

CHAPTER 1

General Description

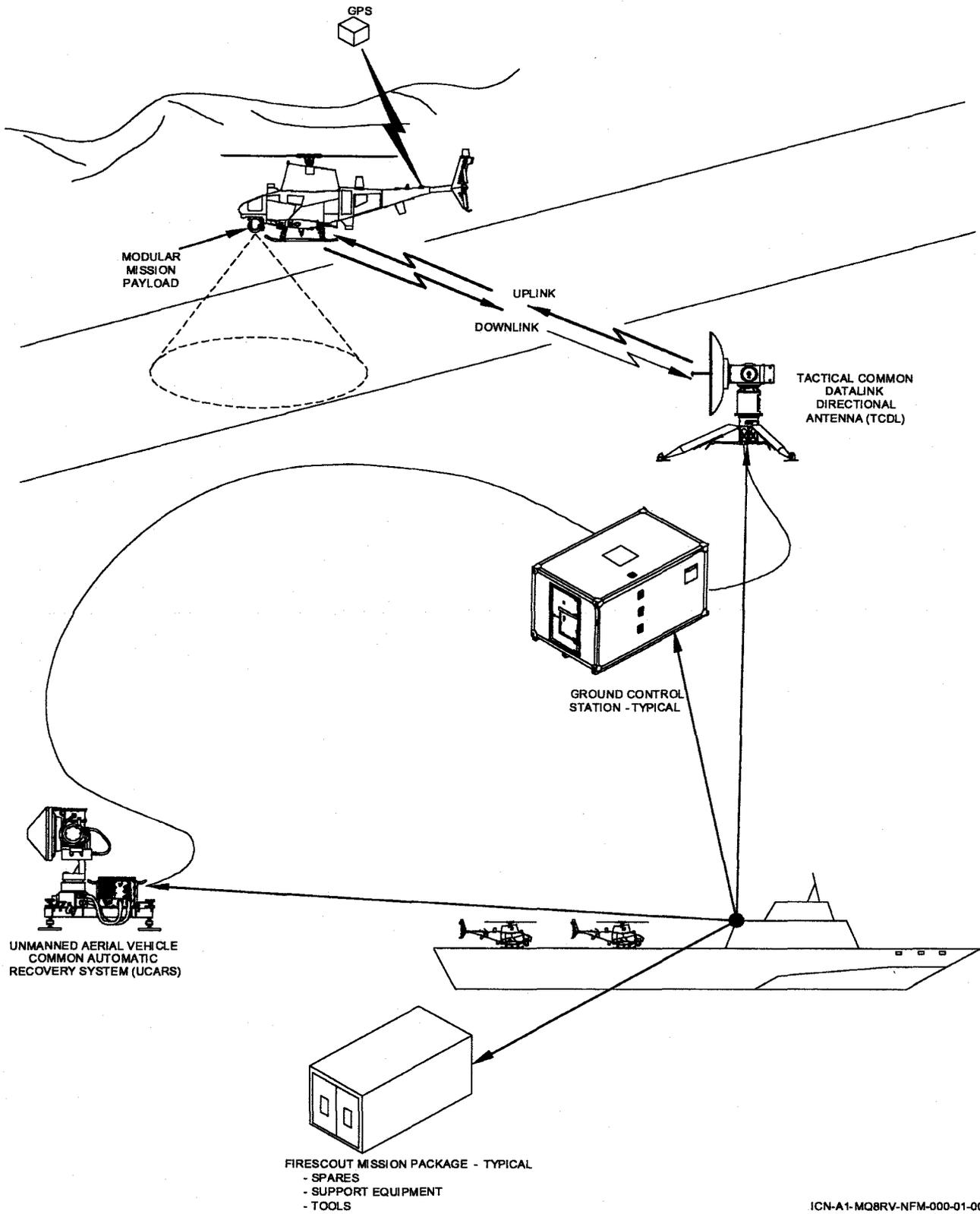
1.1 VTUAV SYSTEM

1.1.1 General

The Vertical Take-off and Landing Tactical Unmanned Air Vehicle (VTUAV) system provides reconnaissance and surveillance; target acquisition and location, target tracking, and laser designation; target damage assessment; and communication relay capability. The VTUAV system (Figure 1-1) consists of a MQ-8B Fire Scout VTUAV, Ground Control Station (GCS) or ship based control station, Tactical Common Data Link (TCDL), and UAV Common Automatic Recovery System (UCARS). The air vehicle carries a Modular Mission Payload (MMP), an electronic sensor platform, for day and night operation. The air vehicle has UHF/VHF and Ku-band radios for air vehicle command and control, secure and plain voice communication relay, image downlink, and data communication. The MQ-8B is autonomous from take-off through landing and shutdown.

The MQ-8B is controlled from a ship based control station through the TC DL and/or a UHF data link. The GCS uses the data links to transmit commands to the MQ-8B for mission and payload adjustments, take-off aborts, automatic landing, and landing waveoff. The MQ-8B sends air vehicle and payload status to the control station over the data links. Near real-time video and infrared images are passed to the control station through the TC DL. MQ-8B control can be transferred from one control station to another.

The control station contains the hardware and software for command and control of the air vehicle and MMP. The shipboard control station is integrated in the ship's interior working spaces or is in a mobile mounted on a deck, in a hangar bay or mission payload space. A control station can manage up to two air vehicles and one MMP at a time.



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Figure 1-1. VTUAV System – Typical

1.1.2 System Interfaces

Figure 1-2 is a simplified block diagram of the VTUAV system interfaces between data terminals and the system elements. The VTUAV GCS provides the capabilities for command and control, VTUAV status, imagery data downlink, and dissemination of downlinked air vehicle and payload data. Figure 1-2 also illustrates the exchange of data between the Air Vehicle (AV) and the GCS.

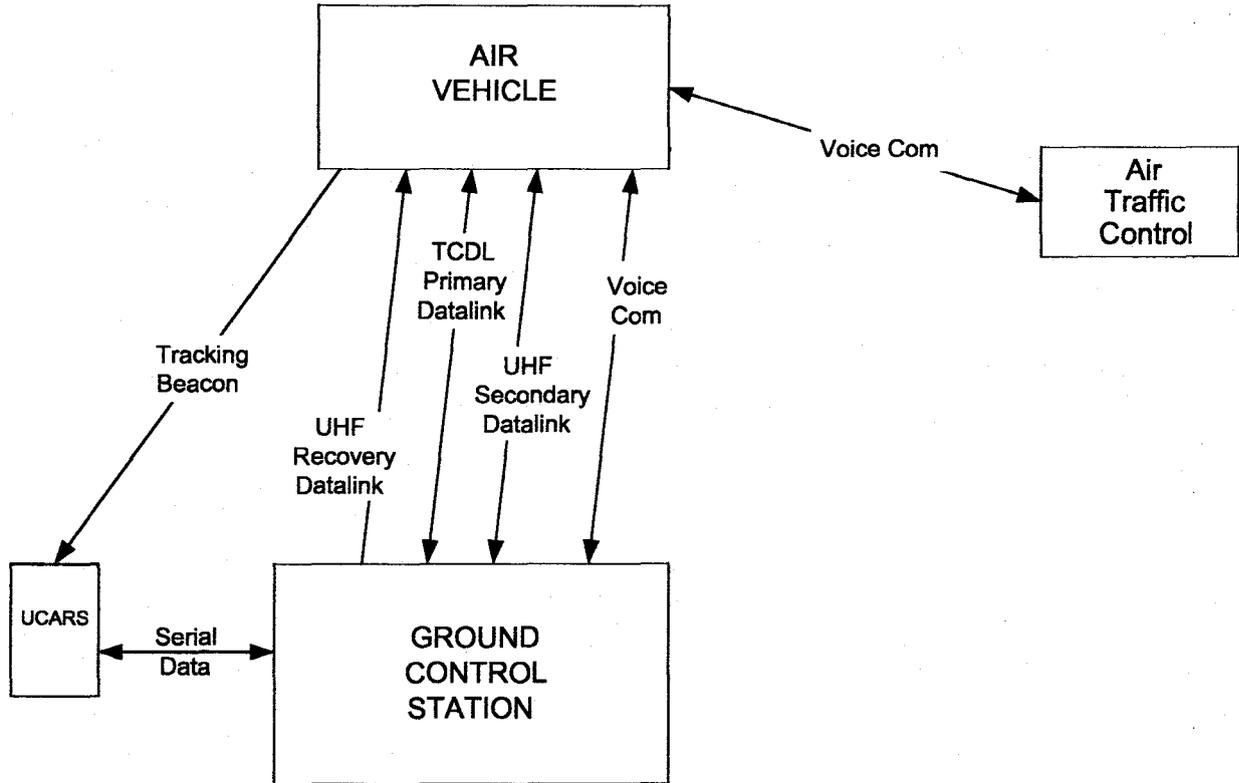


Figure 1-2. VTUAV System Interfaces

1.1.2.1 Portable Electronic Display Device (PEDD) Interface

The PEDD (Figure 1-3) is a rugged portable computing device to support preflight checkout, post-flight maintenance data collection, and general maintenance support functions for the MQ-8B. When an air vehicle is on deck, PEDD may be connected to the external I/O panel located in the port sponson. The Maintenance Portable Electronic Display Device (MPEDD) Graphical User Interface (GUI) allows ground crew personnel to diagnose problems, access the appropriate Interactive Electronic Technical Manuals (IETM) for fault isolation/repair procedures, and subsequently download, archive, and/or transfer maintenance data.

Several interfaces (Dual CAN Bus, Dual 1553 Serial port, Ethernet) are used by MPEDD to communicate with multiple VTUAV subsystems. Interaction between the PEDD and payload is achieved via the Ethernet connection to the PIU. MPEDD is capable of exercising all commands identified in the payload Supplier's Payload Software ICD, however, some payload commands (e.g. Laser Designator arming) may be prohibited while the air vehicle is on deck. MPEDD does not have the ability to display RS-170 imagery data.

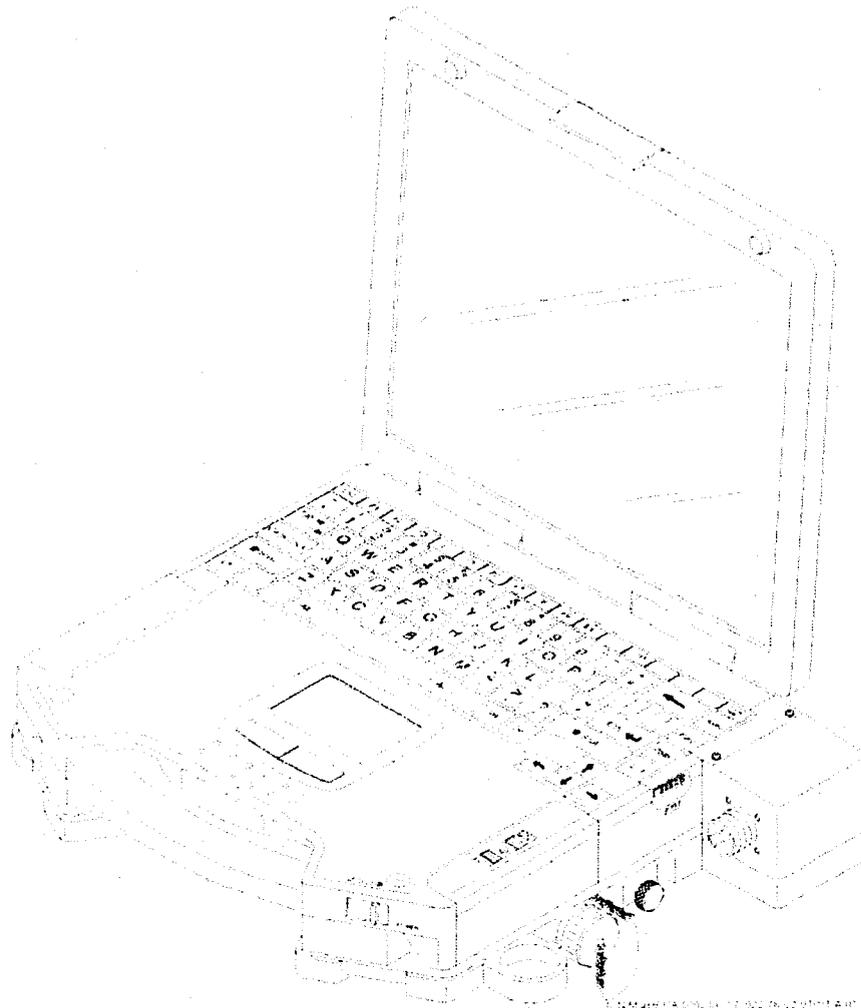


Figure 1-3. PEDD

1.1.3 Crew Requirements

The control station has a crew of three: the Mission Commander (MC), Air Vehicle Operator (AVO), and Mission Payload Operator (MPO). The minimum control station crew required to operate the MQ-8B is the AVO and MPO.

The control station houses two control consoles (Figure 1-4), and electronic Excomms and Icomms equipment racks (Figure 1-5). The two control consoles allow an AVO and MPO to control and monitor the aircraft and its subsystems.

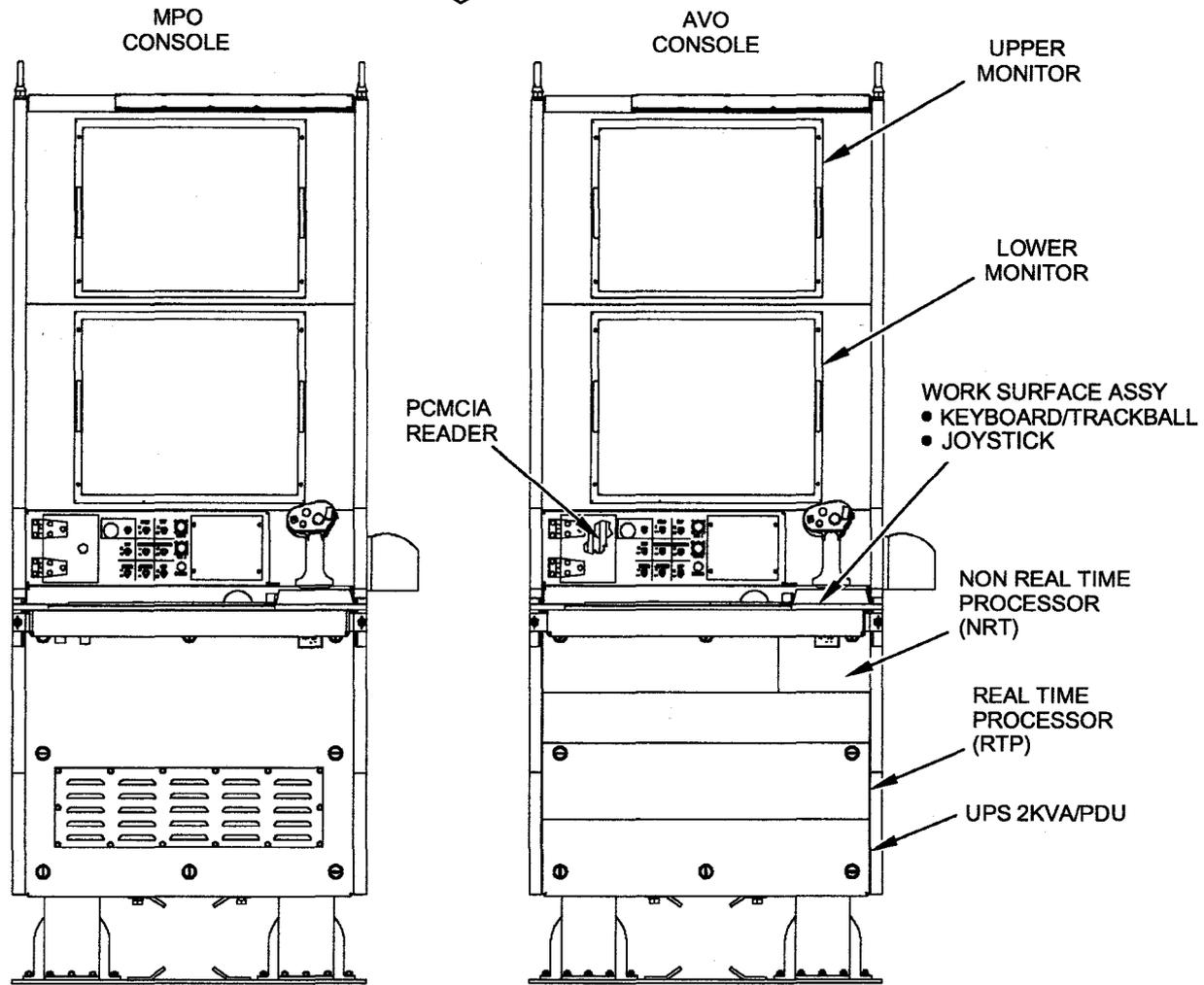
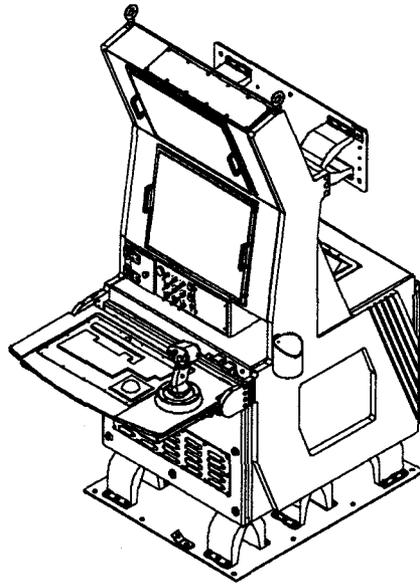
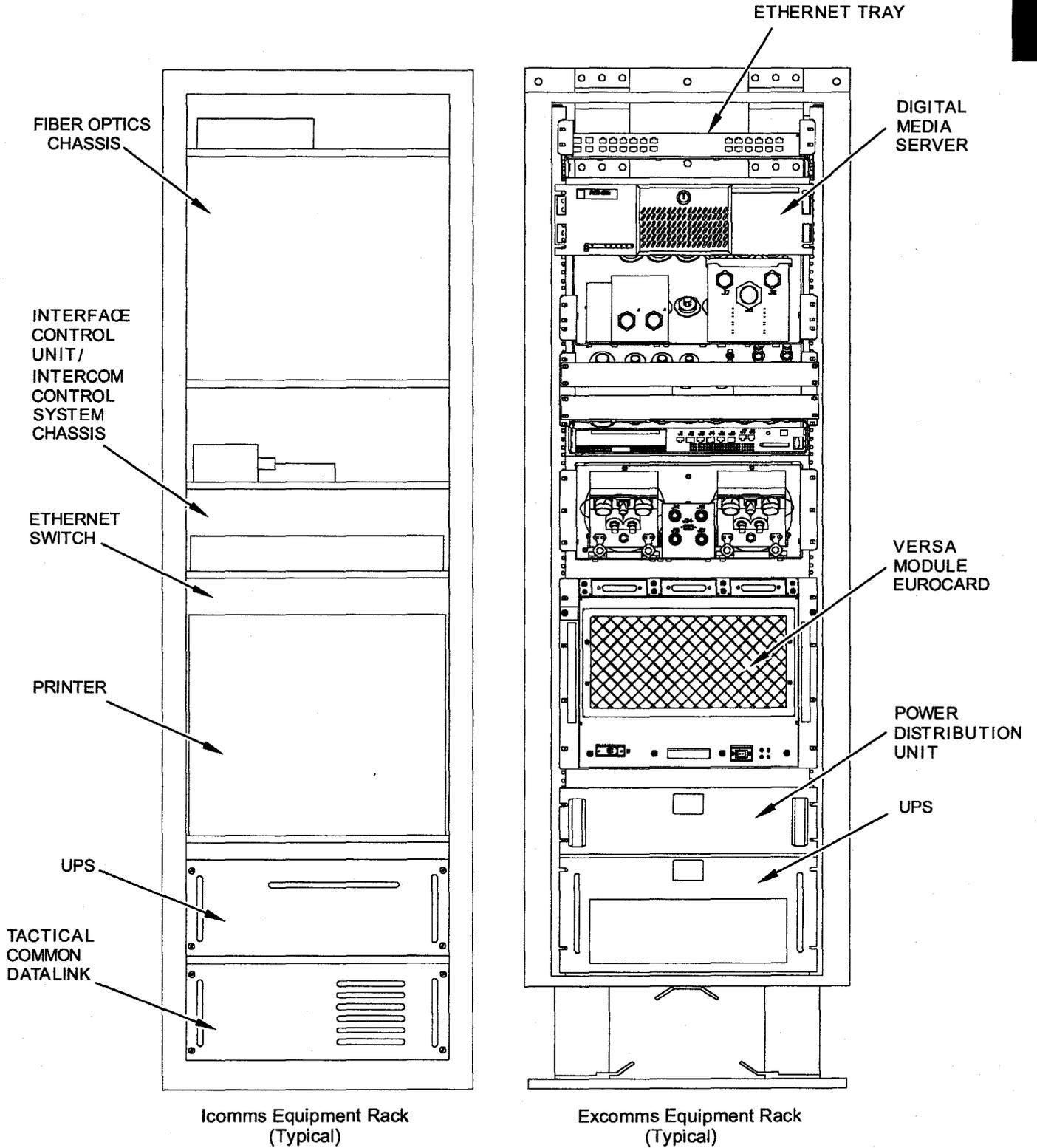


Figure 1-4 AVO and MPO Control Consoles

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Icomms Equipment Rack (Typical)

Excomms Equipment Rack (Typical)

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Figure 1-5 Icomms and Excomms Equipment Racks - Typical

1.1.4 Mission Capability

The MQ-8B supports reconnaissance, intelligence gathering, and special missions.

A typical MQ-8B mission has five segments:

1. Launch (departure)
2. Mission ingress
3. Target area (on-station)
4. Mission egress
5. Recovery (landing)

1.1.4.1 Launch

Air vehicle systems and engine power are automatically checked during the launch sequence. When all systems are ready, the air vehicle takes off and continues to the planned mission departure waypoint. The departure waypoint is usually a latitude and longitude for shore-based launch and a ship-based relative position for shipboard launch.

1.1.4.2 Mission Ingress

Air vehicle and mission payload systems are checked and the mission plan is confirmed or modified during the mission ingress. Coordination with another GCS is necessary if air vehicle control handoff is required.

1.1.4.3 Target Area

The air vehicle and mission payload follow the mission plan in the target area. The mission payload sensor images are monitored and the sensors adjusted to gather the required information.

1.1.4.4 Mission Egress

Air vehicle and mission payload systems are checked and air vehicle control handoff is coordinated during the mission egress. Recovery information is confirmed or updated as required.

1.1.4.5 Recovery

The air vehicle returns to the planned recovery waypoint and enters a preplanned holding pattern or starts the landing sequence. Shore-based landing is based on global positioning system (GPS) and radar altimeter data. Shipboard landing is completed using the UCARS.

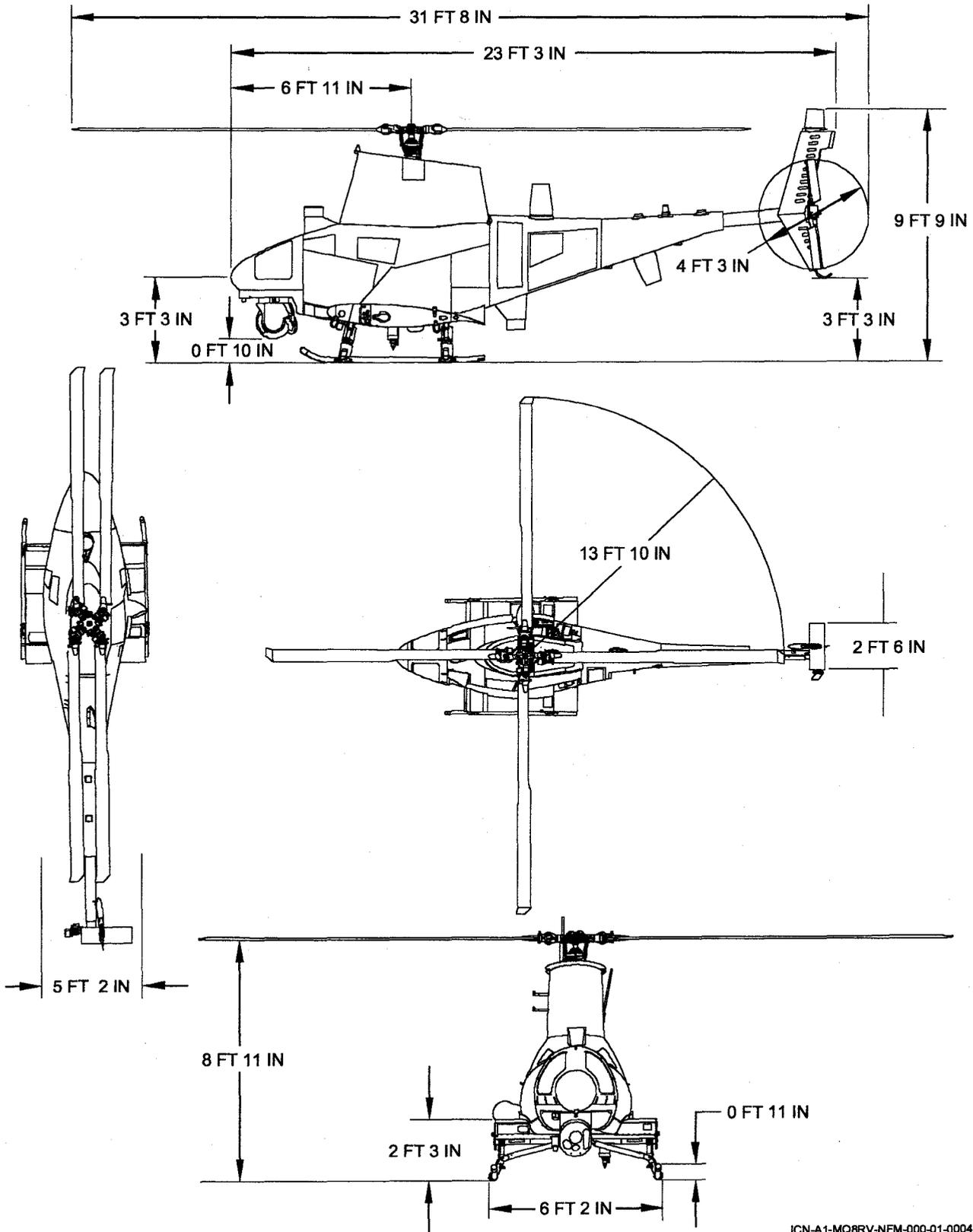
1.1.5 Air Vehicle Dimensions

Air vehicle dimensions are shown in Figure 1-6.

Maximum length (main rotor spread, tail rotor horizontal)	31 ft 8 in
Length (nose to tail, main rotor folded over tail, tail rotor vertical)	23 ft 3 in
Length (nose to tail rotor horizontal)	24 ft 8.8 in
Width (outer diameter of skid tubes)	6 ft 2.3 in
Height of main rotor blades(ground to flat rotor disc)	8 ft 11 in
Height of vertical stabilizer antenna	9 ft 9 in
Main rotor diameter	27 ft 8.5 in
Tail rotor diameter	4 ft 3 in
Ground clearance (fuselage, Water Line to ground)	1 ft 9 in
Ground clearance (tail skid)	3 ft 3 in

1.1.6 Air Vehicle Weight

Air vehicle weight data is provided in Chapter 4 Operating Limitations.



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Figure 1-6. MQ-8B Dimensions

1.1.7 Launch and Recovery

The MQ-8B is a vertical take-off and landing air vehicle. The air vehicle can take-off and land from ships equipped for helicopter operations with a GCS and UCARS. The MQ-8B can operate from shore-based installations with a GCS.