MARVIN TEST SOLUTIONS

AS9100D CERTIFIED ISO 9001:2015

The Marvin Group Overview

We Make Test Easy™



The Marvin Group

MARVIN ENGINEERING COMPANY

MARVIN TEST SOLUTIONS

MLS MARVIN LAND SYSTEMS

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The Marvin Group

- **A world-leader in Alternate Mission Equipment (AME) production, sustainment, test equipment, and land systems**
- **Innovative military and aerospace solutions that are backed by unrivaled long-term support**
- **A privately-held, 55+ year strong small-business**





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Marvin Group Companies & Capabilities



Aircraft Armament Equipment

- Pylons
- Bomb Racks
- Ejector Racks
- Missile Rail Launchers
- Multiple Carriage Systems



Test Systems / Software Solutions

- I-Level / Depot Test Sets
- O-Level / Flightline Test Sets
- Armament / Munition Test Sets
- COTS instruments & test executive
- Airborne Electronics products



Land Systems

- Weapons Stations
- Auxiliary Power Units
- Vehicle Environmental Systems
- Mission Critical Equipment Trailers

Comprehensive Solutions and Support Capabilities
Repair / Overhaul / Upgrades / Maintenance / Training

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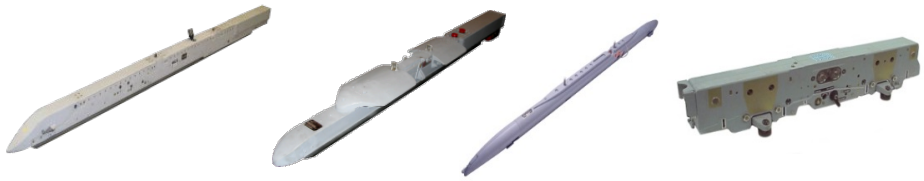
Marvin Engineering Company



Aircraft Armament Equipment

- Pylons
- Bomb Racks
- Ejector Racks
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- Multiple Carriage Systems











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Alternate Mission Equipment (AME): F-18 & F-15





LAU-127 AMRAAM



LAU-117 Maverick



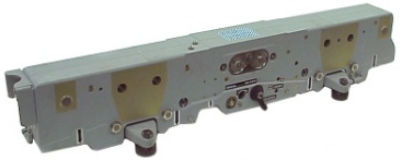
LAU-128 AMRAAM



CATM-120



BRU-32



LAU-7 Sidewinder



SUU-20



MAU-12



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Marvin Test Solutions

MARVIN TEST SOLUTIONS



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Marvin Land Systems

MLS
MARVIN LAND SYSTEMS



Land Systems

- Weapons Stations
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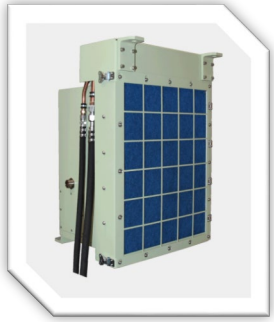
















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MTS: a World Leader in Armament & Munition Test







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From the Flightline to the Depot…

O-Level / Flightline






I-Level / Back Shop






Depot





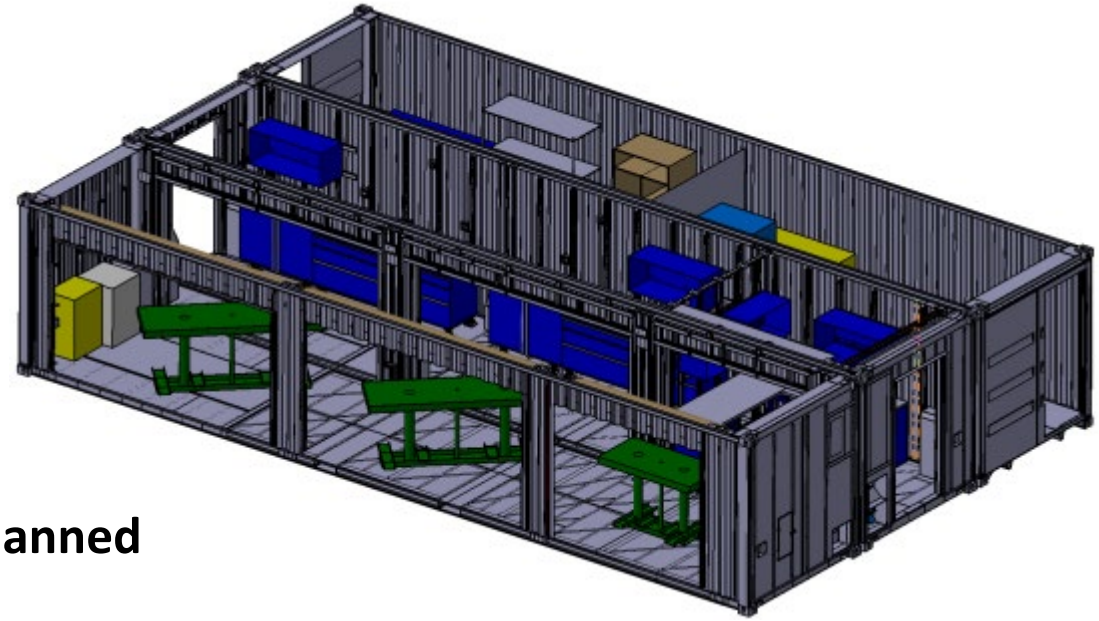


Innovative Solutions Improving Warfighter Effectiveness and Aircraft Readiness

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Configurable Armament Repair Depot

- One-stop repair capability for all AME used across multiple platforms and aircraft including equipment fault isolation, repair, and repair validation
- Use permanent facilities or utilize container configuration and provide mobile repair capability for all AME - configured to meet customer requirements
- Shorter repair turn-around times for all AME due to reduced transportation and consolidation of repair resources



Key Characteristics

- **Affordability**
- **Reduced footprint**
- **Simplified Logistics Support**
- **Deployable solution**
- **Greater Mission Readiness**
- **Fixed & Rotary Wing/UAS/Manned**

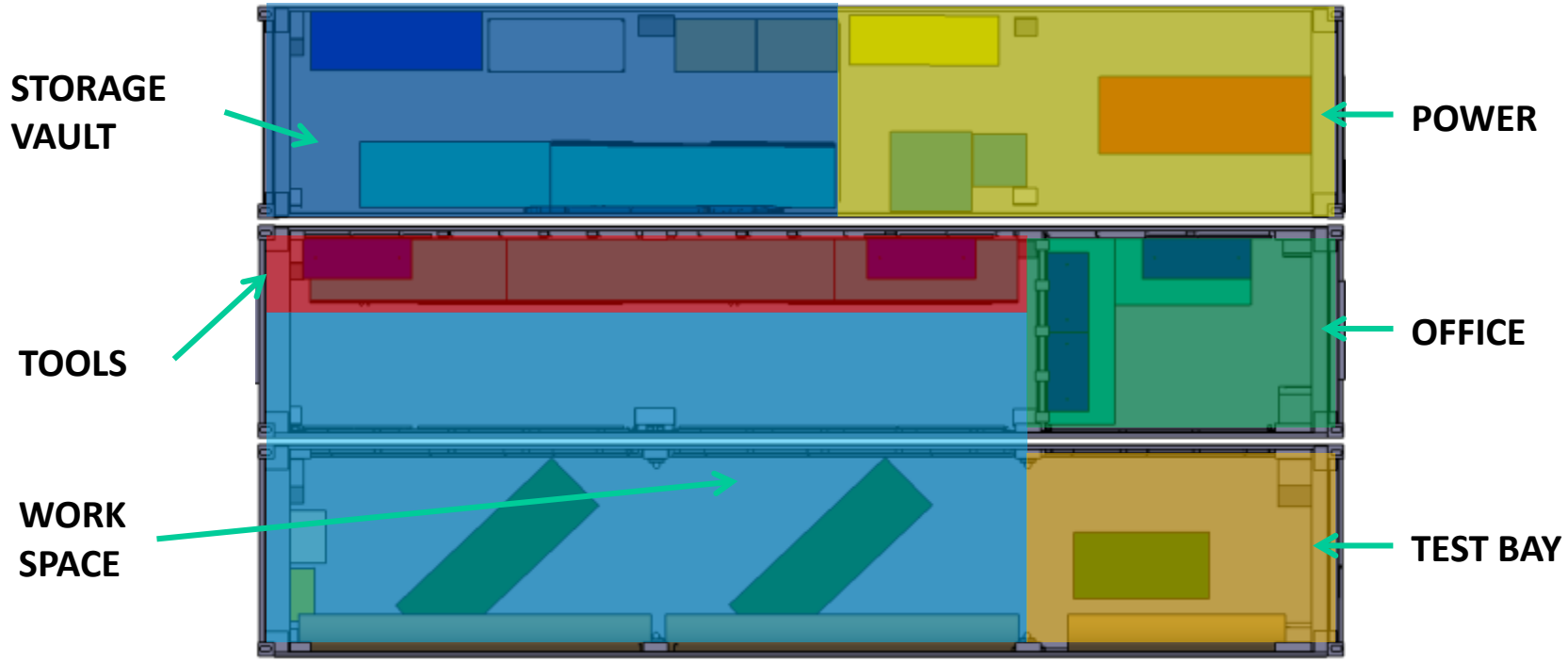
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Typical CARD Layout









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Marvin Test Solutions: Global Deployment

Summary:

- **Over 600 test sets**
- **25 countries**
- **Deployment started in 1994**



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Portable Test Solutions: Overview

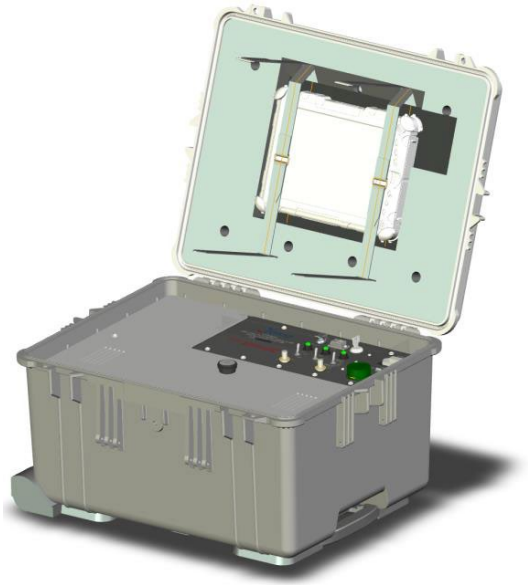


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The MTS-207 Platform (GENASYS RUGGED)

- MTS developed the MTS-207 ultra-rugged portable test platform to support mobile Depot, Intermediate-Level and Organizational-Level test of military LRUs and SRUs
- Hundreds of MTS-207 based test sets deployed in over 25 countries in multiple configurations supporting aircraft, armament, avionics, and munition testing
- A COTS product – PXI-based that shares the same backplane as the commercial TS-700 tester
- An optional 5,000 PSI compressor provides test capabilities for pneumatic LRUs and SRUs and can also charge LRUs that have built-in reservoirs





The MTS-207 Platform (cont'd)

- Two form factors:
  - Standard: 19"x25"x15"
  - Expanded: 25"x25"x17" (only used on BAT)



- Selected by USAF as the platform for the PATS-70 (avionics) and PATS-70A (armament) test sets and deployed throughout the U.S. on the A-10C



- Selected by USAF as the platform for the Bomber Armament Tester (BAT), currently in EMD phase and will start deployment in 2022

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Leveraging the MTS-207 Platform

MTS-209
Universal Armament Test Set



MTS-235A
F-35 Armament



PATS-70/70A
A-10 Avionics/Armament





AN/TSM-205B
Hellfire Missile System



MTS-207
Base Platform



BAT
Bomber Armament Tester



MTS-206A
Maverick Missile System

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MTS-3060A SmartCan™ Universal O-Level Test Set



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Background

- Responding to the need to Bridge The **Armament Test Gap** in 4th and 5th Generation aircraft and air defense systems, Marvin Test Solutions developed the next generation universal O-Level armament test set, helping customers worldwide to:

  "Verify that the weapon will fire/release when it's supposed to and not fire/release when it's not supposed to"



The MTS-3060A SmartCan™ delivers capabilities previously unavailable in a handheld O-level test set, meeting the USAF Flightline of the Future vision TODAY

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SmartCan: Global Deployment

Today:

- 12 Countries
- 8 platforms

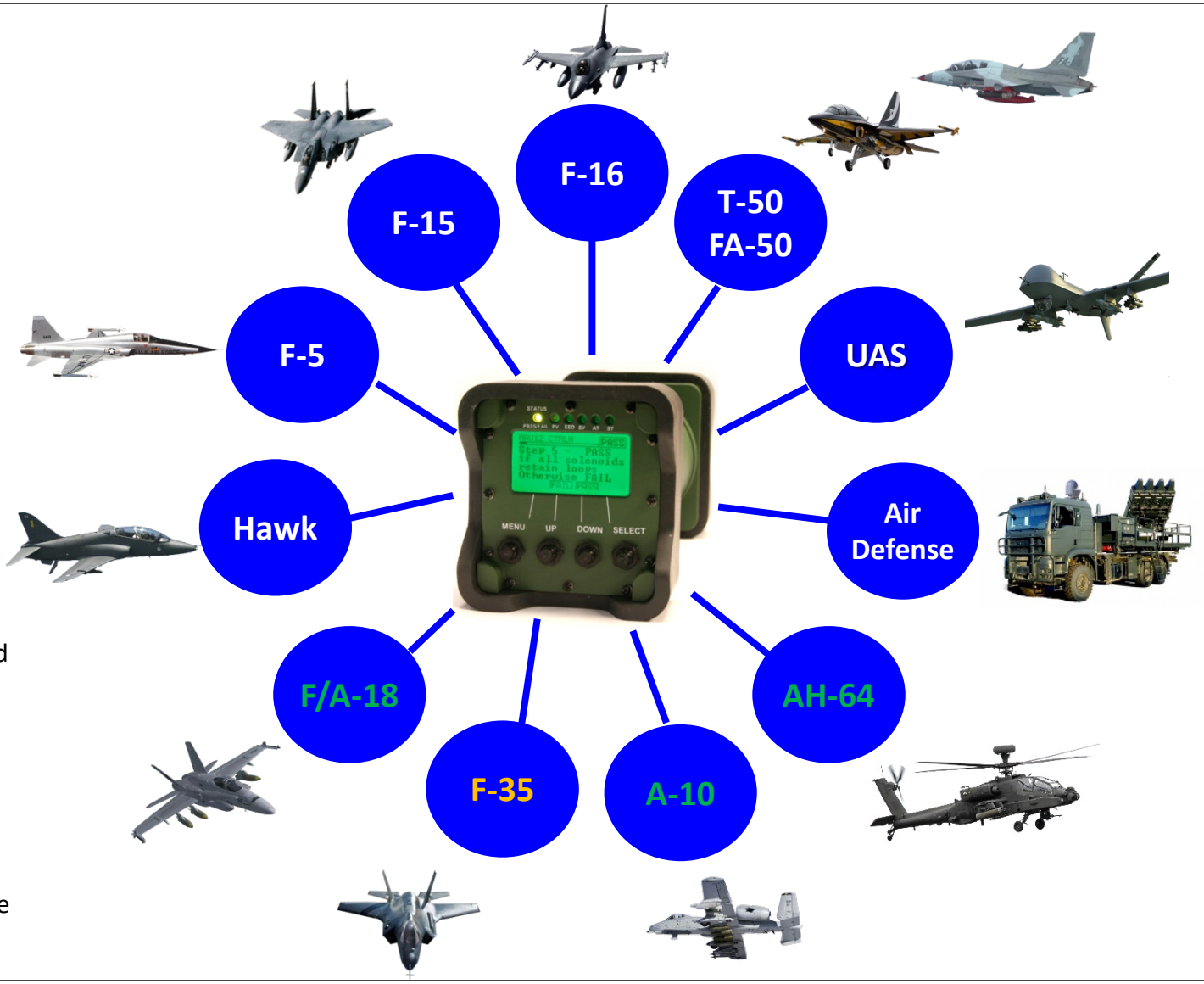
By 2025:

- 15+ Countries
- 10+ platforms



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Universal Test Capabilities and Deployment



SmartCan™ Gen2: Overview



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MTS-3060A SmartCan™ (Gen 2) Overview

- Deployment of the Gen1 SmartCan started in 2011
- In 2016, MTS started the development of the Gen2 SmartCan to address capability gaps and new requirements
- The Gen2 SmartCan successfully completed full qualification in 2018 and started shipping in December 2018
- The Gen2 SmartCan is already deployed in multiple countries on multiple platforms including F-16, F-15, F-18, Hawk, and Air Defense



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MTS-3060A SmartCan™ Gen 2 Enhancements

- **Robust Cyber Security** – Including encrypted programs, encryption keys, and removable SD card
- **Extended Power Management** – longer operating time (40 hours typical) and the ability to use any type of AA batteries (incl. rechargeable batteries)
- **Expanded Communications** – including 1553, EBR-1553, CAN, Ethernet, RS-323/422/485, and more
- **Greater Measurement and Stimuli** – more channels and an internal matrix for complex analog or digital weapon
- **Improved Protection** – many channels protected to 400 V
- **Remote Control** – new satellite mode for multi-point testing
- **Easier Test Program Development** – now using ATEasy® X

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SmartCan Technology

- The SmartCan tests MIL-STD-1760 Smart weapons by emulating Weapons (JDAM, AMRAAM, AIM-9X, etc.) – this enables the **full functional test of the entire system**

- The SmartCan generates audio and video signals to help troubleshoot weapon systems

- The SmartCan provides sophisticated parametric measurement capabilities previously unavailable on the flightline



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Small Footprint and Ease of Maintenance

- Built-In Test (BIT):
  - An extensive test of most internal assemblies and circuits
- Self-Test:
  - Comprehensive self-test of the SmartCan and cables
- Innovative Calibration:
  - Built-in precision references allow a 4 year calibration cycle
  - Calibration verification can be done at unit level or by PMEL



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MTS-3060A: Parametric Test Data

- Test data is being saved automatically by the MTS-3060A after each run
- Test logs can be downloaded for additional diagnostics, trend analysis, or training
- A unique capability not typically available with other O-Level test sets

```
**************************************************************************
Serial Number:  1010
Program Name :  AGM65 on LAU117
Program Rev  :  REV A001
Program Date :  03MAY11
**********
Start Time   :  05/04/11 16:49:07
**************************************************************************

**********************************************************
Step      : 5
**********************************************************

No STA SEL from Launcher yet

Env 28V

Pin: Pin 9    mV        Min: 22000     Res: 28077     Max: 32000     PASS

Missile +30V

Pin: Pin 4    mV        Min: 0         Res: 0         Max: 5000      PASS

Pin: Pin 5    mV        Min: 0         Res: 0         Max: 5000      PASS

Missile -30V

Pin: Pin 1    mV        Min: -5000     Res: 226       Max: 5000      PASS

Pin: Pin 6    mV        Min: -5000     Res: -232      Max: 5000      PASS

**********************************************************
Step      : 7
**********************************************************

STA SEL ON with PWR ON

Env 28V

Pin: Pin 9    mV        Min: 22000     Res: 28168     Max: 32000     PASS

Missile +30V

Pin: Pin 4    mV        Min: 27500     Res: 34270     Max: 40000     PASS

Pin: Pin 5    mV        Min: 27500     Res: 30437     Max: 40000     PASS

Missile -30V

Pin: Pin 1    mV        Min: -40000    Res: -38588    Max: -27500    PASS
```


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Organic Development Capabilities

- With its enhanced test capabilities, the SmartCan can easily adapt to test additional legacy and Smart weapon systems
- Additional munitions can be added rapidly via field software updates
- Using the optional TPS development stations, customers can organically develop additional test procedures



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Cybersecurity



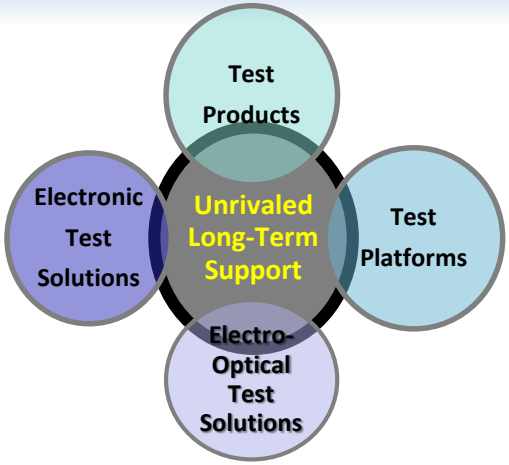
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The Cybersecurity Advantage

- MTS is in the forefront of test equipment cybersecurity with multiple “firsts”:
- The MTS-3060A SmartCan is the most cybersecure flightline test set available today with a custom operating system, program encryption, and a removable hard disk
- ATEasy will be the first Test Executive software to be cyber-certified by the U.S. Air Force
- One MTS-207 application will be the first portable armament tester to be cyber-certified by the U.S. Air Force

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Unrivaled Long-Term Support and Availability



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Unrivaled Long Term Availability and Support

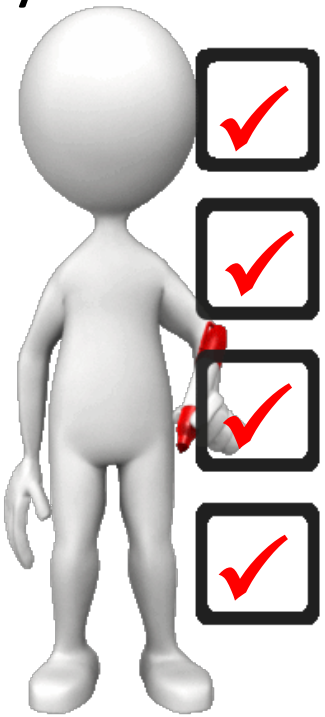
- An aerospace Test & Measurement company, Marvin Test Solutions understands the need for long-term support and availability of products and solutions
- Products introduced nearly three decades ago are still available for purchase as COTS items and are still fully supportable
- Test systems deployed over 25 years ago are still operational and fully supportable by MTS
- All ATEasy versions are backward compatible with prior versions and with the original ATEasy package released in 1991

AS9100D
CERTIFIED
ISO 9001:2015

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Summary

- The MTS-3060A SmartCan is the ultimate Agile Combat Employment (ACE) O-Level test set to support all fighters, bombers, armed helicopters, UAS, and air defense systems:



Supports all legacy and Smart weapons systems

Small footprint and rapid testing

Adaptable to any weapon system

Allows troubleshooting of aircraft armament systems

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Conclusion

- The Marvin Group offers more than 55 years of experience (founded 1963) providing AME, EPU/ECU, and associated test and support equipment
  - Marvin Test Solutions was founded in 1988
  - Goal to be the preferred supplier across the military, aerospace, and manufacturing segments we serve with our test and measurement solutions by 2024
- Marvin Test Solutions **offers innovative test solutions** that meet the customers' needs coupled with **unrivaled long-term support**

