MARINE AIR COMMAND AND CONTROL SYSTEMS (MACCS) WORKBOOK

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FOREWORD

The Marine Corps deploys as a Marine Air Ground Task Force (MAGTF) and prides itself on its ability to integrate aviation with ground combat operations. In order to ensure this synergy occurs, the Marine Air Command and Control System (MACCS) is deployed. This text is provided to allow the prospective Weapons and Tactics Instructor (WTI) a fundamental understanding of the MACCS and how it supports the Aviation Combat Element (ACE) and the MAGTF. The information in these chapters should provide the background for further study at the graduate level.

> "The skillful commander takes up a position in which he cannot be defeated and misses no opportunity to master his enemy"
>
> Sun Tzu

CHAPTER 1

THE MARINE AIR COMMAND AND CONTROL SYSTEM (MACCS)

1. Introduction. The employment of a Marine Air-Ground Task Force (MAGTF) requires the close integration of air and ground operations. To this end, a MAGTF is task-organized to include an aviation combat element (ACE), a ground combat element (GCE), a combat service support element (CSSE) and a command element (CE). Air operations of the MAGTF are conducted under a system of centralized command and decentralized control. The ACE commander exercises command and control by means of the Marine Air Command and Control System (MACCS). The MACCS is composed of a variety of units and agencies equipped to process, evaluate, and disseminate, on a real time basis, critical information which the Aviation Combat Element/Tactical Air Commander or his representative (Senior Watch Officer) and subordinate commanders use to make sound tactical decisions. The Marine Air Control Group (MACG) within each Marine Aircraft Wing (MAW) can task organize its squadrons/battalions to provide a MACCS to support any size MAGTF to contend with the tempo and complexity of the modern battlefield.

2. Marine Air Control Group (MACG) Mission. Coordinate the air command and control system of the Marine Aircraft Wing. Commanded by a Colonel.

3. MACG Tasks

   a. Plan and provide for the operation of the air command and control system in support of the Fleet Marine Forces (FMF).

   b. Advise the ACE Battlestaff on matters pertaining to the tactical employment of subordinate air control agencies.

   c. Maintain the capability of deploying as an integral unit.

   d. Be prepared to deploy independent squadrons, battalions and detachments in support of FMF operations.

   e. Plan and provide logistical support for the MACCS.

4. MACG Organization

   a. MARINE TACTICAL AIR COMMAND SQUADRON (MTACS)

      (1) Mission/Staff. Provides administrative and supply support for the Marine Air Control Group (MACG) headquarters, unless the MACG has personnel support detachment (PSD) established. Additionally, it maintains the capability for

deploying as an integral unit. Primarily, the MTACS provides the current operations section (COS) personnel that man the Tactical Air Command Center (TACC) and the TACC equipment itself. Commanded by a LtCol with a staff of 21 officers and 125 enlisted Marines.

(2) The principal MACCS agency provided by the MTACS is the TACC, requiring personnel and equipment from the MWCS for most external communications, and personnel from the ACE battlestaff for complete staffing of the TACC.

b. MARINE AIR CONTROL SQUADRON (MACS)

(1) Mission/Staff. The Tactical Air Operations Center (TAOC) Detachment provides air surveillance and control of aircraft and surface to air weapons for antiair warfare in support of the FMF. The Air Traffic Control (ATC) Detachment is the primary terminal air control agency within the MACCS. Typically ATC elements support FOBs ranging in size from a main air base, which is capable of handling theater lift assets, to an air site, which is used to preposition fully-loaded and armed aircraft to reduce response time for preplanned and immediate missions. The MACS is commanded by a LtCol with 38 officers, and 337 enlisted Marines, and 3 enlisted sailors.

(2) The principal MACCS agencies provided by the MACS are the TAOC, the Early Warning/Control (EW/C) site and two (2) Air Traffic Control Detachments.

c. MARINE AIR SUPPORT SQUADRON (MASS)

(1) Mission/Staff. Provide Direct Air Support Center (DASC) capabilities for control and coordination of aircraft operating in direct support of MAGTF operations. Commanded by a LtCol and a staff of 41 officers and 196 enlisted Marines.

(2) The principal MACCS agency provided by the MASS is the DASC.

d. LIGHT ANTIAIRCRAFT MISSILE BATTALION (LAAM BN)

(1) Mission/Staff. Provides medium range surface-to-air missile defense for assigned areas of operations, air installations and vital zones against low and medium altitude air attacks. Commanded by a LtCol with a staff of 38 officers and 721 enlisted Marines.

(2) The principal MACCS control facilities provided by the LAAM BN are the Battery Command Post (BCP), the Battalion Command Post, and the Battery/Platoon Combat Operations Centers (COCs).

e. LOW ALTITUDE AIR DEFENSE BATTALION (LAAD BN)

(1) Mission/Staff. Provides close in, low altitude surface-to-air weapons fires in defense of forward combat areas, vital areas and installations. Also provide surface-to-air weapons support for units engaged in special operations and independent operations. CONUS battalions are commanded by a LtCol with a staff of 23 officers and 353 enlisted Marines. WESTPac LAAD is commanded by a Major with a staff of 9 officers and 209 enlisted Marines.

(2) LAAD may be task organized to support all elements of the MAGTF. The section, consisting of five Stinger teams, is the lowest level at which they tactically employ.

f. MARINE WING COMMUNICATIONS SQUADRON (MWCS)

(1) Mission/Staff. The MWCS is tasked to install, operate and maintain expeditionary communications for the ACE of a MEF. Commanded by a LtCol with a staff of 24 officers and 543 enlisted marines.

(2) The MWCS provides backbone communication support to link the ACE Headquarters, agencies of the MACCS, and ACE airfields together. This is accomplished by the component units of the MWCS, the ACE communications detachment and its subordinate ACE communications unit.

CHAPTER 1 POST TEST

THE MARINE AIR COMMAND AND CONTROL SYSTEM (MACCS)

1. The _____ coordinates the air command and control system of the MAW.

2. The _____ provides the Current Operations Section (COS) personnel that man the Tactical Air Command Center (TACC).

3. The _____ provides communications support for an ACE of a MEF.

4. The _____ provides air surveillance and control of aircraft and surface to air weapons in support of the FMF.

5. The _____ provides medium range surface-to-air missile defense of assigned areas against low and medium altitude air attacks.

6. The _____ employs the Stinger missile system.

7. The LAAD Battalion provides _____ for elements of the MEF in forward combat areas.

8. The _____ provides all weather air traffic control service at virtually any type of Forward Operating Base (FOB).

9. The Tactical Air Command Center (TACC) equipment is provided by the _____ of the Marine Air Control Group (MACG).

10. The Tactical Air Operations Center (TAOC) provides air surveillance and control of aircraft and surface to air weapons and is operated by the _____ of the MACG.

11. The Marine Air Support Squadron provides facilities for the _____ operating in direct support of MAGTF operations.

12. The LAAD Battalion's smallest tactical unit at which it should be employed is the _____.

CHAPTER 2

TACTICAL AIR COMMAND CENTER (TACC)

1. Introduction. The TACC is the senior MACCS agency. It is the one MACCS agency that exercises command. It serves as the operational command post of the ACE commander and provides the facility from which he and his battlestaff plan, supervise, coordinate and execute all current and future MAGTF operations.

2. Missions, Role and Duties. The role of the TACC is to function as the senior MAGTF air command and control agency, and to serve as the operational command post for the ACE commander. In order to accomplish the requirements of the TACC's role the battle staff members supporting TACC operations perform the following tasks:

   a. Maintain complete information on the friendly situation, to include both the air situation and ground combat information essential for effective air support.

   b. Manage all aircraft and surface-to -air weapons in the AOR to ensure a balanced use of assets.

   c. Serve as an operational point of contact between the MACCS and other services adjacent and/or higher headquarters command and control agencies external to the MAGTF.

   d. Coordinate combat operations of subordinate MACCS agencies to ensure unity and economy of effort. This includes providing all information required to ensure mission success such as ATOs and OPDATS.

   e. Provide a means for the exchange of information between the battlestaff and the ACE Headquarters for the efficient execution of MAGTF air operations.

   These tasks are not all encompassing, but are representative of the wide range of functions the TACC provides. As the senior MAGTF command and control agency, virtually every decision, request or action relative to current and future operations passes through the TACC. Ultimately the performance of these tasks is the conduit through which the SWO gains situational awareness, makes decisions and passes direction.

3. Concept of Employment.

   The TACC is the senior tactical agency of the MACCS. The principle agencies subordinate to the TACC are the TAOC, DASC and MATC detachments. Through

these agencies the TACC battlestaff can also coordinate the efforts of the ACE's HAWK and Stinger assets, as well as other related control agencies such as the FAC/FAC(A), TAC(A) and ASC(A).

The Marine Air Control Group (MACG), specifically the Marine Tactical Air Command Squadron (MTACS) provides the facility for the TACC and operators for the Current Operations Section (COS). The ACE will provide Marines (usually aviators) as required by task organization to complete the battlestaff. Although the TACC has organic communications assets, the Marine Wing Communication Squadron provides the majority of external communications to the TACC.

4. Personnel and Training.

There is no single primary MOS specific to the TACC, nor is there a formal school for training in TACC functions. The prerequisites for a TACC tour are defined in the T&R manual. The Marine Air Control Group (MACG) fulfills T/O requirements for the Marine Tactical Air Control detachment and TACC with officers and enlisted Marines from other squadrons and battalions within the MACG. This is usually done as Marines check into the MACG. Personnel that work in the various sections of the TACC provide the technical and tactical expertise of their primary MOS to the overall team effort of the agency. MCO P3500.19, Aviation Training and Readiness Manual, Volume V provides for individual training of MACCS personnel. Chapter one of Volume V outlines training standards for both TACC Current Operations Section (COS) and Future Operations Section (FOS) crew members. The standards for functioning of the TACC are provided in MCO 3501.9, MCCRES, Volume VIII.

5. TACC Organization.

The TACC is the operational command post of the Ace Commander. It does not provide facilities for all ACE staff functions such as the G/S-1,2,3 or 4. These staff sections will work out of separate facilities, but may augment the TACC as required. Distinctions are drawn between the TACC and ACE Headquarters. The ACE HQ staff is concerned with planning and developing concepts of operation and employment of the ACE in support of the MAGTF beyond building the next ATO. The TACC provides the facility for the ACE commander's battle staff. This battlestaff consists of two mutually supporting sections, the Current Operations Section and the Future Operations Section.

a. Current Operations Section (COS).

The COS executes and directs current operations utilizing the MACCS. The COS supervises and directs the execution of the current ATO. COS crew members interface directly with subordinate MACCS agencies to ensure that ACE assets are managed/employed per the TAC's intent.

b. Future Operations Section (FOS).

While the COS is fighting the current battle, the FOS develops the next days

ATO. The FOS receives information from the COS on the status of the current battle and from the ACE headquarters on the availability of resources. It also receives the ACE commander's intent and priorities. While formulating the ATO, the MAGTF target list is evaluated for ACE targeting. The FOS coordinates with the COS the need to continue and extend the effects of the current battle.

Prior to discussing crew organization of the COS and FOS, it is important that the distinctions between the TACC and ACE headquarters are understood. The ACE Headquarters staff is concerned with planning, concept of operations and employment of the ACE in support of the MAGTF beyond the next ATO. The ACE headquarters staff conducts on-going planning and coordination with higher, adjacent and external headquarters. The MAGTF commander's intent and priorities provide guidance for the ACE Headquarters staff to initiate development of plans and concepts of operations. As the FOS crew members prepare the next days ATO, they receive information from the ACE Headquarters necessary for detailed planning and resource allocation. While the COS is conducting current operations and the FOS develops the next ATO, the ACE Headquarters is concurrently exchanging information with the battlestaff and higher, adjacent and external agencies/headquarters.

5. Crew Organization.

TACC crewmembers that comprise the battlestaff come from the Marine Tactical Air Command Squadron (MTACS) of the MACG, and from the ACE. The concept of a battlestaff implies a degree of integration between operators provided by MTACS and aviators provided by the ACE. These members of the battlestaff function as TACC crew members. This combination of personnel creates a pool of resident duty experts, that can be task organized to meet the tactical requirements of the ACE in any situation.

a. ACE Commander.

The ACE Commander is not considered as a crew member for either the COS or FOS, but is an integral member of the TACC as a whole. Recall that the TACC is the ACE commander's operational command post. When the CATF delegates the authority to control air operations to the CLF, the CLF exercises this control through the MACCS. In this situation, the ACE Commander is designated the Tactical Air Commander (TAC), responsible to the landing force commander for the control and coordination of air operations in the landing force commander's AOR once control has been passed ashore. The ACE commander makes decisions and provides direction based on information provided to him by the COS and FOS.

b. Senior Watch Officer (SWO).

The SWO is the direct representative of the ACE commander in the TACC. He is responsible for the overall functioning of both the COS and FOS. The SWO

coordinates the battlestaff based on the authority and guidance provided to him by the ACE commander. The SWO ensures proper coordination between the COS and FOS takes place.

c. Current Operations Section.

As a review, the COS is responsible for the supervision and direction of current operations. The COS supervises and directs the execution of the ATO. Crewmembers of the COS include:

(1) Senior Air Coordinator (SAC). The SAC is the Senior MACCS (from the MTACS) watchstander in the COS, and is the most experienced operator. The SAC is responsible for ensuring the COS battlestaff executes current operations through the MACCS in accordance with the ATO, ACE commander's and SWO's guidance. The SAC will coordinate the efforts of the COS with the FOS on any future operations matters that may impact the execution of current operations. The SAC supervises the proper and expeditious dissemination of all essential information and monitors the reporting of events by all interfacing agencies to the TACC. Via the COS crew, the SAC supervises and coordinates the proper employment of OAS, AAW, AS, EW and RECCE assets.

(2) Air Defense Coordinator (ADC). The ADC is responsible to the SAC for coordinating air defense operations within the MAGTF AOR. The ADC coordinates primarily with the Sector Antiair Warfare Coordinator (SAAWC) at the TAOC to ensure that fighters, surface to air missiles and other assets are being managed in accordance with the SWO's intent. The Air Defense section is responsible for maintaining status of all fighters, both airborne and on the ground, tanker status and the status of both HAWK and Stinger assets. The ADC also monitors the equipment status and operational posture of the MACCS relative to AAW and ensures that all activities of the air defense section are properly coordinated with the rest of the COS.

(3) Air Defense Recorder (ADR). The ADR, an enlisted crew member, assists the ADC in the performance of his duties by maintaining all air defense records and updating the TACC displays under the cognizance the air defense section.

(4) Air Support Coordinator (ASC). The ASC is responsible to the SAC for the coordination of OAS and assault support within the MAGTF AOR. The ASC coordinates primarily with the Direct Air Support Center (DASC). By doing so, the ASC not only coordinates the employment of aircraft, but receives information as to the status of the MAGTF's Ground Combat Element (GCE). This information will be plotted on the Air Support map maintained by the ASC.

Of particular concern, is receiving current fire support coordination measures. As information on the status of supporting arms fires flow into the TACC, the ASC helps ensure they are de-conflicted with OAS and assault support missions. The Air Support Section processes immediate Joint Tactical Air Requests (JTARs) and Assault Support Requests (ASRs). Battle Damage Assessments (BDAs) are received from the DASC and/or aircraft, and passed from the Air Support Section to both the intelligence section and the targeting cell.

(5) Air Support Recorder (ASR). The ASR, an enlisted crew member, assists the ASC in the performance of all functions within the air support section by maintaining all air support records, and monitoring all TACC displays pertaining to air support operations.

(6) Interface Coordination Officer (ICO). The ICO is responsible to the SAC for ensuring accurate situation displays and the proper functioning of all data links. The ICO evaluates all data link platform capabilities and establishes an appropriate surveillance plan. The ICO will direct the configuration of the data link network, taking into account each participating agencies' capabilities and limitations.

(7) Track Data Coordinator (TDC). The TDC is responsible to the SAC for track data coordination within the MACCS and other linked tactical data systems. The TDC examines the data link picture and ensures that it is in fact an accurate representation of the air battle. The TDC ensures all symbology is correct and that all possible amplifying data has been entered on a particular track. The TDC will coordinated the resolution of all dual track designations or track reporting conflicts.

Depending upon the tempo of operations the display console within the TACC, ICO and TDC positions can be combined. The number of participants in the data link network will also impact the requirement for having two separate billets responsible for data link related operations.

(8) Tactical Air Watch Officer (TAWO). The TAWO is responsible to the SAC for matching fixed wing assets with requirements. He is an aviator and compliments the battlestaff with his in-depth knowledge of fixed wing platforms, their capabilities and limitations. The TAWO keeps updated on the ATO and the status of aircraft on the ground. He may coordinate asset availability directly with flying groups/squadrons. If the ADC or ASC receive requests for air assets, either from the SAAWC or DASC, the TAWO will advise the ADC or ASC on sourcing the best asset to honor the request.

The TAWO's aviation expertise will allow him to determine if an aircraft's weapons loadout is optimum for a particular type of target. He shares this

expertise with the battlestaff as a whole.

(9) Assault Support Watch Officer (ASWO). The AWSO is responsible to the SAC for matching assault support assets with requirements. He is also an aviator and compliments the battlestaff with his in-depth knowledge of rotary wing platforms, their capabilities and limitations. The ASWO functions in a similar capacity as the TAWO in that he keeps updated on the ATO and the status of rotary wing aircraft on the ground. He will also coordinate asset availability with rotary wing groups and squadrons. If an immediate ASR is received in the TACC, the ASWO will work closely with the TACC battlestaff to ensure the most appropriate assets fill the request.

d. Other COS Personnel.

(1) TACC Crew Chief. The crew chief is the senior enlisted crew member responsible to the SAC for the performance of all enlisted crew members. The crew chief tracks maintenance requirements passed to the maintenance coordinator in accordance with the SAC's priorities. He handles administrative tasks and classified material. The crew chief will assist in updating information in the TACC as required.

(2) Plotter/Data Entry Operator. The plotters assist the Air Defense and Air Support sections by maintaining aircraft radio in and out logs, updating mission status boards and monitoring nets as required. Plotters also maintain the manual crosstell boards with an up-to-date representation of the air war and is kept current to function as a backup should the data links fail.

(3) Maintenance Coordinator. The Maintenance coordinator is a representative from the MTAC's Communications and Electronics Department. This department emplaces and repairs all TACC related electronics equipment. Their representative in the COS is responsible to the SAC for the readiness, availability and restoration of TACC equipment.

(4) Air Boss. The air boss is an extension of the TACC current operations section. Like the TAWO and ASWO, the air boss is also an aviator. He works on or near the flight line of the supporting air base. If there is more than one air base, more than one air boss may be required. The air boss receives tasking directly from the TACC and has complete authority to manage assets on the flight line to accommodate the TACC's need for aircraft. The air boss has numerous duties; all equating to ensuring the smooth, timely launch, recovery and turnaround of aircraft. The airboss will prioritize which aircraft refuel first, what type of ordnance is uploaded and what strip alert status the aircraft will maintain. The objective of this is to ensure the assets available match the requirements of the tactical situation. As a primary conduit of aircraft status to the TACC, the air boss and TAWO/ASWO keep in constant

communications. The TAWO/ASWO, reacting to asset requirements generated by the MACCS or tactical situation will work as a team with the air boss to most effectively source the appropriate asset.

e. Future Operations Section (FOS).

As a review, the FOS evaluates the status of the current battle, resource availability, and conducts detailed planning for the next ATOs, normally 24 to 48 hours in advance. The culmination of their efforts is the publication of the ATO. Since the FOS is manned primarily by aviators from the ACE, and the extent to which it is staffed is dependent on the tactical situation, there is a greater degree of task organization than what is typical of the COS. The following are representative FOS crewmembers:

(1) G-3/S-3 Watch Officer. The G-3/S-3 watch officer is the senior watch officer in the FOS. He is responsible for all matters pertaining to future air operations as they relate to ATO development. He oversees the FOS and integrates the efforts of the FOS with the ACE operations section to coordinate concept of operations and employment with detailed planning and resource allocation for future operations. Additionally, the G-3/S-3 watch officer coordinates the efforts of the FOS with that of the COS for any matters that may impact ATO development. He exchanges information with the COS and the planners in the ACE headquarters on the status of current and future operations.

(2) Fixed Wing/Rotary Wing Fragger (FWF/RWF). Each of these officers is responsible to the G-3/S-3 watch officer for detailed planning of aircraft assets. The Fixed Wing Fragger (FWF) schedules fixed wing assets and the Rotary Wing Fragger (RWF) schedules helicopter assets. Both plan the number of sorties required for the functions performed by their type of platform. The FWF and RWF prepare that portion of the ATO that pertains either fixed or rotary wing aircraft respectively.

(3) Weapons Employment Officer (WEO). The WEO works with the RWF and RWR as they prepare the ATO, recommending ordnance requirements based on available target information. Realistically, most detailed weaponeering will occur at the squadron level during specific mission planning. The WEO is an advisor to the G-3/S-3 on the best utilization of aviation weapons.

(4) Air Control Liaison Officer (ACLO). The ACLO is an officer well versed in command and control issues. He is and advisor to the G-3/S-3 on air control issues. Ideally, the ACLO is the conduit for MACG planners to input requirements to the ACE. Additionally, the ACLO can voice concerns from a command and control perspective to higher headquarters such as the Joint Force Air Component Commander (JFACC), Area Air Defense Commander (AADC) or Airspace Control Authority (ACA).

(5) Command and Control Warfare Plans Officer (C2W). The C2W establishes priorities between EW and signals intelligence missions and ensures that jamming, electronic deception and destructive EW are integrated with other aviation weapons. Additionally, the C2W prioritizes the target requirements of enemy electronic emitting agencies that may influence the MAGTF's capability to conduct operations. He is responsible for advising the ACE on how to make the most effective use of the electromagnetic spectrum, while also coordinating the command's signals security.

(6) Doctrine has not placed an intelligence representative in specific support of either the COS or FOS. The Intelligence Watch Officer (IWO) supports the COS, but is also responsible for advising the FOS on possible courses of enemy action as a result of current operations. In support of the COS, the IWO ensures that all enemy situation boards are kept updated and that intelligence databases are kept current. The IWO has many assigned doctrinal tasks that require integration with the COS, FOS and the ACE Headquarters. Realistically, intelligence representation in the TACC will require a small staff to adequately support all functions associated with the COS and FOS, while maintaining information flow with the ACE Headquarters.

All battlestaff members associated with both the COS and FOS have been detailed as current Marine Corps doctrine views it. One must remember that both COS and FOS crew organization is task organized for the specific tactical situation. Other personnel from the ACE /MACG may augment the battle staff if the situation requires their expertise.

6. Equipment.

The TACC table of equipment (T/E) has recently been modified and is currently in a state of "flux". The TACC is comprised of several different end-items of equipment that are pieced together to form the Marine Corps Tactical Air Command Center capability. Currently, the "standardized" end-items that comprise the TACC are:

a. Advanced Tactical Air Command Central (ATACC) AN/TYQ-51.

An initial operating capability (phase one) of the ATACC AN/TYQ-51 has been fielded to all Marine Corps TACC's as of December 1995. ATACC phase one is a scaled-down/modified version of the original ATACC employment plan. The ATACC AN/TYQ-51 is housed in a standard 8x8x20ft ISO shelter. All operator workstations are capable of being remoted from the AN/TYQ-51 shelter, and in fact this is the preferred mode of deployment for an ATACC AN/TYQ-51 equipped TACC. The ATACC possesses the following capabilities:

(1) Ruggedized Operator Workstations: 6
(2) Commercial Operator Workstations: 4

(3) Operator Communications Units (OCU): 6
(4) Internal Voice/Data Crypto
(5) Link Capability:

TADIL-A: 1 (UHF or HF, no simulcast capability)
TADIL-B: 6 (5 with NATO Link)
NATO Link-1: 1

b. Tactical Data Communications Central (TDCC) AN/TYQ-3A.

The TDCC AN/TYQ-3A was the primary data communications (data links) system for the retired AN/TYQ-1B TACC. The TDCC AN/TYQ-3A will augment the ATACC AN/TYQ-51 data link capability until approximately 30 September 1996, at which time it is scheduled to be deleted from the Marine Corps inventory. The TDCC AN/TYQ-3A provides the equipment necessary to provide the analog to digital and digital to analog conversions required for data link operations. The AN/TYQ-3A is capable of

a. TADIL-A: 1 (UHF and/or HF, simulcast capability)
b. TADIL-B: 10 (9 with NATO Link 1)
c. NATO Link-1:1

c. Communication Group AN/TYA-16B.

The TYA-16B is a communications group containing terminal and control facilities for voice communications. Specifically, the AN/TYA-16B will provide fifteen (15) LS-595 Communication Workstations to the ATACC AN/TYQ-51 system. The AN/TYA-16B was the primary communications platform for the retired AN/TYQ-1B TACC, and is meant to be used as an interim measure to provide/beef up the existing ATACC communications capabilities.

d. Radio-Antenna Coupler Group OE-334/TRC.

Each MTACS possesses two (2) OE-334/TRC Antenna Coupler groups. When combined with the UHF radio capability in the AN/TYA-16B, each TACC has a formidable single-channel UHF, VHF (AM and FM), and lowpower/short range HF radio capability.

e. Contingency Theater Automated Planning System (CTAPS).

All Marine Aircraft Wings have been fielded a fourteen (14) workstation CTAPS capability. CTAPS will be the primary workstation for TACC personnel working from the Future Operations Section. The Marine Corps is currently analyzing plans to outfit each MAW with a 40-45 CTAPS workstation capability.

f. Shelters.

As of print time, no standardized shelter capability has been fielded for any TACC/MTACS. Currently, MTACS are relying upon ingenuity and task

organization when building/designing their TACC capability. The versatility of the ATACC design allows for the MTACS to take advantage of a wide variety of options; (1) complexing 8x8x20ft knockdown shelters together, (2) tents, (3) and taking advantage of existing structures to house the TACC.

7. MAGTF Employment.

The ACE of a MAGTF is task organized with the MACCS agencies necessary to perform the six functions of Marine aviation. They are organized and equipped to support amphibious operations and subsequent operations ashore. The MAGTF TACC will be incrementally phased ashore, initially as a Tactical Air Direction Center (TADC) responsible to the CATF for the landward sector of the amphibious objective area (AOA). With the MAGTF fully established ashore and as a prerequisite to terminating an amphibious operation, the CATF will transfer command and control of tactical air operations in the AOA to CLF. With this transfer of responsibility, the MAGTF TADC will become a TACC while the CATF's TACC becomes the TADC. Upon termination of the amphibious operation, the AOA will be dissolved and an airspace sector will be established. The MAGTF TACC provides control of Marine air assets in its sector.

a. A MEF will normally be supported by a fully automated TACC.

b. A MEF(Fwd) will be supported with either a manual or automated TACC. A manual TACC does not traditionally have a data link capability.

c. The ACE of a MEU normally does not perform all six functions of Marine aviation. When committed, the MEU is supported from its sea base. Elements of the MACCS may be employed in MEU operations. Centralized command and control of tactical air operations are normally retained by CATF's TACC.

8. Succession of Command and Control.

One of the principle tasks of the TACC is to prescribe succession of command and control responsibilities within the MACCS and compensate for any serious degradation within a component agency. The specific procedures for succession of command and control will vary with the MACCS agencies present, available communications, and the tactical situation. Two examples should be noted here.

a. Should the DASC become a casualty, the TACC will temporarily assume the functions of the DASC, establishing communications with the senior FSCC and terminal control agencies, until the DASC can be reestablished.

b. Should the TACC itself become a casualty, the TAOC will temporarily assume the functions of the senior MACCS agency as the Alternate TACC (ATACC), until the TACC facility can be reestablished.

CHAPTER 2 POST TEST

TACTICAL AIR COMMAND CENTER (TACC)

1. The _____ is the operational command post of the Tactical Air Commander and is the only agency which normally exercises command.

   a. TACP

   b. TAOC

   c. TACC

   d. TADC

2. The _____ is an extension of the Current Operations Section (COS) and operates at or near the flight line of the supporting Air Base.

   a. TAWO

   b. Air Support Coordinator

   c. Fixed Wing Fragger

   d. Air Boss

3. Personnel of the TACC are doctrinally organized into two sections; _____ and_____ .

   a. ATO, Execution

   b. Current Operations Section, Future Operations Section

   c. Administrative, Operations

   d. Offensive Planning, Defensive Planning

4. The culmination of the Current Operations Section effort is the publishing of the ATO.

   a. True

   b. False

5. The _____ is the direct representative of the ACE commander in the TACC.

   a. Senior Watch Officer (SWO)

   b. Senior Air Director (SAD)

   c. Fixed Wing Officer/Fragger

   d. Senior Air Coordinator (SAC)

6. The ACE headquarters staff _____.

   a. Writes the ATO

   b. Interfaces directly with the subordinate MACCS agencies.

   c. Does not impact TACC functions.

   d. Is concerned with planning, concept of operations and employment of the ACE in support of the MAGTF beyond the next ATO.

CHAPTER 3

TACTICAL AIR OPERATIONS CENTER (TAOC)

1. Introduction. The Tactical Air Operations Center (TAOC) is the primary Antiair Warfare (AAW) control agency within the MACCS and is responsible to the TACC ashore or afloat. The crewmembers within the TAOC deal with the real-time control of fighter aircraft and Ground Based Air Defense (GBAD) units (HAWK, STINGER). The TAOC receives required data on the air picture from all available sources, coordinates this data with locally generated data and disseminates a composite air picture to the MACCS and other users. Communications equipment (digital data links, radio communications, telephone, multi-channel) permit the TAOC to forward and receive information from various systems to include; Airborne Early Warning (AEW) platforms, Naval Tactical Data System (NTDS) ships and Air Force Theater Air Control System (TACS) aircraft. Additionally, the TAOC forwards and receives data from the TACC, exchange air operations control data with friendly aircraft and with other tactical control agencies (AF CRC/AOC), control aircraft in the conduct of Antiair Warfare (AAW) and communicate with remote radar sites. Equipment and personnel that operate the TAOC are provided by the Marine Air Control Squadron (MACS). There are normally two TAOC's assigned to each Marine Aircraft Wing.

2. Mission. The mission of the TAOC is to detect, identify and control the intercept of hostile aircraft and missiles and to provide navigational assistance to friendly aircraft in the accomplishment of support missions.

3. TAOC Tasks

   a. To detect, identify and classify all aircraft within its assigned sector of responsibility.

   b. To maintain tracks of identified contacts, providing enroute control/navigation assistance as required.

   c. To provide for interface between adjacent and higher air defense agencies.

   d. To recommend the employment of assigned weapons and surveillance systems and assignment of geographical section/subsection responsibility for itself and component elements.

   e. To evaluate, select and assign weapons to meet enemy air threats.

   f. To control the engagement of enemy air threats by interceptors or Ground Based Air Defense (GBAD).

g. To direct the operations of satellite air defense agencies.

h. To maintain a summary display of the air situation and to disseminate this information to other designated agencies.

i. To coordinate and execute emission control (EMCON) conditions set by higher authority.

j. To operate as an alternate TACC/TADC for limited periods of time as required.

4. Concept of Employment.

Depending on the size of the exercise/operation, availability of lift/shipping and the anticipated threat, the TAOC could be deployed in any number of configurations ranging from a manual early warning (EW) site consisting of a single gap-filler radar, radios and a generator, to a fully automated system, however, the most important factor to be considered by missile planners is higher headquarters mission tasking. The TAOC, in its current state, was designed to allow for incremental phase-in as necessary to support mission tasking. This allows for flexibility in support of such diverse missions as contingency and amphibious operations. To provide defense of designated MAGTF air defense priorities, the TAOC will emplace where it can provide the best radar surveillance and early warning. Employment of the TAOC will be task organized to meet ACE requirements necessary to support the MAGTF.

a. MEF. Normally a MEF will employ two TAOCs; however, each TAOC may be task organized and equipped to operate independently in support of a variety of contingencies. The MEF's airspace may be divided into multiple sectors and assigned to separate TAOCs. Control of MEF AAW assets in assigned sectors is coordinated between TAOCs under the cognizance of the TACC. In amphibious operations, an EW/C site can be established ashore initially and eventually be built-up into a full TAOC by utilizing its echelon capability. Each TAOC is established where it can best provide air surveillance, airspace management, and control of AAW assets in its assigned sector within the MAGTF's AOR.

b. MEF (FWD). The MEF(FWD) ACE normally includes one TAOC. In amphibious operations, the TAOC is established ashore in the same manner as the MEF.

c. MEU. Due to the reduced level of air activity normally associated with Marine Expeditionary Unit (MEU) operations, MACCS requirements are minimal. A MACG detachment will be task organized to provide the MACCS functions required by the MEU; however, there is normally no requirement for a TAOC or EW/C.

5. Interagency Relationships.

Interagency functioning is the key to effective control of MAGTF airspace and air assets. Control is decentralized to the TAOC for control of air defense assets to include Combat Air Patrol (CAP) aircraft, GBAD systems, surveillance sensors and control capabilities. Additionally, the TAOC controls aircraft transiting its AOR and coordinates handovers with the TACC, DASC, ATC detachments and joint or combined air control agencies. The TAOC controls assigned air defense weapons systems for threat engagements by both positive and procedural control measures. Further, the TAOC coordinates with HAWK units for radar detection of and defense against low and medium altitude hostile threats. For close in air defense of vital areas against low altitude hostile aircraft, the TAOC coordinates with LAAD units, exchanging threat detection information and disseminating air defense warning conditions and weapons control statues through established MACCS communications nets.

6. Equipment Capabilities.

With the exception of a lack of organic multi-channel (mux) radio communications equipment and certain critical heavy support equipment (LVS's for TAOM transport), the TAOC, regardless of configuration, deploys as a self-sustaining unit. Echeloning capability, a long-range/three-dimensional search radar, short-range/two-dimensonal gap-filler radars, digital data links, and a spectrum of HF/VHF/UHF communications equipment allow the TAOC to integrate with all services in any level of joint and combined operations. The majority of the equipment is capable of being moved by all modes of transportation (helo, aircraft, ship, train, truck).

7. Equipment Limitations.

In employing the system, planners need to consider several limiting factors. The two most prominent are low altitude radar surveillance coverage and the electronic signature produced by the TAOC.

Radar masking from terrain features and the earth's curvature precludes adequate low altitude surveillance from ground-based radars. There are several methods to overcome this deficiency. Additional sensors such as Airborne Early Warning (AEW) platforms, CAP aircraft, HAWK radars, ATC radars and ground visual sightings must all be integrated to provide the best possible recognized air picture. The other option is the forward deploying of an EW/C site to enhance or even extend the overall low level coverage. This site can also provide low altitude surveillance and early warning/cueing to forward based air defense and ground units.

The TAOC has a large electronic signature. Its radars and communications equipment operate throughout a large portion of the electronic spectrum. The use of passive defense measures, radar decoys, radar remoting capabilities and an effective and well executed EMCON (to include radiation control and ZIPLIP communications procedures) plan are essential to reducing or managing this

signature.

8. Crew Organization.

The following are the major positions found in the TAOC and on the TAOC crew:

a. Sector Anti-Air Warfare Coordinator (SAAWC),

normally a LtCol or Maj, is responsible to the Tactical Air Commander (TAC)/Senior Watch Officer (SWO) for surveillance, identification, management of assigned airspace, direction of all defensive air operations and control of all AAW operations within a designated air defense sector. As such, he provides the interface between the TAOC and the TAC's battlestaff allowing the crew to better concentrate on crew coordination, systems interface, equipment status, and control of the real-time air war.

(1) SAAWC Staff Facility. The SAAWC needs both a staff and a facility from which to operate to perform his mission and ensure the information flow essential to air defense battle management is forwarded to the TAC. The SAAWC and his staff normally operate from a facility collocated with the TAOC. This allows access to the most current air situation information required to base battle management decisions. The staff provides the means for battle management information exchange between the SAAWC and TAOC/TACC operators. SAAWC's staff normally consists of:

(a) SAAWC Operations Officer (SAAWC Ops)
(b) Surface to Air Weapons Rep (SAW Rep)
(c) Fixed Wing Rep (FW Rep)
(d) Intelligence Officer (Intel O)
(e) Crew Chief
(f) Plotters

b. Senior Air Director (SAD).

Normally an experienced Company Grade officer responsible for the detailed operations of the TAOC, crew training and readiness, and system configuration. He ensures the proper employment of air defense weapons and the coordination of all offensive and defensive air operations within the TAOC sector of responsibility. He reports directly to the SAAWC and is responsible for his respective TAOC crew.

c. Senior Weapons Director (SWD).

Normally a Capt, 1stLt, or CWO responsible to the SAD for the proper employment of air defense weapons (CAP, HAWK, Stinger) during active air defense periods. The SWD directly supervises the engagement of enemy air threats by missile firing units (HAWK) and interceptors assigned to the weapons section. He also effects the coordination of threat engagements between and

across multiple engagement zones.

d. Senior Traffic Director (STD).

Normally a 1stLt, CWO or SNCO responsible for the safe routing of all aircraft within the assigned sector. He ensures that all information on hazards to flight safety are provided to the weapons controller and aircraft, that aircraft are controlled in accordance with the operational orders or modifications as directed by the TACC, and that aircraft receive required threat situational awareness information. Additionally, he ensures that handovers are conducted in a timely manner, that aerial refueling operations are conducted in an efficient and expeditious manner and that aircraft emergencies are appropriately handled. As directed under active air defense conditions, he assumes the responsibility for the control of aircraft not engaged in air defense.

e. Surveillance Identification Director (SID).

Normally a 1stLt, CWO or SNCO responsible for the detection, identification, and classification of all air tracks within the assigned TAOC sector. Additionally, he is responsible for the correlation of air tracks reported from all sources, management of the air picture developed within the TAOC and transmitted via data links (TADIL A/B) or voice crosstell, and employment and execution of Electronic Protection (EP) and EMCON conditions set by the TACC as appropriate.

CHAPTER 3 POST TEST

TACTICAL AIR OPERATIONS CENTER

1. The MEF (Fwd) will normally include _____ TAOC(S).

   a. 0

   b. 1

   c. 2

   d. EW/C only

2. The two most prominent limiting factors of the TAOC are electronic signature and _____.

   a. Not Transportable

   b. Echelon Capability

   c. Low Altitude Radar Surveillance Coverage

   d. Three dimensional capabilities

3. The _____ is responsible to the TAC for surveillance, identification, management of assumed airspace, direction of all defensive air operations and control of all AAW operations within a designated sector.

   a. Sector Anti-Air Warfare Coordinator (SAAWC)

   b. Senior Air Director (SAD)

   c. Surveillance Identification Director (SID)

   d. Senior Weapons Director (SWD)

4. The SAAWC and his staff operate from a facility _____.

   a. Collocated with the TAOC

   b. Collocated with the TACC

   c. Dispersed from the TAOC

d. In the LAAM Battalion COC

5. The _____ is responsible to the SAD for the proper employment of air defense weapons during active air defensive periods.

   a. Plotter

   b. Surveillance Identification Director (SID)

   c. Senior Traffic Director (STD)

   d. Senior Weapons Director (SWD)

CHAPTER 4

DIRECT AIR SUPPORT CENTER (DASC)

1. Introduction. The DASC is equipped and operated by the Marine Air Support Squadron (MASS). Normally the first major air control agency to land in a amphibious operation, the DASC lands in the same category as the senior GCE FSCC.

   The DASC is the principal air control agency responsible for the direction of air operations directly supporting ground forces. It functions in a decentralized mode of operation, but is directly supervised by the TACC.

2. Mission. The DASC provides the means to process immediate air requests, integrates aircraft employment as a supporting arm, manages terminal control assets supporting ground combat and combat service support forces, and procedurally controls assigned aircraft and itinerant aircraft transiting through its area of responsibility.

3. DASC Tasks

   a. Receives Air Tasking Orders (ATO) from the TACC and coordinates preplanned direct air support.

   b. Receives, processes, and coordinates requests for immediate direct air support.

   c. When delegated authority by the ACE commander and in coordination with the senior GCE FSCC, adjusts preplanned schedules and diverts airborne assets as necessary.

   d. Coordinates the execution of direct air support missions with other supporting arms through the appropriate FSCC and, as required, with the appropriate MACCS agencies.

   e. Receives and disseminates pertinent tactical information reported by aircraft performing direct air support missions.

   f. Provides aircraft and other air control agencies with advisory information to assist in the safe conduct of flight.

   g. Monitors, records, and displays information on direct air support missions.

h. Maintains friendly and enemy ground situation displays, as necessary, to assist in the coordination of direct air support operations.

i. Provides information to other MACCS agencies concerning the friendly and enemy situation.

j. Refers unresolved conflicts in supporting arms to the senior fire support coordinator.

4. Concept of Employment.

The DASC may be task organized to support various tactical situations. The normal DASC configuration is from a ground facility collocated with the senior GCE FSCC. Optimally, this collocation will be by physical proximity, however an electronic link may be an acceptable alternative. DASC sighting requirements may differ from those of the senior FSCC because of the necessity for line-of-sight communications. An airborne DASC (DASC(A)), with limited communication nets, can also be operated from a modified KC-130 aircraft. Additionally, while practical for limited scope and duration operations, the DASC can detach elements to form smaller cells equipped with MRC series radio vehicles and man-portable radios. It is important to note that the first step in identifying the requirements for a DASC is identifying the mission. While a particular DASC configuration may be identified with a MEF, MEF (FWD), or MEU, the specific requirements for a given tactical situation will dictate the actual configuration suitable for mission success.

a. MEF/MEF (FWD).

Coordination and control of direct air support functions for MEF operations require a substantial DASC capability based on the number of TACP's that may request air support, as well as the number of aircraft anticipated. For MEF operations, the DASC is generally collocated with the division FSCC. For MEF (FWD) operations involving one or two regiments, the DASC will normally collocate with the FSCC which is responsible for coordination of all MAGTF supporting arms. In either case, the DASC must have an echelon capability in order to maintain continuous control and communication during movement periods.

b. MEU.

A MEU, centered around a Battalion Landing Team (BLT) and a composite squadron, does not normally require all the functions of the MACCS. To perform the required tasks, a task-organized MACG detachment is formed to support the MEU/ACE. The MASS is capable of deploying and employing an Air Support Element (ASE) as part of this detachment. The MEU Air Support Element is capable of directing limited air support operations and under normal circumstances should not be considered to have complete DASC capabilities.

c. The DASC is a procedural control agency, and as such possesses no radar

capability and is reliant on continuous communications with MACCS agencies (TACC, TAOC, TACP) and airborne aircraft (both fixed and rotary wing), AAW systems (Stinger/HAWK), FSCC's, external air control agencies, and others involved with direct air support operations. Information flow is critical to prompt mission success.

d. Procedural control is predicated on preplanned air direction procedures and control points, readily available to all concerned, to facilitate and coordinate the flow of aircraft to and from the battle area. Communications reliability plays a critical role in the success of air support operations. Maintaining line-of-sight communications with helicopters and other low-flying aircraft is essential to exercise procedural control.

e. Since the DASC is responsible for the control of all direct air support missions, it must maintain the current status of all preplanned, ground alert, airborne alert, and on-going direct air support missions. Likewise, the DASC must maintain the most current information available on current friendly force disposition, fire support operations planned or in progress, and the friendly scheme of maneuver. Communications with the TACC and FSCC's must be maintained to ensure that this requirement is met.

f. These requirements dictate that the DASC be positioned in a communication-friendly location. Terrain masking from enemy positions, use of directional antennas, and remoting and dispersing antennas will enhance communications and serve to reduce the electromagnetic signature of the DASC, thus enhancing survivability.

5. Interagency Relationships

a. DASC/TACC.

The DASC is subordinate to the TACC and provides for decentralized control of direct air support missions.

(1) OAS. Ideally, the ACE commander will decentralize the control of OAS by delegating authority to the MASS commander to divert airborne assets to missions with higher priority and to launch on-call OAS aircraft. If such authority is granted to the MASS commander, he will normally delegate the same authority to the watchstanders in the DASC. This serves to ensure minimum response time to MAGTF requirements. The TACC responds to the DASC requirements to fulfill requests for additional aviation support. The DASC is required to keep the TACC informed on the progress of direct air support missions, the effectiveness of the OAS

effort, and the friendly and enemy air/ground situation. The TACC will advise the DASC of changes to the ATO as they occur.

(2) Assault Support. Ideally, the ACE commander will decentralize the control of assault support missions and allow the DASC to divert and/or launch on-call aircraft to ensure minimum response time. Control of helicopters outside of the DASC's area of responsibility will be performed by the appropriate MACCS agency to maintain the flexibility to immediately divert airborne assets as mission priorities shift. In the conduct of assault support, the TACC should be primarily in the supervisory/monitor mode and respond to the DASC when additional assets are required to continue the assault support effort. The DASC, in turn, must keep the TACC informed of the status of events and the overall effectiveness of the assault support effort.

b. DASC/FSCC.

The link between the DASC and the senior FSCC is vital for coordination and integration of direct air support missions with the employment of other supporting arms, and for the expeditious processing of immediate tactical air requests and assault support requests. An immediate request is normally sent by the Forward Air Controller (FAC) to the DASC, while FSCCs monitor the request and either approve or deny. The Fire Support Coordinator (FSC) is the final arbitrator of all fire support conflicts and will decide all cases of conflicting requests for fire support assets. The FSCC must continuously provide the DASC with updates to unit boundaries and fire support coordination measures, friendly and enemy unit positions, pertinent intelligence data, and other prearranged data items as they are received at the FSCC. The FSCC provides the DASC with information on gun-target lines and trajectories in the vicinity of aircraft flight routes. The DASC is responsible to the FSCC to provide timely information on:

(a) Predicted flight paths for aircraft under DASC control.
(b) BDA.
(c) Status of outstanding requests.
(d) Pertinent intelligence data.
(e) Delays or cancellations to the ATO.
(f) Status of ongoing missions.
(g) Other prearranged data items.

(2) The FSCC is responsible to the DASC to provide timely information on:

(a) Location of friendly forces and artillery.
(b) Location and capabilities of enemy forces.
(c) TACP locations.
(d) Target lists.
(e) Overlays of the GCE scheme of maneuver.
(f) Priority of fires/effort.

(g) Approval of joint tactical air strike requests (JTARS)/assault support requests (ASRs).
(h) Plans to displace/echelon.
(i) Plans for large-scale ehlicopter/ground movements.

c. DASC/AAW Agencies.

The DASC disseminates air defense warning conditions and weapons control statuses received from the TACC and/or TAOC to applicable MAGTF elements, LAAD units, and aircraft under DASC control. This is accomplished over doctrinal communication links and by established procedures. The DASC is also responsible to provide friendly aircraft position information to air defense agencies as required to assist in the aircraft identification process. Additionally, the DASC will normally have a communication link between the appropriate controllers in each agency to effect a handover of aircraft at an established control point. The DASC may also be instrumental in coordinating any SEAD required to support ACE operations.

d. DASC/TAC(A)/ASC(A).

The Tactical Air Coordinator (Airborne) (TAC[A]) and Assault Support Coordinator (ASC[A]) are airborne extensions of and subordinate to the DASC. They may be assigned responsibilities by mission type or geographical working area. As directed, they will coordinate with the DASC, terminal control agencies, fire support assets, and aircraft operating in the appropriate area of responsibility.

e. DASC/TACP/FAC/FAC(A).

The DASC receives and processes immediate air requests from the terminal controller and keeps him advised of the status of aircraft fulfilling his request. The DASC provides direction and mission updates to aircraft prior to executing a procedural turnover to the terminal controller. This necessitates free information exchange to provide aircrew with the most complete and up-to-date information possible.

f. DASC/DASC(A).

The Direct Air Support Center (Airborne) (DASC(A)) is an airborne extension of the DASC and as such provides not only extended communications range but limited echelon and casualty capability. The DASC(A), unlike the TAC(A) or ASC(A), normally extends the coverage of the DASC over its entire AOR.

g. DASC/UAV.

Unmanned Aerial Vehicles (UAV) maintain continuous communication links with the MACCS. The DASC is kept advised of the UAV working area (utilizing control points and established routes) and altitude to ensure deconfliction with other aircraft and friendly surface delivered fires via the UAV Ground Control Station (GCS). The UAV controllers also supply real-time surveillance information that is

forwarded to the TACC/FSCC and might be critical to the friendly intelligence gathering/targeting effort.

h. DASC/ASLT.

The Air Support Liaison Team (ASLT) is made up of MASS personnel and equipment. In situations where the DASC cannot collocate with the FSCC, an ASLT may be deployed with the FSCC to maintain communications and information flow to the DASC. While the ASLT may be dual-roled as an echelon element, it will normally be extremely limited in its ability to assume any DASC functions.

6. Equipment Capabilities.

The DASC can task organize to provide a tailored facility to accomplish the mission. Whether in a large, fully capable MEF facility, or an austere, man-portable configuration, DASC personnel are equipped to maintain single-channel voice communications to all aircraft and ground units operating in today's FMF.

a. TSQ-155/OE-334.

Expandable IDASC shelter with remote radio central. Associated with MEF/MEF-FWD operations, capable of 24 radio nets and 5 phone lines at 16 crew positions. Fully transportable by 5 ton truck; may be set-up/dismantled in 1-3 hours.

b. UYQ-3A.

Shelter houses 7 crew positions with 6 internal radios, 6 external radio positions, and 6 phone lines. Transportable by 5 ton truck or may operate inside specially equipped KC-130 aircraft. Normally associated with MEF (FWD) operations or as an echelon element during periods of movement by the DASC.

c. MRC series radio vehicles and Man-portable Radios.

Often associated with MEU or echelon operations. Affords the DASC a capability to provide liaison elements to mobile ground forces or may perform limited air support functions for short durations.

7. Equipment Limitations.

The DASC possesses no surveillance radar or data link capability. It relies on positive communications and adherence to established procedures to exercise procedural control over aircraft operating in its area of responsibility. Likewise, to provide aircraft with the most current and correct information on the changing ground situation and to provide a timely response to requests for immediate air support, the DASC must maintain a continuous exchange of information flow with the ground elements of the MAGTF. This dependence on communications, particularly in a sophisticated electronic warfare threat environment, places the agency's effectiveness at great risk.

a. TSQ-155/OE-334.

A large electromagnetic signature and logistics footprint often detract from the system's ability to collocate with smaller, more mobile ground combat elements.

b. UYQ-3A.

Lack of capability to remote internal radios away from shelter detracts from system's survivability. Small crew size and limited radio availability also restricts employment to limited scope or limited duration operations.

c. MRC series radio vehicles and Man-portable Radios.

Often associated with MEU(SOC) or echelon operations. Afford the DASC a capability to provide liaison elements to mobile ground forces may perform limited air support functions for short duration.

7. Equipment Limitations.

The DASC possesses no surveillance radar or data link capability. It relies on positive communications and adherence to established procedures to exercise procedural control over aircraft operating in its area of responsibility. Likewise, to provide aircraft with the most current and correct information on the changing ground situation and to provide a timely response to requests for immediate air support, the DASC must maintain a continuous exchange of information flow with the ground elements of the MAGTF. This dependence on communications, particularly in a sophisticated electronic warfare threat environment, places the agency's effectiveness at great risk.

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Lack of capability to remote internal radios away from the shelter detracts from system's survivability. Small crew size and limited radio availability also restricts employment to limited scope or limited duration operations.

8. Crew Organization.

While the DASC crew or facility may be down-sized or expanded to meet the needs of a specific situation, the basic functioning and tasks of the agency will remain constant as they apply to air direction and responding to requests for air support.

a. Senior Air Director (SAD). The most qualified officer on watch responsible for:

(1) Overall functioning of the DASC.

(2) Coordination with external agencies.

b. Crew Chief. Normally a SNCO responsible for:

(1) Assisting the SAD.

(2) Supervising the DASC crew.

(3) Timely and accurate display of all tactical information.

c. Tactical Air Director/Helicopter Director. Commissioned Officers responsible for:

(1) The direction and coordination of Fixed/Rotary Wing aircraft.

(2) Advising the SAD on the status of aircraft under DASC control.

d. Air Support Operations Operators. Air Support Operations Operators (normally enlisted Marines) are responsible for conducting communications with agencies external to DASC (i.e., TACC, FSCC, TACP, etc..).

CHAPTER 4 POST TEST

DIRECT AIR SUPPORT CENTER

1. The _____ is the principal air control agency for the control of direct air support operations.

2. The DASC coordinates the execution of direct air support missions with the activity of other fire support means through the appropriate _____.

3. The watch officer responsible for the detailed operation of the DASC is the:

   a. FAC

   b. FSC

   c. SAC

   d. SAD

4. The DASC is primarily responsible for processing _____ air requests.

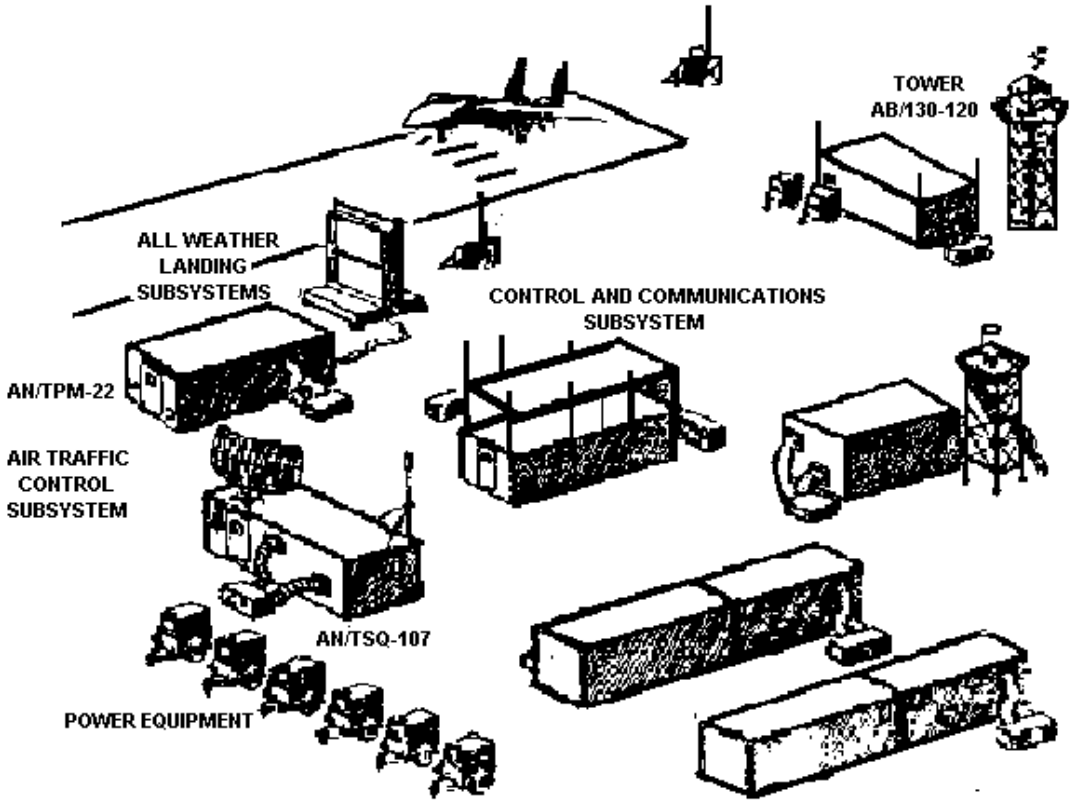
5. The DASC(A) may be utilized for limited _____ or _____ operations.

CHAPTER 5

MARINE AIR TRAFFIC CONTROL

1. Introduction. Located within the Marine Air Control Squadron (MACS) are two Air Traffic Control Detachments. The Marine Air Traffic Control Detachment is the primary terminal air control agency within the MACCS. The ATC Det is organized and equipped to satisfy the air traffic control requirements for virtually any type of forward operating base (FOB). Typically, ATC elements support FOBs ranging in size from a main air base, which is capable of handling theater lift assets, to an air site, which is used to preposition fully loaded and armed aircraft to reduce response time for preplanned and immediate missions. The FOB concept is discussed in detail in Appendix (A).

CURRENT
FLEET MARINE FORCE
MARINE AIR TRAFFIC CONTROL EQUIPMENT



2. Mission. The Marine ATC detachment provides friendly aircraft with continuous all-weather radar/non-radar approach, departure, tower and enroute ATC services within assigned controlled airspace.

3. Marine ATC Tasks.

   a. Provide radar/non-radar approach, departure, tower and enroute air traffic control services within assigned airspace.

   b. Provide precision and non-precision navigational aids (NAVAIDs).

   c. Provide Automatic Carrier Landing System (ACLS) Mode I, Mode II and Mode III approach services for FOB all-weather landings.

   d. Display and disseminate appropriate air/ground information to designated adjacent and higher agencies such as the TACC, TAOC, DASC and ground based air defense (GBAD) units.

   e. Coordinate the activation of the base defense zone (BDZ) as part of the integrated air defense system. A BDZ is an air defense zone established around an airfield. It's size is limited to the engagement envelope of the air defense weapons defending the airfield. BDZs have specified entry, exit and IFF procedures which aircrews must follow. The BDZ is discussed in detail in Appendix (C).

   f. Serve as the operational point of contact between the MACCS and National/International Civil ATC systems.

4. Concept of Employment.

   a. Marine Air Control Squadron.

   The MACS is composed of a headquarters element and a TAOC detachment and two Marine Air Traffic Control Detachments. Each ATC detachment is organized to deploy independently of the MACS headquarters when provided appropriate logistical and embarkation support.

   b. ATC Detachment.

   Each ATC detachment possesses a full range of ATC capabilities including airport surveillance radar (ASR), precision approach radar with Automatic Carrier Landing System (ACLS) capability, navigational aids (NAVAIDs), control tower, radio and data link communications and mobile power sources. This equipment

allows the MATC detachment to provide continuous, all-weather ATC services out to a range of 60 NM. An ATC detachment is normally employed at a main air base. Each detachment may provide a single Marine ATC Mobile Team (MMT) to meet MAGTF ATC requirements at air facilities or air sites. The employment of an MMT will degrade the capabilities of the ATC detachment.

c. Marine ATC Mobile Team.

A typical MMT consists of a 6 man team that may provide ATC services at an air facility or air site. MMT equipment is normally mounted in one or two High Mobility Multipurpose Wheeled Vehicles (HMMWVs) which contain communications equipment, a Global Positioning System (GPS) receiver, and a NAVAID.

d. MAGTF Employment.

Marine ATC elements have been associated with the MAGTF as follows:

(1) MEF. Normally a MEF will employ up to four ATC detachments to provide continuous all-weather services at four main air bases. Up to four MMTs may be utilized to meet short term ATC requirements at air facilities/air sites or as the first echelon in the establishment of a ATC detachment.

(2) MEF(FWD). A MEF(FWD) may employ two ATC detachments and up to two MMTs.

(3) MEU. All weather ATC services for MEU operations have been typically provided by one MMT. Tasking of the MMT is scenario dependent.

5. Interagency Relationships.

Control of MAGTF aviation assets within assigned airspace is coordinated between the ATC detachment and the TAOC under the cognizance of the TACC.

6. Casualty Operations.

In the event that an ATC detachment becomes a casualty, the all-weather ATC services and BDZ coordination which it provided must be continued. This may require transition from positive control to procedural control of friendly aircraft within it's assigned airspace.

7. Site Selection.

ATC elements should consider the following for best site selection:

a. Optimum Runway Coverage

b. Terrain characteristics such as obstructions which could cause radar masking or communications interference.

c. Sighting limits of the radars.

d. Hazards of Electrical Radiation to Ordnance (HERO).

e. Sighting configurations of other airfield services. (i.e. Refuel Point, Ordnance areas, etc.).

8. Equipment Capabilities.

An ATC detachment employs equipment that provides the full spectrum of ATC capabilities. MMTs employ more mobile equipment with fewer capabilities.

9. ATC Detachment.

An ATC detachment's equipment includes the Marine Air Traffic Control and Landing System (MATCALS), NAVAIDs, control tower, and mobile power sources. This equipment is typically associated with a main air base.

(1) MATCALS. The MATCALS, with its three subsystems, provides continuous radar approach, departure, and enroute ATC capabilities. It also collects, evaluates, and displays data and disseminates information to other MACCS agencies. The system includes:

(a) Air Traffic Control Subsystem (ATCS). TheAN/TPS-73. The AN/TPS-73 has primary radar coverage of 60 NM and secondary coverage of 120 NM. It is IFF Mode I-IV capable, possesses an Electronic Protection (EP) capability and operates in a frequency range of 2705-2895 MHZ.

(b) AN/TPN-22 Automatic Carrier Landing System (ACLS). This is a phased array radar which provides ACLS Mode I, II and III approach services for all-weather landings. It has a range of 10nm and data link (TADIL-C) capability which allows data exchange with appropriately equipped aircraft. It operates in a frequency range of 8.995-9.205 MHZ.

(c) AN/TSQ-131 Control and Communications Subsystem (CCS). This system functions as a collection point for radar data produced by the ATCS and the ACLS. The CCS is housed in either one or two shelters. It provides Processor Display System (PDS) consoles which serve as operational work stations for crew members. Each PDS has its own communications capability which provides intercom and switchboard circuits and access to HF, UHF, and VHF nets. The CCS is capable of exchanging command, tactical and situational data with other MACCS agencies via TADIL-B data link.

(2) NAVAIDs. Each ATC detachment has a dual-channel AN/TRN-44 Tactical Air Navigational Aid (TACAN) with Distance Measuring Equipment (DME). This

NAVAID provides standard high altitude service volume navigation/position information to a maximum range of 200 nautical miles. It also provides non-precision approach guidance. The frequency range for the AN/TRN-44 is 962-1213 MHz.

(3) Control Tower. The control tower contains the radios and equipment necessary to provide control of friendly aircraft within assigned airspace.

b. MMT. The MMT may utilize two highly mobile systems to provide ATC services within its assigned airspace.

(1) AN/TRC-195. This is a HMMWV mounted mobile tower designed for one controller to operate out of. It provides space for 4 radios.

(2) AN/TPN-30B Marine Remote Area Approach and Landing System (MRAALS). MRAALS is a lightweight combined precision/ non-precision NAVAID with TACAN/DME and glideslope/localizer information for aircraft equipped with an AN/ARA-63 Pulse Coded Microwave Landing System or an AN/ARN-138 Multi-Mode Receiver. Aircraft operating without this equipment can receive TACAN/DME information out to 40 NM. The TACAN upgrade is being fielded at this time. The frequency range for the AN/TPN-30B is 902-1213 MHz, 1025-1150 MHz and 15412-15680 GHZ.

(3) Remote Landing Site Tower (RLST) System. The RLST is a mobile system mounted in a HMMWV and features a communications package covering all frequency bands used routinely by MACCS agencies (HF/SSB, VHF/FM, VHF/AM, UHF/FM and UHF/AM). The RLST has a talk on the move capability and can be operated by a remote control system. The organic Global Positioning System (GPS) allows operators the ability to rapidly establish their location and to quickly facilitate the emplacement of the NAVAID. This system is due for field testing during FY97.

9. Crew Organization.

The task organization and the assigned mission will determine exact crew requirements for ATC elements. Operator positions typically required for ATC detachments and MMTs are described below.

a. ATC Detachment.

ATC detachment crews are organized into three operational sections: command, radar control and tower control.

(1) Command Section. The command section is responsible for the operations of the ATC detachment.

(a) ATC Operations Watch Officer. The ATC operations watch officer is

responsible for the detailed operation of the detachment's crew, the proper coordination between each of the detachment's sections and the effective coordination between the detachment, internal airfield units and other MACCS agencies.

(b) Radar Supervisor. The radar supervisor is responsible to the ATC operations watch officer for the operational efficiency of the radar section. This includes briefing the section on current weather, equipment and airfield conditions, the exchange and correlation of aircraft position and identification information with other MACCS agencies, the conduct of TADIL-B and TADIL-C data link operations and the coordination of EP within assigned airspace.

(c) Tower Supervisor. The tower supervisor is responsible to the ATC operations watch officer for the operational efficiency of the tower section. This includes briefing the section on current weather, equipment and airfield conditions. The tower supervisor is also responsible for coordinating and directing control of friendly aircraft operating within the assigned airspace as well as the control of air and surface vehicular traffic operating on runways, taxiways and other designated movement areas of the airfield.

(2) Radar Control Section. The radar control section is responsible for management of the air picture within it's assigned airspace. This section transmits information via data link or voice crosstell, supervises the EMCON conditions set by the TACC and employs EP as appropriate. The following major crew positions are found within the radar section.

(a) Approach Controllers. These controllers maintain radar surveillance of assigned airspace and provide ATC services to aircraft as required. They determine the separtation/sequencing of aircraft and initiate/receive radar handoffs from other control agencies. Approach control is not dependent on radar. Navigation and separation can be provided with non-radar procedures.

(b) Arrival Controllers. These controllers accept radar handoffs from the approach controller and provide ATC services for aircraft until they reach approach minimums or are handed off to the final controller.

(c) Final Controller. The final controller is responsible for the conduct of ACLS Precision approaches and ASR approaches.

(d) Data Link Coordinator. The data link coordinator is responsible to the radar supervisor for track coordination with external MACCS agencies,

the accuracy of situation displays and the orderly functioning of all data links and data interfaces.

(3) Tower Control Section. The tower control section is responsible for the control of friendly aircraft operating within the assigned airspace. The tower control section is also responsible for air and surface vehicular traffic operating on runways, taxiways, and other designated areas of the airfield. The following major crew positions are found in the tower control section.

(a) Local Controller. The local controller is responsible for maintaining a continuous visual surveillance of the airspace and other movement areas, formulating and issuing clearances and control instructions to accomplish separation between friendly aircraft and between aircraft and vehicles operating under the jurisdiction of the tower.

(b) Ground Controller. The ground controller is responsible for exercising general surveillance of the airfield and formulating and issuing ground movement clearances to friendly aircraft and vehicles operating on the airport movement area.

(c) Flight Data Operator. The flight data operator posts, relays, and coordinates friendly aircraft movement data.

b. MMT. The MMT is organized into two operational sections consisting of command and tower control.

(1) Command Section. The command section supervises the functions of the non-radar approach control and tower control sections. The command section coordinates ATC operations within the assigned airspace and is manned by the ATC operations watch officer who is responsible for the detailed operation of the MMT. The MMT officer ensures that proper coordination occurs between the MMT sections and both external MACCS agencies and internal airfield agencies.

(2) Tower Control Section. The tower control section is responsible for the control of friendly aircraft operating within the assigned airspace. This section is manned by a local controller who formulates and issues clearances and control instructions to accomplish separation between friendly aircraft and between aircraft and vehicles operating on the airfield. The local controller is responsible for maintaining a continuous visual surveillance of assigned airspace and other movement areas.

10. Maintenance and Maintenance Personnel. The ATC maintenance personnel are usually divided into four sections to support a detachment. These sections are the Communications, Radar, NAVAIDS and Auxiliary Maintenance sections. They are the key to a fully functioning detachment.

CHAPTER 5 POST TEST

MARINE AIR TRAFFIC CONTROL DETACHMENT

1. The mission of the ATC Detachment is to provide Continuous Radar _____, _____, _____ and _____ Air Traffic Control Services within assigned controlled airspace to friendly aircraft.

   a. Approach, Departure, Enroute, Tower

   b. Enroute, Surveillance, Defense, International

   c. Intercept, Surveillance, Departure, Arrival

   d. Weapons, Surveillance, Enroute, Departure

2. The Marine Air Traffic Control Detachment is part of the Marine Air Control Group and functions within the Marine Air Command and Control System as the senior air command and control agency of the Marine Air Ground Task Force.

   a. True

   b. False

3. The Marine Air-Ground Task Force employment of a ATC elements as applied to the Marine Expeditionary Force is _____ Main Air Bases and _____ Light and Mobile Teams. The Marine Expeditionary Brigade is _____ Main Air Bases, and _____ Marine ATC Mobile Teams. The Marine Expeditionary Unit is _____.

   a. 3/5, 2/4, one Marine ATC Mobile Team

   b. 4/8, 2/4, two Marine ATC Mobile Teams

   c. 4/4, 2/2, one Marine ATC Mobile Team

   d. 3/5, 2/3, one Marine ATC Mobile Team

4. The two types of Radar that the ATC Detachment employs are:

   a. Precise and Surveillance Radars

b. Pulse Acquisition and Surveillance Radars

c. Precision Approach and Surveillance Radars

d. Approach Guidance and Surveillance Radars

5. The two NAVAIDS that the ATC Detachment employs are:

a. AN/TRN-33 NDB and AN/TRN-44 TACAN

b. AN/TPN-30 MRAALS and AN/TRN-33 NDB

c. AN/TSQ-107B ILS and AN/TRN-33 NDB

d. AN/TRN-44 TACAN and AN/TPN-30 MRAALS

CHAPTER 6

LIGHT ANTIAIRCRAFT MISSILE BATTALION (LAAM)

1. Introduction. The Light Antiaircraft Missile Battalion (LAAM BN) employs the HAWK (Homing All the Way Killer) missile system. HAWK is the Marine Corps' only medium-range, low-to-medium-altitude, ground based air defense system. For a more detailed discussion of HAWK employment see OH 5-5A Employment of the Light Antiaircraft Missile Battalion.

2. Mission. The mission of the LAAM BN is to provide medium range surface-to-air missile defense for assigned areas of operations, air installations, and vital zones against low and medium altitude air attacks. As the future of LAAM Bn evolves, the mission will shift to theater missile defense.

3. LAAM Tasks.

   a. Provides for battalion operations as the medium range, ground based, surface-to-air missile component of the MAGTF Aviation Combat Element (ACE). This includes maintaining the capability of rapid deployment ashore in an amphibious operation with integral command, control, and logistic support for subordinate HAWK batteries.

   b. Plans and coordinates requirements for liaison and communications with appropriate commands to ensure integration of surface-to-air missile operations with other air, ground, and air defense operations of the Marine Corps and joint/combined forces.

   c. Provides personnel, equipment, and other support for temporary autonomous deployment of subordinate HAWK batteries to meet special tactical situations.

   d. Plans for the embarkation and movement of essential equipment of missile batteries and supporting elements aboard sea, surface, and air vessels to include helicopters.

   e. Plans and coordinates requirements with appropriate commands for the local security of all deployed HAWK batteries and supporting elements.

   f. Conducts, supervises, and coordinates the individual and unit training required to qualify HAWK batteries and supporting elements for tactical deployment and combat operations.

g. Maintains sufficient motor transport assets to simultaneously support the separate deployment of three (3) independent HAWK firing batteries and supporting elements of the Headquarters and Service (H&S) battery.

h. Maintains 3rd and 4th echelon maintenance support capabilities for HAWK peculiar equipment, limited 3rd echelon support capabilities for communications equipment and the electrical components of mobile electric power generation equipment, and organizational maintenance capabilities for all other assigned equipment.

i. Provides medical services that include emergency field treatment, operation of a battalion aid station, evacuation of casualties, and supervision of field sanitation.

j. Provides for the moral and spiritual welfare of assigned personnel.

4. Organization.

a. The LAAM Battalion.

The LAAM BN is composed of a battalion headquarters, a headquarters and service battery, and three (3) HAWK firing batteries. The Headquarters and Service battery is task organized into a Headquarters and Service battery (-) and Headquarters and Service battery detachments to facilitate logistic support of separately deployed firing batteries. See figure 6-1 for manning/organization. Each HAWK battery can deploy independently of the LAAM BN when augmented with appropriate support personnel and equipment from the H&S battery.

b. The Battalion Headquarters.

The battalion headquarters provides command of subordinate batteries of the LAAM BN. It coordinates with appropriate commands to plan for the deployment of the battalion and its separately deployable batteries. See figure 6-1 for manning/organization.

c. The Headquarters and Service Battery.

The H&S battery (-) provides supply, logistic, communication, and administrative support for the LAAM BN headquarters and HAWK firing batteries. The H&S battery detachment provides supply, logistic, and communications support for a separately deployed HAWK firing battery.

d. The HAWK Batteries.

The LAAM BN employs the HAWK system through the three HAWK batteries. HAWK batteries are composed of a battery headquarters, two identical firing platoons, a support platoon, and a maintenance platoon. See figure 6-2.

e. Concept of Employment.

The LAAM BN is organized and equipped for employment in an integrated air defense system in support of MAGTF and/or joint/combined operations or for employment in an independent/autonomous mode of operation. The LAAM BN operates as an integral element of the Aviation Combat Element (ACE). It task organizes for combat based in part on the MAGTF Commander's guidance to the ACE Commander. A LAAM BN normally supports a Marine Expeditionary Force (MEF). A firing battery normally supports a Marine Expeditionary Force (FORWARD) [MEF (FWD)]. The LAAM BN is capable of supporting 2 MEF (FWD)s simultaneously. The LAAM BN normally will not support a Marine Expeditionary Unit (MEU).

- Augments the TAOC in order to provide the MAGTF TMD.
- Provides ground based air degense (GBAD) (both theater missile(TM) and air Breathing threat (ABT) of its designated sector or vital area.
- Detects, identifies, and engages designated hostile aircraft and missiles.
- When configured with an air defense communication platform (ADCP), provides TADIL J information to USMC, Joint, and combined services.
- When able, provides low altitude cueing to nearby short-range defense (SHORAD) units via ground based data link (GBDL).

a. Detachments are employed after the designation of air defense priorities by the MAGTF or JTF Commander. Their employment is based on the air defense guidelines and employment principles listed below.

GUIDELINES	**EMPLOYMENT PRINCIPLES**
Balanced Fires	Mass
Early Engagement	Mix
Weighted Coverage	Mobility
Mutual Support	Integration
Overlapping Fires	
Defense in Depth	

b. Elements of the Air Defense Detachment will be assigned missions of general support to defend logistics areas, airfields, ground combat elements, or other vital areas as determined by the MAGTF Commander.

c. Coordination and control of LAAM BN operations are generally exercised by the TAOC and the TACC and with the use of air defense control measures as

discussed in Appendix E. The TAOC and TACC exercise such coordination and control through the LAAM BN Command Post, Battery/Platoon Combat Operations Centers, and the Battery Command Posts (BCPs).

d. Battalion Command Post.

The BN CP provides a physical grouping of the staff elements of the battalion headquarters concerned with plans, current tactical operations, and current tactical support. The battalion commander exercises command of the batteries from the BN CP. The S-3 supervises the overall functioning of the CP. Based on the tactical situation, the CP may be located with the headquarters (main), with other MACCS agencies, or it may be mobile and located closer to the firing platoons to maintain communications and logistics lines. The functions of the BN CP include:

(1) Planning, coordinating, supervising, and advising other MACCS air defense planners on the tactical employment of HAWK units.

(2) Receiving and disseminating combat information and intelligence on both the air and ground battles.

(3) Planning, directing, and coordinating the movement and positioning of subordinate units.

(4) Planning, directing, and coordinating the direct communications between the TAOC and firing platoons to the maximum extent possible.

(5) Managing and directing the effort to maintain the readiness posture of firing platoons: e.g. states of alert, system equipment status, etc..

(6) Advising air defense planners on air defense priorities and on airspace management. Conducting the requisite planning to support those priorities.

(7) Providing, as required, for the integration of LAAD units in general or direct support of the MAGTF.

(8) Coordinating with supported and defended units.

(9) Receiving and disseminating nuclear, biological, and chemical information when the situation dictates.

(10) Coordinating and providing all logistics and administrative support for the firing platoons.

(12) Conducting casualty control of the fires of HAWK batteries/platoons as

directed by the operations order for succession of control until communications can be restored or redirected to an agency with more capability.

e. Battery/Platoon Combat Operations Center (COC).
The Battery/Platoon COC is the facility where the battery/site commander exercises control of his unit. It provides a location where all of the current statutes of the unit can be displayed and monitored. Additional functions include:

(1) Provide the current air defense situation to enable the on-coming Tactical Officers (TOs) to brief their crews without disrupting the operations of the BCP prior to assuming watch.

(2) The COC also provides an excellent location for a representative from the LAAD platoon/section for surveillance coordination.

(3) The COC crew will normally monitor the following communications nets:

1 Antiaircraft Control (AAC) Net.
2 Antiaircraft Intelligence (AAI) Net.
3 Combat Information/Detection Net.
4 Tactical Air Command Net (if required).
5 Air Defense Alert Net.

5. Battery Command Post (BCP).

The BCP controls the operation of the two firing sections. It houses a Tactical Display and Engagement Control Console (TDECC), an Automatic Data Processor (ADP), a Second Data Processor (SDP), an Identification Friend or Foe system (IFF), two Radar Operator Consoles (ROCs), and communications equipment. The BCP is operated by a Tactical Officer (TO) and a crew of three or four additional Marines. The BCP enables the TO to control and direct the firing sections in order to detect, identify, evaluate, engage, and destroy hostile airborne targets.

6. Interagency Relationships.

a. The HAWK firing platoon is subordinate to the TAOC and provides for the detection, identification, engagement, and destruction of enemy aircraft. The TAOC controls and directs HAWK platoons through the BN CP and BCPs, via planning and coordination meetings, and through the use of doctrinal communications nets and air defense control procedures as discussed in Appendices D and E respectively. In order to facilitate the integration of the HAWK firing platoons to the TAOC and EW/C, the LAAM battalion is organized to provide multi-channel communications connectivity, both in terms of personnel and equipment, from each firing platoon to the TAOC or EW/C.

b. Detection. Detection of aircraft may be accomplished by the organic HAWK acquisition radars or through TAOC radars which data link track information over Army Tactical Data Link - 1 (ATDL-1) to the BCP. Early warning may also be passed by Stinger teams in outlying areas. The overall air situation, air intelligence, and equipment statutes are maintained in the BN CP where decisions are made to position platoons to ensure detection and engagement of aircraft. Early warning information can also be passed utilizing established manual cross-tell procedures over doctrinal comm nets (AAI, CI/D, ADA).

c. Identification. Identification of aircraft is accomplished by an organic IFF system at the BCP or by identification by the TAOC. Identification of aircraft is further accomplished within the parameters of established aircraft identification criteria. Examples of such criteria include evaluation of aircraft with respect to minimum risk routes, prohibited and restricted volumes of airspace, maximum/minimum safe velocities and altitudes, and appropriate IFF code response. Both detection and identification of aircraft may be passed over the AAI net.

d. Engagement. Engagement of aircraft by the platoon will be in accordance with the established mode of control. Under decentralized control, the TO directs the engagement of aircraft in accordance with the rules of engagement. In this mode the TAOC monitors the engagement and changes or cancels the engagement by exception. Under autonomous operations, however, the TO directs the engagement in accordance with the ROE without TAOC monitoring. Under centralized control, the TAOC's missile controller, using fire control orders, as discussed in Appendix E, directs engagements to the TO over the AAC net and ATDL-1. Engagements may also be conducted via control by exception as discussed in Appendix E.

7. Equipment Capabilities.

In addition to the BCP previously discussed, the HAWK system employs the following major items of equipment (See figure 6-3):

a. Continuous Wave Acquisition Radar (CWAR). The CWAR provides low to medium altitude target detection. Target information provided by the CWAR consists of azimuth, radial velocity, approach/recede status, and range. This information is processed by the ADP and displayed in the BCP.

b. High-Powered Illuminator Radar (HPI). The HPI is the HAWK system's tracking radar. It is a continuous wave radar and uses the doppler principle to lock on and track targets. The HPI can operate in one of three modes _ narrow beam, wide beam, or sector search. Narrow beam is the most common mode and permits the HPI to track one target at a time. The wide beam or LASHE (Low Altitude Simultaneous HAWK Engagement) mode uses a fan shaped beam to provide a low altitude illumination pattern allowing the HAWK operator to conduct

multiple engagements against saturation raids using a single HPI. The sector search mode is used in an Electronic Attack (EA) environment. The HPI is supported in its tracking function by an electro-optical tracking system known as the Tracking Adjunct System (TAS). HPI information is processed by the BCP and HPI ADPs and displayed in the BCP on the TDECC and ROCs.

c. Launcher. The launcher serves as a firing platform for one to three missiles. It has three basic purposes: aim the missile, send pre-launch commands to the missile, and send data to the BCP. During an engagement, after the fire command is given, the launcher activates, slaves to and tracks with the HPI, accepts lead angle positioning information from the BCP to aim the missile at a predicted intercept point, and launches the missile.

d. HAWK Missile. The missile has three functional subsystems: propulsion, guidance, and detonation. The missile is propelled by a dual-phase, solid-propellant rocket motor which develops the initial thrust to boost the missile to operational speed and sustain that speed throughout its flight. A semi-active homing guidance system uses energy reflected from the target and a reference signal from the HPI to develop guidance commands and guide the missile to the kill point. The missile warhead is detonated at the optimum point to maximize the probability of target destruction.

8. Equipment Limitations.
Though HAWK is a very capable system, it does have limitations which must be considered in planning for employment and deployment.

a. Mobility. The HAWK system is a mobile system that moves as the tactical situation dictates. Each time the unit moves, however, the system is out-of-action. Out-of-action time is a combination of the time required to march order the system, travel to a new site, and emplace the equipment. Not only is the system out-of-action, but the assets required to move HAWK are significant (13 or more 5-ton tactical vehicles for a complete firing platoon). This limitation is even greater when considering deploying the HAWK system initially by way of airlift or sealift assets in response to contingencies or crisis events throughout the world.

b. Positive Identification. The TOs ability to properly categorize aircraft is only as good as the IFF equipment (both HAWK's interrogator and the aircraft's transponder) and friendly aircrafts' ability to follow designated routes and other return-to-force procedures. In the "fog of war," the identification problem is not trivial.

c. ARM Vulnerability. The HAWK system, particularly the HPI, is susceptible to Anti-radiation Missiles. This vulnerability could cause the HAWK unit to take defensive measures which would decrease the system's overall detection and

engagement capability.

d. Site Considerations. There are restrictive site considerations which often dictate a limited number of locations for deploying a firing platoon within an operational area. These considerations include:

(1) Terrain/Radar Masking. Terrain limits HAWK capabilities by causing radar masking. Irregularities in the terrain create areas in which aircraft could fly undetected.

(2) Terrain Slope and Firmness. The terrain at HAWK locations must be fairly level and firm with adequate drainage. It must be level (not more than a 10 degree slope) to allow equipment movement, positioning, and placement. It must be firm enough to support the heavier pieces of HAWK equipment.

(3) Access. A HAWK unit requires substantial support for maintenance, repair parts, fuel, and general supplies. This requires roads to and from the site, as well as within the site. If roads do not exist or if they are unsuitable for travel, a helipad must be constructed for air delivery of support.

(4) Area Size. An area about 200 by 600 meters is required for a HAWK firing platoon to emplace its equipment.

e. Firepower. The addition of LASHE is designed to address HAWK's previous limitation of engaging only one aircraft per HPI. LASHE, however, can only be used to engage close range and low altitude (within the CWAR's acquisition coverage) aircraft. Additionally, each firing platoon has a maximum of only 12 ready-to-fire missiles on its launchers. During saturation raids this supply can be rapidly depleted and launcher reloading can be a time-consuming process depending on crew proficiency, weather, terrain, and night vs. daytime reloading operations.

f. Missile Signature. A HAWK missile creates a large backblast when fired. The backblast is highly visible, especially in dry, dusty areas. This cloud of smoke and dust will assist a threat pilot in locating the missile unit, as well as possibly giving him sufficient reaction time to avoid missile intercept. The HAWK system also produces significant infrared, electronic, visual, and audio signatures. It should be noted that most of these limitations can be at least partially overcome with creative tactics and rigorous training.

9. Crew Organization.

The major crew positions for the operation of the BCP are the Tactical Officer (TO), Radar Operator (RO), and Second Radar Operator (SRO).

a. Tactical Officer. The TO controls air defense operations from the BCP. He is

primarily responsible for system integration and the control of threat engagements. He monitors the platoon status from the Tactical Display and Engagement Control Console (TDECC) in the BCP. This console displays radar video from the Continuous Wave Acquisition Radar (CWAR) as well as the Identification Friend or Foe interrogation results, data link surveillance information from the TAOC, and computer symbology and target engagement information from the unit's two firing sections. The TO maintains the AAC net and the platoon internal communication nets.

b. Radar Operator. The RO assists the TO in performing his duties. The RO maintains engagement and radar status through the TDECC and operates the Radar Operator Console (ROC) which displays all the information necessary to monitor and conduct High Powered Illuminator (HPI) and Tracking Adjunct System (TAS) target engagements in a clear or Electronic Attack (EA) environment. The RO receives target engagement and fire control orders from the TO. The RO monitors the AAI net.

c. Second Radar Operator. The SRO operates the Second Radar Operator Console (SROC) which contains the controls to monitor and conduct HPI and TAS engagements in a clear or EA environment with the second fire section.

d. Other Crew Positions. In addition to the TO, RO, and SRO, the BCP will normally also be manned by a communicator and an ADP/SDP/IFF operator/technician.

CHAPTER 6 POST TEST

LIGHT ANTIAIRCRAFT MISSILE BATTALION

1. The LAAM Bn provides _____ range surface-to-air missile defense for assigned areas of operations, air installations, and vital zones against _____ and _____ altitude air attacks.

2. The HAWK firing platoons provide for the detection, _____, _____, and destruction of hostile airborne targets.

3. The _____ is used to monitor and control firing operations of a firing platoon.

4. The _____ provides low to medium altitude target detection.

5. The HAWK system's tracking radar is the _____ .

6. The HPI can operate in one of three modes _ _____ beam, _____ beam, or _____ search.

7. The HAWK missile uses a _____ _____ guidance system to develop guidance commands and guide the missile to the kill point.

8. The _____ controls air defense operations of the firing platoon from the BCP.

9. The major crew positions of the BCP are _____ _____ , and _____ .

10. The _____ is where the battery/site commander exercises control of his unit (HAWK Firing Platoon) and provides a location where all of the current statutes of the unit can be displayed and monitored.

CHAPTER 7

LOW ALTITUDE AIR DEFENSE BATTALION (LAAD)

1. Introduction. The Low Altitude Air Defense Battalion (LAAD BN) employs the Stinger guided-missile system. Stinger is the Marine Corps' short range, low altitude ground based guided-missile air defense system. The Stinger is capable of engaging and destroying hostile, low-flying, fixed and rotary-wing aircraft, and reconnaissance drones. For a more detailed discussion of LAAD BN employment, see FMFM 5-52 Employment of the Low Altitude Air Defense Battalion.

2. Mission. Effective air defense operations are essential to executing an amphibious operation and must be responsive to the needs of the MAGTF. The LAAD BN provides close-in low altitude surface-to-air weapons fires in defense of forward combat elements, vital areas, and installations. It also provides surface-to-air weapons support for units engaged in special/independent operations. As an element of the MAGTF Integrated Air Defense System (IADS), coordination and control of LAAD BN operations are generally exercised through the MACCS.

3. LAAD Tasks

   a. Maintain a primary capability as a highly mobile, man-portable, surface-to-air weapons component of the MAGTF with the ability to rapidly deploy in the assault echelon of an expeditionary operation.

   b. Provide for the separate deployment of subordinate batteries and platoons to accommodate special tactical situations and task organization.

   c. Plan and coordinate requirements for liaison and communications with appropriate commands to ensure the most effective integration of LAAD units within the IADS.

   d. Provide early warning of hostile air threats to other elements of the air defense system.

   e. Conduct individual and unit training to qualify subordinate LAAD batteries for tactical deployments and combat operations.

4. Organization.

   The LAAD battalion (see figure 7-1) is organized to provide LAAD capabilities consistent with the type of MAGTF and the scope of the air defense plan.

a. Battalion Headquarters. The battalion headquarters (HQ) is organized to provide command of subordinate batteries and to accomplish those command and staff functions necessary to fulfill the battalion's mission. The battalion HQ consists of a HQ section, S-1 section, S-2 section, S-3 section, and S-4 section.

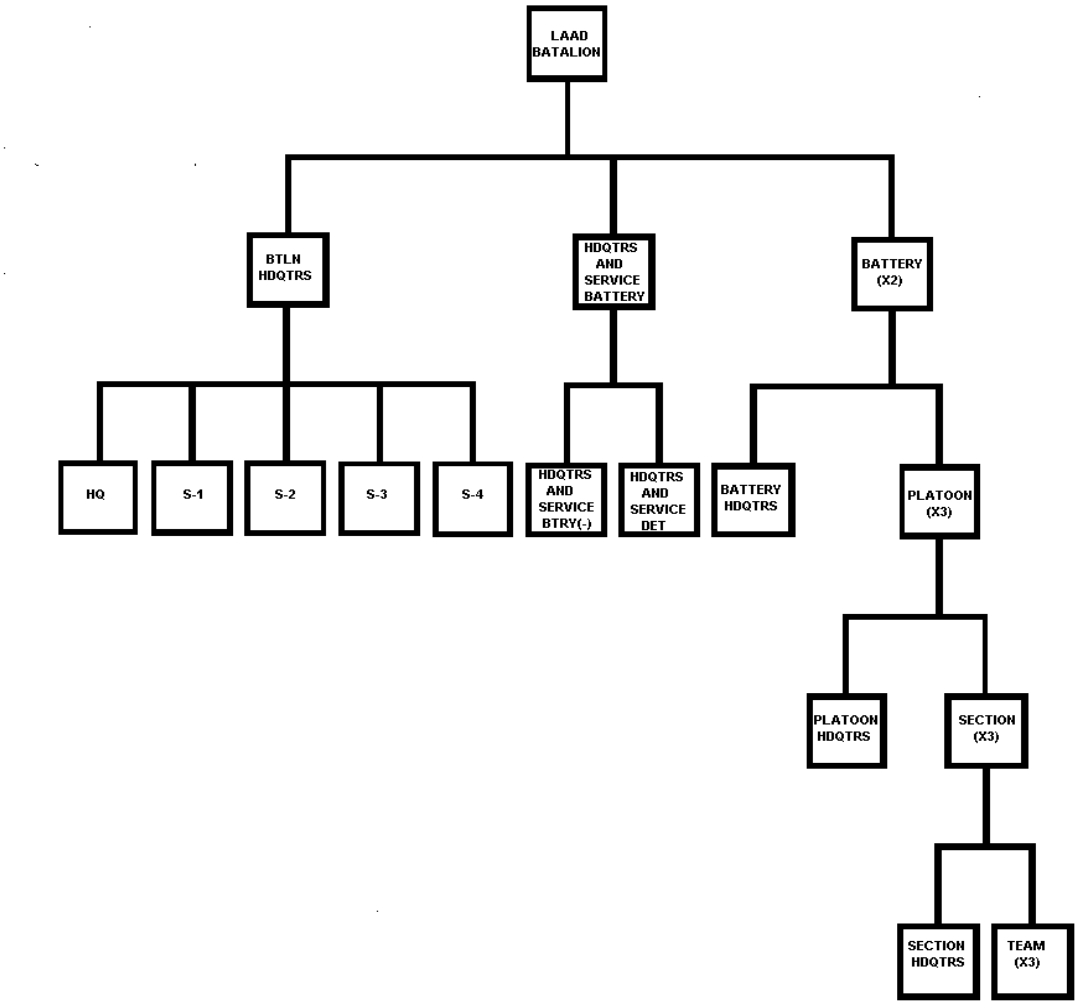


FIGURE 7-1

b. Headquarters and Service Battery. The headquarters and service (H&S) battery is organized and equipped to provide the battalion with supply, logistics, communications, and administrative support. The H&S battery is task organized into an H&S battery minus (-) and an H&S battery detachment which can be deployed separately to support two simultaneously deployed firing batteries.

Depending on the size and scope of the operation, the H&S battery may be augmented with personnel from the battalion HQ for additional administrative, intelligence, operational, and logistical support.

c. Firing Battery. Each firing battery has a battery HQ and three firing platoons. The battery HQ consists of the battery commanding officer, the battery executive officer, the battery first sergeant, and S-1, S-3/Training, and S-4/Supply personnel.

d. Firing Platoon. Each firing platoon has a platoon HQ and three firing sections. The platoon HQ consists of the platoon commander, the platoon sergeant, and two radio operators/ drivers.

e. Firing Section. Each firing section has a section HQ and five firing teams. The firing section is the smallest tactical unit of the LAAD battalion. The section HQ is composed of the section leader and two radio operators/drivers.

f. Firing Team. The firing team consists of a team leader/gunner and a gunner/driver. Both team members are trained as gunners and in communications, target detection, and aircraft recognition. Normally, the gunner/driver will actually fire the Stinger missile, allowing the team leader to evaluate targets and make engagement decisions. However, during periods of intense enemy air activity, both may act as gunners to increase the team's rate of fire.

5. Concept of Employment.

The LAAD BN is organized and equipped for employment in an integrated air defense system in support of MAGTF and/or joint/combined operations or for employment in independent/special operations. It task organizes for combat based in part on the MAGTF Commander's guidance to the ACE Commander. LAAD BNs normally support the four types of MAGTFs as follows:

a. MEF. An entire LAAD BN comprised of an H&S battery and two firing batteries of three firing platoons each. An additional firing battery and supporting H&S element may deploy in support of a MEF also.

b. MEF(Fwd). A LAAD firing battery and a supporting H&S element will normally support a MEF(Fwd).

c. MEU. A LAAD platoon will doctrinally support a MEU. The LAAD platoon's employment will be determined by the MEU commander. Although the LAAD element can provide basic air defense support of the MEU's GCE against a minimal threat, an increased threat during sustained operations ashore or displacement of MEU, ACE, and CSSE assets ashore will require increased

LAAD assets to augment the MEU. Lack of available shipping combined with the MAGTF Commander's priorities normally dictates that only a LAAD section support a MEU.

d. Special Purpose Force (SPF). The SPF is a small MAGTF configured to accomplish missions for which the MEF, MEF(Fwd), and MEU are inappropriate. It can be configured, trained, and equipped to conduct a wide variety of conventional and other operations. It can be deployed by amphibious or commercial ships, tactical or strategic airlift, or by organic Marine Corps assets. This force is normally composed of Marines highly trained in day/night operations including insert/extract, raid, and strike operations. It may possess extensive surveillance and reconnaissance capabilities including unmanned aerial vehicles, radio reconnaissance, and counterintelligence assets, as required. It can be employed in a variety of missions including mobile training teams, security assistance operations, and small independent action forces. There is no particular LAAD unit associated with an SPF. Application of the LAAD employment planning process detailed in FMFM 5-52 will determine the SPF's LAAD requirements.

e. The size of LAAD units required to support a specific operation will depend on the MAGTF commander, principal subordinate element commanders, and anticipated tactical situation. These requirements will also determine whether deployed LAAD units will be assigned a general support or direct support mission. General support is the preferred mission assignment for LAAD units of platoon size and larger. It affords the LAAD unit commander the flexibility to rapidly reposition his assets to meet changing tactical situations and to provide the best possible air defense in depth coverage for the MAGTF. A LAAD element, when assigned a direct support mission, must position and maneuver its firing units to complement the scheme of maneuver of the supported unit. The mobility of the LAAD system enables it to accompany the first elements of the landing force ashore and to provide the initial MAGTF organic ground-based air defense capability.

f. Command and control of LAAD units will vary depending on the size of the operation, types of MACCS agencies employed, and mission assigned to the unit. Internal to the LAAD BN, command and control is exercised through Command Posts established from the platoon through the battalion level.

(1) Battalion Command Post. The Bn CP is a physical grouping of the staff elements of the battalion headquarters concerned with plans, current tactical operations, and current tactical support. The battalion commander exercises command of the batteries from the CP. The S-3 supervises the overall functioning of the CP. The heart of the LAAD battalion's CP is the COC. From the COC, necessary staff personnel (normally the battalion's S-2 and S-3 officers) supervise LAAD battalion operations, obtain and relay

intelligence and combat information, and make recommendations to the battalion commander so he can make appropriate and timely decisions. The internal arrangement, operation, and displacement of the CP and its COC should be prescribed in a battalion SOP. In order for the staff to function properly, communications from the COC to subordinate units, appropriate MACCS agencies, and higher headquarters must be established and maintained. The LAAD battalion may also operate a battalion rear. A battalion rear may be established to coordinate administrative and logistic matters - movement of personnel, supplies, and equipment from and to the rear; medical evacuation of dead and wounded Marines; and coordination of bivouac arrangements when and if the battalion gets rest and relaxation time in the rear. The S-1 and S-4 officers usually coordinate the establishment, operations, and movement of the battalion rear.

(2) Battery/Platoon Command Posts. Battery and platoon commanders also establish CPs. The battery CP is manned by the battery headquarters personnel consisting of the battery commanding officer, battery executive officer, battery first sergeant, operations chief, and field radio operators/vehicle drivers. The battery CP provides the battery commander the capability to monitor missions and make recommendations to the battalion and/or supported unit commander about present and future operations. The battery CP directs the maneuvering of subordinate units and coordinates their logistics. Fire control is indirectly controlled by the battery CP by relaying intelligence, combat information and current air defense control measures including:

(a) Airspace Control Measures
(b) Rules Of Engagement (ROE)
(c) Air Defense Warning Conditions
(d) States of Alert (SOA)
(e) Weapons Control Statuses

The platoon CP is manned by the platoon headquarters personnel consisting of the platoon commander, the platoon sergeant, and field radio operators/vehicle drivers. The platoon CP functions are the same as the battery CP but focused on platoon level operations.

g. Interagency Relations. There are a variety of organizations within the MACCS with which LAAD units may choose to collocate their CPs. Regardless of the locations chosen for the LAAD CPs, each must be close enough to the battle so the LAAD unit commanders can maintain appropriate C^2 of subordinate units. Additionally, the LAAD unit commanders should locate their CPs so as to optimize their battlefield situational awareness through access to early warning/cueing information, ground scheme of maneuver, ground and air intelligence updates, etc..

h. Equipment Capabilities

(1) Stinger Missile System. The weapon utilized by the LAAD BN to accomplish its mission is the Stinger missile system. The Stinger weapon is a man-portable (34.5 pounds), shoulder-fired, passive Infrared (IR) or IR/UV homing guided-missile system. Stinger is a true fire and forget missile. It requires no guidance control from the gunner after firing, thus allowing him to take cover, move to an alternate position, or engage additional targets. Stinger also has an integral IFF subsystem that aids gunners in identifying friendly aircraft. Operations at night or in adverse weather conditions are restricted by the gunner's ability to detect and visually identify the target. The Stinger is designed to counter high-speed, low-level, fixed-wing aircraft. It is also lethal against rotary wing, observation and transport aircraft.

(2) LAAD doctrinal communications are conducted through the following nets and as discussed in Appendix D:

(a) LAAD Battalion Command Net (HF)
(b) LAAD Command Net (HF)
(c) LAAD Weapons Control Net (HF)
(d) LAAD Team Control Net (VHF)

i. Equipment Limitations. Though Stinger is a very capable and lethal system, it does have limitations which must be considered in planning for employment and deployment.

(1) Basic Load. A LAAD Team deploys with a Stinger vehicle and a basic load of 6 missiles. With teams deployed throughout a MAGTF's AOR, missile re-supply becomes a significant challenge in a high air threat environment. Further, if the team reverts to foot mobile operations, then the team will be limited to one or two missile firing capability.

(2) Terrain and Weather. Terrain and weather may degrade either the capability of the operators or the weapon system itself. Those which most affect the Stinger system are as follows:

(a) Sun - The sun can cause IR saturation of the missile seeker.

(b) Clouds, Fog, Rain - They may not only reduce the LAAD team's ability to detect the target visually but will decrease the capability of the seeker to acquire IR from the target.

(c) Rocks - In a desert environment, rocks may generate a large IR signature and thus make it difficult for the gunner to determine if the IR source is

the target or reflected IR from the background terrain.

(3) Night Operations - LAAD teams will not normally be employed at night due to insufficient methods, training, and equipment for searching assigned sectors of fire, as well as acquiring and identifying targets. Tactics, procedures and systems are currently being developed to give LAAD a night engagement capability, and the ability to discriminate between friendly and hostile aircraft.

(4) Positive Identification. The Stinger team's ability to properly categorize/identify aircraft is only as good as the IFF equipment (both the Stinger system's and the aircraft transponder) and the team's visual ID expertise. In the "fog of war" with many of our potential adversaries flying the same airframes as friendly forces, the identification problem becomes significant.

(5) Early Warning/Cueing. Teams still continue to rely on visual search and scan techniques and cueing from any available MACCS agency. This cueing however, if available may be passed through one or more COCs/CPs prior to being received by the team. The LAAD BN also possesses the TDAR (Tactical Defense Alert Radar) which is a rugged, lightweight, transportable radar system. It provides cueing and early warning with a range of 20 kilometers for fixed wing aircraft/10 kilometers for rotary wing aircraft and helicopters.

(5) Crew Organization. The LAAD BN is not organized by crew; rather the organizational structure of teams, sections, platoons, batteries, and battalions directly equates to tactical organization.

CHAPTER 7 POST TEST

LOW ALTITUDE AIR DEFENSE BATTALION (LAAD)

1. The LAAD BN provides close-in _____ surface-to-air weapons fires in defense of _____, _____, and _____.

2. LAAD unit commanders will locate their CP's so as to optimize _____, through _____, _____ etc.

3. Two limitations of the Stinger Missile System are the effects of _____ and _____.

4. Stinger teams utilize _____, _____ as a means of positive identification of aircraft.

5. _____ is the smallest tactical element of the LAAD BN which would be tactically employed.

CHAPTER 8

MARINE WING COMMUNICATIONS SQUADRON

1. Marine Wing Communications Squadron (MWCS). The MWCS is the primary communications organization within the Marine Aircraft Wing (MAW), and is a subordinate squadron to the Marine Air Control Group (MACG). To operate effectively in support of ACE operations, the communications architecture must interface the ACE, MACCS agencies, and forward operating bases into an integrated system. The responsibility for design, installation, operation and maintenance of the communications system rests with the Marine Wing Communications Squadron (MWCS). It is essential for operational planners to understand that without the communications support of the MWCS, the ACE and the MACG would not be able to adequately complete the mission of the Marine Aircraft Wing (MAW).

2. Mission. The MWCS is tasked to install, operate, and maintain expeditionary communications for the ACE of a MEF.

3. Organization. MWCSs 28/38 consist of a Headquarters and two MWCS Detachments. MWCS-18 (WESTPAC) consists of a Headquarters element and one MWCS Detachment. The detachment will be made up of a Detachment Headquarters and six operational platoons.

4. Concept of Employment. The MWCS detachment headquarters and the operational platoons will normally deploy and collocate with the ACE headquarters. The MWCS detachment is commanded by a major. Personnel and equipment from the operational platoons will be tasked out as required to support the integration of MACCS agencies into a single system, as well as supporting the ACE headquarters. MWCS detachments are tasked to support two forward operating bases and, if possible, will support external communication requirements at up to two additional airfields. The MWCS detachment is organized to provide external single channel radio, tactical telephone and message center service to a supported airfield and those units located there. Internal airfield communications are the responsibility of the Marine Wing Support Squadron's (MWSS), Communications Platoon. The MWCS provides single and multichannel radio, tactical telephone, communications center, and information systems support to the ACE commander and his staff as well as to the TACC of the MACCS. Additional tasks include providing command guidance and support to the MWCS detachments, connectivity and entry into the MACCS for subordinate agencies, and maintenance support to units of the ACE as required.

5. Mission Tasks. At the present time, HQMC has not officially promulgated a mission

statement or concept of employment. The concepts presented here are presently under evaluation by the MWCS in the FMF. The following missions will be fulfilled by the MWCS, regardless of it's organization.

a. Provide for the effective command of subordinate detachments.

b. Assist in the systems planning and engineering of ACE communications for command and control of the MAGTF aviation assets. Provide technical assistance in the planning of ACE communications for command and control of MAGTF aviation assets. This is a planning process involving the MWCS, the MACG S-6, and the ACE G-6/S-6. Planning is based on the MAGTF mission, ACE tasking and both the MAGTF and ACE concept of operations.

(1) Communications Control (COMMCON). The MWCS is tasked with providing Communications Control (COMMCON) for the ACE. Doctrinally, COMMCON is defined as "a method through which the organizing, directing, controlling, coordinating, planning, and evaluating of communications resources are accomplished." COMMCON is divided into three major functional areas:

(a) Systems Planning and Engineering (SPE). This is a function coordinated with the G-6/S-6 that includes determining the number of circuits needed, circuit routes, and designing switching and Operation System Control Centers.

(b) Operational Systems Control (OSC). The principle purpose of OSC is to ensure that all available circuits are used to the best advantage to fulfill the requirements of the communications system. The OSC staff is responsible for the day-to-day operation of the communication system and compiling data for use in long range planning. This staff is normally the S-3 of the MWCS or the Comm Bn as appropriate. This function is performed through the use of an Operational System Control Center (OSCC). The OSCC is the communications control facility, subordinate to the OSC staff, which controls the entire communications system as one cohesive entity to provide reliable communications support for the command.

(c) Technical Control (TECHCON). TECHCON is the means of providing centralized technical supervision over the installation, operation and maintenance of the communications system. This is accomplished through the establishment of a Technical Control Facility (TECHCON FAC) using the AN/TSQ-84, SB-4097, or the SB-3659 patch panels and associated equipment for circuit monitoring and restoration purposes.

c. Provide the senior MAGTF ACE Operational Systems control Center for ACE communications systems. The ACE senior OSCC is the sole coordinating

agency for communications connectivity outside the ACE. Although this function is also performed by the different agencies, i.e. TAOC & DASC, and commands, i.e. MWSS, for their individual units, they are still responsible to the MWCS for overall COMMCON.

d. Provide the senior airfield OSCC at up to two airfields per detachment. The MEF ACE OSCC/senior airfield OSCC will advise and coordinate with subordinate OSCCs to include Marine Wing Support Group/Squadron (MWSG/MWSS) and MACCS agency OSCCs established to control ACE digital backbone connectivity entering MWSG/MWSS, MACCS agency subscriber/circuit switches, and single cannel radio.

e. Provide digital backbone communications in support of the ACE CE, expeditionary airfields, and the primary agencies of the MACCS for up to two (2) forward operating bases (FOB), excluding LAAM Bn links. The AN/TRC-170 and AN/MRC-142 are the primary multichannel/multiplexed radio systems employed to support the channel/trunk requirements of the MACCS and airfields utilized for ACE operations. MWCS will ensure the ACE commander has connectivity with his subordinate commanders, MACCS agencies, and forward operating bases. The LAAM Bn to TAOC links are normally established and maintained by the LAAM Bn.

(1) Transmission Means

(a) Line of Sight: this method has a range of approximately 11 miles for SHF systems, approximately 35 miles for UHF system and 50 miles or the VHF system. This range can be extended or restricted by terrain since distant antennas must have unimpeded line-of-sight to establish the link.

(b) Obstacle Gain Diffraction: The range of this method is variable between 11 to 40 miles and uses a hard man-made or natural object as a means of refracting energy. The terminating ends of the MUX link direct their antennas towards the highest point of a predetermined fixed object and use the diffractive characteristics of Super High Frequency (SHF) energy to bend the energy form back to the surface of the earth.

(c) Troposcatter: The last method of establishing a SHF MUX link uses the troposphere and the reflective properties of SHF energy to secure the link. The terminating ends of the link orient their antennas in a predetermined direction and elevation to reflect the SHF energy off the troposphere and back to the surface of the earth. This method has a range of 60 to 100 miles which is sometimes difficult to obtain because of atmospheric conditions.

(2) Equipment

(a) AN/TRC-170 (V3). The AN/TRC-170 is a transportable, multiplexed communications system capable of transmitting and receiving digital data over varying distances up to 100 miles with a frequency range of 4.4 to 5.0 GHz. The AN/TRC-170 is capable of providing up to 144 individual full duplex digital channels at 16 or 32 Kbps. The two KG-194s are used for bulk encryption while a KY-58 is used to encrypt the order wire channel. In addition, the USMC version of the AN/TRC-170 has a distinct antenna system called the OE-468. This system is a member of the TRI-TAC family of radios and switchboards.

Capabilities	Limitations
-Up to 144 digital secure channels	-(4) wire system while most MACCS operational shelters are (2) wire
-Mobile, 30-45 min set up time	
-Black box maint.	
-Extremely clear voice comm	
-Digital to analog interfaces	
-3 means of establishing interfaces link path	

(b) AN/MRC-142. The AN/MRC-142 provides short-range UHF line-of-sight wideband multiplexed communications over a distance of up to 35 miles. Its frequency range is 1350 to 1850 MHz. The AN/MRC-142 is capable of SECURE digital communications with a KG-194 for bulk encryption and a KY-57 for order wire encryption. The number of available channels dependent upon the loop rate setting within the communications system. For example, if the loop setting is 16 kbps the number of channels available is 9 and if the setting is 32 kbps the number of channels is 18. However, one channel is always devoted to timing and order wire usage. This system is member of the TRI-TAC family of radios and switchboards.

Capabilities	Limitations
-Bulk encryption	-Strictly LOS

-Mobile, 30 min set up time	-Limited antenna adjustment
-Compatible with TRI-TAC equipment	-Low power
-(4) wire system	-Must use RMC or SB-3865 to interface with analog communications systems
-Up to 18 channels	
-Extremely clear	

f. Provide tactical automated switching and telephone services for the ACE CE and Tactical Air Command Center (TACC) at one airfield and up to three additional airfields as required. The tactical automated switching system provides multiple subscriber telephone access throughout the MAGTF. The introduction of secure digital switching equipment provides the ACE Headquarters, MACCS agencies and ACE units secure and non-secure telephone service throughout the AOA. The Tactical Automated Switching System (TASS) is established using the AN/TTC-42 and SB-3865 Unit Level Circuit Switch (ULCS) for digital secure and non-secure telephone service. Analog non-secure and hybrid circuit interface is provided by the switchboard SB-3614.

(1) AN/TTC-42 (V). The AN/TTC-42 (V) is a sheltered telephone central office that provides automatic switching service and subscriber service functions to the TRI-TAC family of four-wire, digital secure and non-secure voice terminal telephone instruments (DSVT's) and four-wire digital trunks, including both single channels and Time Division Multiplex (TDM) groups. The AN/TTC-42 (V) allows automatic and semi-automatic switching for selected analog loops and trunks and is configured to provide switching at 16 kbps or 32 kbps.

Capabilities	Limitations
-100 subscribers	-Number of analog subscribers effected by number of digital and analog cards used
-7 Digital Trunk Groups	
-Digital System	
-Faster dialing	

(2) SB-3865 (P)/TTC. The SB-3865 (P)/TT is a team transportable telephone switchboard that provide automatic switching service functions to the TRI-TAC

family. This unit will provide switching service to and from a variety of digital and analog loops and trunks. A single line can provide automatic switching for 30 lines and up to 90 lines by stacking units. The SB-3865 is capable of trunking with the AN/TTC-42.

Capabilities	Limitations
-Two man portable	-Number of terminations
-Capability to stack 3 switches	-Synchronizing with master switch must be exact
-System can be remotely keyed off master TTC-42	-No (2) wire interface (unless w/SB-3614 hybrid stack)
	-Limited analog interface

(3) SB-3614 (V)/TT. The SB-3614 Telephone Switchboard provides service to (2) wire Common Battery Signaling (CBS) lines, 20 Hz ringdown (RD) lines or trunks, common battery dial pulse or DTMF lines, and (2) wire tone signaling trunks over 15 links in a non-blocking matrix arrangement. The unit itself has 30 lines/trunk, but interconnection with 2 additional SB-36714's provides 60 or 90 lines/trunks. The SB-3614 is also capable of being hybrid stacked with the SB-3865.

Capabilities	Limitations
-(2) or (4) wire interface with old 20 Hz system	-Unsecure
	-Slow call processing
-Commercial interface possible	-Trunks and point-to-point circuits limited by number of typecards
-Can interface with in the switchboard new ULCS switches	

(4) TD-1234, Remoter Multiplexer Combiner (RMC). A key component of the TRI-TAC family radios and switching systems. Provides a combination of up to (8) digital or analog circuits and is (4) wire only. The RMC is generally used in three modes: to remote encrypted telephone access, two miles without a repeater or four miles with a repeater, for a SB-3865, an AU/TTC-42

or an AN/MRC-142; for point-to-point communications for (4) wire communications; or a combination of the two.

g. Provide electronic message distribution for the ACE CE, primary MACCs agencies, and tenant units. Provide message center services for the TACC and TAOC, main air bases and air facilities of the ACE, and units utilizing those facilities. Receipt and transmission of Genser/SI message traffic can be accomplished through the use of a variety of computer and communications networking systems. This allows the ACE, through the MAGTF, to interface with CONUS activities via major communications nodes such as Naval Computer and Telecommunications Area Master Stations (NCTAMS), naval Computer and Telecommunications Area Master Station Detachments (NCTAMS DETS), or Naval Communications Stations (NAVCOMSTA).

h. Provide single-channel radio support for ACE external communications as required. The AN/MRC-138 or AN/GRC-193 long haul HF radio systems are used by the TACC for primary command and control single channel circuits. The AN/MRC-110-AN/MRC-145 and AN/PRC-77-AN/PRC-119 VHF radio systems are used by the TACC for primary command and control single channel circuits. The AN/MRC-110-AN/MRC-145 and AN/PRC-77-AN/PRC-119 VHF radio systems are used for secondary communications and their use is limited due to range and terrain considerations. Additionally, the MWCS tasks include voice communications support for forward operating bases of the ACE.

(1) AN/GRC-193B or AN/MRC-138B. The radio sets AN/GRC-193B and AN/MRC-138B are the most frequently employed HF long haul radios. They are capable of providing HF single side-band (SSB) voice and data communications stations for fixed (AN/GRC-193B) or mobile (AN/MRC-138B) applications. The radios operate in the 2.0000 to 29.9999 MHz frequency range with a peak output of 400 watts.

Capabilities	Limitations
-High power, HF	-Encryption devices unreliable with heavy voice distortion
-Long range with proper antenna and good propagation study	-Knowledge base of operators

(2) AN/MRC-110. The radio set AN/MRC-110 is used as an alternate means of single channel radio communications within the MACCS. It is capable of providing encrypted VHF single channel voice and data communications, to include repeater sites, for mobile applications. This radio operates in the 30

to 75.95 MHz frequency range. The AN/MRC-110 is capable of transmitting over distances of 40 miles.

(3) AN/MRC-145. The AN/MRC-145 is a vehicle mounted VHF/FM radio with an operating frequency of 30 to 87.975 MHz. This radio operates in the single channel or frequency hopping mode. This radio system includes two receiver-transmitters that provide long range communications (and retrans capability) with a range of approximately 21 miles. This system has the capability to process digitized information from 600 to 4800 bps with an internal cryptographic capability. This radio system replaces the AN/MRC-110.

i. Provide deployed Wide Area Network (DWAN) and deployed Local Area Network (DLAN) server support for the ACE CE and primary MACCS agencies. There are three general categories of networks based on the size and/or scope of employment. The three categories of networks as well as the various types of equipment used are:

(1) Types of Networks

(a) Local Area Network (LAN): A LAN can best be described as a undetermined number of servers linked together within an area of responsibility. All of the linked servers on MCAS Cherry Point would be an example of a LAN.

(b) Wide Area Network (WAN). A WAN is the incorporation of several LANs to increase the overall coverage and accessibility of information. The linking of all the servers at MCB Camp Lejuene, MCAS Cherry Pt, MCAS New River, MCRD Parris Island, and MCAS Beaufort would form a WAN.

(c) Theater Area Network (TAN): The largest of local area networks is the TAN which incorporates the WANs of a theater(s) into one network.

(2) End User Computing Equipment (EUCE)

(a) Green Gear

1 AN/UYK-83/85s. The AN/UYK-83/85s are rugged, TEMPEST and EMI protected computer based systems. Approved for field use by the USMC. Both are provided with a variety of software and hardware which support the systems.

2 Lightweight Computer Unit (LCU). LCUs are current (486 based) computers that are replacing the older AN/UYK-83/85s. The system is not yet completely fielded.

-Ruggedized	-Limited floppy drive options
-TEMPEST	-hard to upgrade
-EMI Protected	
-Repairable through MIMMS	

3 White Gear. These computers are the commercial computer systems that are purchased to fill the T/E shortfalls of AN/UYK-83/85s.

Capabilities	Limitations
-Easily configured	-Not ruggedized
-System compatibility with new software	-Not TEMPEST
-Increased capabilities	-Not EMI protected

j. Provide calibration and repair of all ground common Test Measurement Diagnostic Equipment (TMDE) within the ACE.

k. Provide cryptographic repair services for all ground common and MACCS assigned communications security equipment within the ACE.

l. Provide 3d echelon maintenance support for ground common communications/electronics equipment held by MWSG units.

m. Plan and coordinate individual and unit training as required to qualify subordinate detachments for tactical deployment and combat operations.

6. Command Relationships for MWCS.

a. Responsibilities to the ACE Commander:

(1) Responsibilities. The MWCS is responsible for providing communications support for the ACE Commander, his headquarters staff and agencies of the MACCS. These tasks are traditionally supported from MWCS T/E and T/O.

(2) Networks. Specific functions such as Computer Networks, (LANs/WANs/TANs), Communication Center service and the personnel

requirements are a shared and coordinated responsibility of the MWCS and the ACE G-6/S-6. The G-6/S-6 Information Systems Management Office (ISMO) manages and implements computer assets within the ACE other than assets in the data comm platoon of the MWCS.

(3) Staff Requirements. The requirements of the ACE headquarters staff are traditionally processed through the G-6/S-6, who in turn coordinates with the MACG S-6 for the tasking of the MWCS to provide all services required to support the ACE commander and his staff.

(4) Annex K. The drafting of the Annex K of the ACE OpOrder is a coordinated effort of the MWCS, MACG S-6 and ACE G-6. The G-6 will usually coordinate all external communications support with higher and adjacent headquarters. This information is then integrated into an Annex K that reflects all the appropriate need lines for the expeditious flow of information to all elements requiring it.

(5) G-6/S-6. The G-6/S-6 is the ACE commander's special staff section that ties together the ACE communications electronics support requirements and tasking for the MWCS.

b. Responsibilities to the MACG Commander.

(1) The MWCS is one of the squadrons in the MACG. Although not a control agency, it performs the critical function of enabling the interface of the agencies of the MACCS.

(2) Since the MWCS is part of the MACG, it is also guided by the MACG CO's direction. The MACG S-6 is the staff officer that receives requests from the ACE G-6, staffs and tasks them as appropriate within the MACG. As with the ACE staff, the MACG staff will make their requirements known to the MACG S-6 who in turn will coordinate and request support from the MWCS for items such as telephone, facsimile and message traffic routing.

8. External Communications Connectivity. ACE connectivity directly to the GCE and CSSE is normally only through single channel radio on common MAGTF command and tactical circuits. A Communications Battalion multichannel SATCOM or troposcatter, i.e. AN/TRC-170, link can be used to interface the ACE CE with the MAGTF Headquarters. An additional troposcatter multichannel link could be established between the ACE and the CSSE to ensure the timely flow of information for aviation maintenance support.

CHAPTER 8 POST TEST

MARINE WING COMMUNICATIONS SQUADRON

1. The organization of MWCS is structured as a _____ with _____ detachments.

   a. Air Combat Det/two

   b. Squadron/two

   c. ACE Comm Units/four

   d. Squadron/six

2. Which is the digital multichannel radio system currently in the MWCS?

   a. AN/GRC-210

   b. AN/MRC-135B

   c. AN/GRC-193

   d. AN/MRC-142

3. The primary multichannel link between the TACC and TAOC is provided by the

   a. MTACS

   b. ACE Comm Unit

   c. MWCS Detachment

   d. MWSS

4. The SB-3865 is a team transportable telephone switchboard capable of providing 30 telephone lines.

   True or False

APPENDIX A

CLASSIFICATION OF FORWARD OPERATING BASE (FOB) CONCEPT

1. The role of the United States Marine Corps in the projection of power into the potential trouble spots of the world is vital to the needs of our nation and our allies. The capability to accomplish this mission is based upon the readiness and capability of Marine Air-Ground Task Forces (MAGTF) to move to and operate within any area where a threat can develop. These potential areas can range in sophistication from heavily built-up areas containing established aviation facilities to areas completely devoid of even the most rudimentary facilities.

2. The MAGTF concept for aviation support requires responsive support to the landing force (LF) during all phases of amphibious operations and subsequent operations ashore. Since responsiveness is a key measure of aviation effectiveness, MAGTF aviation should be capable of operating from sea or shore based airfields that are close to the LF operating area.

3. Currently, the following concept of employment for Marine aviation, relating to the establishment of FORWARD OPERATING BASES (FOBs) is:

   a. Friendly host government airfields will be used to the extent available, possible, and tactically acceptable.

   b. If unavailable, use of abandoned or captured airfields will be pursued to minimize equipment development requirements.

   c. If any of the above are not available in sufficient quantity or are not located in a suitable location, utilizing suitable roadways or highways will be attempted.

   d. As a last resort, the employment of expeditionary airfield construction material would be utilized.

4. The MAGTF FOB concept enhances responsiveness through basing flexibility, dispersal of aircraft, and reduced distances to the support area. In order to provide a common knowledge or understanding of the basing concept, airfields will be categorized by function into: MAIN BASE, FACILITY, SITE or POINT. The following definitions will be incorporated into the revised FMFM 5-40 and FMFM 5-60 and have been entered into the MARINE CORPS DICTIONARY and the DOD DICTIONARY.

   a. Main Air Base. A main air base is a secure airfield that is capable of handling all

types of aircraft, up to and including theater lift assets. Support agencies and facilities will be determined by task organization requirements, but should include at least Intermediate Maintenance Activity (IMA) support and engineering functions required to support current and anticipated needs. In the classic amphibious operation, this base would be located near the coastline and integrated with the MAGTF logistics pipeline. The Main Base's function will be to support sustained operations ashore.

b. Air Facility. A secure airfield capable of supporting a detachment or squadron of aircraft and the associated organization maintenance activity (OMA) to sustain operations at a combat sortie rate as well as provide the support required to initially stage and later replenish forward sites. OMA includes basic troubleshooting and repair, daily turnaround, inspections, refueling and weapons loading, downloading and arming/dearming. Major maintenance functions, such as engine changes and phased inspections are not accomplished at an air facility unless bringing a spare engine and support equipment is more advantageous than returning the aircraft to the rear main base or sea base. Aviation ordnance is stored in the open utilizing accepted procedures. Support equipment, with rough terrain capability, should be provided at each facility to move, load, and maintain aircraft. This facility might be an airfield, road segment, matted runway or in the case of helos, flat ground.

c. Air Sites. The air site is a secure location where combat aircraft are pre-positioned to enhance response time. Suitable for a fully loaded and armed aircraft to land and ground loiter awaiting a mission, either preplanned or on-call. Ideally, fuel and ordnance could be staged at sites. However, the site will not routinely require logistics support and only a minimum number of personnel. The potential exists to expand a site's capability to meet increased operational requirements. Upon completion of a mission from an air site, aircraft would normally return to an air facility or main base for refueling, weapons loading, and accomplishment of required maintenance. During normal operations, the site requires minimal logistics support, since operations are limited to receiving and launching previously loaded aircraft. Personnel required to accomplish site maintenance consist of a plane captain or crew chief per aircraft and normally one ordnance man per site for arming and de-arming of aircraft. Under normal conditions, only hand carried support equipment and tools are required.

c. Air Points. Air points are tactical designations applied to a predetermined geographical location that will support a specific tactical mission. Air points for the purpose of aviation mission support are: Forward Arming and Refueling Point (FARP) and LAGGER point.

(1) Forward Arming and Refueling Point (FARP). FARPs are temporary, transitory in nature and are established for a specific mission. The ultimate objective of the FARP is to minimize flight time to and from the refueling and

rearming area by locating the FARP as close to the objective area as METT allows. Support for the FARP should be minimized to the greatest extent possible. Normal support personnel include refuelers, ordnance men and communicators (when AV-8's are utilized plane captains are required). Aviation maintenance should be restricted to minor repair and adjustments that can be accomplished by the plane captains/crew chiefs. Equipment requirements should be minimal and limited to that equipment which directly supports FARP operation (i.e. HERS, SATS LOADERS and LIGHT equipment).

(2) Lagger points are secure locations designated by aviation units to be utilized for the rendezvous, marshaling, or positioning of flights of aircraft between missions or awaiting completion or activation of an assigned mission. Other than communications, no other support should be required. Laggers can be isolated and independent or they may be adjacent to airfields, facilities, sites, or FARPS.

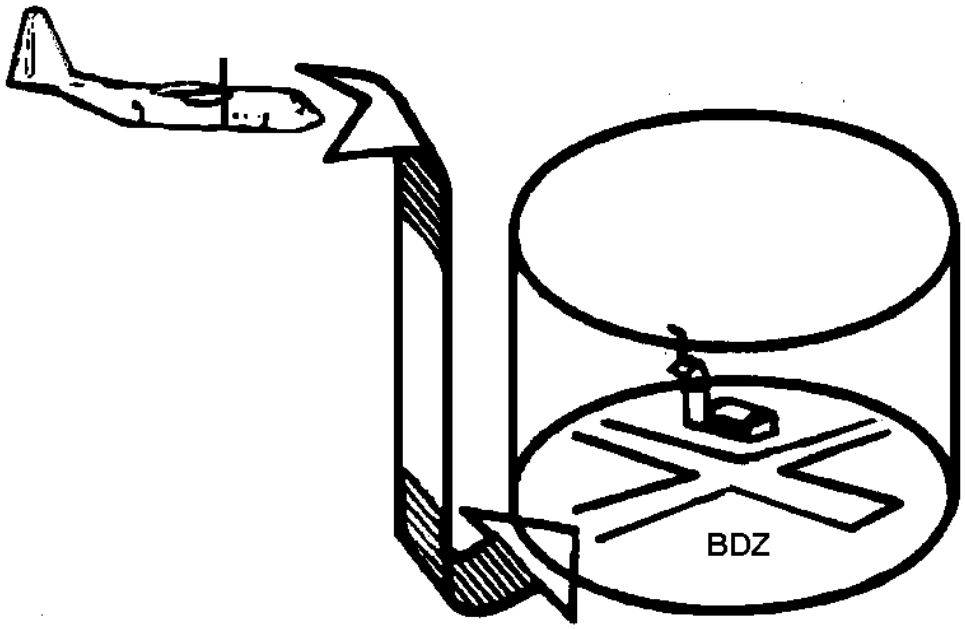
APPENDIX B

BASE DEFENSE ZONE

BASE DEFENSE ZONE (BDZ). The BDZ, a component of the destruction area, is an air defense control measure employed as part of an integrated air defense system. A BDZ is an air defense zone established around an air base and limited to the engagement envelope of the air defense weapon system defending that base. BDZs have specified entry, exit, and IFF procedures which aircrews must follow.

* BASE DEFENSE ZONE

* ENTRY PROCEDURES ARE SPECIFIED AND CONTROLLED



APPENDIX C

AVIATION COMBAT ELEMENT NETS

The following list is a guide to provide planners with a basis on which to construct a communications plan. ACE communications circuits are activated based on numerous factors: scope of the operation, available equipment, geographic location, phase of operation, etc.. The nets/circuits described often transition from single channel radio during the initial phase to wire/multi-channel as the operation progresses. Based on the projected volume of traffic, multiple nets/circuits and links may need to be established or nets could be combined. The transition from this document to an operational communications plan is complex and requires extensive interaction between the aviation and ground agencies. The real-time nature of MACCS communications requires that most circuits be of high quality and reliability.

NOTES:

A. (*) INDICATES AS REQUIRED

B. The first agency listed is the Net Control Station.

1. ACE COMMAND NET (HF)

PURPOSE: Provides a means for the ACE Commander to exercise command, administrative and logistical functions with subordinate units. May be multiple.

COMPOSITION:

a. ACE Headquarters

b. Airfield operations to support tenants:

(1) Marine Aviation Groups/Squadrons

(2) MACG/MACG Units

(3) Marine Wing Support Squadrons

c. Independent Squadrons/Battalions (To include MACG Units)

d. (*) Attached units

2. TACTICAL AIR COMMAND NET (HF/UHF-SATCOM)

PURPOSE: Provide the primary means by which the tactical air commander provides operational tasking to his subordinate units/agencies to include tasking to aviation groups/squadrons to provide aircraft for missions. May be multiple nets on various types of radios.

COMPOSITION:

a. TACC/TADC

b. TAOC(S)

c. Senior LAAM COC

d. DASC

e. (*) Marine Aircraft Groups/Squadrons

f. (*) ATC DET(s)

g. (*) EW/C

3. ACE COMMUNICATIONS COORDINATION NET (HF)

PURPOSE: Provides a means for the coordination, installation and restoration of communication circuits.

COMPOSITION:

a. ACE COMCON

b. TAOCs

c. DASC

d. LAAM Bn COC

e. LAAD Bn COC

f. (*) ATC DET(s)

g. Marine Wing Support Groups/Squadrons

4. LIGHT ANTIAIRCRAFT MISSILE BATTALION (LAAM BN) COMMAND NET (HF)

PURPOSE: Provides the LAAM Battalion commander with a means to exercise command, administrative and logistics functions with subordinate batteries.

COMPOSITION:

a. Light AntiAircraft Missile Battalion CP

b. HAWK Firing Platoon COCs

5. LOW ALTITUDE AIR DEFENSE BATTALION (LAAD BN) COMMAND NET (HF)

PURPOSE: Provides LAAD Bn commander with a means to exercise command, administrative and logistical functions with subordinate batteries.

COMPOSITION:

a. LAAD Bn Headquarters

b. LAAD Battery(s)

6. COMMAND ACTION (CA) NET (MUX/HF)

PURPOSE: Provides a means for command level coordination of antiair warfare through the exchange of information pertaining to missile battery employment, assignment of air targets, and interceptor/missile coordination.

COMPOSITION:

a. TACC/TADC

b. TAOC(s) (SAAWC)

c. (*) Other AAW Agencies

7. AIR OPERATIONS CONTROL (AOC) NET (MUX/HF)

PURPOSE: Provides a means for the TAOC to request interceptor aircraft and to report friendly air defense situation information to the TACC/TADC. Information pertaining to combat air patrol (CAP) availability stationing and assignment and disposition of targets, intercept progress, SAM unit status and employment, and aircraft/missile weapons coordination is passed on this net.

COMPOSITION:

a. TACC/TADC

b. TAOC(s)

c. (*) Other AAW Agencies

8. ANTIAIRCRAFT CONTROL (AAC) NET (MUX/HF)

PURPOSE: Provides a means to control surface-to-air missile units. Types of information passed on this net include: target assignments, fire control orders, weapons control status, battery status reports, and progress of engagements.

COMPOSITION:

a. TAOC(s)

b. HAWK Firing Platoons

c. (*) LAAM HQ/Batteries

d. (*) LAAD HQ Elements

e. (*) EWCs

9. ANTIAIRCRAFT INTELLIGENCE (AAI) NET (MUX/HF)

PURPOSE: Provides a means for surface-to-air missile units to report targets. Additionally this net may be used by the TAOC to pass selected early warning contacts to missile firing units.

COMPOSITION:

a. TAOC(s)

b. HAWK Firing Platoons

c. (*) LAAM BN HQ Elements

d. (*) LAAD HQ/Batteries

e. (*) EWCs

10. COMBAT INFORMATION/DETECTION (CI/D) NET (HF/MUX)

PURPOSE: Provides a means for reporting on unidentified or hostile aircraft,

including initial contact reports, tracking, amplifying, and final disposition reports.

COMPOSITION:

a. TAOCs

b. TACC/TADC (USN)

c. EW/C(s)

d. LAAM BN COC

e. HAWK Firing Platoons

f. (*) Other Service Agencies

g. LAAD

h. (*) ATC DET(s)

11. VOICE PRODUCT NET (VPN) (HF/UHF/MUX)

PURPOSE: Provides a means for reporting on hostile targets in a joint environment.

COMPOSITION:

a. Other service agencies

b. TACC

c. TAOC

d. (*) EA-6B(s)

12. HANDOVER/CROSSTELL NET (HF/MUX)

PURPOSE: Provides a means to prepare for the exchange of aircraft control between air control agencies. Multiple nets could be established for TAOC-EW/C handover, TAOC-DASC handover, ATC-TAOC handover, GCI-GCA handover, etc., or the functions could be combined (conserving assets) based on expected traffic.

COMPOSITION:

a. (*) TAOC(s)

b. (*) EW/C(s)

c. (*) ATC DET(s)

d. (*) Other Service Agencies

e. (*) DASC

13. LAAD COMMAND (LC) NET (HF)

PURPOSE: Provides connectivity between the battery (NCS) and subordinate platoons for administrative and logistics support and to coordinate the tactical employment of LAAD platoons.

COMPOSITION:

a. LAAD Battery Commanders

b. LAAD Platoon Commanders

14. LAAD WEAPONS CONTROL (LWC) NET (HF)

PURPOSE: Provides connectivity between the platoon commander (net control) and his section leaders. Multiple nets may be required. Provides subordinate/senior elements with current air defense warning conditions, weapon control statutes, and pertinent information on hostile, unknown, and friendly aircraft.

COMPOSITION:

a. LAAD Platoon Commanders

b. LAAD Section Leaders

15. LAAD TEAM CONTROL (LTC) NET (VHF)

PURPOSE: Each LAAD section leader (net control) uses this net to control teams and to relay air defense warning conditions, weapons control statutes, and pertinent information on friendly, enemy, and unknown aircraft. Multiple LTC nets, usually one per LAAD section, will normally be required. May also be used by teams to pass aircraft sighting reports, engagement reports, position reports, status reports, and resupply requests to section leaders.
COMPOSITION:

a. LAAD Section Leaders

b. LAAD Teams

16. TADIL A (HF/UHF)

PURPOSE: Provides a secure means for exchanging automatically processed digital data between various tactical data systems. Types of data passed include air and surface tracks, weapons status, and selected orders and functions. TADIL A operates as a half-duplex, netted data link.

COMPOSITION:

a. TACC

b. TAOC(s)

c. (*) Other service air control agencies

17. TADIL B (MUX)

PURPOSE: Provides a secure means for exchanging automatically processed digital data between various tactical data systems. It is operated in a point to point mode using a full duplex wire/multi-channel path.

COMPOSITION:

a. TACC

b. TAOC(s)

c. ATC DET(s)

d. (*) Other service air command and control agencies

18. ATDL-1 (MUX)

PURPOSE: Provides a secure, point to point, full duplex data link between HAWK firing platoons and the TAOC for automatically processed digital data. Data passed over this link includes detected air tracks, engagement commands, and hot missile status.
COMPOSITION:

a. TAOC(s)

b. HAWK Firing Platoons

c. EW/C

19. INTERFACE COORDINATION NET (ICN) (HF/UHF/VHF//MUX)

PURPOSE: Provides a means for command level coordination of Joint Data Link Employment.

COMPOSITION:

a. TACC

b. ATC DET(s)

c. TAOC(s)

d. Other service air control agencies

20. TRACK SUPERVISION NET (TSN) (MUX/HF/UHF)

PURPOSE: Provides a means for track surveillance personnel to exchange voice information to maintain a clear air picture. May assume functions of DCN based on equipment available.

COMPOSITION:

a. TACC/TADC

b. TAOC(s)

c. (*) Other service air control agencies

21. DATA LINK COORDINATION NET (DCN) (MUX/HF/UHF)

PURPOSE: Provides a means for maintenance to maintenance coordination of data link operations. May be combined with TSN for single channel operations. Generally one per TADIL-B/ATDL-1.

COMPOSITION:

a. TACC

b. TAOC(s)

c. HAWK Firing Platoons

d. (*) Other service air control agencies

22. DIRECT AIR SUPPORT (DAS) NET (MUX/HF/VHF)

PURPOSE: Provides a means for the DASC to request direct air support aircraft from the TACC. Additionally, information pertaining to aircraft stationing, fuel and ordnance status, progress of direct air support missions, etc., may also be passed over this net.

COMPOSITION:

a. TACC/TADC

b. DASC

23. TACTICAL AIR REQUEST/HELICOPTER REQUEST (TAR/HR) NET (HF/VHF)

PURPOSE: Provides a means for MAGTF units to request immediate air support from the DASC. The Ground Combat elements FSCCs monitor this net and may modify or disapprove a specific request. The DASC uses this net to brief the requesting unit on the details of the mission. Additionally, battlefield damage assessments may be passed over this net. Multiple TAR/HR nets may be required depending on the scope of close air support operations.

COMPOSITION:

a. DASC

b. TACC/HDC (USN)

c. TACP's

d. (*) TAC(A)

e. (*) FAC(A)

f. ASC (A)

g. AMC

h. (*) Other MAGTF agencies

i. FSCC's

24. TACTICAL AIR CONTROL PARTY (TACP) LOCAL NET (VHF)

PURPOSE: Provides a means for coordination between the Air Officer at the battalion FSCC and the battalion's forward air controllers.

COMPOSITION:

a. BN FSCC

b. Forward Air Controllers

c. (*) FAC(A)

d. (*) TAC(A)

25. TACTICAL AIR TRAFFIC CONTROL (TATC) NET (UHF/VHF)

PURPOSE: Provides a means for the TACC/TADC, TAOC, and DASC to exercise airspace control of all tactical and itinerant-aircraft in the objective area. Types of information passed over this net include aircraft reports of launches by mission number, clearing aircraft to their assigned control agencies, diverting aircraft as necessary, aircraft completed mission reports prior to landing and threat updates. Multiple TATC nets are often required for each control agency.

COMPOSITION:

a. TAOC(s)

b. TACC/TADC

c. DASC

d. (*) EW/C(s)

e. Fixed Wing Aircraft

f. Rotary Wing Aircraft

g. (*) ATC DET(s)

26. FIGHTER AIR DIRECTION (FAD) NET (UHF/VHF)

PURPOSE: Provides a means for air control agencies and elements to control aircraft in the conduct of intercepts. Multiple FAD nets are required and are assigned to major control agencies.

COMPOSITION:

a. TAOC

b. EW/C

c. Interceptor Aircraft

d. (*) Other service air control agencies

27. TADIL-C (UHF)

PURPOSE: Provides a one way or two way unsecured digital data link between air control agencies and interceptor aircraft.

COMPOSITION:

a. TAOC

b. Interceptor Aircraft

c. (*) Other service air control agencies (E-2C/E-3C)

d. (*) EW/C(s)

28. TACTICAL AIR DIRECTION (TAD) NET (UHF/VHF)

PURPOSE: Provides a means for the direction of aircraft in the conduct of close air support missions and for the DASC to brief support aircraft on target information, or assignment to the FAC, etc. Multiple TAD nets are required and are assigned to air control agencies by the DASC. This net is primarily UHF with a secondary VHF capability available in some cases.

COMPOSITION:

a. DASC

b. Direct Air Support Aircraft

c. TACP

d. FAC(A)

e. TAC(A)

f. (*) Other elements within the air command and control system.

29. HELICOPTER DIRECTION (HD) NET (UHF/VHF/HF)

PURPOSE: Navy: (Inbound and Outbound) - These nets are used by the HDC for positive control of inbound and outbound helicopters in the amphibious objective area. The radar controller in the HDC utilizes these nets to direct flight course and altitude of helicopters and holding, letdowns, and climb out when required. USMC: The DASC, TACP, AMC, ASC (A), and TAC(A) use these nets for procedural control of helicopters in the objective area. Both UHF/VHF and HF helicopter direction nets are employed, the HF net being a backup and to provide long-range control of airborne helicopters. Multiple HD nets are required and are allocated to air control agencies by the DASC.

COMPOSITION:

a. DASC

b. HDC

c. (*) Helicopters

d. (*) AMC

e. (*) Helicopter Landing Zone Control Team (HLZCT)

f. (*) TAC (A)

g. (*) ASC (A)

h. (*) TACP's

i. (*) Other elements within the air command and control system.

30. TANKER NET (UHF)

PURPOSE: Provides a means for inflight refueling aircraft to communicate with the tanker. Additionally, it can be used by the TAOC to exchange information with the tanker.
COMPOSITION:

a. Tanker

b. Inflight Refueling Aircraft

c. (*) TAOC(s)

d. (*) ATC DET(s)

31. AIR DEFENSE ALERT NET (UHF)

PURPOSE: Provides for direct coordination and for the exchange of critical threat information between UHF capable ground-based air defense systems and combat air patrols in adjacent engagement zones, also provides verbal warning to friendly aircraft transiting minimum risk routes, in close proximity to missile engagement zones.

COMPOSITION:

a. HAWK Firing Platoons

b. AAW Aircraft

c. Non-AAW Aircraft

d. (*) TAOC(s)

e. (*) EW/C

32. SQUADRON COMMON NET (VHF/UHF)

PURPOSE: Provides a means of communications between inflight squadron aircraft and/or with the squadron headquarters. Each aircraft squadron has its own common net.

COMPOSITION:

a. Squadron Headquarters

b. (*) Squadron Aircraft

33. GROUP COMMON NET (VHF/UHF)

PURPOSE: Provides a means of communications between inflight group aircraft and/or with the aircraft group headquarters. Each aircraft group establishes its own common net. May be established in lieu of squadron commons-based on communications asset availability.

COMPOSITION:

a. Aircraft Group Headquarters

b. (*) Inflight Group Aircraft

c. (*) Squadron Headquarters

34. TOWER PRIMARY NET (UHF/VHF)

PURPOSE: Provides a means for the local controller to issue traffic advisories and aircraft clearances within the ATA. Multiple nets may be required.

COMPOSITION:

a. ATC DET(s)

b. Aircraft

35. GROUND CONTROL NET (UHF/VHF)

PURPOSE: Provides a means for the ground controller to coordinate the movement of all ground aircraft, vehicles, and personnel on taxiways and runways. Multiple nets may be required.

COMPOSITION:

a. ATC DET(s)

b. All aircraft, vehicles, and personnel on taxiways and runways.

36. APPROACH CONTROL NET (UHF/VHF)

PURPOSE: Provides a means to communicate radar traffic into the terminal airspace. May require multiple nets.

COMPOSITION:

a. ATC DET(s)

b. Inbound Aircraft

37. DEPARTURE CONTROL NET (UHF/VHF)

PURPOSE: Provides a means to coordinate radar traffic out of the terminal airspace. May require multiple nets.

COMPOSITION:

a. ATC DET(s)

b. Outbound Aircraft

38. GROUND CONTROL APPROACH NET (UHF/VHF)

PURPOSE: Provides a means for ground control approach to provide bearing and altitude information to aircraft.

COMPOSITION:

a. ATC DET(s)

b. Landing Aircraft

39. GUARD (G) NET (UHF/VHF/HF)

PURPOSE: Provides an emergency distress net used by aircraft to declare an emergency. It further serves as a means for air control agencies to advise aircraft of emergency conditions or serious hazards to aircraft safety.

COMPOSITION:

a. Airborne Aircraft

b. All Air Control Agencies

40. CRASH, FIRE RESCUE (CFR) NET (VHF/VHF-AM)

PURPOSE: Provides a means to coordinate crash recoveries in and about the airfield.

COMPOSITION:

a. ATC DET(s)

b. Crash Crew

c. Airfield Operation Center

d. EOD

e. Medical Facility

f. Military Police

41. SEARCH AND RESCUE (SAR) NET (UHF/VHF/HF)

PURPOSE: Provides a means for the control and coordination of air rescue missions. Multiple SAR nets may be required depending on the number of concurrent SAR/TRAP missions.

COMPOSITION:

a. All elements within the air command and control system.

b. Aircraft involved in search and rescue missions.

42. HELICOPTER LANDING ZONE CONTROL (LZ CONTROL) NET (VHF/UHF)

PURPOSE: Provides a means for the landing zone control team to control helicopters enroute between the initial point and the landing zone. Multiple landing zone control nets may be required depending on the number of zones in operation at the same time.

COMPOSITION:

a. Landing Zone Control Team

b. Helicopters enroute between the initial point and the landing zone.

c. (*) DASC

d. (*) AMC

43. HELICOPTER LANDING ZONE CONTROL TEAM (LZCT) LOCAL NET (VHF)

PURPOSE: Provides a means for the landing zone control team commander to direct the activities of helicopter control personnel in each of the landing sites. Multiple landing zone control team local nets may be required depending on the number of zones in operation at the same time.

COMPOSITION:

a. LZCT

b. Landing Site Controllers

44. MEDICAL BN EVACUATION COORDINATION NET (AIR) (VHF)

PURPOSE: Provides for the coordination between a requesting unit, evacuation helicopters and medical facilities engaged in medical evacuation.

COMPOSITION:

a. Medical BN HQ

b. Medical Evacuation Helicopters

c. DASC

d. (*) Evacuation/Treatment Facilities

e. (*) Requesting Units

The TACC and the ACE Headquarters use the following Landing Force nets to coordinate to higher and adjacent headquarters:

45. LF/MAGTF COMMAND NET (HF/UHF/SATCOM)

PURPOSE: Provides means for the commander to exercise command and to coordinate administrative and logistic functions with the major components of the MAGTF.

COMPOSITION:

a. Command element

b. Ground combat element(s)

c. Aviation combat element(s)

d. Combat service support element

e. (*) Separate units under operational control of the commander, landing force (CLF).

46. LF/MAGTF TACTICAL NET (VHF/HF/UHF-SATCOM)

PURPOSE: Provides primary means for operational traffic between the CLF and the major combat elements of the MAGTF.

COMPOSITION:

a. Command element

b. Ground combat element(s)

c. Aviation combat element(s)

d. Combat service support element(s)

e. (*) Separate combat and combat support units under operational control of the CLF.

47. LF/MAGTF INTELLIGENCE NET (VHF/HF/UHF)

PURPOSE: Provides for rapid collection and dissemination of intelligence information between the CLF and the major combat elements of the MAGTF.

COMPOSITION:

a. Command element

b. Ground combat element(s)

c. Aviation combat element(s)

d. Separate combat and combat service support units under operational control of the commander, landing force.

e. (*) Combat Service Support Element(s).

48. LF/MAGTF COMMUNICATIONS COORDINATION NET (HF/SATCOM)

PURPOSE: Provides a means for the coordination, installation and restoration of communications circuits.

COMPOSITION:

a. Command element OSCC

b. Ground combat element OSCC

c. Aviation combat element OSCC

d. Combat service support element OSCC

APPENDIX D

AIR DEFENSE CONTROL TERMINOLOGY

1. Air Defense Warning Conditions - A degree of attack probability by aircraft and/or missiles.

   a. Red - Attack is imminent or in progress

   b. Yellow - Attack is probable

   c. White - Attack is improbable

   2. Airspace Control - A service provided in the combat zone to increase operational effectiveness by promoting safe, efficient, and flexible use of airspace through coordination, integration, and regulation of the airspace as well as identification of all tracks within the airspace.

   3. Positive Control - A method of airspace control which relies on positive identification, tracking, and direction of aircraft within an airspace. Such control is conducted with electronic means by an agency having the authority and responsibility therein.

4. Procedural Control - A method of airspace control which relies on a combination of previously agreed upon and promulgated orders and procedures.

5. Modes of Control - There are only two modes of control - centralized and decentralized. Autonomous is not a mode of control, since higher echelons cannot exercise control when a unit is autonomous. It should be noted that the mode of control is established irrespective of the designated weapons control status. Rules of engagement will be exercised within the bounds of the established mode of control.

   a. Centralized - Centralized control is the mode of control in which the controlling agency directs target engagements. Permission to engage other targets must be requested by the fire unit from the controlling agency. Centralized control is used to minimize the likelihood of engaging friendly aircraft while permitting engagements of hostile aircraft, but only when specific orders are issued to initiate the engagement. However, the right of self-defense is never denied. Centralized control can only be effectively exercised when the controlling agency has an effective recognized air picture and positive communications to subordinate fire units. Once it becomes apparent that the controlling agency is incapable of responding to the threat in a timely manner due to a lack of

situational awareness or insufficient Recognized Air Picture, the mode of control should be changed to that of decentralized.

b. Decentralized - Decentralized control is necessary when the controlling agency is unable to effectively manage the timely response to threat aircraft due to an insufficient RAP and/or degraded communications to subordinate fire units. Controlling agencies monitor unit actions, making direct target assignments to prevent engagement of friendly aircraft and to prevent simultaneous engagements of hostile aircraft. Decentralized control is used to increase the likelihood that a hostile aircraft will be engaged in a high density threat environment.

Although decentralized control is the desired mode of operation for HAWK firing platoons, it is not always consistent with National Command Authority objectives/priorities or Higher Headquarters objectives/priorities. For example, the political ramifications and media ramifications of fratricide may outweigh the political ramifications of a limited success enemy air strike. Therefore, it may be necessary to exercise a Centralized mode of control for IADS operations.

c. Autonomous Operations - Autonomous operation is the mode assumed by a GBAD unit after it has lost all communication with the controlling agency. The GBAD unit commander/leader assumes full responsibility for control of weapons and engagement of hostile targets within the established rules of engagement. Units experiencing communication loss will remain in the same weapons control status as had been directed prior to the communication loss.

d. Control by Exception - Although not designated as a formal mode of control, HAWK units can operate via control by exception. Within control by exception, decisions to engage aircraft rest solely with the HAWK Tactical Officer (TO) based on the established rules of engagement. Doctrinal voice communication and data link nets will continue to be maintained with the control agency (TAOC, EW/C); however, there is no requirement to inform the missile controller of the TO's actions/decisions on a real time basis. This method of operation would likely only be exercised when faced with a high density air threat, when the risk of fratricide is low, and when the SAAWC has determined that it is in the best interests of the IADS for the TO to direct all his attention to engaging the air threat without concerning himself with on-going TO - missile controller dialogue. The missile controller still retains the ability to intervene, however, and direct appropriate fire control orders.

e. Right of Self-Defense - The right to self-defense is never denied to any weapon system. Specific criteria for the exercise of this right should be developed for each particular weapon system. An example of the criteria for HAWK's right of self-defense is as follows:

6. Weapons Control Status - The weapon control status is a condition that establishes

the constraints under which the fires of the air defense system are managed. Normally, the weapons control status is set by the Tactical Air Commander or the SAAWC. Other commanders have the authority to impose a more restrictive weapons control status within their areas of operations for assigned, attached, or organic air defense weapons. These commanders can request that the air defense commander set a less restrictive weapons control status for their respective areas.

a. Weapons Free - A weapons control order imposing a status whereby weapons systems may be fired at any target not positively recognized as friendly. Executed within the limits imposed by the ROE and mode of control.

b. Weapons Tight - A weapons control order imposing a status whereby weapons systems may be only fired at targets recognized as hostile. Executed within the limits imposed by the ROE and mode of control.

c. Weapons Hold - A weapons control order imposing a status whereby weapons systems may only be fired in self-defense or in response to a formal order. Normally time, area, or unit-limited as to class of aircraft.

7. Fire Control Orders - Commands that are used to control air defense engagements on a case-by-case basis, regardless of the prevailing weapons control status. They are transmitted to HAWK batteries by either ATDL-1 or manual crosstell (voice) procedures. The orders are:

a. Engage - Order used to direct authorized units and/or weapon systems to "attack designated contact."

b. Cover - Order which indicates that the specified target is engaged by another unit or not yet a significant threat. The air defense unit is to assume a posture that will allow engagement of the target if directed.

c. Cease Fire - Command given to air defense units to refrain from firing on a target. Unit is to continue to track target. Missiles already in flight will be permitted to continue to intercept.

d. Cease Engage - Command which directs air defense units to cease tracking a target. Missiles in flight, however, will be permitted to continue to intercept.

e. Hold Fire - An emergency order to stop firing. Missiles already in flight must be prevented from intercept if technically possible.

8. Weapons Engagement Zone (WEZ) - Airspace of defined dimensions within which the responsibility for engagement normally rests with a particular weapon system. Within the general framework of a WEZ, specific WEZs are designated.

a. Missile Engagement Zone - The geographical, three-dimensional subdivision of the destruction area where surface-to-air missile systems have primary responsibility for destruction of the airborne threat.

b. Crossover Zone (Crossover Point) - The crossover point is that range in the destruction area at which a target ceases to be an air intercept target and becomes a surface-to-air missile target. The crossover zone is the airspace separating adjacent engagement zones where more than one type of weapon system may engage the enemy airborne threat. Weapon systems making engagements in this zone must be under positive control of the TAOC, EW/C, or airborne early warning aircraft.

c. Fighter Engagement Zone - The geographical, three-dimensional subdivision of the destruction area where fighter aircraft have primary responsibility for destruction of the airborne threat.

9. Electromagnetic Emissions Control - Air defense planners will create an Emissions Control (EMCON) plan that will dictate what radar and radio equipment will radiate at any given time. This effort is normally coordinated at the TAOC. Through Electronic Intelligence (ELINT), electromagnetic emissions can give away the location of the best camouflaged and concealed position. Electromagnetic emissions are invisible but still detectable with the proper equipment. They can give away any location as easily as a visual sighting. Enemy surveillance capabilities can be significantly reduced by controlling emissions and directing them away from the enemy.

10. Rules of Engagement (ROE) - Directives issued by competent military authority which delineate the circumstances and limitations under which United States forces will initiate and/or continue combat engagement with other forces encountered. ROE for AAW weapons systems are established by the Area Air Defense Commander (AADC). They allow him to delegate the authority to engage aircraft and to retain control of the air battle by prescribing the exact conditions under which engagements can be conducted. ROE for AAW assets will at a minimum encompass ID criteria, weapons control status, and the right of self defense.

11. Firing Doctrine - Firing doctrine establishes the range at which targets will be fired upon, the number of missiles fired at the target, and the technique by which the missiles will be fired.

CHAPTER 1 POST TEST ANSWERS

THE MARINE AIR COMMAND AND CONTROL SYSTEMS (MACCS)

1. The **MACG** coordinates the air command and control system of the MAW.

2. The **MTACS** provides the Current Operations Section (COS) personnel that man the Tactical Air Command Center (TACC).

3. The **MWCS** provides communications support for a MEF ACE.

4. The **TAOC** provides air surveillance and control of aircraft and surface to air weapons in support of the FMF.

5. The **LAAM BN** provides medium range surface-to-air missile defense of assigned areas against low and medium altitude air attacks.

6. The **LAAD BN** employs the Stinger missile system.

7. The LAAD Battalion provides **close in air low altitude surface-to-air weapons fire** for elements of the MEF in forward combat areas.

8. The **ATC Det** provides all weather air traffic control service at virtually any type of Forward Operating Base (FOB).

9. The Tactical Air Command Center (TACC) equipment is provided by the **MTACS** of the Marine Air Control Group.

10. The Tactical Air Operations Center (TAOC) provides air surveillance and control of aircraft and surface to air weapons and is operated by the **MACS** of the Marine Air Control Group.

11. The Marine Air Support Squadron provides facilities for the **DASC** operating in direct support of MAGTF operations.

CHAPTER 2 POST TEST ANSWERS

TACTICAL AIR COMMAND CENTER (TACC)

1. The **TACC** is the operational command post of the Tactical Air Commander and is the only agency which normally exercises command.

2. The **Air Boss** is an extension of the Current Operations Section and operates at or near the flight line of the supporting Air Base.

3. Personnel of the TACC are doctrinally organized into two sections; **Current Operations Section**, and **Future Operations Section**.

4. The culmination of the Current Operations Section effort is the publishing of the ATO.
   False

5. The **Senior Watch Officer (SWO)** is the direct representative of the ACE commander in the TACC.

6. The ACE headquarters staff **is concerned with planning, concept of operations, and employment of the ACE in support of the MAGTF beyond the next ATO**.

CHAPTER 3 POST TEST ANSWERS

TACTICAL AIR OPERATIONS CENTER

1. The MEF (FWD) will normally include _____ TAOC(S).

   a. 0

   b. **1**

   c. 2

   d. EW/C only

2. The two most prominent limiting factors of the TAOC are electronic signature and _____.

   a. Not Transportable

   b. Echelon Capability

   c. **Low Altitude Radar Surveillance Coverage**

   d. Three dimensional capabilities

3. The _____ is responsible to the TAC for surveillance, identification, management of assumed airspace, direction of all defensive air operations and control of all AAW operations within a designated sector.

   a. **Sector Anti-Air Warfare Coordinator (SAAWC)**

   b. Senior Air Direction (SAD)

   c. Surveillance Identification Director (SID)

   d. Senior Weapons Director (SWD)

4. The SAAWC and his staff operate from a facility _____.

   a. **Co-located with the TAOC**

   b. Co-located with the TACC

c. Dispensed from the TAOC

d. In the LAAM BN COC

5. The _____ is responsible to the SAD for the proper employment of Air Defense weapons during active air defensive periods.

a. Plotter

b. Surveillance Identification Director (SID)

c. Senior Traffic Director (STD)

d. **Senior Weapons Director (SWD)**

CHAPTER 4 POST TEST ANSWERS

DIRECT AIR SUPPORT CENTER

1. The **DASC** is the principal air control agency for the control of direct air support operations.

2. The DASC coordinates the execution of direct air support missions with the activity of other fire support means through the appropriate **FSCC**.

3. The officer responsible for the detailed operation of the DASC is the:

   a. FAC

   b. FSC

   c. SAC

   d. **SAD**

4. The DASC is primarily concerned with **immediate** air requests.

5. The DASC(A) may be utilized for limited **SCOPE** or **DURATION** operations.

CHAPTER 5 POST TEST ANSWERS

MARINE AIR TRAFFIC CONTROL DETACHMENT

1. The mission of the ATC Detachment is to provide Continuous Radar _____, _____, _____ and _____ Air Traffic Control Services within assigned controlled airspace to friendly aircraft.

   a. **Approach, Departure, Enroute, Tower**

   b. Enroute, Surveillance, Defense, International

   c. Intercept, Surveillance, Departure, Arrival

   d. Weapons, Surveillance, Enroute, Departure

2. The Marine Air Traffic Control Detachment is part of the Marine Air Control Group and functions within the Marine Air Command and Control System as the senior air command and control agency of the Marine Air Ground Task Force.

   a. True

   b. **False**

3. The Marine Air-Ground Task Force employment of a ATC elements as applied to the Marine Expeditionary Force is _____ Main Air Bases and _____ Marine ATC Mobile Teams. The Marine Expeditionary Brigade is _____ Main Air Bases, and _____ Marine ATC Mobile Teams. The Marine Expeditionary Unit is _____.

   a. 3/5, 2/4, one Marine ATC Mobile Team

   b. 4/8, 2/4, two Marine ATC Mobile Teams

   c. **4/4, 2/2, one Marine ATC Mobile Team**

   d. 3/5, 2/3, one Marine ATC Mobile Team

4. The two types of Radar that the ATC Detachment employs are:

   a. Precise and Surveillance Radars

   b. Pulse Acquisition and Surveillance Radars

c. **Precision Approach and Surveillance Radars**

d. Approach Guidance and Surveillance Radars

5. The two NAVAIDS that the ATC Detachment employs are:

a. AN/TRN-33 NDB and AN/TRN-44 TACAN

b. AN/TPN-30 MRAALS and AN/TRN-33 NDB

c. AN/TSQ-107B ILS and AN/TRN-33 NDB

d. **AN/TRN-44 TACAN and AN/TPN-30 MRAALS**

CHAPTER 6 POST TEST ANSWERS

LIGHT ANTIAIRCRAFT MISSILE BATTALION

1. The LAAM Bn provides **medium** range surface-to-air missile defense for assigned areas of operations, air installations, and vital zones against **low** and **medium** altitude air attacks.

2. The HAWK firing platoons provide for the detection, **identification**, **engagement**, and **destruction** of hostile airborne targets.

3. The **Battery Command Post** is used to monitor and control firing operations of a firing platoon.

4. The **Continuous Wave Acquisition Radar (CWAR)** provides low to medium altitude target detection.

5. The HAWK system's tracking radar is the **High Powered Illuminator Radar (HPI)**.

6. The HPI can operate in one of three modes - **narrow** beam, **wide** beam, or **sector** search.

7. The HAWK missile uses a **semi-active homin**g guidance system to develop guidance commands and guide the missile to the kill point.

8. The **Tactical Officer (TO)** controls air defense operations of the firing platoon from the BCP.

9. The major crew positions of the BCP are **Tactical Officer**, **Radar Operator**, and **Second Radar Operator**.

10. The **Battery/Platoon Combat Operations Center (COC)** is where the battery/site commander exercises control of his unit (Hawk Firing Platoon) and provides a location where all of the current statutes of the unit can be displayed and monitored.

CHAPTER 7 POST TEST ANSWERS

LOW ALTITUDE AIR DEFENSE BATTALION

1. The LAAD BN provides close-in **low altitude** surface-to-air weapons fires in defense of **forward combat areas, vital areas, and installations**.

2. LAAD unit commanders will locate their CP's so as to optimize **SA**, through **EW/Cueing**, **Intelligence** etc.

3. Two limitations of the Stinger missile system are the effects of **Weather/Terrain or Night Operations** and **Early Warning/Cueing or Identification**.

4. Stinger teams utilize **IFF**, **Visual Identification**.

5. The **Section** is the smallest tactical element of the LAAD BN which would be tactically employed.

CHAPTER 8 POST TEST

MARINE WING COMMUNICATIONS SQUADRON

1. The organization of MWCS is structured as a _____ with _____ detachments.

   a. Air Combat Det/two

   b. **Squadron/two**

   c. ACE Comm Units/four

   d. Squadron/six

2. Which is the digital multichannel radio system currently in the MWCS?

   a. AN/GRC-210

   b. AN/MRC-135B

   c. AN/GRC-193

   d. **AN/MRC-142**

3. The primary multichannel link between the TACC and TAOC is provided by the

   a. MTACS

   b. ACE Comm Unit

   c. **MWCS Detachment**

   d. MWSS

4. The SB-3865 is a team transportable telephone switchboard capable of providing 30 telephone lines.

   True or False