Introduction

- **Purpose:** To share select portions of the “Naval Aviation ATS Roadmap”
  - “Naval Aviation” encompasses US Navy and US Marine Corps aviation

- Although the focus is Naval Aviation, there are some surface and sub-surface Navy applications

- **Navy’s General ATS Strategy:**
  - Define a standard Family of ATE – the “CASS Family of Testers” (CASS FoT)
  - Rehost TPSs from the multiple legacy ATE onto the “CASS FoT”
    - TPSs from 30 legacy ATE have been rehosted to the CASS FoT
  - Design each new generation of CASS Family Member to easily “Migrate” the TPSs from an old Family Member to the new Family Member
    - US Navy is able to re-use its over $2B investment in CASS FoT TPSs
3 Generations of the CASS Family of Testers (FoT) (IOC dates)

Mainframe CASS -- 1992

RTCASS -- 2008

eCASS -- 2017

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High Level Summary Roadmap

- RTCASS IOC
- RTCASS D (Depot Capabilities)
- eCASS IOC
- CASS "I" level Sundown


- CASS to RTCASS TPS Migration
- RTCASS D (Depot Capabilities) to eCASS TPS Migration
- eCASS IOC to RTCASS TPS Migration

10 FMS Countries and USN Depots may use CASS into the 2030s

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Mainframe CASS Sundown

Planned CASS improvements

USN I-Level CASS replaced by eCASS

Begin removing CASS from “I”

Continued CASS Depot and International use

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Planned Major CASS Improvement Changes

- Modernizing the CASS station’s media and hard drives
  - Magneto Optical to DVD media and solid state drives

- Improving the CASS EO3 Module’s reliability and calibration cycle

- Providing an alternate to the procurement obsolete Automatic Gyro/Gimbal Control System (AGCS)

- High Speed Subsystem (HSS) -- Adding an ancillary capable of addressing the emerging weapon system modern high speed buses and providing Real Time Testing leveraging FPGA technology
RTCASS Status

- Computer Upgrade ECP in process *(field 2016)*
  - Improve performance while modernizing and aligning with eCASS computer

- Implementing some NxOMS functions (net-centric related functions)
  - Recently demonstrated with V-22 program

- Planning other H/W and S/W convergence with eCASS

- Modifying 10 RTCASS into a “depot variant” with a focus of providing greater circuit card test capability
RTCASS, Depot (RTCASS-D)

- Targeted for depot testing of SRAs
- First Fielding Fall 2014
- Will operate all existing RTCASS TPSs

✓ RTCASS packaged in Commercial racks
✓ Enhanced analog (AI-760 added)
✓ Cross-point matrix that allows tester per pin technology on each digital pin
✓ Commercial PDU
✓ Enhanced digital (DI-050)
✓ Computer upgrade – Quad Core Win 7
✓ Adds National Instruments LabWindows/CVI based TPS development environment and Test Stand

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Still Making New CASS/RTCASS OTPSs

• ATS Lot 1 Offload to CASS Reliability Improvement Program
  – A complete hardware remake with improved test programs
• ALR 67v2 SRAs Offload to CASS (depot OTPS)
• H-53 AFCS Offload to CASS
• F-18 DTS Direct to CASS
• EA-18G ALQ 218 Direct to CASS
• P-8 ALQ 240, MAS, and SMS Direct to CASS
• H-60 MMR Radar, AAS-44C (FLIR), and ALFS ST/R Direct to CASS
• V-22 ABIU, NIU, WIU, RMU, DDMS, APU, ECU, IAP Direct to CASS
• H-/UH-1Y Mission Computer and HIAOC Direct to CASS
• T-45 EGI Direct to CASS
• MQ-4C Triton – In planning (may be Direct to eCASS)
eCASS Systems

EO

HP

RF

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Replacing Mainframe CASS with eCASS

- eCASS Development & LRIP contract
- LRIP Authorized
- eCASS FRP contract(s)
- Full Rate Production Orders
- CASS to eCASS TPS Migration
- Replacing CASS with eCASS

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eCASS Current Status

• In spite of all the DoD budget reductions, eCASS is doing well
• The eCASS RF Limited Rate Initial Production (LRIP) 1 and 2 Milestone Decision (MS “C”) was granted on 16 December 2013
  – LRIP 3 Decision anticipated November 2014 for eCASS EO and HP
• The next major acquisition Milestone will be the Full Rate Production decision in FY16
• 90% complete development – M-demo is a key upcoming development event
• Navy organic teams have begun the legacy CASS TPS “Migration” to eCASS
• On target for 2017 first eCASS Fleet fielding
• Originally planned to produce 338 eCASS with delivery through 2024
  – Total production eCASS quantity is increasing as new USN aircraft platforms and Foreign Military Sales requirements emerge

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Some eCASS Key Features

- eCASS will reuse:
  - 550 CASS TPSs for about 1,300 aircraft UUTs
  - CASS High Power and Electro Optics module
  - CASS facilities interfaces
    - Electric
    - Air
    - Chilled water
    - Within the CASS Footprint

- Will use Ultracaps for power backup (an option)

- eCASS will include a “CASS ATLAS Test Program” environment but adds the more modern “LabWindows/CVI Test Program” environment

- eCASS and the F-35 LMSTAR are very similar systems
  - Planning a F-35 LMSTAR TPS “migration” to eCASS demonstration
eCASS Key Features

Ancillary Equipment

• eCASS will require only two Ancillary Subsystems:
  – ADTS (Air Data Test Set)
  – IDTS (Inertial Data Test Set)

• The emerging High Speed Subsystem (HSS) will likely be a third
  – May be an integral capability

• The equivalent capability for the following legacy CASS Ancillary items have all been integrated into eCASS:

  – Air Flow Management (AFM) Ancillary Set
  – Multi Analog Capability (MAC) Ancillary Set
  – Universal Load Assembly (ULAS) Ancillary Set
  – Multi Purpose Raster Stroke Display (MPSRD) Ancillary Set
  – Automatic Gyro/Gimbal Control System (AGCS) Ancillary Set
  – Enhanced External hard Drive (EEHD)
  – Manchester Harpoon Card Ancillary
  – Video Pattern Generator (VPG)
TPS Roadmap

About 2,800 CASS TPSs
• About 1,700 Re-hosted from 30 legacy ATE
• About 1,100 Direct to CASS

722 CASS TPSs “Migrated” to RTCASS

Direct to eCASS TPSs

About 550 CASS TPSs will be “Migrated” to eCASS

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**Future Naval Aviation “I” ATE Family**

**eCASS**
(Target: Ship and Shore Navy)
(14 per CV for POR Platforms)

- Navy “I” – 338
  - eCASS Hybrid
  - eCASS RF
  - eCASS HP
  - eCASS EO

**Planned Support**

- F/A-18A-F
- EA-18G
- E-2D
- AV-8B
- V-22
- H-1
- H-60
- C-2
- H-53
- T-45
- Common Systems

**RTCASS**
(Target: Man Transportable & MMF)

- Marine Air “I” - 143
- Navy Depot - 10
- Air Force - 9
- FMS - 2

**Candidates**

- P-8 (now participating)
- UAV (now participating)
- JSF (in process)
- NGJ (in process)

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Planned CASS Family Technology Insertions

- **Improved use of net-centric functions**
  - NxOMS – Next Generation Operation Maintenance System -- Joint Services initiatives

- **Improved board level testing**
  - RTCASS D adds new test technologies

- **Electro Optic Module Replacement** (2020 and beyond)

- **Addressing high speed avionics systems buses and real time testing**
  - High Speed Subsystem (HSS) CASS Family Ancillary

- **Common Development Environment for TPSs (CDET)**
  - A standard modern Integrated Development Environment (IDE)

- **Hybrid Test Language (HTL)**
  - ATLAS like constructs but written in “C” programming language

- **H/W and S/W convergence of RTCASS, eCASS, and LMSTAR**
CASS Family Science & Technology Projects
(S&T source)

- Electronic Root Cause Failure Analysis (219 BAR)
- Acoustic Measurement for Electronics Prognostics (219 BAR)
- Automatic Test Sequence Generator (219 BAR)
- Reactive Near Field Prober (219 TT)
- Pinless Connector (219 TT)
- V-22 Improved Support via NxOMS & Reasoning (219 TT)
- Automated Support System for the Development and Maintenance of TPSs (SBIR)
- Improved Electronics Maintenance Through Tester Prognostics (SBIR)
- Automated Test Program Set Analysis for Maintenance Data Metrics Generation (SBIR)
- Automated Generation of Advanced Test Diagrams to Reduce Test Program Set Life-Cycle Costs (SBIR)
- Formalizing Accommodation of Transitory Path Intrinsic Characteristics (SBIR)
- Real-Time Remote Electronics Test Capability (SBIR)
- Rapid SRA Test Capability for RTCASS (RIF)
  - Reactive Near-Field Prober to enhance effectiveness of electromagnetic evaluation (EME)

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Naval Aviation ATS Summary

• CASS Test Systems will be replaced by eCASS Test Systems by the end of 2024 at the I-Level of Maintenance

• All known Naval Aviation immediate ATE test capability or test technology needs are currently being met with formal Navy Programs Of Record

• Today’s budget reality could modify or stretch out current Roadmap plans or eliminate elements altogether

• Navy will continue to leverage test technology investments with the other Services and embrace the new DoD ATS Framework interface standards as they are defined
Thank You.

Any Questions?