



# APR-39D(V)2

*Digital Radar Warning Receiver*





# AN/APR-39 Radar Warning Receiver (RWR) System Description



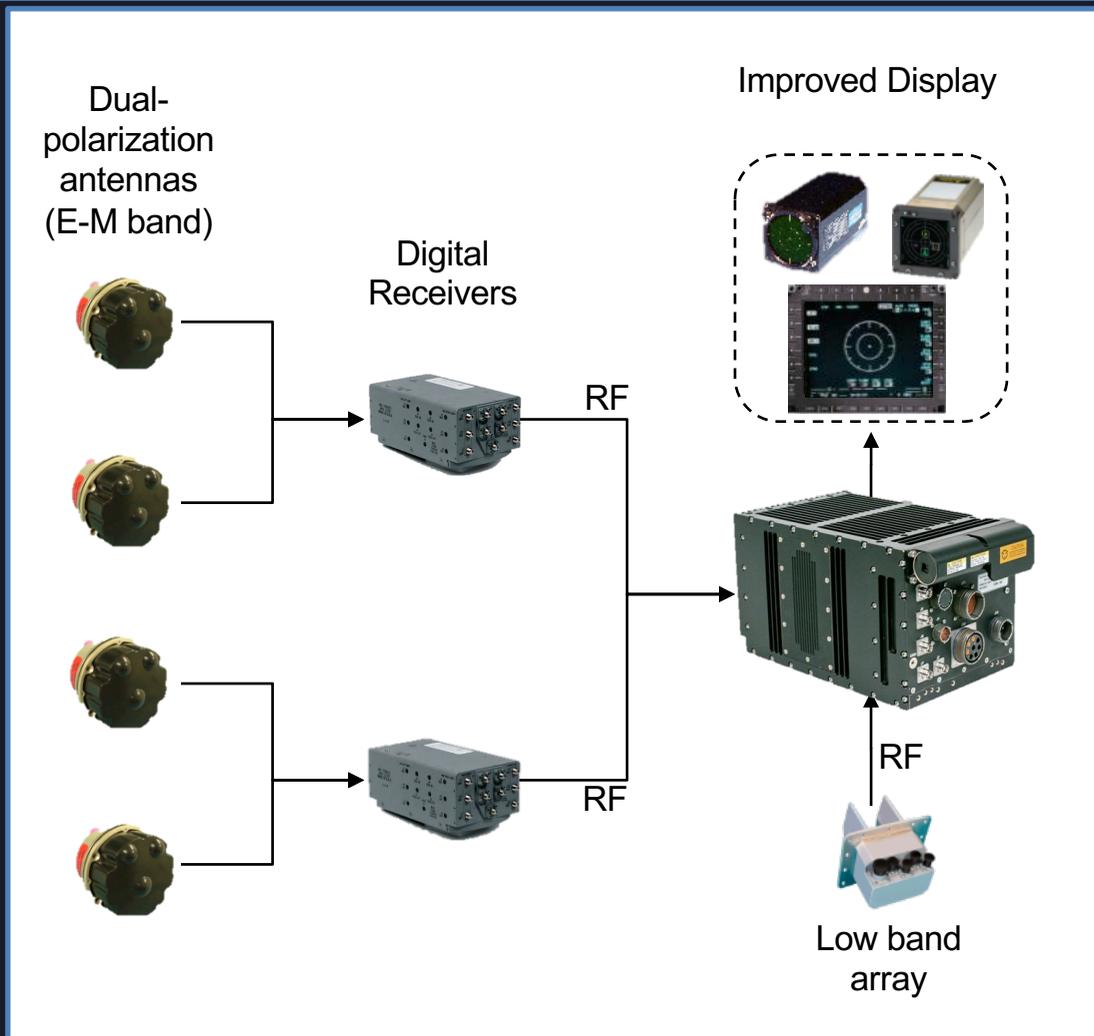
- Mission: Identify surface-to-air and air-to-air radar assisted threats. Enhances Aircrew Situational Awareness and improves aircraft mission survivability
- System Functionality
  - Monitor the Radio Frequency (RF) environment
  - Detect RF Surface-to-Air/Air-to-Air threats
  - Provide audio and visual threat warning messages to the aircrew
  - Provide threat data to the CounterMeasure Dispensing System (CMDS)



## Three Key Performance Parameters (KPPs):

- Probability of Detection (Pd)
- Frequency Range
- Operational Availability (Ao)

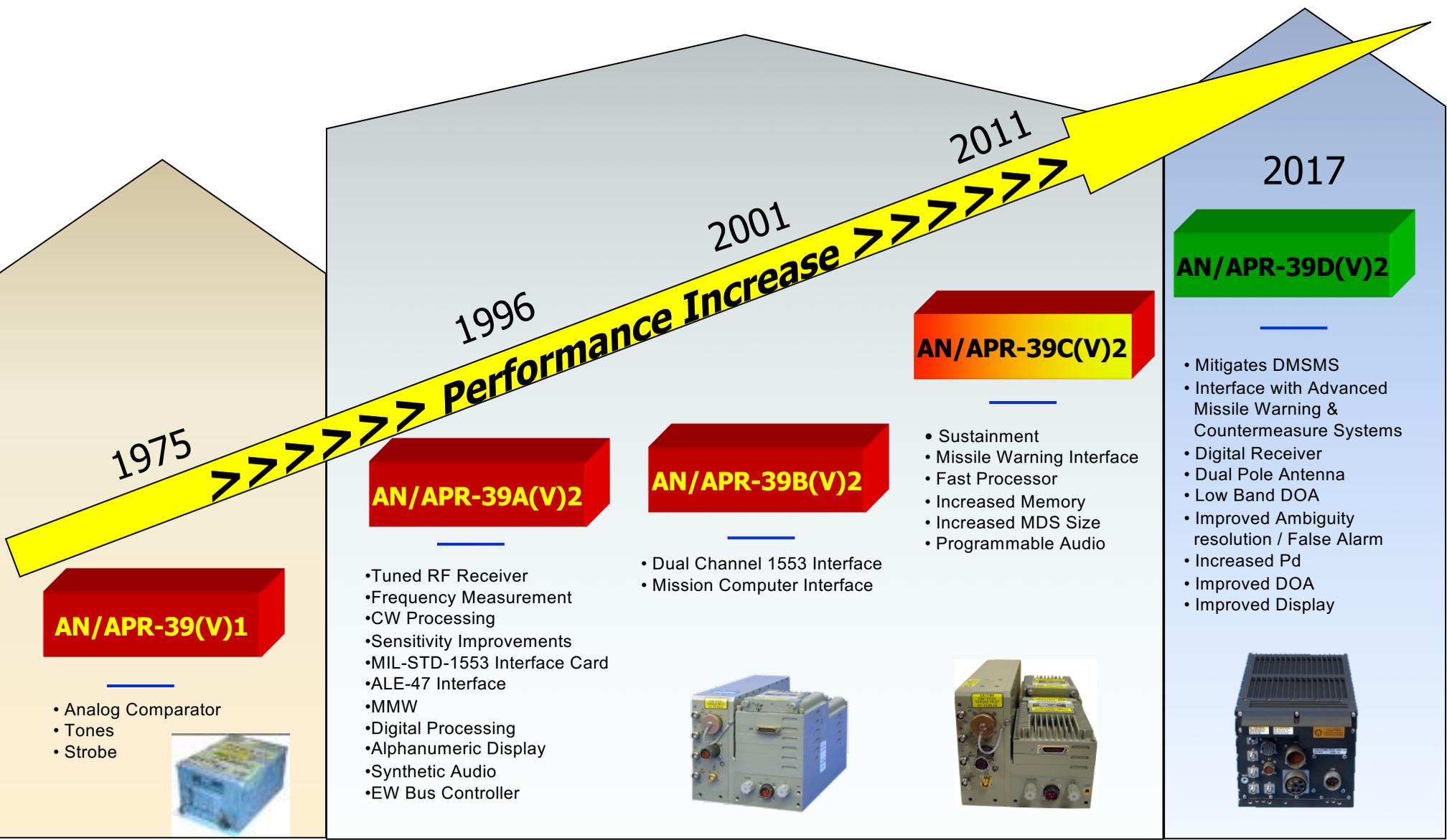




- AN/APR-39D(V)2 is the program of record for the U.S. Army, USN, USMC rotary wing platforms
- 2-channel digital RWR derived from the Common Digital Receiver Exciter (DRE) product line
  - Expansion slot allows 4-channel option
- Future Growth
  - RF Countermeasures
  - Suite Controller
- Flexible interfaces allow seamless integration on multiple platforms with single Operational Flight Programs (OFPs)
- System 48 lbs, 312 Watts



# AN/APR-39 RWR Roadmap





# APR-39 Comparison

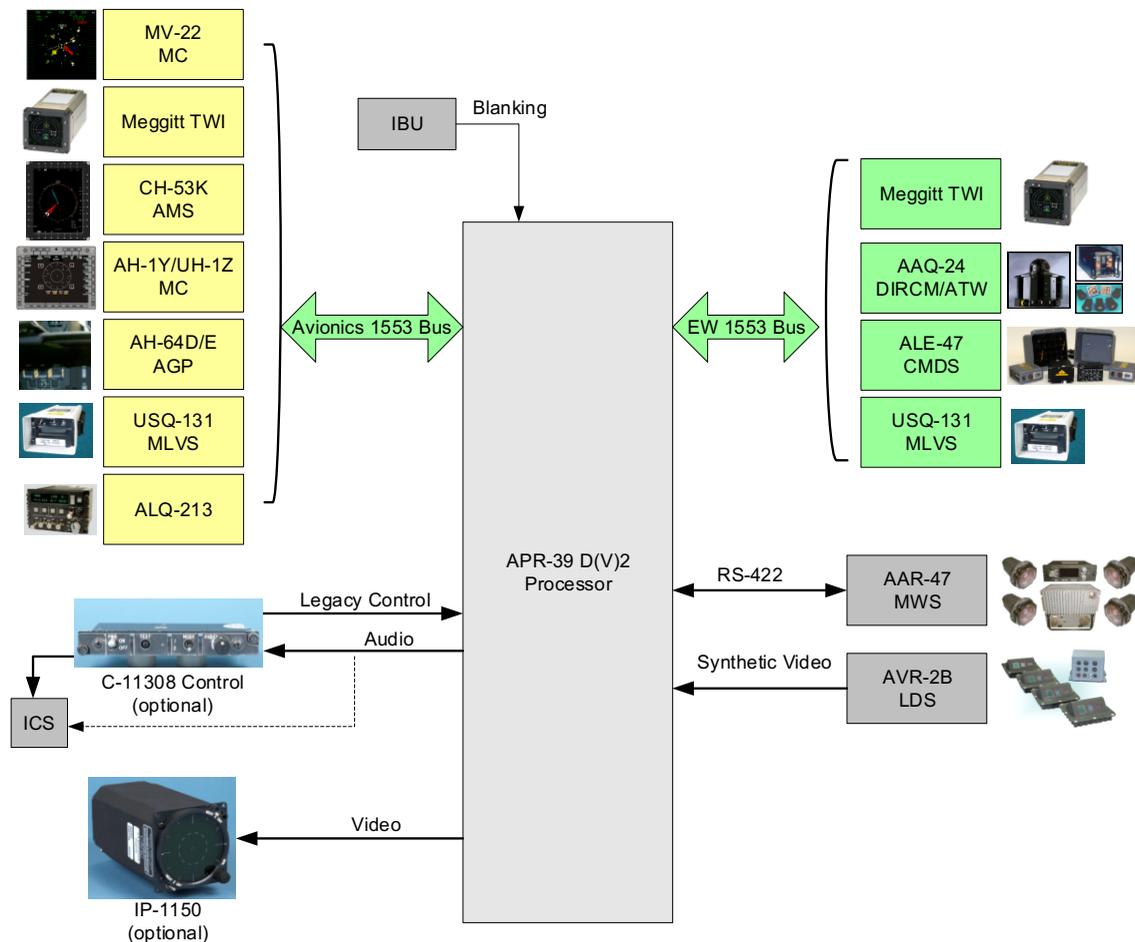


<b>AN/APR-39 RWR COMPARISON</b>	<b>B(V)2</b>	<b>C(V)2</b>	<b>D(V)2</b>
Weight	33 lb/15 kg	33 lb/15 kg	48 lb /21.7 kg
Power	200W, 28VDC	200W, 28VDC	312W, 28VDC
Audio	Synthetic Voice	User defined wav file	User defined wav file
Pulse Density (Processor Upgrade)		50% Greater than B(V)2	Est. 300% Greater than B(V)2
Ambiguity Resolution	25% Improvement (RF Resolve)	Same as B(V)2	High accuracy RF Resolve
Memory (Processor Upgrade)	2MB Flash 64KB RAM	128 MB Flash 128MB RAM	16 GB Flash 4GB RAM
MDS Size (Processor Upgrade)	64K Encrypted	128K Encrypted	4MB Encrypted



# D(V)2 ASE Suite Controller Capability

- Situational awareness is more than just RWR. The threat is full spectrum
- D(V)2 maintains C(V)2 ASE interfaces & suite controller functionality
  - Missile, Laser Warning
  - Chaff/Flare dispensers
  - DIRCM/ATW
- Integrates controls, threat reports, BIT reports for aircraft ASE
- Interfaces with various mission computers over 1553 Avionics bus
- Open architecture OFP adaptable to multiple aircraft and ASE suite configurations





# AN/APR-39D(V)2 Program Overview



- Full-rate Production

- Currently in Production
- Follow-on production order to be awarded in 2020, (3) ordering periods over (3) years, up to 600 systems



- Milestones achieved

- Flight testing complete on MV-22 and AH-64

- Upcoming Milestones

- RFCM Lab Demonstration Q4 2019
- Integration efforts on-going:
  - AH-1Z
  - UH-1Y
  - CH-53E/K



D(V)2 Shipset

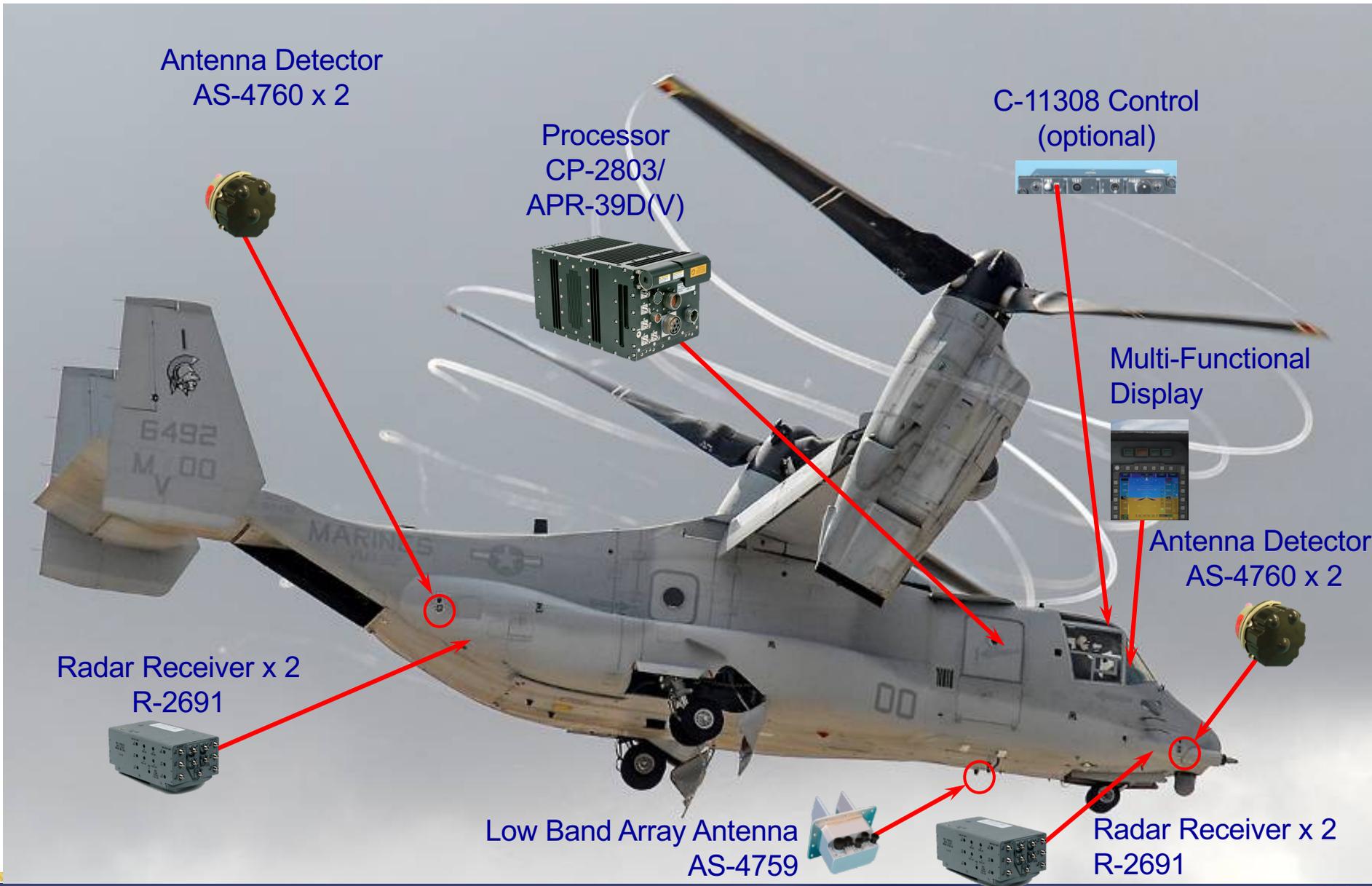




# A-Kit Installs to convert from D(V)2



# APR-39D(V)2 A-Kit Install





# Aircraft Interface Requirement Changes APR-39A/B/C(V)2 to APR-39D(V)2

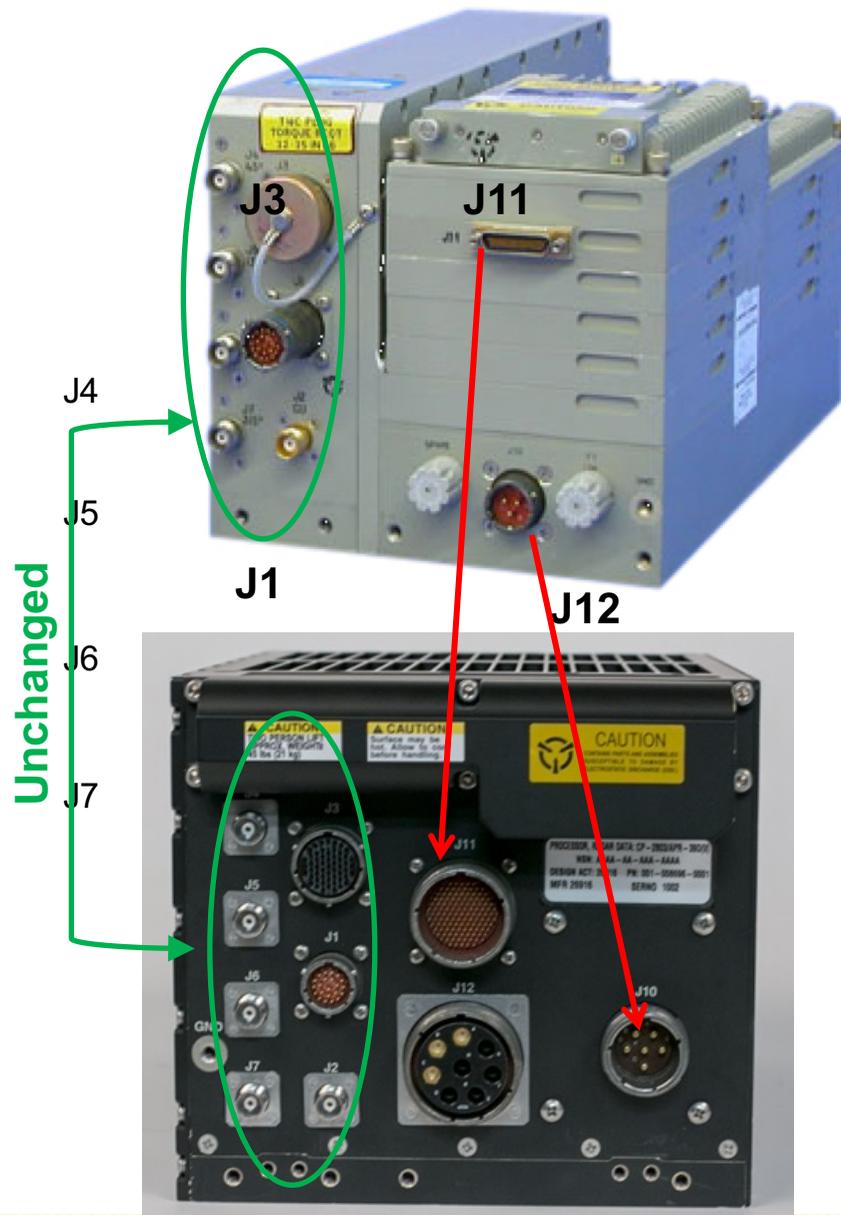


## AIRCRAFT INTERFACE REQUIREMENTS CHANGE

		<b>CHANGE</b>	<b>NOTES</b>
1	ECS load requirement	Airflow requirements added for Processor WRA cooling	Additional cooling needed for processor
2	Electrical interface	2 each +28VDC/+28VDC Return wires required, larger wire gauge	Larger J10 power input connector, Additional RF cabling between Antenna-Detectors and Receivers required
3	Electrical load requirement	Increased +28VDC current draw	> 50% increase in Processor power draw
4	Mechanical interface	New Low Band Array Antenna mounting and cabling requirements	No changes to Processor, Antenna-Detectors, and Receiver mountings
5	Pilot command and control	No change if using legacy display and control	Optional Meggitt TWI interface available for color symbology and expanded pilot control
6	Aircraft Software changes	Expanded message set for mission computer interface	No changes to aircraft interface required
7	Weight & location	Increase in system weight, no change in locations	Increased weight for Processor. The relative aircraft location of the processor is unchanged.

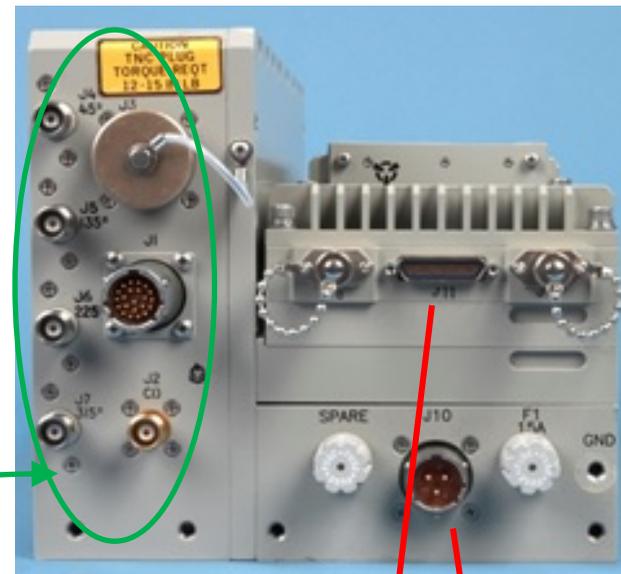
# B(V)2 to D(V)2 Processor Front Panel

- J1 & J3 38999s unchanged
  - Compatible with legacy A-kit
- J2, J4 – J7 TNCs unchanged
  - Compatible with legacy A-kit
- J10 modified to accommodate increased current draw
- J11 Micro-D changed to 38999 to comply with platform ruggedization requirements
  - Pigtail adaptor required for legacy A/B(V)2 installs
- J12 multi-RF 38999 (new) supports Low Band Array and RF growth



# C(V)2 to D(V)2 Processor Front Panel

- J1 & J3 38999s unchanged
  - Compatible with legacy A-kit
- J2, J4 – J7 TNCs unchanged
  - Compatible with legacy A-kit
- J8 & J9 twinax removed
  - Pigtail adaptor required for legacy A(V)2 installs
- J10 modified to accommodate increased current draw
- J11 Micro-D changed to 38999 to comply with platform requirements
  - Pigtail adaptor required for legacy A/B(V)2 installs
- J12 multi-RF 38999 (new) supports Low Band Array and RF growth



Unchanged





# A-Kit Change Summary

- J3 Connector
  - New Low Band Array Power and Control signals (7 lines)
  - New harness required between Processor J3 and LBA J1
- J10 Connector
  - Larger 6 pin connector (vs 3 pin for legacy)
  - 16 AWG to 12 AWG wire change
  - Single +28VDC/Return to two each +28VDC/Return
- J11 Connector
  - Connector changed to 121 pin 38999 type (from 51 pin micro-D connector)
- J12 LB Array RF connections (new)
  - 3 new RF cables from Processor J12 to LBA J2 – J4 required
  - Includes growth RF connections
- Antenna-Detector to Radar Receiver
  - 1 additional RF cable from each quadrant Antenna-Detector J3 to Receiver J10/J11 (4 total)



# APR-39D(V)2 B-Kit



# APR-39D(V)2 System SWAP



APR-39D(V)2 Suite					
Qty	Equipment Designation	Nomenclature	Dimensions (inches) (Width x Depth x Height)	Weight (lbs)	Power Dissipation (Watts)
1	Processor	CP-2803/APR-39D(V)	8.02 x 14.05 x 7.30	36	245
2, 3, or 4	Receiver	R-2691/APR-39D(V)	3.52 x 6.00 x 2.50	2.25	27.5 EA
4	Antenna (Dual-Pod)	AS-4760/APR-39D(V)	3.13 x 3.71 x 3.13	0.8	1 EA
1	Low Band Array Antenna	AS-4759/APR-39D(V)	6.00 x 5.00 x 5.95	4	8
1 (opt)	Blade Antenna	AS-2890/APR-39(V)	1.75 x 5.25 x 3.30	0.4	0
1 (opt)	Detecting Set Control	C-11308/APR-39A(V)	5.75 x 2.61 x 0.75	0.5	5.3
1 (opt)	Threat Warning Indicator	Meggitt 34303-11-54	3.27 x 5.51 x 3.27	2.76	20
1 (opt)	Radar Signal Indicator	IP-1150A/APR-39A(V)	3.25 x 6.55 x 3.25	2.4	17.1
Total (2 receivers)				47.7 - 51	312 - 337



Detecting Set Control (Optional)



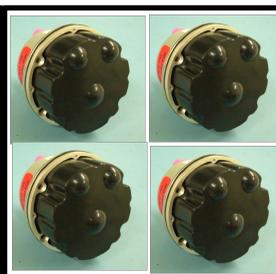
Radar Signal Indicator or Meggitt TWI (Optional)



Processor



2x - 4x Receivers



4x Dual-Pod Antenna



Low Band Array Antenna



Blade Antenna (Optional)

# Radar Data Processor



- APR-39C(V)2 Processor
  - E-K Wideband Video
  - E-G Narrowband Video
  - C-D/H-J Analog YIG Receiver
  - 2 1553 Buses (AV and EW)
  - 2 100Base-T Ethernet
  - 2 RS-422
  - 2 RS-232
  - 2 Blanking inputs



- APR-39D(V)2 Processor
  - E-M Wideband Video
  - 2 C-J Digital Receiver channels
  - 3 1553 Buses (AV, EW, RFCM Growth)
  - 6 RS-422
  - 2 RS-232
  - 4 Blanking inputs
  - Compatible with legacy mounting locations



# Processor & Memory Comparison



Processor LRU Configuration	Circuit Card Assemblies	Processor Speed	RAM	Flash
<b>C(V)2</b>	<b>IOP</b> <b>PowerPC 755</b>	<b>250 MHz</b>	<b>64 MB</b>	<b>64 MB</b>
	<b>SPU</b> <b>PowerPC 755</b>	<b>250 MHz</b>	<b>64 MB</b>	<b>64 MB</b>
	<b>YPU</b> <b>Intel 80186</b>	<b>19 MHz</b>	<b>0.064 MB</b>	
	<b>MDS</b>			<b>128 KB</b>
<b>D(V)2</b>	<b>ESBC</b> <b>i7 Quad Core</b>	<b>800 – 2.1 GHz</b>	<b>4 GB</b>	<b>16 GB</b>
	<b>MDS</b>			<b>4 MB</b>

# Radar Receiver



- A/B/C(V)2 Radar Receiver
  - Supports two quadrants
    - EJ RF input
    - K Video input
    - E-K Video output
    - E-J RF output



- D(V)2 Radar Receiver
  - Supports two quadrants
    - 2 (RHCP and LHCP) E-J RF inputs
    - K-M Video input
    - E-M Video output
    - E-J RF output
    - 2 RF gain states to support standard and large A/C installs
  - Improved BIT capabilities
  - Compatible with legacy mounting locations

# Antenna-Detectors



- A/B/C(V)2 RH and LH Antenna-Detector
  - AS-4130A is RHCP
  - AS-4131A is LHCP
  - K band element is polarized the same as E-J element
  - Single E-J RF output
  - Single K band video output



- D(V)2 Dual-Pol Antenna-Detector
  - Each antenna-detector has 4 apertures
    - LHCP E-J band
    - RHCP E-J band
    - LHCP K-M band
    - RHCP K-M band
  - Separate LH and RH E-J RF outputs
  - Single K-M band video output (summed LH and RH detected video)
  - Compatible with legacy mounting locations

# Low Band Antenna



- A/B/C(V)2 Blade Antenna
  - C/D Band coverage
  - Omni-directional, no Angle of Arrival measurement possible
- D(V)2 Low Band Array
  - C/D Band coverage
  - 4 monopole antenna elements
  - D(V)2 Processor compares the phase on the four elements to measure Angle of Arrival



# NAVAIR Sample Programmatic



# D(V)2 Timeline Milestone Estimates



- LOR Received
- Six (6) months signed LOA
- Contract Awards (CA)
  - After contract awards:
    - 24 months - Software Development
    - 24 to 30 months - Hardware Delivery to Freight Forwarder
    - 28 to 32 months - In-Country Training (after signed LOA)



# PMA272 Mission and Vision



## Mission Statement

*Delivering Affordable Airborne Defensive Electronic Warfare Self-Protection Solutions to Enable the Global Warfighter Success Against an Evolving Adversary*

## Vision Statement

*Be the Leader in Developing and Fielding Future – Scalable - Integrated Electronic Warfare Capabilities to Win the War of Tomorrow*

