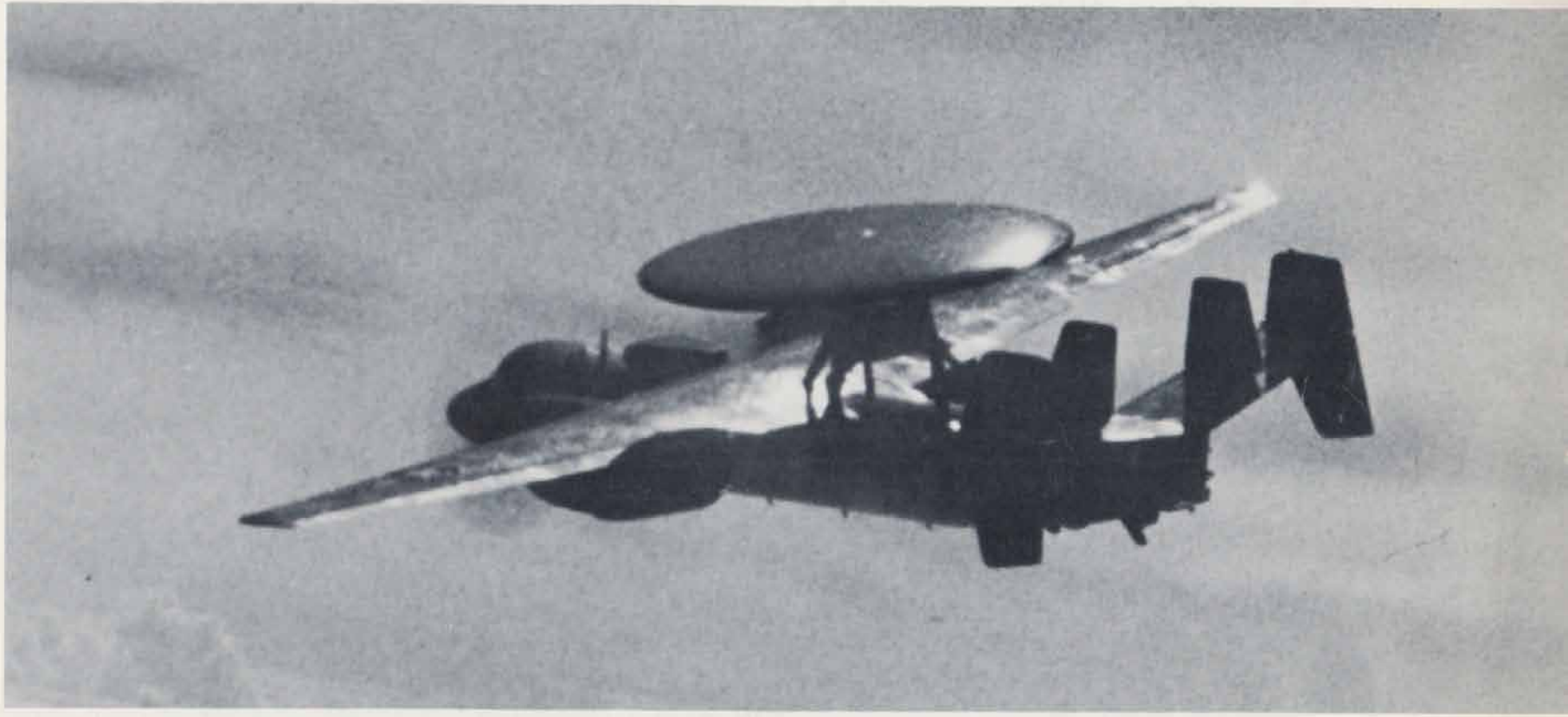
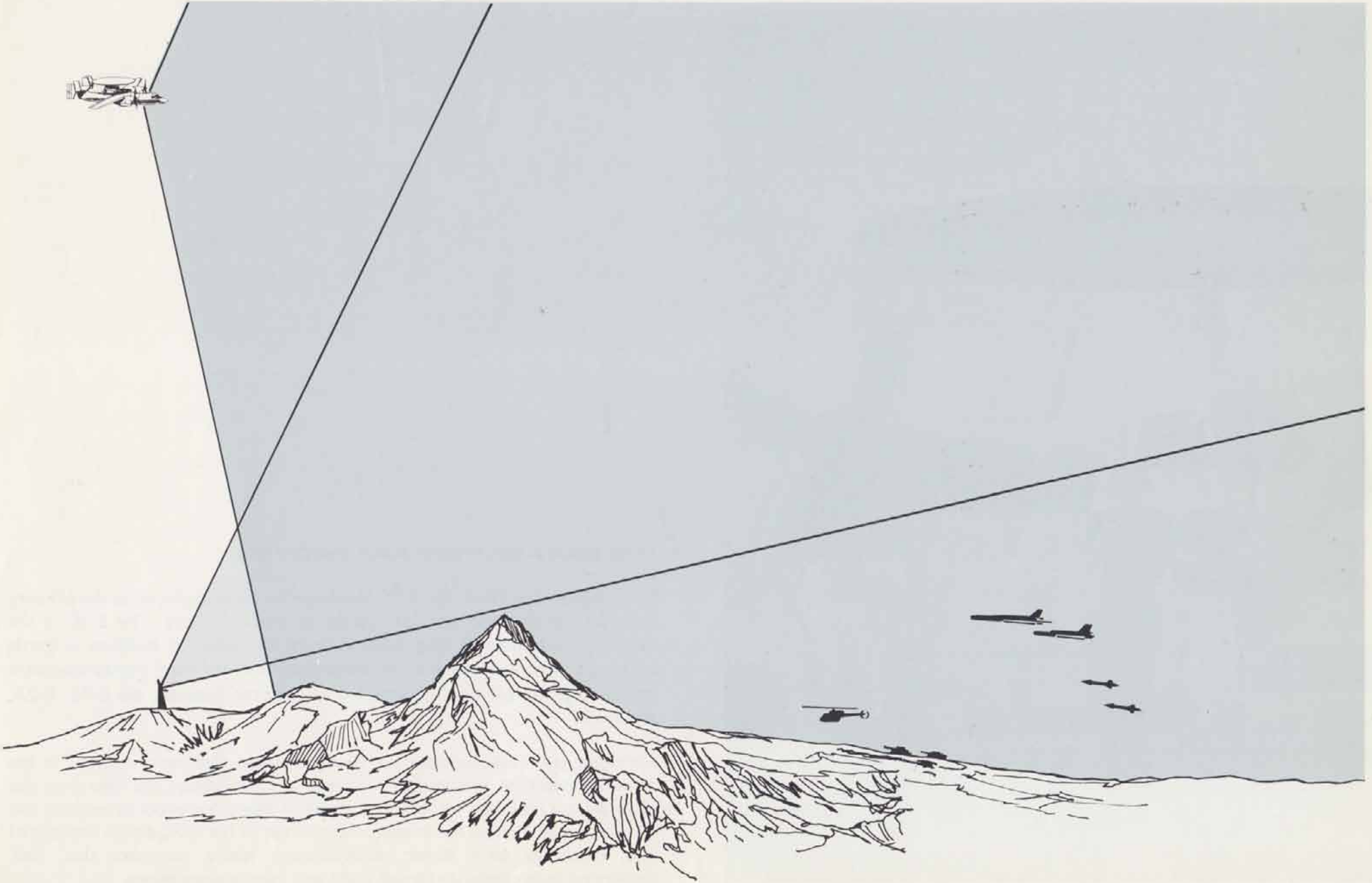
AIRBORNE WARNING and CONTROL



OVER LAND and SEA

IN EARLY WARNING



E-2C HAWKEYE IS

IT'S CAPABILITIES ARE PROVEN

Since September 1974, the E-2C Hawkeye has been deployed as the primary airborne warning and control system of the U.S. Navy. The E-2C is the newest in Grumman's long history (over 25 years) of building airborne warning and control systems. Its design has benefited from the development and production of three generations of airborne systems: the E-1B, E-2A, and E-2B.

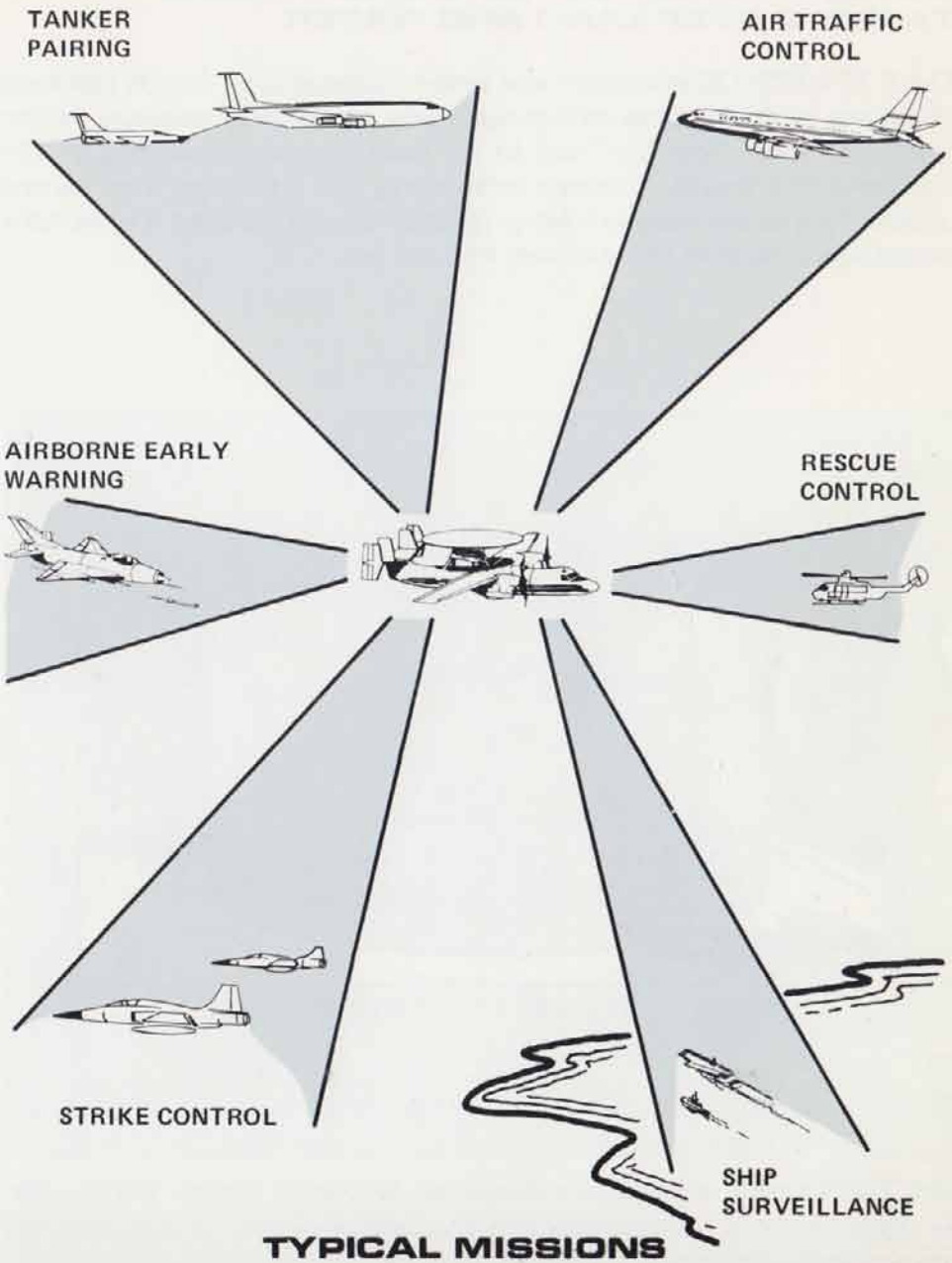
Although Hawkeye includes the most advanced electronic systems, it has demonstrated high operational readiness and availability. Its operating and maintenance costs are far less than those of any other airborne warning and control system. These lower costs are inherent in the E-2C design concept of high reliability with fewer replenishment spares, compact size, fuel-conserving turboprops, and small flight and maintenance crews.

OPERATIONAL TODAY

PERFORMS A WIDE RANGE OF MISSIONS

In routine operations Hawkeye has demonstrated its ability to automatically:

- Track several hundred aerial and surface targets simultaneously, in high-density environments
- Transmit (via data link) the total tactical picture to the area commander for real-time assessment, while at the same time controlling multiple strike and interceptor forces
- Derive computer-optimized flight paths for SAM and anti-aircraft avoidance, precision weapons delivery, and fuel conservation



TYPICAL MISSIONS

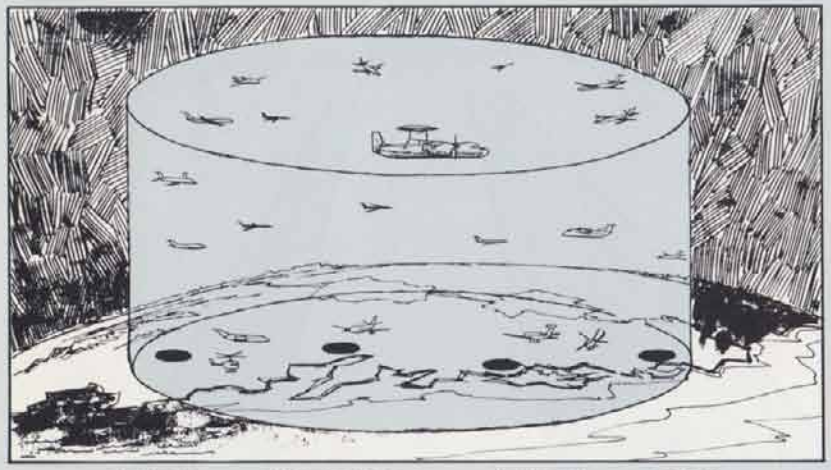
E-2C SEES THE TOTAL AIR

AUTOMATICALLY DETECTS AND TRACKS TARGETS OVER LAND AND WATER

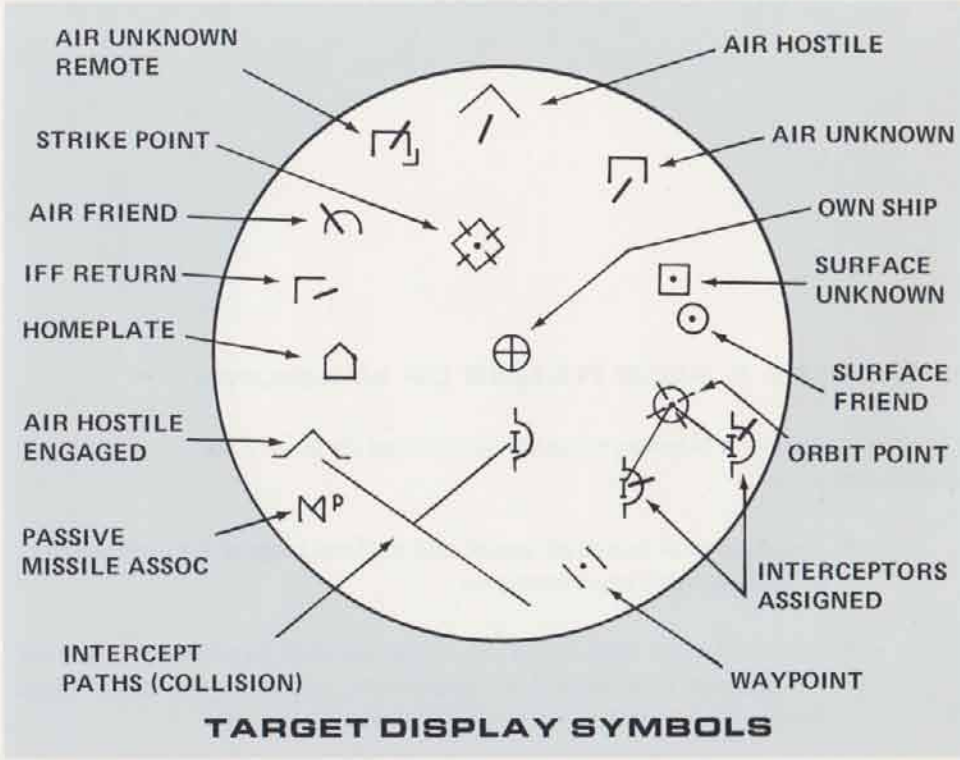
The E-2C's APS-125 advanced radar system automatically detects hundreds of targets within a three-million-cubic-mile surveillance envelope. It can detect the small "low flier" out to the radar horizon. Operating on the Doppler-shift principle, it detects radar energy that is reflected from moving objects. Its specially designed clutter-rejection circuitry enables it to monitor targets operating at all altitudes over land and sea.

Target course, speed, altitude and IFF identification are maintained in the E-2C computer file. Target tracks, acquired automatically, are displayed in real time, identifying unknown or hostile aircraft, friendly interceptors, surface task forces, and other targets as well as geographic features. The ability to distinguish different types of targets combined with automatic track acquisition enables the operators to evaluate more of the tactical environment than is possible with a manual target track acquisition system.

The Hawkeye's automation thus precludes possible oversight of a threat in one sector while the operator's attention is demanded for manual operations in another.



The E-2C system provides the flexibility to display surface traffic only, air traffic only, or the combined surface-and-air picture in such crowded environments as the busy "Northeast Corridor" of the U.S.



The system's repertory of operational display symbols includes 180 different types.

AND SURFACE PICTURE

The E-2C radar operates effectively against a broad variety of jamming devices through efficient combination of Doppler filtering, filtering of narrow-band jamming signals, and side-lobe-cancellation techniques.

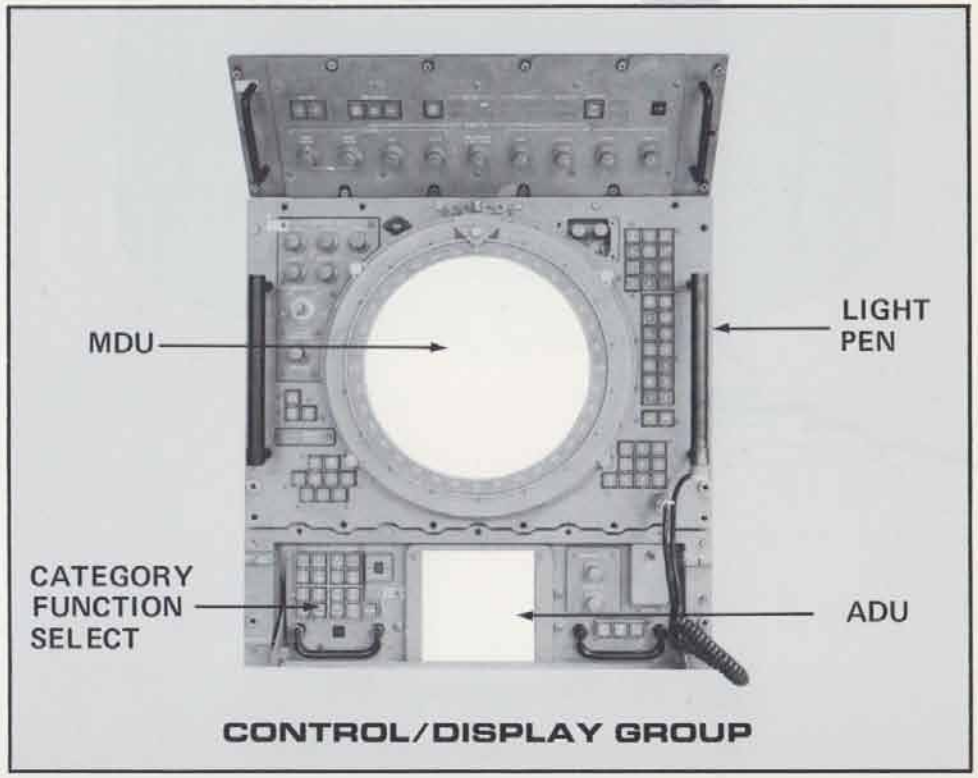
PERFORMS IN HIGH-DENSITY ENVIRONMENTS

The highly automated system permits the Hawkeye's three operators to monitor the hundreds of targets present in today's high-density traffic environment.

Each operator addresses the system through the Control/Display Group, a digitally-controlled display system. The group consists of:

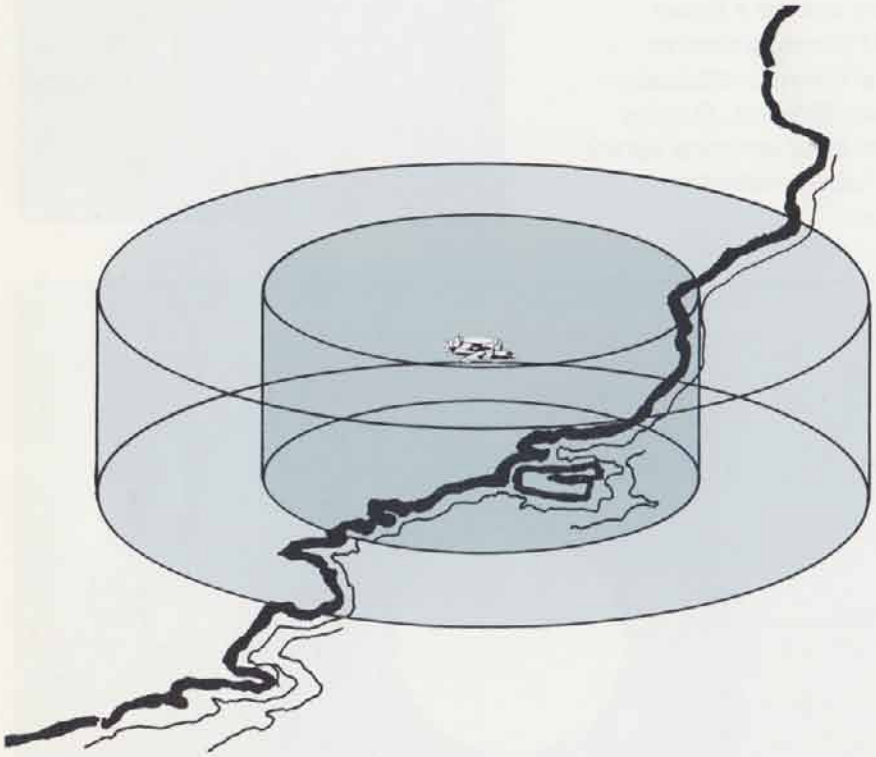
- Main Display Unit (MDU) — This 10-inch-diameter plan position indicator (PPI) displays the tactical picture in the form of raw video, processed video, and/or target symbology. At each operator station, data entries and requests are directed to the computer by means of an alphanumeric keyboard and a light pen located at the main display.

- Auxiliary Display Unit (ADU) — Specific target information is displayed on the upper half of the five-inch ADU. It permits the operator to read out, in alphanumerics, such target information as range, bearing, course, speed, altitude, etc. The lower half of the ADU is formatted in a four-by-four matrix display of alphanumeric labels corresponding to a four-by-four pushbutton keyboard. By pressing the buttons, the operator can select category and function of operation or display of system data.



CONTROL/DISPLAY GROUP

E-2C SILENTLY DETECTS AND IDENTIFIES THREATS



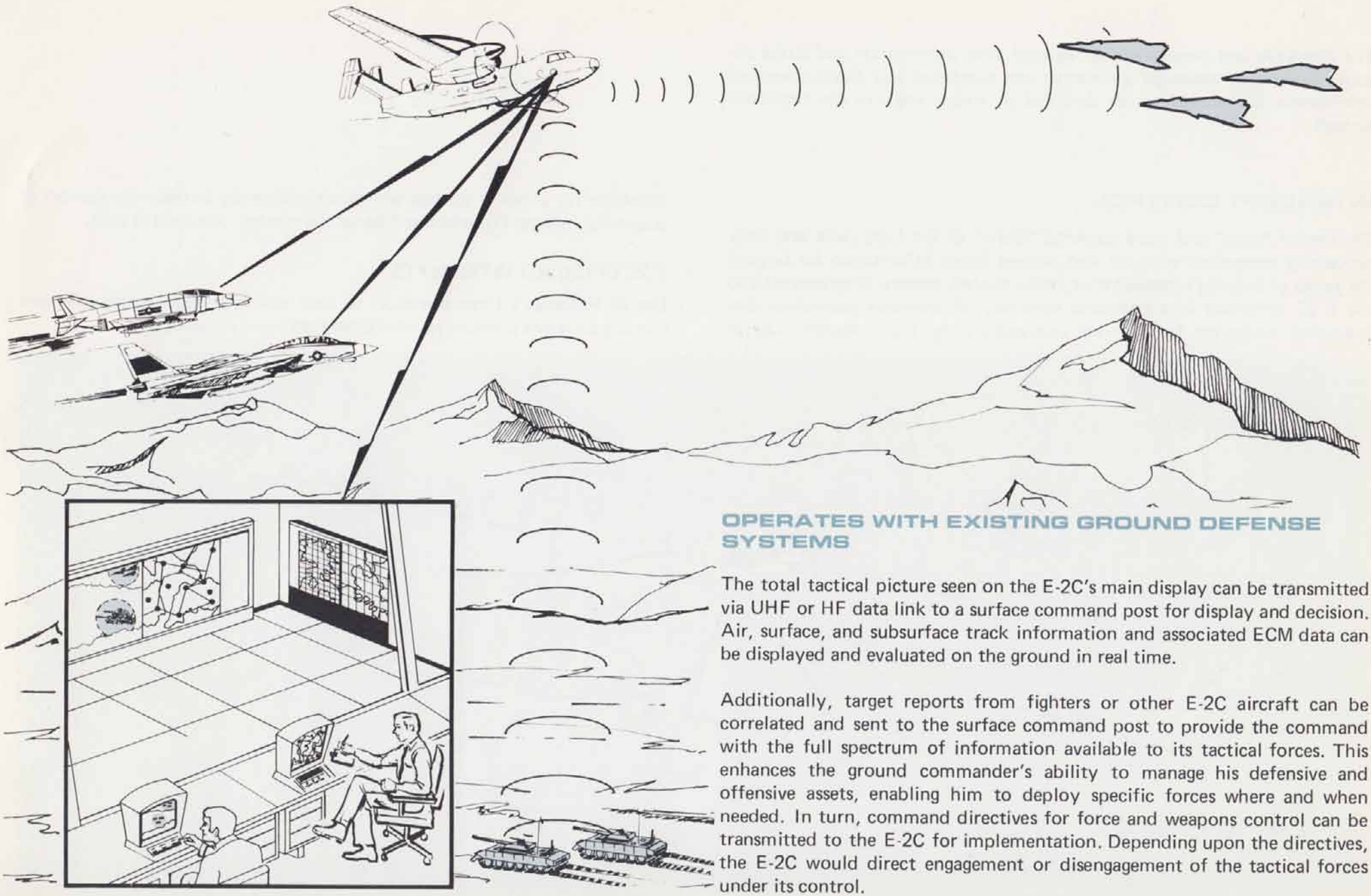
LEGEND

PDS DETECTION ENVELOPE

RADAR DETECTION ENVELOPE

PASSIVE DETECTION SYSTEM

Hawkeye's passive detection system (PDS), which operates as an adjunct to the radar surveillance system, provides an alert to the presence of an emitter and identifies airborne or surface threats. The PDS detects electronic emissions at distances well in excess of the radar detection range. Received signal characteristics such as frequency and pulse-width are automatically compared to a file of known radars. When a match is made, the identity of the radar and its associated platform is displayed to the E-2C operators. Bearing and radar track data are correlated to provide a positive emitter location. Exact emitter position is also determined by triangulating on lines of bearings from its emissions. This provides a covert means of monitoring an adversary's military activities.



OPERATES WITH EXISTING GROUND DEFENSE SYSTEMS

The total tactical picture seen on the E-2C's main display can be transmitted via UHF or HF data link to a surface command post for display and decision. Air, surface, and subsurface track information and associated ECM data can be displayed and evaluated on the ground in real time.

Additionally, target reports from fighters or other E-2C aircraft can be correlated and sent to the surface command post to provide the command with the full spectrum of information available to its tactical forces. This enhances the ground commander's ability to manage his defensive and offensive assets, enabling him to deploy specific forces where and when needed. In turn, command directives for force and weapons control can be transmitted to the E-2C for implementation. Depending upon the directives, the E-2C would direct engagement or disengagement of the tactical forces under its control.

E-2C DELIVERS

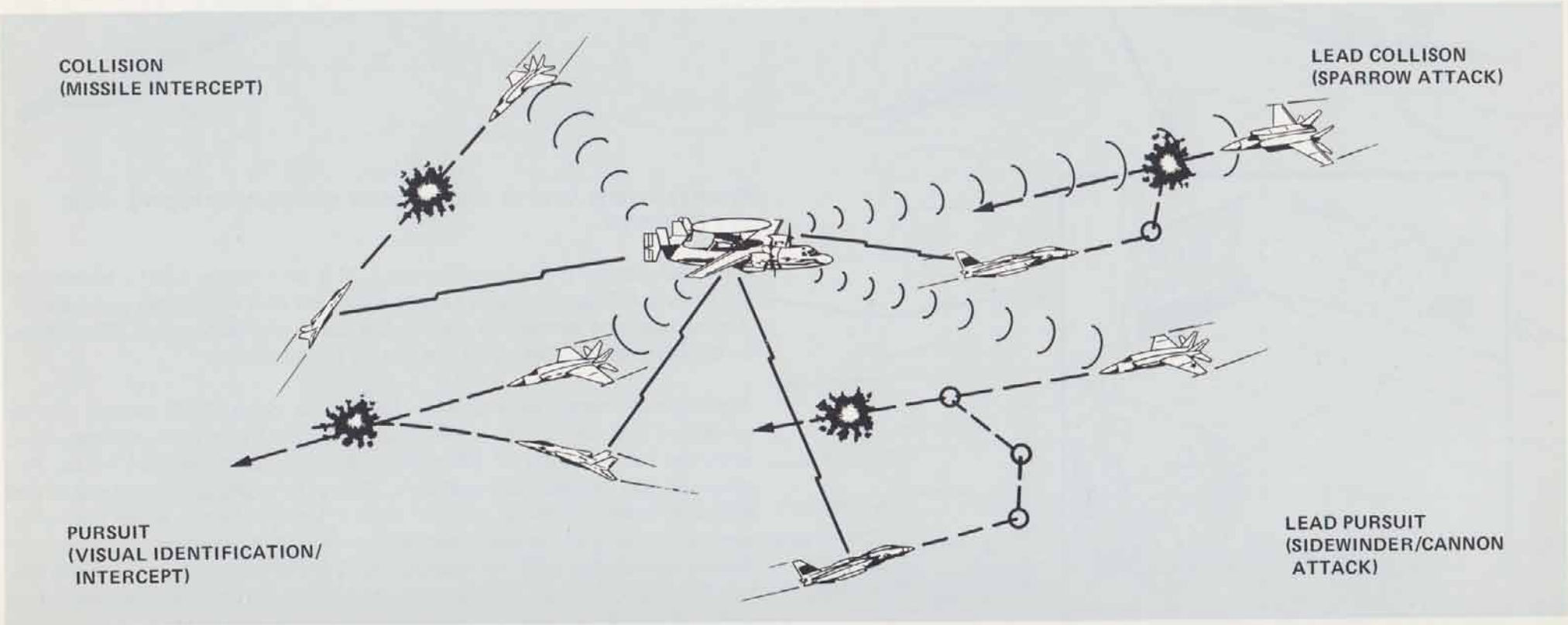
The Hawkeye can simultaneously control both interceptors and strike aircraft. Strike and intercept geometries are computed and flight command information is transmitted via data link or secure voice to the respective aircraft.

INTERCEPT CONTROL

The keener "eyes" and more powerful "brain" of the E-2C radar and data-processing computers pick up and process target information far beyond the range of existing interceptor or strike aircraft sensors. Programmed into the E-2C computer is a complete repertory of intercept geometries (see examples) optimized for different interceptors and their weapons. Use of Hawkeye for airborne control will thus significantly increase the number of successful intercept missions and boost the number of potential kills.

E-2C DIRECTED INTERCEPTS

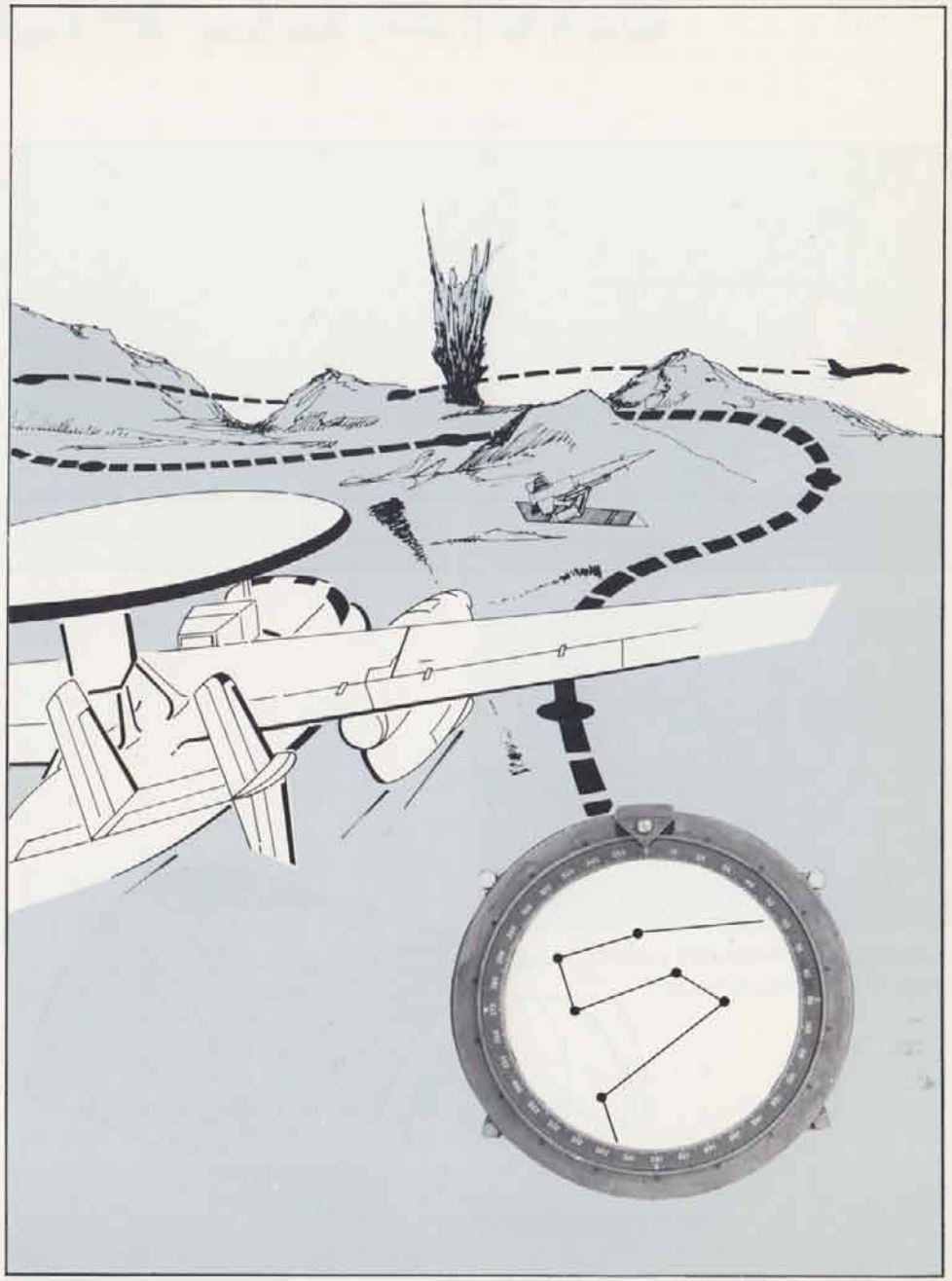
Use of Hawkeye's three operators to help with intercept assignments and combat solutions provides an additional significant advantage.



A ONE-TWO PUNCH

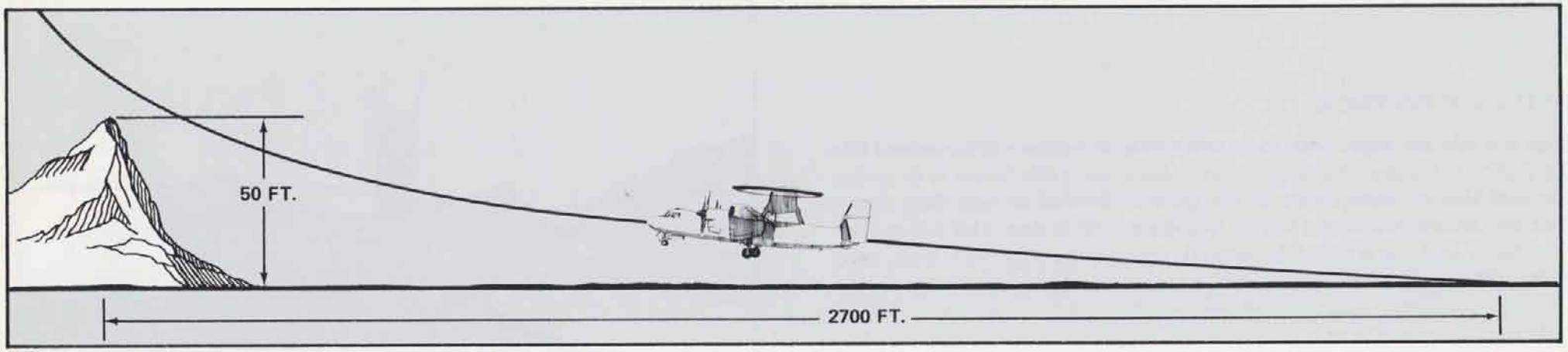
STRIKE CONTROL

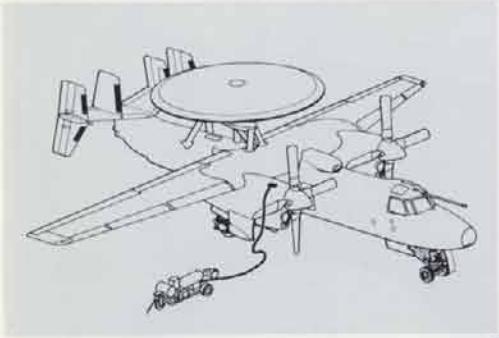
Once the selected flight path for a strike mission has been programmed into the E-2C's computer, the system can provide the strike forces with navigation and steering instructions to the point of landfall or help them thread their way around prominent terrain features and SAM sites. This information is updated and transmitted to aircraft under control at least once every 10 seconds.



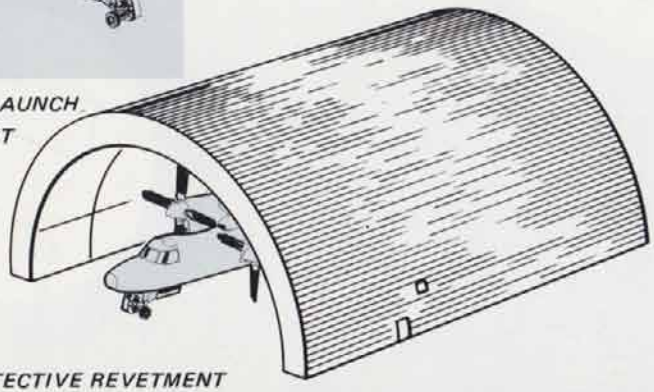
E-2C OPERATES FROM SMALL FORWARD BASES

SHORT FIELD CAPABILITY





QUICK REACTION PERMITS LAUNCH IN 5 MIN FROM READY ALERT



PROTECTIVE REVETMENT

Because the rugged E-2C was designed for the tough operating requirements of the carrier environment, it offers several key advantages:

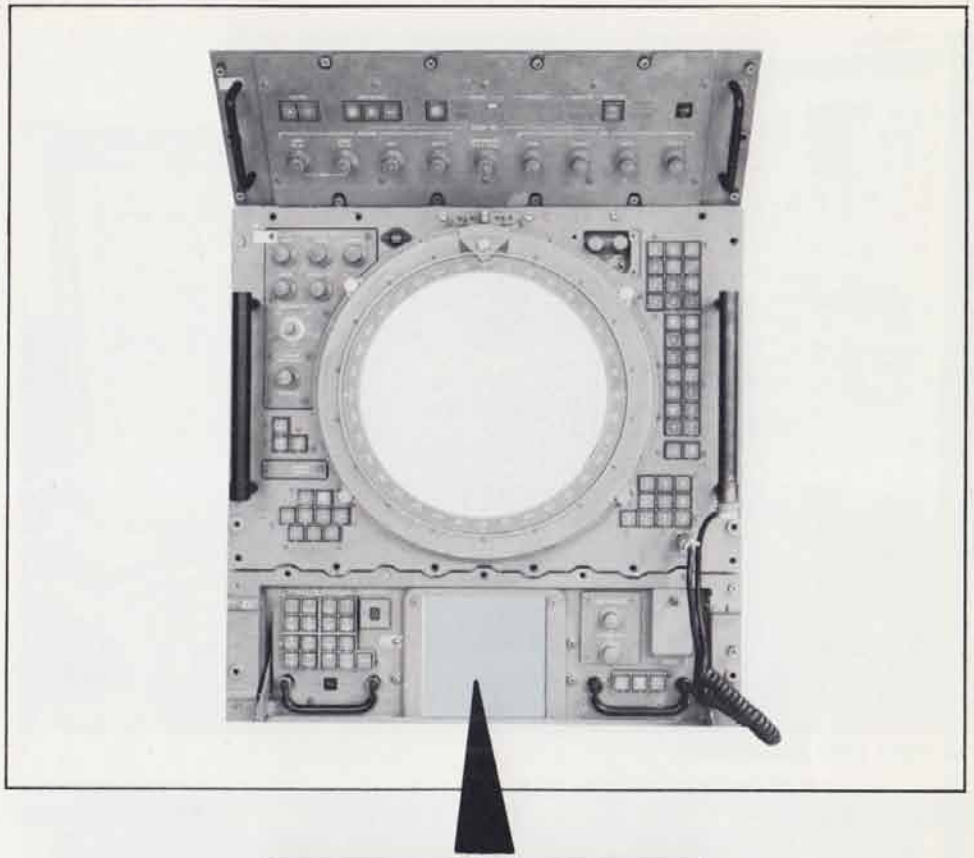
- An airframe ideally suited to forward-base land operation in combat environments – because it was designed to master the even tougher stresses of operation from a carrier deck
- A thrust-to-weight ratio allowing virtually STOL performance combined with rugged landing gear and propeller reverse-thrust capability make it suitable for operation out of small, relatively unimproved landing strips
- Folding wings that give it a smaller profile for camouflage purposes or for positioning in protective revetments
- Avionics that are the latest in the arts of solid-state technology, miniaturization, and reliability

The system is readily dispersed away from areas of high risk, increasing the enemy's targeting problems and allowing it to be based closer to areas of use, thus minimizing enroute time and reducing operating cost.

SETS A NEW STANDARD OF RELIABILITY

The E-2C Hawkeye has set a new standard for airborne warning and control system performance and has demonstrated a reliability level 2 to 3 times beyond the Navy's specification.

- *Maintenance manhours per flight hour reduced to 50% of previous AEW aircraft*
- *On initial deployments, E-2Cs completed more than 90% of the hundreds of sorties scheduled*
- *In fleet exercises, E-2Cs provided 24-hour continuous coverage*



CAINS FAULT CONV – AMPL RDR FAULT			
		IFPM FCTN 1	
RDR XMTR 2	RDR SIG PROC 2	IFF EECM 2	COMM 2
NAV 2	PDS 2	SPL TST 2	CLR ALL SCRAMS
CP TEST RESET			INT CNT RESET
IFPM CLEAR	IFPM HISTORY	IFPM MSG	FAULT STATUS

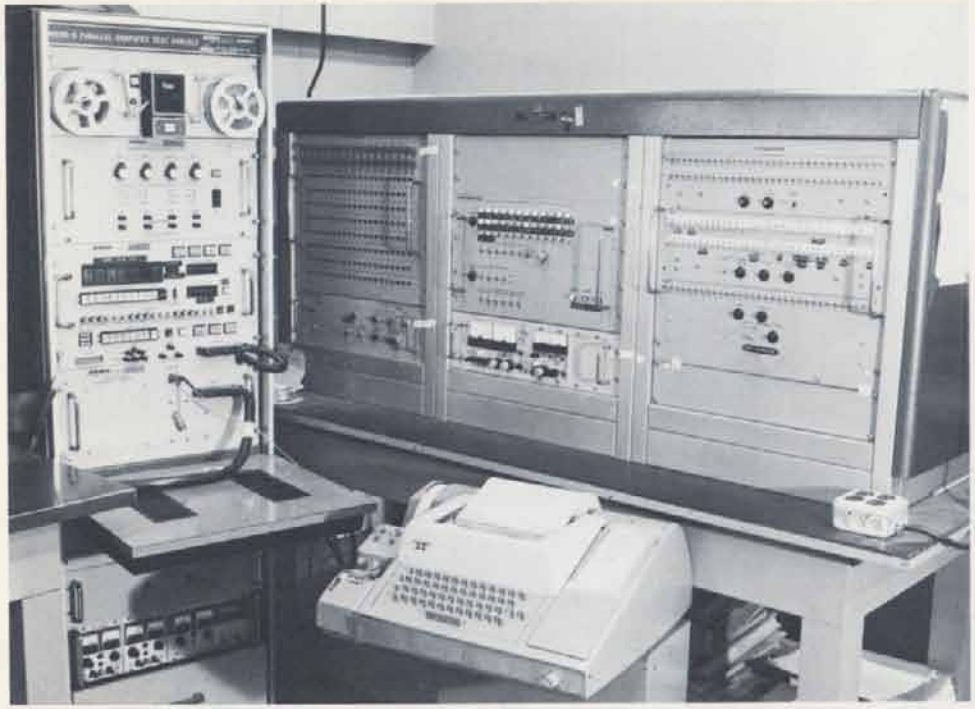
IN-FLIGHT PERFORMANCE MONITOR FAULT SUMMARY

IN FLIGHT MONITORING SYSTEM

A built-in system of warning and status lights continuously advises the crew of system status, automatically alerts operators to any system failure, and identifies the component that has either failed or malfunctioned. The source of the trouble and its functional impact are displayed on the operator's auxiliary display in alphanumeric messages so that he can select an alternate operating mode for continuing the mission.

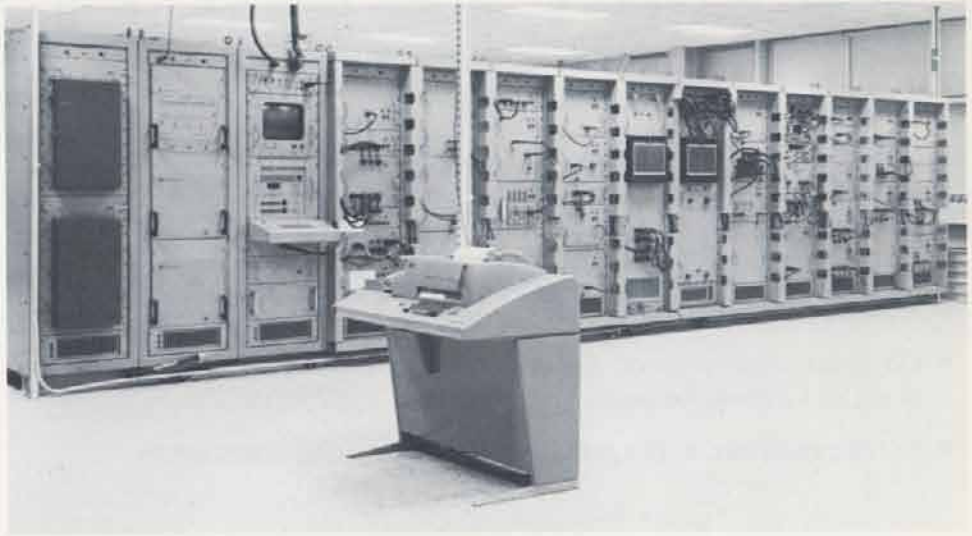
This built-in status monitoring system facilitates rapid preflight, post-flight, and repair verification and minimizes flight-line test equipment requirements.

E-2C SUPPORT: TAILORED



FACTORY TEST EQUIPMENT

SPECIAL TEST EQUIPMENT



VAST

A CHOICE OF CHECKOUT EQUIPMENT

■ VERSATILE AVIONICS SHOP TEST (VAST)

A universal tester developed for both aircraft carrier and land-based use, VAST emphasizes automatic checkout and fault-isolation, thereby reducing the skill level required of test personnel. VAST provides a computer-controlled test profile to identify a malfunction to the component level.

■ FACTORY TEST EQUIPMENT (FTE)

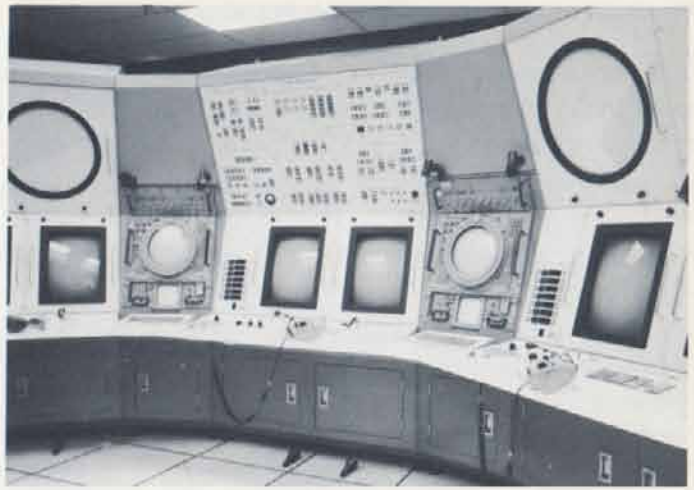
Although more time-consuming for fault detection and isolation than VAST and requiring higher skill levels, FTE provides a more thorough system test capability at modest cost. Used on E-2C production lines to check out the avionics prior to aircraft installation, FTE has demonstrated a high degree of test reliability.

■ SPECIAL TEST EQUIPMENT (STE)

Special Test Equipment provides signal levels, test points, and measurements not available with VAST. Primarily manual in operation, it consists of RF and analog test equipment.

TO USER'S NEEDS

COCKPIT PROCEDURES TRAINER



TACTICS TRAINER

INTEGRATED SYSTEMS
MAINTENANCE TRAINER

TRAINING/TRAINERS

The E-2C Tactics, Cockpit Procedures, and Integrated System Maintenance trainers are all fully operational and provide "hands-on" training of both flight and maintenance personnel. Each trainer is a replica of the aircraft so that all training will have real-world validity, thus minimizing on-the-job training.

TECHNICAL SERVICES

Our Worldwide Field Service Program assures effective in-the-field support of your E-2C aircraft. Field Service Teams specialize in analyzing your existing in-country support facilities, solving problems on the spot, or calling upon Grumman's on-line staff for timely response to any unique operational maintenance problems.

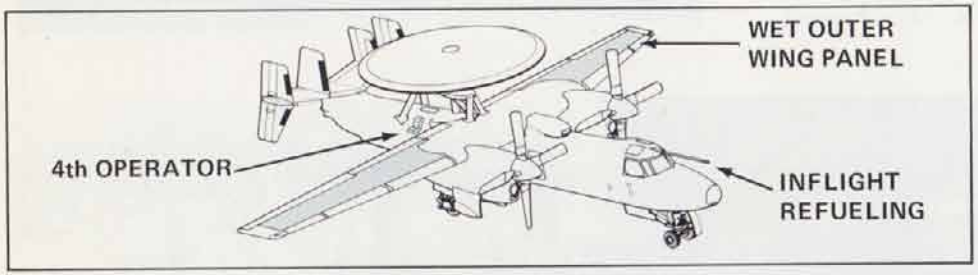
E-2C GROWTH: BASIC TO

EXTENDED ENDURANCE

In its present configuration, Hawkeye will maintain station at a distance of some 200 miles for about four hours. Range and endurance capability can be increased by adding:

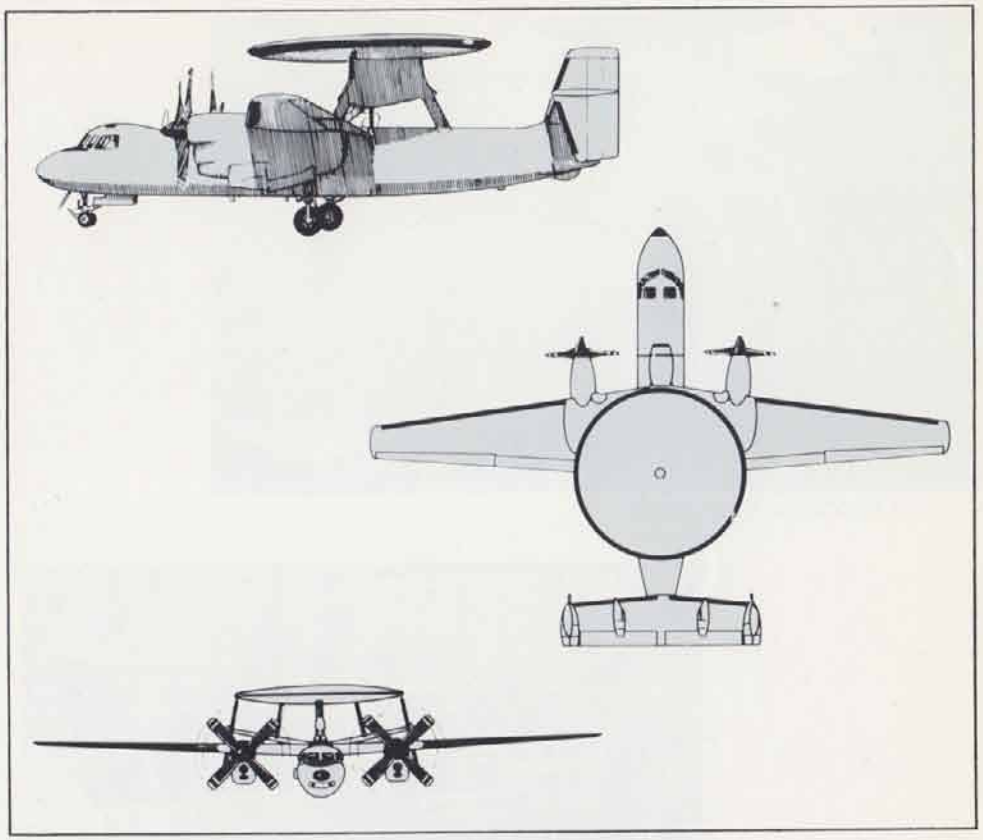
- Fuel tanks to the outer section of the wings, increasing on-station time to more than 6 hours
- An inflight refueling probe that will sustain on-station time for indefinite periods

The E-2C normally carries a pilot, copilot, and three operators, each at an independent operating station. For extended time-on-station, a fourth operator can be accommodated, allowing relief for the operators through rotation of positions.



PERFORMANCE

	PRESENT E-2C	WET OUTER PANEL OPTION
• Endurance	6.1 hr	9.3 hr
• Cruise Speed (Max Range)	269 kt (498 km/hr)	270 kt (500 km/hr)
• Service Ceiling	30,800 ft (9,388 m)	29,000 ft (8,840 m)
• Ferry Range	1,394 n mi	2,170 n mi
• Approach Speed	100 kt (185 km/hr)	100 kt (185 km/hr)
• T.O. Distance: Ground Run – Over 50-ft obstacle	1,900-2,600 ft (580-790 m)	2,900-3,700 ft (880-1,130 m)
WEIGHT		
• Weight Empty	38,009 lb (17,240 kg)	38,589 lb (17,500 kg)
• Max. Fuel (Internal)	12,400 lb (5,625 kg)	19,800 lb (8,980 kg)
• Max. T.O. Gross Weight	51,900 lb (23,540 kg)	59,880 lb (27,160 kg)



DIMENSIONS

VEHICLE DESIGN

Wing area . . . . . 700 sq ft (65.03 sq m)
Wing span . . . . . 80 ft 7 in. (24.56 m)
Overall length . . . . . 57 ft 7 in. (17.55 m)
Height . . . . . 18 ft 4 in. (5.59 m)

GENERAL DATA

Crew 5
Power plant
- Number of Engines 2
- Manufacturer . . . . . Allison
- Type T56-A-425

Rating (Maximum power) . . . . . 4910 SHP (ea)