MCRP 3-20F.7

Marine Air Traffic Control Detachment Handbook

U.S. Marine Corps

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FOREWORD

The Marine air command and control system (MACCS) provides the Marine Corps aviation combat element commander with the means to exercise control of the organic and nonorganic aviation assets necessary to support Marine air-ground task force (MAGTF) operations. Marine Corps Tactical Publication (MCTP) 3-20F, *Control of Aircraft and Missiles*, addresses basic planning considerations for MACCS operations, employment, and interoperability among MACCS and joint service agencies.

Marine Corps Reference Publication (MCRP) 3-20F.7, *Marine Air Traffic Control Detachment Handbook*, complements and expands on the information found in MCTP 3-20F by focusing on the details of the Marine air traffic control detachment (MATCD) and the role it plays in MAGTF, joint, and multinational operations. Intended for MAGTF, naval expeditionary force, and joint force commanders and their staffs, MCRP 3-20F.7 highlights MATCD fundamentals, systems, planning, operations, and training. By investigating these areas, MCRP 3-20F.7 provides commanders and their staffs with the information required for understanding and evaluating the operational principles and capabilities of various MATCD employment options.

This publication supersedes MCRP 3-20F.7, *Marine Air Traffic Control Detachment Handbook*, dated 11 November 2004.

Reviewed and approved this date.

BY DIRECTION OF THE COMMANDANT OF THE MARINE CORPS

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CHAPTER 1
FUNDAMENTALS

The mission of the Marine air control squadron (MACS), which is accomplished in part by the Marine air traffic control detachment (MATCD), is to provide air surveillance and control of friendly aircraft and surface-to-air weapons in support of offensive air support and antiair warfare (AAW), continuous all-weather radar, nonradar, tower air traffic control (ATC) services, airspace management, and meteorological and oceanographic (METOC) services that support the Marine air-ground task force (MAGTF) and joint force commanders. Marine air traffic control (MATC) is the principal terminal control agency within the Marine air command and control system (MACCS). By providing ATC services and functioning as the airfield command, control, and communications node at each Marine forward operating base (FOB), MATC is the enabling MACCS agency for the start and end of each aircraft sortie. As part of this role, MATC connects airfield functions to the MACCS.

In support of MAGTF operations, MATC is structured to provide MATCDs, MATCDs (minus), and Marine air traffic control mobile teams (MMTs). These units are provided by the MACS. The MATCDs normally deploy as a part of the MACCS within the MAGTF, but they may also deploy independently or as part of a joint force.

The MATCD functions as an integral part of a MAGTF or joint force integrated air defense system by providing input on friendly aircraft and serving as the controlling agency for the activation of a base defense zone (BDZ).

MISSION-ESSENTIAL TASK LIST

The Marine Corps tasks (MCTs) associated with MATC are identified in the Marine Corps Task List, maintained by the Deputy Commandant for Combat Development and Integration. The tasks consist of four subsets specific to the types of ATC services that the MATCD provides. Tasks specific to the meteorological section of the MATCD are covered in Marine Corps Reference Publication (MCRP) 2-10B.6, *MAGTF Meteorological and Oceanographic Support*.

The tasks are as follows:

- MCT 5.3.5.4.1.2—Provide ATC Tower Services.
- MCT 5.3.5.4.1.4—Provide MMT Services.
- MCT 5.3.5.4.1.5—Provide ATC Approach Services.
- MCT 5.3.5.4.1.6—Provide ATC Arrival/Departure Services.
- MCT 5.3.5.8—Provide METOC Services.

To accomplish the assigned ATC services-related MCTs, MATC performs several tasks. The following list is not all-inclusive, but it identifies some of the MATC's important responsibilities and key activities that fulfill the MCTs and are conducted as part of its normal operations:

- Sequence and separate aircraft.
- Provide airspace control, airspace management, and surveillance.
- Provide approach, departure, and en route services.
- Provide navigational assistance.
- Display and disseminate pertinent air track data to higher and adjacent agencies via tactical data links (TDLs) and command and control systems.
- Develop, review, and revise terminal instrument procedures (TERPS).
- Coordinate the BDZ.
- Coordinate with higher and adjacent agencies aboard the FOB.
- Provide control of vehicular traffic on airfield operating surfaces.
- Provide precision and nonprecision navigational aids (NAVAIDS).
- Serve as the operational liaison between the MAGTF and national/international ATC agencies and organizations.

To support MMT services, the MMT is trained and equipped to perform specific tasks related to its short duration and expeditionary nature, including operations with the Marine expeditionary unit. Some key activities that MMT conducts as part of its normal operations include the following:

- Formulate and issue ATC clearances, instructions, and advisories to affect the safe, orderly, and expeditious movement of aircraft operating in MMT airspace.
- Perform as a command, control, and communications node by establishing communications and integrating with higher and adjacent command and control agencies.
- Rapidly establish assault landing zones (LZs) and positively control them for fixed-wing, tiltrotor, and rotary-wing aircraft.
- Perform liaison duties with civil and military ATC agencies.
- Assist in assault LZ site selection.
- Conduct assault LZ surveys and assessments for initial and close battle area airfields (e.g., air sites, air points).
- Provide and operate manportable, Federal Aviation Administration (FAA)-certified NAVAIDS.
- Mark and light assault LZs, as the mission dictates.
- Provide limited, noncertified weather observations and information.
- Gather information to assist in the development of basic TERPS for assault LZs.

Support for METOC MCTs is accomplished by the METOC section of the MATCD. Some key activities that the METOC section conducts as part of its normal operations are–

- Collect environmental data.
- Analyze environmental data.

- Predict METOC conditions.
- Tailor METOC information into actionable decision aids and mission execution or planning forecast products.
- Integrate METOC information into the planning and decision-making process.
- Evaluate the effectiveness of METOC information.

MARINE AIR TRAFFIC CONTROL ORGANIZATION

The MATCD is resident within the MACS of the Marine air control group (MACG). Each MACS within the continental United States has three MATCDs. The MACS outside the continental United States has two MATCDs, and one MATCD resides in the Marine Corps Reserves. Each MATCD is organized and equipped to support a full instrument flight rules requirement, METOC capability, and three MMTs. The MATCD is composed of 6 officers and 111 enlisted Marines, allowing the MATCD to conduct all internal functions autonomously. Typically, the MATCDs are collocated with a Marine Corps air station (MCAS) and receive controller training and qualification through garrison MATC facilities. Together with METOC forecasters, the MATCD supports the operation of the air station through the fleet assistance program.

Each detachment consists of a command section and the supporting personnel to provide operations, METOC, and maintenance support (see fig. 1-1 on page 1-4).

Command Section

The command section, which includes the detachment commander, staff noncommissioned officer in charge, tower and radar chiefs, ATC maintenance officer and chief, METOC officer and chief, and two watch commanders, supervises and coordinates the MATCD's activities. In addition to named command section billets, Marines and Sailors of various types are either listed on the table of organization or may augment the MATCD while deployed (e.g., maintenance quality assurance representatives, aviation and ground supply personnel, corpsmen, maintenance central technical publication librarians, individual material readiness list managers).

Detachment Commander. The detachment commander (military occupational specialty [MOS] 7220, ATC officer), normally a captain (O-3), is responsible for the command of the ATC detachment. The detachment commander supervises the technical and tactical employment of the detachment personnel and equipment. In addition, the detachment commander ensures that the MATCD integrates with the MACCS, joint agencies, and adjacent airfield units.

Staff Noncommissioned Officer in Charge.The staff noncommissioned officer in charge (MOS 7277/7291, senior air traffic controller) is normally a master sergeant (E-8) who provides assistance and recommendations to the detachment commander concerning all aspects of operations, personnel, and administration.

Radar Chief. The radar chief (MOS 7257 and either a 7253 or 7254) is responsible for the planning and conduct of radar operations and integration with higher and adjacent ATC and tactical agencies. The radar chief oversees the training, testing, and proficiency of all radar controllers

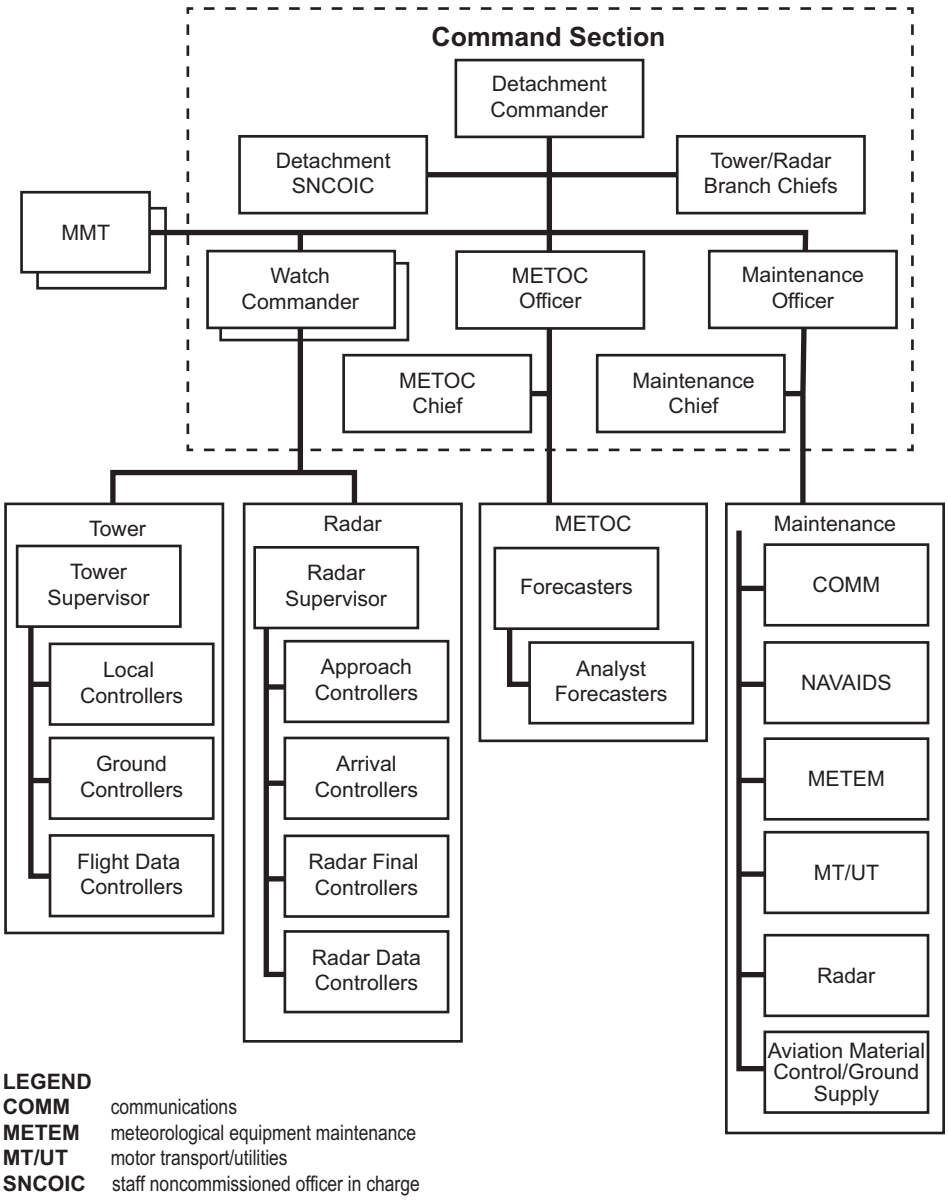

Figure 1-1. Marine Air Traffic Control Detachment Organization.

and ensures continuity from crew to crew. The radar chief is the principal advisor to the detachment commander on issues relating to the operation and employment of the radar section.

Tower Chief. The tower chief (MOS 7257/7252) is responsible for the planning and conduct of tower operations and coordination with airfield users, services, and adjacent agencies. The tower chief oversees the training, testing, and proficiency of all tower controllers and ensures continuity from crew to crew. The tower chief is the principal advisor to the detachment commander on issues relating to the operation and employment of the tower.

Maintenance Officer. The maintenance officer (MOS 5950, ATC systems maintenance officer) is further delineated as the assistant maintenance officer by Commander, Naval Air Forces

Instruction (COMNAVAIRFORINST) 4790.2C, *The Naval Aviation Maintenance Program (NAMP)*. The maintenance officer provides technical expertise on expeditionary ATC systems and support equipment, including maintenance, employment, logistics, and operations. The maintenance officer's responsibilities include the following:

- Supervise the maintenance of all detachment ATC and combat equipment.
- Manage ATC expeditionary equipment, support equipment, and aviation material control/ supply functions.
- Ensure the timely logistical flow of necessary replacement parts and maintenance documentation.
- Manage the detachment's operations and maintenance (Marine Corps) and operations and maintenance (Navy) funds.
- Coordinate the detachment's embarkation for ATC expeditionary and support equipment.
- Coordinate, implement, and maintain a communications plan.
- Coordinate and implement maintenance training requirements and documentation.

Maintenance Chief. The maintenance chief (MOS 5959, ATC systems maintenance chief) is further delineated as the maintenance material control officer by COMNAVAIRFORINST 4790.2C. The maintenance chief is responsible to the maintenance officer for the scheduling and performance of all maintenance management system requirements and technical training within all maintenance sections. The maintenance chief also coordinates all logistic support with squadron S-4, S-6, Marine aviation logistics squadron (MALS), Marine wing support squadron (referred to as MWSS), and supporting agencies.

Meteorological and Oceanographic Officer. The METOC officer (MOS 6802) is responsible for the following:

- Supervise the daily operations and training of the forecasters in accordance with Marine Corps Order 3500.14, *Aviation Training and Readiness Program Manual*, and Navy/Marine Corps Departmental Publication (NAVMC) 3500.3B, *Meteorological and Oceanographic Training and Readiness Manual*, while ensuring combat readiness and mission capability of METOC personnel and equipment.
- Manage all logistic, administrative, and fiscal functions of the section.
- Supervise and provide quality control for all METOC products.
- Provide climate and environmental studies for tactical and operational requirements.
- Employ and supervise the collection strategy provided by higher headquarters.
- Serve as a METOC subject matter expert to the commanding officer of the MACS.

Meteorological and Oceanographic Chief. The METOC chief (MOS 6842) is responsible to the METOC officer for supervising the daily operations of the METOC section in both garrison and expeditionary environments. This includes supervising the mentoring and training of all enlisted Marines within the section; the employment, operation, maintenance, and logistic functions of the Meteorological Mobile Facilities (Replacement) Next Generation (METMF[R]NexGen); and the quality assurance of all METOC products. The METOC chief also ensures the establishment of liaison with supporting activities.

Air Traffic Control Watch Commander. The ATC watch commander (MOS 7220), normally a second lieutenant (O-1) or first lieutenant (O-2), is the direct representative of the detachment commander and is responsible for the employment and operations of the MATCD in the detachment commander's absence. During the watch, the watch commander is responsible for ensuring continuity between crews, coordinating between the detachment and MACCS agencies, coordinating with adjacent units internal to the airfield, and ensuring compliance with radiation control (RADCON), air defense warning conditions, and weapons control statuses and postures. The watch commander is responsible for the physical security of the MATCD, including entry control points and integration with the base security forces.

Operations Section

The operations section consists of the tower section, radar section, METOC section, maintenance section, and MMTs staffed by Marines from those sections.

Tower Section. The function of the control tower is to sequence and separate aircraft by issuing clearances and information to aircraft operating within assigned airspace and vehicular traffic operating on runways, taxiways, and other designated areas of the airfield. Airspace is typically limited to an area that can be visually observed and surveyed from the tower (approximately 5 NM radius from the airfield up to an altitude of 2,500 feet above ground level [AGL]). When operating without a radar section, the control tower coordinates aircraft movement information with higher and adjacent air command and control agencies.

Tower Supervisor. Though not a table of organization billet, the tower supervisor is a critical part of the tower crew. The tower supervisor is a senior controller who holds qualifications on all operating positions within the tower. The tower supervisor briefs the control tower watch team on weather conditions, traffic, equipment status, field conditions, and special evolutions for the assigned watch. The tower supervisor assigns personnel to operating positions based on requirements and qualifications and oversees the crew throughout the watch.

Local Controller. The local controller maintains visual surveillance of the controlled airspace assigned to the tower, runways, 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 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 Personnel. Flight data personnel post, relay, and coordinate aircraft movement data and post weather updates. Flight data personnel also coordinate other information, as required, with airfield services and higher and adjacent air command and control agencies.

Radar Section. The radar section is responsible for providing radar ATC services to, and management of, aircraft operating within the assigned airspace. The radar section is responsible for integrating air traffic into the air defense system, coordinating the BDZ, forwarding radar surveillance via data links to other MAGTF/joint command and control agencies, and coordinating aircraft movement information with higher and adjacent air command and control agencies.

Radar Watch Supervisor. Similar to the tower supervisor, the radar watch supervisor is not a table of organization billet but is responsible for the operational efficiency of the radar section. The radar watch supervisor's responsibilities include briefing the section on the current tactical situation, weather, equipment, and airfield conditions; the exchange and correlation of aircraft position and identification information with higher and adjacent air command and control agencies; the conduct of data links; the coordination of electronic protection related to MATC; and the coordination of the airfield's BDZ.

Approach Controller. The approach controller is responsible for coordination and control of all instrument flight rules traffic within their assigned airspace. This includes issuing clearances and advisory information to aircraft under the approach controller's jurisdiction. The approach controller maintains radar surveillance of the assigned sector in order to ensure the sequencing and separation of aircraft, executes timely handoffs from adjacent facilities or agencies, and provides assistance to aircraft, as required.

Arrival/Departure Controller. The arrival/departure controller accepts radar or procedural handoffs from the approach controller and provides ATC services for aircraft until they reach approach minima or are handed off to either the final controller or local controller. The arrival/departure controller may use radar or nonradar methods of control to process aircraft within the arrival/departure airspace.

Final Controller. The final controller conducts precision and non-precision surveillance approaches using the precision approach radar (PAR) and the airport surveillance radar (ASR). The final controller typically provides these services to aircraft during periods of reduced visibility and/or ceiling.

Radar Data Personnel. Radar data personnel post, relay, and coordinate aircraft movement data; coordinate and process flight clearances; and post weather updates.

Data Link Coordinator. The data link coordinator is a collateral duty for senior radar controllers. The data link coordinator is responsible for the orderly functioning of the data link with other MACCS/joint air control agencies and ensures the accuracy of the situation display and tracks coordination functions with the data link's interface control unit.

Marine Air Traffic Control Mobile Team. Each MMT consists of Marine air traffic controllers, a navigation aid (NAVAID) technician, and an ATC communications technician specifically trained to conduct MMT operations. A standard team consists of one officer and five enlisted personnel. The team may be task-organized to meet mission requirements by adding controllers, forecasters, or technicians to the team or by dividing it into smaller elements. An example of a typical MMT is outlined in table 1-1 on page 1-8.

Marine Air Traffic Control Mobile Team Leader. The MMT leader is normally a first lieutenant (O-2) or gunnery sergeant (E-7) trained and qualified in MMT operations. The MMT leader is responsible for the overall planning and employment of the MMT. The MMT leader provides input during the planning process for the establishment of assault LZs and the integration of the MMT into the command and control architecture.

Table 1-1. Typical Marine Air Traffic Control Mobile Team.

MOS	Rank	Billet
7220/7252	1st lieutenant/gunnery sergeant	Team leader
7257/7252	Staff sergeant	Assistant team leader/local controller
7257/7252	Corporal/sergeant	Local controller
7257	Lance corporal/corporal	Ground controller
5952	Lance corporal/sergeant	NAVAID technician
5954	Lance corporal/sergeant	Communications technician

Assistant Marine Air Traffic Control Mobile Team Leader. The assistant MMT leader is normally a staff sergeant (E-6) trained and qualified in MMT operations. The assistant MMT leader supports the MMT leader in the execution of their duties and ensures the team is prepared for operations. As a qualified tower local controller, the assistant MMT leader advises the MMT leader and develops procedures for traffic flow at the assigned landing zone.

Marine Air Traffic Control Mobile Team Members. Members of the MMT serve as additional controllers and provide expertise in communications and NAVAID equipment. Members allow the team to rapidly establish marking and control of landing zones, conduct limited surveys, and provide security for the team.

Meteorological and Oceanographic Section. The METOC section provides meteorological, oceanographic, and space environmental information, products, and services that are required to support Marine Corps operations. Products include surface and upper-air observations, mission-specific forecasts, and METOC products that support intelligence preparation of the battlespace. The METOC section is capable of providing environmental support to one main airbase and two additional FOBs or air sites. For additional information on METOC capabilities, see MCRP 2-10B.6.

Meteorological and Oceanographic Officer and Chief. The METOC officer and chief's responsibilities are listed under the command section paragraph in this chapter.

Meteorological and Oceanographic Forecasters. The METOC forecasters provide general support to each element of the MAGTF, primarily the Marine Corps aviation combat element (ACE). Their responsibilities include acquiring, monitoring, and analyzing METOC data to produce tailored, value-added information for supported units; operating all METOC equipment, including satellite receivers, radar, and other available environmental sensors and display equipment used as the basis for collecting and forecasting environmental conditions; preparing and disseminating forecasts focused on specific missions, locations, and METOC parameters critical to current operations and future planning; forecasting upper-level winds; providing aviation flight weather briefings in support of aviation missions; and providing weather watches, warnings, and advisories in support of sustained operations ashore to ensure force protection (FP).

Maintenance Section. The maintenance section includes various specialty backgrounds required to maintain expeditionary ATC equipment. The maintenance section contains the capability to support radar, communications, NAVAIDS, meteorological maintenance, motor transport,

utilities, and aviation material control/ground supply. The maintenance section is capable of repairing to the component level or lowest replaceable unit level and coordinating with the MALS or MACS supply section to obtain replacement parts and logistic support.

The maintenance officer/chief's responsibilities are listed under the command section paragraph in this chapter. Guidance for the detachment maintenance officer/chief under the titles of assistant maintenance officer/maintenance material control officer is established in COMNAVAIRFORINST 4790.2C.

Radar Section. The radar section is responsible for the planned and corrective maintenance of radar sensors, display systems, and ancillary equipment organic to the MATCD. The radar section conducts surveys of the airfield to ensure proper placement of MATCD radar equipment in support of radar ATC services.

Communications Section. The communications section performs planned and corrective maintenance for radio, telephone, data communications equipment, and mobile facilities organic to the MATCD. Communications technicians also support MMTs as required. The communications section coordinates with external agencies to ensure the data requirements of the MATCD are met.

Navigational Aids Section. The NAVAIDS section operates and performs planned and corrective maintenance for NAVAIDS systems and mobile facilities organic to the MATCD. Navigational aids technicians support MMTs as required.

Meteorological Equipment Maintenance Section. The meteorological equipment maintenance section is responsible for the planned and corrective maintenance of the METOC radar, sensors, display systems, and ancillary equipment organic to the MATCD.

Motor Transport/Utilities Section. The motor transport/utilities section establishes, operates, and performs planned and corrective maintenance for the generators, power distribution systems, environmental control systems, tactical vehicles, and organic logistic support systems of the MATCD.

Aviation Material Control/Ground Supply Section. The aviation material control/ground supply section is responsible for the requisition of parts and material from the MALS or MACS supply section to support the maintenance and operation of MATCD equipment.

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CHAPTER 2
SYSTEMS

From the light and rapidly-deployable MMT to the full radar approach control facility, the MATCD's suite of equipment provides the capabilities to facilitate the full spectrum of ATC services. The MATCD's equipment is designed for compliance with FAA standards, allowing for operation in the National Airspace System and reciprocal acceptance by International Civil Aviation Organization (ICAO) members.

RADAR SYSTEMS

There are two primary radar system variants used in MATC. The AN/TPN-31 is an air traffic navigation, integration, and coordination system (ATNAVICS) that is a highly-mobile, self-contained, tactical ASR and PAR system providing ATC services at designated airfields and landing sites. The AN/TSQ-263 tactical terminal control system (TTCS) is designed to work in conjunction with the ATNAVICS system.

AN/TPN-31 Air Traffic Navigation, Integration, and Coordination System

The ATNAVICS includes a sensor vehicle and trailer, operations shelter and trailer, and a TTCS composed of a high mobility multipurpose wheeled vehicle (HMMWV)-mounted pack-out shelter and integrated trailer-environmental control unit-generator (ITEG) II. The sensor vehicle houses the radio frequency transmitting and receiving equipment for ASR; secondary surveillance radar (SSR) with identification, friend or foe (IFF); and PAR. The operations shelter houses the display and display processing equipment, radio communications equipment, and landline (telephone) equipment. The TTCS provides the systems and ancillary equipment necessary to expand the functionality of the operations shelter. A fiber optic data link is used to interface the sensor vehicle with the operations shelter/TTCS. The sensor, operations, and TTCS trailers provide 208/120VAC, 3-phase, 60 Hz power to their respective units. The ATNAVICS, which is entirely HMMWV-based, is air transportable with roll-on/roll-off capability on a C-130 or larger aircraft.

Sensor Unit. The ATNAVICS sensor unit is composed of a pallet, ATNAVICS equipment, and HMMWV expanded-capacity vehicle. The pallet assembly is an all-steel construction (for stability), supported by four vertical stabilizing legs mounted onto the existing HMMWV expanded-capacity vehicle mounting features. The following equipment is mounted on the pallet structure:

- E-Band (S in industry standard) ASR.
- D-Band (L in industry standard) SSR (IFF).
- Pedestal.

- I-Band (X in industry standard) PAR antenna.
- Heat exchanger.
- Pump and reservoir system.
- ASR electronics equipment enclosure.
- PAR electronics equipment enclosure.
- Power distribution unit.
- Environmental control unit (referred to as an ECU).
- External heaters and sensors.
- Antenna actuation and leveling equipment.
- Cable and wiring harnesses.
- Grounding equipment.

Components are stowed in such a way that they provide a low profile during transportation. The ATNAVICS is capable of withstanding normal weather and battlefield conditions. The system is also capable of withstanding biological/chemical attacks, radio frequency signal jamming/detection, and electromagnetic pulse while providing continuous ATC coverage.

Operations Shelter. The operations shelter is an S-788 lightweight multipurpose shelter housing two multimode controller consoles, a radar data processor, a digital data recording system, radio communications equipment, a communications selection panel, a satellite navigation set, and environmental control equipment.

The ATNAVICS' operations shelter contains two operator consoles. Each console includes a display with controls, data entry devices, voice communications, equipment shelf, and lighting control. Each display has the capability to allow the operator to select the ASR, PAR, SSR, maintenance, or training mode. Descriptions of these modes are as follows:

- *Surveillance mode (ASR)*. The surveillance mode provides an ATC situation display. This mode allows operators to control aircraft entering and departing their assigned sector.
- *Precision approach mode (PAR)*. The precision mode provides a dual precision approach display (azimuth vs. range and elevation vs. range) when selected by the operator. This mode allows the operator to control aircraft on final approach to the airport.
- *Flight data mode (SSR [IFF])*. The flight data mode enables the entry of flight data information into a database used by the processing system. Correlation of aircraft identification, using the IFF and flight plan data response, is used to provide the operator information to conduct ATC surveillance, precision landing, and training operations. Flight data may be displayed in all modes of operation.
- *Maintenance mode*. The maintenance mode contains the built-in test used to exercise diagnostics and determine equipment status by detecting and isolating failures.
- *Training mode*. The training mode supports system training for ATC operators. Training is accomplished through the use of either live or prerecorded/stored situation data. The ATNAVICS does not possess a full simulation capability.

The communications system includes nine multifunction very high frequency (VHF)/ultrahigh frequency (UHF) AN/PRC-117F radio sets, shelter-mounted antennas, externally-remoted antennas (when required), communications selection panels, and communications control units. A dedicated satellite communications antenna provides beyond line of sight communications.

AN/TPN-31(V)5. The AN/TPN-31(V)5 ASR system consists of a single antenna, a receiver/exciter, a transmitter, and a signal data processor. The antenna is capable of tilting plus/minus 4 degrees from level and provides 360 degree azimuth surveillance coverage ranging out to 25 NM with 10,000 feet in altitude. The ASR is capable of simultaneously detecting and tracking a maximum of 150 aircraft. Antenna rotation is 15 rotations per minute, providing an update rate of 4 seconds. The ASR has four locked frequencies in S-band and is selectable in 1MHz steps between 2.7 GHz and 2.9 GHz. The SSR (IFF) provides 360 degrees of coverage and is able to interrogate and receive replies from aircraft at altitudes up to 10,000 feet AGL. The SSR (IFF) provides identification status, mode, reply code, altitude, range, azimuth data, jamming, and garble indications to the operator display. It is capable of interrogating and decoding aircraft transponder replies for Selective Identification Feature Modes 1, 2, 3A, and C and Secure IFF Mode 4. See figure 2-1.

AN/TPN-31(V)7. The AN/TPN-31(V)7 ASR is capable of simultaneously detecting and tracking aircraft to 60 NM and to a height of 30,000 feet AGL. This National Telecommunications and Information Administration-compliant ASR is selectable in 1MHz steps between 2.7 GHz and 2.9 GHz. The antenna rotates at 12 rotations per minute providing an update rate of 5 seconds. The SSR (IFF) provides 360 degrees of coverage and is able to interrogate and receive replies from aircraft out to 60 NM and up to 30,000 feet AGL. It is capable of interrogating and decoding aircraft transponder replies for Selective Identification Feature Modes 1, 2, 3A, and C and Secure

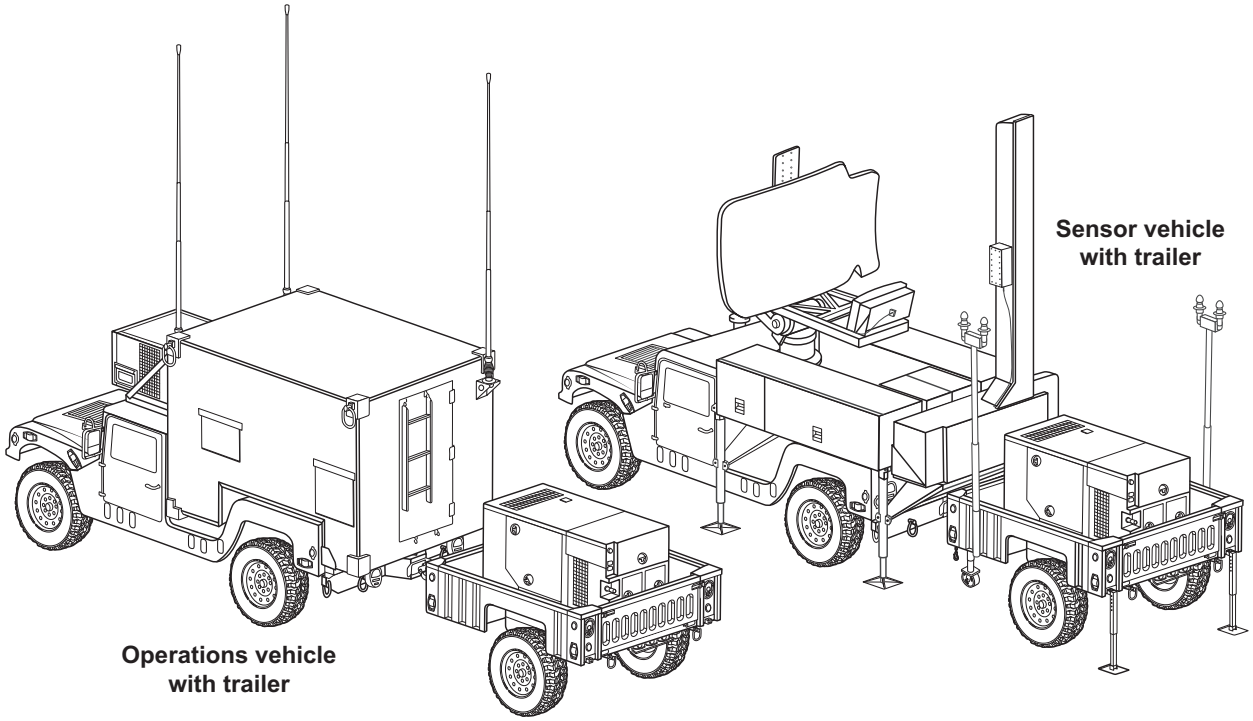

Figure 2-1. AN/TPN-31(V)5 Air Traffic Navigation, Integration, and Coordination System.

IFF Mode 4. The SSR (IFF) provides identification status, mode, reply code, altitude, range, azimuth data, jamming, and garble indications to the operator display. See figure 2-2.

The primary difference between the AN/TPN-31(V)5 and the AN/TPN-31(V)7 is that the (V)7 has the ASR range extension modification, which increases the range of the ASR from 25 NM to 60 NM. There are some different modules installed in the ASR equipment cabinet such as: the high power amplifier, which replaced the transmitter, power supplies, a compressor/dehydrator module, and various ASR modules. The software and processors are different in the two variants, and hard drives from the two variants are not interchangeable.

The PAR for both variants is an active phased array antenna composed of two array faces: elevation and azimuth. The radio frequency beam is electronically steered in a predetermined pattern. The azimuth array has a coverage volume of plus/minus 15 degrees in azimuth and -1 degree to 8 degrees in elevation. The elevation array has a coverage volume of plus/minus 8 degrees in azimuth and -1 degree to 8 degrees in elevation. This entire volume is scanned every second to a range of 10 NM. The PAR is capable of simultaneously detecting and tracking at least 26 designated aircraft on or about the course line. The PAR is locked at four frequencies in the X-band and operates on four crystal controlled frequencies between 9.0 GHz and 9.2 GHz.

AN/TSQ-263 Tactical Terminal Control System

The TTCS is a highly mobile, self-contained system that provides ATC services at designated airfields and landing sites. It is designed to interface with the ATNAVICS. The TTCS provides the MATCD with six additional ATC workstations, a supervisor console, and ancillary equipment housed within an environmentally-controlled facility. The operations and communications equipment provide secure, jamming-resistant voice communications, multimode ATC display units, a self-contained environmental control unit, and power generation equipment. The TTCS

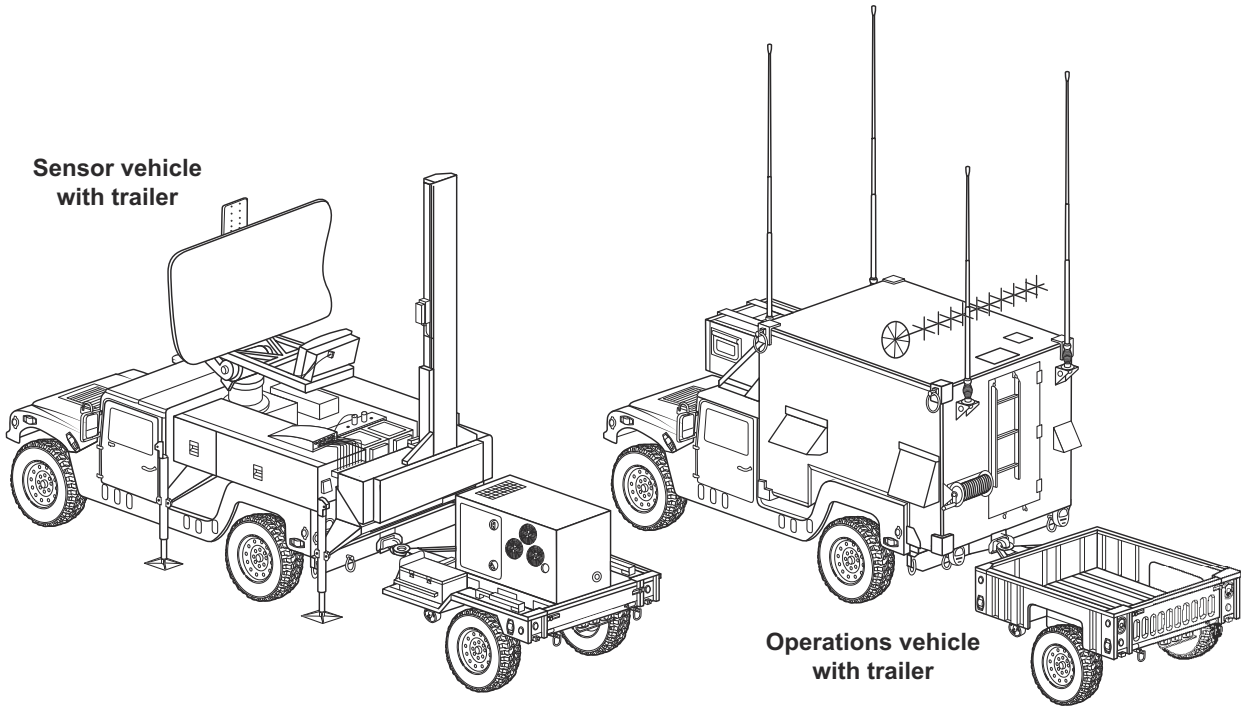

Figure 2-2. AN/TPN-31(V)7 Air Traffic Navigation, Integration, and Coordination System.

consists of one HMMWV with an ITEG II and is air transportable with roll-on/roll-off capability on a C-130 or larger aircraft (see fig. 2-3).

The S-788 HMMWV serves as the prime mover for the TTCS and ITEG II and provides a storage location for the TTCS equipment. The tent shelter is a BASE-X lightweight multipurpose shelter that houses the six multimode controller consoles, communications selection panels, data interface equipment, and power distribution equipment. Each console is capable of operating in the ASR, PAR, and flight data modes, a mirror of the ATNAVICS operations shelter. The ATNAVICS/TTCS antenna system consists of seven external mast-mounted antennas and four ATNAVICS operations vehicle-mounted antennas. Many antenna types support communication between 30 MHz and 512 MHz while providing the operator with the flexibility to configure the communication system to meet mission requirements. Broadband, bi-conical antennas provide communications flexibility and support ground-to-air communications. Shelter-mounted, broadband whip antennas provide ground-to-ground and ground-to-air communications.

TOWER SYSTEMS

AN/TSQ-120C Air Traffic Control Central

The ATC central tower (see fig. 2-4 on page 2-6) is a transportable tower facility that provides operators with both a 360 degree visual field of view for the observance of aircraft, 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 central tower may be erected to heights of 8, 16,

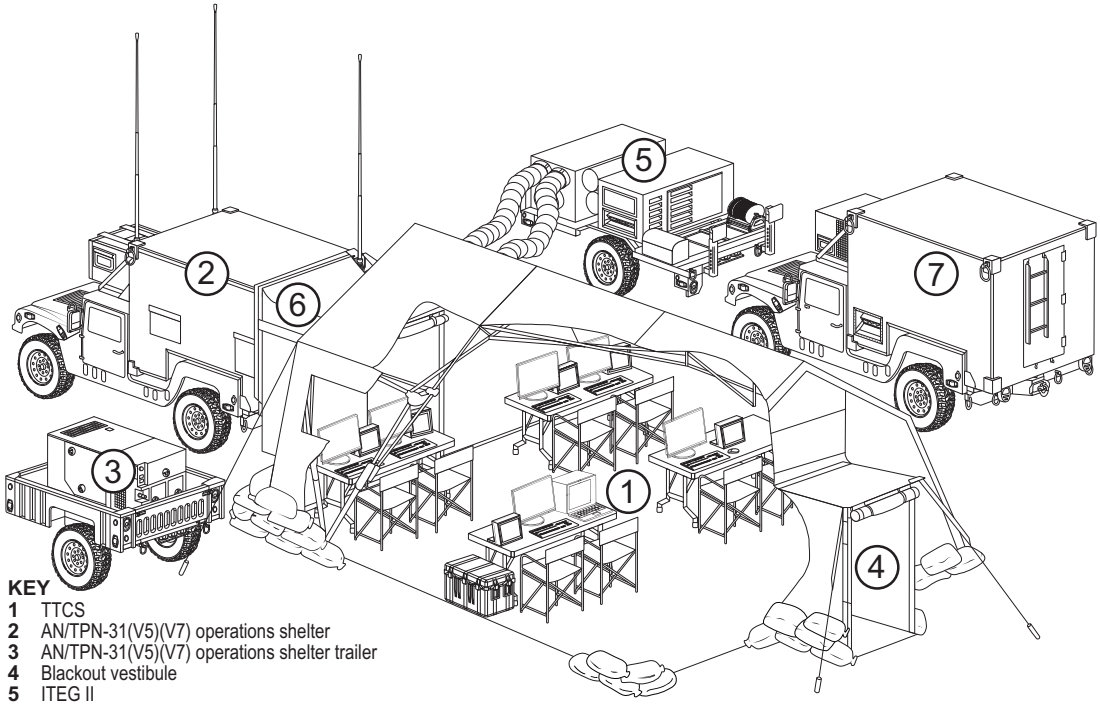

Figure 2-3. AN/TSQ-263 Tactical Terminal Control System Layout (with air traffic navigation, integration, and coordination system operations shelter and trailer).

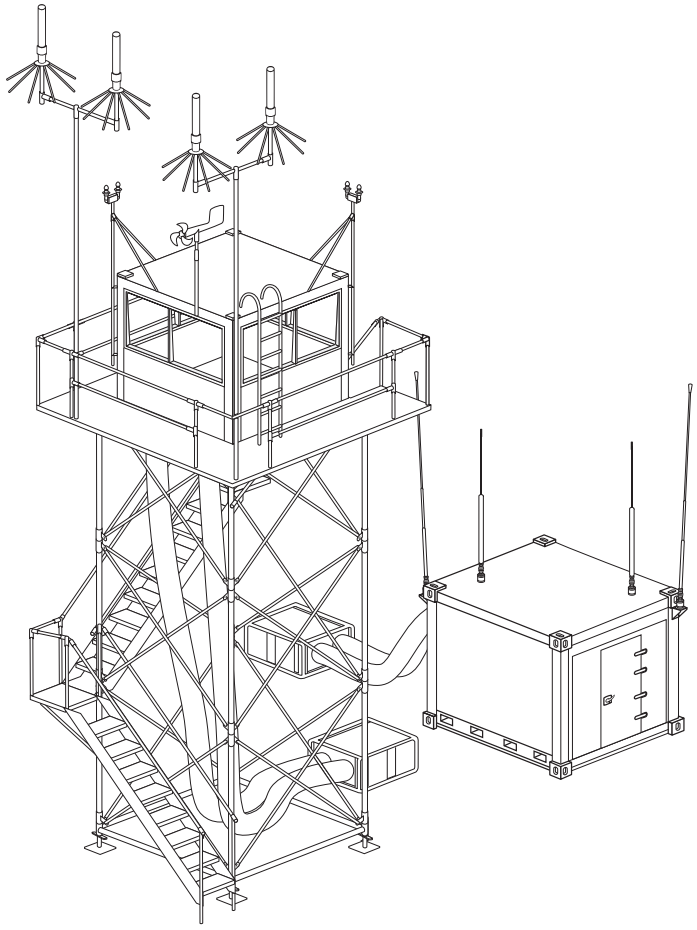

Figure 2-4. AN/TSQ-120C Air Traffic Control Central.

or 24 feet. It provides three operator positions from which aircraft and airfield control is affected through the use of radio communications and visual aids. The AN/TSQ-120C provides operators with access to 1 VHF ground communications radio, 2 high frequency (HF) radios, 5 VHF/UHF radios, and up to 10 telephone lines. All radio communications are recorded. Controllers use a signal light gun for visual communication when it is not possible to use voice communication or when radio silence is a mission critical requirement.

AN/TSQ-216 Remote Landing Site Tower

The AN/TSQ-216 remote landing site tower (RLST) (see fig. 2-5 on page 2-7) provides for the rapid emplacement, establishment, and withdrawal of extended range communications and other capabilities required for tower ATC services at remote landing sites. The AN/TSQ-216 RLST consists of an extendable roof shelter containing the equipment required for air traffic control operations at remote sites. The system includes a highly mobile trailer, which carries antennas, generators, and communications equipment. The AN/TSQ-216 RLST is capable of operating in either a HMMWV-mounted or standalone configuration. The AN/TSQ-216 RLST has VHF/HF ground communication, VHF/UHF satellite communication capability, and three VHF/UHF radios. It has the capability to introduce up to six telephone lines into its communications system. This system is HAVE QUICK and SINCGARS [single-channel ground and airborne radio system] capable.

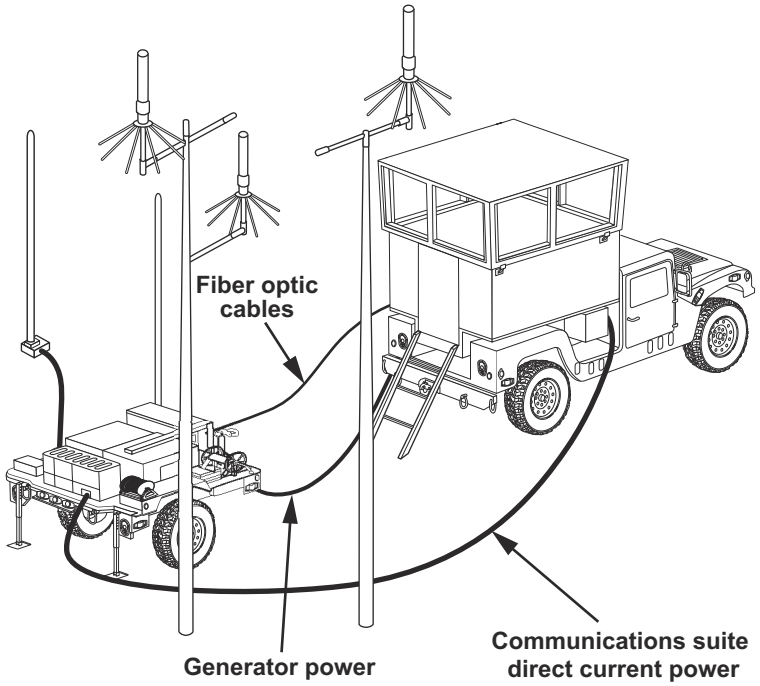

Figure 2-5. AN/TSQ-216 Remote Landing Site Tower.

NAVIGATIONAL AIDS

Marine Corps ATC maintains two tactical air navigation (TACAN) NAVAIDS. Tactical air navigation is a radio beacon and transponder system used for air navigation. The system provides the pilot of an aircraft with the following information:

- Azimuth bearing to the selected TACAN ground station.
- A code identifying the station.
- Distance from the station in international nautical miles (6076.1154 feet).

The TACAN has 126 channels in each of 2 operational modes, X or Y. Tactical air navigation ground-to-air channels operate from 962 MHz to 1213 MHz while air-to-ground channels operate from 1025 MHz to 1150 MHz. Each channel is spaced in 1 MHz intervals.

AN/TRN-44A Tactical Air Navigation Set

The AN/TRN-44A TACAN set (see fig. 2-6 on page 2-8) is a transportable, dual-channel NAVAID, which provides 100 TACAN-equipped aircraft with range, bearing, and station identification information within effective radius coverage of 200 NM. It is used for both en route navigation guidance and as an instrument approach aid. The AN/TRN-44A TACAN set can be erected to heights of 6, 12, 18, 24, and 30 feet.

AN/TRN-47 Tactical Air Navigation Set

The AN/TRN-47 TACAN set is a lightweight, portable system designed to assist aircrews in locating landing, drop, and extraction zones in remote locations. The AN/TRN-47 TACAN set provides radio

navigation information, azimuth and distance to the station, and a station identification code to as many as 100 aircraft simultaneously. The maximum range, under ideal conditions, is 200 NM.

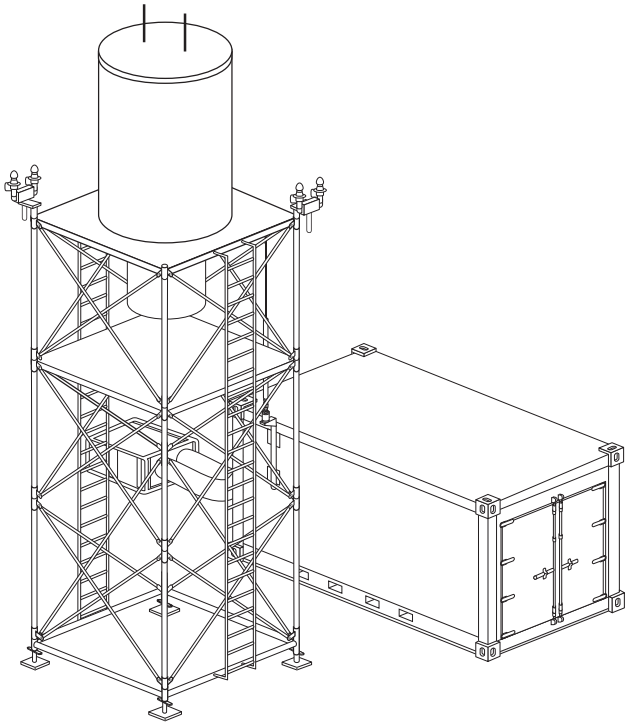

Figure 2-6. AN/TRN-44A Tactical Air Navigation Set.

Representative ranges would include functionality for aircraft within 18 NM at 1,000 feet AGL, 40 NM with aircraft at 5,000 feet AGL, and 100 NM with aircraft at 20,000 feet AGL (see fig. 2-7). The AN/TRN-47 TACAN set has six major components:

- Radio receiver/transmitter.
- Antenna.
- Tripod.
- Remote status monitor.
- AC/DC power supply.
- Azimuth monitor.

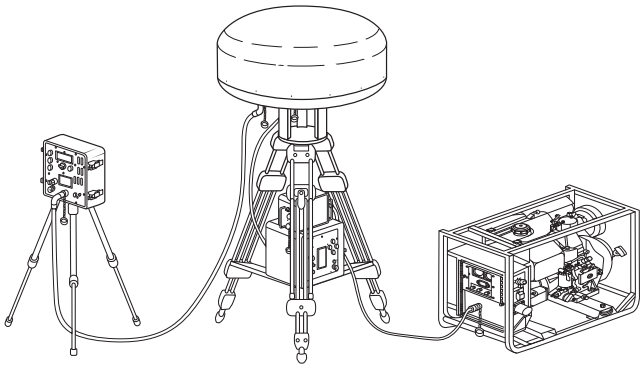

Figure 2-7. AN/TRN-47 Tactical Air Navigation Set.

METEOROLOGICAL AND OCEANOGRAPHIC EQUIPMENT

AN/TMQ-56 Meteorological Mobile Facilities (Replacement) Next Generation

The AN/TMQ-56 METMF(R) NexGen is a lightweight, highly-mobile meteorological data collection system capable of sustaining METOC operations in direct support of all elements of the MAGTF. The METMF(R) NexGen contains all the equipment necessary for environmental sensing and data ingestion, the efficient collation and integration of collected data, user-friendly graphic user interfaces, and the software tools necessary for accurate interpretation.

The METMF(R) NexGen permits the Marine METOC analyst to effectively turn relevant METOC data into tailored and actionable METOC products, which in turn can facilitate timely operational decision making. The METMF(R) NexGen can sustain continuous operations in support of US and coalition forces across the range of military operations worldwide (see fig. 2-8).

AN/UMK-4(V) Naval Integrated Tactical Environmental System-Mobile Variant IV

Navy Integrated Tactical Environmental System (NITES)-Mobile Variant IV is a portable, lightweight, rugged, flexible, and independent automated METOC display and forecasting system. Specific capabilities the NITES IV brings to the battlespace are—

- Reachback access to METOC data and products in the METMF(R) NexGen and major production center databases.
- Compliance with the defense information infrastructure common operating environment (referred to as DII-COE).

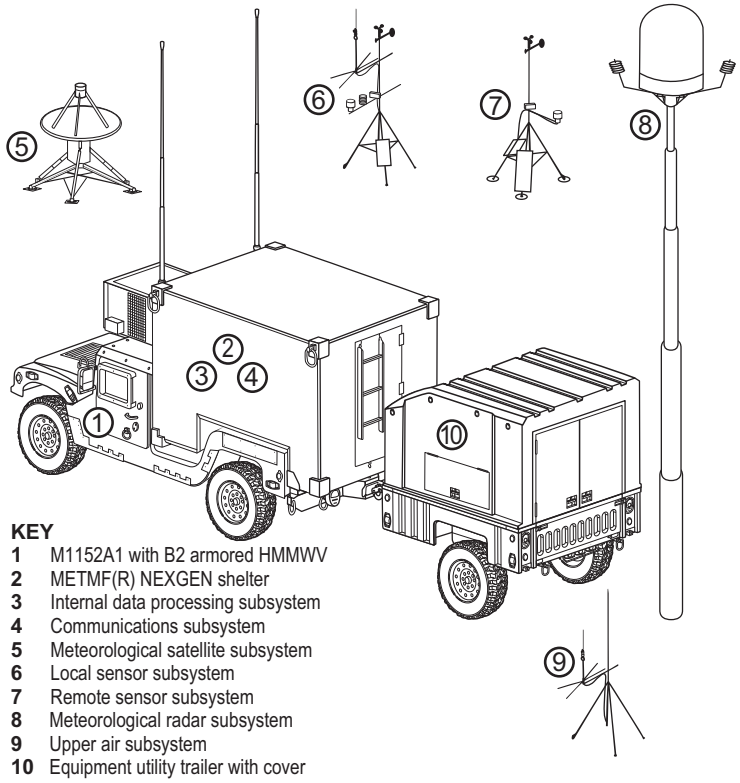

Figure 2-8. AN/TMQ-56 METMF(R) NexGen with Subsystems.

- Compatibility with evolving joint communications and METOC architectures (e.g. the command and control personal computer).
- Secure and unsecure data connectivity.
- Automated weather observation system (referred to as AWOS), which measures surface winds, surface air and dew point temperatures, liquid precipitation rate, cloud heights, horizontal visibility, atmospheric pressure and altimeter settings, and electric field potential.
- Kestrel 4000 handheld weather sensor (this sensor is not certified but provides estimates of surface wind direction and speed, surface air and dew point temperatures, humidity, atmospheric pressure, altimeter setting, pressure altitude, and density altitude).
- International maritime satellite (referred to as INMARSAT) connectivity.
- Production of tactical decision aids for electro-optical sensors and electromagnetic systems.
- Worldwide astronomical and tidal predictions.
- First in, last out METOC capability.

OTHER EQUIPMENT

Marine Air Traffic Control Mobile Team Equipment List

Table 2-1, on page 2-11, is an equipment list for the MMT.

Maintenance Facilities

Facility requirements supporting the maintenance section include various permanent, semi-permanent, and expeditionary platforms. When in garrison, the MATCD coordinates with the MCAS for the use of permanent facilities. Semipermanent and expeditionary facilities requirements are supported by mobile facilities and the logistic support system, described in the following subparagraphs.

Mobile Facilities. The ATC detachment employs mobile facilities, provided through the MALS, to conduct maintenance services. Mobile facilities are housed in a 20-foot ISO [International Organization for Standardization] container and provide maintenance personnel with shelter, environmental control, lights, power panels, safety equipment, shelves, work benches, and test benches.

Logistic Support System. The logistic support system is a HMMWV-based maintenance system composed of a SECM-V [shop equipment contact maintenance-vehicle] common number 21, an ITEG II, and a small BASE-X tent with connection to the shelter of the shop equipment-contact maintenance vehicle. The logistic support system provides the MATCD maintenance section with a highly expeditionary shelter that is roll-on/roll-off capable with C-130 aircraft (see fig. 2-9 on page 2-12).

Generator Sets

The MATCD utilizes various power generating sources to support the expeditionary nature of MATC.

Table 2-1. Marine Air Traffic Control Mobile Team Equipment List.

Serialized			
Nomenclature	**TAMCN**	**Part #/NSN**	**Quantity**
AN/PRC-117F or AN/PRC-117G	A2068	5820-01-462-2484	4
			4
AN/PRC-150	A2042	5820-01-492-3628	2
Manpack radio speaker box		5965-01-504-6139	2
AN/PRC-148	A2043	5810-09-000-0353	6
AN/PRC-148, 6 battery charger		6130-01-504-3675	1
AN/PYQ-10, SKL		5810-01-517-3587	2
Cable, fill		5810-01-066-7587	2
M-24 7X50 binocular	K4038	1240-01-207-5782	2
AN/PVS-14	E1154	5855-01-432-0524	6
Compass, lensatic	K4222	6605-01-196-6971	2
AN/PSN 13A DAGR	A12607G	5825-01-526-4783	2
AZL-15 tactical lighting kit			1 set
AN/TYQ-88 Toughbook	A-2546	7010-09-000-4287	1
AN/TRN-47 TACAN		5820-51-575-4990	1
MEP 531, generator	F0016	6130-01-495-2839	1
AN/PSQ-34 survey kit			1
Battery charger	HL027	6150-01-435-3931	2
BB-2590		6140-01-490-4316	24
Camouflage screen support bag	C-4260	1080-00-108-1173	1
Camouflage netting bag	C-4261	1080-01-266-1798	1
Gas can	K-4128	7240-01-502-4390	1
Spout can flexible		7240-00-177-6154	1
Water can	C-4436	7240-00-089-3827	2
2-person tent		8340-01-452-5919	6
Spaces solar kit			1
M-4 rifle			6
M1038 HMMWV	D1156		1
Palletized container or quadruple container			2 1
Commercial Off the Shelf			
HP Photosmart M-24 camera			1
Measuring wheel			1
Scientific calculator			2
16 pwt. 3.5 in. steel cut masonry nail			10
60 pwt. 6 in. bright common nail			1
4lb. hand-held sledge hammer			6
Protective case		6760-01-491-2706	2
Protective case		6760-01-491-2807	2

Legend

in.	inch	pwt.	pennyweight
lb.	pound	TAMCN	table of authorized material control number
NSN	national stock number		

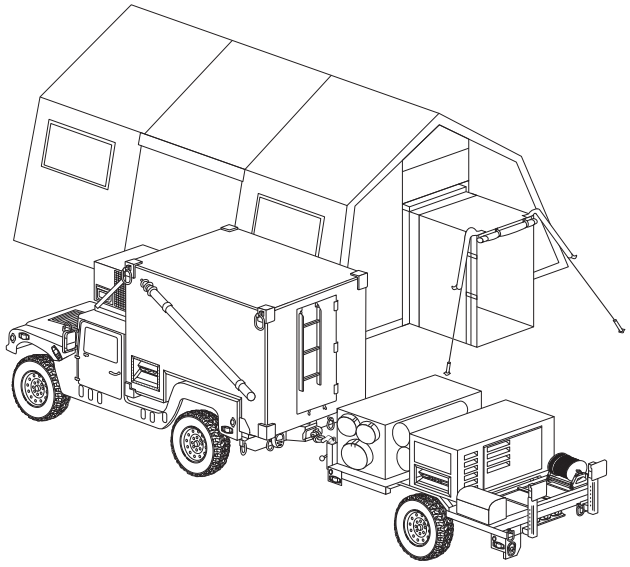

Figure 2-9. Logistic Support System.

Generator Set, Diesel Engine MEP-1060. The MEP-1060 is the primary power source for the AN/TSQ-120, the AN/TRN-44A TACAN, the mobile facilities, and the associated equipment organic to the MATCD. The MEP-1060 is a 30-kW, 120/208-VAC, 50/60-Hz, 3-phase generator with a 16.7-gallon integral fuel tank. The MEP-1060 is designed to operate alone or in series with other AMMPS [Advanced Mobile Medium Power Source] generators. It is capable of operating with JP-5 or JP-8 fuel at a consumption rate of 1.7 gallons per hour.

Generator Set, Diesel Engine MEP-531A. The MEP-531A is a 2-kW military tactical generator that is self-contained, skid-mounted, and portable. The MEP-531A is the primary power source for the AN/TRN-47 TACAN. It provides 120 volt-power on diesel/JP-8 fuel. Fuel consumption is 0.3 gallons per hour with a fuel capacity of 1.6 gallons. Though portable, the generator weighs 152 pounds.

Integrated Trailer-Environmental Control Unit-Generator II. The ITEG II is an integrated HMMWV-towable unit. The generator supports the ATNAVICS system and is used to power and cool/heat the operations shelter and TSQ-263 shelter. The generator produces 25 kW of electrical power and can be synchronized with other ITEG units. The environmental control unit provides complete environmental air conditioning including cooling, heating, ventilation, and filtering and has a nominal cooling capacity of 96,000 BTU/hour and a nominal heating capacity of 100,000 BTU/hour. The integral trailer is based on the standard LMCCHC M1102 trailer chassis designed with high ground clearance and run-flat tires. Fuel consumption is 4.3 gallons per hour with a fuel capacity of 38 gallons. Though portable, the ITEG II has a dry weight of 3,980 pounds.

CHAPTER 3
PLANNING

PLANNING CONSIDERATIONS

Prior to deploying in support of an operation or exercise, MATCD leadership must consider numerous planning factors derived from guidance given by the MAGTF and ACE commanders.

Initial Planning

Considerations for the initial planning phase include the following:

- Conducting problem framing, including specified and implied tasks, based on the MAGTF and ACE commander's intent and concept of operations.
- Identifying assumptions necessary for the continuation of the planning process. These assumptions should supplement assumptions already addressed by higher headquarters and be in concert with the planning guidance received by higher headquarters.
- Analyzing the friendly force composition from the joint/multinational level down to the MACCS and addressing integration/interface requirements with the MAGTF/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 ICAO, host nation ATC facilities, and the FAA for airspace and liaison requirements.
- Analyzing the threat's air and ground order of battle and electronic warfare, reconnaissance, and unconventional warfare capabilities.
- Analyzing the amphibious objective area/area of operations with particular emphasis on the MAGTF commander's and ACA's guidance to begin initial planning for terminal control airspace, Class D airspace, Class E airspace, and en route corridors or minimum-risk routes (referred to as MRRs).
- Identifying communications requirements for subordinate, adjacent, and higher level circuits with ACE/MAGTF communications planners. Initial communications planning should focus on the flow of critical information and the desired connectivity necessary to achieve this flow.
- Providing ATC specialist input to aviation estimates of supportability for all assigned operations. This input should summarize significant aviation aspects of the situation that may influence any proposed course of action (COA). The ATC specialist input is also used to evaluate and determine how aviation units may best be employed to support contemplated MAGTF COAs. The aviation estimate is prepared by the ACE commander, the 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 COAs may best be supported by the ACE.
- Salient disadvantages of less desirable COAs.
- Significant aviation limitations or resource shortfalls (including command and control) and operational or logistical problems.

Air Traffic Control Detachment Site Surveys

The two types of necessary site surveys for MATCD equipment emplacement are the map survey and the physical survey.

Map Survey. As higher headquarters examines potential airfields, the MATCD should conduct airfield map surveys in order to gain an initial impression of the surrounding terrain, runways, taxiways, and parking aprons. This analysis is used to determine factors influencing the flow of air traffic and the siting of MATCD equipment. The purpose of the map survey has two goals: first, to ascertain the practicality of providing unobstructed "views" for the tower and radars, which enable identifying potential locations for the MATCD's equipment, and second, to maximize the efficiency of ATC procedures. Considerations during the map survey should address the identification of equipment separation limitations based on cable length and similar factors, safety zones around radiation hazards, and the potential for electromagnetic interference from other radio/electronic sources. Imagery may often be more current and accurate than map data, making it more useful for the survey of nondepicted manmade objects. Map data is often preferred for the initial site survey.

Physical Survey. A physical survey is required prior to the emplacement of MATCD equipment. The physical survey allows the MATCD staff to ensure that appropriate locations are available and determine equipment layout prior to arrival. During this survey, the MATCD staff determines support requirements for logistic and communications services and identifies specific challenges. This survey determines the exact locations of key aspects of the landing surface in relation to the MATCD's equipment, which allows for the development of TERPS and the operation of precision and nonprecision radars, NAVAIDS, and METOC equipment.

Additionally, MATCD planners must ensure adequate space for site establishment, physical access to the MATCD site, and logistic supportability of the site once established. 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, portable flight planning system, other automated sources, or manual computations.
- Determining optimum siting locations for communications connectivity with higher, adjacent, and subordinate agencies using applicable computer programs, line-of-sight diagrams, and radio frequency propagation predictions.

- Submitting a list of candidate sites to the ACE commander based on map surveys and other studies. The MATCD siting considerations should encompass all task-organized equipment and personnel in both the movement and physical aspects. Physical site characteristics considerations include—
  - Radar coverage of the assigned airspace.
  - Ground with a slope of no more than 10 degrees.
  - Spatial requirements (e.g., antennas, radio frequency hazards).
  - Logistic supportability.
  - Traffic ability and access.
  - Drainage.
  - Antiterrorism (AT)/FP and defensibility.
  - Dispersion of equipment and personnel.

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

- Fuel points and fuel storage areas.
- Ordnance storage areas, taking into consideration hazards of electromagnetic radiation to ordnance (HERO)/hazards of electromagnetic radiation to fuels (HERF) requirements.
- Arming/de-arming areas.
- Pre-existing NAVAIDS.
- Arresting gear.
- Medical evacuation areas.
- Search and rescue aircraft.
- Airfield rescue and firefighting, structural fire, and rescue units.
- Field weather observation services.
- Field of view.
- Obstructions.
- Cargo aircraft loading/offloading areas.

Equipment Emplacement

The safe conduct of ATC services is predicated on the controller's ability to detect aircraft and communicate with the aircrew. The location and employment of MATCD equipment plays a significant role in facilitating these services.

Air Traffic Control Tower. Priority should be given to the controller's field of vision when siting the control tower. A clear view of runways, movement areas, and approach surfaces is paramount. Tower personnel should have unobstructed views of taxiways, ramp areas, and arming/de-arming sites in order to enhance safe movement in and around the airfield. The tower requires a 10- by 15-foot level area with firm soil for emplacement.

Tactical Air Navigation. The TACAN is a line-of-sight transmitter. Antenna height is determined by local terrain, obstacles, and capabilities for erecting using organic or external means. To achieve the best possible approach (a straight-in approach to minima of 1 statute mile and 500 feet AGL), the TACAN must be located based on the requirements for instrument procedures and number of runways supported. The site should be a clear, flat area free of obstructions (e.g., buildings, trees) for 1/4 mile, if possible. Hard surfaces, such as runways or taxiways, especially if constructed of metal matting, should be avoided due to reflections that distort the TACAN's radiation pattern.

Radars. Radar emplacement is generally more difficult than other equipment suites due to radars susceptibility to terrain effects, necessary logistic support, and physical interface limitations with other equipment suites.

An operational analysis of the airfield, including the number of approaches to different runways, number of touchdown points, and desired landing minima should be made before selecting radar sites. Selection of the primary instrument runway occurs after taking into account numerous factors (e.g., weather [prevailing winds], terrain, obstacles). Normally, this runway will have the least restrictive (lowest) landing minima. Secondary instrument runways and their attendant touchdown points are identified and covered, if possible.

Plans to support aircraft arrivals to the runway and physical and electromagnetic effects on radar tracking are key factors for radar site consideration. The ASR must be sited to reduce or eliminate radar blind spots. The PAR must be sited within the system's capabilities in relation to the runway, touchdown point, and physical proximity to the operations shelter. The approach corridor for the primary instrument runway should be free of obstructions. The PAR's siting is the most critical because it provides terminal guidance for aircraft landing in adverse weather/poor visibility situations and drives the location of the ASR and control shelters.

A secondary factor for consideration when siting a radar is the HERO effect. Power output, frequencies usage, and location must be coordinated with aviation ground support (AGS) personnel to ensure the proper distance between radars and ordnance.

Meteorological Equipment. Key factors for METMF(R) NexGen site consideration include—

- *Surface*. Select a reasonably flat and level area approximately 100 by 100 feet. The surface must be capable of supporting the METMF(R) NexGen vehicle, as well as the grounding rods and equipment anchoring spikes. The METMF(R) NexGen must be located in an area that is relatively free of natural or manmade obstructions (any obscuration or blocking phenomena within 1,000 feet). Any obstruction which exceeds 5 degrees in elevation within an 80-foot radius of the antenna beam paths will cause signal degradation. The HERO/HERF/HERP [hazards of electromagnetic radiation to personnel] distances must be maintained for all subsystems.
- *Power*. The METMF(R) NexGen requires 120/208 VAC, 60 Hz, 3-phase power. The METMF(R) NexGen normally operates using shore power. If operated in remote locations without the benefit of shore power, tactical generators meeting the above requirements will allow for continuous, 24-hour operation. For short-term power (up to 72 hours), vehicle integrated

primary electrical resource (referred to as VIPER) generators of the HMMWV are available as the alternative to operating on shore power or with a tactical generator. The vehicle integrated primary electrical resource generators allow the METMF(R) NexGen to operate the systems on a limited-time basis dependent upon the amount of fuel maintained in the HMMWV fuel tank.

- *Access*. Both SECRET Internet Protocol Router Network and Nonsecure Internet Protocol Router Network (referred to as SIPRNET and NIPRNET respectively).

Airspace Management Planning

Airspace management planning involves segmenting assigned airspace by volume/time for the safe and expeditious flow of air traffic. Airspace management also involves establishing various air defense control measures and airspace coordinating measures, which are designed to protect friendly installations from enemy air attack and provide flexibility for mission requirements.

Planning considerations include—

- *Coordinating airspace*. Beginning with the establishment of a memorandum of agreement/ understanding with the ACA and host nation authorities, MAGTF and joint planners may begin coordination for airspace, which facilitates the control of airspace within the assigned area of operations. Additional coordination with ICAO, host nation ATC, and FAA authorities ensures the effective use of existing airspace.
- *Publishing ATC procedures*. Coordinate with higher headquarters to publish ATC procedures in the airspace control plan (ACP)/airspace control order (ACO) and pilot controller handbook.
- *Analyzing amphibious objective area/area of operations*. Determine dimensions, suitable airfields within, possible conflicts with civil aviation, potential conflicts with or suitability of use for unmanned aircraft systems (UASs), and preferred routings for friendly aircraft.
- *Determining dimensions of terminal control airspace*. Usable NAVAIDS, civil air traffic patterns, UASs, and conflicts with other users of this airspace will affect the airspace's configuration.
- *Determining the dimensions of Class D airspace*. Generally, Class D airspace is from the surface to 2,500 feet above the airport elevation (charted in mean sea level) surrounding those airports that have an operational control tower (see JP 3-52, *Joint Airspace Control*). Military (manned and unmanned aircraft) and applicable civil air traffic patterns should be considered.
- *Determining the dimensions of Class E airspace*. Generally, Class E airspace is controlled airspace to include federal airways that is not classified as Class A, B, C, or D airspace. (JP 3-52).There may be a requirement for real-time co-use or an instant capability to give the airspace to tactical agencies in order to facilitate missions located within Class E airspace. Class E airspace should be developed to wholly contain all portions of instrument procedures to supported airfields.
- *Determining the dimensions of the BDZ*. The BDZ dimensions are normally determined by the effective engagement envelope of the supporting air defense systems, such as 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.
- *Participating with other MACCS agencies*. Plan and develop general airspace routing and configurations.

- *Developing procedures for handling transient aircraft*. Procedures are needed for all aircraft traveling within the MAGTF/joint area of operations.
- *Developing fire support coordination measures and associated airspace coordinating measures*. This is necessary to facilitate collocated surface-to-surface weapon systems that fire through MATCD airspace.

Flight Inspection and Terminal Instrument Procedures Planning

Terminal instrument procedures and FAA flight inspections are outlined in affiliated FAA and naval aviation publications. Additional MATCD considerations are as follows:

- TERPS:
  - Type/model/series aircraft supported.
  - Precision/nonprecision approach requirements.
  - Desired weather minima.
  - Proximity of obstacles to approach segments.
  - Live fire areas/ammunition supply points/aerostats.
  - Proximity to UAS operations.
  - Airfield design and expansion considerations.
  - Duration of operations.
- Flight inspection (tactical vs. FAA):
  - Threat to aircraft.
  - Timeline for request.
  - Availability of FAA flight inspection aircraft.
  - Degree of requirements regarding inspection.
  - Aircraft utilizing approach.
  - Duration of use.
- Tactical flight inspection:
  - Submit standard instrument approach procedures data to the naval flight information group (NAVFIG).
  - Obtain NAVFIG approval of procedures.
  - Submit a formal request to the Marine aircraft wing/higher/joint/coalition commander.
  - Coordinate with delegated flight inspection personnel.
  - Ensure the documentation of the inspection.
  - Effect the publication of approaches and restrictions via notices to air personnel/special instructions.
- FAA flight inspection:
  - Submit a request to the FAA 90 days prior to scheduled implementation date.
  - Submit standard instrument approach procedures data to the NAVFIG.
  - Obtain NAVFIG approval; all further coordination will be conducted between the NAVFIG and the FAA.
  - Flight inspection personnel will make liaison with the MATCD.

- Upon certification, issue a notice to air personnel approving published approach procedures.
- After certification, ensure periodic flight checks are scheduled, as required.

Air Traffic Control Night Vision Device Planning

Conducting ATC operations using night vision devices (NVDs) requires proper training and planning. Marine Aviation Weapons and Tactics Squadron One (MAWTS-1) provides detailed information in the *MAWTS-1 Night Vision Device (NVD) Manual*. Additionally, night imaging threat evaluation laboratories exist at each MCAS for controller instruction. The following are basic considerations for planners:

- Lighting:
  - Airfield/assault zone area ambient lighting: discuss with site commander/ director of safety and standardization.
  - ATC equipment compatibility:
    - Internal considerations: windows/lights/blackening of material.
    - External considerations:
      - Covert lights for equipment obstruction lighting.
      - Vehicles operating on the FOB.
- Standard operating procedures (SOP) for controllers and pilots:
  - Awareness of traffic controlled by the tower ground controller.
  - ATC local control procedures.
  - Crew NVD usage procedures: preparation of NVDs by the crew prior to the watch, to include personal NVD adjustment/sighting in.
  - Coordination with aviators:
    - Reporting points (with Marine aircraft group socialization).
    - Requirements for aviation operations in conjunction with covert airfield operations.

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 the required communications connectivity between adjacent MACCS agencies, including those agencies internal and external to the supported airfield, and civil ATC agencies.
- Determining required communications nets, as well as a prioritization and restoration plan for the use of these nets. Appendix A provides a list of communications nets used by MATC.
- Determining data link connectivity requirements.
- Identifying communications security material. Planners should address required encryption hardware and software, authentication tables, brevity codes, and challenge/password changeover times.
- Ensuring the MATCD is included on distribution lists for the automated communications electronics operating instruction and ACO/air tasking order (ATO).

- Addressing frequency requirements unique to the MATCD with ACE/MAGTF communications planners. The necessity for like communications media between MATC and civil aviation authorities requires MATCD planners to use frequencies within the VHF AM [amplitude modulation] frequency spectrum. 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.
- Determining whether to use encrypted or unencrypted communications. The threat and tactical environment will dictate the level of encryption required by the MATCD. When encryption is required, the MATCD will require both capabilities to accommodate military aircraft that lose their encryption capability and civilian aircraft operating at the FOB. This requires additional radio sets and informing higher headquarters of the requirement.
- Including communications security and controlled cryptographic item transportation requirements, including fills, encryption equipment, an appropriately-trained communications custodian, and SECRET Internet Protocol Router Network computers and hard drives.
- Establishing contact with agencies that provide services to the MATCD for coordination of requirements.

Electronic Warfare Planning

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

- Requesting an assessment of the enemy's electronic order of battle (e.g., communications and radar jamming capabilities, antiradiation missile capabilities, delivery profiles).
- Submitting recommendations for emission control (EMCON) and RADCON standards within MATCD's assigned sector. The EMCON and RADCON plans should incorporate all ground-based sensors operating within the sector and consider the anti-radiation missile threat to maintain effective sector surveillance. The EMCON and RADCON planning considerations should address the following:
  - Minimum communications procedures.
  - The use of brevity codes and authentication devices.
  - The use and security of communications security materials.
  - Delegation of EMCON authority.
  - Signals security.
  - The cessation of all other transmissions (commonly referred to as beadwindow calls) while essential elements of friendly information are transmitted.
  - Procedures for defending against imitative communications deception.
  - 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.
- Considering available demand features on NAVAIDS and their use.

- Ensuring that planners, operators, and electronic equipment users thoroughly understand the electronic warfare threat and the EMCON/electronic protection techniques used to counter that threat.
- Establishing joint spectrum interference resolution procedures. (See Chairman of the Joint Chiefs of Staff Manual 3320.02F, *Joint Spectrum Interference Resolution (JSIR) Procedures.*)

Air Defense/Base Defense Zone Planning

As part of the larger air defense weapons engagement zone, and in defense of critical assets, the BDZ requires detailed planning to execute effectively. Planners must coordinate with not only the weapon system agency but the other agencies involved in the air defense system. Detailed procedures for conducting operations over data links and communications nets are required to ensure the timely and efficient flow of information. The MATC personnel do not routinely conduct air defense operations and may require additional training and coordination with air defense units to ensure effective procedures are developed. Base defense zone planning considerations include—

- Entry/exit procedures:
  - Sectors.
  - Return to force and lost communication situations.
  - Minimum-risk routes.
  - Inclusion within ATC SOP and special instructions.
- ATC capabilities impacting BDZ design:
  - Radar limitations:
    - Two-dimensional radars.
    - Relatively short range.
  - Weapon limitations:
    - Low altitude.
    - Short range:
      - Available sensor and TDLs.
      - Track classification/identification responsibilities.
      - Cueing.
      - IFF: modes/codes/ATO.
- Airspace/friendly aircraft requirements.
- Threat aircraft and missile profiles.
- Communications:
  - Nets to monitor.
  - Nets to conduct handover/cross-tell.
  - Tie into the short-range air defense (SHORAD) weapons system:
    - Liaison location.
    - Cross-tell procedures.
  - Communication with adjacent and higher air command and control nodes.

- Cueing with adjacent agencies:
  - Identification authority.
  - Manual procedures.
  - Phraseology.
- EMCON plan:
  - RADCON conditions.
  - MATCD radar states.

Marine Air Traffic Control Information Management

Information management includes a broad range of information push/pull coordinated by various elements of the MACCS:

- *Marine Corps tactical air command center (TACC) (referred to as Marine TACC)*. Very important persons, airfield status, aircraft departures/arrivals, equipment status, attacks, local test fire range use, incidents, and ATO/ACO coordination.
- *Direct air support center (DASC)*. Aircraft movement information, airspace, routing, handoffs, mutual support, and fires deconfliction originating from FOB.
- *Tactical air operations center (TAOC)*. En route ATC procedures, a letter of agreement for airspace sharing and coordination, killboxes, aircraft information procedures, and handoffs.
- *Base defense operation center (a secondary mission for low altitude air defense [LAAD] and AGS)*. Small arms range procedures; convoy ranges; rotary-wing, tiltrotor, and fixed-wing aircraft ranges; and integration into the base defense plan.

In addition, joint ATC, the control and reporting center, coalition relationships with the air and space operations center, and host nation ATC are information management considerations with regard to—

- Aircraft movement information.
- Letters of agreement.
- Handoffs.
- Airspace coordination.
- Representation of MAGTF ATC procedures.
- Concerns and requirements at the air and space operations center.

Unmanned Aircraft Systems/Marine Unmanned Aerial Vehicle Squadron Integration

Unmanned aircraft systems may operate from the same FOBs as manned aircraft. As such, coordination for the integration into regular traffic patterns is required. Because UASs cannot provide any form of separation (visual/sense and avoid), the MATCD must provide all separation between UASs and other aircraft in the terminal airspace. Regardless of the unit/agency operating the UAS, all UAS operations within the terminal control area must be in contact with MATCD.

The MATCD shall coordinate with UAS agencies in the development of course rules. While UAS launch and recovery requirements may limit flexibility, consideration should be given to system siting and development of procedures that minimize conflicts between manned aircraft and UASs.

Marine Air Traffic Control Detachment Integration With Surface Fires

Due to the MATCD being located on a FOB, there may be collocated surface-to-surface fires units. This physical relationship requires the MATCD to clear assigned airspace of aircraft and coordinate the fires to and from adjacent command, control, and communications nodes, such as the DASC. The following subparagraphs detail considerations and provide a basic checklist for MATCD integration with unscheduled and scheduled surface fires.

Unscheduled Surface Fires. Unscheduled fires require the MATCD to clear airspace in support of the urgent need for fire support. The following procedures serve as a guide:

- The requesting agency (normally the DASC) will provide the MATCD with fires request information.
- Upon receipt of information, the MATCD plots the gun-target line.
- The MATCD deconflicts aircraft from the gun-target line.
- The MATCD advises the requesting agency when the gun-target line is clear for fires.

Scheduled Surface Fires. While scheduled surface fires allow for advanced coordination, the identical level of fidelity for unscheduled surface fires should be applied. The following procedures serve as a guide:

- The requesting agency shall coordinate planned surface fires with the MATCD via the ATO.
- Prior to commencing fires, the requesting agency shall coordinate with the MATCD.
- The MATCD deconflicts aircraft from the gun-target line.
- The MATCD shall then advise the requesting agency when the gun-target line is clear for fires and shall keep all aircraft clear until the requesting agency advises the MATCD that fires are complete.
- When a long-term use range has been established, the MATCD shall develop procedures to deconflict all air traffic from the range airspace.

External Support Planning

Marine air traffic control external support planning considerations include—

- Identifying and coordinating sufficient transportation and the materials handling equipment necessary to rapidly emplace the MATCD.
- Coordinating aviation supply and logistic support through the MALS.
- Developing a plan supporting multichannel data communications support.
- Coordinating and planning for ground security requirements.

Antiterrorism/Force Protection

The following subparagraphs detail AT/FP planning considerations for MATC operations.

Deployment and Redeployment Considerations. Deployment and redeployment considerations for MATCD operations with respect to AT/FP planning are as follows:

- Convoy operations and protection of the force.
- Integration with maneuver forces during initial and transition phases.
- Integration with airfield and rear area security.

Forward Operating Base Emplacement and Operating Site Considerations. Forward operating base emplacement and operating site considerations for MATCD operations with respect to AT/FP planning are as follows:

- Appointment of AT/FP officer or liaison.
- MATCD site layout:
  - Dispersed or condensed layout of gear based on threat.
  - Perimeter control and access control.
- Defensive positions and reaction procedures.
- Chemical, biological, radiological, and nuclear posture and continued operations in a mission-oriented protective posture.
- Berm and barrier protection:
  - Placement of critical equipment and key personnel.
  - Indirect fire considerations.
- Developing an AT/FP unit SOP.
- Coordinating with the higher headquarters AT/FP officer.

Airfield Considerations. Airfield considerations for MATC operations with respect to AT/FP planning are as follows:

- Base recovery after attack:
  - Surface checks.
  - Aircraft divert and holding.
  - SOP development:
    - Immediate reaction for aircraft on final approach.
    - Information flow to appropriate agencies.
    - Strip alert aircraft missions.
    - Counterbattery fire procedures.
- Rapid runway repair.

BRIEFING REQUIREMENTS

As an integral aviation operations node within the joint air control system and within the MACCS, the MATCD has specific responsibilities at the joint/multinational level, the command level, and the detachment level of operations.

Joint-/Multinational-Level Responsibilities

The MATCD, as an agency of the MACCS and overall ACP, has the responsibility to submit information to the ACA for inclusion in the ACP. This information may include—

- Unit location.
- Systems status.
- Schedule for flight inspection of approaches.
- Instrument approach procedures and charts.
- Communications:
  - Frequencies.
  - Call signs.
  - Brevity codes.
- Services provided:
  - Tower.
  - Radar.
  - Instrument approaches.
  - Airfield.
- Course rules and procedures:
  - Hours of operation.
  - Ingress and egress routes.
  - Waveoffs.
  - Landing zone heading and runway heading.
  - Obstacles.
  - Lost communications procedures.
  - NAVAIDS and visual signals.

Command Section-Level Responsibilities

The following considerations are briefing requirements provided by the MATCD to higher headquarters before, during, and after operations:

- Recommended employment options:
  - Assessment of COA supportability.
  - Echelon capability.

- Advance echelon and survey requirements:
  - Collection of TERPS data and MATCD equipment siting requirements.
  - Integration into the base defense and AT/FP plan.
  - Suitability for external support.
- Equipment movement data.
- Required support from external agencies:
  - Communications.
  - Logistics.
  - Life support.
  - Access to the supply system for parts.
- Equipment status.
- Operations counts.
- Safety:
  - Operational deviations.
  - Operational incidents.
  - Naval Safety Center reporting requirements.

Detachment-Level Responsibilities

Each MATCD, regardless of its task-organized size, will require a briefing of procedures prior to operating in each new location. This begins with the information briefed to higher and adjacent agencies, and becomes more specific to MATCD operations. Depending on the nature of the operation, each of the planning topics covered in this chapter may be briefed to the members of the MATCD.

CHAPTER 4
OPERATIONS

CONCEPT OF EMPLOYMENT

Marine Air Traffic Control in the Forward Operating Base Concept

The MATCD is organized and equipped to support each level of the FOB concept as outlined in AGS doctrine. The four levels—main air base, air facility, air site, and air point—each have specific requirements and serve as a baseline for the employment of MATCD capabilities.

Main Air Base. A main air base is a secure airfield capable of supporting sustained operations ashore. The main air base includes intermediate maintenance activity support and the full ground, logistic, and engineering functions required to support current and future operations. The main air base is typically associated with large numbers of aircraft, particularly fixed-wing aircraft. The main air base is normally associated with an entire MATCD to provide the full range of ATC services. This may include the AN/TSQ-120 tower, AN/TRN-44 TACAN, an ATNAVICS with the AN/TSQ-263 TTCS, and the AN/TMQ-56 METMF(R) NexGen.

Air Facility. An air facility is a secure airfield capable of supporting squadron-sized elements and associated organizational maintenance activities. The facility sustains operations at a combat sortie rate and supports staging and replenishment of forward sites. Depending on the mix of aircraft types and traffic volume, the air facility is likely to receive services from an MATCD or an MATCD (minus). If radar services are not required, the MATCD may provide an AN/TSQ-120 for tower services and an AN/TRN-44A TACAN to provide navigational assistance to aircraft operating from the air facility. If some radar services are required, the ATNAVICS, without the TTCS, may be employed. Commander's guidance will drive what ATC services are required.

Air Site. An air site is a secure location where aircraft pre-position to reduce response time. Air sites are suitable for fully-loaded and armed aircraft to land and await preplanned or immediate missions. Operations at these locations are normally limited to receiving and launching previously-loaded aircraft. Fuel and ordnance may be staged at an air site, but these sites do not receive routine logistic support and they contain minimum personnel. Depending on the duration and complexity of operations, the MATCD may support an air site with a small tower detachment equipped with the AN/TSQ-216 RLST to provide tower services, an AN/TRN-47 TACAN to provide navigational assistance, or an MMT for operations of a shorter duration. Meteorological and oceanographic support may be provided with the use of the NITES IV and automated weather observation system.

Air Point. Air points are designed to support specific tactical missions at predetermined geographical locations. Air points are further broken down into forward arming and refueling

points or laager points. Forward arming and refueling points are normally serviced by the MMT. Laager points may have MMT services, but most likely will not receive ATC services.

Marine Air Traffic Control in a Joint Phasing Model

The joint phasing model identifies six phases—shape, deter, seize the initiative, dominate, stabilize, and enable civil authority—to support operations. Based on the type and nature of the operation, the joint force commander may choose to compress, expand, or omit phases. The MATCDs are equipped and staffed to support operations across the range of military operations and may echelon capabilities based on mission requirements.

Shape and Deter. The initial phases of a joint operation are to shape and deter. During these phases, the MATCD's physical involvement may be limited or substantial as required by the commander (e.g., deployment preparations and/or mobilization, a forward presence in theater, MMTs afloat).

Seize the Initiative and Dominate. If deterrence fails, the joint force will look to seize the initiative and dominate. To accomplish this, the MMT is normally one of the first MACCS entities phased into an operation. The MMT doctrinally operates for up to 72 hours without resupply or relief. As the MAGTF requires additional ATC services, MATCDs or MATCD (minus) phase into the operation. Once forward of their assembly areas, they may remain stationary or advance as required by the MAGTF commander. For the MATCD, these phases include the periods where earlier-employed MATCD resources require replacement, replenishment, augmentation, or an increase in ATC capabilities. The end result of these phases is the achievement of the desired level of ATC and METOC services for a given FOB. During these phases, the MMT may serve as a precursor to a MATCD or MATCD (minus) while providing airfield information to the MATCD. This information will enable follow-on ATC services (e.g., the development of precision and nonprecision approaches). While the commander's requirements determine the type of trained personnel and equipment for any phase of the operation, the MATCD's echelon capability supports multiple COAs depending on the required level of ATC services and available lift.

Stabilize and Enable Civil Authority. After the joint force meets conditions to transition into the final phases of an operation, the MATCD will likely remain stationary and possess all types of ATC capabilities. In addition to tactical ATC operations during these phases, the MATCDs may also train host nation air traffic controllers to provide civil ATC services after the departure of military ATC services. These phases continue until the MATCD is relieved by another MATCD or another Service or control is transitioned to civil authority.

Marine Air Traffic Control at Existing Airfields

For operations at existing airfields, particularly in a permissive environment, MATCD personnel may provide liaisons, augmentation, and additional services. Liaisons advise host nation ATC personnel on routine procedures of various Marine Corps aircraft and ensure the coordination of issues between the MAGTF and the host nation facility. In certain situations, MATCD personnel may augment existing services with personnel to increase the capacity of the existing ATC system. This is largely dependent on the laws of the host nation, reciprocal agreements to accept FAA qualifications, and traffic levels at the facility. Likewise, the MATCD may provide equipment to

augment the services of an existing facility. For civilian-only airports, existing NAVAIDS may be unusable for Marine Corps aircraft. The MATCD provides equipment and personnel to provide the additional services in concert with the existing facility.

MARINE AIR TRAFFIC CONTROL INTERAGENCY RELATIONS WITH THE MARINE AIR COMMAND AND CONTROL SYSTEM

Marine Air Traffic Control and Tactical Air Command Center

The MATCD and MMT are subordinate to the Marine TACC and provide decentralized control for friendly air traffic operating in and around designated FOBs. Through liaisons at host nation ATC facilities and operational detachments established at FOBs, MATCD personnel inform the Marine TACC on the status of friendly and civilian air traffic; changes to airspace coordinating measures, which impact air operations; and the operational status of various air bases/airfields. The Marine TACC provides the MATCD with guidance for the conduct of MAGTF air operations and updates to the ATO, ACP, and ACO.

Marine Air Traffic Control and Tactical Air Operations Center

The TAOC and MATCD coordinate aircraft departure, en route, and arrival information. The TAOC serves as the MAGTF's primary long-range air surveillance control agency and will coordinate interrelated airspace management matters, identify en route aircraft, and be the primary tie-in point for TDL operations. As the primary identification authority for the MAGTF, the TAOC will provide identification of air tracks to the MATCD via data link and cueing via the combat identification and detection net when link information is not available. The MATCD will coordinate aircraft departures and handoffs with the TAOC to facilitate the rapid identification of friendly aircraft. The TAOC advises the MATCD of the current air defense warning conditions and threat information for the MATCD's activation and control of the BDZ.

Marine Air Traffic Control and Direct Air Support Center

The DASC and the MATCD coordinate aircraft departure and arrival information. Due to the MATCD's location at FOBs, MATCDs should expect to conduct coordination with the DASC for clearing terminal airspace in support of FOB-based, surface-to-surface artillery and missile systems and updating aircraft status via—and affecting the launch of—strip alert aircraft. The MATCD will work closely with the DASC for the development and daily management of airspace.

Marine Air Traffic Control and Low Altitude Air Defense

The MATCDs and SHORAD units coordinate the BDZ and similar procedures for point defense of a FOB. The MATCD provides a radar picture for LAAD cueing and coordination with the TAOC for the overall classification of aircraft. The MATCD will host a LAAD section leader, or the direct representative, within the operations shelter of the radar system in use. This allows for the rapid identification of threats and dissemination of cueing to the teams operating in support of the BDZ. The MATCD ensures that all procedures for arriving, departing, and transiting aircraft are briefed to the LAAD teams. Although the MATCD normally coordinates with Marine LAAD,

US Army, host nation, and coalition SHORAD weapons may also be used for a BDZ. Low altitude air defense also has a secondary mission for air base ground defense. The MATCD will work closely with LAAD for inclusion within the FOB's perimeter defense during its development. This may require coordination during the establishment of ground test fire ranges close to the FOB, as well as other air and ground activities LAAD may control via the base defense operations center. The MATCD operates from an elevated tower, affording MATCD personnel a unique view of the airfield and the ability to report security issues.

Marine Air Traffic Control and Marine Unmanned Aerial Vehicle Squadron

The MATC units will coordinate with the Marine unmanned aerial vehicle squadron (referred to as VMU) during planning and execution in order to incorporate UAS operations within MATC-assigned airspace and airfield operations. Procedures for priority of traffic between manned and unmanned aircraft, and accepted methods of deconfliction between them, must be understood and briefed to all participants.

Marine Air Traffic Control and Marine Wing Communications Squadron

The MATCDs coordinate with the Marine wing communications squadron (MWCS) in order to plan for and execute communications. Though the MATCD is organically equipped to provide all single channel radio requirements, it requires additional support for data services. The Marine wing support squadron is responsible for communications internal to the FOB, whereas the MWCS provides access to data services and communications between FOBs. The site requirements for the MATCD's radar equipment often include extended data services across runways and taxiways. The MWCS often provides the tropospheric scatter/satellite support radio to provide data services to the MATCD.

Marine Air Traffic Control and the Site Commander

The MATCD works with the ACE site commander at a FOB to coordinate air operations. Site command doctrine directs that all forces at the FOB will fall under the purview of the site commander, who retains overall responsibility at that FOB to produce sorties. For the MATCD, this equates to a tactical control relationship with the site commander that must be defined with coordination amongst commanders from the MACG and the Marine aircraft group. When the MATCD is under the tactical control of the FOB site commander, it must retain an operational tie-in with higher and adjacent air command and control agencies.

Marine Air Traffic Control Mobile Team

Known first as the remote area landing site team, then as the light and mobile team, the MMT concept of support for Marine aviation was developed at MAWTS-1 in 1989 to support expeditionary maneuver warfare. The mission, training standards, and procedures were adopted, in part, from US Air Force special tactics teams.

The MMT has grown in its capability since its inception. A fully-trained team is assigned to and capable of supporting mission sets tied to Marine expeditionary unit capabilities as well as major theater and Marine expeditionary force-level operations. Concurrently, there are smaller FOBs that require more than an MMT-sized element of ATC to provide standard ATC and information management for longer durations. These types of missions are in line with the capabilities of the

MATCD (minus), but may also be serviced by an MMT. Specifics regarding MMT employment are discussed in the MAWTS-1 *Marine Air Traffic Control Mobile Team Tactical Standard Operating Procedures (MMT TACSOP)* and individual unit SOP.

The mission of the MMT is to provide initial rapid-response ATC and command, control, and communications in support of MAGTF and joint operations. The MMT's training encompasses many aspects of MATC training and readiness standards, but focuses primarily on contingency and expeditionary ATC operations while emphasizing basic Marine Corps infantry tactics. Responsibility for MMT training resides with the MATCD commander. Concentrated team training enhances controller technical expertise, tactical proficiency, and unit cohesion.

The MMT provides a highly-responsive unit prepared to offer a solution to the command, control, and communications challenges presented by the maneuver element of the ACE and MAGTF/ multinational/joint commander. The MMT is often the first aviation command and control agency into an objective supported by aviation. Early establishment of ATC services at the air site or air point ensures that all follow-on aviation efforts have ATC and navigational guidance available, thus enhancing the safe and expeditious flow of air traffic into and out of the air site or air point and surrounding airspace. The MMT is capable of controlling assault zones for fixed-wing, tiltrotor, and rotary-wing aircraft under visual meteorological conditions. The MMT is self-sufficient for 72 hours without resupply or augmentation.

The MMT is specifically designed for insertion at remote locations to support MAGTF air operations and is commonly inserted via aviation assets or tactical vehicles. The most common and preferred method is via aviation assets. The MMT may be inserted and moved within the objective area via tactical vehicle; however, an HMMWV may or may not be organic to the MMT. Logistic coordination with the supported unit should be considered during planning to ensure proper support.

The MMT conducts assault zone surveys in accordance with joint criteria. An assault zone is an operational surface area designed for a drop zone or landing zone:

- *Drop zone*. Surface area designated for aerial drops of personnel, supplies, or equipment.
- *Landing zone*. Any specified zone used for the landing of aircraft. Surface areas vary depending on the aircraft type (fixed-wing, rotary-wing, or tiltrotor):
  - Fixed-wing and tiltrotor aircraft require a surface area of sufficient size for a runway and taxiway or other aircraft operating surfaces (e.g., aprons, turnarounds) designed for the arrival and departure of fixed-wing and tiltrotor aircraft. Landing zones may be paved or semi-prepared.
  - Rotary-wing aircraft and vertical tiltrotor operations require a surface area of sufficient size and dimensions for arrival and departure.

Data Link Communications

The MATCD contributes to the MAGTF's overall air picture through air track exchange over TDLs. For air defense operations, expeditious reporting of air tracks and updating track position is crucial.

The ATNAVICS does not currently possess a data link capability. The first increment of the planned improvements includes the addition of a display of the link picture within the TTCS. Upon receiving the second increment, ATNAVICS will transmit data to other air command and control agencies. It will receive data from the connected agency and display it on a flat panel screen inside the TTCS.

This exchange of track information enhances situational awareness for all participating air command and control agencies and assists in the identification of friendly aircraft, thus reducing the potential for fratricide and assisting in the tracking of military and civil air traffic across the area of operations. Voice reporting (e.g., manual cross-tell) of air tracks may be used to supplement the data link picture or enhance situational awareness when the data link is inoperative.

Antiterrorism/Force Protection

General AT/FP regulations and guidance are provided in Department of Defense Instruction 2000.12, *DoD Antiterrorism (AT) Program*; Joint Publication 3-10, *Joint Security Operations in Theater*; and Marine Corps Order 3302.1, *USMC Antiterrorism (AT) Program*. Each deploying squadron is directed to have a unit AT/FP program. Embedded within the squadron program, there should be a MATCD-level program. Lessons learned from prior deployments highlight the need for each entity of a deploying squadron to have an autonomous AT/FP capability. The MATCD-level AT/FP program should have an identified lead and should be able to protect the MATCD without reinforcements or an established airfield perimeter. Historical examples show that during the initial phases of an operation, MATCDs must be self-sustaining as the FOB is being established. Planning considerations are discussed in full detail in chapter 3.

Terminal Instrument Procedures and Flight Inspection Requirements

Terminal Instrument Procedures. The MATCD develops instrument approaches to the airport after the level of ATC services and equipment locations have been determined at the selected airfield. Instrument approach procedures are developed to ensure adequate clearance from obstructions and then sent to the NAVFIG for approval. A notice to airmen is disseminated until published in the flight information publication. Each detachment maintains at least one resident TERPS specialist.

Flight Inspection. Prior to the publication of instrument approaches, the FAA requires a flight inspection. The inspection is normally conducted by an FAA flight inspection aircraft. When an FAA aircraft is not available, the Marine aircraft wing or higher joint/coalition commander may authorize a military aircraft to conduct the flight inspection in accordance with Naval Air Systems Command (NAVAIR) 00-80T-114, *NATOPS Air Traffic Control Manual*. This alternative will allow MAGTF aircraft, and potentially joint/coalition aircraft under the purview of the commander, to use the instrument approaches until the FAA completes a successful flight inspection.

Marine Air Traffic Control Maintenance Fundamentals

Maintenance fundamentals are the primary responsibility of the maintenance officer. Routine communication of maintenance data and information between MATCD commanders and aircraft maintenance officers supports the responsibility of the MATCD commanders to coordinate with higher headquarters in order to enable planned and corrective maintenance. Key facets of maintenance planning and documentation are as follows:

- Detachment commanders may need to coordinate with higher headquarters in order to schedule required MATCD equipment maintenance downtime.
- Higher headquarters may not understand MATCD's maintenance requirements, and it is incumbent upon the MATCD commander to articulate the rationale behind turning MATCD equipment (e.g., radars, TACANs) off.
- Without the MATCD's radars, higher headquarters may be concerned with the lack of an active MAGTF airspace surveillance capability.
- Planned outages may be offset during MATCD maintenance times with coordination between adjacent, radar-capable, MACCS agencies.
- Planned maintenance is required to prevent catastrophic failure (time varies by system and parts required).
- Higher headquarters may be concerned with the flow of parts affiliated to nonmission capable equipment. The ability to obtain parts in a timely manner from outside agencies is not always possible due to the location of that particular part and limited parts availability within the supply system.
- Detachment commanders must be mindful of the movement of equipment certified by a flight inspection.
- Higher headquarters may not be aware of requirements associated with flight inspection-certified equipment and the possible impacts to instrumental flight rules on ATC operations.
- The detachment commander must carefully consider higher headquarters requests for moving equipment on an airfield. The mission may dictate moving equipment, but the priority to keep the equipment certified may outweigh the request for moving key MATCD equipment.
- MATCD equipment is maintained by the MATCD maintenance section and supported by the NAVAIR.

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CHAPTER 5
TRAINING

UNIT TRAINING

Unit training prepares the MATCD to perform its mission. Unit training may take on many forms, including command post exercises, simulated exercises, and field training exercises. The 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

Marine aviation planning problems are low-cost and low-overhead exercises that allow commanders to train their staffs to perform special integration and planning functions in a simulated environment. Marine aviation planning problems are particularly effective for determining command and control requirements to support possible contingencies.

Marine Air Command and Control System Integrated Simulated Training Exercise

The MACCS integrated simulated training exercise is a locally-produced MACG exercise that involves the detailed preparation of a simulated scenario and its subsequent execution at the MACCS level. The MACCS integrated simulated training exercise may serve to prepare units for upcoming field training exercises or contingencies, and it provides an opportunity for units to operate communications equipment and TDLs prior to an operation.

CREW TRAINING

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

Air Traffic Control Timeshare Operations

Timeshare operations are conducted with tactical ATC equipment sited at existing garrison air stations. These operations allow air traffic controllers assigned to air stations under the fleet assistance program to receive proficiency training on tactical equipment and to complete training and readiness manual training requirements. The MATCD maintenance technicians and utilities personnel also receive training during timeshare operations. Timeshare operations also provide the local air station with backup, FAA-certified equipment for use in the event of planned maintenance outages or station equipment failure. Included with timeshare operations are classes provided by

the MACS or MATCD personnel for the controllers at the air station. These classes cover requirements under the training and readiness program to ensure that all controllers achieve proficiency in garrison and expeditionary subjects.

Simulated Training

Organic assets that have simulation capability are necessary components of the MATC individual training program. In addition to maintaining currency and proficiency during insufficient traffic situations, simulator training is used for—

- Unusual situations, such as weather affecting flights and other types of emergencies.
- Seldom used procedures, such as transitioning to and applying nonradar separation.
- Traffic and safety advisories.
- Areas identified as needing reinforcement.
- Integrating adjacent MACCS agencies outside the scope of large scale exercises.

INDIVIDUAL TRAINING

There are four types of individual training: initial, on-the-job, expeditionary, and follow-on schools. The following subparagraphs explain each in detail as they apply to air traffic controllers and MATCD technicians.

Air Traffic Controllers

Air traffic controllers attend a variety of formal schools and locally-based training to prepare them for deployment in support of operations or exercises.

Initial Training. Entry-level air traffic controller training is conducted at Naval Air Station Pensacola. Upon completion of initial training, ATC personnel complete the FAA's airman's written test and possess the basic knowledge necessary to begin on-the-job training as air traffic controllers.

On-the-Job Training. Subsequent to basic ATC school training, each air traffic controller undergoes a period of on-the-job training in order to attain MOS and initial certifications. Air traffic controller training requirements, both individual and crew-specific, are standardized by NAVAIR 00-80T-114. Technical MOS and proficiency training for tower and radar positions are conducted at all Marine Corps ATC facilities. Approach controller training is available at MCAS Beaufort, MCAS Cherry Point, MCAS Iwakuni, and MCAS Yuma.

Expeditionary Training. The requirement to complete the aviation career progression model, which introduces MATC personnel to the MACCS agencies, the six functions of Marine aviation, and a variety of topics related to aviation operations, is phased into the qualifications attained at garrison ATC facilities. Once complete with a station qualification, MATC personnel complete additional requirements related to expeditionary MATC employment to achieve training and readiness proficiency requirements in an expeditionary environment.

Follow-on Training. Several formal and informal schools are available to air traffic controllers after achieving initial certifications. Additional information may be found online (Joint Knowledge Online Web site) or in the annual MACCS skills enhancement message. Courses of instruction include the following:

- Weapons and Tactics Instructor.
- MMT Leader Instructor.
- Advanced Radar ATC (Approach).
- Military Airspace Management.
- ATC Manager.
- Joint Air Operations Air Command and Control.
- TERPS.
- Multi-TDL Advanced Joint Interoperability.
- Link 16 Basics.
- Multi-TDL Advanced Joint Interoperability.
- Link 16 Interoperability.
- Link 16 Unit Manager.
- Advanced Joint Interface Control Cell.
- Air and Space Operations Center Initial Qualification Training (Airspace).

Marine Air Traffic Control Detachment Technicians

Initial Training. The MATCD technicians undergo their entry-level training at Naval Air Station Pensacola. Maintenance technician training requirements are outlined in NAVMC 3500.76, *Marine Air Traffic Control Maintenance Training and Readiness Manual*, and COMNAVAIRFORINST 4790.2C.

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.

Several formal and informal schools and training opportunities are available to MATC technicians after initial training. Additional information may be found online (Joint Knowledge Online Web site) or in the annual MACCS skills enhancement message. Courses of instruction include MACCS maintenance courses, courses provided by Defense Acquisition University and the Naval Aviation Maintenance Program, and the following specific courses:

- Weapons and Tactics Instructor.
- MATC Maintenance Manager.
- MATC Work Center Supervisor.
- Aviation Radar Technician Theory.

- Link 16 Basics.
- Multi-TDL Advanced Joint Interoperability.
- Link 16 Interoperability.
- Link 16 Unit Manager.
- Advanced Joint Interface Control Cell.
- System Approach to Training.
- Total Force Structure Management Systems.

APPENDIX A
COMMUNICATIONS NETS

Aircraft Rescue and Firefighting Net (Very High Frequency/Ultrahigh Frequency [Amplitude Modulation])

The aircraft rescue and firefighting net provides a means to coordinate emergencies on and around the airfield. The following organizations are examples of those that may use the aircraft rescue and firefighting net:

- ATC detachment.
- Crash crew.
- Airfield operations.
- Explosive ordnance disposal.
- Medical facility.
- Military police.

Air Defense Alert Net (Ultrahigh Frequency)

The air defense alert net provides for the direct coordination and exchange of critical threat information between UHF-capable, ground-based air defense systems and combat air patrols in adjacent engagement zones. It also provides a verbal warning to friendly aircraft transiting minimum-risk routes close to missile engagement zones. The following organizations are examples of those that may use the air defense alert net:

- TAOC.
- Early warning/control (EW/C).
- AAW aircraft.

Air Defense Command and Control Net (High Frequency/Ultrahigh Frequency/Tactical Satellite)

The air defense command and control net provides a means for the coordination of air defense operations. The following organizations are examples of those that may use the air defense command and control net:

- Marine TACC.
- TAOC.
- Area air defense commander/regional air defense commander.
- Other Service air command and control agencies.
- Surface-to-air missile units.

Air Operations Control Net (Multiplex/High Frequency)

The air operations control net provides a means for the TAOC to request interceptor aircraft and report friendly air defense situation information to the Navy tactical air control center (referred to as Navy TACC) and tactical air direction center (TADC). Information pertaining to combat air patrol availability, stationing, assignment and disposition of targets, intercept progress, surface-to-air missile unit status and employment, and aircraft/missile weapons coordination is coordinated on this net. The following organizations are examples of those that may use the air operations control net:

- Marine TACC.
- Navy TACC.
- TADC.
- TAOC.
- Other AAW agencies.

Antiaircraft Control Net (Multiplex/High Frequency)

The antiaircraft control net 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. The following organizations are examples of those that may use the antiaircraft control net:

- TAOC.
- LAAD headquarters elements.
- EW/C.
- Other AAW agencies.

Antiaircraft Intelligence Net (Multiplex/High Frequency)

The antiaircraft intelligence net 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. The following organizations are examples of those that may use the antiaircraft intelligence net:

- TAOC.
- LAAD headquarters/batteries.
- EW/C.
- Other AAW agencies.

Approach Control Net (Ultrahigh Frequency/Very High Frequency)

The approach control net provides a means to communicate with radar-controlled traffic in and around the terminal airspace. The following organizations are examples of those that may use the approach control net:

- ATC detachment.
- Radar-controlled aircraft.

Combat Information/Detection Net (High Frequency/Multiplex)

The combat information/detection net provides a means for reporting on unidentified or hostile aircraft, including initial contact reports, tracking, amplifying, and final disposition reports. The following organizations are examples of those that may use the combat information/detection net:

- TAOC.
- Navy TACC.
- TADC.
- Marine TACC.
- EW/C.
- Sector air defense facility.
- Other Service agencies.
- LAAD.
- MATCD.

Command Action Net (Multiplex/High Frequency)

The command action net provides a means for command-level coordination of AAW through the exchange of information pertaining to missile battery employment, assignment of air targets, and interceptor/missile coordination. The following organizations are examples of those that may use the command action net:

- Navy TACC.
- TADC.
- Marine TACC.
- TAOC.
- Sector air defense commander.
- Other AAW agencies.

Data Link Coordination Net (Multiplex/High Frequency/Ultrahigh Frequency)

The data link coordination net provides a means to maintain the coordination of data link operations. It may be combined with track supervision net for single-channel operations. Generally, there is one data link coordination net per Link 11B. The following organizations are examples of those that may use the data link coordination net:

- Marine TACC.
- TAOC.
- Other Service air command and control agencies.

Departure Control Net (Ultrahigh Frequency/Very High Frequency)

The departure control net provides a means to coordinate with radar-controlled traffic in and around the terminal airspace in the event that arrival and departure are not combined with

approach control position based on traffic density. The following organizations are examples of those that may use the departure control net:

- ATC detachment.
- Radar-controlled aircraft.

Direct Air Support Net (Multiplex/High Frequency/Very High Frequency)

The direct air support net provides a means for the DASC to request direct air support aircraft from the Marine TACC. Additionally, information pertaining to items such as aircraft stationing, fuel and ordnance status, or progress of direct air support missions may also be passed over this net. The following organizations are examples of those that may use the direct air support net:

- Navy TACC.
- TADC.
- Marine TACC.
- DASC.

Fighter Air Direction Net (Ultrahigh Frequency/Very High Frequency)

The fighter air direction net provides a means for air control agencies and elements to control aircraft in the conduct of intercepts. Multiple fighter air direction nets are required and assigned to major control agencies. The following organizations are examples of those that may use fighter air direction nets:

- TAOC.
- EW/C.
- Interceptor aircraft.
- Other Service air command and control agencies.

Ground Control Approach Net (Ultrahigh Frequency/Very High Frequency)

The ground control approach net provides a means for ground-controlled approach controllers to provide bearing and altitude information to aircraft on final approach to the airport. The following organizations are examples of those that may use the ground control approach net:

- ATC detachment.
- Radar-controlled arriving aircraft.

Ground Control Net (Ultrahigh Frequency/Very High Frequency)

The ground control net provides a means for the ground controller to coordinate the movement of all ground aircraft, vehicles, and personnel on taxiways and runways. The following organizations are examples of those that may use the ground control net:

- ATC detachment.
- All aircraft, vehicles, and personnel on taxiways and runways.

Group Common Net (Very High Frequency/ Ultrahigh Frequency)

The group common net provides a means of communication between inter-/intra-flight communications between group aircraft and the aircraft group headquarters. Each aircraft group establishes its own common net. A group common net may be established in lieu of squadron common nets based on the availability of communications assets. The following organizations are examples of those that may use the group common net:

- Aircraft group headquarters.
- Group aircraft.
- Squadron headquarters.

Guard Net (Ultrahigh Frequency/Very High Frequency)

The guard net 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. The following organizations are examples of those that may use the guard net:

- Airborne aircraft.
- All air command and control agencies.

Handover/Cross-tell Net (High Frequency/Multiplex)

The handover/cross-tell net provides a means to prepare for the exchange of aircraft control between air control agencies. Multiple nets may be established for other elements (e.g., the TAOC-EW/C handover, TAOC-DASC handover, ATC-TAOC handover, ground control intercept/approach handover). To conserve assets, the functions may also be combined based on expected traffic. The following organizations are examples of those that may use the handover/cross-tell net:

- TAOC.
- EW/C.
- ATC detachments.
- Other Service agencies.
- DASC.

Landing Zone Control Team Local Net (Very High Frequency)

The landing zone control team (LZCT) local net provides a means for the LZCT commander to direct the activities of helicopter control personnel in each of the landing sites. Multiple LZCT local nets may be required depending on the number of zones in operation at the same time. The following organizations are examples of those that may use the LZCT local net:

- LZCT.
- Landing site controllers.

Low Altitude Air Defense Battalion Command Net (High Frequency)

The LAAD battalion command net provides a LAAD commander with a means to exercise command, administrative, and logistic functions with subordinate batteries. The following organizations are examples of those that may use the LAAD battalion command net:

- LAAD battalion headquarters.
- LAAD battery.

Low Altitude Air Defense Command Net (High Frequency)

The LAAD command net provides connectivity between the battery or net control station and subordinate platoons for administrative and logistic support and to coordinate the tactical employment of LAAD platoons. The following organizations are examples of those that may use the LAAD command net:

- LAAD battery commanders.
- LAAD platoon commanders.

Low Altitude Air Defense Team Control Net (Very High Frequency)

The LAAD team control net provides the means for the LAAD section leader to control teams and to relay air defense warning conditions, weapons control statutes, and pertinent information on friendly, enemy, and unknown aircraft. The LAAD normally requires multiple LAAD team control nets, usually one per LAAD section. These nets may also be used by teams to pass aircraft sighting reports, engagement reports, position reports, status reports, and resupply requests to section leaders. The following organizations are examples of those that may use the LAAD team control net:

- LAAD section leaders.
- LAAD teams.

Low Altitude Air Defense Weapons Control Net (High Frequency)

The LAAD weapons control net provides connectivity between the platoon commander, net contol and the section leaders. Multiple nets may be required. It also provides subordinate/senior elements with current air defense warning conditions, weapons control statutes, and pertinent information on hostile, unknown, and friendly aircraft. The following organizations are examples of those that may use the LAAD weapons control net:

- LAAD platoon commanders.
- LAAD section leaders.

Metro Net (Ultrahigh Frequency/Very High Frequency)

The metro net provides a means for METOC to provide time-critical meteorological information to aircrew and ground personnel within communications range of their location. While this is primarily a radio frequency net, the MATCD may pass metro net information to higher and

adjacent agencies via tactical chat. The following organizations are examples of those that may use the metro net:

- METOC.
- MACCS agencies requiring METOC information.
- Aircrew requiring current and forecast METOC information.
- Ground personnel requiring current and forecast METOC information.

Non-Antiair Warfare Aircraft Squadron Common Net (Very High Frequency/ Ultrahigh Frequency)
The non-antiair warfare aircraft squadron common net provides a means of inter-/intra-flight communications between squadron aircraft and squadron headquarters. Each aircraft squadron normally has its own common net, which may be used by organizations such as the following:

- Squadron headquarters.
- Squadron aircraft.

Search and Rescue Net (Ultrahigh Frequency/Very High Frequency)
The search and rescue (SAR) net 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 or tactical recovery of aircraft and personnel (TRAP) missions. The following organizations are examples of those that may use the SAR net:

- Air command and control agencies involved in SAR and TRAP missions.
- Aircraft involved in SAR and TRAP missions.

Tactical Air Command Net (High Frequency/Ultrahigh Frequency/Satellite Communication/Multiplex)
The tactical air command net is the primary means by which the tactical air commander provides operational tasking to subordinate units and agencies including tasking to aviation groups and squadrons to provide aircraft for missions. The following organizations are examples of those that may use the tactical air command net:

- Navy TACC.
- TADC.
- Marine TACC.
- TAOC.
- LAAD battalion combat operations center.
- DASC.
- Marine aircraft groups and squadrons.
- ATC detachments.
- EW/C.

Tactical Air Traffic Control Net (Ultrahigh Frequency/Very High Frequency)
The tactical air traffic control net provides a means for the Navy TACC, TADC, Marine TACC, TAOC, and DASC to exercise airspace control over all tactical and itinerant aircraft in the

objective area. Tasks conducted over this net include reporting aircraft launches by mission number, switching aircraft to their assigned control agencies, diverting aircraft as necessary, completing aircraft mission reports prior to landing, and providing threat updates. Multiple tactical ATC nets are often required for each control agency. The following organizations are examples of those that may use tactical air traffic control nets:

- AOC.
- Navy TACC.
- TADC.
- Marine TACC.
- DASC.
- EW/C.
- Fixed-wing, rotary-wing, and tiltrotor aircraft.
- ATC detachment.
- MMT.
- Unmanned aircraft.

Tactical Data Link 11A Net (High Frequency/Ultrahigh Frequency)

Link 11A provides a secure means for the exchange of automatically-processed digital data among various tactical data systems. Types of data passed include air and surface tracks, weapons status, and selected orders and functions. Link 11A operates as a half-duplex, netted data link. The following organizations are examples of those that may use Link 11A:

- Marine TACC.
- TAOC.
- EW/C.
- Other Service air command and control agencies.

Tactical Data Link 11B Net (Multiplex)

Link 11B provides a secure means for the exchange of automatically-processed digital data between various tactical data systems. It is operated in a point-to-point mode using a full-duplex wire/multichannel path. The following organizations are examples of those that may use Link 11B:

- Marine TACC.
- TAOC.
- ATC detachment.
- EW/C detachment.
- Other Service air command and control agencies.

Tactical Data Link J (Link 16) Net (Ultrahigh Frequency)

Link 16 provides a secure, time division, multiple access, full duplex data link between the TAOC and other Link 16-capable platforms for automatically-processed digital data. Data passed over this link includes detected air tracks, engagement commands, ground tracks of interest, voice

communications, and other special information system aircraft/national source data inputs. The following organizations are examples of those that may use Link 16:

- TAOC.
- EW/C.
- Other Service air command and control agencies.

Tanker Net (Ultrahigh Frequency)

The tanker net provides a means for in-flight refueling capable aircraft to communicate with the tanker. Additionally, it may be used by the TAOC to exchange information with the tanker. The following organizations are examples of those that may use the tanker net:

- Tankers.
- In-flight refueling capable aircraft.
- TAOC.
- ATC detachment.

Tower Primary Net (Ultrahigh Frequency/Very High Frequency)

The tower primary net provides a means for the local controller to issue traffic advisories and aircraft clearances within the airport traffic area. The following organizations are examples of those that may use the tower primary net:

- ATC detachment.
- Aircraft.

Track Supervision Net (Multiplex/High Frequency/ Ultrahigh Frequency)

The track supervision net provides a means for track surveillance personnel to exchange voice information to maintain a clear air picture. This net may assume the functions of a data link coordination net based on available equipment. The following organizations are examples of those that may use the track supervision net:

- Navy TACC.
- TADC.
- Marine TACC.
- TAOC.
- Other Service air command and control agencies.

Voice Product Net (Multiplex/ Ultrahigh Frequency/High Frequency)

The voice product net provides a means for reporting on hostile targets in a joint environment. The following organizations and aircraft are examples of those that may use the voice product net:

- Other Service agencies.
- Marine TACC.
- TAOC.
- EA-6B Prowler.

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GLOSSARY

Section I: Abbreviations and Acronyms

AAW ..... antiair warfare
ACA ..... airspace control authority
ACE ..... aviation combat element
ACO ..... airspace control order
ACP ..... airspace control plan
AGL ..... above ground level
AGS ..... aviation ground support
ASR ..... airport surveillance radar
AT ..... antiterrorism
ATC ..... air traffic control
ATNAVICS ..... air traffic navigation, integration, and coordination system
ATO ..... air tasking order

BDZ ..... base defense zone
BTU/hour ..... British thermal unit per hour

COA ..... course of action
COMNAVAIRFORINST ..... Commander, Naval Air Forces instruction

DASC ..... direct air support center

EMCON ..... emission control
EW/C ..... early warning/control

FAA ..... Federal Aviation Administration (DOT)
FOB ..... forward operating base
FP ..... force protection

GHz ..... gigahertz

HERF ..... hazards of electromagnetic radiation to fuels
HERO ..... hazards of electromagnetic radiation to ordnance
HF ..... high frequency
HMMWV ..... high mobility multipurpose wheeled vehicle
Hz ..... hertz

ICAO ..... International Civil Aviation Organization
IFF ..... identification, friend or foe
ITEG ..... integrated trailer-environmental control unit-generator

JP-5 ..... jet propulsion fuel, type 5 (standard high-flash-point Navy fuel, MIL-T-5624)
JP-8 ..... jet propulsion fuel, type 8 (standard Air Force kerosene jet fuel, MIL-T-83133)
JP ..... joint publication

kHz ..... kilohertz
kW ..... kilowatt

LAAD ..... low altitude air defense
LZ ..... landing zone
LZCT ..... landing zone control team

MACCS ..... Marine air command and control system
MACG ..... Marine air control group
MACS ..... Marine air control squadron
MAGTF ..... Marine air-ground task force
MALS ..... Marine aviation logistics squadron
MATC ..... Marine air traffic control
MATCD ..... Marine air traffic control detachment
MAWTS-1 ..... Marine Aviation Weapons and Tactics Squadron One
MCAS ..... Marine Corps air station
MCRP ..... Marine Corps reference publication
MCT ..... Marine Corps task
MCTP ..... Marine Corps tactical publication
METMF(R)NexGen ..... Meteorological Mobile Facilities (Replacement) Next Generation
METOC ..... meteorological and oceanographic
MHz ..... megahertz
MMT ..... Marine air traffic control mobile team
MOS ..... military occupational specialty
MWCS ..... Marine wing communications squadron

NAVAID ..... navigation aid
NAVAIDS ..... navigational aids
NAVAIR ..... Naval Air Systems Command
NAVFIG ..... naval flight information group
NAVMC ..... Navy/Marine Corps departmental publication
NITES ..... Navy Integrated Tactical Environmental System
NM ..... nautical mile (aviation)
NVD ..... night vision device

PAR ..... precision approach radar

RADCON ..... radiation control
RLST ..... remote landing site tower

S-4 ..... logistics officer/logistics office
S-6 ..... communications system officer/communications staff office
SAR ..... search and rescue

SHORAD ..... short-range air defense (system)
SOP ..... standing operating procedure
SSR ..... secondary surveillance radar

TACAN ..... tactical air navigation
TACC ..... tactical air command center (USMC)
..... tactical air control center (USN)
TADC ..... tactical air direction center
TAOC ..... tactical air operations center
TDL ..... tactical data link
TERPS ..... terminal instrument procedures
TRAP ..... tactical recovery of aircraft and personnel
TTCS ..... tactical terminal control system

UAS ..... unmanned aircraft system
UHF ..... ultrahigh frequency

VAC ..... volts, alternating current
VHF ..... very high frequency

Section II: Terms and Definitions

air control—1. The authority to effect the maneuver of aircraft. 2. The authority to direct the physical maneuver of aircraft in flight or to direct an aircraft or surface-to-air weapon unit to engage a specific target. The elements of air control are: air control agency, air controller, airspace control, operational control, positive control, procedural control, radar control, and terminal control. See also **air control agency, air controller, airspace control, Marine air command and control system**, and **terminal control**. (MCRP 1-10.2)

air control agency—An organization possessing the capability to exercise air control. See also **air control** and **Marine air command and control system**. (MCRP 1-10.2)

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 the individual for operation within a specified area. See also **air control; Marine air command and control system**. (MCRP 1-10.2)

air direction—1. The guidance and supervision that a commander employs to focus air resources on mission accomplishment. 2. The authority to regulate the employment of air resources (aircraft and surface-to-air weapon units) to maintain a balance between their availability and the priorities assigned for their usage. Air direction occurs as a sequence of the air apportionment, air allocation, tasking, and fragmentary order development. See also **Marine air command and control system**. (MCRP 1-10.2)

airspace control—(See the DOD Dictionary for core definition. Marine Corps amplification follows.) A process that coordinates, integrates, and regulates the use of an airspace of defined proportions. It does not include measures to approve, disapprove, deny, or delay air operations. See **air control** and **Marine air command and control system**. (MCRP 1-10.2)

airspace control area—Airspace that is laterally defined by the boundaries of the operational area and may be subdivided into sectors. (DOD Dictionary)

airspace control order—An order implementing the airspace control plan that provides the details of the approved requests for airspace coordinating measures. Also called **ACO**. (DOD Dictionary)

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 operational area. Also called **ACP**. (DOD Dictionary)

airspace management—The coordination, integration, and regulation of the use of airspace of defined dimensions. (DOD Dictionary)

area of operations—An operational area defined by a commander for land and maritime forces that should be large enough to accomplish their missions and protect their forces. Also called **AO**. (DOD Dictionary)

base defense zone—An air defense zone established around an air base and limited to the engagement envelope of short-range air defense weapons systems defending that base. Also called **BDZ**. (DOD Dictionary)

emission control—The selective and controlled use of electromagnetic, acoustic, or other emitters to optimize command and control capabilities while minimizing, for operations security: a. detection by enemy sensors; b. mutual interference among friendly systems; and/or c. enemy interference with the ability to execute a military deception plan. Also called **EMCON**. (DOD Dictionary)

forward arming and refueling point—A temporary facility, organized, equipped, and deployed to provide fuel and ammunition necessary for the employment of aviation maneuver units in combat. Also called **FARP**. (DOD Dictionary)

forward operating base—An airfield used to support tactical operations without establishing full support facilities. Also called **FOB**. (DOD Dictionary)

HAVE QUICK—An electronic counter-countermeasure modification that provides a frequency hopping capability to selected radios. (As contained in this glossary, this term and its definition are applicable to this publication only.)

landing zone—(See DOD Dictionary for core definition. Marine Corps amplification follows.) A specified ground area for landing assault support aircraft to embark or disembark troops and/or cargo and it may contain one or more landing sites. Also called **LZ**. (***Note:*** Replaces helicopter landing zone [HLZ].)

Marine air command and control system—(See DOD Dictionary for core definition. Marine Corps amplification follows.) The two major types of control exercised by the Marine air command and control system are: a. air direction and b. air control. See also **air control** and **air direction**. (MCRP 1-10.2)

Marine air traffic control mobile team—A task-organized element provided by the Marine air traffic control detachment that is trained and equipped to provide initial rapid response air traffic control and command, control, and communications in support of Marine air-ground task force and joint missions. Marine air traffic control mobile teams usually support operations at air sites, forward arming and refueling points, rapid ground refueling points, or laager points. Normally, a fully staffed and equipped mobile team capability can be provided on a 24-hour basis for up to 72 hours without resupply or augmentation. Also called **MMT**. (MCRP 1-10.2)

procedural control—A method of airspace control which relies on a combination of previously agreed and promulgated orders and procedures. (DOD Dictionary)

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. See **air control** and **Marine air command and control system**. (MCRP 1-10.2)

sector—An area designated by boundaries within which a unit operates, and for which it is responsible. (MCRP 1-10.2)

terminal control—(See DOD Dictionary, part 1 for core definition. Marine Corps amplification follows.) The authority to direct the maneuver of aircraft that are delivering ordnance, passengers, or cargo to a specific location or target. See air control and Marine air command and control system. (MCRP 1-10.2)

Section III: Nomenclature

C-130 ..... cargo aircraft (Hercules)

LMCCHC M1102 ..... heavy cargo trailer (*Integrated Trailer-Environmental Control Unit-Generator II*)

MEP-1060 ..... generator set, diesel engine (*Advanced Mobile Medium Power Source variant*)
MEP-531A ..... generator set, diesel engine

PRC-117F ..... portable radio communications

S-788 ..... lightweight multipurpose shelter (air traffic control operations)
Stinger ..... man-portable air defense system surface-to-air missile

TMQ-56 ..... lightweight, highly-mobile meteorological data collection system (*Meteorological Mobile Facilities [Replacement] Next Generation*)
TPN-31 ..... air traffic navigation, integration, and coordination system
TPN-31(V)5 ..... air traffic navigation, integration, and coordination system (*variant*)
TPN-31(V)7 ..... air traffic navigation, integration, and coordination system (*variant*)
TRN-44A ..... transportable tactical air navigation set
TRN-47 ..... lightweight, portable tactical air navigation set
TSQ-120C ..... transportable air traffic control central tower
TSQ-216 ..... remote landing site tower (*variant*)
TSQ-263 ..... tactical terminal control system

UMK-4(V) ..... portable, lightweight, automated METOC display and forecasting system (*Naval Integrated Tactical Environmental System–Mobile Variant IV*)

Note: Italic text is not part of the definition, it is explanatory in nature.

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REFERENCES AND RELATED PUBLICATIONS

Department of Defense Issuance (DODI)

2000.12 DoD Antiterrorism (AT) Program

Chairman of the Joint Chiefs of Staff Manuals (CJCSM)

3320.02_ Joint Spectrum Interference Resolution (JSIR) Procedures

Joint Issuances

Joint Publications (JPs)
3-09.3 Close Air Support
3-10 Joint Security Operations in Theater
3-52 Joint Airspace Control

Joint Miscellaneous
DOD Dictionary of Military and Associated Terms

Navy/Marine Corps Departmental Publications (NAVMCs)

3500.38_ Meteorological and Oceanographic Services Training and Readiness Manual
3500.76 Marine Air Traffic Control Maintenance Training and Readiness Manual

United States Marine Corps Publications

Marine Corps Tactical Publications (MCTP)
3-20F Control of Aircraft and Missiles

Marine Corps Reference Publications (MCRP)
1-10.2 Marine Corps Supplement to the DOD Dictionary of Military and Associated Terms
2-10B.6 MAGTF Meteorological and Oceanographic Support

Marine Corps Orders (MCOs)
3302.1_ USMC Antiterrorism (AT) Program
3500.14_ Aviation Training and Readiness (T&R) Program Manual

Miscellaneous
Marine Air Traffic Control Mobile Team Tactical Standard Operating Procedures (MMT TACSOP)
MAWTS-1 Night Vision Device (NVD) Manual

Navy Publications

Commander, Naval Air Forces Instructions (COMNAVAIRFORINST)
4790.2_ The Naval Aviation Maintenance Program (NAMP)

Naval Air Systems Command (NAVAIR)
00-80T-114 NATOPS Air Traffic Control Manual

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https://homeport.usmc.mil/sites/mcdoctrine/SitePages/Home.aspx