1177 ***Distance Between TAOMs and Ground-Mounted Antennas***

1178 Three factors determine the distance between a TAOM and its ground-mounted antennas: personnel  
1179 safety, antenna isolation requirements, and hardware limitations. Each TAOM ground-mounted antenna's  
1180 individual requirements are—

- 1181 • HF Whip. The separation between two HF whip antennas should be a minimum of 400 feet. Because  
1182 of these separation constraints, two HF antennas cannot be roof-mounted on the same shelter and  
1183 used at the same time. Special attention should be given to radiation patterns and reflective areas of  
1184 the antennas.
- 1185 • UHF Antenna. The separation between two UHF antennas should be a minimum of 20 feet. Special  
1186 attention should be given to radiation patterns and reflective areas of the antennas.
- 1187 • VHF Antenna. The separation between two VHF antennas should be a minimum of 40 feet. Special  
1188 attention should also be given to the radiation patterns and reflective areas of the antenna.
- 1189 • HF Sloping Dipole. If multiple HF sloping dipole antennas are to be co-located, the separation  
1190 between antennas should be a minimum of 260 feet mast-to-mast. Special attention should also be  
1191 given to the radiation patterns and reflective areas of the antennas.

### 1192 ***Distance Between TAOMs and Radars***

1193 The distance between a TAOM and a radar set is determined by the method of interface. The TAOM can  
1194 interface with the radar set by one of two methods: direct connection (fiber-optic cables) or indirect  
1195 connection (remote radio sets). If fiber-optic cables are used, the maximum distance between the TAOM  
1196 and radar set is limited to the length of the fiber-optic cables. The length of a TAOM's radar interface  
1197 fiber-optic cable is 2,000 meters or 6,560 feet; therefore, a directly coupled radar set must be within a  
1198 6,560-foot radius from the TAOM. Operators should allow for adequate cable slack to prevent cable  
1199 connector stress, which could damage the connectors when planning the TAOM-to-radar separation  
1200 distances. If the remote radar interface capability of the TAOM is used, the maximum distance between  
1201 the TAOM and radar is limited to 24 nm/40 km (software limitation).

### 1202 ***Distance Between TAOMs***

1203 The minimum distance recommended between collocated TAOMs is 8 feet. This distance allows access to  
1204 shelter cable connection panels, environmental control ducting, and adequate roof-mounted antenna  
1205 separation. The maximum distance allowed between TAOMs is dictated by the inter-TAOM bus fiber-  
1206 optic cables. The length of the inter-TAOM cables are 500 meters or 1,640 feet; therefore; the actual  
1207 separation allowed between TAOMs must be less than 500 meters. When planning TAOM separation,  
1208 allow for adequate cable slack to prevent cable connector stress. Excessive stress on the connectors could  
1209 cause damage.

### 1210 ***Distance Between TAOM and Pallet Assembly***

1211 The pallet assembly must be located within 25 feet of its associated TAOM.

### 1212 ***Distance Between TAOMs and Power Sources***



1213 The TAOM requires 120/208 v, 3-phase, 50/60 Hz, configured prime power. It is obtained from either  
1214 tactical generators or commercial power systems. Site location for prime power generators is determined  
1215 by the location of the equipment they supply.

1216

## CHAPTER 5

### TRAINING

1216  
1217

1218 Every Marine Corps leader has the responsibility to establish and conduct technical and tactical training  
1219 for Marines to successfully accomplish the unit's mission. The tools available to assist leaders in  
1220 establishing the base for an effective training plan are relevance, standardization, efficiency, and  
1221 specificity. Due to the complexities of amphibious, joint, and multinational operations, the importance of  
1222 individual, crew, and unit level training for TAOC controllers and operators cannot be understated. The  
1223 impact from meaningful, quality training will reflect on a Marine's proficiency.

#### 1224 **INDIVIDUAL TRAINING**

1225 TAOC controller and operator training requirements are standardized by MCO P3500.19, *Training and*  
1226 *Readiness (T&R) Manual*. It specifies training events and position requirements necessary for controllers  
1227 and operators to progress through various level qualifications. Follow-on formal training is available to  
1228 those Marines who demonstrate military occupational specialty (MOS) proficiency.

#### 1229 **Formal Schools**

1230 **Entry Level Training** is conducted for air defense control officers (MOS 7210), tactical air defense  
1231 controllers (MOS 7236), and air control electronics operators (MOS 7234) at Air School, Marine Corps  
1232 Communication-Electronics School (MCCES), Marine Corps Air-Ground Combat Center, Twentynine  
1233 Palms, California.

1234 **Air Defense Control Officer Course** provides instruction regarding TAOC system capabilities,  
1235 employment and crew operations; system configuration; surveillance, traffic, and weapons functioning;  
1236 principles of air defense; and air intercept control.

1237 **Air Control Electronics Operator Course** provides the same instructional package as the **Air Defense**  
1238 **Control Officer Course** withstanding the air intercept controller training portion.

1239 **Tactical Air Defense Controller Course** provides intercept control training to corporals and sergeants  
1240 carrying an interim MOS 7236 designation. Upon successful course completion, the Marine will receive a  
1241 permanent MOS 7236 designation. The **Air Control Electronics Operator Course** is a prerequisite for  
1242 the **Tactical Air Defense Controller Course**.

1243 **Graduate Level Training** is conducted for Air defense control officers (MOS 7210) and tactical air  
1244 defense controllers (MOS 7236) exhibiting technical and tactical proficiency may be selected by their  
1245 commands to attend mid- and high-level MOS training. Training includes the Navy Fighter Weapons  
1246 School (TOPGUN), Marine Division Tactics Course (MDTC), and the Weapons and Tactics Instructor  
1247 (WTI) course.

1248 **TOPGUN** provides controllers with advanced training in threat and friendly air tactics; weapons systems  
1249 capabilities; and Naval power projection doctrine. Prerequisites for TOPGUN include qualification as an  
1250 air intercept controller instructor (AICI).

1251 **Marine Division Tactics Course** provides controllers with ground and practical application instruction in  
1252 doctrine, tactics, and weapons employment considerations for a division or more of Marine fighters in a

1253 multi-bogey environment as part of an integrated air defense system. Marine aviation weapons and tactics  
1254 squadron 1 (MAWTS-1) instructors teach MDTC

1255 **Weapons and Tactics Instructor Course** provides students advanced training and practical application  
1256 on planning and execution of the six functions of Marine aviation. MOS 7210 students receive specific  
1257 instruction in MACCS and TAOC planning and SADC/TAOC operational execution. Prerequisites for  
1258 WTI attendance include SAD qualification with MEF-level exercise experience. Upon completion,  
1259 students receive MOS 7277 (weapons and tactics instructor) designation.

1260 **Follow-on Schools.** Additional formal schools are available for field grade officers, including the Air  
1261 Defense Control Officers Senior Course (ADCOSC) and the WTI Commanders Course.

1262 **Air Defense Control Officers Senior Course is conducted** at Air Schools, MCCES, Marine Corps Air-  
1263 Ground Combat Center, Twentynine Palms, California, the ADCOSC is designed to provide MACCS  
1264 field grade officers with instruction on air defense capabilities and limitations. Conducted as a  
1265 symposium, the ADCOSC provides insight to air defense operations and planning considerations.

1266 **WTI Commanders Course is held** at MCAS, Yuma, Arizona, the WTI Commanders Course provides  
1267 field grade officers with an opportunity to examine and discuss issues affecting the MACCS and  
1268 considerations for MACCS employment.

## 1269 **On-the-Job Training**

1270 Most TAOC controller and operator MOS training is conducted at the squadron level. Requirements for  
1271 both academic and practical application training and position qualification for TAOC controllers and  
1272 operators are specified in MCO P3500.19. A specific T&R syllabus exists for MOS 7210 air defense  
1273 control officers, MOS 7236 tactical air defense controllers, and MOS 7234 air control electronics  
1274 operators. Tracking of individual readiness is computed by the aviation training and readiness information  
1275 management system (ATRIMS). Training for TAOC controllers and operators is conducted at four  
1276 progressive levels. Completion of each level equates to reaching a given level of combat readiness.

1277 **Combat Capable Training** is completed at the MCCES entry-level school and includes the basic skills  
1278 training required by TAOC personnel to operate TAOC equipment and function as a TAOC crewmember.

1279 **Combat Ready Training** includes additional training in tactics and weapons systems in both permissive  
1280 and restrictive threat environments to raise the skill level of TAOC personnel.

1281 **Combat Qualification Training.** Upon completion of this phase, TAOC operators and controllers will be  
1282 proficient in the employment of the weapons system in a sophisticated threat environment.

1283 Completion of **Full Combat Qualification** indicates a Marine is proficient in the employment of the  
1284 weapons system in integrated operations in all threat environments.

1285 **Special Qualifications.** MCO P3500.19 provides guidance for TAOC crew members to attain  
1286 designations as instructors for various T&R levels, flight supervisors, simulator operators and  
1287 programmers, and in specific crew positions.

## 1288 **CREW TRAINING**

1289 For TAOC controllers and operators, maintenance personnel, and the SADF staff, TAOC crew training is  
1290 normally affected through the use of the TAOM's built-in simulation capability. The TAOM's simulation  
1291 program provides operators with the ability to design air defense scenarios of varying complexity based  
1292 on the crew's training requirements. Crew training need not include the entire crew, but may be designed  
1293 to specifically challenge an individual TAOC section (e.g., surveillance, traffic, or weapons) on its

1294 functioning and procedures. Crew training drills are extremely important for identifying crew  
1295 shortcomings, enhancing inter-crew coordination, testing air control procedures, and preparing the crew  
1296 to interface with external agencies.

## 1297 **UNIT TRAINING**

1298 Unit training involves that training necessary in preparing the TAOC to perform its mission. Unit training  
1299 can take on many forms, including command post exercises (CPXs), simulated exercises (SIMEXs), and  
1300 field training exercises (FTXs). During unit training, MACS personnel are intimately involved in  
1301 preparing training plans and coordinating with higher, adjacent, and subordinate C<sup>2</sup> and support elements.

## 1302 **Marine Aviation Planning Problem Exercises**

1303 Marine Aviation Planning Problem (MAPP) exercises are low cost, low overhead training which allow  
1304 commanders to train their staffs to perform special integration and control functions in a simulated  
1305 environment. MAPP exercises are particularly effective for determining command and control  
1306 requirements to support possible contingencies.

## 1307 **MACCS Integrated Simulated Training Exercise**

1308 The MACCS Integrated Simulation Training Exercise (MISTEX) is a MACG locally produced exercise,  
1309 which involves detailed preparation of a simulated scenario and its subsequent execution at the MACCS  
1310 level. The MISTEX can serve to prepare units for upcoming FTXs or contingencies. Individual Marine  
1311 participation in filling a crew position during a MISTEX is a T&R requirement for position qualification.

## 1312 **Joint System Training Exercises**

1313 Similar to the MISTEX, joint *system* training exercises (JSTEs) provide integrated systems training that  
1314 incorporates the challenges of integrating the MACCS in joint operations. JSTE scenarios have been  
1315 developed to support joint C<sup>2</sup> training for probable contingency operations worldwide.

## 1316 **Other Unit Training**

1317 In addition to CPX and SIMEX type training, the MACS often deploys to the field to participate in FTXs.  
1318 Field training provides a unit with the most beneficial training opportunities available, living and  
1319 operating in conditions similar to that, which would be expected in real world operations.

## 1320 **EVALUATING TRAINING**

1321 The success of individual, crew, and unit training must be qualitatively measured to identify training  
1322 deficiencies and create a baseline for designing future training. Evaluation tools to identify training  
1323 deficiencies are MCO 3501.9B, *MCCRES*, and MCO P3500.19. The *MCCRES* is a standardized;  
1324 Headquarters Marine Corps directed evaluation program designed to measure a unit's warfighting  
1325 readiness. It specifies mission performance standards (MPS) which agencies are expected to perform  
1326 during their wartime mission. MCO P3500.19 specifies individual performance standards.

1327

1327

## APPENDIX A

1328

# CREW BRIEFING GUIDE/FORMAT

1329

## OPERATIONS BRIEF

1330 The operations brief should be developed based on planning conducted at the MACCS (MACG) planning  
1331 staff level. As such, it will incorporate specifics from the MACCS commander's brief, however, it must  
1332 be appropriately tailored for the TAOC. The operations brief should incorporate specific issues to the  
1333 MACS, beyond the scope of the commander's brief, which are required for effective TAOC employment.

1334 The operations brief is designed to provide the TAOC detachment commander with a standardized,  
1335 comprehensive, and concise format to brief critical TAOC crew members and the SADC for an operation  
1336 or exercise. The briefing format will then allow TAOC crews to develop and present their crew briefs  
1337 prior to execution.

1338 The format for this operations brief is not designed to script every possible item that could be included in  
1339 a TAOC crew brief, nor do all the items listed need to be included. The individual developing and  
1340 presenting this brief must analyze the information presented in the MACCS commander's brief,  
1341 determine which information is critical to the TAOC's mission accomplishment, and tailor his brief to  
1342 meet these needs. The operations brief format follows:

1343

## GENERAL SITUATION

1344

### Enemy Forces

- 1345 • Ground forces disposition:
  - 1346 ♦ Enemy troop locations
  - 1347 ♦ Forward edge of the battle area (FEBA)
  - 1348 ♦ Projected movements
- 1349 • Locations of known/suspected airbases
- 1350 • Location, Number, type, and variant of aircraft:
  - 1351 ♦ Fixed-wing
  - 1352 ♦ Rotary-wing
  - 1353 ♦ UAVs
- 1354 • Possible loadouts/ordnance/delivery techniques:
  - 1355 ♦ Air-to-surface missiles (ARM/general/theater)
  - 1356 ♦ Precision guided munitions (forward-looking infra-red radar [FLIR]/TV/laser/command)
  - 1357 ♦ Iron bombs
  - 1358 ♦ NBC capabilities
  - 1359 ♦ Infrared countermeasures (IRCM) capabilities
- 1360 • Enemy air capability to target air defense priorities
- 1361 • EW threat:
  - 1362 ♦ Airborne/ground electronic warfare support (ES) systems/ capabilities
  - 1363 ♦ Airborne/ground electronic attack (EA) systems/capabilities
- 1364 • Locations/systems/capabilities of SAM threat

- 1365 • Surface-to-surface threat to C<sup>3</sup> and air defense priorities
- 1366 • Special operations/terrorist threat
- 1367 • Expected air threat axis and likely avenues of approach
- 1368 • Expected times of attack
- 1369 • Most likely enemy course(s) of action

### 1370 **Friendly Forces**

- 1371 • Airfields and locations/divert
- 1372 • Aircraft mission, locations and loadouts:
  - 1373 ♦ Fixed-wing
  - 1374 ♦ Rotary-wing
  - 1375 ♦ UAVs
- 1376 • C<sup>3</sup> agencies, capabilities, and locations

### 1377 **Commander's Intent**

- 1378 • Main effort/friction areas
- 1379 • Strengths to exploit
- 1380 • Vulnerabilities enemy may exploit
- 1381 • TAOC mission

### 1382 **Joint/Multinational Interoperability Issues**

- 1383 • Interface with JFACC/ACA/AADC
- 1384 • Airspace control area/sectors
- 1385 • Air defense area/region/sector
- 1386 • Interface with International Civil Aviation Organization (ICAO) and host nation air traffic control (ATC) facilities
- 1387
- 1388 • ATO input and receipt means/procedures

### 1389 **Command, Control and Communications Employment Plan**

- 1390 • Air defense priorities
- 1391 • Surveillance coverage and radar contracts
- 1392 • Responsiveness to the threat
- 1393 • Destruction area (BDZs/MEZ/FEZ/crossover zones/points/ joint engagement zones [JEZs])
- 1394 • Data links:
  - 1395 ♦ Connectivity/configurations
  - 1396 ♦ Interface control unit (ICU)/interface coordination officer (ICO)
- 1397 • Manual cross tell procedures
- 1398 • Orbit areas (AEW/CAP/tankers/CAS stacks/EA/ES)
- 1399 • Routing (minimum risk routes [MRR]/fade/bugout/IFF turn on and off lines)
- 1400 • Airspace coordination areas (ACAs)
- 1401 • Additional airspace control measures
- 1402 • NAVAID (tactical air navigation system[TACAN]/VHF omnidirectional range [VOR]/nondirectional beacon [NDB]) locations
- 1403
- 1404 • Lame duck procedures
- 1405 • CAP management and control

- 1406 • Tanker management and control
- 1407 • AEW/airborne agency coordination procedures
- 1408 • Aircraft handover procedures
- 1409 • Initial air defense warning condition/weapons control status
- 1410 • Initial states of alert (aircraft/Hawk/Stinger/air defense artillery [ADA])
- 1411 • Initial GBAD/CAP mode of control:
- 1412 ♦ Authority to change mode
- 1413 ♦ Procedures for autonomous operations
- 1414 • ROE:
- 1415 ♦ Identification (ID) authority
- 1416 ♦ Engagement authority
- 1417 ♦ ID criteria
- 1418 ♦ Commit criteria
- 1419 ♦ Self-defense criteria
- 1420 ♦ Impact of night on ROE
- 1421 • Tactical recovery of aircraft and personnel (TRAP)/medical evacuation (MEDEVAC):
- 1422 ♦ Assets/locations
- 1423 ♦ Casualty collection points
- 1424 ♦ Zones/safe areas
- 1425 • Communications:
- 1426 ♦ Planned and exceptions; current period for communications-electronics operating instructions (CEOI)
- 1427 ♦ Critical information flow
- 1428 ♦ Critical information flow
- 1429 • Communications assignments:
- 1430 ♦ Frequencies/callsigns
- 1431 ♦ Required communication nets to be monitored
- 1432 ♦ Prioritization for restoration
- 1433 • Data link specifics:
- 1434 ♦ Data link reference point (DLRP)/unit system coordinate center (USCC)
- 1435 ♦ NCS
- 1436 ♦ Frequencies/nets/callsigns
- 1437 ♦ Addresses (Btrys/PUs/RUs)
- 1438 ♦ Track blocks
- 1439 • Crypto change times
- 1440 • EMCON/EP plan to include RADCON and ZIPLIP procedures
- 1441 • Codewords
- 1442 • Required reports (equipment/frequency interference reports (FIR)/meaconing, intrusion, jamming, and interference (MIJI) to include required times or time of event)
- 1443 • ATO distribution to subordinate agencies
- 1444 • Intelligence connectivity
- 1445 • Casualty procedures:
- 1446 ♦ Functional degradation
- 1447 ♦ Data link and voice communications
- 1448 ♦ Data link and voice communications
- 1449 • Delegation of authority:
- 1450 ♦ CAP launch
- 1451 ♦ WEZ activation/deactivation
- 1452 ♦ RADCON management

1453 **Time Hack**

## 1454 **Questions**

## 1455 **TAOC CREW BRIEF**

1456 Principal TAOC crew members conduct organized briefings prior to assuming the watch. Crew briefs  
1457 should be as detailed as practical, however, may be abbreviated to expedite the group brief and  
1458 concentrate on TAOC section particulars either prior to or immediately following the crew's mass brief.  
1459 The normal briefing order is the—

- 1460 • SAD (Introductory Comments)
- 1461 • Intelligence representative
- 1462 • SCC
- 1463 • SID
- 1464 • STD
- 1465 • SWD
- 1466 • SAD
- 1467 • SADC/RADC /ACE commander/senior watch officer (SWO)

1468 The minimum required information to be passed in the TAOC crew mass brief is specified in MCO  
1469 3501.9B. This information, combined with other additional useful information, is outlined on the  
1470 following pages.

## 1471 **Intelligence Representative**

- 1472 • Weather:
  - 1473 ♦ Current airfield/operating area conditions
  - 1474 ♦ 6-hour forecast for airfield(s)/operating area
  - 1475 ♦ Divert field conditions
- 1476 • Friendly ground situation
- 1477 • Friendly air situation
- 1478 • Enemy ground situation:
  - 1479 ♦ Special operating forces (SOF) and activities
  - 1480 ♦ Operations impacting on friendly operations
- 1481 • Enemy air situation to include the air order of battle:
  - 1482 ♦ Locations of known or suspected airbases
  - 1483 ♦ Number and type of suspected aircraft threat
  - 1484 ♦ Possible ordnance loads and configurations
  - 1485 ♦ Aircrew training level
  - 1486 ♦ Missile order of battle
  - 1487 ♦ High-speed anti-radiation missile (HARM) capabilities and tactics
  - 1488 ♦ Attack profiles
- 1489 • Enemy naval order of battle
- 1490 • Enemy electronic order of battle
- 1491 • Enemy surface-to-surface weapons capabilities
- 1492 • Enemy surface-to-air capabilities and locations
- 1493 • Vulnerability windows
- 1494 • NBC capabilities and employment means



## 1495 **System Configuration Coordinator**

- 1496 • System configuration/equipment status:
  - 1497 ♦ Mass memory units (MMU) (to include Master MMU)
  - 1498 ♦ Radar interface units (RIU)
  - 1499 ♦ Computer units (CU)
  - 1500 ♦ Communication interface units (CIU) (to include Master CIU)
  - 1501 ♦ DDB
  - 1502 ♦ Printer units (PRU)
  - 1503 ♦ Data communication units (DCU)
  - 1504 ♦ Data terminal sets (DTS)
- 1505 • Communication configuration/status:
  - 1506 ♦ Direct access trunks (DAT)
  - 1507 ♦ Single destination (SD) nets
  - 1508 ♦ Multi-destination (MD) nets
  - 1509 ♦ UHF nets/channelization
  - 1510 ♦ Crypto assignments
  - 1511 ♦ Switchboard access
  - 1512 ♦ Phone numbers
  - 1513 ♦ Hot lines
  - 1514 ♦ Other circuits
- 1515 • Data communication:
  - 1516 ♦ SADF
  - 1517 ♦ Radar voice control access units (VCAU)
  - 1518 ♦ SADF VCAU
- 1519 • Radar availability
  - 1520 ♦ AN/TPS-59 radar, IFF, Mode IV
  - 1521 ♦ AN/TPS-63 radar, IFF, Mode IV
- 1522 • Seating positions
- 1523 • System degradation and manual reconfiguration procedures
- 1524 • Crypto changeover times
- 1525 • Authentication devices and location
- 1526 • Required reports

## 1527 **Surveillance Identification Director**

- 1528 • TAOC's sector of responsibility:
  - 1529 ♦ Warning areas
  - 1530 ♦ Civil air routes
  - 1531 ♦ Restricted areas
  - 1532 ♦ Area restrictions
  - 1533 ♦ High-density airspace control zone (HIDACZ)
- 1534 • Area entry/exit points
- 1535 • Available radars to include minimum and maximum range
- 1536 • Terrain features affecting radar detection
- 1537 • Threat air axis and likely avenues of approach
- 1538 • Surveillance section (i.e., SOs') sectors of responsibility
- 1539 • (Sectors should overlap between SOs)
- 1540 • TAOC acquisition, threat, and auto ID modes
- 1541 • System configuration:

- 1542 ♦ Sector inhibits
- 1543 ♦ Censor areas
- 1544 ♦ Clutter gates
- 1545 ♦ Declination
- 1546 ♦ Radar tilt
- 1547 ♦ Radar throttling
- 1548 ♦ Threat zones
- 1549 ♦ Hostile/missile profile data
- 1550 • Identification criteria:
  - 1551 ♦ IFF/selective identification feature (SIF) information
  - 1552 ♦ IFF turn on/off lines
  - 1553 ♦ Mode I, II, and III information
  - 1554 ♦ Aircraft identification profiles
- 1555 • Classification criteria (with flow chart)
- 1556 • Theater/national asset identification assets and capabilities
- 1557 • Data link configuration:
  - 1558 ♦ TADIL-A
  - 1559 ♦ TADIL-B
  - 1560 ♦ TADIL-J
  - 1561 ♦ ATDL-1
  - 1562 ♦ Link 1
- 1563 • Responsibilities (i.e., ICU, track data coordinator [TDC], force track coordinator [FTC], NCS, etc.)
  - 1564 ♦ Participants with PU/RU assignment
  - 1565 ♦ Track block assignments
  - 1566 ♦ Primary/alternate configurations
  - 1567 ♦ Processing of near-real time (NRT) tracks
  - 1568 ♦ Filters
- 1569 • Manual cross tell procedures
- 1570 • EMCON:
  - 1571 ♦ RADCON plan
  - 1572 ♦ ZIPLIP procedures
  - 1573 ♦ EP plan/procedures
  - 1574 ♦ ARM profiles/parameters
  - 1575 ♦ Stop buzzer frequency/channel
  - 1576 ♦ Applicable brevity codes/codewords
  - 1577 ♦ Current ZIPLIP/RADCON
- 1578 • Section symbol management responsibility
- 1579 • Reports required (to include MIJI/frequency interference report [FIR] and report routing)
- 1580 • Surveillance responsibilities in the Alt TACC role
- 1581 • Section internal and external communication requirements
- 1582 • Section casualty procedures

## 1583 Senior Traffic Director

- 1584 • Non-air defense fixed-wing events scheduled on the ATO:
  - 1585 ♦ DAS packages
  - 1586 ♦ Joint/non-US events
  - 1587 ♦ Stealth events
- 1588 • Check-in/out points and altitudes
- 1589 • Approach and departure routes

- 1590 • Tactical routing and major contact points (CP) for air defense and itinerant aircraft
- 1591 • RTF/MRR routing and procedures
- 1592 • Known safety of flight hazards
- 1593 • Location/status of NAVAIDs
- 1594 • Military and nonmilitary airspace considerations:
  - 1595 ♦ No fly areas
  - 1596 ♦ No fire areas
  - 1597 ♦ Restricted areas
  - 1598 ♦ Operating areas
  - 1599 ♦ Deconfliction procedures with civil airways/Federal Aviation Administration (FAA)
  - 1600 ♦ Visual flight rules (VFR)/instrument flight rules (IFR) regulations
- 1601 • Handover/takeover procedures (both internal and external)
- 1602 • Tanker information:
  - 1603 ♦ Slide and Retrograde plan
  - 1604 ♦ Track locations
  - 1605 ♦ Join-up procedures
  - 1606 ♦ Giveaway amounts
  - 1607 ♦ Scheduled tanking events
  - 1608 ♦ Prioritization
- 1609 • AEW and airborne ELINT tracks and/or orbits
- 1610 • Emergency procedures
- 1611 • Search and rescue (SAR) procedures:
  - 1612 ♦ SAR unit location and type
  - 1613 ♦ Availability
  - 1614 ♦ Launch authority
  - 1615 ♦ Coordination procedures
- 1616 • Hung ordnance procedures/drop locations
- 1617 • Appropriate codewords/brevity codes
- 1618 • Symbol management
- 1619 • Traffic section responsibilities in the Alt TACC role
- 1620 • Reports required
- 1621 • Section communications (internal and external)
- 1622 • Section casualty procedures

## 1623 **Senior Weapons Director**

- 1624 Air defense assets in the sector under TAOC control to include alert/readiness states, fuel, weapons
- 1625 loadouts, and locations:
- 1626 ♦ Fighter aircraft (radar, visual CAP)
  - 1627 ♦ Alert/readiness states
  - 1628 ♦ Fuel
  - 1629 ♦ Primary and alternate weapons loadouts
  - 1630 ♦ Fighter locations
  - 1631 ♦ Dedicated air defense tanker support
  - 1632 ♦ SAW units
  - 1633 ♦ CAP/FEZ manning priorities
  - 1634 ♦ Relief plan for aircraft, likely friendly tactics to be employed (section, division, etc.), and FEZ
  - 1635 manning priority
  - 1636 • Radar contracts with radar fighters

- 1637 • Air defense priorities
- 1638 • Utilization of weapons engagement zones (MEZ, FEZ):
- 1639 • ♦ Activation/deactivation plans
- 1640 • ♦ Casualty plans
- 1641 • ♦ Data link connectivity
- 1642 • ♦ Manual tell procedures
- 1643 • Air defense warning and weapons release conditions to include authority to set conditions
- 1644 • Rules of engagement:
- 1645 • ♦ Beyond visual range (BVR) criteria and authority
- 1646 • ♦ Electronic identification (EID) criteria
- 1647 • ♦ Visual identification (VID) criteria
- 1648 • Air raid warning procedures
- 1649 • Emergency actions to be taken by aircraft, controllers, and SAW units
- 1650 • Fire control orders
- 1651 • Routing within the IADS
- 1652 • Information flow requirements:
- 1653 • ♦ Critical vs noncritical
- 1654 • ♦ Controller/aircrew cadence
- 1655 • Air defense warning and release conditions
- 1656 • Air raid warning procedures
- 1657 • Positive and procedural control measures
- 1658 • TADIL-C operations
- 1659 • Alternate and supplemental sites for SAW units
- 1660 • Communications:
- 1661 • ♦ Communications brevity procedures/codewords
- 1662 • ♦ Secure communication means
- 1663 • ♦ Gingerbread/authentication procedures
- 1664 • ♦ Internal communications
- 1665 • ♦ External communications
- 1666 • Weapons section responsibilities in the Alt TACC role
- 1667 • Reports required
- 1668 • SAW casualty procedures
- 1669 • Section casualty procedures

## 1670 Senior Air Director

- 1671 • System configuration priorities
- 1672 • Concept of operations:
- 1673 • ♦ TAOC's role in AAW
- 1674 • ♦ Location of higher/adjacent/subordinate units
- 1675 • ♦ Command relationships
- 1676 • ♦ ACE commander's guidance
- 1677 • ♦ Coordination procedures for higher and adjacent air defense agencies
- 1678 • Status of phasing air defense responsibilities ashore
- 1679 • Alternate TACC/TADC procedures
- 1680 • TAOC casualty procedures:
- 1681 • ♦ Rally point
- 1682 • ♦ Unit(s) to assume TAOC functions
- 1683 • ♦ Personnel augmentation requirements

- 1684 • Alternate TAOC locations
- 1685 • Coordination requirements with the SADF
- 1686 • Safety requirements (regarding both air and ground safety)
- 1687 • Communications requirements (internal and external)
- 1688 • Individual casualty procedures
- 1689 • Administrative information:
  - 1690 ♦ Watch schedules
  - 1691 ♦ Camp security responsibilities
  - 1692 ♦ Special instructions
  - 1693 ♦ Sitdown time
- 1694 • Classified Material (verify)
  - 1695 ♦ Location and responsibility
  - 1696 ♦ Documents
  - 1697 ♦ Fill devices and CIKs
- 1698 • Crypto changeover times (classified)
- 1699 • Crypto fill deletion times (classified)
  - 1700 ♦ Crew relief procedures
  - 1701 ♦ Time and location of debrief
  - 1702 ♦ Time hack

## 1703 **QUESTIONS**

1704

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1706

## APPENDIX B

# ALTERNATE TACTICAL AIR COMMAND CENTER PROCEDURES

1707 The SADF and/or TAOC may be required to assume the Alt TACC role in those situations where the  
1708 Marine TACC/TADC is unable to perform all or part of its mission. Activation of the Alt TACC usually  
1709 occurs as a result of one of the following conditions:

- 1710 • TACC/TADC as an operational casualty. The TACC's declaration as an operational casualty is the  
1711 most severe situation in which the SADF and TAOC would be required to assume the Alt TACC role.  
1712 The unexpected loss of functions may occur when the TACC/TADC sustains either significant  
1713 equipment loss or damage or personnel casualties.
- 1714 • TACC/TADC movement/echelon. When the TACC/TADC would not maintain an austere manual  
1715 capability during its movement and subsequent build-up to full operational capability, the SADF  
1716 and/or TAOC may function as the Alt TACC.

### 1717 **ROLE**

1718 The Alt TACC provides limited TACC/TADC operational functions for command continuity when the  
1719 TACC/TADC becomes a casualty for a limited or specified period of time. This highlights two key  
1720 limitations of the Alt TACC

### 1721 **Limited Functions**

1722 The Alt TACC is designed to assume only those functions associated with the TACC/TADC's COS. The  
1723 Alt TACC is responsible for coordinating and supervising the execution of the current day's ATO. Alt  
1724 TACC functions do not include promulgation and distribution of ATOs.

### 1725 **Limited Operations**

1726 The Alt TACC is designed to function for only a limited or specified period. Alt TACC operational  
1727 periods should be measured in terms of hours (i.e., through the end of the crew watch or to the completion  
1728 of the current ATO) rather than days. The SADF and TAOC are limited by both the personnel and  
1729 equipment required to support sustained Alt TACC operations. TACC/TADC functions are returned to  
1730 the TACC/TADC once it is able to perform its functions manually.

### 1731 **PREREQUISITES**

1732 Assumption of the Alt TACC role is contingent on certain circumstances and events.

1733 TACC/TADC as an Operational Casualty

1734 The TACC/TADC must be declared an operational casualty. Confirmation may be received from higher  
1735 headquarters or from adjacent agencies. When MACCS agencies have lost communication with the

1736 TACC/TADC for a preplanned, specified period, the SADF and TAOC will initiate procedures to assume  
1737 the Alt TACC role. Before assuming the Alt TACC role, the TAOC will—

- 1738 • Attempt to contact the TACC/TADC on all required nets to include secondary paths and circuits.
- 1739 • Contact other MACCS agencies in direct communication with the TACC/TADC (i.e., the DASC and  
1740 MATCDs) and request they attempt to contact the TACC/TADC on applicable communication  
1741 circuits.
- 1742 • Request the TAOC's systems control (SYSCON) and technical control (TECHCON) facilities contact  
1743 the MAW SYSCON to confirm or deny that the TACC/TADC is a casualty.
- 1744 • Direct an airborne aircraft to attempt contact with the TACC/TADC on UHF/VHF circuits, which the  
1745 TACC/TADC is required to monitor.

1746 If the above actions do not result in contact with the TACC/TADC by any agency, the TAOC will assume  
1747 the Alt TACC role.

## 1748 **Notification by the TACC/TADC Prior to Loss of Functions**

1749 When the TACC/TADC is planning movement to a new/alternate location, the TACC/TADC may  
1750 coordinate with the SADF/TAOC to designate a period in which the Alt TACC will be activated. This  
1751 situation allows for a coordinated phasing of Alt TACC functions to the SADF and TAOC, thus  
1752 facilitating the assumption of TACC/TADC operational functions.

## 1753 **ALT TACC FUNCTIONS**

1754 Upon assumption of the Alt TACC role, the SADF and TAOC will assume certain functions associated  
1755 with the TACC/TADC COS. They include:

- 1756 • Coordinating USMC air defense efforts with joint/multi- national service agencies.
- 1757 • Integrating MACCS data link participants with joint/multi-national services.
- 1758 • Acting as the operational point of contact for execution of the daily ATO.
- 1759 • Coordinating with Marine aircraft groups (MAGs) to ensure adequate aviation resources are available  
1760 to execute the ATO and to determine availability of additional aircraft sorties to meet immediate  
1761 aviation requirements.
- 1762 • Managing MAGTF aviation resources to include strip launch and divert authority to meet immediate  
1763 aviation requirements.
- 1764 • Establishing EMCON postures for the MACCS commensurate to the radio-electronic threat.
- 1765 • Processing and coordinating SAR and TRAP efforts within the assigned AO.
- 1766 • Realigning/retasking aircraft to meet changes in both the air and ground threat or the MAGTF  
1767 commander's focus of effort.
- 1768 • Maintaining current friendly and enemy ground and air situation information to include the ground,  
1769 air, and missile orders of battle.

## 1770 **ALT TACC FACILITY**

1771 The Alt TACC will normally be located within the SADF facility.

## 1772 Situation Displays

1773 Situation displays are used to provide the Alt TACC staff with a means to monitor the current and  
1774 projected air and ground situation. A typical Alt TACC will include the following situational displays.

1775 **Air Defense.** The air defense situation display provides information on the current status of both airborne  
1776 and ground-based air defense assets.

1777 **ATO Displays.** ATO displays are used to graphically display and to provide tracking of the current ATO.  
1778 Generally, an air defense and air support ATO display will be included in the Alt TACC facility.

1779 **Communications Display.** The communications display normally includes a listing and location of  
1780 communication nets located within the Alt TACC facility and various unit call signs.

1781 **Status Display.** The status display provides information on the operational status of various MACCS  
1782 agencies.

1783 **Cross tell Display.** The cross-tell display graphically depicts the current air situation. The cross tell  
1784 board may either augment or be used in lieu of an automated (data link) presentation in the Alt TACC  
1785 facility.

1786 **Intelligence Displays.** Intelligence displays are maintained by the squadron's intelligence Marines and  
1787 will include a depiction of the enemy ground order of battle, air order of battle, and missile order of  
1788 battle. Intelligence Marines will also provide maps and status information on the friendly ground situation  
1789 and scheme of maneuver, air assets by location, and missile locations for SAM units.

## 1790 Communications

1791 Upon assumption of the Alt TACC role, certain communication nets not normally guarded by the  
1792 SADF/TAOC must be activated. An exact delineation of nets the Alt TACC needs to guard is  
1793 exercise/operation specific. However, certain nets are generic to any situation.

1794 **Tactical Air Request/Helicopter Request (TAR/HR) Nets.** These nets provide a means for forward  
1795 ground combat elements to request immediate air support. Intermediate ground combat echelons monitor  
1796 the net and may approve, disapprove, or modify the request. After the request has been filled, the DASC  
1797 uses the net to brief the requesting agency on the details of the mission. Damage assessments are also  
1798 passed. Other net participants include terminal controllers and the force fires coordination center  
1799 (FFCC)/fire support coordination center (FSCC). The TAR net may be designated for use in either the HF  
1800 or VHF spectrum.

1801 **Tactical Air Direction (TAD) Nets.** TAD nets provide a means for the direction of aircraft in the conduct  
1802 of offensive air support missions and for the DASC to brief support aircraft on target information or  
1803 assignment. Normally a VHF or UHF net, TAD nets are also monitored by terminal air controllers (e.g.,  
1804 forward air controller [airborne] [FAC(A)], tactical air coordinator [airborne] [TAC(A)], tactical air  
1805 control party [TACP]).

1806 **Direct Air Support Net.** The direct air support net provides a means for the DASC to request direct air  
1807 support aircraft from the TACC/TADC. In addition to requesting direct air support aircraft, the direct air  
1808 support net may be used to report/request aircraft stationing, fuel and ordnance states, and the progress of  
1809 ongoing direct air support missions. HF is the normal medium used.

1810 **Airboss Connectivity.** Communication between the Alt TACC and the airboss is essential to provide the  
1811 airboss with information on ATO changes and to determine aircraft status or availability from the MAGs.



1812 **Digital Communications.** Responsibilities on data link management or participation requirements should  
1813 be outlined in the applicable OPTASKLINK. Data link networks may require reconfiguration following a  
1814 TACC/TADC casualty.

## 1815 **ALT TACC MANNING AND RESPONSIBILITIES**

1816 Upon notification that the TAOC will assume the Alt TACC role, SADF and TAOC crew members will  
1817 take on additional responsibilities associated with the Alt TACC function.

## 1818 **SADC/RADC**

1819 The SADC/RADC will assume the duties as the ACE SWO until such time that another SWO is  
1820 designated or until the TACC/TADC is prepared to reassume its duties. The SADC/RADC will be  
1821 responsible for the coordination and execution of all aviation tasks occurring within the MAGTF's AO.  
1822 The SADC/RADC will also be responsible for overall coordination of the Alt TACC crew.

## 1823 **SADC/RADC Watch Officer**

1824 The SADC/RADC Watch officer will assume the responsibilities normally associated with the  
1825 TACC/TADC's air defense coordinator (ADC) and tactical air watch officer (TAWO). The SADC/RADC  
1826 Watch officer is responsible for planning and allocating air defense aircraft to air defense control units  
1827 within the MAGTF's AO. Further, he is responsible for recommending changes to the SWO  
1828 (SADC/RADC) regarding RADCON, air defense, and weapons release conditions. The SADC/RADC  
1829 Watch officer will also coordinate directly with the airboss to determine the current status and/or  
1830 availability of fixed-wing assets to either meet the current ATO's requirements or to meet changes in the  
1831 threat situation.

## 1832 **GBAD Representative**

1833 The GBAD representative will assist the SADC/RADC Watch officer in the execution of his tasks.

## 1834 **SADC/RADC Plotters**

1835 Plotters will continue to track the fixed-wing ATO and maintain the crosstell board.

## 1836 **SADC/RADC Intelligence Officer**

1837 The intelligence officer will assume the responsibility of coordinating intelligence dissemination within  
1838 the MACCS.

## 1839 **Senior Air Director**

1840 The SAD will coordinate TAOC crew functions and provide additional Marines to man the Alt TACC.  
1841 The SAD will also coordinate directly with and advise the SADC/RADC on the current status of all air  
1842 activity within the MAGTF's AO.

**1843 Senior Weapons Director**

1844 The SWD will coordinate with and advise SADC/RADC Watch officer on all matters pertaining to the  
1845 threat's air activities. In the absence of a SADC/RADC Watch officer, the SWD will assume those  
1846 functions of the TACC/TADC ADC.

**1847 Senior Traffic Director**

1848 The STD will continue to monitor the DASC handover net and will establish communications for rotary  
1849 wing check-ins. The traffic section in conjunction with SADC/RADC Watch officer is responsible for  
1850 coordinating directly with the DASC to maintain timely information concerning the status of CAS and  
1851 assault support missions.

1852 The traffic section will be responsible for guarding the direct air support and TAD net(s). The direct air  
1853 support net is normally the key coordination net between the TACC/TADC and the DASC. The TAD  
1854 net(s) is used to both monitor the status of fixed-wing aircraft assigned CAS missions and to provide  
1855 aircraft with briefs prior to conducting their CAS missions.

1856 When additional radio net operators are not available, the traffic section will assume responsibility for  
1857 monitoring the TAR net and maintaining the current status of ongoing and pending tactical air requests.

**1858 Surveillance Identification Director**

1859 The Surveillance Identification Director (SID) will assume those functions normally associated with the  
1860 TACC/TADC's ICO and TDC. Assignments for primary and secondary responsibilities for these tasks are  
1861 normally outlined in the OPTASKLINK. These functions may include assignment/designation of primary  
1862 surveillance areas for military radar units, designation/maintenance of track production areas, assumption  
1863 of track data coordination functions, reconfiguration of digital data links to ensure a comprehensive air  
1864 picture is maintained, and coordination with data link participants external to the MACCS. Other data link  
1865 machine functions may need to be assumed to include acting as the TADIL-A NCS or gridlock reference  
1866 unit (GRU). The SID will also coordinate manual cross-tell responsibilities for surveillance agencies  
1867 within the MAGTF AO.

**1868 Net Operators**

1869 Additional net operators will be required to monitor the TAD, direct air support, and TAR/HR nets. If a  
1870 sufficient number of Marines are not available in the current TAOC crew manning, additional operators  
1871 need to be called in to augment the additional radio monitoring requirements.

**1872 Rotary-Wing Functions**

1873 Tasks associated with monitoring and coordinating the rotary-wing ATO's execution will normally be  
1874 delegated to the DASC. The DASC, in turn, will report to the Alt TACC the current status and projected  
1875 shortfalls of assault support functions. If not already authorized, the DASC will be delegated strip launch  
1876 authority for assault support missions and divert authority for immediate MEDEVAC missions. Functions  
1877 of the TACC/TADC's rotary-wing tasker, which include direct coordination with the rotary wing  
1878 MAG(s), will also be delegated to the DASC.

1879

## 1879 **SPECIAL CONSIDERATIONS**

1880 Special planning considerations will be warranted when the TACC was tasked with specific duties as  
1881 RADC, RICO, Component Rescue Coordination Center (RCC), etc.

## 1882 **AUGMENTATION**

1883 When the Alt TACC is expected to function for an extended period of time or when adequate  
1884 coordination can be accomplished prior to the TAOC assuming Alt TACC functions, both  
1885 communications and personnel augmentees may be required/requested.

## 1886 **Communications Augmentation**

1887 The requirement for additional communications equipment and operators is situationally dependent.  
1888 Projected requirements for long-haul and multi-channel communication assets and necessary needlines  
1889 should be considered during the planning cycle. Depending on the TAOC's requirements for air-to-  
1890 ground communications, additional UHF assets may also be required to perform Alt TACC functions.

## 1891 **Personnel Augmentation**

1892 The TAOC is not organized to perform Alt TACC functions for an extended period. Therefore, if the  
1893 TAOC is expected to assume Alt TACC functions for longer than normally expected (i.e., beyond the end  
1894 of the crew watch or ATO day) the TAOC will require augment personnel from other units. When  
1895 requesting augments, the TAOC should specify that sufficient personnel should be provided to man two  
1896 12-hour crews. The augments would include—

- 1897 • SWO - one per crew.
- 1898 • Intelligence representatives - two per crew.
- 1899 • Fixed-wing tasker- one per crew.
- 1900 • Rotary-wing tasker- one per crew.
- 1901 • Close Battle Coordinator- one per crew.
- 1902 • Plotters - two per crew.
- 1903 • Radio net operators - two per crew.

## 1904 **Unit Tasks**

1905 In preparation for assumption of Alt TACC responsibilities, the following should be accomplished.

## 1906 **Administrative Officer**

1907 The squadron administrative officer will assist the operations officer in preparing any messages requiring  
1908 release in the case of assumption of Alt TACC responsibilities.

## 1909 **Intelligence Officer**

1910 The squadron intelligence officer will—

- 1911 • Maintain current information on both friendly and threat ground, air, and missile orders of battle and  
1912 ensure this information is posted in the SADF.  
1913 • Coordinate with the TACC/TADC on intelligence matters impacting on future friendly ground  
1914 operations.  
1915 • Be prepared to act as the intelligence dissemination point for the MACCS if the TACC/TADC  
1916 becomes a casualty. Should the TACC/TADC become a casualty, specific preparations should be in  
1917 place to receive the required MACCS intelligence support as Air Combat Intelligence (ACI), a  
1918 component of the TACC/TADC) was likely providing this support.

## 1919 **Operations Officer/TAOC Detachment Commander**

1920 The MACS operations officer/TAOC detachment commander will—

- 1921 • Coordinate with the TACC/TADC on probable actions to be taken if the TACC/TADC becomes an  
1922 operational casualty.  
1923 • Ensure the SADF is functionally designed and prepared to meet Alt TACC requirements.  
1924 • Determine and request (if necessary) Alt TACC personnel augmentation if the TAOC is to assume  
1925 Alt TACC functions for an extended period.  
1926 • Coordinate with the communication-electronics officer to ensure required Alt TACC nets are  
1927 designated in the radio guard chart or Annex K to the OPLAN/OPORD.  
1928 • Ensure Alt TACC procedures are included as an integral portion of each TAOC crew brief.

## 1929 **Services/Supply Officer**

1930 The services/supply officer will coordinate with the Operations Officer/TAOC Detachment Commander  
1931 on Alt TACC requirements.

## 1932 **Communication-Electronics Officer**

1933 The communication-electronics officer will—

- 1934 • Coordinate with the operations officer to ascertain and designate additional operational net  
1935 requirements, should the TAOC be required to assume the Alt TACC role.  
1936 • Determine additional communication augmentation required for assumption of Alt TACC  
1937 responsibilities.  
1938 • Ensure alternate voice and data communication paths designated in Annex K are sufficient to meet  
1939 MACCS requirements should the TAOC assume the Alt TACC role.  
1940 • Plan for and be prepared to activate needlines to airbases and joint/multinational service agencies in  
1941 support of Alt TACC operations.

1942

# APPENDIX C GLOSSARY

## —Section I— Acronyms

1942  
1943  
1944  
1945

1946	AAC	anti-air control
1947	AADC	area air defense commander
1948	AAI	anti-air intelligence
1949	AAM	air-to-air missile
1950	AAW	anti-air warfare
1951	ABT	air breathing target
1952	ACA	airspace control authority
1953	ACA	airspace coordination area
1954	ACE	aviation combat element
1955	ACEOC	air control electronics operator course
1956	ACO	airspace control order
1957	ACP	airspace control plan
1958	ADA	air defense artillery
1959	ADC	air defense coordinator
1960	ADCOC	air defense control officers course
1961	ADCOSC	air defense control officers senior course
1962	ADCP	air defense communications platform
1963	AEW	airborne early warning
1964	AIC	air intercept controller
1965	AICI	air intercept controller instructor
1966	Alt TACC	alternate tactical air command center
1967	Alt TADC	alternate tactical air direction center
1968	AO	area of operations
1969	AOA	amphibious objective area
1970	AOI	area of interest
1971	AOC	air operations control
1972	AR	aerial refueling
1973	ARM	anti-radiation missile
1974	ASWO	assault support watch officer
1975	ATC	air traffic control
1976	ATDL-1	Army tactical data link-1
1977	ATDS	airborne tactical data system
1978	ATF	amphibious task force
1979	ATO	air tasking order
1980	ATRIMS	aviation training and readiness information management system
1981	AWACS	airborne warning and control system
1982	AWC	air warfare commander; assistant weapons controller
1983	BDZ	base defense zone
1984	BVR	beyond visual range
1985	C <sup>2</sup>	command and control

1986	C <sup>2</sup> W	command and control warfare
1987	C <sup>3</sup>	command, control, and communications
1988	C <sup>4</sup> I	command, control, communications, computers, and intelligence
1989	CAC <sup>2</sup> S	common aviation command and control system
1990	CAP	combat air patrol
1991	CAS	close air support
1992	CATF	commander, amphibious task force
1993	CBR	chemical, biological, and radiological
1994	CEC	cooperative engagement capability
1995	CEOI	communications-electronics operating instructions
1996	CID	combat identification
1997	CIU	communications interface unit
1998	CLF	commander, landing force
1999	CM	cruise missile
2000	COA	course of action
2001	COMSEC	communications security
2002	COS	current operations section
2003	CP	contact point
2004	CRC	control and reporting center
2005	CRE	control and reporting element
2006	CRP	combat readiness percentage
2007	CSSE	combat service support element
2008	CTAPS	contingency theater automated planning system
2009	CU	computer unit
2010	DAS	deep air support (function);
2011		direct air support (communication net)
2012	DASC	direct air support center
2013	DAT	direct access trunk
2014	DCU	digital communication unit
2015	DDB	digital data bus
2016	DLC	data link coordinator
2017	DLR	data link relay
2018	DLRP	data link reference point
2019	DTS	data terminal set
2020	EA	electronic attack
2021	ECAC	Electromagnetic Compatibility Analysis Center
2022	ECU	environmental control unit
2023	EEI	essential elements of information
2024	EID	electronic identification
2025	ELINT	electronics intelligence
2026	EMCON	emission control
2027	EOB	enemy order of battle
2028	EP	electronic protection
2029	EPO	electronic protection operator
2030	ES	electronic warfare support
2031	EW	electronic warfare
2032	EW/C	early warning and control
2033	FAA	Federal Aviation Administration
2034	FAC(A)	forward air controller (airborne)
2035	FAD	fighter air direction

2036	FDOC	fire direction operations center
2037	FEBA	forward edge of the battle area
2038	FEZ	fighter engagement zone
2039	FFCC	force fires coordination center
2040	FIR	frequency interference report
2041	FLIR	forward-looking infrared radar
2042	FLOT	forward line of own troops
2043	FMF	fleet Marine force
2044	FOB	forward operating base
2045	FOC	future operational capability
2046	FOS	future operations section
2047	FRM	Firmware Reconfigurable Modem
2048	FSCC	fire support coordination center
2049	FTC	force track coordinator
2050	FTX	field training exercise
2051	GBAD	ground based air defense
2052	GCE	ground combat element
2053	GBDL	ground-based data link
2054	GPS	global positioning system
2055	GRU	gridlock reference unit
2056	HARM	high-speed anti-radiation missile
2057	HF	high frequency
2058	HIDACZ	high-density airspace control zone
2059	HMMWV	high mobility multi-purpose wheeled vehicle
2060	Hz	hertz
2061	ID	identification
2062	IADS	integrated air defense system
2063	ICAO	International Civil Aviation Organization
2064	ICN	interface coordination net
2065	ICO	interface coordination officer
2066	ICU	interface control unit
2067	IFF	identification, friend or foe
2068	IFR	instrument flight rules
2069	IGPS	improved global positioning system
2070	IOC	initial operational capability
2071	IR	infrared
2072	IRCM	infrared countermeasures
2073	IRE	internal radio equipment
2074	ISO	International Standards Organization
2075	JEZ	joint engagement zone
2076	JFACC	joint force air component commander
2077	JFC	joint force commander
2078	JM	JTIDS module
2079	JSTE	joint service training exercise
2080	JTIDS	joint tactical information distribution system
2081	JTF	joint task force
2082	JTMD	joint theater missile defense
2083	kw	kilowatt
2084	LF	landing force
2085	LMS	lightweight multi-purpose shelter

2086	LOS.....	line of sight
2087	LVS.....	logistics vehicle system
2088	MACCS.....	Marine air command and control system
2089	MACG.....	Marine air control group
2090	MACS.....	Marine air control squadron
2091	MADCP.....	modified air defense communications platform
2092	MAG.....	Marine aircraft group
2093	MAGTF.....	Marine air-ground task force
2094	MAPP.....	Marine aviation planning problem
2095	MATCD.....	Marine air traffic control detachments
2096	MAWTS.....	Marine aviation weapons and tactics squadron
2097	MC.....	missile controller
2098	MCAEW.....	Marine Corps airborne early warning
2099	MCO.....	Marine corps order
2100	MCCRES.....	Marine Corps Combat Readiness Evaluation System
2101	MCE.....	modular control equipment
2102	MD.....	multi-destination
2103	MDTC.....	Marine division tactics course
2104	MEDEVAC.....	medical evacuation
2105	MEF.....	Marine expeditionary force
2106	MEF (Fwd).....	Marine expeditionary force (forward)
2107	MEP.....	mobile electric power
2108	MEZ.....	missile engagement zone
2109	MHE.....	materials handling equipment
2110	MHz.....	megahertz
2111	MIG.....	MCE interface group
2112	MIJI.....	meaconing, intrusion, jamming, and interference
2113	MINCOMM.....	minimum communication
2114	MISTEX.....	MACCS integrated simulated training exercise
2115	MMU.....	mass memory unit
2116	MPS.....	mission performance standard
2117	MRR.....	minimum risk route
2118	MRU.....	military radar unit
2119	MSV.....	multi-speed variant
2120	MTS.....	<i>modern tracking system</i>
2121	MUX.....	multi-channel radio
2122	MWCS.....	Marine wing communications squadron
2123	MWSS.....	Marine wing support squadron
2124	NADGE.....	NATO air defense ground environment
2125	NATO.....	North Atlantic Treaty Organization
2126	NAVAID.....	navigation aid
2127	NBC.....	nuclear, biological, and chemical
2128	NCS.....	net control station
2129	NDB.....	non-directional beacon
2130	NEF.....	naval expeditionary force
2131	NRT.....	near-real-time
2132	NTDS.....	naval tactical data system
2133	OAAW.....	offensive anti-air warfare
2134	OCU.....	operator console unit
2135	OJT.....	on-the-job training



2136	OPLAN	operation plan
2137	PPDL	point to point data link
2138	PPI	plan position indicator
2139	PRU	printer unit
2140	PU	participating unit
2141	RADC	Regional Air Defense Commander
2142	RADCON	radiation control
2143	RAP	recognized air picture
2144	RCC	Rescue Coordination Center
2145	RF	radio frequency
2146	RHI	range height indicator
2147	RICO	Regional Interface Control Officer
2148	RIU	radar interface unit
2149	ROE	rules of engagement
2150	RSTA	reconnaissance, surveillance, and target acquisition
2151	RTF	return to force
2152	RU	reporting unit
2153	SAD	senior air director
2154	SADC	Sector Air Defense Facility
2155	SADF	Sector Air Defense Commander
2156	SAM	surface-to-air missile
2157	SAR	search and rescue
2158	SAW	surface-to-air weapon
2159	SCC	system configuration coordinator
2160	SD	single destination
2161	SID	surveillance identification director
2162	SIF	selective identification feature
2163	SIGSEC	signals security
2164	SIMEX	simulated exercise
2165	SJS	shelterized JTIDS system
2166	SO	surveillance operator
2167	SOA	states of alert
2168	SOF	special operations forces
2169	STD	senior traffic director
2170	SWD	senior weapons director
2171	SWO	senior watch officer
2172	SYSCON	system control
2173	T&R	training and readiness
2174	TAC	tactical air command net
2175	TAC(A)	tactical air coordinator (airborne)
2176	TACAN	tactical air navigation system
2177	TACC	tactical air command center (USMC); tactical air control center (USN)
2178	TACP	tactical air control party
2179	TAD	tactical air direction
2180	TADC	tactical air direction center
2181	TADCC	tactical air defense controller course
2182	TADIL	tactical digital information link
2183	TAMPS	tactical aviation mission planning system
2184	TAOC	tactical air operations center
2185	TAOM	tactical air operations module

2186	TAR/HR.....	tactical air request/helicopter request
2187	TATC.....	tactical air traffic controller (TAOC position);
2188	.....	tactical air traffic control (communications net)
2189	TAWO.....	tactical air watch officer
2190	TBM.....	theater ballistic missile
2191	TBMCS.....	Theater Battle Management Core Systems
2192	T/E.....	table of equipment
2193	TECHCON.....	technical control
2194	TFMS.....	Theater Force Management System
2195	TIBS.....	tactical intelligence broadcast system
2196	TIG.....	TAOM interface group
2197	T/O.....	table of organization
2198	TM.....	theater missile
2199	TMD.....	theater missile defense
2200	TRAP.....	tactical recovery of aircraft and personnel
2201	TRAP.....	tactical and related applications program
2202	TSN.....	track supervision net
2203	TTI.....	time-to-intercept
2204	UAV.....	unmanned aerial vehicle
2205	UHF.....	ultrahigh frequency
2206	USCC.....	unit system coordinate center
2207	v.....	volt
2208	VCAU.....	voice control access unit
2209	VFR.....	visual flight rules
2210	VHF.....	very high frequency
2211	VID.....	visual identification
2212	VPN.....	voice product net
2213	VOR.....	VHF OMNI-DIRECTIONAL RANGE SYSTEM
2214	WEZ.....	weapon engagement zone
2215	WTI.....	weapons and tactics instructor
2216		

**—Section II—****DEFINITIONS**

2216

2217

2218 **A**

2219 **active air defense** - Direct defensive action taken to nullify or reduce the effectiveness of hostile air  
2220 action. It includes such measures as the use of aircraft, air defense weapons, weapons not used primarily  
2221 in an air defense role, and electronic warfare. (Joint Pub 1-02)

2222 **air defense** - All defensive measures designed to destroy attacking enemy aircraft or missiles in the  
2223 Earth's envelope of atmosphere, or to nullify or reduce the effectiveness of such attack. (Joint Pub 1-02)

2224 **airspace control authority** - The commander designated to assume overall responsibility for the  
2225 operation of the airspace control system in the airspace control area. (Joint Pub 1-02) Also called ACA.

2226 **area air defense commander** - Within a unified command, subordinate unified command, or joint task  
2227 force, the commander will assign overall responsibility for air defense to a single commander. Normally,  
2228 this will be the component commander with the preponderance of air defense capability and the  
2229 command, control, and communications capability to plan and execute integrated air defense operations.  
2230 Representation from the other components involved will be provided, as appropriate, to the area air  
2231 defense

2232 **commander's headquarters.** (Joint Pub 1-02) Also called AADC.

2233 **area of operations** - An operational area defined by the joint force commander for land and naval forces.  
2234 Areas of operation do not typically encompass the entire operational area of the joint force commander,  
2235 but should be large enough for component commanders to accomplish their missions and protect their  
2236 forces. (Joint Pub 1-02) Also called AO.

2237 **area of responsibility** - 1. The geographical area associated with a combatant command within which a  
2238 combatant commander has authority to plan and conduct operations. 2. In naval usage, a predefined area  
2239 of enemy terrain for which supporting ships are responsible for covering by fire on known targets or  
2240 targets of opportunity and by observation. (Joint Pub 1-02) Also called AOR.

2241 **B**

2242 **base defense zone** - An air defense zone established around an air base and limited to the engagement  
2243 envelope of short-range air defense weapons systems defending that base. Base defense zones have  
2244 specific entry, exit, and identification, friend or foe procedures established. (Joint Pub 1-02) Also called  
2245 BDZ.

2246 **C**

2247 **counter air** - A US Air Force term for air operations conducted to attain and maintain a desired degree of  
2248 air superiority by the destruction or neutralization of enemy forces. Both air offensive and air defensive  
2249 actions are involved. The former range throughout enemy territory and are generally conducted at the  
2250 initiative of the friendly forces. The latter are conducted near or over friendly territory and are generally  
2251 reactive to the initiative of the enemy air forces. (Joint Pub 1-02)

2252 **D**

2253 **data link** - The means of connecting one location to another for the purpose of transmitting and receiving  
2254 data. (Joint Pub 1-02)

2255 **deep air support** - Air action against enemy targets at such a distance from friendly forces that detailed  
2256 integration of each mission with fire and movement of friendly forces is not required. Deep air support  
2257 missions are flown on either side of the fire support coordination line; the lack of a requirement for close  
2258 coordination with the fire and movement of friendly forces is the qualifying factor. (FMFRP 0-14) Also  
2259 called DAS.

2260 **direct air support** - Air support flown in direct response to a specific request from the supported unit.  
2261 (FMFRP 0-14)

2262 **direct air support center** - The principal air control agency of the Marine air command and control  
2263 system responsible for the direction and control of air operations directly supporting the ground combat  
2264 element. It processes and coordinates requests for immediate air support and coordinates air missions  
2265 requiring integration with ground forces and other supporting arms. It normally collocates with the senior  
2266 fire support coordination center within the ground combat element and is subordinate to the tactical air  
2267 command center. (FMFRP 0-14, proposed modification to Joint Pub 1-02) Also called DASC.

2268 **direct air support center (airborne)** - An airborne aircraft equipped with the necessary operations and  
2269 communications facilities, and manned by the essential personnel, to function in a limited role, as a  
2270 DASC. (FMFRP 0-14, proposed modification to Joint Pub 1-02) Also called DASC(A).

2271 **E**

2272 **electronic warfare** - Any military action involving the use of electromagnetic and directed energy to  
2273 control the electromagnetic spectrum or to attack the enemy. Also called EW. The three major  
2274 subdivisions within EW are: electronic attack, electronic protection, and electronic warfare support.

2275 **a. electronic attack** - That division of electronic warfare involving the use of electromagnetic or directed  
2276 energy to attack personnel, facilities, or equipment with the intent of degrading, neutralizing, or  
2277 destroying enemy combat capability. Also called EA. EA includes 1. actions taken to prevent or reduce an  
2278 enemy's effective use of the electromagnetic spectrum, such as jamming and electromagnetic deception,  
2279 and 2. employment of weapons that use either electromagnetic or directed energy as their primary  
2280 destructive mechanism (lasers, RF weapons, particle beams).

2281 **b. electronic protection** - That division of electronic warfare involving actions taken to protect  
2282 personnel, facilities, and equipment from any effects of friendly or enemy employment of electronic  
2283 warfare that degrade, neutralize, or destroy friendly combat capability. Also called EP.

2284 **c. electronic warfare support** - That division of electronic warfare involving actions tasked by, or under  
2285 direct control of, an operational commander to search for, intercept, identify, and locate sources of  
2286 intentional and unintentional radiated electromagnetic energy for the purpose of immediate threat  
2287 recognition. Thus, electronic warfare support provides information required for immediate decisions  
2288 involving electronic warfare operations and other tactical actions such as threat avoidance, targeting, and  
2289 homing. Also called ES. Electronic warfare support data can be used to produce signals intelligence  
2290 (SIGINT), communications intelligence (COMINT), and electronics intelligence (ELINT). (Joint Pub 1-  
2291 02)

2292 **emission control** - The selective and controlled use of electromagnetic, acoustic, or other emitters to  
2293 optimize command and control capabilities while minimizing, for operations security (OPSEC): a.  
2294 Detection by enemy sensors; b. Minimize mutual interference among friendly systems; and/or c. Execute  
2295 a military deception plan. (Joint Pub 1-02) Also called EMCON.

2296 **essential elements of information** - The critical items of information regarding the enemy and the  
2297 environment needed by the commander by a particular time to relate with other available information and  
2298 intelligence in order to assist in reaching a logical decision. (Joint Pub 1-02) Also called EEI.

2299 **F**

2300 **forward operating base** - An airfield used to support tactical operations without establishing full support  
2301 facilities. The base may be used for an extended time period. Support by a main operating base will be  
2302 required to provide backup support for a forward operating base. (FMFRP 0-14) Also called FOB.

2303 **future operations section** - That portion of the tactical air command center and aviation combat element  
2304 commander's battlestaff responsible for the detailed planning and coordination of all future air operations  
2305 conducted by the aviation combat element in support of the Marine air-ground task force. The future  
2306 operations section plans for and publishes the next air tasking order(s) (normally a 48 to 72-hour period).  
2307 (FMFRP 0-14) Also called FOS.

## 2308 G

2309 **gap filler radar** - A radar used to supplement the coverage of the principal radar in areas where coverage  
2310 is inadequate. (Joint Pub 1-02)

## 2311 H

2312 **high-density airspace control zone** - Airspace designated in an airspace control plan or airspace control  
2313 order, in which there is a concentrated employment of numerous and varied weapons and airspace users.  
2314 A high-density airspace control zone has defined dimensions, which usually coincide with geographical  
2315 features or navigational aids. Access to a high-density airspace control zone is normally controlled by the  
2316 maneuver commander. The maneuver commander can also direct a more restrictive weapons status within  
2317 the high-density airspace control zone. (Joint Pub 1-02) Also called HIDACZ.

## 2318 I

2319 **identification** - The process of determining the friendly or hostile character of an unknown detected  
2320 contact. (Joint Pub 1-02)

## 2321 J

2322 **joint force air component commander** - The joint force air component commander derives authority  
2323 from the joint force commander who has the authority to exercise operational control, assign missions,  
2324 direct coordination among subordinate commanders, redirect and organize forces to ensure unity of effort  
2325 in the accomplishment of the overall mission. The joint force commander will normally designate a joint  
2326 force air component commander. The joint force air component commander's responsibilities will be  
2327 assigned by the joint force commander (normally these would include, but not be limited to, planning,  
2328 coordination, allocation, and tasking based on the joint force commander's apportionment decision).  
2329 Using the joint force commander's guidance and authority, and in coordination with other Service  
2330 component commanders and other assigned or supporting commanders, the joint force air component  
2331 commander will recommend to the joint force commander apportionment of air sorties to various  
2332 missions or geographic areas. (Joint Pub 1-02) Also called JFACC.

2333 **joint theater missile defense** - The integration of joint force capabilities to destroy enemy theater  
2334 missiles in flight or prior to launch or to otherwise disrupt the enemy's theater missile operations through  
2335 an appropriate mix of mutually supportive passive missile defense; active missile defense; attack  
2336 operations; and supporting command, control, communications, computers, and intelligence measures.  
2337 Enemy theater missiles are those that are aimed at targets outside the continental United States. (Joint Pub  
2338 1-02) Also called JTMD.

2339

2339 **L**

2340 **low-altitude missile engagement zone** - In air defense, that airspace of defined dimensions within which  
2341 the responsibility for engagement of air threats normally rests with low- to medium-altitude surface-to-air  
2342 missiles. (Joint Pub 1-02) Also called LOMEZ.

2343 **low level transit route** - A temporary corridor of defined dimensions established in the forward area to  
2344 minimize the risk to friendly aircraft from friendly air defenses or surface forces. (Joint Pub 1-02) Also  
2345 called LLTR.

2346 **M**

2347 **Marine air command and control system** - A US Marine Corps air command and control system which  
2348 provides the aviation combat element commander with the means to command, coordinate, and control all  
2349 air operations within an assigned sector and to coordinate air operations with other Services. It is  
2350 composed of command and control agencies with communications-electronics equipment that  
2351 incorporates a capability from manual through semiautomatic control. (FMFRP 0-14, proposed  
2352 modification to Joint Pub 1-02)

2353 **Marine air-ground task force** - A task organization of Marine forces (division, aircraft wing, and  
2354 service support groups) under a single command and structured to accomplish a specific mission. The  
2355 Marine air-ground task force components will normally include command, aviation combat, ground  
2356 combat, and combat service support elements (including Navy Support Elements). Three types of Marine  
2357 air-ground task forces which can be task organized are the Marine expeditionary unit, Marine  
2358 expeditionary force (forward), and Marine expeditionary force. Also called MAGTF. The four elements  
2359 of a MAGTF are:

2360 **a. command element (CE)** - The MAGTF headquarters. The CE is a permanent organization composed  
2361 of the commander, general or executive and special staff sections, headquarters section, and requisite  
2362 communications and service support facilities. The CE provides command, control, and coordination  
2363 essential for effective planning and execution of operations by the other three elements of the MAGTF.  
2364 There is only one CE in a MAGTF.

2365 **b. aviation combat element (ACE)** - The MAGTF element that is task organized to provide all or a  
2366 portion of the functions of Marine Corps aviation in varying degrees based on the tactical situation and  
2367 the MAGTF mission and size. These functions are air reconnaissance, anti-air warfare, assault support,  
2368 offensive air support, electronic warfare, and control of aircraft and missiles. The ACE is organized  
2369 around an aviation headquarters and varies in size from a reinforced helicopter squadron to one or more  
2370 Marine aircraft wing(s). It includes those aviation command (including air control agencies), combat,  
2371 combat support, and combat service support units required by the situation. Normally, there is only one  
2372 ACE in a MAGTF.

2373 **c. ground combat element (GCE)** - The MAGTF element that is task organized to conduct ground  
2374 operations. The GCE is constructed around an infantry unit and varies in size from a reinforced infantry  
2375 battalion to one or more reinforced Marine division(s). The GCE also includes appropriate combat  
2376 support and combat service support units. Normally, there is only one GCE in a MAGTF.

2377 **d. combat service support element (CSSE)** - The MAGTF element that is task organized to provide the  
2378 full range of combat service support necessary to accomplish the MAGTF mission. CSSE can provide  
2379 supply, maintenance, transportation, deliberate engineer, health, postal, disbursing, enemy prisoner of  
2380 war, automated information systems, exchange, utilities, legal, and graves registration services. The CSSE  
2381 varies in size from a MEU service support group (MSSG) to a force service support group (FSSG).  
2382 Normally, there is only one combat service support element in a MAGTF. (proposed change to Joint Pub  
2383 1-02) Note: A fourth type of MAGTF which can be task-organized is the special purpose force.

2384 **Marine air traffic control mobile team** - A task organized element provided by the Marine air traffic  
2385 control detachment to perform control of friendly aircraft operating within the assigned base defense zone  
2386 of a forward operating base air facility/air site. The mobile team provides visual flight rules (VFR) air  
2387 traffic control services within its assigned terminal control area and base defense zone. Normally, a fully  
2388 manned and equipped mobile team capability can be provided on a 24-hour basis for up to 72 hours  
2389 without resupply or augmentation. (FMFM 5-50) Also called MMT.

2390 **Marine expeditionary brigade** - A Marine air-ground task force that is constructed around a reinforced  
2391 infantry regiment, a composite Marine aircraft group, and a brigade service support group. The Marine  
2392 expeditionary brigade (MEB), commanded by a general officer, is task-organized to meet the  
2393 requirements of a specific situation. It can function as part of a joint task force, or as the lead echelon of  
2394 the Marine expeditionary force (MEF), or alone. It varies in size and composition, and is larger than a  
2395 Marine expeditionary unit but smaller than a MEF. The MEB is capable of conducting missions across  
2396 the full range of military operations. It may contain other Service or foreign military forces assigned or  
2397 attached. Also called MEB.

2398 **Marine expeditionary force** - The largest Marine air-ground task force and the Marine Corps principal  
2399 warfighting organization, particularly for larger crises or contingencies. It is task-organized around a  
2400 permanent command element and normally contains one or more Marine divisions, Marine aircraft wings,  
2401 and Marine force service support groups. The Marine expeditionary force is capable of missions across  
2402 the range of military operations, including amphibious assault and sustained operations ashore in any  
2403 environment. It can operate from a sea base, a land base, or both. It may also contain other Service or  
2404 foreign military forces assigned or attached to the MAGTF. Also called MEF.

2405 See also aviation combat element; combat service support element; command element; ground combat  
2406 element; Marine air-ground task force; Marine expeditionary force (Forward); Marine expeditionary unit;  
2407 special purpose Marine air-ground task force; task force.

2408 **Marine expeditionary unit** - A Marine air-ground task force that is constructed around an infantry  
2409 battalion reinforced, a helicopter squadron reinforced, and a task-organized combat service support  
2410 element. It normally fulfills Marine Corps forward sea-based deployment requirements. The Marine  
2411 expeditionary unit provides an immediate reaction capability for crisis response and is capable of limited  
2412 combat operations. It may contain other Service or foreign military forces assigned or attached. Also  
2413 called MEU.

2414 See also aviation combat element; combat service support element; command element; ground combat  
2415 element; Marine air-ground task force; Marine expeditionary force; Marine expeditionary force  
2416 (Forward); Marine expeditionary unit (special operations capable); special purpose Marine air-ground  
2417 task force; task force.

2418 **minimum-risk route** - A temporary corridor of defined dimensions recommended for use by high-speed,  
2419 fixed-wing aircraft that presents the minimum known hazards to low-flying aircraft transiting the combat  
2420 zone. (Joint Pub 1-02) Also called MRR.

2421 **missile engagement zone** - The airspace of defined dimensions within which the responsibility for  
2422 engagement normally rests with missiles. (FMFM 5-60) Also called MEZ. MEZs may be designated  
2423 within the missile intercept zone (MIZ).

2424 **mutual support** - That support which units render each other against an enemy, because of their assigned  
2425 tasks, their position relative to each other and to the enemy, and their inherent capabilities. (Joint Pub 1-  
2426 02)

2427

2427 N

2428 **naval tactical data system** - A complex of data inputs, user consoles, converters, adapters, and radio  
2429 terminals interconnected with high-speed, general-purpose computers and its stored programs. Combat  
2430 data is collected, processed, and composed into a picture of the overall tactical situation, which enables  
2431 the force commander to make rapid, accurate evaluations and decisions. (Joint Pub 1-02) Also called  
2432 NTDS.

2433 **near real time** - Pertaining to the timeliness of data or information which has been delayed by the time  
2434 required for electronic communication and automatic data processing. This implies that there are no  
2435 significant delays. (Joint Pub 1-02)

2436 O

2437 **offensive air support** - Those air operations conducted against enemy installations, facilities, and  
2438 personnel to directly assist the attainment of MAGTF objectives by the destruction of enemy resources or  
2439 the isolation of his military force. (FMFRP 0-14) Also called OAS.

2440 **offensive anti-air warfare** - Those operations conducted against enemy air assets and air defense systems  
2441 before they can be launched or assume an attacking role. Offensive anti-air warfare operations in or near  
2442 the objective area consist mainly of air attacks to destroy or neutralize hostile aircraft, airfields, radars, air  
2443 defense systems, and supporting areas. (FMFRP 0-14) Also called OAAW.

2444 **operations security** - A process of identifying critical information and subsequently analyzing friendly  
2445 actions attendant to military operations and other activities to:

2446 a. Identify those actions that can be observed by adversary intelligence systems.

2447 b. Determine indicators hostile intelligence systems might obtain that could be interpreted or pieced  
2448 together to derive critical information in time to be useful to adversaries.

2449 c. Select and execute measures that eliminate or reduce to an acceptable level the vulnerabilities of  
2450 friendly actions to adversary exploitation. (Joint Pub 1-02) Also called OPSEC.

2451 P

2452 **passive air defense** - All measures, other than active air defense, taken to minimize the effectiveness of  
2453 hostile air action. These measures include deception, dispersion, and the use of protective construction.  
2454 (Joint Pub 1-02)

2455 R

2456 **rules of engagement** - Directive issued by competent military authority which delineate the  
2457 circumstances and limitations under which United States forces will initiate and/or continue combat  
2458 engagement with other forces encountered. (Joint Pub 1-02) Also called ROE.

2459 S

2460 **sector air defense commander** - An individual designated by the aviation combat element commander to  
2461 function as his air defense battle manager. He functions to the extent of authority delegated to him by the  
2462 aviation combat element commander. The sector anti-air warfare coordinator is responsible for  
2463 coordination and management of all active air defense weapons (aircraft and surface-to-air weapons)  
2464 within his assigned sector. (FMFRP 0-14) Also called SADC.

2465 T

2466 **tactical air operations center** - The principal air control agency of the Marine air command and control  
2467 system responsible for airspace control and management. It provides real time surveillance, direction,  
2468 positive control, and navigational assistance for friendly aircraft. It performs real time direction and



2469 control of all anti-air warfare operations, to include manned interceptors and surface-to-air weapons. It is  
2470 subordinate to the tactical air command center. (FMFRP 0-14, proposed modification to Joint Pub 1-02)  
2471 Also called TAOC.

2472 **theater missile** - A missile, which may be a ballistic missile, a cruise missile, or an air-to-surface missile  
2473 (not including short-range, non-nuclear, direct fire missiles, bombs, or rockets such as Maverick or wire-  
2474 guided missiles), whose target is within a given theater of operation. (Joint Pub 1-02)

2475

2475

**APPENDIX D**

2476

**REFERENCES AND RELATED PUBLICATIONS****2477 Joint Publications (Joint Pubs)**

2478	0-2	Unified Action Armed Forces (UNAAF)
2479	1-02	Department of Defense Dictionary of Military and Associated Terms
2480	3-0	Doctrine for Joint Operations
2481	3-25	Joint Doctrine for Countering Air and Missile Threats
2482	3-25.8	Doctrine for Joint Theater Missile Defense
2483	3-50.2	Doctrine for Joint Combat Search and Rescue
2484	3-26	Doctrine for Joint Airspace Control in a Combat Zone
2485	3-56.1	Command and Control for Joint Air Operations

**2486 Naval Warfare Publications (NWP)**

2487	3-26.8	Anti-air Warfare
2488	3-26.9	Anti-air Warfare Commander's Manual
2489	3-01.8	JIADS (Joint Integrated Air Defense Systems), ALSA/NWP
2490	3-26.10	JFACC Organization And Processes
2491	3-26.11	TAGS (Theater Air Ground System), ALSA/NWP
2492	3-26.12	Brevity Codes, ALSA/NWP
2493	6-02.5	TADIL-J/LINK-16, ALSA/NWP

**2494 Marine Corps Doctrinal Publications (MCDPs)**

2495	1	Warfighting
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**2496 Marine Corps Warfighting Publications (MCWPs)**

2497	3-27	Aviation Operations
2498	3-28	Control of Aircraft and Missiles
2499	3-28.8	ICAC 2, ALSA/FMFRP
2500	3-28.9	TAGS, ALSA
2501	3-28.10	MACCS Handbook
2502	3-28.11	TACC Handbook
2503	3-28.12	DASC Handbook
2504	3-28.13	SAAWC Handbook
2505	3-28.14	MATCD Handbook
2506	3-28.15	MACCS Comm Handbook
2507	3-28.16	LAAD Handbook
2508	5-11.1	Aviation Planning, FMFM 5-70

**2509 Marine Corps Reference Publications (MCRP)**

2510	5-12C	Marine Corps Supplement to the DOD Dictionary of Military and Associated Terms
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**2511 Marine Corps Orders (MCOs)**

- 2512 P3500.19 Training and Readiness (T&E) Manual
- 2513 3501.9B Marine Corps Combat Readiness Evaluation System (MCCRES)

**2514 Joint Publications (Joint Pubs)**

- 2515 0-2 Unified Action Armed Forces (UNAAF)
- 2516 1-02 Department of Defense Dictionary of Military and Associated Terms
- 2517 3-0 Doctrine for Joint Operations
- 2518 3-29 Joint Doctrine for Countering Air and Missile Threats
- 2519 3-29.8 Doctrine for Joint Theater Missile Defense
- 2520 3-50.2 Doctrine for Joint Combat Search and Rescue
- 2521 3-30 Doctrine for Joint Airspace Control in a Combat Zone
- 2522 3-56.1 Command and Control for Joint Air Operations

**2523 Naval Warfare Publications (NWP)**

- 2524 3-30.8 Anti-air Warfare
- 2525 3-30.9 Anti-air Warfare Commander's Manual
- 2526 3-01.8 JIADS (Joint Integrated Air Defense Systems), ALSA/NWP
- 2527 3-30.10 JFACC Organization And Processes
- 2528 3-30.11 TAGS (Theater Air Ground System), ALSA/NWP
- 2529 3-30.12 Brevity Codes, ALSA/NWP
- 2530 6-02.5 TADIL-J/LINK-16, ALSA/NWP

**2531 Marine Corps Doctrinal Publications (MCDPs)**

- 2532 1 Warfighting

**2533 Marine Corps Warfighting Publications (MCWPs)**

- 2534 3-31 Aviation Operations
- 2535 3-32 Control of Aircraft and Missiles
- 2536 3-32.8 ICAC 2, ALSA/FMFRP
- 2537 3-32.9 TAGS, ALSA
- 2538 3-32.10 MACCS Handbook
- 2539 3-32.11 TACC Handbook
- 2540 3-32.12 DASC Handbook
- 2541 3-32.13 SAAWC Handbook
- 2542 3-32.14 MATCD Handbook
- 2543 3-32.15 MACCS Comm Handbook
- 2544 3-32.16 LAAD Handbook
- 2545 5-11.1 Aviation Planning, FMFM 5-70

**2546 Marine Corps Reference Publications (MCRP)**

- 2547 5-12C Marine Corps Supplement to the DOD Dictionary of Military and Associated Terms
- 2548

**2548 Marine Corps Orders (MCOs)**

2549 P3500.19 Training and Readiness (T&E) Manual

2550 3501.9B Marine Corps Combat Readiness Evaluation System (MCCRES)

2551

2551

2552

2553

## APPENDIX E

### RECOMMENDATIONS FOR EQUIPMENT DEADLINING CRITERIA

2554 **AN/TYQ-23(V)4 TAOM**

2555 The TAOM will be considered deadlined if it is unable to perform either of its two basic functions. These  
2556 two functions are: (1) to receive, process, correlate, display, and forward sensor and/or data link track  
2557 information and (2) to transmit, receive, and process voice communication information.

2558 A failure of any component or secondary repairable in any redundant system which degrades the  
2559 operational capability of a particular equipment group or unit by 50 percent or more. Equipment groups  
2560 that fall into this category are as follows:

- 2561 • Operator Console Units
- 2562 • Computer Units
- 2563 • Computer Unit Bus Interface Controllers
- 2564 • Communications Interface Unit
- 2565 • Digital Data Bus
- 2566 • Voice Communications Bus
- 2567 • Radar Data Bus

2568 A failure of any component or secondary repairable in any non-redundant system that renders a particular  
2569 equipment group or unit completely inoperative. Equipment groups that fall into this category are as  
2570 follows:

- 2571 • Communications Interface Unit Bus Interface Controller
- 2572 • Radar Interface Unit
- 2573 • Mass Memory Unit
- 2574 • Power Distribution Control Unit
- 2575 • Disk Memory Unit
- 2576 • Digital Communications Unit Controller
- 2577 • Digital Communications Unit Modem
- 2578 • Mass Memory Controller
- 2579 • Exchange Assembly

2580 **JTIDS MODULE**

2581 The JM will be considered deadlined if it is unable to perform its primary mission of transmitting and  
2582 receiving JTIDS information in a JTIDS network.

2583 A failure of any component secondary repairable or software that inhibits the JM's ability to transmit and  
2584 receive JTIDS information is justification to consider the JM deadlined.

## 2585 ADCP

2586 The ADCP will be considered deadlined if it is unable to perform its primary mission of transmitting  
2587 TBM data over both JTIDS and GBDL.

2588 A failure of any componet, secondary repairable, or software that inhibits the ADCP's ability to transmit  
2589 data over a JTIDS network or GBDL is justification to consider the ADCP deadlined.

## 2590 AN/TPS-59(V)3 RADAR

- 2591 • The radar will be considered deadlined if it is unable to perform either of its two basic missions.  
2592 These two missions are (1) detecting and tracking ABTs (Air Breathing Targets) and (2) detecting  
2593 and tracking TBMs (Theater Ballistic Missiles).
- 2594 • A failure of any component, secondary repairable, or software that inhibits the radar's ability to detect  
2595 and track ABTs and/or TBMs is justification to consider the radar deadlined.
- 2596 • A failure of any component, secondary repairable, or software that inhibits the radar's ability to  
2597 detect, receive, process, and display IFF targets is justification to consider the radar deadlined.
- 2598 • A failure of any component, secondary repairable, or software that inhibits the radar's ability to  
2599 detect, receive, process, display, and accurately classify Mode 4 IFF targets is justification to consider  
2600 the radar deadlined.
- 2601 • A failure of any component, secondary repairable, or software that inhibits the radar's ability to  
2602 forward Radar, IFF, or Mode 4 information via the TOAM Interface Group (TIG) to the TAOM is  
2603 justification to consider the radar deadlined.
- 2604 • A failure of any component, secondary repairable, or software that inhibits the radar's ability to  
2605 forward TBM information (via PDDL) to the air defense communications platform (ADCP) is  
2606 justification to consider the radar deadlined.
- 2607 • The antenna array electronics must be maintained at a high level of performance in order for the  
2608 radar to accurately detect and track targets. The level of performance required for TBMs is much  
2609 greater than for ABTs. Therefore, the deadline criteria for the array electronics will be based on the  
2610 minimum required performance level for TBM detection. The following guidance is given: The radar  
2611 will be considered deadlined when 6 or more rows of electronics are down (faulty). A row will be  
2612 considered down if any of the following components have failed:
  - 2613 ♦ Row Power Supply
  - 2614 ♦ Row Transmitter
  - 2615 ♦ Row Receiver
  - 2616 ♦ Row Feed
- 2617 • Any combination that yields a total of **Six Rows Down**. [Example: 1 Row Power Supply (Rows 3 &  
2618 4) + 2 Row Transmitters (Rows 51 & 54) + 2 Row Receivers (Rows 11 & 20) yields a total of 6 Rows  
2619 down.]

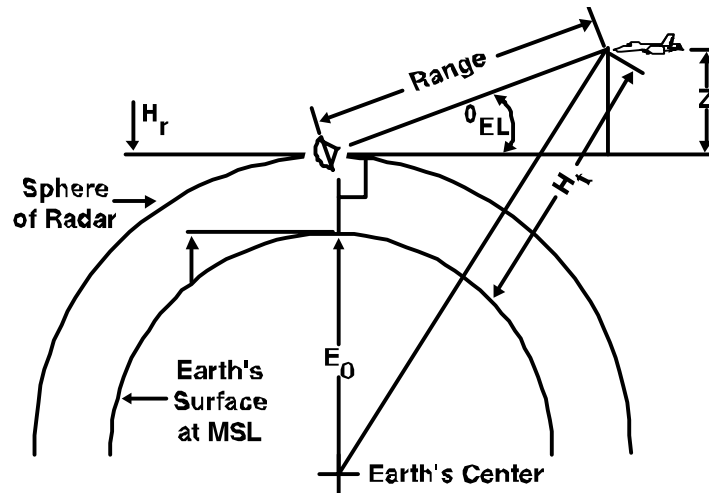
2620 *NOTE: In the above example it is possible to move the failed components so that only two rows are down.*  
2621 *The bad Transmitters in Rows 51 & 54 and the bad Receivers in Rows 11 & 20 can be moved to Rows 3*  
2622 *and 4 with the bad Power Supply. The Radar OIC will make every effort to reduce the number of failed*  
2623 *rows before deadlining the radar.*

## 2624 AN/TPS-63 RADAR

- 2625 • The radar will be considered deadlined if it is unable to perform its basic mission of detecting and  
2626 tracking ABTs (Air Breathing Targets).

- 2627 • A failure of any component or secondary repairable that inhibits the radar's ability to detect and track
- 2628 ABTs is justification to consider the radar deadlined.
- 2629 • A failure of any component or secondary repairable that inhibits the radar's ability to detect, receive,
- 2630 process, and display IFF targets is justification to consider the radar deadlined.
- 2631 • A failure of any component or secondary repairable that inhibits the radar's ability to detect, receive,
- 2632 process, display, and accurately classify Mode 4 IFF targets is justification to consider the radar
- 2633 deadlined.
- 2634 • A failure of any component, secondary repairable, or software that inhibits the radar's ability to
- 2635 forward Radar, IFF, or Mode 4 information via the TOAM Interface Group (TIG) to the TAOM is
- 2636 justification to consider the radar deadlined.
- 2637

## APPENDIX F RADAR HEIGHT FINDING



2640

$$2641 \quad (E_0 + H_t)^2 = (E_0 + H_r)^2 + R^2 - 2(E_0 + H_r)R \cos(\theta_{EL} + 90^\circ)$$

2642  $E_0$  = the earth's radius

2643  $H_t$  = the height of the target above mean sea level (MSL)

2644  $H_r$  = the elevation of the radar above MSL

2645  $R$  = the range (slant range) from radar to target

2646  $\theta_{EL}$  = the radar's elevation angle (degrees)

2647 The above formula determines altitude and range limitations of a radar system tracking a target in relation  
2648 to the earth's curvature.

2649

**Figure 2-4. Radar height finding geometry.**