

# DoD Automatic Test Systems Strategies and Technologies



## JTEG Forum on ATE/ATS

28 October 2014

# Service ATS Participants

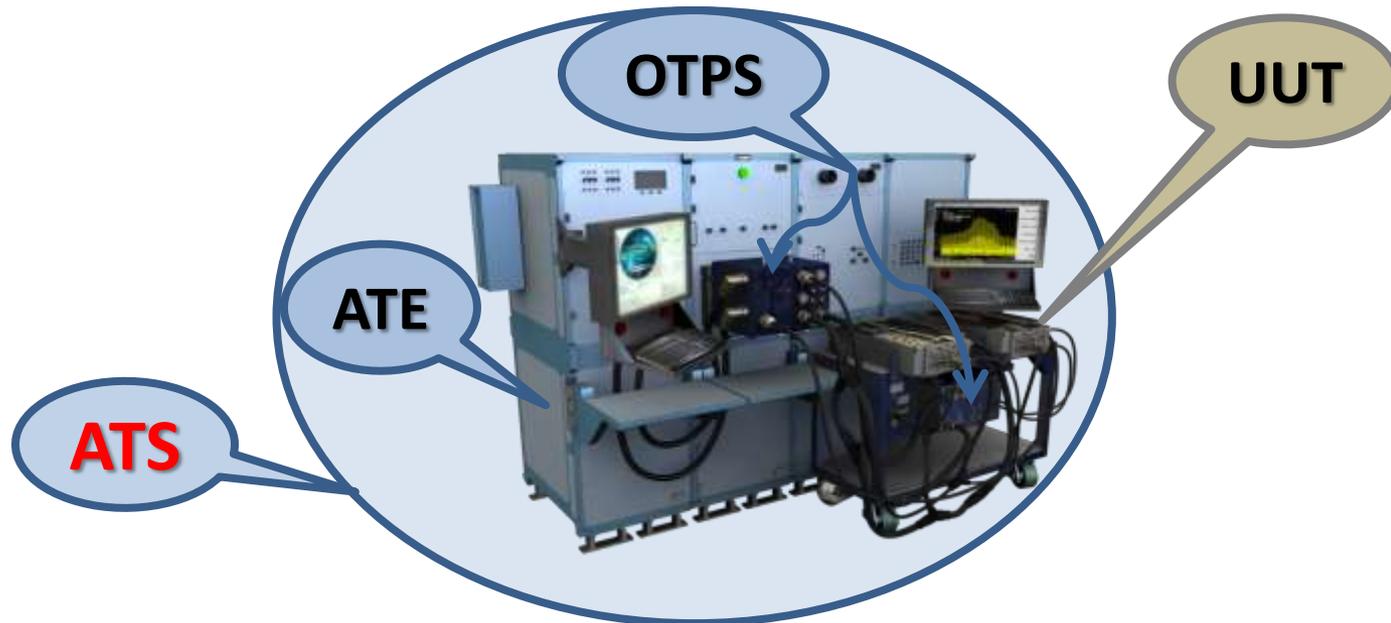
## ATS

- **Bill Ross** (Eagle Systems, NAVAIR and DoD ATS Support)
  - Introduction and Background
- **George Mitchel** (Army, Product Director TMDE)
  - US Army ATS Roadmap
- **Chris Giggey** (Navy, Dept. PM for ATS)
  - Naval Aviation ATS Roadmap
- **Mike Heilman** (Marine Corps, ATS Team Lead)
  - Ground Marine Corps ATS Roadmap
- **Lt Col Sean Rivera** (Air Force, Chief ATS Division)
  - Air Force ATS Roadmap
- **Jay Romania** (Army, Competency Manager, ATS Division)
  - Dod ATS NxTest IPT Chair – Joint Test Technologies
- **Mike Malesich** (Navy, Automatic Test Software Branch Head)
  - DoD ATS Framework IPT Chair – ATS Standards

# “Automatic Test Systems” Terminology

ATS

- **ATE or Automatic Test Equipment** = Integrated set of test and measurement instruments able to do weapon system test and diagnostics
- **OTPS or Operational Test Program Set** = A set of hardware to physically interface a group of weapon system Unit(s) Under Test (UUTs) to the ATE and the UUTs test program software
- **ATS or Automatic Test System = ATE + its OTPSs**



# Automatic Test Systems

ATS



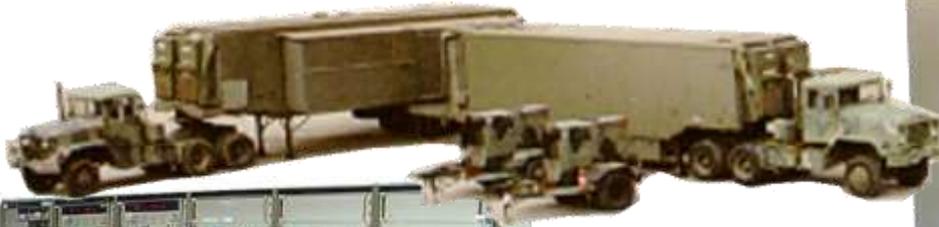
- Complex electronic test and diagnostics equipment
- Used at all levels of maintenance from factory to field
- Hundreds of different types in DoD inventory and tens of thousands of application test programs in use
- \$51B spent on automatic test systems from 1980 – 1992

# The DoD ATE Problem

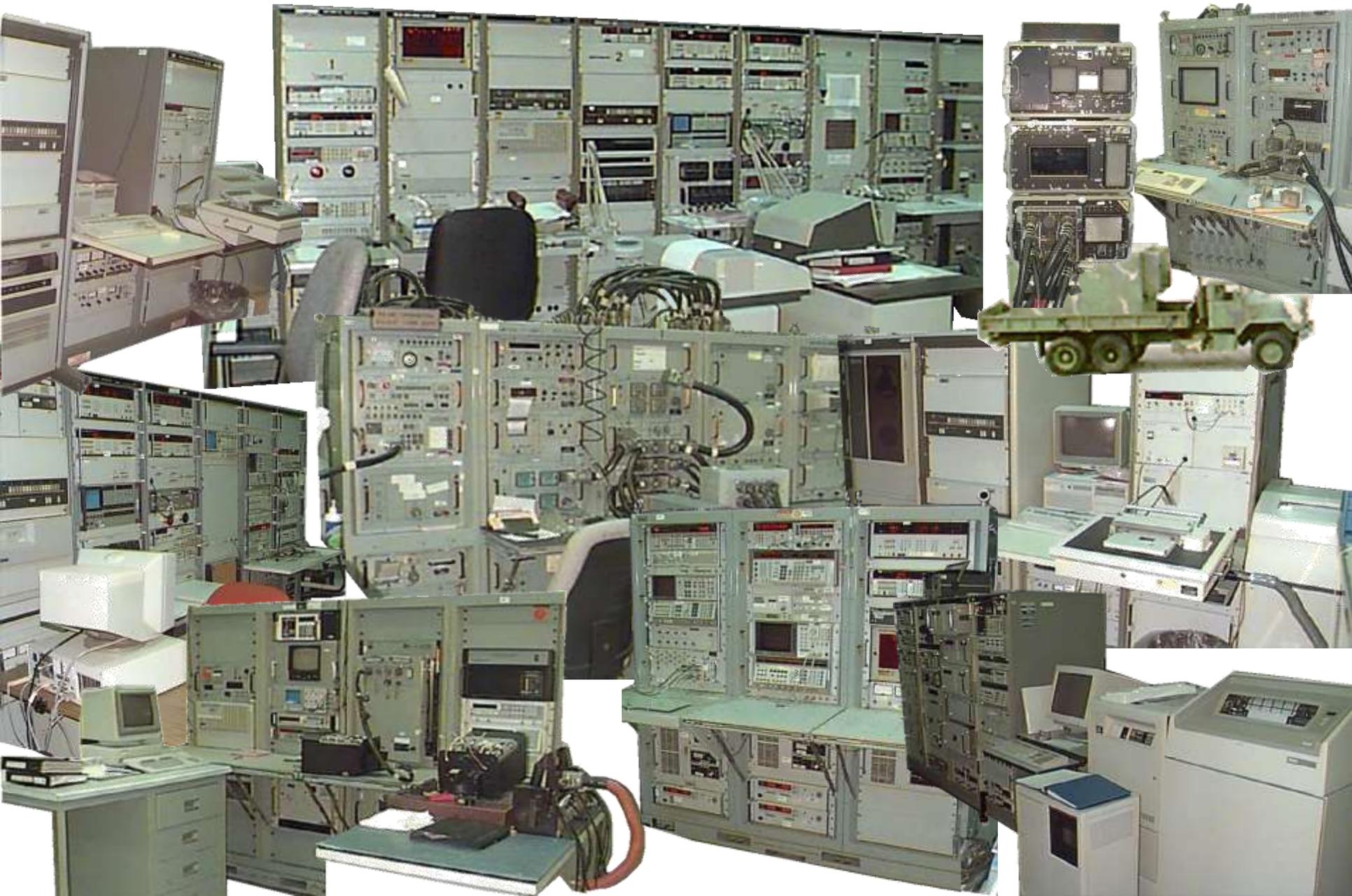
--- Over 400 different ATE ---



more problems....



...and there's even more



# The Major Issues Facing DoD - Late '90s

ATS

1. 85-95% common test capability among the different DoD ATE
2. Most ATE are or are becoming obsolete
3. We pay for similar redesigns multiple times
4. We have NO interoperability among our different ATE types
5. Our ATS does NOT leverage available valuable diagnostic data
6. Combat technologies are being fielded faster than the required support equipment
7. Support costs are rising significantly as DoD combat support systems age
8. Old technology drives huge logistic footprints (volume)
9. Existing ATE does NOT allow for easy and cost effective technology insertion
10. Unique labor skills are required to operate, maintain and support each ATE

# DoD ATS Executive Directorate (ED)

ATS

- OSD established the DoD ATS ED Office to better coordinate ATS across the DoD
  - DoD IG, Congress, and GAO “Tried to Help”
- Goals of the DoD ATS ED:
  - “Reduce the total cost of ownership of DoD ATS”
  - “Provide greater flexibility to the warfighter through Joint Services interoperable ATS”
  - “Reduce logistics footprint”
  - “Improve quality of test”



# DoD ATS Executive Directorate

ATS



## Two Primary Organizational Elements

- **DoD ATS Management Board or AMB**
  - Senior ATS leader from each Service
- **Joint Services Integrated Product Teams or IPTs**
  - Service members interested in the IPT topic

# DoD ATS Management Board

OSD (AT&L)

DASN(L)  
ATS Executive  
Director

ATS Executive  
Directorate  
NAVAIR PMA260

Service Acquisition Executives

Navy

Navy  
PMA260  
CAPT Jacobs  
(Chair)

Air Force

USAF  
AFLCMC/WNA  
LtCol Rivera

Army

ARMY  
PEO CS & CSS  
Brian McVeigh

USMC

USMC  
Product Manager  
Ed Howell

*DoD ATS Management Board (AMB)*

Integrated Product Teams

# Joint Services Integrated Product Teams

**TPS  
Standardization**

**Procedures for standardizing the Test Program Set acquisition process**

**ATS  
Processes**

**DoD ATS Master Plan; Processes and tools for analyzing ATE selections**

**ATS Framework**

**Defines/selects the elements or standards desired in DoD ATS**

**NxTest**

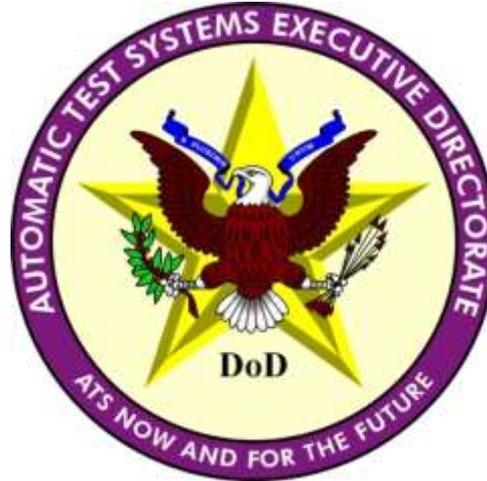
**Assessing and demonstrating emerging test technologies  
Defining and managing the DoD ATS Framework (architecture)**

**IT**

**Developing an Information Assurance Framework for ATE**

# DoD ATS Executive Directorate

ATS



- Originally focused on putting internal Service and cross Services ATS Policies and Processes in place
- Now, more focused on sharing test technologies and leverage ATS investments among the Services

# DoD ATS ED General Strategy

ATS

- 1. Designate DoD Standard ATS Families**
- 2. Define a Technical Open System Framework for ATS designs**
- 3. Share test technology development and insertion**
- 4. Each Service modernize own Standard ATS Family**

# DoD ATS Technology Demonstration

ATS

## **Agile Rapid Global Combat Support (ARGCS)**

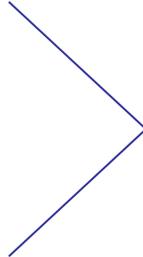
- 2004 – 2008 OSD Advance Concept Technology Demonstration project
  - Competitively awarded to Northrop Grumman
- Investments by OSD, Army, Navy, Marine Corps, and Air Force
  - Funding, technical support and material
  - Information exchange with UK MOD

# Share Investment in Next Generation ATS Demonstrations

---

## ARGCS Key Features & Metrics

- ATS interoperability among weapon systems, Services, and other countries
- Scalable to need and performance enhancements
- Smaller footprint, reduced logistics burden
- Better use of weapon system diagnostics data and historical maintenance data
  - ATE Net-Centric functions
- Key technologies demonstrated:
  - Common Tester Interface (CTI)
  - Synthetic Instruments – stimulus and measurement
  - ATML – net-centric diagnostics functions



Validation of emerging ATS Technical Framework standards

# Share Investment in Next Generation ATS Demonstrations

---

- Services jointly supported the Agile Rapid Global Combat Support (ARGCS) ACTD system-level demonstration
- Successfully demonstrated a number of test technologies:
  - ARGCS Architecture
  - ATML Standards
  - ATML (first implementation)
  - Common Tester Interface
  - Net-Centric Diagnostics
  - Synthetic Instrumentation (SI)
  - SI Component Interface Standards
  - LXI standards
  - Multiple Run-time Environments
  - Commercial Instrument Maturity
    - Bus Test Emulation Instrument
    - High Density Digital Instrument
    - High Density Analog Instrument
    - Advanced Power Supplies



# Share Investment in Next Generation ATS Demonstrations

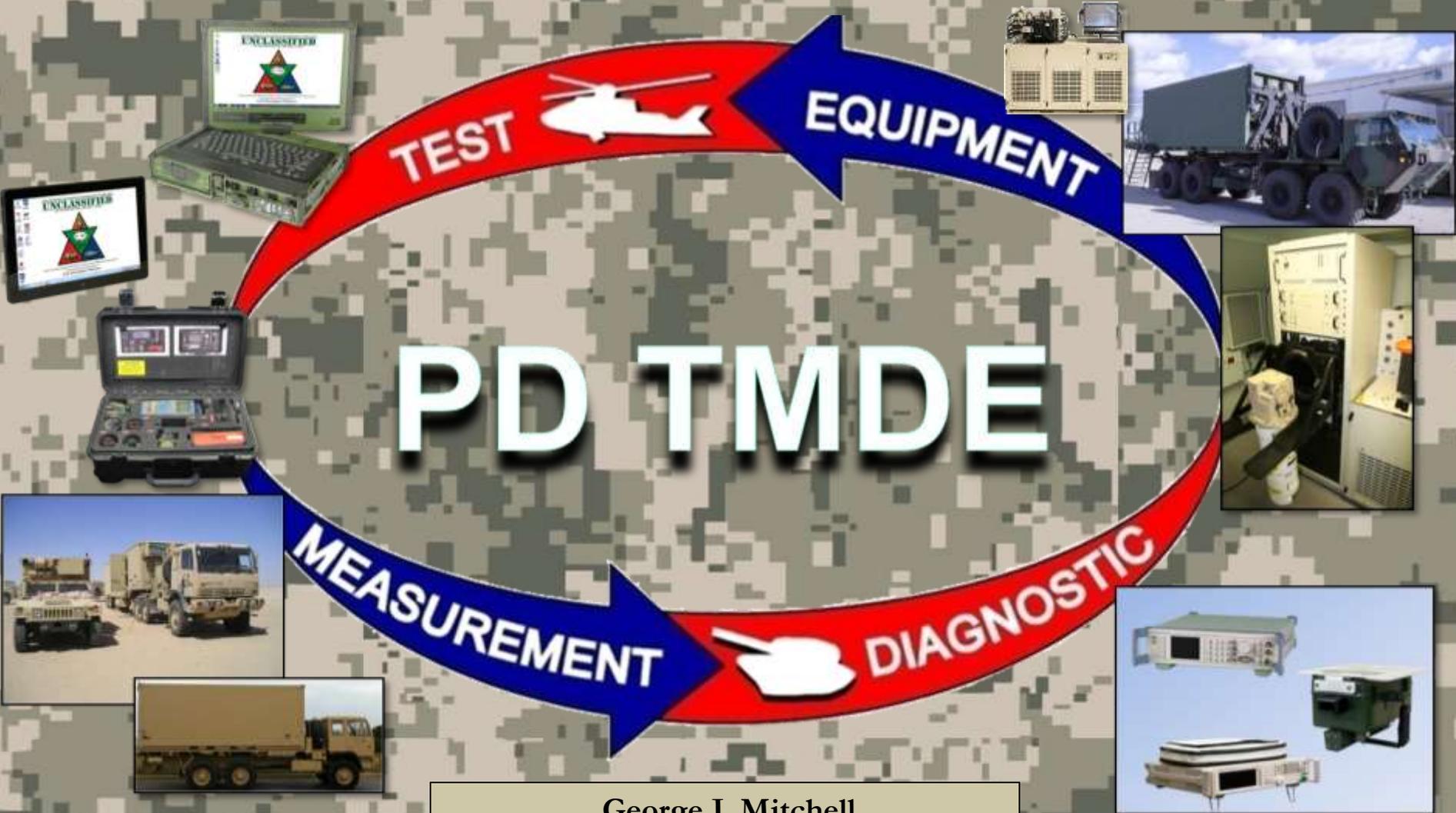
---

- Services jointly supported the Agile Rapid Global Combat Support (ARGCS) ACTD system-level demonstration
- Successfully demonstrated a number of test technologies:
  - ARGCS Architecture
  - ATML Standards
  - ATML (first implementation)
  - Common Tester Interface
  - Net-Centric Diagnostics
  - Synthetic Instrumentation (SI)
  - SI Component Interface Standards
  - LXI standards
  - Multiple Run-time Environments
  - Commercial Instrument Maturity
    - Bus Test Emulation Instrument
    - High Density Digital Instrument
    - High Density Analog Instrument
    - Advanced Power Supplies



**These technologies are being incorporated into the current generation of DoD ATS Families**

*Serving "Our Army at War - Relevant and Ready"*



George J. Mitchell  
Product Director

*Innovation for Today and Tomorrow's Expeditionary Forces*

28 October 2014

**At-Platform Automatic Test Systems (APATS) Maintenance Support Device (MSD)**



Used by all weapon systems maintainers at Field and Sustainment Levels to perform At - Platform maintenance .

**Off-Platform Automatic Test Equipment (OPATS) Next Generation Automatic Test System (NGATS)**



Supports repair of Line Replaceable Modules at Field and Sustainment Levels for multiple weapon systems.

**General Purpose Electronic Test Equipment (GPETE) Test Equipment Modernization (TEMOD)**



Provides Field and Sustainment Level testing of weapon system operational tolerances.

**Calibration Sets (CALSETS) Instruments and Standards**



Performs Precision Maintenance & Calibration for General Purpose Electronic Test Equipment supporting weapon systems.



# Opportunities and Challenges



- Force structure changes and Basis of Issue analysis are impacting quantities of test equipment procured
- Although decreasing (like other programs), test equipment procurement funding will continue
- Procurements for Army general purpose electronic test equipment (via TEMOD program) will continue to be individual ACAT III managed programs, for now
- CALSETS and TEMOD procurements will continue to be primarily influenced by the annual developed Joint Working Group prioritization lists which require HQDA approval
- Shift to multi-task synthetic instrumentation as a material solution remains a work in process
- Establishment of a separate funding line for the TS-4549 bench level radio test set





**Automatic Test Station**



**TPS Storage**



NGATS is a highly mobile, rapidly deployable, general-purpose, reconfigurable automatic test system which directly supports testing and screening of Army weapon systems to maintain their readiness to shoot, move, and communicate. Designated to replace Direct Support Electronic Systems Test Set (DSESTS), Base Shop Test Facilities (BSTF) versions 3 and 5, and other legacy automatic/automated off-platform test equipment currently used by the Army.

**NGATS Fielding:**

- NGATS will replace legacy ATE
- Projected AAO is 181 systems,
  - includes 52 non-sheltered consoles

**NGATS Status:**

- Draft RFP released March 2013
- Final RFP released March 2014
- Award targeted September 2014

# Maintenance Support Device (MSD)



- Internal Combustion Engine Testing
- Mission Planning Software Up-loader
- IETM Diagnostic Software Host
- Digital LogBook

### PERFORMANCE:

- 25% reduction in maintenance task time, quicker, more accurate diagnoses
- Automates / eliminates the use of multi-meters, oscilloscopes, paper manuals, etc. used to troubleshoot and isolate faults

### SPECIAL FEATURES:

- Operates over an extended temperature range in rain, sand, and dust, and survives a 36-inch drop
- Passes 160 degree Fahrenheit temperature test

### FIELDING:

AAO: 38,994  
 FUE: 2006 (MSD-V2)  
 2012 (MSD-V3)  
 FIELDING PLAN: IAW AOP and as TPF or ASIOE with weapons supported

### PRIME CONTRACTOR:

VT Miltope, Hope Hull, AL

### ACQ STRATEGY:

Competitive award production contract based on performance specification

### SCHEDULE:

Production and deployment phase (MSD-V3)

## Supports More than 50 Weapon Systems & 30 Maintainer MOS's

- Abrams
- Apache
- Armored Security Vehicle
- Army Tactical Missile System
- Avenger
- Aviation Mission Planning System (AMPS)
- Base Shop Test Facility
- Blackhawk
- Bradley
- Calibration Sets
- Chinook
- CROWS
- Deployable Universal Combat Earthmover
- Explosive Ordnance Disposal
- Family of Medium Tactical Vehicles
- Firefinder Radar
- Forward Repair System
- Fox

- Heavy Equipment Transporter System (HET)
- Heavy Expanded Mobility Tactical Truck (HEMTT)
- Heavy Tactical Trucks
- Hellfire
- Hercules
- High Mobility Artillery Rocket System (HIMARS)
- High Mobility Multi-Purpose Wheeled Vehicle (HMMWV)
- Hunter
- Hydraulic Excavator
- Javelin
- Joint Attack Munitions System (JAMS)
- Joint Cargo Aircraft
- JLENS
- Joint Light Tactical Vehicle
- Joint Robotics
- Joint Tactical Ground Station
- Kiowa Warrior

- Knight
- Lightweight Howitzer
- Logistical Support Vehicle (LSV)
- Long Range Advanced Scout Surveillance Systems
- Marine Corps Tactical Unmanned Aerial System
- Mine Resistant Ambush Protected (MRAP)
- Multiple Launch Rocket System (MLRS)
- Paladin
- Palletized Load System
- PEO Integration
- Patriot
- Sentinel
- Shadow
- Stryker
- Tactical Quiet Generators
- Theater High-Altitude Area Defense
- Wolverine

# PD TMDE Acquisition Calendar

	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24
Next Generation Automatic Test Station	LRIP			FRP contract Award	KP FAT	FRP Decision KP	Production			Follow-on Production Contract			
						-LUT (-) -Reliability -Maintainability	FUE						



TPS & ETMS

*Systems Impacted: 13 / TPSs Required: 289*



CMF: 94



Night Vision System - 5    Wolverine - 5    Stryker - 72    M777 - 15    Bradley - 69    Abrams - 67



CREW - Duke - 9    Longbow - 4    Tow-Cobra - 4    CROWS - 24    MLRS - 5    Avenger - 9    Missile Guidance System - 1

AAO: 181  
FUE: 30FY17

	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24
MSD-V4 (Light & Rugged)			MSD-V4(L) TC-LP/LRIP		MSD-V4(L) LRP Contract Award								
			MSD-V4(R) RFP		MSD-V4(L) FUE					MSD-V4(R) FRP			
			MSD-V4(R) Contract Award		MSD-V4 FAT		MSD-V4(R) FUE						

*MSD IETMs Supporting 50 Systems and 40 MOSs*



MSD-V4 (L)

CMF: 11, 12, 13, 15, 18, 19, 25, 74, 88, 89, 91, 92, & 94



Ground Combat Platforms - 7    UAV-2    Wheel and Track Support Vehicles - 12    Missile Systems - 7    Diagnostic - 3



Radar/Surveillance-8    CROW - 1    Aviation - 5    TQ Generators - 1



MSD-V3 Rugged

MSD-V4 (L)  
AAO: 14K  
FUE: 20FY16

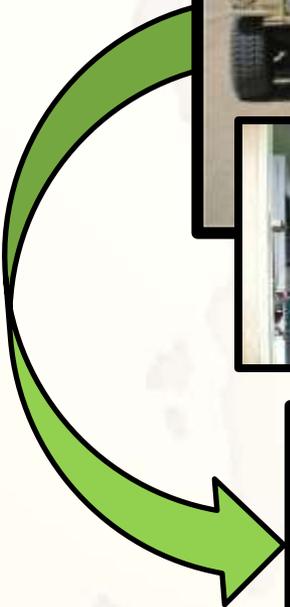
MSD-V4 (R)  
AAO: 26K  
FUE: 30FY17

## Tactical (Active and NGB) = 52



AN/GSM 421

AN/GSM 705



AN/GSM 421 V2 (New)

Sets	MTOE	TDA USATA/ NGB	NGB	Total
AN/ GSM 705	14		12	26
AN/ GSM 421	14		12	26
<b>Instruments</b>				
AN/ GSM 286		24/21		53
AN/ GSM 287		50/17		67
AN/ GSM 439	14	13	12	39
AN/ GSM 440	14	8	12	34

## Acquisition & Production Calendar

### Calibration Equipment Supporting the War Fighter

#### Individual Weapons



- M-2 .50 Cal
- M-4 Carbine
- M-9 Pistol
- M-16 Rifle
- MK19-3 Grenade Machine Gun
- M24 Sniper Rifle
- M203 Grenade Launcher
- M240B Machine Gun
- M-249 Squad Automatic Weapon

#### Aircraft and Missile



- Apache Longbow
  - Hellfire Missile
  - 30mm Cannon
- Black Hawk
- Chinook
- Kiowa Warrior
- Armament:
  - 70mm rockets
  - .50 caliber machine gun
  - Stinger missiles

#### Air Defense Artillery



- Avenger
- High Mobility Artillery System
- Medium Extended Air Defense System
- Surface Launched Advanced Medium Range Air-to-Air Missile
- Patriot
- Stringer

#### Indirect Fire Systems



- MLRS
- M102, M119, M198, Towed Howitzer
- M120/M121, M224, M252 Mortar
- Paladin

#### NBC Defense Equipment



- NBCRS M93/M93A1

#### Tracked Vehicles



- Abrams
- Bradley
- M88A2 Hercules
- M113 Family of Vehicles

#### Anti-armor Weapons



- Javelin
- TOW

#### Communications



- VSAT
- SINGARS
- Transceivers

#### Wheeled Vehicles



- FMTV M1070 HET
- PLS Stryker
- HEMTT HMMWV

FY12    FY13    FY14    FY15    FY16    FY17    FY18    FY19    FY20    FY21    FY22    FY23    FY24

CALSETS and Instruments Fielding	<b>In Fielding</b>											

**Fielding Actions:**

- 11 each: Infrared Thermometer Calibrator
  
- 30 each: Signal Generators
  
- 21 each: Weight Sets

Systems Impacted:



Wheel Vehicles



Aviation



Air Defense



Communication



Aviation



Air Defense



Indirect Fire



Missile



Wheel and Track Vehicles



FY12    FY13    FY14    FY15    FY16    FY17    FY18    FY19    FY20    FY21    FY22    FY23    FY24

CALSETS and Instruments Fielding			<b>In Fielding</b>									
----------------------------------	--	--	--------------------	--	--	--	--	--	--	--	--	--

**Fielding Actions:**

- 155 MSD Automated Test Equipment to Calibration organizations:
- 4 each: AN/GSM-421A(V)2 tactical calibration platforms
- 14 each: Themometry Bridge Temperature standards
- 162 each: Microwave Adapter Kits
- 162 each: Dyn400 Night Vision Test Set calibrators

Systems /Units Impacted:

**Tactical and TDA Units**  
 Joint Base Lewis-McChord  
 Ft. Bragg  
 Ft. Riley  
 520<sup>th</sup> OD CO (Korea)



Aviation

Track Vehicles



Aviation

Air Defense

Communication



Night Vision Goggles



# CALSETS Transfer Level



## JWG LIST (FY13 JWG)

CALSETS Transfer JWG LIST (FY13 JWG)				
FY12 Priority	JWG #	Item Name	Sets	FY13 Priority
3	JWG10-02	Instrument Controller (Replacement)	REF, 286, 287, 440, 439	1
12	JWG10-02	ICE Software Replacement	REF, 286, 287, 440, 439	2
NEW	JWG13-01	Pneumatic Pressure Controller	REF, 286, 287, 439, 440	3
8	JWG08-38	Tachometer Calibrator	REF, 440	4
20	JWG09-19	Fluke 744 Portable Thermocouple Calibrator	REF, 440	5
NEW	JWG13-03	Distortion Analyzer	REF, 286, 287, 440	6
6	JWG10-07	Core Workstation Replacement	REF, 286, 287, 440, 439	7
19	JWG10-01	Long Gauge Block Set	286, 287, 440, 439	8
16	JWG12-22	Thermocouple Calibrator	REF, 286, 287, 440	9
10	JWG09-16	Syncro-Resolver Calibrator	REF, 440	10
11	JWG12-05	DC Power Supply Test Set	286, 287, 440	11
21	JWG11-16	Precision Type N Gage Kit	REF	12
5	JWG11-10	3458A DMM Replacement	REF, 286, 287, 440, 439	13
7	JWG08-46	H-Frames and Pumps	286, 287, 440	14
4	JWG12-03	Fiber Optic calibration Workstation (FOCUS)	287, 440	15
9	JWG08-42	Torque Cells	REF, 286, 440	16
14	JWG10-16	Joint Chemical Agent Detector Tester Calibrator	286, 287, 440	17
13	JWG10-28	Joint Biological Detector System Calibrator	286, 287, 440	18
17	JWG09-02	HP 905A Coax Sliding Load	REF, 286, 287, 440	19
24	JWG08-35	Gamma Source For Calibrating Radiac Sensors	440	20
18	JWG09-10	Fluid Separator, MIS-26326 Replacement	REF, 286, 287, 440	21
23	JWG11-21	T-55 Test Fixture	440	22
15	JWG10-05	MERLIN Inventory System	P, REF, 286, 287, 440, 439	23





# CALSET'S Reference Level/APSL



## JWG LIST (FY13 JWG)

CALSET'S Ref/APSL JWG LIST (FY13 JWG)				
FY12 Priority	JWG #	Item Name	Sets	FY13 Priority
NEW	JWG13-04	Low Differential Pneumatic Pressure Standard	REF	1
4	JWG10-23	Blackbody Calibration Source	REF	2
NEW	JWG13-26	Phase Noise Standard	P	3
NEW	JWG13-27	Power Sensor Standard	REF, P	4
NEW	JWG13-24	Freq Counter Standard	REF, P	5
NEW	JWG13-25	Oscope Plugin Standard	REF, P	6
NEW	JWG13-19	Type N Calibration Kit	P	7
6	JWG12-07	Low Frequency Vector Network Analyzer	REF	8
10	JWG12-21	Phase Angle Standard	P, REF	8
NEW	JWG13-18	Noise Figure Analyzer	P	9
15	JWG11-17	VNA Calibration Kits	REF	10
35	JWG09-08	Electronic Height Gauge	REF	11
17	JWG08-44	Teraohmmeter MIS-10549 & 13440048 (Guildline 9520 & 6500)	REF	12
16	JWG09-20	Fluke 5520A Multi-Product Calibrator	REF	13
34	JWG09-15	Gauge Block Comparator	REF	14
33	JWG09-17	Gaussmeter Calibrator	REF	15
19	JWG12-17	Signal Gen, 20GHz	P	16
20	JWG12-16	Test Cables, Vector Network Analyzer	P	17
21	JWG12-15	Signal Gen, Microwave Analog	P	18
22	JWG12-14	Power Meter, P Series	P	19
23	JWG12-13	PRT High Temperature	P	20
24	JWG12-10	Balance, 100G	P	21
25	JWG12-11	Balance, 5G	P	22
26	JWG12-12	Balance, 1KG	P	23
27	JWG12-09	Dead Weight Tester (Pneumatic)	P	24
28	JWG12-08	Temperature Readout, CHUB-E4	P	25
11	JWG12-20	Surface Measurement System	P	26
29	JWG09-09	Universal Calibrator	REF	27
30	JWG11-05	Pressure Controllers	P	28
32	JWG11-03	Humidifiers	P	29
18	JWG10-27	High Pressure Pneumatic controller Calibrator	REF	30
14	JWG12-18	Vibration System Controller, 4 channel	P	31
36	JWG11-06	Aerosol Cascade Impactor	P	32
12	JWG12-19	Reciprocity Accelerometer Calibration System	P	33
37	JWG11-02	Audio source	P	34
38	JWG11-04	High Frequency Oscilloscope Sysstem	P	35
13	JWG10-21	Hydraulic Deadweight Tester	REF	36
39	JWG08-24	Low Frequency Spectrum Analyzer	REF	37



# PD TMDE Acquisition Calendar

FY12    FY13    FY14    FY15    FY16    FY17    FY18    FY19    FY20    FY21    FY22    FY23    FY24

<u>TS-4549/T</u> <u>Radio Test Set</u>						▲ ACQ Strategy Approval							
	▲ Issue Sources Sought					▲ Draft APB							

*Scheduled is dependent on availability of funds in FY 16*



Actual photo not available

- Project pending allocation of funding to new line established for the TS-4539/T

# PD TMDE Acquisition Calendar

	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24
<b>ME-572(U)/U Ammeter</b>				▲ Contract Award	▲ FRP								
				▲ FUE									



CMF: 15, 25 & 91

### Systems Impacted



Aviation

Signal

Automotive

AAO: 682  
FUE: 1QFY16

	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24
<b>Oscilloscope: OS-305/U &amp; OS-307/U</b>				▲ ACO Strategy Approval									
				▲ Tech Evaluation									



Picture not Available

CMF: 25, 35 & 94

### Systems Impacted



Ordnance, Intelligence &  
Signal Schools

Communication & Electronic Shops  
& Area TMDE Support Teams

OS-305/U  
AAO: 1564  
FUE: 4QFY16

OS-307/U  
AAO: 3572  
FUE: 2QFY16

# PD TMDE Production Calendar

	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24
TS-4530A/UPM RADAR TEST SET			▲ FRP Kits ▲	▲ FRP Sets ▲									

Systems Impacted:



CMF: 15 & 94 Maintainers



DOD Aircraft



DOD Watercraft



Commercial Aircraft



Preflight Checks

AAO: 1709  
 FUE: 3QFY14  
 Number Fielded: 50

	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24
AN/PRM-36 Radio Test Set		▲ Contract Award ▲	▲ PVT ▲	▲ FUE ▲	▲ FRP ▲								



CMF: 15, 25 and 94,



ARC-201

GRC-245

PSC-5

Systems Impacted:



PRC-148



ARC-186



PRC-150

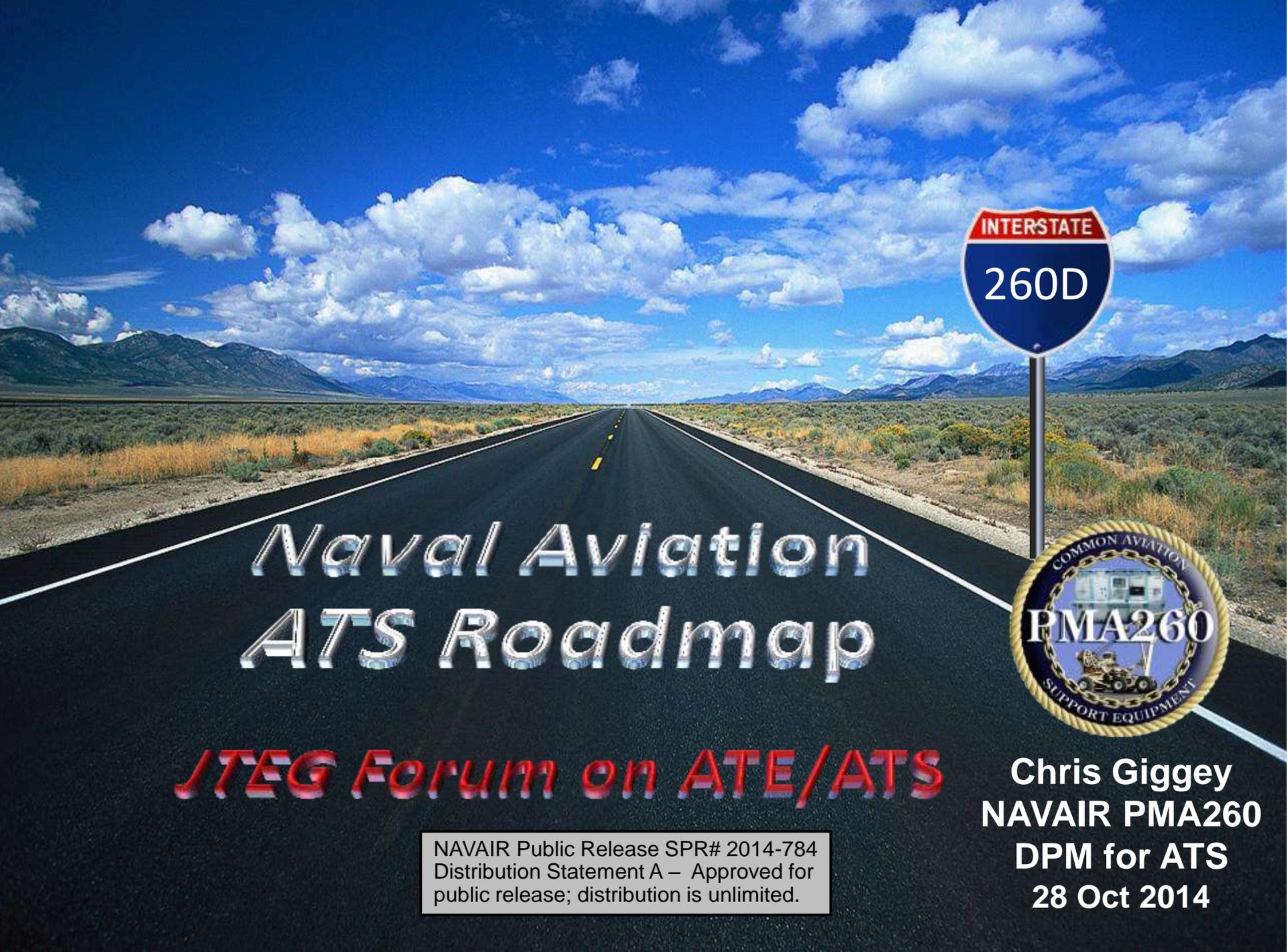
AAO: 8000  
 FUE: 4QFY14  
 Number Fielded: 802



## Prioritization List

- |  |  |
|--|--|
| 1. SPECTRUM ANALYZER                   | Replaces: AN/USM-677, (LIN A70285)   |
| 2. TEST SET, OPTICAL FIBER             | Replaces: TS-4320/G, (LIN T24009)  |
| 3. TEST SET, RADAR (IFF)               | Replaces: AN/UPM-155, (LIN R19417)   |
| 4. COUNTER, UNIVERSAL ELECTRONIC       | Replaces: AN/USM-459, (LIN C19266); AN/USM-459A, (LIN C19266); AN/USM-459B, (LIN C19266) |
| 5. TEST SET, OPTICAL POWER             | Replaces: TS-4358/G, (LIN T23357)  |
| 6. SPECTRUM ANALYZER                   | Replaces: AN/USM-620, (LIN S01484)   |
| 7. TEST SET, RADIO FREQUENCY POWER     | Replaces: AN/URM-213, (LIN R22666)   |
| 8. METER, POWER (Wattmeter)            | Replaces: TS-3790/U, (LIN P41172); TS-3793/U, (LIN T90150)                               |
| 9. LEVEL METER, FREQUENCY SELECTIVE    | Replaces: AN/USM-490, (LIN F60502)   |
| 10. ANALYZER, LOCAL- WIDE AREA NETWORK | Replaces: TS-4511/P, (LIN A55428)  |
| 11. MODULATION METER                   | Replaces: ME-523/U, (LIN M61743)   |





# Naval Aviation ATS Roadmap

## *JTEG Forum on ATE/ATS*

NAVAIR Public Release SPR# 2014-784  
Distribution Statement A – Approved for  
public release; distribution is unlimited.



**Chris Giggey**  
**NAVAIR PMA260**  
**DPM for ATS**  
**28 Oct 2014**

# 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)

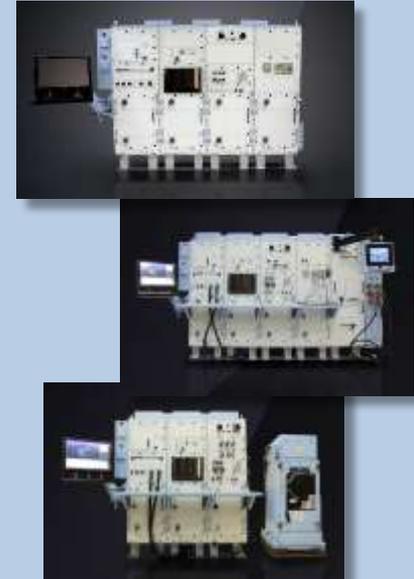
## Mainframe CASS -- 1992



## RTCASS -- 2008



## eCASS -- 2017



NAVAIR Public Release SPR# 2014-784  
Distribution Statement A – Approved for  
public release; distribution is unlimited.



# CASS FoT Operating Environments

## Marine Aviation Logistics Ship



## Aircraft Carriers



## Assault Ships



## Shore Intermediate Maint.



## Depots



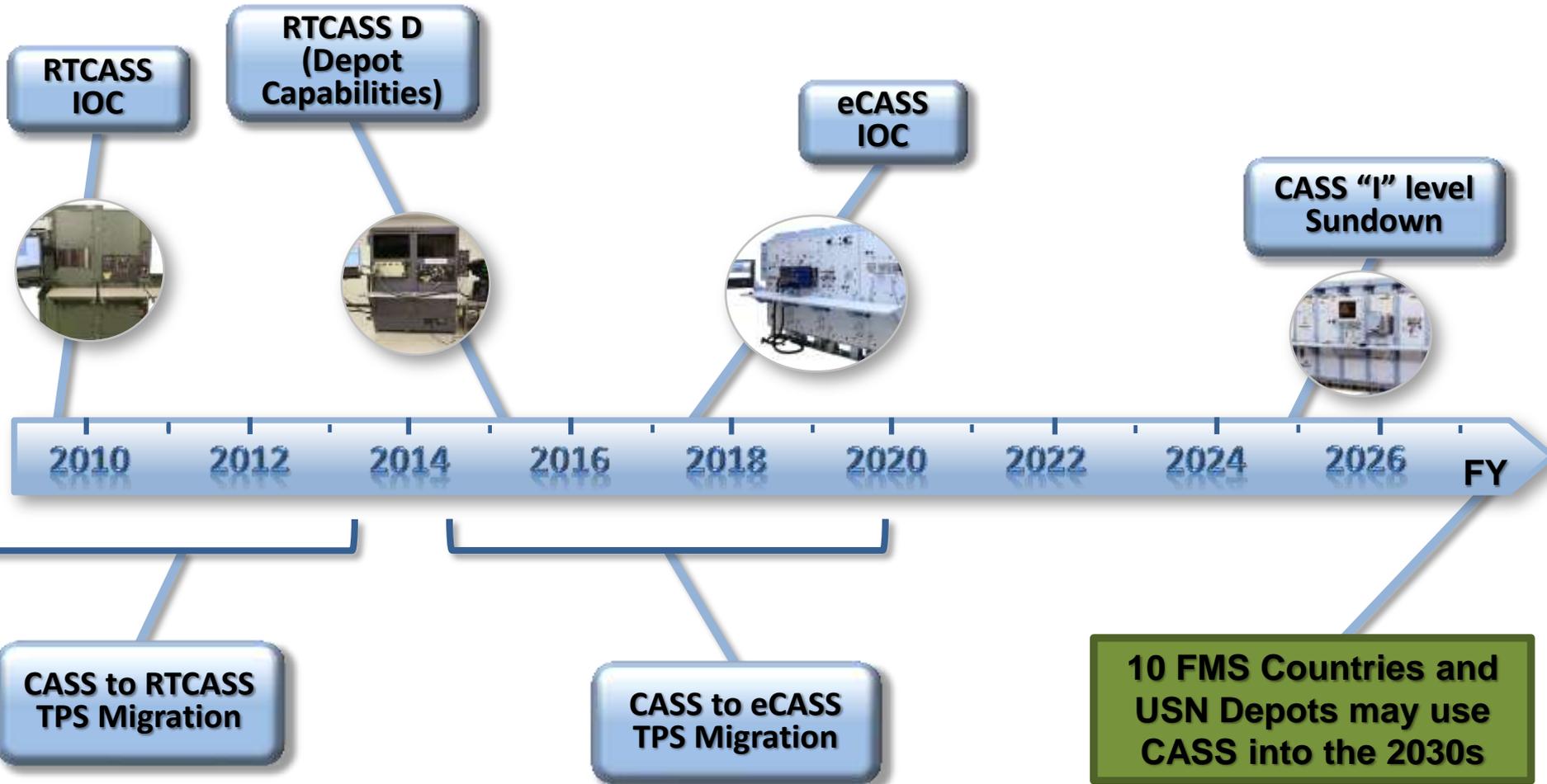
## Marine Maint. Van Pads



NAVAIR Public Release SPR# 2014-784  
Distribution Statement A – Approved for  
public release; distribution is unlimited.

# High Level Summary Roadmap

ATS



NAVAIR Public Release SPR# 2014-784  
Distribution Statement A – Approved for public release; distribution is unlimited.

# CASS SUNDOWN

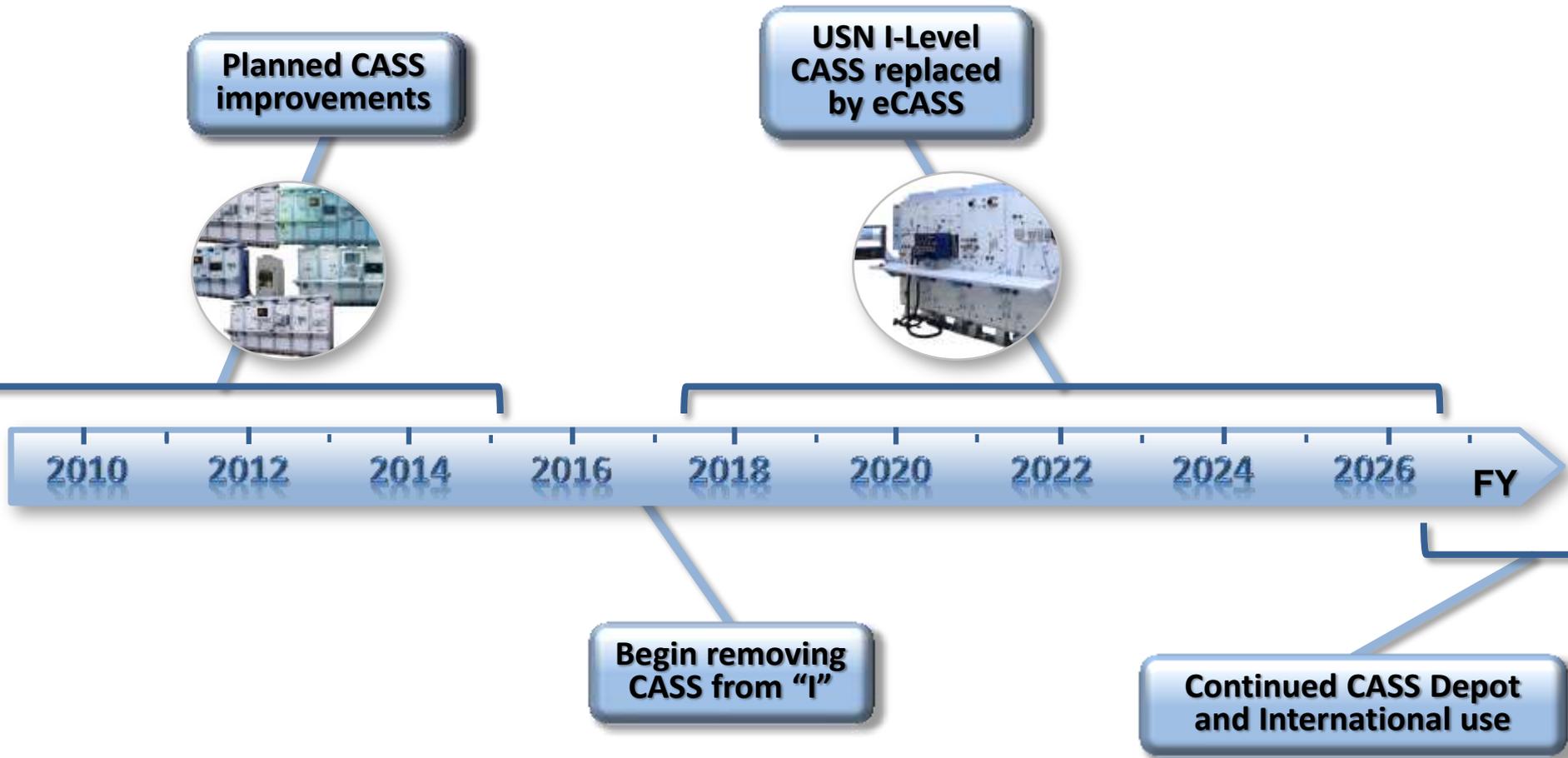
I-Level Sundown

2016 - 2026

NAVAIR Public Release SPR# 2014-784  
Distribution Statement A – Approved for  
public release; distribution is unlimited.



# Mainframe CASS Sundown



NAVAIR Public Release SPR# 2014-784  
Distribution Statement A – Approved for  
public release; distribution is unlimited.

# 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

## RTCASS

- 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



NAVAIR Public Release SPR# 2014-784  
Distribution Statement A – Approved for  
public release; distribution is unlimited.



# RTCASS, Depot (RTCASS-D)

RTCASS

- 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

NAVAIR Public Release SPR# 2014-784  
Distribution Statement A – Approved for  
public release; distribution is unlimited.

# Still Making New CASS/RTCASS OTPSs

CASS

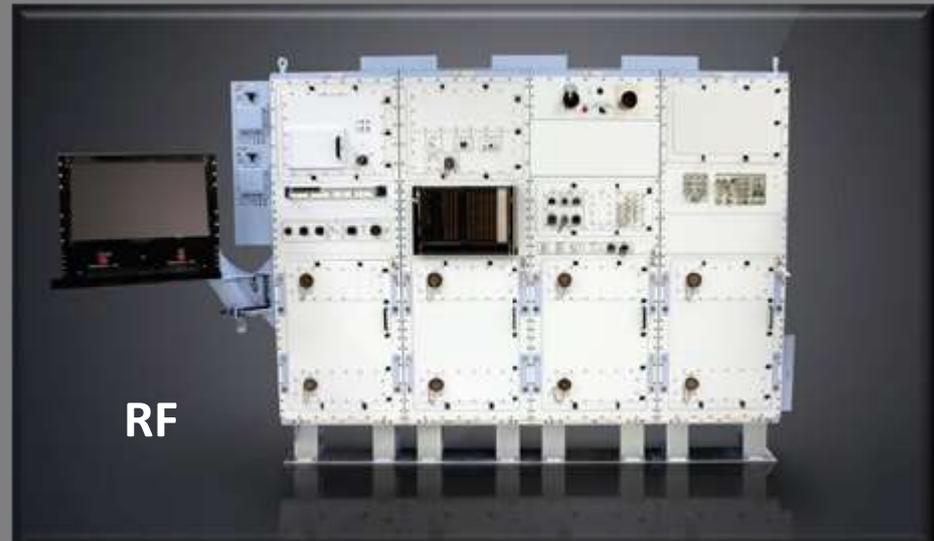
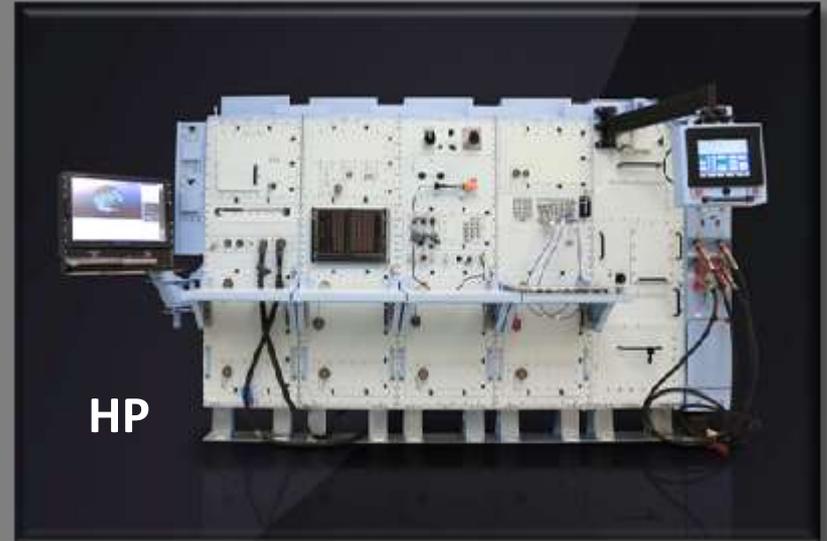
- ATS Lot 1 Offload to CASS Reliability Improvement Program
  - A complete hardware remake with improved test programs
- ALR 67v2 SRAs Offload to CASS (depot OTPS)
- H-53 AFCS Offload to CASS
- F-18 DTS Direct to CASS
- EA-18G ALQ 218 Direct to CASS
- P-8 ALQ 240, MAS, and SMS Direct to CASS
- H-60 MMR 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)

## **F-18 International Partners Contributing**

- ATS Depot OTPS Offload
- F-18 USSR and RMM
- AYK 14 Computer Offload to CASS
- F-18 Radar Altimeter (planned)

NAVAIR Public Release SPR# 2014-784  
Distribution Statement A – Approved for  
public release; distribution is unlimited.

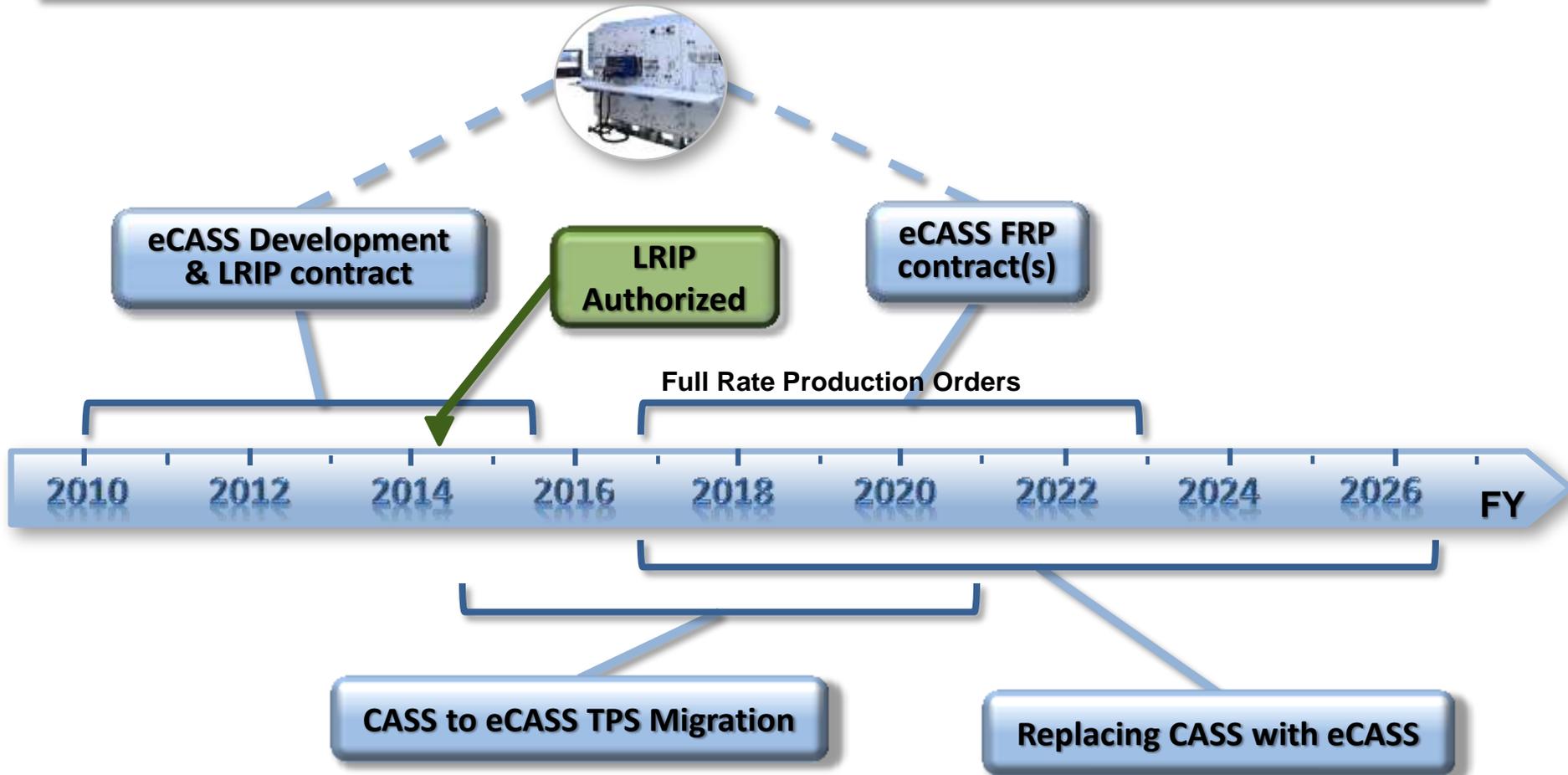
# eCASS Systems



NAVAIR Public Release SPR# 2014-784  
Distribution Statement A – Approved for  
public release; distribution is unlimited.

# Replacing Mainframe CASS with eCASS

eCASS



NAVAIR Public Release SPR# 2014-784  
Distribution Statement A – Approved for  
public release; distribution is unlimited.

# 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

# 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
- Universal Load Assembly (ULAS) Ancillary
- Multi Purpose Raster Stroke Display (MPSRD) Ancillary
- Automatic Gyro/Gimbal Control System (AGCS) Ancillary
- Enhanced External hard Drive (EEHD)
- Manchester Harpoon Card Ancillary
- Video Pattern Generator (VPG)

# TPS Roadmap

ATS

## About 2,800 CASS TPSs

- About 1,700 Re-hosted from 30 legacy ATE
- About 1,100 Direct to CASS



## Direct to eCASS TPSs



1990 1995 2000 2005 2010 2015 2020 2025 2030

## 722 CASS TPSs “Migrated” to RTCASS



## About 550 CASS TPSs will be “Migrated” to eCASS



NAVAIR Public Release SPR# 2014-784  
Distribution Statement A – Approved for  
public release; distribution is unlimited.

# Future Naval Aviation “I” ATE Family

ATE

## 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

eCASS POR

## Candidates

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

## RTCASS

(Target: Man Transportable & MMF )

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



- RTCASS
- RTCASS HP
- RTCASS D

NAVAIR Public Release SPR# 2014-784  
Distribution Statement A – Approved for  
public release; distribution is unlimited.

# Planned CASS Family Technology Insertions

ATS

- **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**

NAVAIR Public Release SPR# 2014-784  
Distribution Statement A – Approved for  
public release; distribution is unlimited.

# CASS Family Science & Technology Projects

ATS

(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)

# Naval Aviation ATS Summary

ATS

- 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

NAVAIR Public Release SPR# 2014-784  
Distribution Statement A – Approved for  
public release; distribution is unlimited.

*Thank You.*

*Any Questions?*



# United States Marine Corps ATS

28 October 2014



Mike Heilman  
ATS Team Lead  
Quantico, VA

***Marine Corps Test, Measurement, and Diagnostic Equipment (TMDE)***



# APS VISUAL DESCRIPTION

Weapon System  
Secrep  
Components



Application  
Program Set HW  
and SW Interface



Automated Test  
System





## APS OBJECTIVES AND BENEFITS

- **Reducing maintenance cost**
  - Utilizing trained MOS Marines vs. contractor support
  - Enabling systems to be tested/ repaired as far forward as possible
  - Providing a screening capability for UUT's to eliminate NEOFs and ensure Code A condition
  - Reducing shipping cost
  - Reducing GPETE
  - Providing one General Purpose ATE solution vs. multiple platform testers
- **Reducing maintenance repair time**
  - Repair vs. evacuate
  - Dynamic testing to rapidly isolate fault
- **Reducing foot print**
  - General Purpose ATE platform to support multiple Weapon System Platforms vs. multiple special purpose test equipment
- **Commonality across the USMC and within DOD**
  - Marine maintainers will operate & maintain common test platform across entire maintenance community
  - Adhering to DOD ATS guidelines for automated test programs



# Marine Corps Family of ATE

TETS/VIPER-T → GPATS --- Large ATS

GRMATS --- Small ATS (Comm)

EMSS --- Small ATS (Weapon Sys)

## Goals :

- Develop Commonality across each ATS platform
  - Common Instrument Controller
    - Upgradeable
    - Manage IA requirements
  - Common Software (meets IA requirements)
    - Operating System
    - Test Program Runtime/Development Environment
  - Allows for:
    - Hardware cost and integration savings
    - Reuse of software/Test Program Code
    - User familiarity
    - Improved Configuration Management
- Modular Design configurable to support specific user requirements
  - Test Resources fielded based on support requirements



# Roadmap for USMC AT&T



*Marine Corps Test, Measurement, and Diagnostic Equipment (TMDE)*



# Today

## 1990's Technology



USB Interface

PCI MXI-2 Controller

PCI Serial Interface

PCI Ethernet Interface

PCI Card GPIB Interface

VXI Counter Timer

VXI Medium Frequency Switches

# Sunset

VXI PCI to MXI-2 Interface

PCI-to-PCI Expansion

VXI High Frequency Switches

VXI Arbitrary Function Generator

PCI Card 1553 Interface

VXI Multi-purpose Switches

VXI Digital Test System

DMM

PCI-PCM Carrier

VXI Local Oscillator

Windows XP Operating System

VXI Microwave Synthesizer

VXI Oscilloscope

VXI Radio Frequency Down Converter Power Meter

VXI Electronic Digitizer

# End of Life

Power Sensor

PCI Analog Video Capture

IC Controller Docking Station

Instrument Controller Laptop

32 bit PCI Expansion Backplane

*Marine Corps Test, Measurement, and Diagnostic Equipment (TMDE)*



# Large System Platform has Major Obsolescence issues

How do we  
mitigate the issues?



Replace and/or Tech Refresh



# Technology Refresh

The periodic replacement of Commercial Off-The-Shelf (COTS) components within a DoD system to assure continued supportability during the system life cycle.

- **Technology upgrades, refreshers, and insertions?**
- **“Modernization through Spares”**
- **Technical obsolescence risk strategy**
- **Replacement of DoD Software development tools with the latest tools**
- **Parts obsolescence strategy**
- **Procurement strategy**



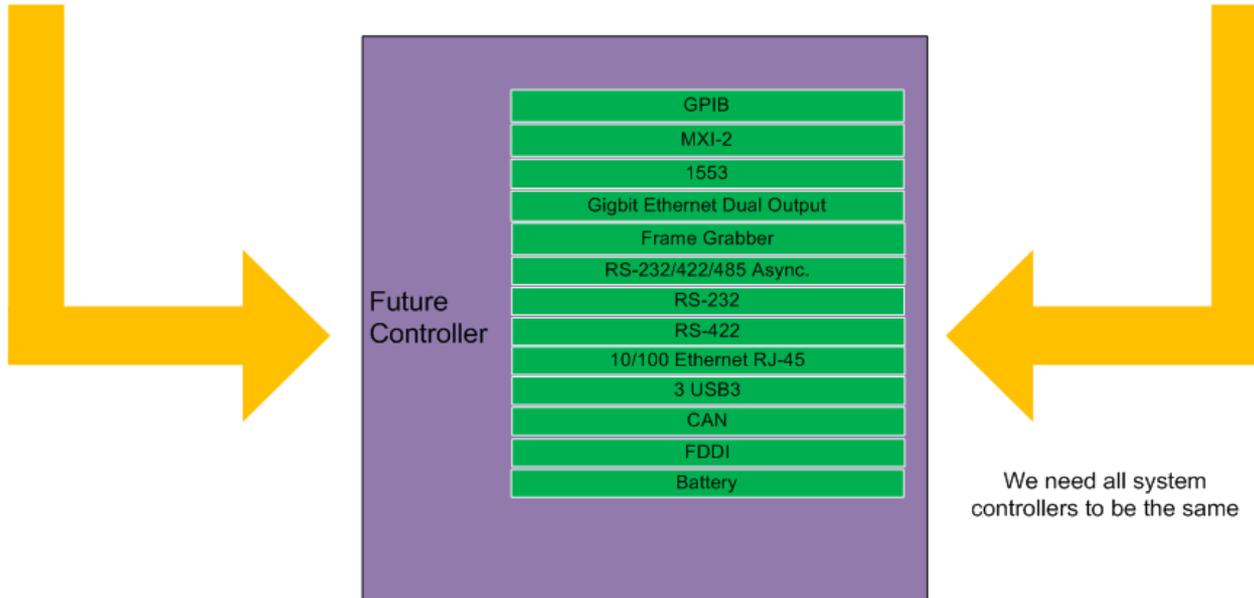
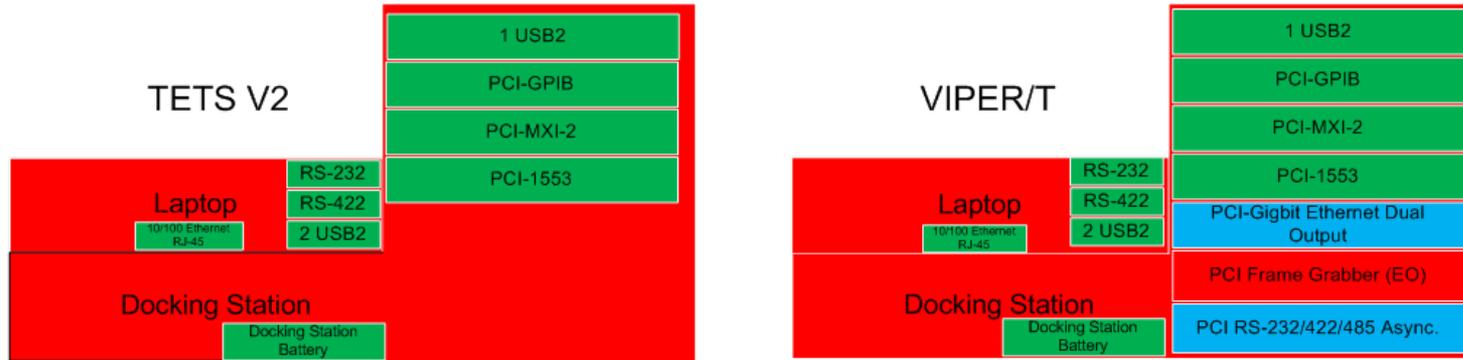
# IC Replacement



## Current

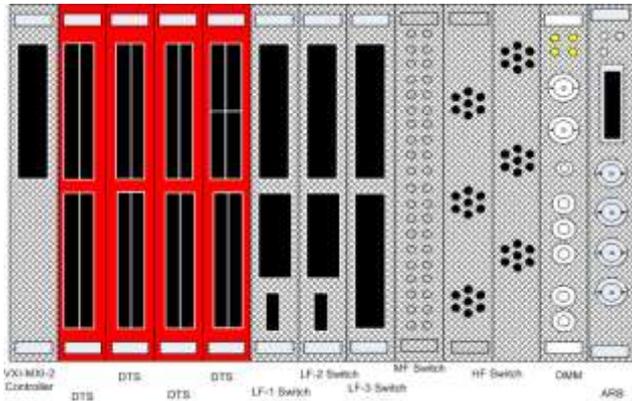


# IC Replacement

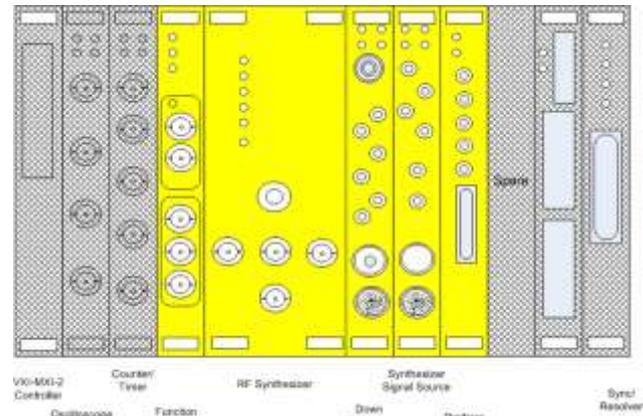




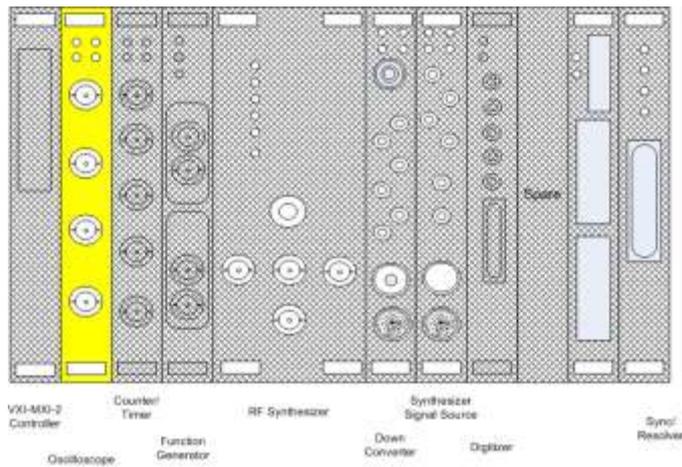
## Digital Test System



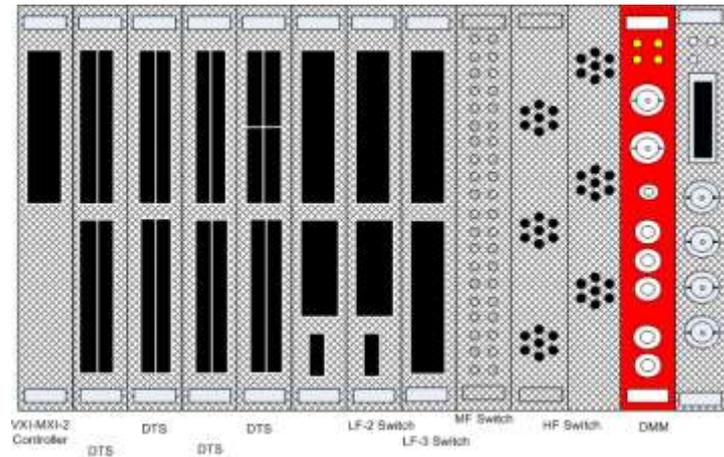
## RF Replacement

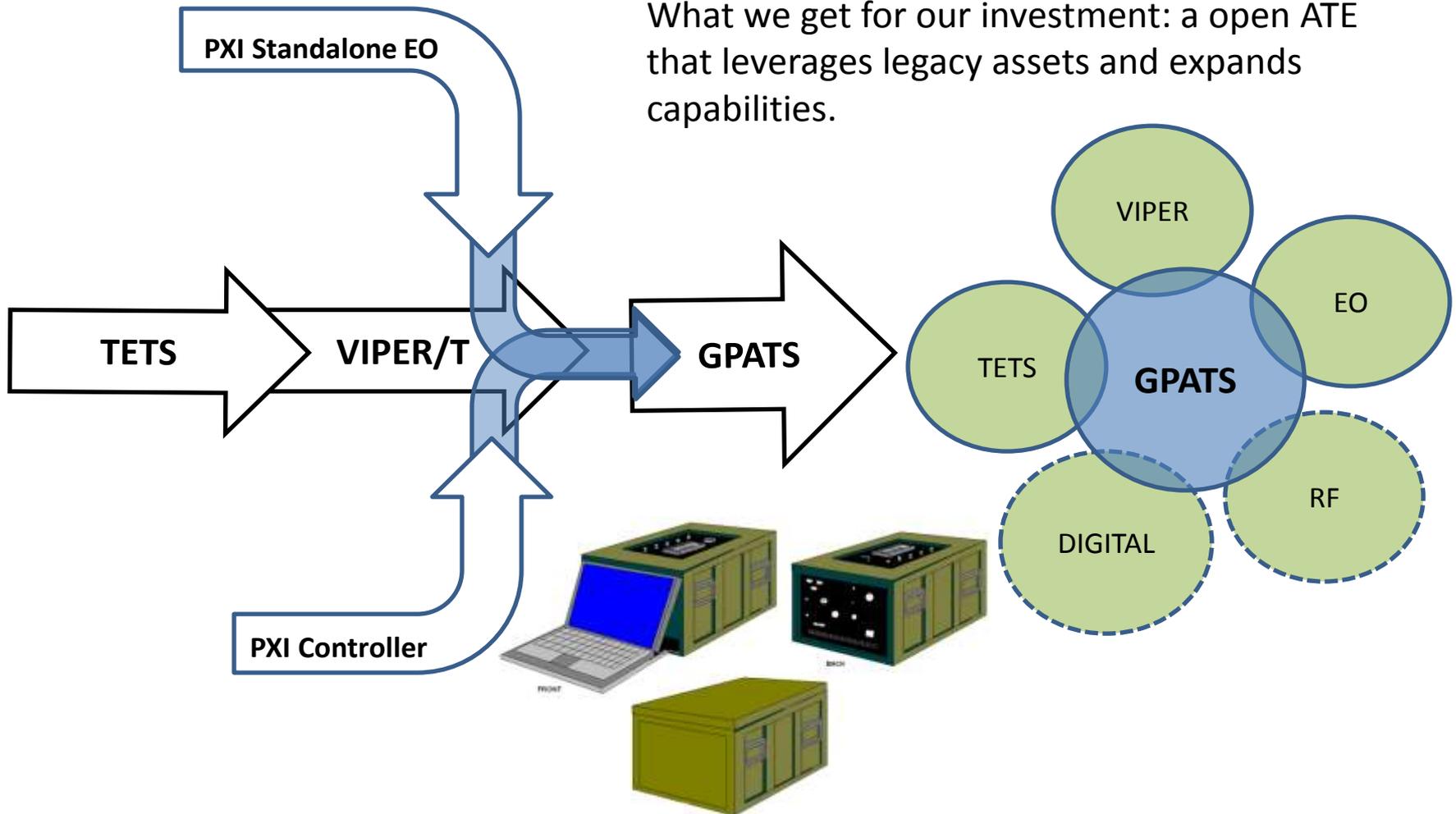


## Oscilloscope Replacement



## Digital Multimeter Replacement





GPATS is the direct result of upgrades to the TETS/VIPER IC. It can stand on its own as ATE or act as a control for VIPER, TETS, EO and or any future ATE testers.



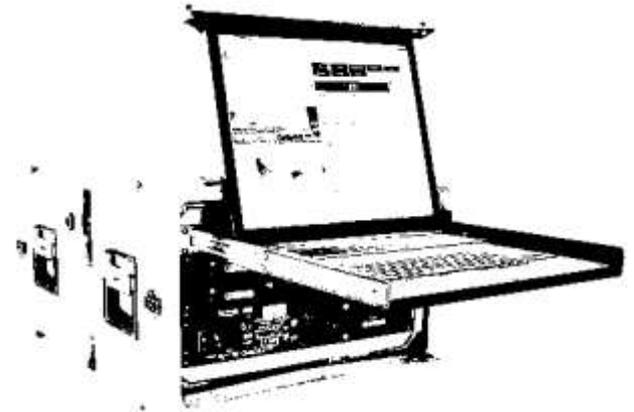
# Total System Replacement

**Third Echelon Test System**



**TETS**

**General Purpose Automatic Test System**



**GPATS**



# General Purpose Automated Test System

## PROBLEM:

Technological advances in weapon system design and performance, coupled with impending obsolescence of fielded instrumentation, dictate that a next-generation test solution must be identified and employed in order to meet the demands of future combat systems.

## BACKGROUND:

The Marine Corps Automatic Test Equipment Set (MCATES) Family of Systems (FoS) Analysis of Alternatives (AoA) identified a Hybrid tester using new technologies along with existing test assets as both an effective and affordable replacement to the existing MCATES. The current TETS and VIPER/T systems are based on late 1980s technology and are becoming increasingly difficult to support. By addressing obsolescence within the legacy systems with the proposed PXI technology, the Marine Corps will be capable of providing the required support to existing and future weapons systems.

## PRODUCT / SOLUTION:

Build a modular test solution that can use the latest COTS standards while leveraging existing GOTS test assets.



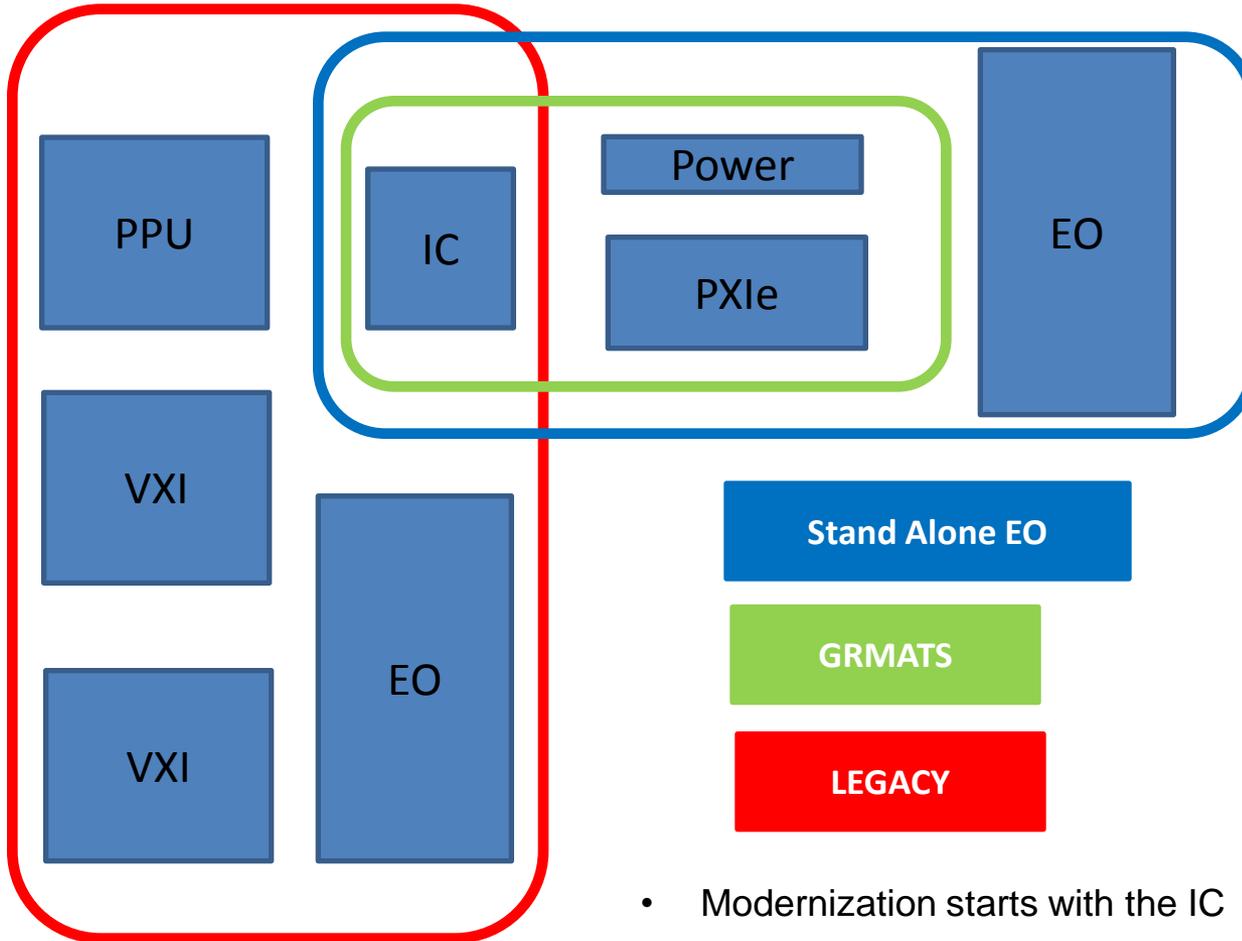
## Approach:

- Procure an updated VIPER/T to meet LAV requirements
- Establish a future technology test bed
- Satisfy forward optics testing requirements through a stand alone Electro-Optic capability
- Implement alternative testing languages
- Address multiple operating systems



## Future Test Activities

### GPATS Configurations





# Stand Alone EO Test Set

## PROBLEM:

An Operational need for a smaller footprint and additional assets to repair as far forward as possible.



P

;

- Design and build of a Stand Alone controller and power supply for the VIPER and TETS/EO.
- Target is hand held optics, range finders and sights
- Smaller footprint will allow the capability to move to additional units.

## BACKGROUND:

USMC TMDE Program Office determined from meetings with the EO community that a complete VIPER/T suite, strictly being used to support EO testing was an undue burden. A smaller test and optical control suite will provide additional testing capability.

Minimum capabilities needed to support a VEO-2 are:

Power supply to provide 28 VDC and 15 VDC to VEO-2

- Ruggedized laptop
- Timer/Counter card for laser measurements (currently supported in VIPER/T)
- Oscilloscope card for laser measurements (currently supported in VIPER/T)
- RS-170 video frame grabber (currently supported in VIPER/T)
- Programmable power supply for UUT power

## APPROACH:

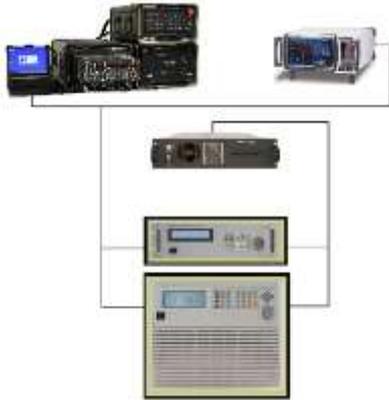
- Contract to build prototypes for analysis and testing
- Design interface with full up VIPER system
- Verify functionality of current test programs.
- Define system location objective and workload



## Power Supply Test Capability

### PROBLEM:

An Operational need for a capability to test and perform diagnostics on system power supplies



### BACKGROUND:

USMC TMDE Program Office for ATE has determined a need to create a Power supply test capability that will support system Power Supplies, Uninterruptable Power Supplies (UPS), and Power Conditioners. This should be a modular test capability that is upgradeable with new hardware technology and flexible software options for easy programming of new power supplies, UPSs, and power conditioners.

### PRODUCT / SOLUTION:

- Design and build of a power supply test module that can be integrated with our current and Future ATS systems .
- The Power Supply Test Module will consist primarily of a Programmable Power supply and a Programmable Load and will interface with the Core ATE systems for control , measurements, and diagnostics .

### APPROACH:

- Contract to build prototypes for analysis and testing
- Design interface with VIPER ,GPATS, and EMSS systems
- Verify functionality of current test programs.
- Define system location objective and workload



# Ground Radio Maintenance Automated Test System (GRMATS)

2000's Technology  
Small System Platform  
for Communications



USB 2 Interface

SBC (Single Board Computer) PCBSBC

PXI Bridge

PXI Synthesized LO

LCD Display

PXI DMM

LXI

PXI O-Scope

PXI chassis

PXI RF Receiver

Linux OS

Ethernet Interface

Touch Sensor Screen

Serial Rapid I/O (sRIO)

Open Multimedia Application Platform (OMAP)

Optional SATA Hard Drive

Micro-TCA busses

PCI Express (PCIe)

Python language

PXI RF Generator

CORBA (Common Object Request Broker Architecture)

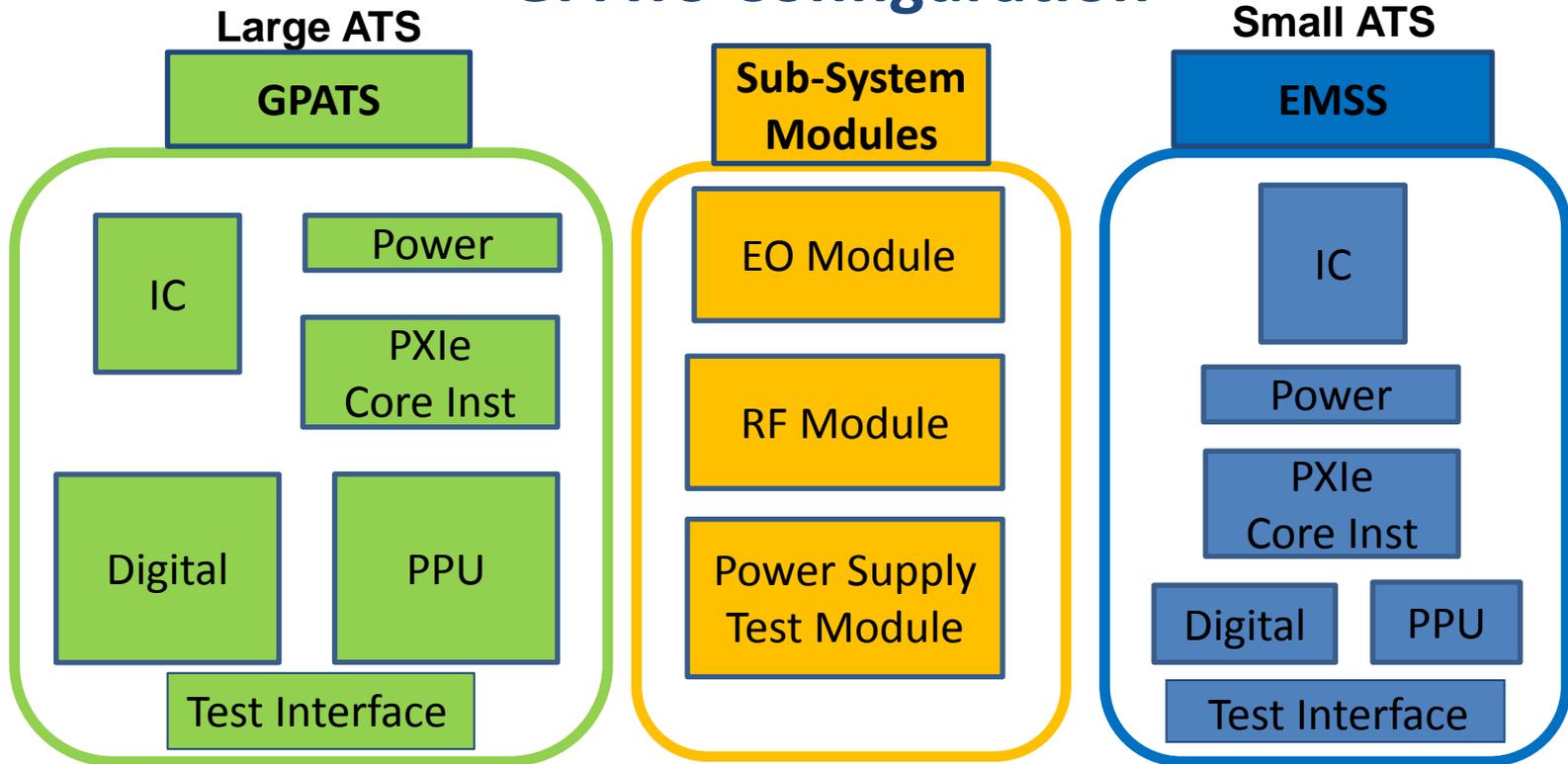
Sunset

End of Life



Future Tester Concept

## GPATS Configuration



- Modernization starts with the IC
- Modular Sub-systems can be controlled by Large or Small Tester based on Application requirements



# Electronic Maintenance Support System (EMSS)

- Currently 2000 Devices fielded with Interactive Electronic Technical Manuals (IETMs).
- Concept is to develop an At-System Test Capability designed to support field level maintenance, troubleshooting, and diagnostics.
- Test capability and diagnostics can be integrated with the IETMs
- Portable and Configurable to support multiple weapon systems to enhance readiness through system operational and functional testing.
- Can be connected to the Net to upload data and download updates.
- Concept is to evolve with the GPATS Framework



Current



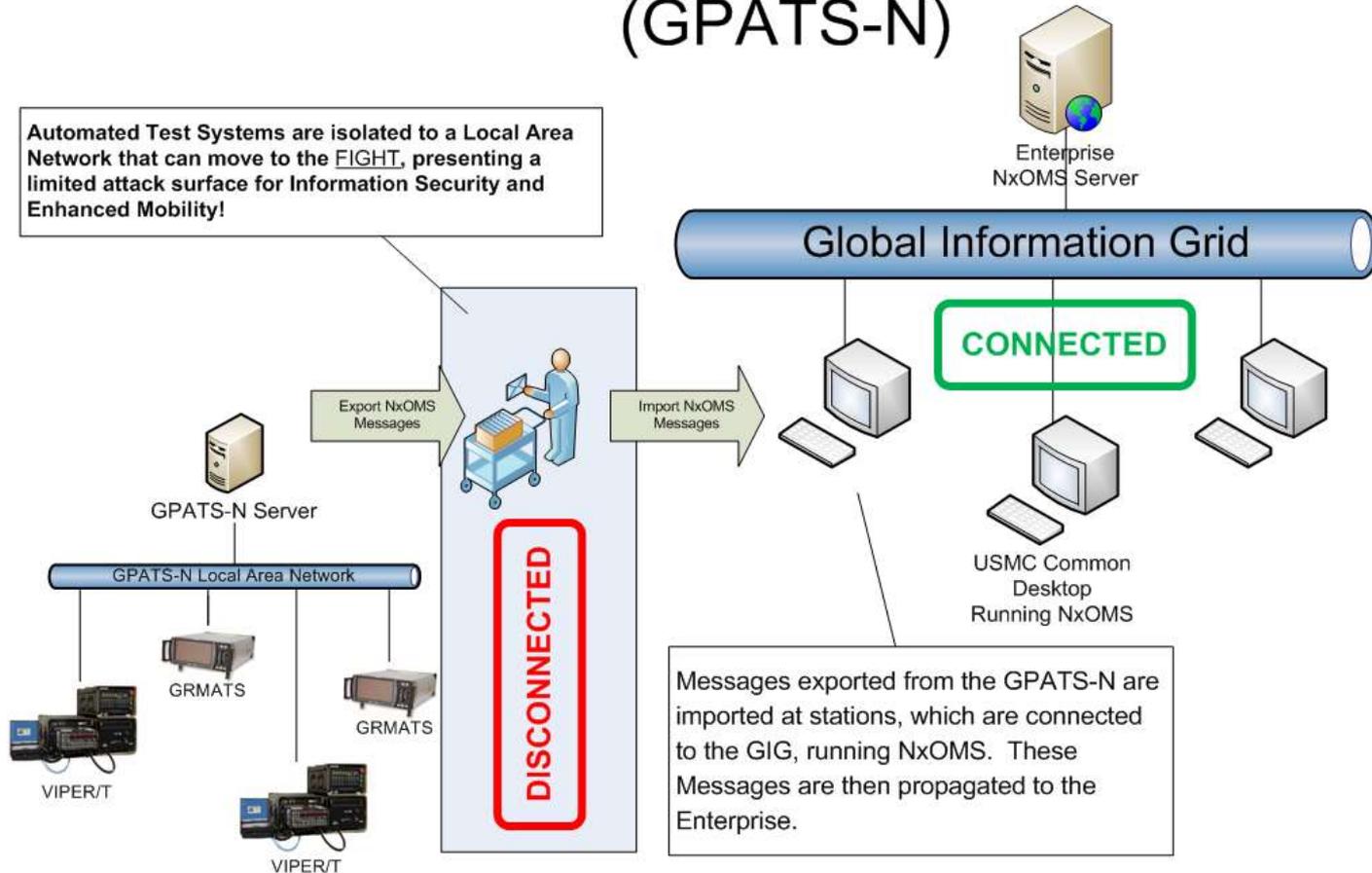
Concepts with  
Test resource  
modules





# GENERAL PURPOSE AUTOMATIC TEST SYSTEMS – NETWORK (GPATS-N)

Automated Test Systems are isolated to a Local Area Network that can move to the FIGHT, presenting a limited attack surface for Information Security and Enhanced Mobility!



Messages exported from the GPATS-N are imported at stations, which are connected to the GIG, running NxOMS. These Messages are then propagated to the Enterprise.



# Long Range Future Marine Corps Automatic Test Equipment





# Questions ?



# **Versatile Depot Automatic Test Station (VDATS) Program**

**28 Oct 14**



**Lt Col Sean Rivera  
Chief, Automatic Test Systems Division  
AFPEO Agile Combat Support  
DSN: 472-2100**



# VDATS Overview



*AFLCMC... Providing the Warfighter's Edge*

- **Program strategy**
- **Current Requirements**
- **Locations Served**
- **Available Configurations**
- **Capability Adaptations**
- **Systems Integration Lab**
- **POCs**





# Program Strategy



*AFLCMC... Providing the Warfighter's Edge*

- **Organic Manufacture**
  - **Active Production Line**
    - WR-ALC
    - Tobyhanna Army Depot
  - **Government owns all data rights**
- **Sustainment: Organic Supply Chain**
- **Augmentation Development: Organic and Contractor (as required) to develop required AB's and/or MESS**
- **Organic management and maintenance of VDATS station software**

# Current Locations

*AFLCMC... Providing the Warfighter's Edge*



# Current Configurations

*AFLCMC... Providing the Warfighter's Edge*

- **Digital Analog (DA)**
  - This is the core tester
  - Capability to test 80% of Air Force depot workload
    - DA-1 (4920-01-553-0693KV)
    - DA-2 (4920-01-553-1534KV)



# Auxiliary Bay

*AFLCMC... Providing the Warfighter's Edge*

- **Auxiliary Bays (AB)**

- Utilized when a more robust test solution is required
- Require and are transportable between DA stations



**AB-2 (B2 Avionics)**



**AB-3  
(Blower)**



**AB-4  
(Kadena/Hill)**



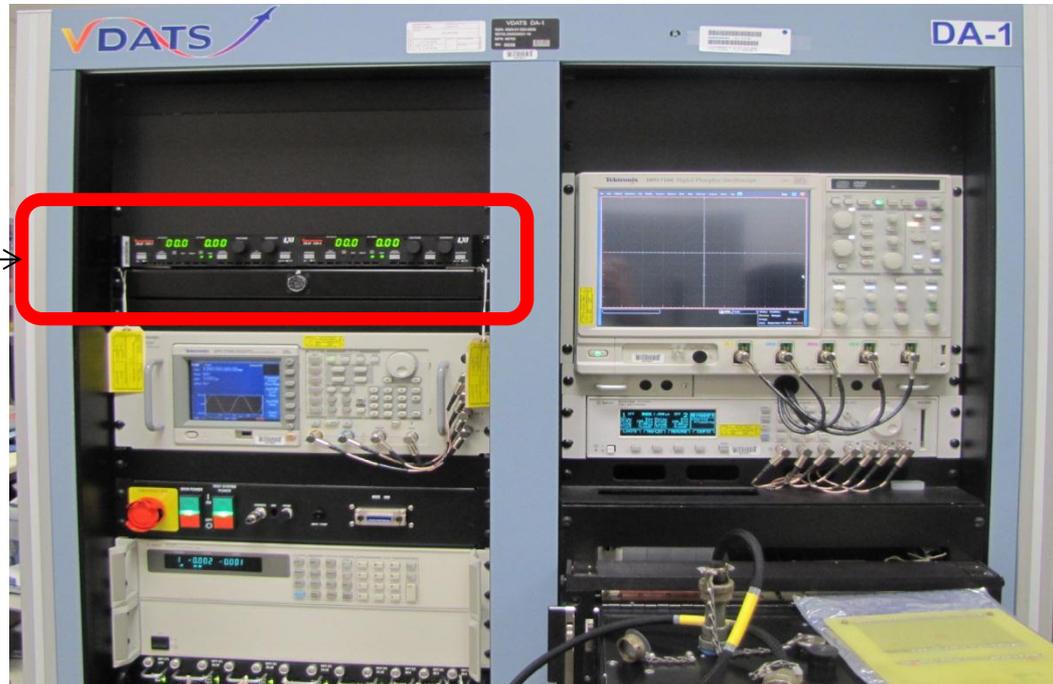
# Mission Equipment Support Set (MESS)



*AFLCMC... Providing the Warfighter's Edge*

- Provide less complex capability when AB not warranted
- Each core station has designated real estate/standard interface to house modular capability enhancements
- MESS units transportable between DA stations

Single  
Instrument  
Example

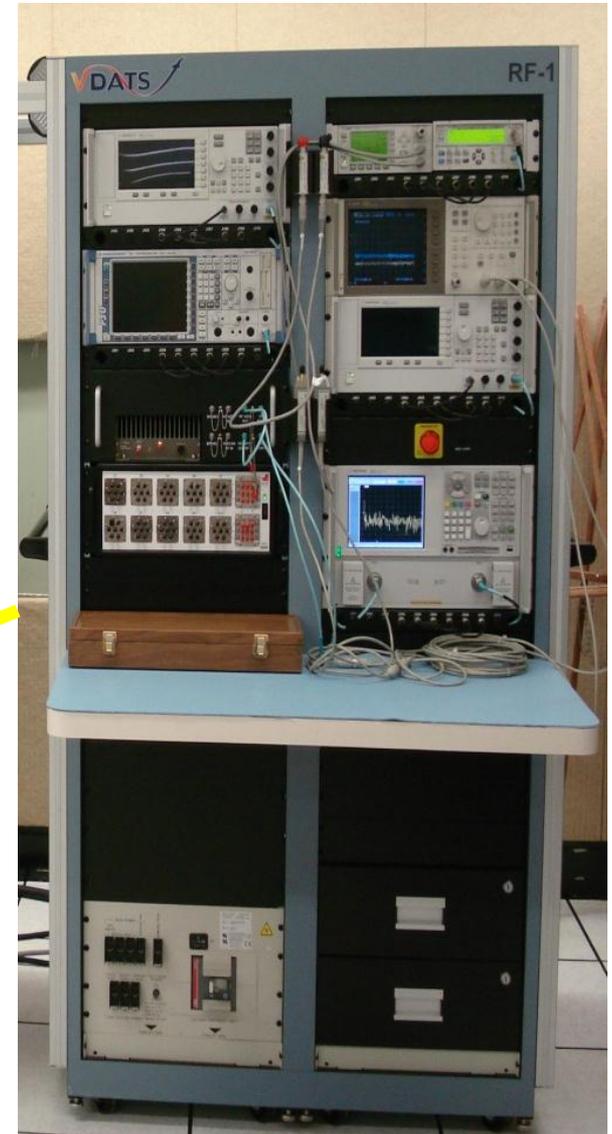


**MESS-001 (NHR-8100i)**

# Roll Up Bay

*AFLCMC... Providing the Warfighter's Edge*

- **Radio Frequency (RF)**
  - RF-1 (4920-01-553-1535KV)
  - Addition of Radio Frequency (RF) auxiliary unit increases capability to 95% of depot workload





# VDATS - Augmentations



*AFLCMC... Providing the Warfighter's Edge*

## • Capability enhancements in-use/in-work

### – Auxiliary Bays (AB) :

- AB-1 CARA
- AB-2 B-2 Avionics
- AB-3 Blower for UUT cooling
- AB-4 Numerous UUTs @  
Kadena
- AB-5 JSTARS UUTs
- AB-6 B-52 IWIU
- AB-7 F-16 IFF

### – Mission Equipment Support Set (MESS):

- MESS-001 NHR 8100i
- MESS-002 LANTIRN
- MESS-003 C-130J SCSI (Part 1 of 2)
- MESS-004 JTAG for ALR-69
- MESS-005 JSTARS (RF)
- MESS-006 ALR-69A
- MESS-007 COMM for ALR-69
- MESS-008 C-130J SCSI (Part 2 of 2)

### – PA-1:

Portable Automatic Test Equipment Calibrator (PATEC) Augmentation (PA-1).  
PATEC Augmentation Rack (Driven by requirement surrounding AC/DC power/current)



# Systems Integration Lab (SIL)



*AFLCMC... Providing the Warfighter's Edge*

- **Provides ATS/ATE technology insertion and upgrades**
- **Manufacture of AB & MESS**
- **Provides operator/maintainer and TPS developer training at Robins and user locations**
- **Provides dedicated customer support for station and TPS development**
- **Provides software sustainment, including deficiency report resolution**



# Summary



*AFLCMC... Providing the Warfighter's Edge*

- **VDATS is the standard depot-level tester for avionics workload**
- **Openly collaborating with program offices and industry for smooth depot activations**
- **ATS Division is committed to ensuring the viability of VDATS into the future**



# VDATS Points of Contact



*AFLCMC... Providing the Warfighter's Edge*

<b>Name</b>	<b>DSN</b>	<b>E-Mail</b>
<b>Joe Eckersley, Section Chief</b>	<b>472-0255</b>	<b>joseph.eckersley@us.af.mil</b>
<b>Tony Maynard, Pgm Mgr</b>	<b>472-0303</b>	<b>john.maynard@us.af.mil</b>
<b>Matt Mosely, Prod/Conf Mgt Log</b>	<b>472-0298</b>	<b>mathew.mosely@us.af.mil</b>



U.S. AIR FORCE

*AFLCMC... Providing the Warfighter's Edge*



# Questions?



**RDECOM**

# DoD NxTest IPT



Malcolm Baldrige  
National  
Quality  
Award  
2007 Award  
Recipient



**TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.**

**ARDEC, Automated Test Systems Division**

**10/28/14**

- The purpose of this DoD Automatic Test Systems Executive Agent Office (ATS EAO) document is to formally charter the DoD Next Generation Automatic Test Systems (NxTest) Integrated Product Team (IPT), hereafter referred to as the NxTest Team.
- The overall goals of the ATS EAO and the NxTest Team are to reduce the total acquisition and support costs of DoD ATS and to improve the inter- and intra-operability of the Services' ATS functions.
- The purpose of the NxTest Team is two-fold: First, to define the elements that contribute to the above goals. The second purpose of the NxTest Team is to define, develop, demonstrate and plan implementation of emerging test technologies into the DoD maintenance test environment to meet current and future critical mission requirements.



- Inertial Test Reference System
- High Speed Serial Bus
- Link 16 Test Technology
- High Performance Multi Analog Capability
- Advanced Synthetic Instruments
- Improved ATE and TP Software
- Common Tester Interface (CTI)
- ATE Net-Centric Techniques – Automatic Test Mark-up Language
- Board Test Technologies
- Parallel Test Techniques
- **Agile Rapid Global Combat Support (ARGCS) Test System Level Demonstration**

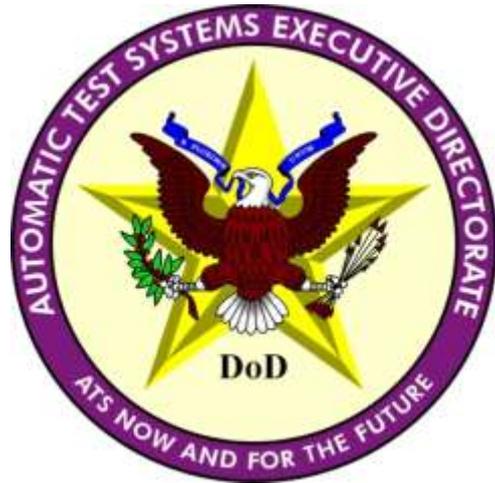


- **Greater use of Net Centric functions – NxOMS**
- **Electro Optics (EO) Test Systems Modernization**
- **RF Test Systems Modernization**
- **IEEE SCC-20 Test System & Diagnostics Standards Implementation**
- **Looking to determine next challenges with “Quartz Watch” Test Industry Week**



- Test Technology “Quartz Watch” Event
  - Purpose is to access the latest developments in the test industry to assure that DoD ATS organizations can meet critical mission requirements of today and tomorrow. This will enable the Services to use what has already been developed to avoid duplicative development costs. In addition, it often provides us the benefit of R&D dollars that industry uses to develop their technology and products.
- Next Test Technology “Quartz Watch” Event
  - This Week, 28 October 2014, here in Crystal City





# **DoD ATS Framework IPT**

**Mike Malesich (NAVAIR)  
Framework IPT Chairman  
Oct 2014**

# DoD ATS Framework IPT Background

---

- **The Framework IPT helps steer future ATS designs in order to meet DoD ATS Executive Directorate (ED) goals**
  - Focuses on identifying commercial interface specifications that satisfy the elements in the Framework
  - Assists in the development of formal specifications within industry standards organizations
- **Supports future DoD ATS acquisition**
  - As specification(s) are published, the IPT selects applicable standards that meet the DoD ATS Framework Element requirements
    - These are then applied to future DoD ATS designs
  - The selected standards are listed on the DoD ATS website (<http://www.acq.osd.mil/ats/>)

# Framework IPT Strategy

---

- **The DoD ATS ED defined the following goals for DoD Automatic Test Systems -- These goals provide direction for all Framework IPT efforts:**
  - Reduce the total cost of ownership of DoD ATS
  - Provide greater flexibility to the warfighter through Joint Services interoperable ATS
  - Reduce Logistics footprint
  - Improve the quality of test
- **Define the Framework Elements**
- **Help ensure that the DoD ATS Framework Elements are incorporated in future DoD ATS**

# **Framework Objectives**

## **Associated with the DoD ATS ED Goals**

---

- **TPS transportability**
- **Improve instrument interchange**
- **Make ATE more scalable**
- **Faster technology insertion**
- **Improve TPS rehost**
- **Improve TPS interoperability**
- **Use model based programming techniques**
- **Modernize test programming environment**
- **Define a TPS performance specification**
- **Greater use of commercial products**
- **Capture design to test data**
- **Use weapon system to test data**
- **Use knowledge based TPSs**

# IEEE Standards Being Implemented in DoD ATS

---

- **Air Force VDATS**
  - IEEE 1445
  - IEEE 1636.1
  - Future -- implement more ATML and SIMICA standards
- **Army IFTE**
  - IEEE 1445
  - IEEE 1636 and 1636.1
  - IEEE 1641
  - IEEE 1671-1671.6
- **Army NGATS**
  - IEEE 1636.1
  - IEEE 1641
- **Navy eCASS**
  - IEEE 1445
  - IEEE 1671.2, .4, .6
  - IEEE 1636 and 1636.1

**Each ATE also implements  
other commercial standards  
such as IVI and VPP**

# Two Framework IPT “Working Groups”

---

- **Framework Management Working Group provides overall direction and oversight**
  - Service representatives
- **Framework Technical Working Group provides the technical work**
  - Membership made up of Service and industry representatives
  - Assists governing bodies in the preparation of the needed formal specifications

# Framework Management WG

---

- **Air Force (AFLCMC, Warner Robbins)**
  - Larry Adams, Nathan Hinks, John Stabler
- **Army (AMRDEC, Redstone)**
  - Brit Frank, Mike Smith
- **Marines (MARCORLOGCOM, Albany)**
  - James Butterworth, Bill Spearow
- **Navy (NAVAIR, Lakehurst)**
  - Jennifer Fernandi, Mike Malesich, Mukund Modi
- **Several other supporting members from each Service participate as needed**

# Current Framework Efforts

---

- **Define the Generic ATS open system architecture (Framework) based on commercial interface specifications**
  - **Continuing to advance Framework elements and standards, mainly via small R&D efforts**
- **Updating key element definitions**
- **Continuing to monitor and support standards organizations**
- **Developing demonstration environments**

# Current Framework Efforts (Cont)

---

- **Supporting Projects that Leverage the Framework**
  - Test Development Environment
  - NxOMS
  - NxTest IPT
  - DoD/MOD collaboration
- **Status of 25 identified interfaces:**
  - 7 elements recommended
  - 11 elements in process of being recommended
  - 7 elements waiting to be addressed

# Benefits of Framework Activities

---

- **Provides a systems/organizational view of how to apply open systems concepts**
- **Quantifies levels of standardization and commercialization for acquisition policy**
- **Maintains focus on DOD ATS ED and acquisition goals**
- **Provides an independent evaluation of standards applicability and usefulness, and vendor claims**