

# ***ASTRONICS***



ELEVATING  
*performance*

CORE  
Center for Overhaul &  
Repair of Electronics

TEST SOLUTIONS

# Extending the life of your equipment through building in-country solutions and efficiencies for electronic maintenance.

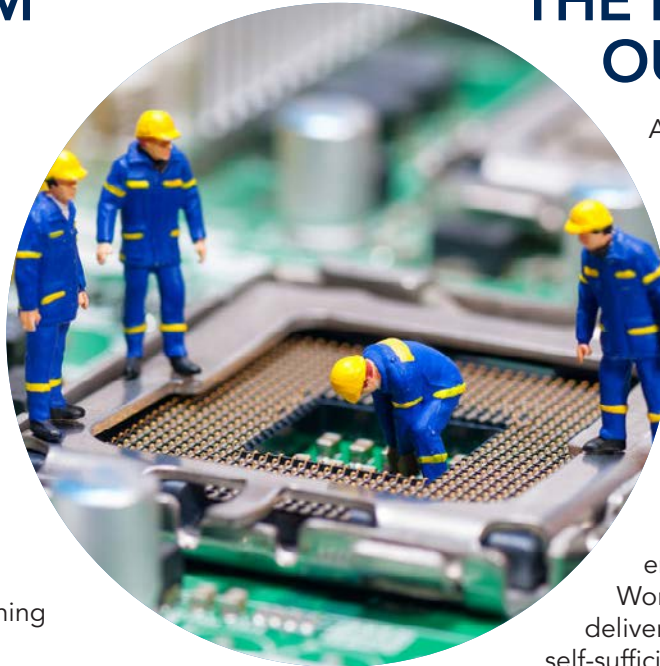
## THE PROBLEM

More than ever, mission critical organizations are increasingly dependent on highly complex electronic systems composed of Printed Circuit Boards (PCBs) and Line Replaceable Units (LRUs) consisting of numerous components and circuitry. A failure on any component or in any circuit can leave an aircraft unserviceable (AOG - Aircraft On Ground), Surveillance Radar, Communication Radio System, Metro railcar, or any other essential system inoperable, or potentially create a life-threatening situation.

These barriers have led to:

- » Dependence on Original Equipment Manufacturer (OEM)
- » High cost of repair
- » No longer supported: obsolescence, no information, skills fade in OEM, among others
- » Long Turn-Around-Time (TAT) for repairs
- » Returned as Beyond-Economic-Repair (BER) or No Fault Found (NFF)
- » Unreliable in service or diminished readiness

Often facing limited budgets, many organizations must operate a mix of legacy, current, and state-of-the-art systems with a high dependency on properly working electronics. Historically, these complex systems are supplied with little to no electronics diagnostic maintenance training, which impedes organizations from self-maintaining their systems when components fail. These issues hinder self-sufficiency, increase downtime, and ultimately, drive costs up.



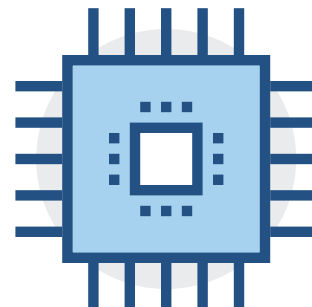
## THE REQUIRED OUTCOME

Astronics Test Systems provides a wide range of test solutions to ensure optimal performance of electronic systems in aerospace, defense, mass transit, and other mission-critical industries.

CORE (Center for Overhaul and Repair of Electronics) is a maintenance solution integrating our deep expertise in hardware and software with our legendary engineer-to-engineer (E2E) collaboration.

Working side-by-side with you, we deliver a world-class solution, giving you self-sufficiency and long-term support of your complex electronic systems, as well as benefits from:

- » Creation of high-technology jobs
- » Augmented in-country values (ICV)
  - » Transferring knowledge and technology know-how
- » Extended working life for systems
- » Reduced through-life costs
- » Faster Turn-Around-Time (TAT)
- » Reduced inventory levels and associated costs
- » Increased systems availability
- » Management of obsolescence issues
- » Elevated independence in systems support



## THE PATH TO CORE

Typical repair issues on electronic systems, what it means to your organization, the cost implication, and how best to mitigate the issue.

REPAIR ISSUE	WHAT IT MEANS	WHAT IT COSTS	SOLUTION
An electronic Module/PCB sent for repair is returned as "No Fault Found (NFF)"	You pay for the repair even though no fault was found. Often, the issue remains and the cycle of NFF continues.	Within the military sector alone, the cost of NFF was estimated as a \$6B global issue.*	Introduction of in-depth testing and accurate diagnostics.
An electronic module/PCB is sent back for repair. Item is returned as "Beyond Economical Repair (BER)".	You are required to buy a replacement PCB.	\$5k-\$60k per PCB	In-country capability and re-manufacturing.
Long Turn-Around-Time (LTAT) when items are sent for repair.	Item may be out for repair for months. Extra inventory is required to cover the repair period.	\$10k to \$250k+ for each product	Rapid in-country repairs.
Obsolescence or skills fade in the OEM.	The 3 <sup>rd</sup> party will no longer support or repair the PCB. You need to upgrade or replace the entire system.	Replacement for system, which can be \$M's.	In-country repair capability to extend the useful life of a system, test, and return to service with confidence.
Over-dependence on the supply chain.	You are left with few options for cost, time, and continued operation.	Self determination \$M's	In-country capability.
Unreliable circuit	Repeated repairs.	Increased downtime, lost production, sacrifice readiness.	Accurate fault diagnosis and overhaul.
Counterfeit components are becoming an increasing threat to global defense force.	Critical electronics can fail unexpectedly in service.	\$M's depending on application.	In-country ability to detect and reject during repair cycle.

\*AutoTestCon 2012

# CENTER FOR OVERHAUL AND REPAIR OF ELECTRONIC SYSTEMS

The complete in-country solution for the support, maintenance, and repair of your electronic systems

## WHAT WILL CORE BRING TO YOUR ORGANIZATION?



### KEY BENEFITS

- Autonomous support capability with technical independence
- Increased technical capability of your engineers
- Support for equipment of any origin
- Reduced through life costs
- Improved asset availability
- Obsolescence management
- Extending program & equipment life

### TRANSFER OF KNOWLEDGE

- » Field study
- » Consultancy
- » Training
- » Test design and programming
- » Transfer of processes

Have our experienced test engineers sit alongside your local engineers for an extended training period, transferring their knowledge and understanding.

### TRANSFER OF TECHNOLOGY KNOW-HOW

- » State-of-the-art test equipment for all levels of maintenance (O-Level, I-Level, and D-Level)
- » Integration & optimization of test programs for all levels of maintenance
- » Obsolescence management
- » Workbenches & tools
- » ESD handling

Introduce state of the art test equipment to assist the local workforce in testing and diagnosing their electronic systems down to component level.

### WORKING TOGETHER

- » Project management
- » Progress reviews
- » Assistance & support
- » Building success
- » Integrated product team (IPT) approach

Leverage our 60 years of global test and measurement success across various mission critical industries to customize a solution for you.

# CORE Solutions at All Levels of Maintenance

## Center for Overhaul and Repair of Electronic Systems

### ORGANIZATIONAL LEVEL

1ST LINE

Pre-screening and basic fault identification.  
 » Industrial & commercial (ramp testing & transponders)

### INTERMEDIATE LEVEL

2ND LINE

Pass / Fail module test and component 'fault group'

### DEPOT LEVEL

3RD LINE 4TH LINE

Full range of test and fault identification solutions to component level  
 » Obsolescence and re-manufacturing solutions

**PinPoint Alpha**  
 » PinPoint Alpha PCB screening of digital and analog circuits from board to component level, combining dynamic functional in-circuit (ICT) diagnostics, functional edge, boundary scan, passive and active analog testing, mixed signal tests, vectorless test, etc. with net capture and schematic generation.

**CTS-6010**  
 » CTS-6010 Portable communication test set for tactical and commercial radio testing, radio LRUs screener

**Freedom R8100**  
 » Freedom R8100 Land Mobile Radio (LMR) protocol tester supporting P25 (Project 25 Digital Trunking) Phase 1 & 2, DMR, TETRA, NXDN (Next Generation Digital Narrowband), PTC (Positive Train Control), and dPMR. Avionics ramp testing for ILS (Instrument Landing System) Localizer and Glide Slope, VOR (VHC Omni-directional Range), Marker Beacons, Non-Directional Beacons / ADF (Automated Direction Finding), SELCAL (Selective Calling System), and Morse Code Identification.

**ATS-6100 WFT**  
 » ATS-6100 WFT Wire Fault Tester for troubleshooting of wire faults in air, land, and sea mission critical systems. Detect and isolate intermittent wiring faults on controlled or uncontrolled impedance wiring. Types of intermittent faults that can be isolated include Wire to Wire, Wire to Chassis, Chafed Insulation, and Cracked insulation.

**Trainline PTE**  
 » Trainline PTE Verifies the integrity of the trainline signals between electric couplers in the same consist.

**PinPoint IIR-PXle**  
 » PinPoint IIR-PXle In addition to the features of the PinPoint Alpha, this variant provides full digital PCB edge testing for GO/NO-GO testing utilizing Astronics PXle-6943 best in class digital test instrument. The PinPoint-UDA variant steps up the combinational test capability to provide full integration into rack/stack ATE for full LRU or PCB GO/NO-GO or diagnostics testing.

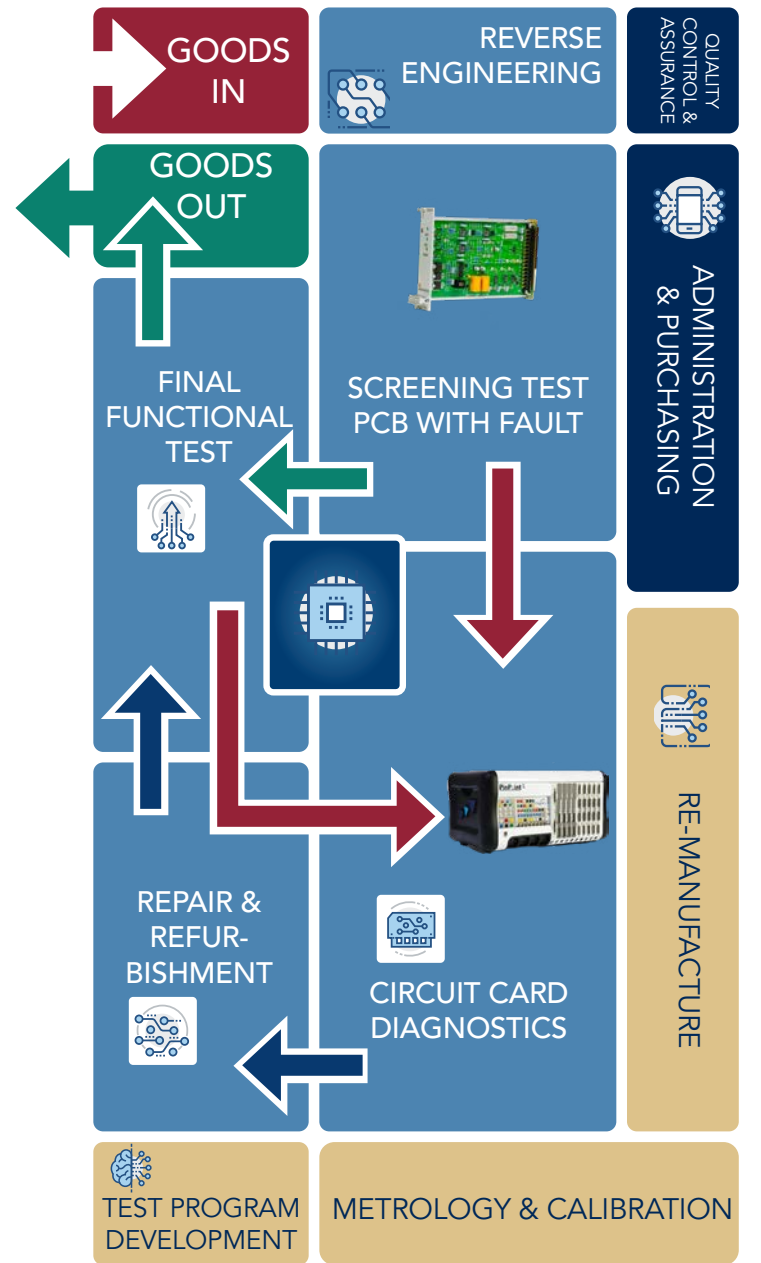
**ATS-3100 RTS / VRS**  
 » ATS-3100 RTS / VRS Communications Radio Test Set with diagnostics capability to identify faults at LRU level. For Tactical and Commercial Radio Testing.

**S500 FT/UDA PinPoint UDA**  
 » S500 FT/UDA PinPoint UDA Configurable, functional tester that consolidates testing requirement to a single platform. Use for LRU and LLRU Functional Go/No-Go testing, diagnostics to ambiguity group. Support for legacy mission critical systems as well as today's newer electronics. Available variations include  
 » Low Voltage Functional Test  
 » Optical Test  
 » Communications Test  
 » RF Radar and Targeting Systems Testing

**S500-HV**  
 » S500-HV Configurable high-voltage functional tester that consolidates testing requirement to a single platform. Use for LRU Functional Go/No-Go testing.

» Custom Test Solutions and Platforms Our engineering team collaborates directly with yours to develop a custom solution specifically for your needs. Leverage our existing scalable platforms or count on our proven expertise in build-to-print and build-to-spec projects to deliver a solution to solve your toughest test challenges.

## CORE AT DEPOT LEVEL FULL RANGE ELECTRONICS MAINTENANCE



# DEFENSE AND INTEGRATION

## Electronic Maintenance Achievements

### Raytheon

MK698

- » Common core tester for the Standard Missile and Evolved Sea Sparrow Missile (ESSM)



### Honeywell

Barracuda S-RIMU

- » Skew Redundant Inertial Measuring Unit Test Stand



### Viasat

ELATS

- » Enhanced Link 16 Acceptance Test Equipment System
- » Testing of JTRS, LVT-1, and LVT-2 radios



UPT

- » Universal Pressure Test System
- » Upgrades based on existing PX3 Calibration Station



Cryptographic Equipment



F-16 Instrumentation



F-16 Anti Skid System

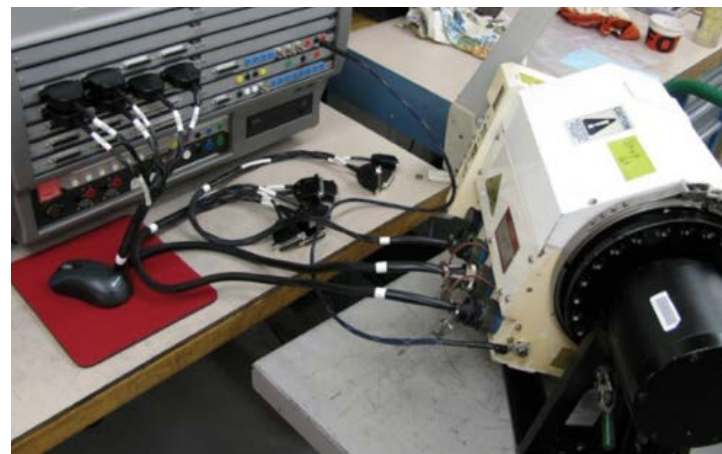


C-130 Cargo Area Lighting



AV-8 Harrier Avionics

- » Automated initial fault screening with formal process and data collection
- » Hundreds of measurements in less than 10 minutes
- » Increased fault detection
- » Significantly less operator intervention and fault interpretation required
- » Ability to add and define meaningful fault messages
- » Allows repair technicians to quickly sanity check the repairs without having to spend hours of setup time
- » Detailed reporting and data collection for each unit tested



CORE - Center for Overhaul & Repair of Electronics

## EXAMPLES OF MISSION CRITICAL SYSTEMS SUPPORTED

### Defense



### Air Force

AWACS, F-15, F-16, Global Hawk, TPS-75, B-1B, Watch-keeper Mirage F1, Alphajet, Puma, Rafael, Transall NG, Rohini, Reporter II.

### Navy

F-18, NAVAIR, Trident II, V-22, H-53, AV-8, EA6B, Shikari, Lynx, among others.

### Marines

Marine-1, SINGGARS, AN/TRC 170 Radio.

### Army

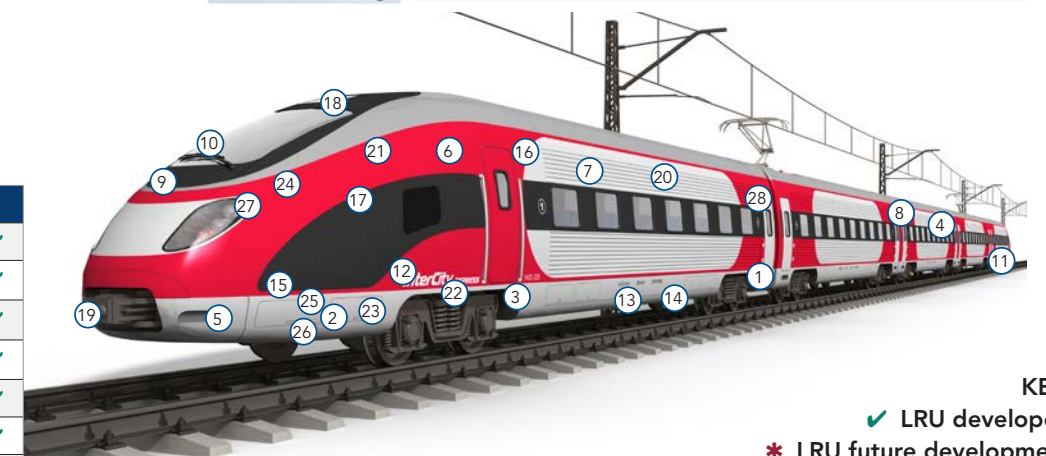
Apache A/D, CH-47 Chinook, UH-60 Black Hawk, G/VLLD, OH-58 Kiowa, TPS-77, Avenger, EETF, among others.

### OEM

Hellfire, HIMARS, SINGGARS, AN/TPQ-36 FireFinder, Space Station.

### Mass Transit

#	LRU	
1	Door Electronics	✓
2	Propulsion Systems	✓
3	Brake Systems	✓
4	Sign-CIIS, SIIS	✓
5	Doppler Radar Speed Detector	✓
6	Event Recorder	✓
7	Communication Systems	✓
8	HVAC (Heating, Ventilation, Air Conditioning)	✓
9	P/BKR Assemblies	✓
10	Train Operator Display	✓
11	ATO/ATC	✓
12	High-Speed Circuit Breaker	✓
13	Auxiliary Power Supplies	✓
14	Inverters	✓



#	LRU	
15	ERVC (Electronic Relay Valve Control)	✓
16	Logic Cradle	✓
17	TCU (Temperature Control Unit)	✓
18	Master Control	✓
19	Supervisor & CCU	✓
20	Lighting Systems	*
21	Train Radio (RF)	✓

#	LRU	
22	Pneumatics (Brakers)	*
23	Tread Brake Unit	*
24	Cab & Cab Controls	✓
25	Air Compressor Invertor	✓
26	Rail Gap Detector	✓
27	Trainline & Car Control	✓
28	Door Systems (E-Mech)	✓

KEY:

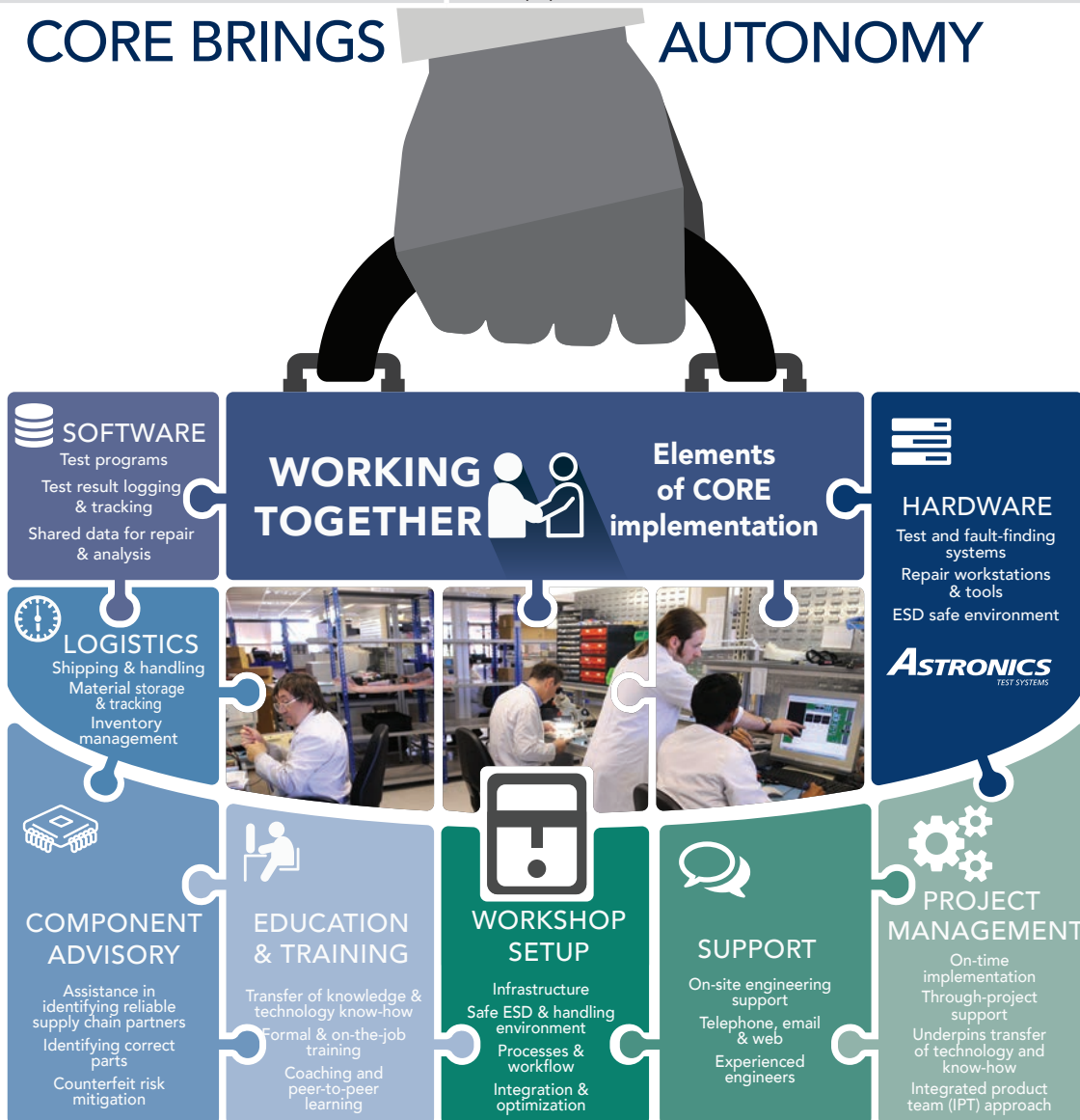
✓ LRU developed

\* LRU future development

A solution that provides a solid foundation on which to build a world-class and self-sufficient capability for the overhaul, repair, & maintenance of electronic systems, LRUs, and PCBs with:

STATE-OF-THE-ART EQUIPMENT AND PROCESSES	An unrivaled capability for the test, fault identification, and repair of electronics
TRANSFER OF TECHNOLOGY KNOW-HOW AND KNOWLEDGE	Tailored training programs, coaching, and on-the-job training
CREATION OF HIGH-TECHNOLOGY JOBS	Helping drive the immediate and on-going success of the facility
EXTENDED WORKING LIFE FOR SYSTEMS	By overcoming obsolescence issues and repairing PCBs
IMPROVED SYSTEMS RELIABILITY	By minimizing the re-work required through the accurate identification of failures and in-depth test
IMPROVED SYSTEMS AVAILABILITY	Through the reduction of turn-around time for repairs
REDUCED THROUGH-LIFE COSTS	Reduction of inventory & extending working life
EARLY RESULTS WITH VISIBLE PROGRESS	Fully managed implementation helping ensure early results and equipment utilization

## CORE BRINGS AUTONOMY



## Astronics brings you CORE

The key focus of CORE is to provide maintenance autonomy to organizations, boosting local economic development and expanding mission critical sectors. The scope of CORE is scalable and complementary to any existing capability. CORE extends the life of your electronic systems and ensures mission-readiness in aerospace, defense, communications, mass transit, and other critical industries.

Notice: Some of the CORE deliverables may be categorized as export controlled under the International Traffic in Arms Regulations (ITAR) or the Export Administration Regulations (EAR) of the United States of America, which may require obtaining an Export License from the US Government.



## Certifications

These certifications represent our commitment to quality, safety, environmental standards, and efficiency.



Astronics Corporation (NASDAQ: ATRO) serves the world's aerospace, defense, and other mission critical industries with proven, innovative technology solutions. We work side-by-side with customers, integrating our array of power, connectivity, lighting, structure, interior, and test technologies to solve complex challenges. For 50 years, we've delivered creative, customer-focused solutions with exceptional responsiveness. Today global airframe manufacturers, airlines, military branches, completion centers, and Fortune 500 companies rely on the collaborative spirit and innovation of Astronics.

## ASTRONICS

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