- 360 degree high sensitivity detection

- Modular design facilitating infusion of advanced technology

- Precision DF to cue sensor narrow FOV

- High sensitivity to acquire threat emissions before ownship detection

- Positive identification with mode determination for fire control threat correlation

- Adaptable to multiple platforms

- Programmable UDM Threat Library

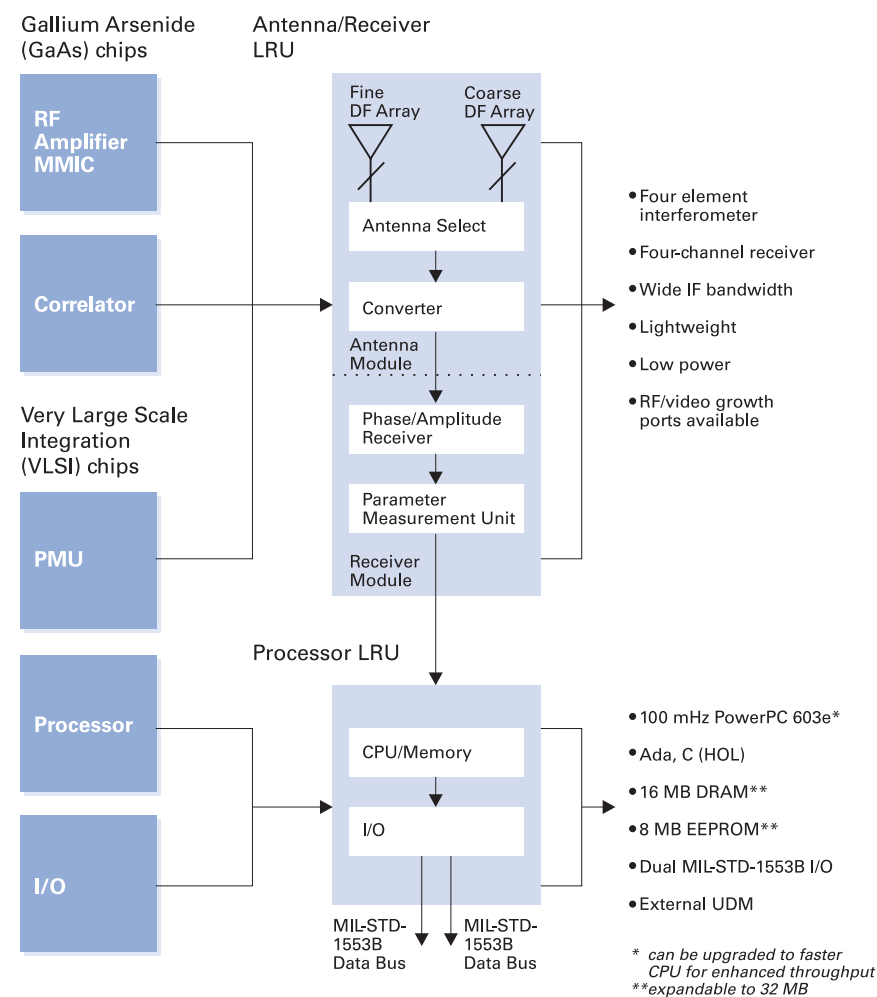- Organic toolset for generation and validation of MDLs

Technical features:

- Lightweight, total system 29.5 pounds

- Second generation, wideband antenna design

- Integrated Radar Frequency components

- Receiver chip technology for monopulse parameter measurement and digitization

- PowerPC™ Single Board Computer

- I/O Field Programmable Gate Array configurable for different applications

- Self-cooled 150 Watt thermal design

Pre-planned product improvements:

- Digital Receiver technology insertion

- Extended frequency coverage

- RFI ASE controller function

System Layout:

Gallium Arsenide (GaAs) chips

RF Amplifier MMIC

Correlator

Very Large Scale Integration (VLSI) chips

PMU

Antenna/Receiver LRU

Fine DF Array · Coarse DF Array

Antenna Select

Converter

Antenna Module

Phase/Amplitude Receiver

Parameter Measurement Unit

Receiver Module

- Four element interferometer
- Four-channel receiver
- Wide IF bandwidth
- Lightweight
- Low power
- RF/video growth ports available

Processor LRU

Processor

I/O

CPU/Memory

I/O

MIL-STD-1553B Data Bus   MIL-STD-1553B Data Bus

- 100 mHz PowerPC 603e*
- Ada, C (HOL)
- 16 MB DRAM**
- 8 MB EEPROM**
- Dual MIL-STD-1553B I/O
- External UDM

* can be upgraded to faster CPU for enhanced throughput
**expandable to 32 MB

LOCKHEED MARTIN

We never forget who we're working for™

AN/APR-48A
Radar Frequency Interferometer

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Tomorrow's electronic battlefield will be characterized by an increasingly complex mix of electromagnetic technologies: those already in the field and those that will emerge. It is in this tactical arena that the AN/APR-48A can play a decisive role.

The AN/APR-48A Radar Frequency Interferometer (RFI) system passively detects, accurately identifies and precisely locates radar emitters. Tested, field-proven and deployed today, the RFI is installed on the AH-64D Longbow Apache helicopter. The system operates either as a stand-alone unit or works with other avionic system components. Its signal intercept, positive identification, fast response time and precision Direction Finding (DF) capabilities establish it as both an accurate targeting system as well as a superior Radar Warning Receiver (RWR) for helicopters.

Fast, Accurate Detection and Improved Survivability

Long-range detection and unambiguous identification of radar emissions are essential for complete situational awareness in battlefield environments. The AN/APR-48A provides accurate information under ever-changing battlefield conditions and intentional electromagnetic interference.

Modern target acquisition, threat identification, and RWR systems must function at longer ranges and rapidly locate and identify targets to preserve both weapons system lethality and aircraft survivability.

Performance
The ability of the AN/APR-48A to detect, identify, prioritize and locate radars in varying threat conditions makes it a significant tool for the modern warfighter. Its RWR capabilities have been deployed in numerous missions, including Desert Storm, Operation Iraqi Freedom and Operation Enduring Freedom. Receiver sensitivity enables the system to detect a threat, or a friendly, long before the host aircraft is vulnerable, allowing aircrews to control engagement.

Operational overview
The AN/APR-48A performs target acquisition and cueing for the Fire Control Radar system in the AH-64D Apache Longbow attack helicopter. It can also deliver warning of radar directed anti-aircraft threats and serve as the controller for an integrated Aircraft Survivability Equipment (ASE) system.

System capabilities of the AN/APR-48A significantly reduce exposure time, thereby increasing both platform survivability and lethality. The system also enhances Suppression of Enemy Air Defenses, armed reconnaissance and attack missions.

The AN/APR-48A provides high sensitivity and precision angle of attack in a lightweight, modular configuration suitable for airborne or ground-based platforms. These features allow the system to work efficiently with radar and Electro Optic (EO) sensors to extend useful range, decrease acquisition time and provide positive target identification.

Modular design for multi-platform use
Lockheed Martin's AN/APR-48A was designed for the Apache Longbow and Kiowa Warrior helicopters and is applicable to several platforms, including unmanned aerial vehicles and ground-based air defense systems.

The system can be packaged as a single Line Replaceable Unit (LRU) or can be configured as multiple LRUs depending on the requirements of the host platform.

Signal acquisition, measurement and processing
Signal acquisition and parameter measurement functions are performed in the Antenna and Receiver LRUs. The Processor LRU performs pulse sorting, emitter and system control processing functions.

Digital signal processing is performed by the Operational Flight Program (OFP). The OFP sorts incoming pulses, computes DF, characterizes and identifies emitters and determines threat priority. The OFP also performs built-in test, fault isolation, calibration and system control. The processor contains Input/Output (I/O) interfaces to the host platform including dual-redundant MIL-STD-1553B ports, analog inputs for rotor blade position, blanking signals, miscellaneous configurable discretes and test interfaces. The Processor provides an externally mounted, easily removable User Data Module (UDM) containing a re-programmable system threat library. As part of the Aircraft Ground Equipment interface, Small Computer System Interface (SCSI), Serial, and Ethernet type interfaces are available for use.

The OFP was developed using high-level Ada and C++ languages and industry available commercial-off-the-shelf (COTS) software tools for ease of software maintenance. Its modular design facilitates reconfiguration for performance enhancements and tailoring for new applications.

Direction finding
The AN/APR-48A incorporates a four-element interferometer coupled with a four-channel phase receiver. The four-element, high sensitivity coarse DF array with 360 degree field of view (FOV) is used for initial signal acquisition and RWR alert. When a fine DF measurement is required, the four-element, long-baseline interferometer with 120 degree rotating FOV, as used on the Apache Longbow, provides high DF

accuracy and tolerance to multipath-induced errors. Unique hardware and software with rotor blade processing algorithms, perform precision DF while looking through the rotor blades.

RWR and survivability
Increased sensitivity, high probability of intercept and positive signal identification make the AN/APR-48A an ideal solution for RWR applications. Advanced warning of a radar-guided threat allows the aircrew to prepare for engagement before the threat can endanger the aircraft. The system can serve as the controller for an integrated Aircraft Survivability Equipment system, thereby increasing both aircraft survivability and lethality.

Passive Ranging Subsystem
The Passive Ranging Subsystem (PRSS) was conceived as an adjunct to RWRs used on high performance warfighting aircraft, giving pilots accurate range to threatening enemy air defense sites. When PRSS is enabled, the AN/APR-48A system provides emitter range and location solution to the host aircraft while simultaneously providing signal detection and identification information required for platform targeting and cueing functions.

Single-ship PRSS passively determines the location and range to detectable active ground-based emitters. A multi-ship PRSS function, where two or more platforms with RFI systems exchange emitter information, is also available.

System interface
The system has an amplitude DF measurement covering 360 degrees, higher accuracy, narrower FOV, and phase DF measurement on a dual-redundant MIL-STD-1553B data bus. On-signal phase calibration further enhances DF accuracy. Other commercial I/O interfaces include SCSI, Ethernet, JTAG, RS-232 and RS-422.

The UDM can be rapidly reprogrammed with a new threat library, allowing system operation changes in response to new missions or threats. Lockheed Martin, under contract to the U.S. Army, developed an organic toolset for generation and validation of UDM Mission Data Loads.

Antenna

Processor

Reciever

System Specifications	
Weight	29.5 pounds
• Antenna LRU	7.9 pounds
• Receiver LRU	8.5 pounds
• Processor LRU	12 pounds
Dimensions	
• Antenna LRU	21" x 7.7" x 3.9"
• Receiver LRU	11" x 8.5" x 7"
• Processor LRU	10" x 5.7" x 7"
Power Dissipated	150 watts
MTBF	1,900 hours