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APQ-122(V) - Archived 11/96

Orientation

Description. Airborne adverse weather aerial delivery system (AWADS) radar.

Sponsor

US Air Force
Warner Robins Air Logistics Center
Robins AFB, Georgia (GA) 31098
USA
Tel: +1 912 468 1001

Contractors

Texas Instruments Inc
Defense Systems & Electronics
P.O. Box 660246 M/S 3131
Dallas, Texas (TX) 75243
USA
Tel: +1 214 480 3866
Fax: +1 214 480 6296
(Prime)

Systems Research Labs, Inc
2800 Indian Ripple Rd
Dayton Ohio (OH) 45440
USA
Tel: +1 513 426 6000
Fax: +1 513 426 1984
(Digital Scan Converter)

Status. In service, ongoing logistics support.

Total Produced. An estimated 250 units have been produced.

Application. This radar provides for terrain and weather avoidance as well as cargo drop point location for C-130E/H and MC-130E, T-43A aircraft.

Price Range. Approximately US\$300,000 each.

Technical Data

Characteristics

Frequency Range:	8 to 10 GHz (long-range) 20 to 40 GHz (short-range, high-resolution)
Ground mapping range:	200+ nm
Weather detect range:	150 nm
Beacon interrogation:	240 nm

Design Features. The APQ-122(V) is a dual-frequency radar that functions as a long-range navigation sensor used for weather-avoidance and navigation in supply-dropping missions. The I-band system provides a ground-mapping capability, weather data and beacon interrogation.

When short-range, high-resolution, or target-location missions are required, the K-band frequencies are used. In the K-band mode, the APQ-122(V) produces a high-resolution ground map display that allows target identification and location for position-fixing and aerial

delivery missions. This mode gives the radar the ability to detect and display a target with a radar cross-section of 50 m² while working in a rainfall environment of 4 mm per hour. In the cross-scan mode, the radar combines the terrain-following and avoidance on a time-share basis.

In the terrain-following, terrain-avoidance, and cross-scan modes a smaller circular antenna is connected to the I-band transmitter/receiver.

Scan Converter. Systems Research Laboratories developed a high-resolution scan converter specifically to interface with the APQ-122(V)s in use on C-130 aircraft,

although it can also be applied to radars in other aircraft. The scan converter was initially used onboard approximately 12 special mission C-130s with multi-function/multi-purpose displays and the (V)8 version of the APQ-122(V).

Operational Characteristics. The navigator normally operates the APQ-122(V); but a repeater scope is provided for the pilot-copilot for weather-avoidance and crew coordination.

Operational modes are:

1. Terrain following (TF)
2. Terrain avoidance (TA)

3. Terrain-following/terrain-avoidance (CS)
4. Long-range ground map
5. Weather detection
6. Beacon
7. Precision ground map (PGM)
8. Simultaneous TF/PGM, TA/PGM, CS/PGM.

The radar can command the aircraft to fly at a fixed distance above the terrain in the terrain-following mode. In the terrain-avoidance mode, the radar shows all terrain at and above the altitude of the aircraft.

Variants/Upgrades

The **APQ-122(V)1** is a dual-frequency system designed for the USAF C-130E Adverse Weather and Delivery System (AWADS) program.

The **APQ-122(V)5** is a single-frequency, I-band radar designed as a direct replacement for the APN-59 radar used on the C-130H and E-4A/B aircraft. Features include long-range mapping, weather evaluation and avoidance, and beacon rendezvous.

The **APQ-122(V)7** is a navigation trainer version of the (V)5 designed for use in T-43A aircraft.

The **APQ-122(V)8** is a dual-frequency radar that adds terrain-avoidance/terrain-following and cross-scan features to the basic radar and is carried on the MC-130E aircraft.

The **APQ-122(V)2**, **(V)3** and **(V)4** radars were developed for special purposes and are no longer produced.

Program Review

Background. Texas Instruments developed the APQ-122 radar for the Lockheed C-130E transport aircraft as part of the USAF Adverse Weather Aerial Delivery System (AWADS) program. Used for navigational purposes, AWADS allows a plane to fly a specific route to a drop zone for rapid and continuous aerial resupply of ground units in adverse weather conditions.

The APQ-122(V) entered production in the early 1960s. Variants were developed between 1973 through 1975. The first APQ-122(V)5-equipped USAF C-130H was accepted in March 1975.

Since 1975, most APQ-122 activity has been limited to spares and repair parts contracts, though additional systems were built for FMS needs. The last production units were built in 1984.

On December 5, 1986, the US Air Force issued an RFP for replacement of the APQ-122(V)1 radar onboard C-130E AWADS aircraft. Texas Instruments and Emerson Electric competed for the contract.

In late 1987, the Air Force awarded Emerson Electric a contract to replace the APQ-122(V)1 radars onboard 50 C-130E aircraft with the Emerson Electric APQ-175.

Funding

Spare and repair parts are funded through Operation and Maintenance budgets.

Analysis. This radar became widespread because of the international use of the C-130. It is adequate for the mission assigned, but newer systems have captured significant segments of the market, reducing the likelihood that it will be selected for future installations. The recently introduced Westinghouse APN-241 radar

selected for the C-130H and J combines weather/windshear detection with ground mapping and AWADS operations. It has been proven effective in air drop operations and will further eliminate the likelihood that future users will procure the APQ-122.

Recent Contracts

No recent DoD contracts over US\$5 million recorded.

Timetable

	1968	Design definition
	1970	Pre-production models
	1972	Initial production for USAF
	1974	Full-scale production
	1975	AWADS successfully tested
	1984	US contracts completed
Fall	1985	SRL began testing new indicator group for MC-130E aircraft
	1991	Contract flight test support APQ-175

Worldwide Distribution

For the **US Air Force**, the APQ-122 is the terrain- following/terrain-avoidance radar onboard the C-130E Combat Talons, C-130E/Hs equipped with the Adverse Weather Delivery System.

Foreign sales of APQ-122(V)s have been reported to: **Argentina, Australia, Bahamas, Bolivia, Cameroon, Congo, Denmark, Ecuador, Egypt, Greece, Indonesia, Iran** (probably inoperative), **Israel, Italy, Jordan, Libya, Morocco, New Zealand, Nigeria, Oman, the Philippines, Portugal, Saudi Arabia, Singapore, Spain, Sudan, Thailand, Venezuela, and Zaire.**

Forecast Rationale

The APQ-122(V) went out of production in 1984. Over 250 systems were delivered for C-130E/H aircraft in the USAF inventory. The system has been sold with several C-130 FMS orders. The APQ-122(V) was originally procured for the Air Force's Combat Talon MC-130E aircraft, but follow-on Combat Talon II MC-130H aircraft will carry the APQ-170.

Due to the age of the system, availability of spares and introduction of more advanced systems, further activity will be for spare parts to support systems still in operation. Most APQ-122(V) operators would rather replace than update the systems. The APQ-122(V) is being replaced with newer equipment such as the APQ-170(V) and APQ-175(V) in parts of the US fleet.

Ten-Year Outlook

No further production expected.