

MCWP 3-25-8

**Marine Air Traffic Control
Detachment Handbook**



U.S. Marine Corps

PCN: 143 00030 00

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Subj: RECOMMENDATIONS CONCERNING MCWP 3-25.8,
*MARINE AIR TRAFFIC CONTROL DETACHMENT
HANDBOOK*

1. In accordance with the Foreword to MCWP 3-25.8, which invites individuals to submit suggestions concerning this MCWP directly to the above addressee, the following unclassified recommendation is forwarded:

<u>Page</u>	<u>Article/Paragraph No.</u>	<u>Line No.</u>	<u>Figure/Table No.</u>
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DEPARTMENT OF THE NAVY
Headquarters United States Marine Corps
Washington, DC 20380-1775

1 August 1997

FOREWORD

The Marine air command and control system (MACCS) provides the Marine aviation combat element commander with the means to exercise control of those organic and nonorganic aviation assets that are necessary to support Marine air-ground task force (MAGTF) operations. Fleet Marine Force Manual (FMFM) 5-60, *Control of Aircraft and Missiles*, addresses basic planning considerations for MACCS operations, employment, and inter-operability among MACCS and joint Service agencies.

Marine Corps Warfighting Publication (MCWP) 3-25.8, *Marine Air Traffic Control Detachment Handbook*, complements and expands on the information in FMFM 5-60 by focusing on the details of the Marine air traffic control detachment (MATCD) operations and the role it plays in MAGTF, joint, and multinational operations. Designated for MAGTF, naval expeditionary force, and joint force commanders and staffs, MCWP 3-25.8 highlights MATCD—

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

By investigating these areas, MCWP 3-25.8 provides the requisite information needed by commanders and staffs to understand and evaluate the operational principles and capabilities of various MATCD employment options.

Reviewed and approved this date.

BY DIRECTION OF THE COMMANDANT OF THE MARINE
CORPS

PAUL K. VAN RIPER
Lieutenant General, U.S. Marine Corps
Commanding General
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Marine Air Traffic Control Detachment Handbook

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Chapter 1

Fundamentals

The Marine air traffic control detachment (MATCD) is the principal terminal air traffic control organization within the Marine air command and control system (MACCS). Two MATCDs are structured to operate as subordinate elements of the Marine air control squadron (MACS).

Each MATCD is organized and equipped to provide continuous all-weather air traffic control services to an independent and geographically separated main air base or air facility and one remote air site or point. Appendix A describes these forward operating bases.

The MATCD mission is to provide continuous, all-weather air traffic control services to a main air base/facility and to a remote area landing site as part of the MACCS.

The MATCD also functions as an integral part of a MAGTF's integrated air defense system (IADS). Marine air traffic control equipment is maintained by the MATCD and supported by the Naval Air Systems Command.

ROLE

The MATCD—

- Provides airspace control, management, and surveillance for its designated airspace sector.
- Provides navigational assistance to friendly aircraft, including itinerant air traffic control services.
- Interfaces with the MACCS, other military air control agencies, and/or civilian agencies/authorities.
- Provides required air traffic control services in support of MAGTF operations.
- Provides personnel to the survey, liaison, reconnaissance party team to ensure MATCD siting criteria and terminal instrument procedures (TERPs) are considered and addressed during the site survey.

TASKS

The MATCD—

- Provides control tower, radar, and non-radar approach/departure control services within its assigned airspace.
- Provides precision as well as nonprecision navigational aids (NAVAIDs).
- Provides automatic landing system approach and landing services under all-weather conditions.

- Displays and disseminates appropriate air and ground situation information to designated higher and adjacent air command and control agencies, including the Marine tactical air command center, tactical air operations center, direct air support center, air defense detachment, and low altitude air defense battalion, while functioning as an integral element of the MACCS.
- Serves as the operational liaison between the MAGTF and national/international air traffic control agencies.
- Coordinates the activation of the airfield base defense zone (BDZ).

MATCD OPERATIONAL ORGANIZATION

The MATCD's assigned mission and supporting task organization will determine the air traffic control element's exact crew requirements.

The MATCD is headed by a detachment commander who coordinates detachment activities and supervises the detachment's air traffic control watch officers. Watch officers are crew managers. MATCD crews are typically operationally organized into command, radar control, and tower control sections. Each detachment is organized to provide the MAGTF with one Marine air traffic control mobile team (MMT). Figure 1-1 shows a MATCD's notional organization.

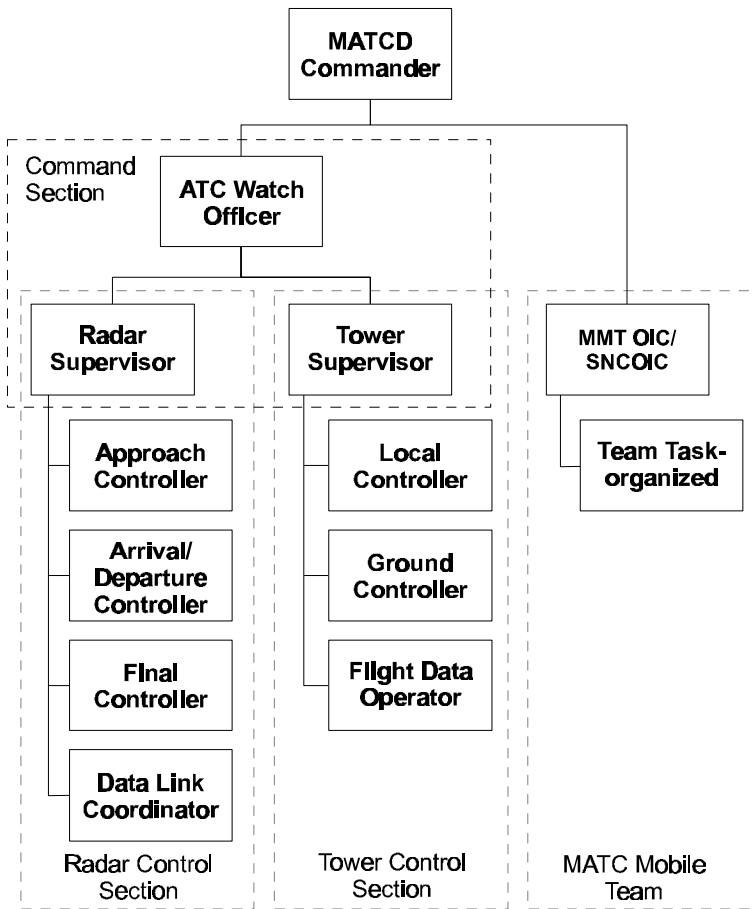


Figure 1-1. Notional MATCD Operational Organization.

Command Section

The command section supervises and coordinates each MATCD's activities. The command section includes the air traffic control (ATC) watch officer, radar supervisor, and tower supervisor.

ATC Watch Officer. The ATC 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 proper coordination between the detachment, internal airfield units, and other MACCS agencies.

Radar Supervisor. The radar supervisor is responsible to the ATC watch officer for the operational efficiency of the radar section. Responsibilities include briefing the section on the current weather, equipment and airfield conditions; the exchange and correlation of aircraft position and identification information with other MACCS agencies; the conduct of tactical digital information link (TADIL) B and TADIL C data link operations; and the coordination of electronic protection (EP) within the terminal control area (TCA).

Tower Supervisor. The tower supervisor is responsible to the ATC watch officer for the operational efficiency of the tower section. Responsibilities include briefing the section on current weather, equipment, and airfield conditions. The tower supervisor is also responsible for coordinating and directing control of aircraft operating within the TCA as well as the control of air and surface vehicular traffic operating on runways, taxiways, and other designated movement areas of the airfield.

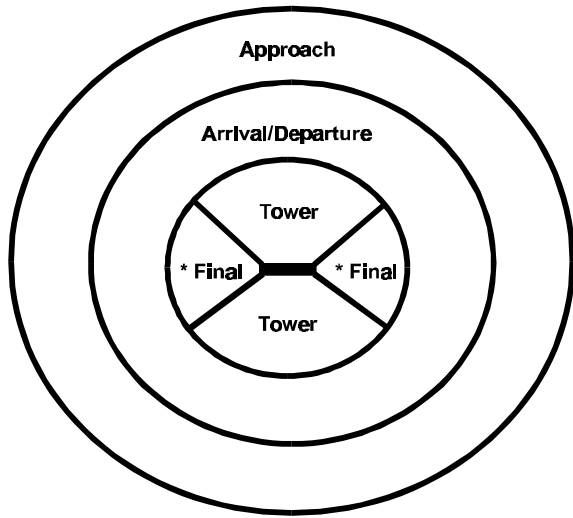


Figure 1-2. Radar Control Section Responsibilities.

Radar Control Section

Under the cognizance of the radar supervisor, the radar control section is responsible for management of assigned/designated airspace. The radar control section's division of responsibilities (fig. 1-2) can be compared to a bull's-eye (though not necessarily concentric) with the approach, arrival/departure, and final controllers each responsible for aircraft control within an assigned ring. The radar control section transmits information via data link or voice cross tell to other air control agencies, supervises MATCD execution of the emission control (EMCON) conditions set by the Marine tactical air command center (TACC), and employs appropriate EP measures.

*The tower typically controls the "inner ring" during VFR conditions.

Approach Controller. The approach controller maintains radar surveillance of approach control airspace and provides air traffic control services to aircraft. Approach controllers determine the separation/sequencing of aircraft and initiate/receive radar handoffs from other control agencies. Approach controllers typically process and coordinate aircraft passing through the TCA entering arrival/departure airspace. While radar is the preferred method of separating aircraft, approach controllers can provide navigation and aircraft separation information using non-radar procedures.

Arrival/Departure Controller. The arrival/departure controller accepts radar or procedural handoffs from the approach controller and provides air traffic control services for aircraft until they reach approach minimums or are handed off to the final controller or tower controller. The arrival/departure controller may use radar or non-radar methods of control to process aircraft within the arrival/departure airspace.

Final Controller. The final controller conducts precision approaches using the automatic carrier landing system (ACLS) and radar approaches using the airport surveillance radar. The final controller typically provides these services to aircraft during periods of poor weather or visibility. Aircraft operating under visual flight rules (VFR) conditions typically contact the airfield tower to conduct a VFR approach.

Data Link Coordinator. The data link coordinator is responsible for the orderly functioning of the data link with other MACCS/joint Service air control agencies, the accuracy of situation displays, and track coordination functions with the data link's interface control unit.

Tower Control Section

The tower control section is responsible for the control of friendly aircraft operating within the tower's assigned airspace. Airspace is typically limited to an area that can be visually observed and surveyed from the tower (approximately a 5-mile radius from the airfield up to an altitude of 2,500 feet above ground level). The tower control section is also responsible for air and vehicular traffic operating on runways, taxiways, and other designated areas of the airfield.

Local Controller. The local controller maintains visual surveillance of the TCA and other movement areas to formulate and issue clearances and control instructions to aircraft operating under the jurisdiction of the tower. Clearances and control instructions given by the local controller are designed to provide necessary separation between aircraft.

Ground Controller. The ground controller provides general surveillance of the airfield and formulates and issues ground movement clearances to aircraft and vehicles operating on the airport movement area.

Flight Data Operator. The flight data operator posts, relays, and coordinates aircraft movement data and posts weather updates.

Marine Air Traffic Control Mobile Team

The MMT is normally the lead element for establishing initial MAGTF air traffic control services. MMTs usually support operations at air sites, forward arming and refueling points (FARPs), rapid ground refueling (RGR) points, or lager points. (See app. A.) As a stand-alone air traffic control capability, the

MMT can task-organize to provide air traffic control services for airfield seizures, noncombatant evacuation operations, humanitarian/civil assistance operations, and other MAGTF operations.

Functions. The MMT rapidly establishes and controls tactical landing zones (TLZs), which are temporary, austere landing strips for fixed-wing aircraft, and helicopter landing zones (HLZs) for rotary wing aircraft in remote locations. The MMT is specifically trained and task-organized to—

- Recommend/assist in TLZ/HLZ site selection.
- Conduct TLZ/HLZ surveys.
- Mark TLZ/HLZ.
- Provide air traffic control services at designated TLZs/HLZs.
- Coordinate with civil and military control agencies.

Tasks. The MMT supports the MAGTF by—

- Formulating and issuing air traffic control clearances, instructions, and advisories to effect safe, orderly, and expeditious movement of air traffic in their assigned airspace.
- Surveying air sites to determine each site's operational suitability for the number and the type of aircraft.
- Marking TLZs/HLZs (as the mission dictates).
- Establishing a control point from which to exercise air traffic control.
- Establishing a TCA around each TLZ and controlling all air

traffic within this area under VFR and instrument flight rules conditions. This task may be extended to include non-radar approach control services.

- Developing terminal instrument procedures for TLZs/HLZs.
- Providing and operating NAVAIDs.
- Providing limited weather observations and information.
- Assisting in selecting sites for TLZ/HLZ operations.
- Establishing communications for air traffic control services and coordination within the MMT's TCA and for MMT connectivity with the MACCS.

Chapter 2

System Description

The MATCD's equipment serves two primary purposes. Equipment is used to provide air traffic controllers with the information necessary to maintain situational awareness and to effectively control and coordinate friendly aircraft activities in and around forward operating bases. MATCD equipment also provides information to aircraft navigating in MATCD-controlled airspace. The MATCD task-organizes the equipment it needs to meet mission requirements.

MARINE AIR TRAFFIC CONTROL AND LANDING SYSTEM (MATCAL)

The MATCAL provides continuous radar approach, departure, and en route air traffic control capabilities. MATCAL collects, evaluates, and displays air track data and disseminates information to other air control agencies. MATCAL consists of three subsystems: AN/TPS-73 air traffic control subsystem (ATCS), AN/TPN-22 all-weather landing subsystem (ALS), and AN/TSQ-131 control and communications subsystem (CCS).

AN/TPS-73 Air Traffic Control Subsystem

The AN/TPS-73 ATCS (fig. 2-1) is a two-dimensional, transportable tactical airport surveillance radar system operating in the E band (2705 - 2895 MHz). This nonlinear radar is capable of a 60 nautical mile (nmi) surveillance range for its primary radar

and a 120 nmi search range for its secondary radar (identification, friend or foe [IFF]). It can also detect airborne targets up to an altitude of 60,000 feet. The AN/TPS-73 ATCS can interrogate IFF Modes I, II, III, IV, and C. Radar and IFF information from the ATCS are processed within the CCS and can be forwarded to other agencies via data link (TADIL B) and/or voice communications. The AN/TPS-73 ATCS can simultaneously detect and track up to 600 air targets.

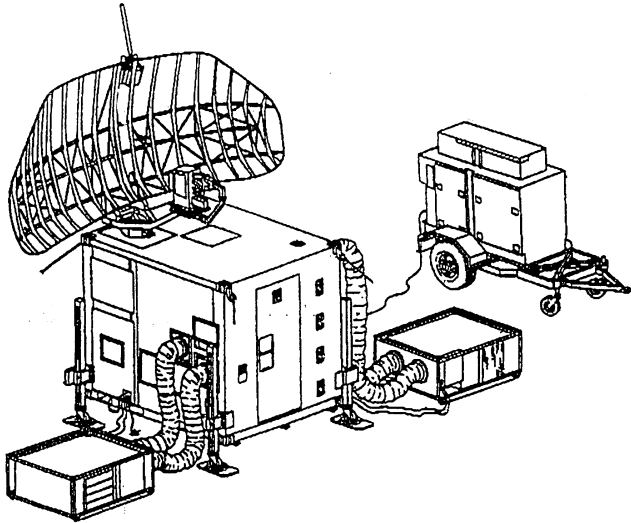


Figure 2-1. AN/TPS-73 Air Traffic Control Subsystem.

AN/TPN-22 All-Weather Landing Subsystem

The AN/TPN-22 ALS (fig. 2-2) is an I band (9000 - 9200 MHz), three-dimensional, transportable phased array radar which provides the MATCD with tactical precision approach capabilities.

The AN/TPN-22 ALS's pencil beam radar has a 10 nmi range and an 8 degree (-1 to +7 degree) angular coverage in elevation. The AN/TPN-22 ALS provides ACLS Mode I/IA, Mode II, and Mode III approach services via TADIL C for all-weather landings. The AN/TPN-22 ALS is capable of automatic tracking for up to six aircraft simultaneously.

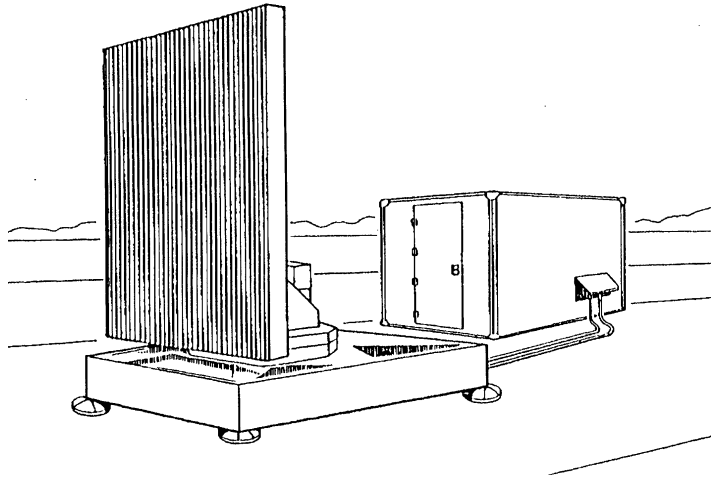


Figure 2-2. AN/TPN-22 All-Weather Landing System.

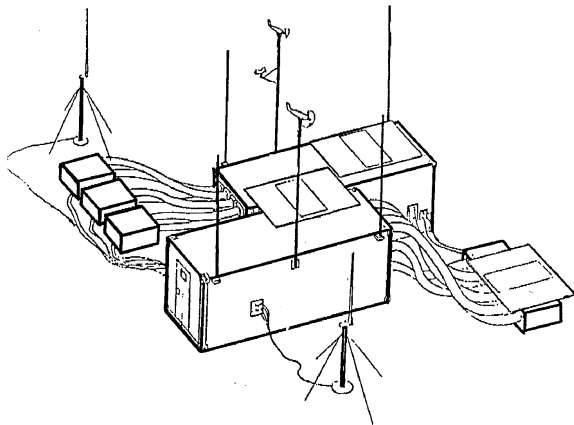
AN/TSQ-131 Control and Communications Subsystem

The AN/TSQ-131 CCS (fig. 2-3) is the heart of MATCAL. It functions as a collection point for radar data produced by the ATCS and the ALS. The CCS consists of two International Standards Organization shelters which allow its employment in either a single or dual shelter configuration. Each shelter provides four processor display system (PDS) consoles which serve as operational workstations for crew members. Each PDS has its own

communications capability. In addition to intercommunications and switchboard circuits, the CCS provides access to one high frequency (HF), three very high frequency (VHF) amplitude modulation (AM), one VHF frequency modulation (FM), and eight ultrahigh frequency (UHF) radios. One UHF radio is reserved for TADIL C. In addition to accessing single channel radios, the CCS provides access to 10 external telephone lines.

The CCS has the capability to automatically exchange certain elements of command tactical intelligence and situation data with other MATCDs, tactical air operation centers (TAOCs), and the TACC via TADIL B. The AN/TSQ-131 is also capable of encrypted communications.

AN/TSQ-120A/B AIR TRAFFIC CONTROL CENTRAL (ATC TOWER)



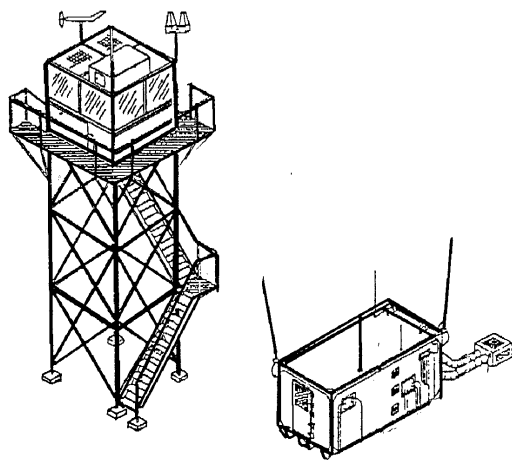
The ATC tower (fig. 2-4) is a transportable tower facility which

**Figure 2-3. AN/TSQ-131 Control
and Communications Subsystem.**

provides operators with a 360 degree visual observance of aircraft, both on the ground and in the air, operating within a designated control zone and visual control over ground vehicles operating in the vicinity of the runway. The ATC tower can be erected to heights of 8, 16, or 24 feet. The ATC tower provides three operator positions from which aircraft and airfield control is effected through the use of radio communications and visual aids. The ATC tower provides operators with access to 1 HF, 3 VHF/ AM, 1 VHF/FM, and 5 UHF single channel radios, and up to 10 telephone lines. The AN/TSQ-120B model is capable of encrypted communications. All audio communications are recorded. Visual communication is effected through the use of an ALDIS lamp.

AN/TRC-195 CONTROL CENTRAL

The AN/TRC-195 (fig. 2-5) provides a limited tower capability for remote site operations. Typically employed in the rear section of a high mobility, multipurpose wheeled vehicle (HMMWV),



**Figure 2-4. AN/TSQ-120A/B
Air Traffic Control Central.**

the AN/TRC-195 provides up to two controllers with communications access to four 20 Hz telephone lines and one HF/VHF FM, one VHF AM, and two UHF single channel radios.

AN/TRN-44 TACTICAL AIR NAVIGATION (TACAN) SET

The AN/TRN-44 TACAN (fig. 2-6) is a transportable, dual-

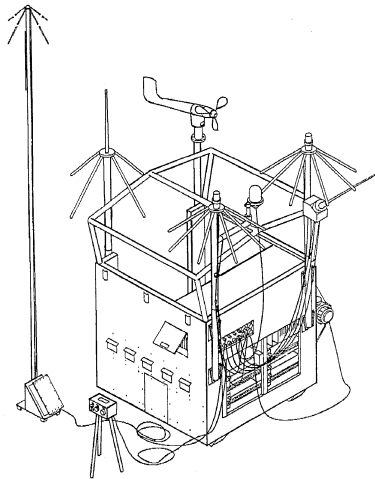


Figure 2-5. AN/TRC-195 Control Central.

channel navigational aid which provides up to 100 TACAN-equipped aircraft with range, bearing, and station identification

information within an effective radius coverage of 200 miles. It is used for both en route navigation guidance and as an instrument approach aid. The AN/TRN-44 TACAN tower can be erected to heights of 6, 12, 18, 24, and 30 feet.

**AN/TPN-30 MARINE REMOTE AREA APPROACH
AND LANDING SYSTEM (MRAALS)**

The AN/TPN-30 MRAALS (fig. 2-7) is a two-person, portable, all-weather instrument landing system. It provides a 40 degree

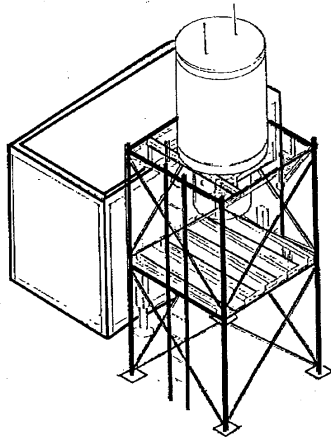
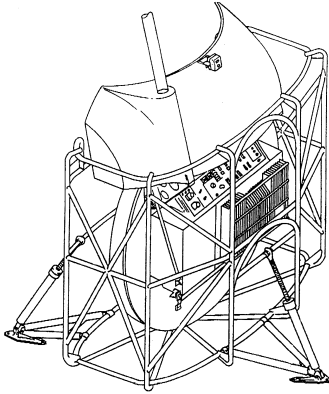


Figure 2-6. AN/TRN-44 TACAN.

azimuth and 20 degree elevation guidance out to 10 nmi on final approach to aircraft equipped with the ARA-63 airborne radar system. It also provides 360 degree distance measuring equipment and station identification information out to 40 nmi.

AN/TSM-170 MAINTENANCE REPAIR GROUP

The AN/TSM-170 consists of four shelters which contain workbenches, test equipment, cabinets, tools, and other equipment



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Figure 2-7. AN/TPN-30 MRAALS.

maintenance of air traffic control equipment.

MOBILE ELECTRIC POWER

The MATCD and its parent MACS provide 60 Hz mobile electric power to support detachment operations.

ENVIRONMENTAL CONTROL UNIT

The HD-1099 environmental control unit is used with MATCD electronic equipment shelters for cooling and heating.

LIMITATIONS

Electronic Signature

The MATCD has a large electronic signature generated by its air surveillance radars and voice and data communications equipment. Effective planning and employment of EMCON measures are paramount to maximizing the MATCD's survivability.

Low Altitude Air Surveillance

The MATCD employs ground-based radar systems. Therefore, its radar coverage is susceptible to line of sight (LOS) limitations. Use of high ground for radar emplacement, airborne sensors, dispersion of sensors, and incorporation of other radar units' air picture can be used to minimize terrain masking effects on the MATCD.

Dispersion

The MATCD must contend with physical limitations of the equipment when considering options for dispersal. Dispersion between each radar and the CCS is restricted to the 250-foot length of the connecting cable.

EQUIPMENT UPGRADES AND REPLACEMENTS

Among the planned improvements to Marine air traffic control equipment are two principal initiatives: the remote landing site tower (RLST) and the common aviation command and control

system (CAC²S).

Remote Landing Site Tower

The RLST (fig. 2-8) is intended as a replacement for the AN/TRC-195 control central. The RLST will provide the means for rapid emplacement, establishment, and withdrawal of communications and other related capabilities required for VFR air traffic control services at remote landing sites.

The RLST will consist of an extendible-roof S-250 shelter containing the equipment required for air traffic control services at remote sites. The system will include a high mobility trailer to carry antennas, generators, and communications equipment.

The RLST will be capable of operating in a HMMWV-mounted configuration or in a stand-alone configuration. The RLST system will include six radios and have the capability to introduce up to six land lines into its communications system.

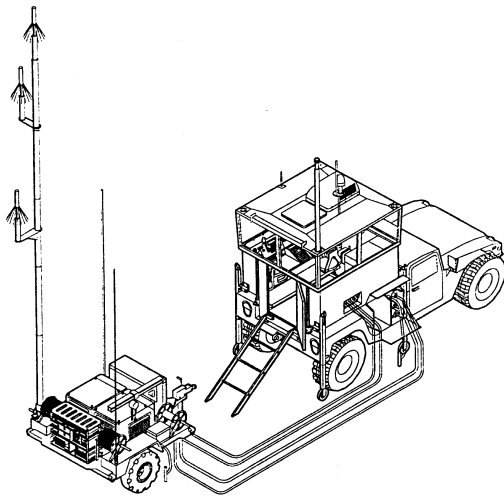


Figure 2-8. Remote Landing Site Tower.

Common Aviation Command and Control System

Upon the end of its service life, the AN/TSQ-131 CCS may be replaced with CAC²S and the CAC²S communications suite. The CAC²S initiative will provide a common equipment suite within the MACCS, thus enhancing interoperability and reducing logistics requirements. CAC²S's standardized hardware suite will be equipped with a MACCS-common complement of servers, workstations, processors, etc. CAC²S's software will consist of standardized common components with agency-specific (TACC, TAOC, direct air support center [DASC], etc.) applications. Each system will be modular in design and configured to meet each agency's mission requirements.

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Chapter 3

Planning

Specific information on the MAGTF planning process and the documents useful in conducting MAGTF and aviation combat element (ACE) planning are contained in FMFM 3-1, *Command and Staff Action*, FMFM 5-70, *MAGTF Aviation Planning*, and FMFRP 5-71, *MAGTF Aviation Planning Documents*. MCO 3501.9B, *Marine Corps Combat Readiness Evaluation System (MCCRES)*, outlines MATCD specific planning requirements. Though the planning phases outlined below may occur in sequence, most of these steps are conducted concurrently.

INITIAL PLANNING

Considerations for the initial planning phase include—

- Conducting a mission analysis, including specified and implied tasks, based on the MAGTF and ACE commanders' intent and concept of operations.
- Identifying assumptions necessary for continuation of the planning process. These assumptions should supplement assumptions already addressed by higher headquarters and be in concert with planning guidance received from higher headquarters.
- Analyzing the friendly force composition from the joint/multinational level down to the MACCS and addressing integration/interface requirements with MAGTF and joint

force planners (specifically the airspace control authority [ACA], the area air defense commander, and adjacent air control agencies).

- Conducting initial coordination/liaison with the International Civil Aviation Organization (ICAO), host nation air traffic control facilities, and the Federal Aviation Administration (FAA) for airspace and liaison requirements.
- Analyzing the threat's air and ground order of battle and electronic warfare (EW), reconnaissance, and unconventional warfare capabilities.
- Analyzing the amphibious objective area (AOA)/area of operations (AO), with particular emphasis on the ACA's guidance, to begin initial planning for terminal control airspace, Class D airspace, and minimum risk routes (MRRs). Class D airspace is that airspace from the surface to 2,500 feet above the airport elevation surrounding those airports/airfields that have an operational control tower.
- Identifying communications requirements for subordinate, adjacent, and higher level circuits with the ACE/MAGTF communications planners. Initial communications planning should focus on the critical information flow and the desired connectivity necessary to achieve this flow.
- Providing air traffic control specialist input to aviation estimates of supportability for all assigned operations. Input should summarize significant aviation aspects of the situation that might influence any course of action (COA) proposals. The input is also used to evaluate and determine how aviation units can best be employed to support contemplated MAGTF COAs. The aviation estimate is prepared by the ACE commander, his staff, and subordinate elements. The end product

of the aviation estimates of supportability will include recommending a COA to the MAGTF commander. At a minimum, aviation estimates of supportability will include—

- Which contemplated COA(s) can best be supported by the ACE.
- Salient disadvantages of less desirable COAs.
- Significant aviation limitations (including command and control) and problems of an operational or logistical nature.

INTELLIGENCE PLANNING

MATCD personnel will coordinate intelligence planning with the squadron S-2 or higher headquarters. Intelligence planning considerations include—

- Obtaining preliminary and detailed aviation intelligence estimates.
- Identifying intelligence requirements and submitting them to the squadron S-2 in the form of simple, concise requests. Intelligence requirements should state the preferred product format.
- Determining the MATCD staff's requirements for maps, charts, photographs, and other graphic aids.
- Obtaining a complete enemy order of battle including information on the threat's missiles, aviation assets, EW, naval, and ground force capabilities.

- Preparing a detailed rear area assessment for the MATCD and any deployed sites within its assigned sector.
- Determining the enemy's access to and the overhead times for satellite systems and the enemy's processing time for the imagery.

COMMUNICATIONS PLANNING

Communications planning involves a coordinated effort between MATCD/MACS representatives and communications planners within the MACCS and ACE/MAGTF staffs. Communications planning considerations include—

- Establishing required communications connectivity between adjacent MACCS agencies, as well as those agencies external and internal to the supported airfield (including civil air traffic control agencies).
- Determining required communications nets, as well as a prioritization and restoration plan for the use of these nets. Appendix B provides a list of communications nets used by the MATCD.
- Determining data link connectivity requirements for both TADIL B and TADIL C.
- Developing a security control of air traffic and navigational aids (SCATANA) plan. The SCATANA plan will include procedures for silent aircraft taxi, launch, and recovery procedures for day and night operations, NAVAIDs which will be secured, and the securing authority for the NAVAIDs.

- Identifying communications security material. Planners should address required encryption hardware and software, authentication tables, brevity codes, and challenge/password change-over times.
- Ensuring the MATCD is included on distribution lists for the automated communications electronics operating instruction and air tasking order (ATO).
- Addressing air traffic control unique frequency requirements with ACE/MAGTF communications planners. The necessity for like communications media between the MATCD and civil aviation authorities requires MATCD planning for using frequencies within the VHF(AM) frequency spectrum (116-134 MHz w/50 kHz spacings). This frequency band is used for the control of civil aircraft; 50 kHz spacing may also be necessary for the UHF band for communicating with allied nations' aircraft.

ELECTRONIC WARFARE PLANNING

When the enemy has a known EW and electronics intelligence capability, planning considerations may include—

- Requesting an assessment of the enemy's electronic order of battle (communications and radar jamming capabilities, antiradiation missile capabilities, and delivery profiles).
- Submitting recommendations for EMCON and radiation control (RADCON) standards within the MATCD's assigned sector. EMCON and RADCON plans should incorporate all ground-based sensors operating within the sector and consider

the antiradiation missile threat to maintain effective sector surveillance. EMCON and RADCON planning considerations should address—

- Minimum communications procedures.
 - Use of brevity codes and authentication devices.
 - Use and security of COMSEC materials.
 - Delegation of EMCON authority.
 - Signals security.
 - Beadwindow calls.
 - Gingerbread procedures.
 - Employment of directional antennas.
 - Circuit discipline.
 - Appropriate radio wattage.
 - Radar blinking and blanking.
 - Use of frequency diversity and frequency agile radios.
 - Physical dispersion and appropriate siting of communications emitters (including radars, radios, and NAVAIDs).
 - Available demand features on NAVAIDs and their use.
- Considering the EW threat when determining the locations of MATCD radars.

- Providing input to the MAGTF command and control warfare plan.
- Ensuring that planners, operators, and users of electronic equipment thoroughly understand the EW threat and the EMCON/EP techniques used to counter that threat.

SITE SELECTION PLANNING

The site selection process begins once the MATCD's sector is assigned. Planners must ensure adequate space for site establishment, access to the site, and radar coverage of the sector are maximized. The site selection process includes—

- Conducting surveys using maps, aerial photos, charts, and other graphic aids to identify candidate sites.
- Producing/obtaining radar coverage diagrams from the tactical aviation mission planning system, Joint Electronics Office, other automated sources, or manual computations.
- Determining optimum siting locations for communications connectivity with higher/adjacent and subordinate agencies using applicable computer programs, LOS diagrams, and HF frequency propagation predictions.
- Submitting a list of candidate sites to the ACE commander based on map surveys and other studies. MATCD siting considerations should encompass all task-organized equipment and personnel in both movement and physical requirements. Physical site characteristics considerations include—
 - Radar coverage of the assigned airspace.

- Ground that has no more than 10 degrees of slope.
- Spatial requirements (e.g., antennas or radio frequency hazards).
- Logistics supportability.
- Camouflage and concealment.
- Trafficability and access.
- Emergency destruction and/or movement.
- Drainage.
- Defensibility.

In addition to the physical geography of the site, planners should consider the candidate site's proximity to related activities occurring in or around the forward operating base. These functional site considerations should address the locations of—

- Fuel points and fuel storage areas.
- Ordnance storage areas.
- Arming/dearming areas.
- Air lift control element locations.
- Pre-existing NAVAIDs.
- Arresting gear.
- Medical evacuation areas.
- Search and rescue aircraft.

- Crash, fire, and rescue units/hot spots.
- Field weather observation services.
- Field of view.
- Obstructions.
- Requesting radar frequency authorization from the appropriate authorities.
- Establishing a phased plan of equipment arrival at the site to facilitate rapid commencement of operational capabilities and communications.
- Selecting an advanced party to conduct physical reconnaissance, locate positions for equipment, and plan specific equipment sites.
- Preparing diagrams or models that depict equipment locations and are the basis for setup crew briefings.
- Ensuring site plans consider maximum dispersal and remoting of equipment to reduce electromagnetic and infrared signatures.
- Designating alternate site locations.

AIRSPACE MANAGEMENT PLANNING

Airspace management planning involves segmenting assigned airspace by volume and/or time for the safe and expeditious flow of air traffic. Airspace management also involves establishing various air defense control measures which are designed to protect

friendly installations from enemy air attack. Planning considerations include—

- Analyzing the AOA/AO to determine dimensions, suitable airfields within, possible conflicts with civil aviation, unmanned aerial vehicles (UAV), and preferred routings for friendly aircraft.
- Determining the size and shape of terminal control airspace. Usable NAVAIDs, civil air traffic patterns, UAVs, and conflicts with other users of this airspace will affect the airspace's configuration.
- Determining the size and shape of Class D airspace. Military (manned and unmanned aircraft) and applicable civil traffic patterns should be considered.
- Ascertaining the size and shape of the BDZ. BDZ dimensions are normally determined by the effective engagement envelope of the supporting air defense systems (e.g., Stinger) and anticipated air traffic patterns. Entry and exit procedures, including safe lanes as well as IFF mode and code requirements, must be established during BDZ construction.
- Preparing TERPs for designated airfields and submitting the approach plates to the Naval Flight Information Group for approval and publication.
- Participating with other MACCS agencies in the planning and development of MRRs. Planning should include consideration of UAV and civil aircraft routing.
- Coordinating with ICAO, host nation air traffic control, and/or FAA authorities for the effective use of existing airspace.

- Coordinating with higher headquarters to publish air traffic control procedures in the airspace control order/airspace control plan (ACO/ACP) and pilot controller handbook.
- Coordinating with local ground-based air defense unit(s) for BDZ early warning cueing.
- Developing procedures for handling transient aircraft within the MAGTF's AO.

EXTERNAL SUPPORT PLANNING

MATCD-unique external support planning considerations include—

- Identifying and coordinating sufficient transportation and materials handling equipment necessary to rapidly emplace the MATCD.
- Coordinating aviation supply/logistics support for Naval Air Systems Command-supported equipment through the Marine aviation logistics squadron.

JOINT/MULTINATIONAL OPERATIONS PLANNING

The MAGTF must ensure its operations are integrated and coordinated with joint/multinational forces. MAGTF air command and control representatives should be included as part of the joint operations planning (e.g., development of the joint air operations plan, ACP, or the air defense plan). The ACE commander, his staff, and/or MACCS agencies normally provide these subject

matter experts. They also identify MAGTF capabilities and requirements relative to airspace control and air defense operations. Joint/multinational operations plans must specifically—

- Integrate with and complement the joint/multinational force's mission.
- Ensure the interoperability of equipment and personnel.
- Ensure the common use and understanding of terminology.
- Allow responsiveness and the massing of firepower whenever and wherever needed.
- Identify the proper liaison and staff/agency representation between joint force components. Representatives from each component must enable and improve the information flow and provide expertise.
- Outline procedures for airspace control and air defense degradation.
- Facilitate transition from peacetime conditions to hostilities.

Air operations, airspace, and air defense planning will be integrated with the joint force's planning cycle. Input from all components must be consolidated and integrated into the joint air operations plan, the ACP, and the air defense plan. The ACP and air defense plan are part of the joint air operations plan and must be included in the joint force operations plan. The ACO is published and disseminated based on guidelines established in the ACP. As an integral part of the joint ATO, integrated tasking order, or air tasking message (NATO), the ACO may be distributed as a part of these documents or may be issued separately.

OPERATIONS BRIEF

The MATCD operations brief is developed based on the planning conducted at the MACCS (e.g., Marine air control group [MACG]) planning staff level. It is designed to ensure that the detachment has sufficient information to prepare for operations at its forward operating base. The brief may serve as an additional source of information along with operations orders, the ACP, the ACO, and applicable standing operating procedures for supervisors to prepare crew briefings before assuming their watch. Appendix C is an operations brief format.

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Chapter 4

Operations

The MAGTF commander uses Marine aviation to assist efforts in support of the commander, amphibious task force; naval expeditionary force commander; joint task force commander; or joint force commander. In its most common employment, the MATCD will operate in support of expeditionary operations ashore.

EMPLOYMENT

The MATCD task-organizes to fulfill its mission. The services required at a forward operating base will dictate the number of personnel and types of equipment necessary to support the mission. Common MATCD employment options follow.

Full Service ATC Detachment

The full service ATC detachment is designed to support continuous all-weather air traffic control services at a main air base. Services provided by the full service ATC detachment typically include control tower, TACAN, radar approach and departure control, and precision/nonprecision and instrument approaches. Table 4-1 is a notional equipment listing for a full service ATC detachment.

**Table 4-1. Full Service ATC Detachment
Notional Equipment Listing.**

<u>System</u>	<u>Nomenclature</u>	<u>Quantity</u>
AN/TSQ-12 A/B	ATC Tower	1
AN/TRN-44	TACAN	1
AN/TPN-22	Precision Approach Radar	1
AN/TPS-73 1	Airport Surveillance Radar	
AN/TSQ-131	Communication Control Subsystem	2
AN/TPN-30	MRAALS (Microwave Landing System)	3
OA-9141/TSM-170	Auxiliary Equipment Maintenance Facility	1
OA-9142/TSM-170	Communications Equipment Maintenance Facility	1
OA-9143/TSM-170	Radar Equipment Maintenance Facility	1
OA-9144.TSM-170	Microcomputer Repair Facility	1
HD-1099	Environmental Control Unit	18
MEP006A	Generator Set	11
MEP015A	Generator Set	7

Tower and TACAN Detachment

The tower and TACAN detachment capabilities focus on providing all-weather air traffic control services at a designated site. Services provided by the tower and TACAN detachment include control tower and TACAN instrument approaches and departures. Table 4-2 is a notional equipment listing for a tower and TACAN detachment.

**Table 4-2. Tower and TACAN Detachment
Notional Equipment Listing.**

<u>System</u>	<u>Nomenclature</u>	<u>Quantity</u>
AN/TSQ-12 A/B	ATC Tower	1
AN/TRN-44	TACAN	1
OA-9142/TSM-170	Communications Equipment Maintenance Facility	1
HD-1099	Environmental Control Unit	5

MMT

The MMT is used for short duration operations, typically 72 hours or less, as the lead element of a follow-on detachment. An MMT can provide non-radar air traffic control services up to 40 nmi from a TLZ using a portable NAVAID and non-radar procedures. The MMT’s relatively small logistics footprint requires fewer transportation assets than the larger MATCD options and is conducive to rapid site establishment and retrograde. Table 4-3 is a notional equipment configuration for the MMT.

CONCEPT OF EMPLOYMENT

The MATCD task-organizes its personnel and assets to support its MAGTF assigned mission. While a particular MATCD configuration may normally be associated with a Marine expeditionary force (MEF) or Marine expeditionary unit (special operations capable) (MEU(SOC)), specific requirements for a given tactical situation will dictate the actual configuration suitable for the mission.

Table 4-3. MMT Notional Equipment Listing.

<u>System</u>	<u>Nomenclature</u>	<u>Quantity</u>
AN/TPN-30	MRAALS (Microwave Landing System)	1
MEP015A	Generator Set	1
AN/PRC-113	UHF/VHF Radio*	3
AN/PRC-119	VHF/FM Radio*	2
AN/PRC-104	HF Radio*	1
TA-312	Field Phone	2
KY-57	TSEC Device*	2
KY-65	TSEC Device*	1
AS-390	UHF Antenna*	1
RC-292	VHF Antenna*	1
ACR/L-32	Light Set*	1
- - - -	Hand-Held Anemometer	1
- - - -	Portable ALDIS Lamp*	1
M-9	Pyrotechnic Pistol*	1
- - - -	7x50 Binoculars	1

* Equipment not on the MATCD table of equipment which requires sourcing from other units.

Marine Expeditionary Force

Coordination of MAGTF air operations during MEF operations requires a considerable amount of air traffic control support and will typically be based on the number of air bases and forward operating bases from which MAGTF aircraft are operating. Normally, four full MATCDs will deploy to provide continuous, all-weather air traffic control services at up to four main air bases. The four detachments can also field four MMTs to provide limited air traffic control services at air facilities or air sites. MEF forward elements are typically supported by two MATCDs. The two detachments can provide continuous, fully capable air traffic

control services at up to two main air bases and two MMTs for air traffic control support at two air facilities or air sites.

MEU(SOC)

Limited air traffic control services are typically provided to a MEU(SOC) by one MMT. The MMT is capable of controlling TLZs for fixed-wing aircraft and HLZs for rotary wing aircraft under both visual meteorological conditions and instrument meteorological conditions. The MMT has the organic capability to operate for up to 72 hours without resupply or augmentation. It can support a variety of air traffic control missions as an independent unit or as part of a larger force in joint/multinational operations. Specifics regarding MMT employment are discussed in unit standing operating procedures.

The MMT is specifically designed to be inserted in remote locations to support MAGTF air operations. Common methods of MMT insertion are tactical vehicle and air insert.

Tactical vehicle insertion is the primary method of deploying an MMT to its air point. To move personnel and equipment to the air point, each MMT is equipped with a HMMWV. Normally, all MMT personnel and equipment fit within the HMMWV.

Air insert operations deliver the MMT to their assigned air point by fixed-/rotary wing aircraft. The MMT is among the first aviation capabilities introduced into the objective area. Early establishment of air traffic control services at the air point ensures that all succeeding aviation efforts have air traffic control and navigational guidance available, thus enhancing the safe and expeditious flow of air traffic into and out of the air point and surrounding airspace.

MATCD/MACCS INTERAGENCY RELATIONS

MATCD and TACC

The MATCD is subordinate to the TACC and provides decentralized control functions for friendly air traffic operating in and around designated forward operating bases. Through liaisons to host nation air traffic control facilities and operational detachments established at forward operating bases, MATCD personnel keep the TACC informed on the status of friendly and civilian air traffic, changes to airspace control measures which impact on MATGF air operations, and the operational status of various air bases/airfields. The TACC provides the MATCD with guidance on the conduct of MAGTF air operations and updates to the air tasking order and airspace control order.

MATCD and TAOC

The TAOC and MATCD coordinate aircraft departure and return to force information to assist in the aircraft identification and recovery process. The TAOC advises the MATCD on the current air threat situation and provides air warning data for the MATCD activation and control of the BDZ. The MATCD disseminates air defense control measures received from the TAOC to applicable MAGTF elements and aircraft under MATCD control.

MATCD and DASC

The DASC and MATCD coordinate aircraft departure and return to force information to assist in the aircraft identification and recovery process.

OPERATIONAL REQUIREMENTS

Each MATCD has the capability of supporting one main air base and one remote air site or point. The detachment has a full range of air traffic control capabilities to include air surveillance radar, IFF, ACLS radar, communications, NAVAIDs, and a control tower. This equipment provides a MATCD with positive airspace control capabilities that encompass airspace extending out to 60 nmi from a main air base using radar control procedures and out to the limits of MATCD designated airspace using non-radar procedures (procedural control). To maximize the capabilities of the MATCD, the following general operational requirements should be considered.

Siting

The safe conduct of air traffic control services is predicated on the controllers' ability to detect aircraft and communicate with the aircrew. The location of air traffic control equipment plays a significant role in facilitating these services. See "Equipment Selection and Siting Considerations," page 4-11, for further details.

Terminal Instrument Procedures

Following selection of an airfield, determination of the level of air traffic control services, and selection of MATCD equipment locations, airfield instrument approaches are developed to ensure obstruction clearance is adequate. Once instrument approach procedures are developed, they are sent to the Naval Flight Information Group for approval. A notice to airmen is disseminated until published in the flight information publication.

Flight Inspection

A flight check of air traffic control instrument approaches is required by the FAA. The check is normally conducted by an FAA flight check aircraft. When an FAA flight check aircraft is not available, the ACE commander may authorize a military aircraft to conduct the flight check in accordance with FAA publication AO P 8200.1, *Flight Inspection Manual*. This alternative will allow MAGTF aircraft to use the instrument approaches until an FAA flight check is successfully completed.

MATCD IN AMPHIBIOUS/EXPEDITIONARY OPERATIONS

MATCD elements, notably the MMT and liaison officers, are typically among the first MACCS air control capabilities introduced ashore. MMTs, used in either a stand-alone role or as a precursor for a buildup for a larger MATCD, are initially established to coincide with initiation of forward operating base air operations. As airfields are secured, additional air traffic control capabilities may be phased into the AOA/AO to provide additional, continuous air traffic control services for USMC, joint, and allied Services' aircraft operating from AOA/AO airfields. When MAGTF aviation elements are forward based at an allied nation's airfield located near the AOA/AO, MATCD personnel may be assigned as liaisons to the host nation's air traffic control administration. With the introduction of air traffic control radars into the MAGTF's AO, the MATCD will coordinate the requisite voice and data links necessary to contribute to the force's IADS through the Marine or Navy sector anti-air warfare coordinator or the anti-air warfare commander.

JOINT/MULTINATIONAL OPERATIONS

The MATCD's role in joint/multinational operations differs little from amphibious/expeditionary operations. The MATCD will support MAGTF air operations and integrate with the joint/multinational force. Marine air traffic control coordination with the ACA for the promulgation of airspace control measures and airfield rules is a high priority for MACCS operations. Of equal significance is the role MATCD controllers play as liaisons to allied air traffic control facilities to facilitate the coordination of MAGTF airspace. MATCD personnel may be functioning from airfields used by both joint and allied Service aircraft. Versatility, familiarity, and experience in joint/multinational air traffic control and airfield procedures is paramount to enhancing aircrew safety and success.

MILITARY OPERATIONS OTHER THAN WAR

The MATCD is capable of deploying and operating independent of the MAGTF, joint force, or joint task force to provide air traffic control support for various types of operations other than war. Examples of this type of air traffic control support are providing air traffic control services to assist humanitarian efforts, assisting other joint/allied Services, and supporting intergovernmental air traffic control requirements.

VOICE COMMUNICATIONS

The MATCD is a communications-intensive agency. A typical voice communications configuration for a MATCD includes air-to-ground communications with aircraft and ground-to-ground communications with MACCS, joint, and multinational/host na-

tion air control agencies. Appendix B lists the communications nets commonly used by the MATCD. Communications planners should consider that while secure voice communications may be used in support of tactical operations, communications with civil aircraft must be conducted on nonsecure circuits.

DATA LINK COMMUNICATIONS

Expediency in reporting air tracks and updating track position is crucial to effective air defense operations. The MATCD contributes to the MAGTF's overall air picture development through air track exchange over digital data links.

MATCALs is capable of exchanging track data information over one TADIL B data link with another TADIL B-capable air command and control agency, such as the Marine TACC or TAOC. If the second TADIL B reporting unit is conducting TADIL operations with other air command and control agencies, air tracks initiated by the MATCD can be forwarded to other participating data link agencies, and the MATCD can receive tracks forwarded from the other air command and control agencies.

This exchange of track information greatly enhances situational awareness for all participating agencies and significantly assists in the identification of friendly aircraft, thus reducing chances of fratricide. Voice reporting (cross tell/voice tell) of air tracks may be used to supplement the data link picture or when the data link is inoperative.

EQUIPMENT SELECTION AND SITING CONSIDERATIONS

Upon receipt of a warning order or after initial tasking, MATCD planners begin determining the equipment needed to support operations.

Generally, equipment requirements are based on the detachment's mission, location(s), available lift and logistics support, anticipated duration, and space available at the site. The MATCD commander and maintenance officer will typically weigh these factors against historical data to determine the equipment suites necessary to support operations, necessary maintenance facilities, mobile electric power support, and parts pack-up. The initial equipment plan is briefed to the MACS commanding officer for initial approval. Specific concerns for selecting potential sites that follow apply to all MATCD operations, whether the MATCD is operating in a garrison or tactical situation.

Surveys

Two types of surveys are necessary for determining the equipment needed to support operations: the map survey and the physical survey.

The map survey is normally conducted concurrently with initial equipment planning. Map surveys of potential airfields/air sites are used to gain an initial impression of the surrounding terrain, runways, taxiways, and parking aprons and to determine how these factors influence MATCD equipment siting. The goal of the map survey is to ascertain the practicality of providing unobstructed "views" for the tower and radars and to identify potential locations for the detachment's equipment. Key considerations

to be addressed during the map survey include identification of the limitations on equipment separation based on cable length, etc., safety zones around radiation hazards, and potential of electromagnetic interference from other radio-electronic sources.

When practical, a physical site survey should be conducted to confirm or refute site locations identified during the map survey. The physical survey affords MATCD personnel the opportunity to update site information that was not available from a map, adjust equipment locations, and determine the types of support, such as commercial power and telephone access, available at the airfield/air site. Physical site surveys conducted by qualified MATCD personnel are recommended prior to deployment of the detachment's equipment.

Equipment Siting

When conducting the map and physical surveys and during the actual equipment emplacement, MATCD Marines should consider unique properties associated with the various equipment.

AN/TSQ-120 (ATC Control Tower). When siting the control tower, priority should be given to the controller's field of vision. A clear view of runways, movement areas, and approach surfaces is paramount. Tower personnel should have unobstructed views of taxiways, ramp areas, and arming/dearming sites to enhance safe movement in and around the airfield. The tower requires a 10' x 15' level area with firm soil for erection. Tower height should be kept as low as practical to reduce its vulnerability as a target.

AN/TRN-44 (TACAN). The TACAN is an LOS transmitter. Antenna height is determined by local terrain and obstacles. Like

the control tower, it should be raised no higher than necessary. To achieve the best approach possible (a straight-in approach to minimums of 1 mile and 500 feet), the TACAN must be located within 1 mile of the approach end of the runway. The site should be a clear, flat area free of obstructions; e.g., buildings or trees, for 1/4 mile if possible. Hard surfaces; e.g., runways or taxiways, especially if constructed of metal matting, should be avoided due to reflections that distort the TACAN's pattern.

Radars. Siting of the radars is generally more difficult than the other equipment suites due to their susceptibility to terrain effects, necessary logistics support, and limitations to interface with other equipment suites.

An operational analysis of the airfield, number of approaches to different runways, number of touchdown points, and desired landing minimums should be made before selecting radar sites. The primary instrument runway is selected after taking into account factors such as weather, terrain, and obstacles. Normally, this runway will have the least restrictive (lowest) landing minimums. Secondary instrument runways and their attendant touchdown points are identified and covered if possible.

Two key factors for radar site consideration are the landing operations to be supported and physical and electromagnetic effects on a radar's tracking. The airport surveillance radar must be placed such that radar blind spots are eliminated. The precision approach radar must be sited to maximize coverage and preclude drop-tracks due to clutter. The approach corridor for the primary instrument runway should be free of obstructions. The TPN-22 precision approach radar's siting is the most critical as it provides terminal guidance for aircraft landing in adverse weather and/or poor visibility situations.

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Chapter 5

Training

Every Marine Corps leader has the responsibility to establish and conduct technical and tactical training to successfully accomplish the unit's mission. The complexities of amphibious, joint, and multinational operations, as well as the importance of MATCD individual, crew, and unit level training, cannot be overstated.

INDIVIDUAL TRAINING

Air Traffic Controllers

Air traffic controller entry-level training is conducted at Naval Air Station (NAS), Pensacola. Air traffic controller training requirements, both individual and crew-specific, are standardized by NAVAIR 00-80T-114, *Air Traffic Control Facilities Manual*, and MCO P3500.19, *Training and Readiness (T&R) Manual*. NAVAIR 00-80T-114 ratings are issued by the FAA or designated examiners within the MATCD. Procedures for rating air traffic controller skills are outlined in applicable ICAO and FAA regulations. NAVAIR 00-80T-114 specifies the training and position requirements for controllers to progress through various levels of qualification within the tower or radar facility.

On-the-Job Training. Subsequent to basic ATC school training, each air traffic controller undergoes a period of on-the-job training (OJT) to attain hard-skill military occupational specialty (MOS) and initial certifications.

Technical MOS and proficiency training for tower and radar positions are conducted at Marine Corps ATC facilities. Approach controller training is available at Marine Corps Air Station (MCAS), Beaufort; MCAS, Cherry Point; MCAS, Iwakuni; MCAS, Yuma; and Marine Corps Air Facility, Kaneohe Bay.

Follow-on Schools. Several formal and nonformal schools are available to air traffic controllers once initial certifications are achieved. Courses of instruction include—

- Weapons and Tactics Instructor Course.
- MMT Leaders Course (given by Marine Aviation Weapons and Tactics Squadron 1).
- Advanced Radar Air Traffic Control (Approach) Course.
- Advanced MATCALs Course.
- Joint Airspace Management Course.
- Airspace Management Course.
- Terminal Instrument Procedures.

MATCD Technicians

MATCD technicians undergo their entry-level training at NAS, Pensacola. Maintenance technician training requirements are outlined in MCO P4790.12A, *Individual Training Standards System (Maintenance Training Management and Evaluation Program)* (Short title: *ITSS [MATMEP]*). Subsequent to initial in-service training schools, technicians will undergo a period of OJT before performing in their assigned billets.

Training Levels. ITSS (MATMEP) training is conducted and

maintained at the unit level. ITSS (MATMEP) training is task-oriented and encompasses OJT for MATCALs equipment. ITSS (MATMEP) delineates four levels of certification:

- Level 1, Apprentice Technician.
- Level 2, Advanced Apprentice Technician.
- Level 3, Journeyman Technician.
- Level 4, Master Technician.

Follow-on Training. Marines demonstrating the required technical proficiency may be selected to attend advanced training. Two common follow-on schools available to technicians are the micro-miniature component repair course and the advanced technician course. Additional on-site training opportunities include the operational software supplemental training course and system-specific on-site technical training.

CREW AND INDIVIDUAL PROFICIENCY TRAINING

Training for individual MATCD crew members and the inter-crew coordination is accomplished through several different methods, including both live and simulated training events. Two of the more common methods of attaining crew and individual proficiency is through ATC timeshare operations and simulated training.

ATC Timeshare Operations

Timeshare operations are operations conducted with tactical ATC equipment sited at existing air stations. They allow air traffic controllers assigned to air stations under the fleet assistance program to receive proficiency training on tactical equipment and to complete some T&R Manual training requirements. MATCD maintenance technicians and utilities personnel also receive training. Timeshare operations provide the local air station with back-up FAA certified equipment in the event of station equipment failure.

Simulated Training

MATCALs has an internal simulation capability that allows for basic ground-controlled approach, flight data coordination, arrival control, and approach and departure control training. TADIL B data link training is accomplished via shelter-to-shelter simulation and live traffic data transfer.

UNIT TRAINING

Unit training involves that training required to prepare the MATCD to perform its mission. Unit training can take on many forms, including command post exercises, simulated exercises, and field training exercises (FTXs). MATCD personnel are intimately involved in preparing training plans and coordinating with higher, adjacent, and subordinate air command and control and support elements.

Marine Aviation Planning Problem (MAPP)

MAPP exercises are low-cost, low-overhead training which allows commanders to train their staffs to perform special integration and control functions in a simulated environment. MAPP exercises are particularly effective for determining command and control requirements to support possible contingencies.

MACCS Integrated Simulated Training Exercise (MISTEX)

The MISTEX is a MACG locally produced exercise which involves the detailed preparation of a simulated scenario and its subsequent execution at the MACCS level. The MISTEX can serve to prepare units for upcoming FTXs or contingencies.

Joint Service Training Exercises (JSTEs)

Similar to the MISTEX, JSTEs provide integrated systems training that incorporates the challenges of integrating the MACCS in the joint arena. JSTE scenarios have been developed to support joint training for probable contingency operations worldwide.

Field Training

Field training provides a unit with the most beneficial training opportunities available: living and operating conditions are similar to those expected in combat. FTXs provide live operational training covering all phases of planning and operational employment including—

- Actual employment of an operational tactical approach control

facility.

- Unique opportunity for training in an operational tactical control tower.
- Full liaison training with external air traffic control organizations.
- Full embark and planning training.
- MCCRES evaluation of equipment employed.
- Full maintenance support training.
- Integration training with MACCS agencies.

EVALUATING TRAINING

Both individual and unit training must be continuously scrutinized and evaluated to identify areas for improvement. The two key instruments used to aid MACCS commanders in assessing their readiness are MCO P3500.19 and MCO 3501.9B.

MCO P3500.19B addresses specific training requirements for MATCD operators and controllers and specifies the training required to progress from qualification to qualification. The MCCRES is a standardized, Headquarters Marine Corps-directed evaluation program designed to measure a unit's warfighting readiness. MCCRES specifies mission performance standards that agencies are expected to perform during their wartime mission.

Appendix A

Forward Operating Bases

MAGTF aviation operates from sea- or shore-based airfields close to or within its area of operations. When operating ashore, MAGTF aviation uses forward operating bases to support tactical operations without establishing full support facilities. Forward operating bases increase responsiveness through basing flexibility and aircraft dispersal and by decreasing distances to support areas.

The distinguishing characteristic among the various MAGTF airfields is the services that are available at a given type of air base. The *maintenance functions and sustainability aspects*, not the *method of construction*, give each type of forward operating base its specific definition. Classifications for various forward operating bases follow.

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. A main air base's support agencies and facilities are determined by task organization requirements but should include intermediate maintenance activity support and engineering functions necessary 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 air base functions to support *sustained operations ashore*.

AIR FACILITY

An air facility is a *secure airfield* capable of supporting a detachment or squadron and its associated organizational maintenance activity. An air facility should be capable of *sustained operations at a combat sortie rate* and provide the support required to initially stage and later replenish forward sites.

Organizational maintenance activity support should include basic troubleshooting and repair, daily turnaround inspections, refueling, weapons loading/downloading, and arming/dearming functions. Major maintenance functions such as engine changes and phase inspections are not accomplished at an air facility unless it is more advantageous than returning the aircraft to the rear area main base or a sea base. Aviation ordnance is stored in the open, using accepted procedures. Support equipment with rough terrain capability is desirable for movement, loading, and maintenance of aircraft. An air facility might be an airfield, road segment, matted runway, or in the case of vertical/short takeoff and landing aircraft and helicopters, flat ground or a grass strip.

AIR SITE

The air site is a *secure location* where combat aircraft are prepositioned to enhance response time. It is 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 would be staged at this site. During normal operations, the air site requires minimal logistics support. Operations are limited to receiving and launching previously loaded aircraft and require a minimum number of support personnel. The air site has the *potential to expand its capabilities* to meet operational requirements. Upon completion of a mission from an air site, aircraft

normally return to an air facility or main base for refueling, arming/dearming, and maintenance. Personnel typically required to accomplish site maintenance include a plane captain or crew chief per aircraft and one ordnance man per air site. Generally, only handcarried support equipment and tools are required.

AIR POINT

Air points are specific predetermined geographic locations that will support a specific tactical mission. Types of air points include the FARP and the lagger point.

Forward Arming and Refueling Point

FARPs are *temporary and 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 objective area. This is accomplished by locating the FARP as close to the objective area as allowed by mission, enemy, terrain and weather, troops and support available, and time available. Normally, FARP support consists of fuel, ordnance, communications, and command element personnel. When fixed-wing assets are used, plane captains are required. Aviation maintenance conducted at a FARP should be restricted to minor repair and adjustments that can be made by the crew chief or plane captain. Equipment that normally supports the FARP should be limited to that which directly supports the mission (i.e., helicopter expeditionary refueling system, rapid ground refueling, short airfield for tactical support loaders, and other necessary ground support equipment).

Lagger Point

Lagger points are *secure locations* designated by aviation units for the rendezvous, marshalling, or positioning of flights of aircraft between missions or when awaiting completion or activation of an assigned mission. Other than communications, no other equipment support should be required. Lagger points can be isolated or independent, or they may be adjacent to a main base, air facility, air site, or FARP.

Appendix B

Communications Nets

TACTICAL AIR COMMAND (TAC) (VHF/HF/UHF-SATCOM)

Purpose

Provides the primary means by which the ACE commander tasks subordinate elements to meet the six functions of Marine aviation.

Composition

- Marine TACC
- Sector antiair warfare facility
- TAOs
- DASC
- Marine aircraft groups/squadrons
- MATCDs
- Early warning and control (EW/C) sites

TADIL B (CABLE/MUX)

Purpose

A point to point, full duplex digital data link designed to exchange air track information between appropriately equipped air command and control agencies.

Composition

- Marine TACC
- TAOCs
- EW/Cs
- MATCDs
- Other Service air command and control agencies

INTERFACE COORDINATION NET (ICN) (MUX/HF/UHF)

Purpose

Provides a means for command level coordination of joint data link employment.

Composition

- Marine TACC
- TAOCs
- EW/Cs
- MATCDs
- Other Service data link-capable air command and control agencies

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

Purpose

Provides a means for track surveillance personnel to exchange voice information to maintain a clear data link picture. This net may be used as the data link coordination net based on equipment availability.

Composition

- Marine TACC
- TAOCs
- EW/Cs
- MATCDs

- Other Service data link capable air command and control agencies

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

Purpose

Provides a means for reporting on hostile or unidentified aircraft. Multiple CI/D nets may be required when several radar surveillance activities are employed.

Composition

- Marine TACC
- TAOCs
- EW/Cs
- MATCDs
- HAWK engagement sections
- Low altitude air defense units
- Other surveillance agencies

HANDOVER/CROSS TELL (H/O/X-TELL) NET (UHF/MUX)

Purpose

Provides a means to coordinate aircraft control between air control agencies. Multiple nets can be established or the functions may be combined based on traffic load.

Composition

- Marine TACC
- TAOCs
- EW/Cs
- DASC
- MATCDs

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

Purpose

Provides a means for the TACC/TADC, TAOC, EW/C, MATCDS, and DASC to exercise control of all tactical and itinerant aircraft in the objective area.

Composition

- Marine TACC
- TAOCs
- EW/Cs
- MATCDs
- DASC
- DASC(A)
- Fixed-wing aircraft
- Rotary wing aircraft

GUARD NET (UHF/VHF)

Purpose

Emergency distress net for aircraft; also used to warn aircraft of emergency conditions.

Composition

- Marine TACC
- TAOCs
- EW/Cs

- DASC
- MATCDs
- Fixed-wing and rotary wing aircraft
- Other Service air command and control agencies

SEARCH AND RESCUE (SAR) NET (UHF)

Purpose

Provides a means for control and coordination of SAR missions. Multiple SAR nets may be required.

Composition

- All elements within the air command and control system
- Aircraft involved in SAR operations

CRASH, FIRE, AND RESCUE (CFR) NET (VHF)

Purpose

Provides a means to coordinate crash recoveries on or around an airfield.

Composition

- Crash crew
- Air traffic control facilities
- Airfield operations

AIR TRAFFIC CONTROL (ATC) COMMON (MUX/HF)

Purpose

Provides a means for ATC facilities to coordinate airspace management between airfields.

Composition

- Includes involved ATC facilities

Appendix C

Operations Brief Format

Weather

Intelligence/Situation Brief

- Enemy:
 - Air order of battle
 - Ground order of battle
 - EW capabilities
 - Nuclear, biological, and chemical capabilities
 - Surface-to-surface missile threat
 - Terrorist threat
- Friendly:
 - Forward operating bases
 - Aircraft
 - UAVs
 - Ground forces

- MACCS agencies and locations
- Joint/multinational air control agencies
- ICAO/host nation air traffic control agencies

Commander's Intent

Command, Control, and Communications Plan

- Airspace management
- AOA/AO:
 - Approach control airspace
 - Class D airspace
 - Destruction area
 - BDZ
 - Missile engagement zones
 - Fighter engagement zones
 - Terminal control areas
 - Routing
 - Fixed-wing
 - Rotary wing
 - UAV

- Civil
 - ACP/ACO update
 - Air defense warning conditions
 - Lame duck procedures
- Communications plan:
 - Communications connectivity
 - Required communications nets
 - Data link
 - EMCON/SCATANA
 - Crypto

Rules of Engagement

- Identification authority
- Engagement authority
- Identification criteria
- Weapons control status
- Self-defense criteria

Emergency Procedures

- SAR/MEDEVAC
- Tactical recovery of aircraft and personnel
- Flush plan

Reports

Questions

Appendix D

Glossary

Section I Acronyms

ACA	airspace control authority
ACE	aviation combat element
ACLS	automatic carrier landing system
ACO	airspace control order
ACP	airspace control plan
ALS	all-weather landing system
AM	amplitude modulation
AO	area of operations
AOA	amphibious objective area
ATC	air traffic control
ATCS	air traffic control subsystem
ATO	air tasking order
BDZ	base defense zone
CAC ² S	common aviation command and control system
CCS	control and communications subsystem
CI/D	combat information/detection
COA	course of action
DASC	direct air support center
DASC(A)	direct air support center (airborne)
EMCON	emission control
EP	electronic protection
EW	electronic warfare
EW/C	early warning and control
FAA	Federal Aviation Administration
FARP	forward arming and refueling point
FM	frequency modulation

FOB forward operating base
FTX field training exercise
HF high frequency
HLZ helicopter landing zone
HMMWV high mobility, multipurpose wheeled vehicle
Hz hertz
IADS integrated air defense system
ICAO International Civil Aviation Organization
IFF identification, friend or foe
ITSS (MATMEP) individual training standards system
(maintenance training management and evaluation program)
JSTE Joint Service Training Exercise
kHz kilohertz
LOS line of sight
MACCS Marine air command and control system
MACG Marine air control group
MACS Marine air control squadron
MAGTF Marine air-ground task force
MAPP Marine aviation planning problem
MATCALS Marine air traffic control and landing system
MATCD Marine air traffic control detachment
MCAS Marine Corps Air Station
MCCRES ... Marine Corps combat readiness evaluation system
MEF Marine expeditionary force
MEU(SOC) Marine expeditionary unit (special operations
capable)
MHz megahertz
MISTEX MACCS integrated simulated training exercise
MMT Marine air traffic control mobile team
MOS military occupational specialty
MRAALS Marine remote area approach and landing system
MRR minimum risk route
NAS Naval Air Station
NAVAIDs navigational aids

nmi nautical mile
OJT on-the-job training
PDS processor display system
RADCON radiation control
RLST remote landing site tower
RGR rapid ground refueling
SCATANA . security control of air traffic and navigational aids
SNCOIC staff noncommissioned officer in charge
SPMAGTF special purpose MAGTF
TACAN tactical air navigation
TACC tactical air command center (USMC)
TADIL tactical digital information link
TAOC tactical air operations center
TCA terminal control area
TERPs terminal instrument procedures
TLZ tactical landing zone
T&R training and readiness
UAV unmanned aerial vehicle
UHF ultrahigh frequency
VFR visual flight rules
VHF very high frequency

Section II Definitions

A

air control - The authority to effect the maneuver of aircraft. The elements of air control are: air control agency, air controller, airspace control, operational control, positive control, procedural control, radar control, and terminal control. (FMFRP 0-14) Air control is the authority to direct the physical maneuver of aircraft in flight or to direct an aircraft or SAW unit to engage a specific target. (FMFM 5-60)

air controller - An individual especially trained for and assigned the duty of the control (by use of radio, radar, or other means) of such aircraft as may be allotted to him for operation within his area. (Joint Pub 1-02)

air control agency - An organization possessing the capability to exercise air control. (FMFRP 0-14)

airspace control order - An order implementing the airspace control plan that provides the details of the approved requests for airspace control measures. It is published either as part of the air tasking order or as a separate document. (Joint Pub 1-02) Also called ACO.

airspace control plan - The document approved by the joint force commander that provides specific planning guidance and procedures for the airspace control system for the joint force area of responsibility/joint operations area. (Joint Pub 1-02) Also called ACP.

airspace management - The coordination, integration, and

regulation of the use of airspace of defined dimensions. (Joint Pub 1-02)

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

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

B

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

E

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

F

forward arming and refueling point - A temporary facility, organized, equipped, and deployed by an aviation commander, and normally located in the main battle area closer to the area of operation than the aviation unit's combat service area, to provide fuel and ammunition necessary for the employment of aviation maneuver units in combat. The forward arming and refueling point permits combat aircraft to rapidly refuel and rearm simultaneously. (Joint Pub 1-02) Also called FARP.

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

M

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

Marine air traffic control mobile team - A task-organized element provided by the Marine air traffic control detachment to perform control of friendly aircraft operating within the assigned

base defense zone of a forward operating base air facility/air site. The MATCD mobile team can provide continuous, control tower, non-radar approach, departure, and en route air traffic control services within its assigned terminal control area and base defense zone. Normally, a fully manned and equipped mobile team capability can be provided on a 24-hour basis for up to 72 hours without resupply or augmentation. (FMFM 5-50) Also called MMT.

P

positive control - 1. A method of airspace control that relies on positive identification, tracking, and direction of aircraft within an airspace, conducted with electronic means by an agency having the authority and responsibility therein. (Joint Pub 1-02) **2.** The tactical control of aircraft by a designated control unit, whereby the aircraft receives orders affecting its movements which immediately transfer responsibility for the safe navigation of the aircraft to the unit issuing such orders. (FMFRP 0-14 under "Marine air command and control system")

procedural control - A method of airspace control which relies on a combination of previously agreed and promulgated orders and procedures. (Joint Pub 1-02)

R

radar control - The operation of air traffic in a radar environment in which heading, altitude, and airspeed of the aircraft are directed by the control facility, and radar separation from other traffic is provided. (FMFRP 0-14 under "Marine air command and control system")

S

sector - An area designated by boundaries within which a unit operates, and for which it is responsible. (Joint Pub 1-02, Part 1 of a 2-part definition)

T

terminal control - The authority to direct the maneuver of aircraft which are delivering ordnance, passengers, or cargo to a specific location or target. Terminal control is a type of air control. (FMFRP 0-14 under "Marine air command and control system")

terminal control area - A control area or portion thereof normally situated at the confluence of air traffic service routes in the vicinity of one or more major airfields. (Joint Pub 1-02) Also called TCA.