APN-241:
Radar Capability to Enhance Hercules Missions
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APN-241 Overview
The standard for tactical transport radars

- Capabilities to expand aircraft missions
  - Military & Humanitarian missions
  - DBS/SAR modes for radar approach and airdrop
- Designed to reduce O&M costs
  - Eliminates costs of scheduled maintenance and I-Level support
- Continuously upgraded to meet new requirements
  - TF/TA, SAR, C-130J IPRA
- Future upgrades include Precision Airdrop, Maritime Patrol & Terrain Avoidance

The APN-241 is the only transport radar that offers SAR mode. (25-Foot resolution shown)
50+ Years Of Performance & Sustainment Enhancement

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<tr>
<th>80s</th>
<th>90s</th>
<th>00s</th>
<th>10s</th>
<th>20s</th>
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<td>80s</td>
<td>90s</td>
<td>00s</td>
<td>10s</td>
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...Future

APN-241

APN-59

APN-242

Sustainable Legacy Capability

>800 Systems worldwide ... 4 Configurations Increasing Value to C-130 Users
Sustainable Mission Versatility

- Multi-mission radar capability for military and civil applications
  - Tactical employment, Humanitarian Assistance, Ecological Support
    - SAR, TF/TA, DBS, MGM, Skin Paint, Windshear, Turbulence Detection
- Technology insertion benefits – C-130H/J commonality
- Established worldwide logistics support system
  - 800+ systems delivered to 21 countries
  - Robust production line
Enhanced Mission Capability

Take-Off and Landing

Weather
Skin Paint
Wind Shear
MGM ARA with HUD
TCAS & Flt Plan Overlay

Employment En-Route: Airdrop, Airland, MAFFS, Maritime Patrol

Terrain Avoidance
DBS
Ballistic Wind for Precision Airdrop
SAR
Maritime Patrol

Improving Situational Awareness & Crew Coordination
Take Off and Landing
Unparalleled Capability for Radar Approach

- MGM/DBS/SAR modes enhance Airborne Radar Approach Capability
  - Highest resolution map modes
- Windshear protection
  - 10 nm range vs. 5 nm
  - Operational above 5,000 Ft. AGL
  - Two-Bar scan eliminates false alarms
  - Three-levels of alert
    - Advisory - 10nm
    - Caution - 5nm
    - Alert - 1.5nm
- Mode interleaving enhances crew coordination & safety

Enhanced safety in critical flight phases; anytime and anyplace
Enroute
See and Avoid Weather and Traffic

- Weather: Integrated System Mode
  - 320 nm range, selectable range scales
  - Weather-through-weather
  - Automatic turbulence detection
  - TCAS & Flight Plan overlay
  - Mode Interleaving: Two modes/maps simultaneously
  - Non-emitting Freeze mode
- Skin Paint
  - 20 nm range - Longest in class
  - Rejects clutter and ground moving targets
  - Target icon proportional to RCS
  - Doppler stick indicates head/tail aspect and velocity

Enhanced safety for any scenario
Low Level Navigation and Airdrop

MGM Effective range: 320nm
- Display expands (2:1 and 4:1)
- Sector scans (±15°, ±30°, ±60°, ±135°)

DBS Effective range: 40nm
- Three cursor modes
- Automatic Tilt & Gain

APN-241 precision supports expanded CONOPS
Map Resolution Comparison
High resolution terrain images for tactical employment

Wx Radar Real Beam Ground Map
APN-241 MGM

APN-241 DBS
APN-241 SAR
Automatic Parameter Adjustment

- Frees aircrew to perform other tasks
- Enhances safety of flight
- Based on mode, range scale, altitude
  - Radar optimizes
    - > Tilt
    - > Gain
    - > Video Intensity
    - > Beam Shape
- Manual changes are memorized for each mode

Reduces crew workload; Optimizes Radar Performance & Crew Coordination
Mode Interleaving:
Reduces crew workload; Improves crew coordination
Upgrades for User Requirements

- **C-130H upgrades**
  - New range scales, color ground map (pilots), adjustable clutter notch
  - USAF AMP modes: TF/TA and SAR
- **C-130J**
  - Integrated mission computer-based architecture
  - “Hurricane Hunter” Wx mode
  - Integrated Precision Radar Approach
  - SAR maritime patrol demonstration to USCG (May 08)
- **C-27J/C-295 antenna development**
  - Retains all mode performance and capabilities

SAR Developed for USAF C-130 AMP, now a software-only upgrade.
Tactical Landing Precision: Heads Up or Heads Down

Radar Ground Map Display

Tactical Landing Ground Map Image Shown on Heads Up Display
Advanced New Mission Capability

• First Pass Precision airdrop
  – Ballistic wind measurement
• Maritime Patrol Modes
  – Surveillance capability based on Skin Paint mode
  – Moving Target indicator/Moving Target Tracking
  – Adjustable range gate to detect high speed targets
• Terrain Awareness
  – Low level flight safety enhancement
• Retrofitable to all APN-241 configurations

No hardware changes or aircraft modification required
First Pass Precision Airdrop

Ballistic Wind is a modification of the Windshear mode

Range To Go to HARP

Range Vector Offset to HARP

Ant. Beamwidth

Drop Zone (DZ)

Range as shown: 7.1nm

Ballistic Wind is a modification of the Windshear mode
Maritime Patrol

- Surveillance capability based on mapping modes (MGM, DBS, SAR)
  - SAR application demonstrated in 2008 USCG C-130J demo flight
- Tracking capability based on Skin Paint
  - Low Risk software development
- Moving Target Detection/Moving Target Indicator
  - Demonstrated in 2009 USN program
- AIS integration

The APN-241 is the low cost solution to the Maritime Patrol mission. Low risk development is based on proven technologies.
Terrain Awareness
Enhances safety in low altitude environments

• Based on USAF C-130 AMP TF/TA mode
  – More than 140 test flights in USAF program
• No new hardware required
• Adjustable Set Clearance Plane
  – Elevation angle of azimuth scan can be adjusted to geography and mission parameters

The Terrain Avoidance mode was developed under the USAF C-130 AMP program. No hardware change is required

SW mod for enhanced, safe low level operations
Terrain Following

Low level Ingress/Egress...

..to & from austere locations

Safe Low level ops with TF/TA, SAR, and precision ground mapping
# C-130 Radar Upgrade Assessment

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<tr>
<td>APN-59</td>
<td>Limited</td>
<td>&lt;50Hrs</td>
<td>N/A</td>
<td>Out of Production</td>
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<tr>
<td>APN-241</td>
<td>Outstanding</td>
<td>1000+Hrs</td>
<td>NRE for Installation</td>
<td>ILS In Place</td>
<td>In Production</td>
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<tr>
<td>APN-242</td>
<td>Limited</td>
<td>2000 Hrs</td>
<td>No NRE</td>
<td>ILS In Place</td>
<td>Production Line Ready</td>
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APN-241 Summary
Sets the standard for tactical transport radars

- Unequaled Performance expands mission sets
  - Precision Mapping, Skin Paint & Windshear
  - Capability to support military and humanitarian/civil govt. missions
- Designed to reduce O&M costs
  - High reliability
  - Two-level maintenance
  - No special tools, no special training
- Continuously upgraded for new requirements
  - Engineering support for technology updates
  - Advanced capabilities available

Precision, versatility and reliability – anytime and anyplace
For More Information Contact:

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