

## AN/ALR-56M Radar Warning Receiver (RWR)

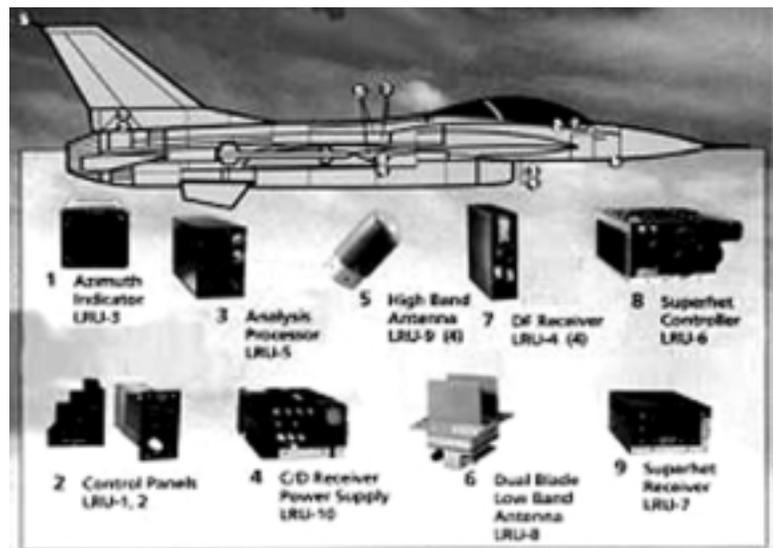
The AN/ALR-56M Radar Warning Receiver (RWR) is intended to contribute to individual aircraft survival through improved aircrew situational awareness of the radar guided threat environment. It includes a fast scanning superhet receiver, superhet controller, analysis processor, low band receiver/power supply, and four quadrant receivers. It provides inputs to the ALE-47 Countermeasure Dispenser System to enable pilot selectable and threat specific chaff and flare dispensing programs for aircraft self-protection. The AN/ALR-56M, by comparison to earlier RWR systems, is intended to provide improved performance in a dense signal environment, as well as increased detection and display features for threat systems with advanced capabilities. The AN/ALR-56M is intended to be a form fit replacement for the AN/ALR-69 RWR in specific models of the F-16 aircraft. In addition to the F-16, the AN/ALR-56M is employed on C-130 aircraft and was chosen for integration into the open architecture Defensive System Upgrade Program for the B-1B bomber Conventional Mission Upgrade Program.

A December 1992 DOT&E Beyond Low-Rate Initial Production (BLRIP) report stated that AN/ALR-56M was operationally effective and suitable. In addition, the 1992 DOT&E BLRIP report recommended Follow-on Test and Evaluation (FOT&E) “because of the deferral of tactics verification testing and the concern about bearing errors and delayed deletions during extensive maneuvers.” The current Test and Evaluation Master Plan (TEMP) calls for additional AN/ALR-56M testing as part of continuing Block 40 and Block 50 F-16 follow-on testing.

FOT&E has been conducted by the United States Air Force Air Combat Command (ACC), Air Warfare Center on subsequent software versions. ACC has continued routine upgrades to Mission Data Table software to keep pace with the changing electronic order of battle priorities for various geographical areas of operation. However, tactics verification testing during FOT&E resulted in notations in the AN/ALR-56M User’s Handbook concerning the operational significance of the performance problems considered to be training issues. Training is required to ensure that aircrews understand AN/ALR-56M performance during maneuvering.

Some of the major operationally significant changes associated with the latest software upgrade, Operational Flight Program (OFP) 0040, include the following:

- Reduced ambiguities between the Surface to Air Defense System X Target Tracking Radar and airborne interceptor radars.
- Reduced number of multiple threat symbols associated with burst-ranging radars.
- Repeats of the missile launch audio warning instead of a one-time initial warning.
- Threat symbol age-out as soon as a break-lock occurs during excess maneuvers, and re-display as soon as a new lock-on occurs.
- Improvements to the ALE-47 expendable countermeasure dispenser system, and the interface with it.
- System initialization, reset, and internal communications deficiencies.



*The AN/ALR-56M Radar Warning Receiver is intended to contribute to individual aircraft survival through improved aircrew situational awareness of radar guided missiles.*

# AIR FORCE PROGRAMS

Requirements for changes to the fielded OFP software include correction of deficiencies noted in previous testing, desired enhancements targeted at handling evolving threats, and man-machine interface improvements directed at improving pilot situational awareness. Desired changes to the fielded OFP are a culmination of user requirements consolidated and prioritized by Headquarters, ACC. A broad summary of those software changes include: update of Mission Data threat parameters; improved threat information interface with the ALE-47; and improved detection of emitters with complex waveforms.

## **TEST & EVALUATION ACTIVITY**

Developmental Laboratory and Flight Testing of AN/ALR-56M 0040 configuration, the latest hardware and software version upgrade, was conducted by the 416th Flight Test Squadron at Edwards Air Force Base, California, during FY98 and FY99, and encompassed a variety of Air-to-Air and Air-to-Ground flight profiles. The system transitioned to the 36th Electronic Warfare Squadron at Eglin Air Force Base, Florida, where it entered Phase I Operational Testing (Familiarization & Training) during FY99. Several significant performance deficiencies were discovered in both Developmental Test (DT) and Operational Test, and the program was halted for corrections in FY00. New, corrected software for DT was delivered in FY00, followed by a combined DT/Operational Test at Eglin Air Force Base in FY01. The system was certified for entry into dedicated FOT&E at the end of FY01, and DOT&E approved the FOT&E test plan at that time. FOT&E was conducted in FY02. FOT&E was reduced in size by carefully tracking data collected. This reduction was followed by DOT&E and did not adversely affect test adequacy, but did save redundant costs. FOT&E consisted entirely of flight tests; however the final assessment will include hardware in the loop and DT/Operational Test results as well. The final United States Air Force report is expected in FY03.

## **TEST & EVALUATION ASSESSMENT**

The FOT&E was a well designed side-by-side comparison of the upgraded AN/ALR-56M hardware and software with the 0026 configuration previously tested. Although budgetary and technical issues caused extensive delays in the test and evaluation, it appears that the AN/ALR-56M is effective and suitable. The United States Air Force test plan specified 20 features to be added and/or problems to be resolved, and initial inspection of the test results indicates that all were accomplished successfully. Comparison to the baseline performance of the now six-year-old system software indicates that systems effectiveness was maintained for the most part, though some additional features in the latest build did result in increased signal processing time. One item from the DOT&E 1992 BLRIP report was addressed during this test: the effect of maneuvers on symbol age-out time. Initial results of the test indicate that the display is now much more responsive to changes in the threat radar's track of the aircraft while the aircraft is maneuvering, improving pilot situational awareness. Suitability has been maintained, and the upgraded processor should improve logistic supportability in the long term.