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**BUPAT LTD.** was founded in 1983 as electronic components and equipment company in Ankara, Turkey. It is a privately owned company. It functions as a value-added representative and distributor of electronic products and services of the world's leading manufacturers such as Curtiss-Wright, COBHAM, Radiall, Evans Capacitors, AOS, Grayhill and BOYD. It has been serving the electronics, defense and aerospace industry for the last 20 years.

**BUPAT GLOBAL LLC** founded in July 2013 in Chicago, Illinois, acts as the strategical partner of **BUPAT LTD.** It maintains close relations with US based manufacturers and offers Turkish clients great benefits by providing top-notch services, including (but not limited to) fast shipping, competitive pricing and technical support.

We, as **BUPAT LTD** and **BUPAT GLOBAL LLC**, give utmost importance to our customers, responding their requests in timely manner. We put special focus on in-house training so as to be ready to meet our customers with our expert staff. For long term production schedules of our customers, we also keep stocks, reducing significantly the cost and delivery times. For R&D and prototyping projects, we also assist our customers in obtaining samples for test and evaluation.

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bupat

**EQUIPMENT COMPANIES**



# ***COBHAM***

## DEFENCE ANTENNAS



## SECURITY ANTENNAS



## SATELLITE COMMUNICATION ANTENNAS



## COMMERCIAL ANTENNAS



## ABOUT

# COBHAM

Cobham is a leading global technology and services innovator, respected for providing solutions to the greatest challenges; from deep space to the depths of the ocean. Our ethos is rooted firmly in our history of innovation, leadership and empowerment, and we take great pride in solving the big problems that others can't. If it can be done, we can find a way.

Our core values have driven us from our launch in 1934 by Sir Alan Cobham, an aviation innovator, to becoming the hugely diverse, international technology company that we are today.

### **COBHAM AEROSPACE CONNECTIVITY (CHELTON LTD) (MARLOW-UK)**

Cobham Antenna Systems is World leader in the design and manufacture of airborne antenna systems, airborne search and rescue systems, airborne tetra systems, electrostatic dischargers for antennas, RF interference cancellation systems, tactical land antennas and UHF SATCOM antennas. Its pioneering spirit and breadth of experience have created a worldwide reputation of quality, capability, reliability and innovative antenna design for over six decades.

### **(NEW MARKET-UK)**

The Cobham Antenna Systems facility in Cheveley, Newmarket, is a centre of excellence for the design and manufacture of our range of microwave antennas.

Cobham Antenna Systems develops and manufactures high specification sector and multi-sector, directional, omni-directional, ultra-wideband (UWB) and MIMO antennas.

A wide range of products is available for customers, small and large, worldwide, in Commercial, Military, Satellite and Security markets.

The company specialises in bespoke development projects for niche requirements.

The company's on-site near-field antenna test facility enables customers to view accurate performance profiles and test results.

### **COBHAM AEROSPACE COMMUNICATIONS (DOURDAN-France)**

Cobham Aerospace Communications is the world leader in the design and manufacture of antennas, enabling platforms such as General Aviation, Helicopter, Business Jet, Regional Jet, Medium Range, Long Range and Wide Body aircraft.

Cobham has more than 55 years' experience manufacturing aircraft communication antennas for multiple platforms. Our antennas cover multiple applications whilst continuing to improve performance, stealth and reduce weight and drag.

Cobham's aircraft communication antennas are used by more than 100 countries throughout the world.

We make VHF, VOR, Localizer, Glide Slope, Marker, MLS dir, MLS omni, ATC-DME, ELT, UHF for Helicopters, trainer aircraft, business and regional jets, medium size and long range aircraft and general aviation

## ANTENNAS FOR COMMUNICATION AND NAVIGATION



AIRBORNE COMMUNICATION ANTENNAS • AIRBORNE GPS ANTENNAS • AIRBORNE NAVIGATION ANTENNAS • RF AIRBORNE COMPONENTS

## GENERAL AVIATION ANTENNAS



GENERAL AVIATION RADIOPHONE / DME ANTENNAS • GENERAL AVIATION VHF COMM ANTENNAS • GENERAL AVIATION VOR/LOC/GS • DME/TRANSPONDER ANTENNAS  
GM BAND AND AM/PM ANTENNAS • UHF/L BAND NAVIGATION ANTENNAS • UHF/L BAND COMMUNICATION ANTENNAS • ELT ANTENNAS • COMDAT MULTI-FUNCTION ANTENNAS  
FM COMMUNICATION ANTENNAS

## ELECTROSTATIC DISCHARGERS FOR ANTENNAS



STATIC DISCHARGERS

## ANTENNA COUPLERS / COMBINERS AND DUPLEXERS



CI 120-3 POWER COMBINER • CI 120-4 POWER COMBINER • CI 120-5 POWER COMBINER • CI 502 COUPLER • CI 503 COUPLER • CI-601 DUPLEXER SWITCHING

## GPS NAVIGATION ANTENNAS



GPS/XM ANTENNAS • VHF/GPS ANTENNAS • VHF/GPS/XM ANTENNAS • VHF/XM ANTENNAS • XM ANTENNAS • VHF COMMUNICATION ANTENNAS



## MARKER BEACON ANTENNAS



COMANT CI 102 • COMANT CI 118 • COMANT CI 118-1 • COMANT CI 118-9 • COMANT CI 118-10 • COMANT CI 164

## ANTENNA SHIPSET



GLIDE ANTENNA • MARKER ANTENNA • ATC-IFF/DME-TACAN/TCAS ANTENNA • ELT ANTENNA

## AIRBORNE ANTENNAS & RF SUB-SYSTEMS



UHF ANTENNA • BAND REJECT FILTER • BAND ANTENNA • TRAJECTOGRAPHY ANTENNA • IFF ANTENNA

## AIRBORNE SEARCH AND RESCUE SYSTEMS



## DIRECTIONS FINDING (DF) SYSTEMS FOR ALL SEARCH & RESCUE (SAR) MISSIONS



## AIRBORNE TETRA



CH150



CH250



7-450-14



CH450

## ANTENNAS AND TERMINALS FOR SATCOM



## DATALINK AND SATCOM ANTENNAS



## DIAMOND FLATPLATE SATCOM ANTENNAS



## UHF AIRBORNE SATCOM ANTENNAS



## UHF LAND SATCOM ANTENNAS



## UHF/L/S BAND SATELLITE ANTENNAS



## DIAMOND X-BAND FLATPLATE ANTENNA



## ANTENNAS FOR BATTLEFIELD COMBAT IDENTIFICATION



Omni Directional Antenna



Interrogator Antenna

## X-BAND FLAT-PLATE ANTENNA APERTURE FOR ON THE MOVE APPLICATIONS



## MICROWAVE ANTENNAS



GROUP 1 ANTENNAS (0.4 GHz to 1 GHz) • GROUP 2 ANTENNAS (1GHz to 2GHz) • GROUP 3 ANTENNAS (2 GHz to 3 GHz) • GROUP 4 ANTENNAS (3 GHz to 4 GHz)  
GROUP 5 ANTENNAS (4GHz to 6GHz) • GROUP 6 ANTENNAS (6 GHz and Above)

## C-BAND ANTENNAS - 4.7 GHz



TACTICAL COMMUNICATIONS C-BAND, 4.4 TO 5.0 GHz ANTENNAS • SECTOR ANTENNAS • MULTI-SECTOR ANTENNAS • OMNI-DIRECTIONAL ANTENNAS

## ELECTRONICS WARFARE ANTENNAS - UWB



ULTRA WIDEBAND OMNI • CAVITY BACKED SPIRALS • HIGH POWER PLANAR SPIRAL ANTENNAS • OMNI ANTENNA MATRIX - SINGLE AND MULTI-STACKED

## UNMANNED VEHICLE ANTENNAS



OMNI-RUGGED DIPOLE • OMNI-SLIM FLEXIBLE DIPOLE • BLADE-OMNI DIRECTIONAL • ANTENNAS-OMNI UNMANNED SYSTEMS (1 GHz to 3GHz)  
ANTENNAS-ULTRA WIDEBAND OMNI FOR UNMANNED SYSTEMS • ANTENNAS-ULTRA WIDEBAND DIRECTIONAL PLANAR SPIRAL FOR UNMANNED SYSTEMS  
SECTOR ANTENNAS, MULTI SECTOR ANTENNAS FOR CONTROL CENTRES



## TACTICAL COMMUNICATIONS ANTENNAS - LINK16



LINK16 TACTICAL COMMUNICATIONS GROUND TO AIR • RUGGED OMNI ANTENNAS WITH SPIGOT OR FLANGE • OMNI ANTENNAS WITH SPIGOT OR FLANGE  
OMNI ANTENNAS FOR TRANSMITTERS, GROUND STATION, VEHICLE AND MARINE • OMNI ANTENNA GROUND, VEHICLE AND MARINE  
DIPOLE FOR SHORT RANGE 20W TRANSMITTERS • 120° SECTOR ANTENNA • BANDPASS AND BANDSTOP FILTERS

## DAS (DISTRIBUTED ANTENNA SYSTEM)



PMR AND TETRA ANTENNAS OPEN AREA, CAR PARKING • ULTRA WIDEBAND DIRECTIONAL ANTENNA (150-2700 MHz) FOR PMR, TETRA, GSM AND WIRELESS LAN  
ULTRA WIDEBAND CEILING MOUNT OMNI DIRECTIONAL ANTENNA (380-6000 MHz) FOR TETRA, GSM AND WIRELESS LAN

### GROUND CONTROL ANTENNAS



### WiMAX/LTE ANTENNAS



### WIRELESS LAN ANTENNAS



### RFID ANTENNAS



### CELLULAR ANTENNAS



### COFDM ANTENNAS



### TELEMETRY ANTENNAS



### SECURITY AND SUEVILLANCA ANTENNAS



### RADAR ANTENNAS



### PMR/TETRA ANTENNAS



## TRACKING ANTENNA SYSTEMS



KU-BAND AIRBORNE ANTENNA  
KU-BAND ANTENNA  
X-BAND ANTENNA  
X+S DUAL-BAND ANTENNA

## EMBEDDED SPACE ANTENNAS



X-BAND TELEMETRY ANTENNA • DUAL-BAND UHF+S POSITIONING DORIS ANTENNA • GPS PATCH ANTENNA • C-BAND RADAR • UHF DUAL FREQUENCY ARGOS ANTENNA

## TACTICAL LAND ANTENNAS



MANPACK ANTENNAS • VEHICLE ANTENNAS • VEHICLE COMMUNICATIONS AND JAMMING ANTENNAS

## HF FULL-LOOP & HALF-LOOP ANTENNAS



HF FULL-LOOP ANTENNA AVAILABLE IN 150W, 500W AND 1kW  
HF HALF-LOOP ANTENNA AVAILABLE IN 150W

## GROUND TO AIR VHF & UHF ANTENNAS



UHF DIPOLE ANTENNA  
UHF VERTICAL COLINEAR DIPOLE STACKING ANTENNA UP TO 6 PORTS  
12 UHF PORT ANTENNA  
3 VHF PORTS, 3 UHF PORTS, 1V&UHF PORT

## NAVAL ANTENNAS



UHF MULTI-PORT ANTENNAS • HF RECESS HALF LOOP ANTENNA • HF LOOP ANTENNA • LINK16 ANTENNA FAMILY

## JAMMING ANTENNAS





# EV/TechNEWS

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# XMC and VPX

## Graphics and Video Capture Products



## ABOUT



EIZO Rugged Solutions, Inc. was established in 1987 under its original name, Tech Source, Inc. Since then, EIZO Rugged Solutions has been a pioneer in high performance computer graphics hardware solutions for niche markets. With a strong engineering team, the company has evolved over the years, now serving commercial, defense and other rugged markets that include Air Traffic Control/Management (ATC/ATM), avionics, military and embedded systems with several COTS (commercial off-the-shelf) and tailored (custom) products. The product range includes graphics, imaging and video capture boards, H.264 encoders and high compression video recorders.

The Raptor product line has served the ATC/ATM market since 1995, with products deployed in over 35 countries through OEMs such as Raytheon, Lockheed Martin, Northrop Grumman, Thales, Indra and Telephonics. The products have evolved over the years through various technologies. The current Raptor 4000 product line is used in a major US program called the FAA STARS program, upgrading the nation's Air Traffic Control systems.

The core of EIZO Rugged Solutions' strength has been the ability to design graphics solutions to satisfy specific customer requirements. Our extensive efforts have produced breakthroughs in graphics and imaging technology. From designing graphics processing units (GPUs) and high compression encoders to FPGA targeted special graphics/imaging algorithms, the company has a broad range of knowledge and offers product customizations and new product delivery in a matter of months.

The Condor product line includes a range of XMC/VPX based COTS products that are targeted towards extended temperature and rugged applications such as avionics, defense and industrial applications. Several of the Condor products have been chosen for major programs in the US and other countries.

In 2007, Tech Source was acquired by EIZO, a leading Japanese manufacturer of high-end visual display products. EIZO is listed on the First Section of the Tokyo Stock Exchange (TSE: 6737). The combined expertise and complementary product lines of Tech Source and EIZO allow the companies to produce cutting-edge graphics solutions for ATC, military, and other markets.

[www.eizorugged.com](http://www.eizorugged.com)





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## XMC GRAPHICS AND VIDEO CAPTURE

**NEW**



### Condor NVP2100 Series



NVIDIA Quadro  
Pascal P2000 (GP107)  
XMC Graphics &  
GPGPU Card  
Inputs : Four 3G-SDI;  
Outputs : Two 3G-SDI,  
Two DVI/DisplayPort,  
One VGA

### Condor 3000 Series



High Performance  
XMC graphics with  
GPGPU capability

### Condor NVP2000x Series



NVIDIA® Quadro®  
P2000 (GP107)  
XMC Graphics &  
GPGPU Card  
with Two Rear PMC I/O  
and One Front DVI  
Video Output

### Condor VC100 Series



H.264 XMC  
Video Encoder  
with up to  
4 Video Inputs

### Condor 4100 Series



Rugged  
XMC Graphics with  
Dual 3G-SDI  
Video Input and  
Output

### Condor 2100 Series



XMC  
Graphics Board and  
Video Input Card

### Condor 4000 Series



High Performance  
XMC Graphics  
with up to six  
multi-function  
video outputs and  
GPGPU capability

### Condor 2000 Series



High Performance  
Graphics for  
Embedded System  
Applications



# VPX GRAPHICS AND VIDEO CAPTURE

## Condor GR4 3U VPX



NVIDIA®  
Pascal™ Based  
Rugged Graphics,  
GPGPU &  
Video Capture Card  
with Four 3G-SDI I/O

NEW



## Condor GR5 3U VPX

Rugged 3U  
VPX Graphics &  
GPGPU Card  
with CUDA® Support  
Based on  
the NVIDIA® Quadro® P2000

## Condor GR3 3U VPX



Rugged 3U  
VPX GPGPU / SBC  
Solution with  
CUDA Support

## Condor 4000 3U VPX



High Performance  
3U VPX Graphics  
with GPGPU capability

## Condor VPX-H265 Series



Rugged 3U  
VPX H.265 (HEVC) or  
H.264 Video/Audio Encoder  
with Two 3G-SDI  
Inputs and CoT / KLV  
Metadata Insertion

## Condor GR2 3U VPX



Rugged 3U  
VPX Graphics &  
GPGPU Card with  
CUDA® Support  
Based on  
NVIDIA® Quadro® P5000  
or P3000 GPU



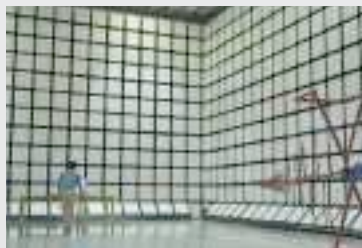
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# THE ULTIMATE RUGGED MONITOR





RELIABILITY. COMMITMENT. SERVICE.

# Solutions for the Modern Engineer



**NTDS PRODUCTS**

**HIGH DENSITY I/O PRODUCTS**

**SYSTEM PRODUCTS**



## ABOUT



Founded in 1982, GET Engineering is a leading edge, high technology engineering firm providing tactical data solutions to government and industrial clients. GET is a Small Business dedicated to providing the United States Department of Defense and its coalition forces the most cost effective tactical communication products and solutions available. GET accomplishes this by utilizing its 33+ years of knowledge to produce products that bridge legacy systems to new technology. GET provides products and services to over 300 customers in the Department of Defense, Foreign Military Sales (FMS) and commercial contractor community. GET provides a high level of customization by being able to implement customer requirements into our innovative products.

GET Engineering is a complete design, engineering and manufacturing organization that provides engineering and design services, cable assemblies and manufacturing solutions for commercial, industrial and MIL-SPEC solutions. All of our work is accomplished at our 11,000 square foot facility located in El Cajon, California. Our facility is ISO 9001:2008 Registered and complies with both IPC-A-610 Board Level Manufacturing and WHMA-A-620 Cable Assembly.

**[www.gethdio.com](http://www.gethdio.com)**



## NTDS OVER ETHERNET SYSTEMS



1-16 Channel 4u



1-4 Channel 3u Rack Mount



PC104 1-2 Channel Bulkhead/ATR Mount



NTDS Serial Type D/E



RS-422



NTDS-Parallel A/B/C/H

## AIRBORNE NTDS OVER ETHERNET SYSTEMS

## HARDENED NTDS OVER ETHERNET SYSTEMS



## ATDS OVER ETHERNET SYSTEMS

## SMALL FORM FACTOR ATDS OVER ETHERNET SYSTEMS



## FIBER OPTIC PRODUCTS



### NTDS TO FIBER OPTIC CONVERTERS

### AN/USQ-62 HSDS REPLACEMENT



## POINT TO POINT NTDS TO FIBER CONVERTERS





## TACTICAL DATA PROCESSORS

### COMPACT EMBEDDED SYSTEMS



### TACTICAL DATA PROCESSORS



### PORTABLE NTDS ANALYZER / DEBUGGER

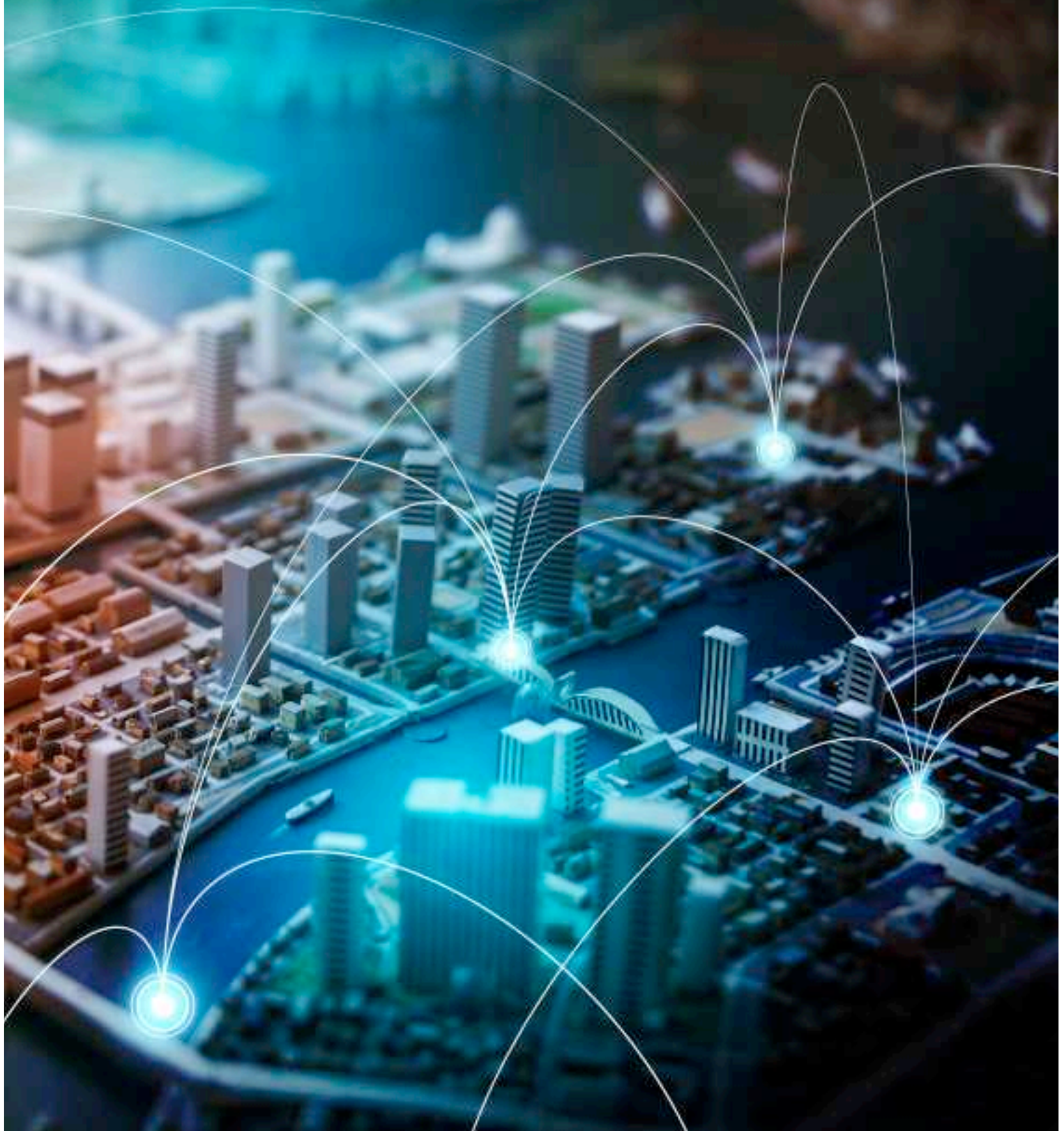


### NTDS PC/104+ EMBEDDED SYSTEMS





**Domo Tactical Communications, one platform offering secure and reliable security and surveillance products, along with high performance wireless broadcast systems for all industries.**



## ABOUT



DTC was formed in 2016 when Marlin Equity Partners, a leading private equity firm, based in California, acquired the Tactical Communications and Surveillance division from the British company Cobham Plc.

The DTC group consists of Domo, Micromill, Spectronic and Corp Ten International divided into five value streams with an emphasis on their strong historic brands, coming together once again to create a cohesive surveillance and broadcast product portfolio. Backed by an award winning engineering team, DTC's trusted technology is at the heart of everything we do.

DTC has a global reach, with regional offices based in the United States, United Kingdom, Denmark and Singapore.

DTC is a global technology leader and our passion for innovation keeps us one step ahead in the rapidly changing and increasingly challenging environments we perform in, whether on the battlefield, the streets of our cities or the world's largest sporting events. High performance overt and covert surveillance, communications and broadcast systems enable our customers to securely detect, monitor, communicate and share information with confidence in complex environments. With integrated solutions across our Wireless Video and IP, Cellular, Covert Audio and Video and C2 Systems, DTC can provide professional security networks that protect your people and your infrastructure in some of the world's most demanding environments, keeping you in touch with what matters, no matter how demanding the situation.

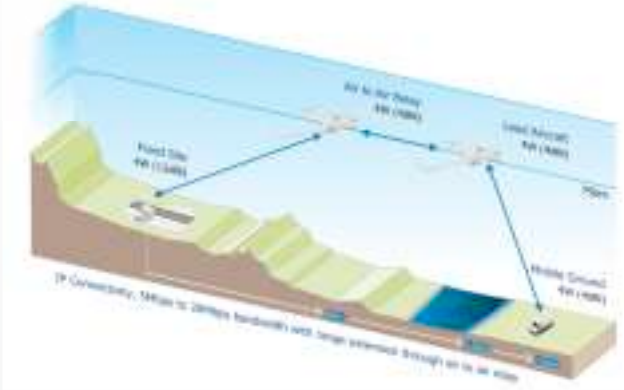
**[www.domotactical.com](http://www.domotactical.com)**





## VIDEO SURVEILLANCE

### Trial—Airborne Mesh



### Urban/City Surveillance



### Mobile Convoy Comms & SA



### Battlefield Mesh



### Satcom and UGV



### Tactical IP Mesh



### IP Satcom Backhaul



### IP Backhaul & Border Security



## VIDEO SURVEILLANCE

### Underground Environment



### Mesh Scenario Marine



### Mesh Scenario Fire



### Mesh Scenario Airport



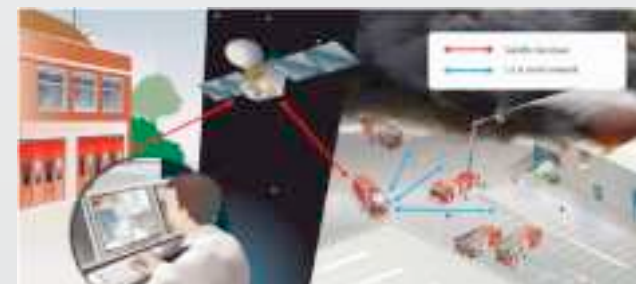
### Mesh Scenario City



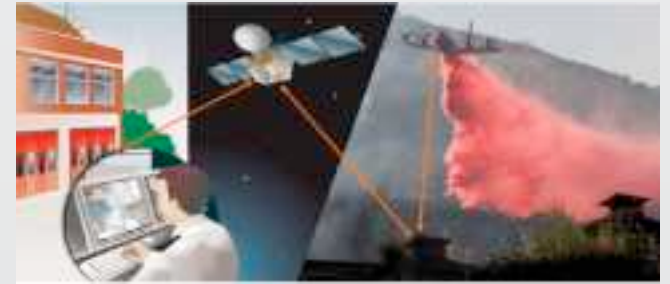
### SOLO Video Mesh Deployment



### DTC Mesh SATCOM Scenario



### Bush Fire





## SOFTWARE DEFINED RADIO

### HIGH THROUGHPUT IP MESH (P5 RANGE)



NETNODE IP MESH RADIO PHASE 5 (PLAIN - PLAIN TRI-BAND - ROBUST - ROBUST TRI-BAND - ROBUST MOBILE)  
SOL8SDR-H SPECIAL ROLE RADIO • SOLO8 SOFTWARE DEFINED RADIO (PLAIN - CONCEALMENT - ROBUST)

### STANDART IP MESH (P4 RANGE)

### IP ACCESSORIES AND AMPLIFIERS

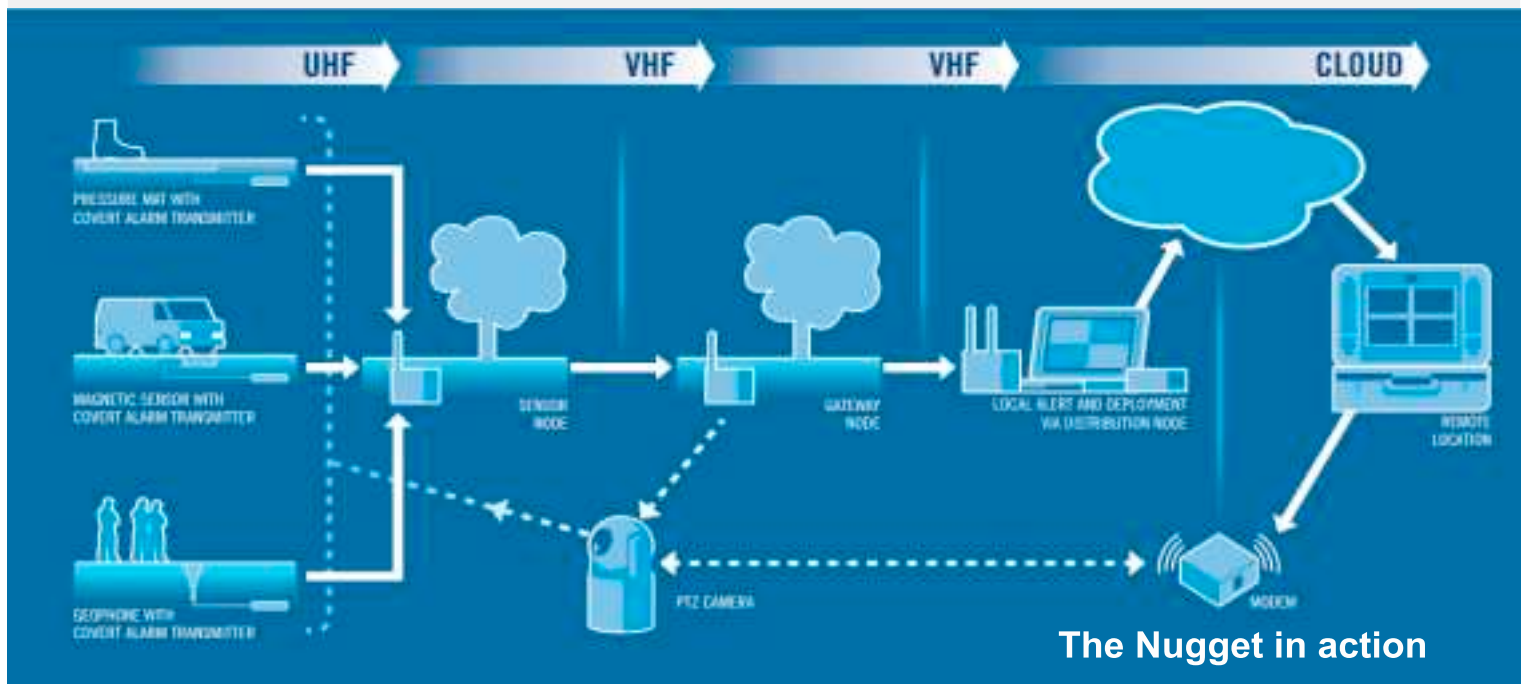


NETNODE IP 5W RADIO (ROBUST) • NETNODE IP 2W RADIO (ROBUST)

NETNODE AMP MINI ROBUST 1W / 2W AMPLIFIER • SOLO8 HDMI/COMPOSITE TO SDI

## NEXT GENERATION GROUND SENSORS

### NUGGET MKIII VHF SENSOR NETWORK NODE



### ADDING SENSORS



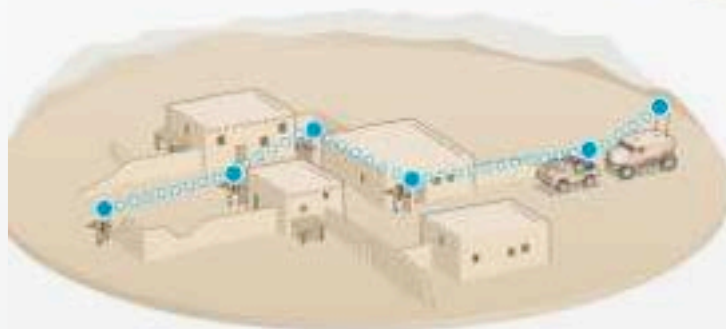
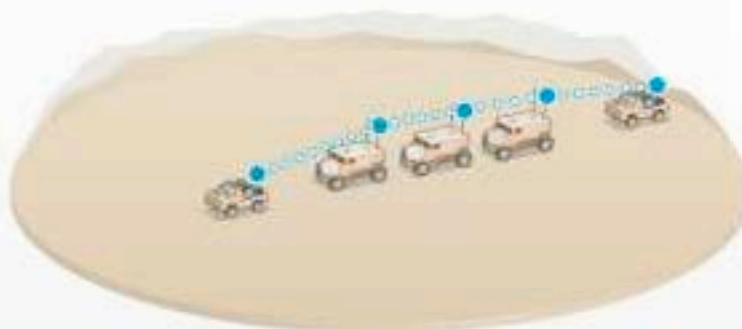
M8040 PIR  
M8007 Trip Wire Sensor  
M8008 Geophone  
M7232 Magnetic Sensor



## BATTLE SPACE SOLUTIONS

### Convoy Protection

Seamless communication and IP data transfer between mobile platforms in a fluid self-healing Mesh.

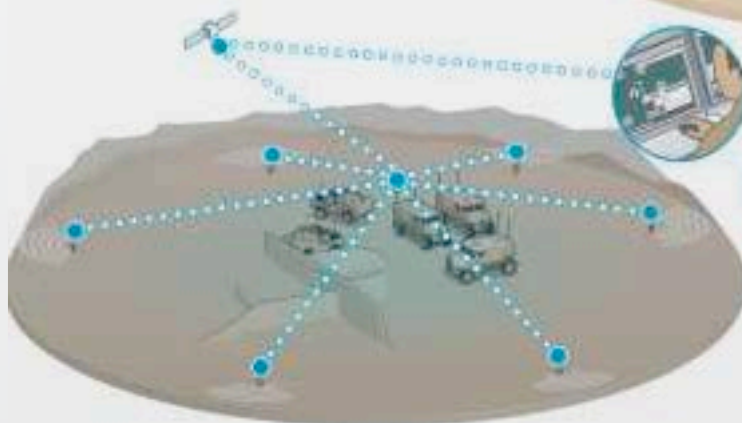
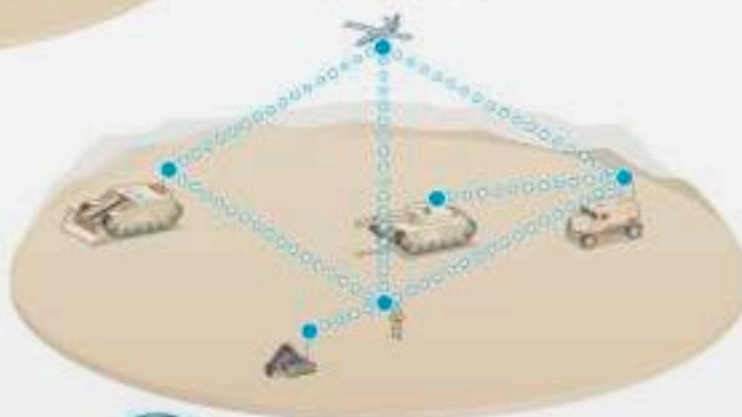


### Dismounted Soldier

Video and data sharing between dismounted teams and supporting vehicles on challenging battlefield environments.

### Autonomous Vehicle Operation

Remote image viewing, sensor monitoring and control of autonomous assets in the battlefield environment.

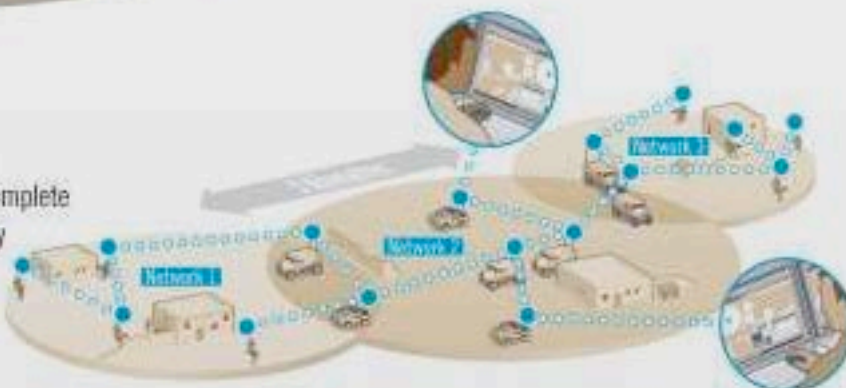


### Perimeter Security/Force Protection

Seamless integration of perimeter security by wireless Unattended Ground Sensors and Mesh networks, including automated alarms and monitoring.

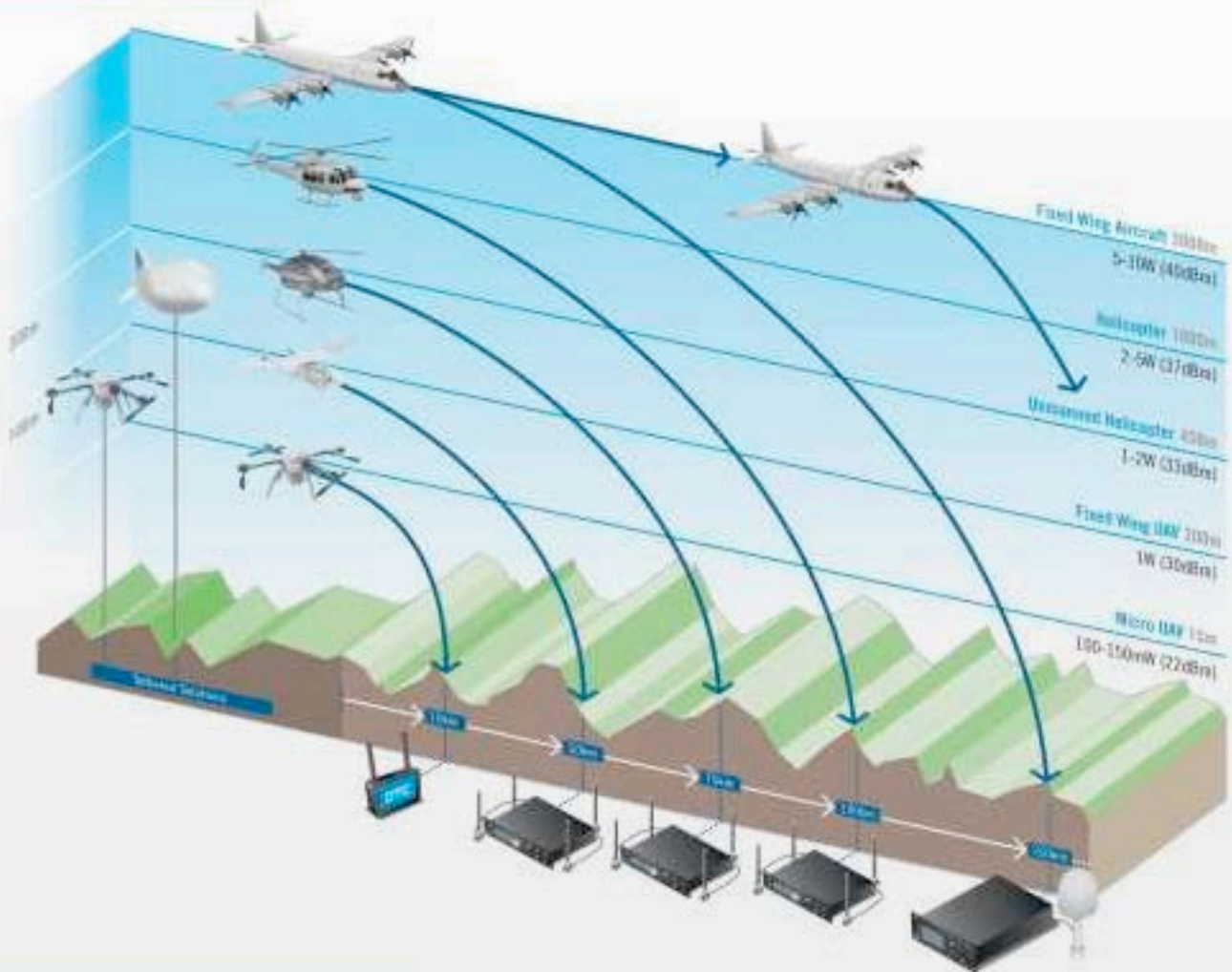
### Network Architectures

DTC's solutions can be combined into a multi-network architecture, creating a complete solution to manage data and connectivity in a complex battle space.



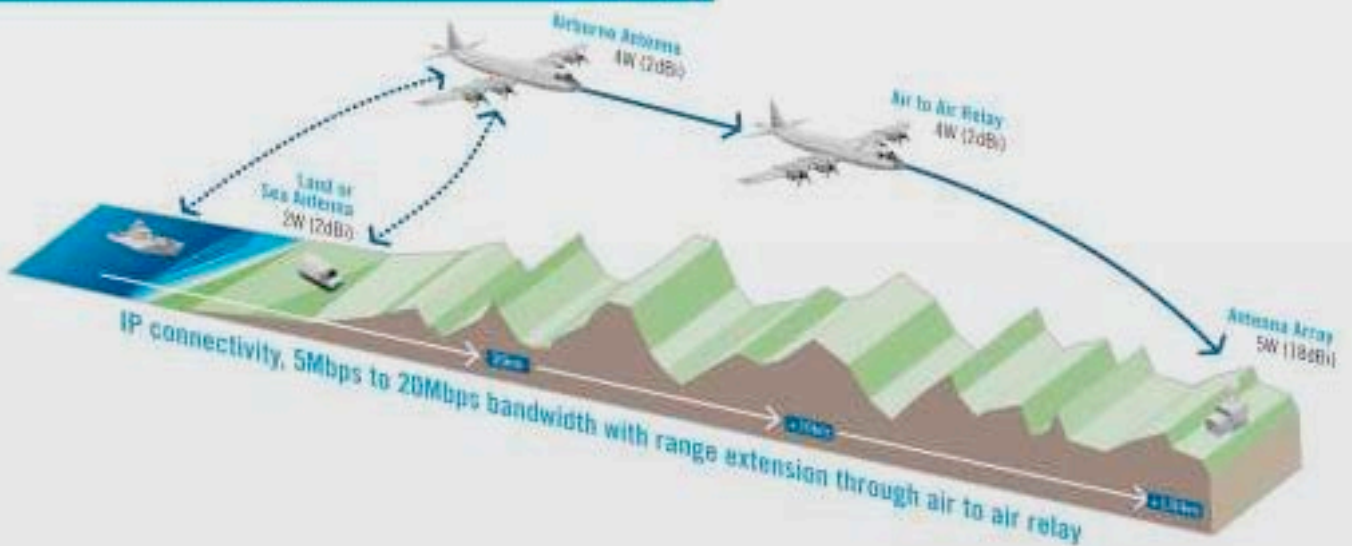
## BATTLE SPACE SOLUTIONS

### SOLO downlink and amplifier options for every application



### Typical IP Mesh link capability

(Total MIMO link throughput at 6MHz bandwidth (15Mbps))





## TRACKER

## Personnel Tags

A VIP at risk of kidnap wears a tiny body-worn tag to a meeting in the city. His security officer is able to keep track of him over the dedicated secure RF link without the need for 3G infrastructure, while his close protection team use Body Worn Receivers to pick up his signal.

If kidnapped, the tag can be tracked at greater range over mobile or airborne receivers to enable swift recovery.

Multiple VIPs can be monitored using a single mobile (vehicle or airborne) or fixed receiver.



## Tracker Receiver family



Receiver	Following tags into and through buildings	Pinpoint tags down to a room or package	Track multiple tags	Decode GPS data from tags	Track a tag when GPS is not available	Typical tracking range (urban environment)
Bodyworn	■	■		■	■	500 to 1000m
Mobile			■	■	■	2 to 3km
Infrastructure			■	■	■	30 to +40km
Airborne			■	■	■	50 to +60km

## Tracker Transmitter family



Transmitter	Rapidly deployed on a vehicle	Tracking people	Tracking packages	Concealments	Pattern of life	Can be tracked when GPS is not available
Micro-Tag		■	■	■		■
Ruggedised GPS	■				■	■
Micro-GPS		■	■	■	■	■





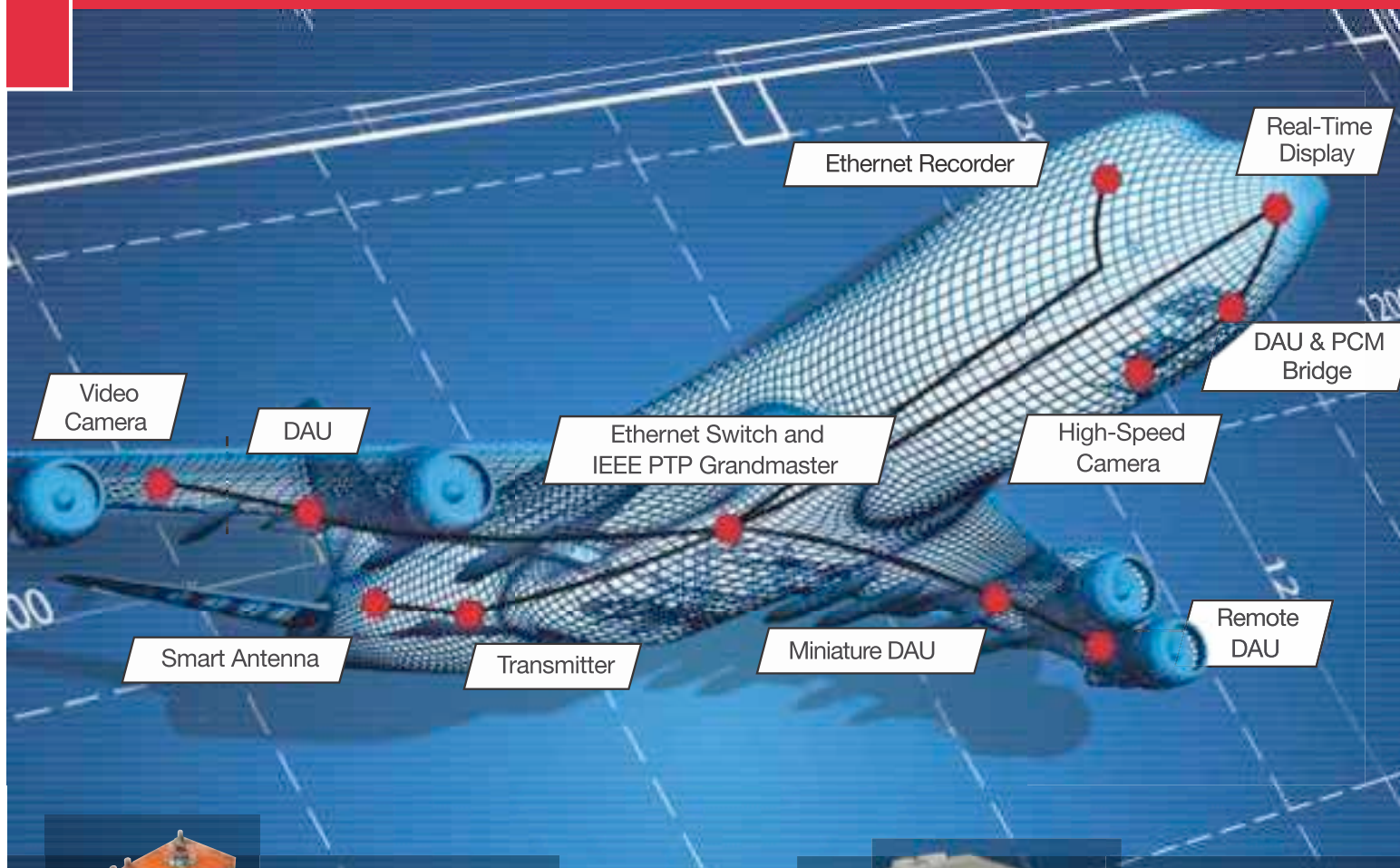
# TELETRONICS

A Curtiss-Wright Company

## CURTISS - WRIGHT

www.curtisswrightds.com

# Fully Integrated Flight Test Systems



Remote Data Acquisition Unit



High Speed Camera

Data Server and Recorder



High Definition Camera



10 GbE Ethernet Switch



Multimode Transmitter



+90 312 417 7653 • bupatltd@bupat.com.tr • [www.bupat.com.tr](http://www.bupat.com.tr)

## ABOUT

# ***CURTISS - WRIGHT***

Curtiss-Wright Defense Solutions, a division of Curtiss-Wright, is an industry-leading supplier of sophisticated electronics products. We are recognized around the world as one of the most innovative designers and manufacturers of highly engineered systems built to perform reliably in harsh conditions.

Curtiss-Wright is the leading rugged data acquisition provider in the world and has been producing systems for decades. Deploying such proven systems means less risk of useless data, having to repeat a flight or losing weeks or compromising the integrity of a maintenance program and suffering the schedule and financial costs.

Curtiss-Wright also provides proven camera and video acquisition products that can capture, convert, route, transmit, record and view test imagery. These can all be combined into a fully integrated and synchronized system from one to dozens of video sources and feature industry leading latency.

Curtiss-Wright offers system solutions that air data computers, cockpit voice and flight data recorders, data concentrators, data recorders & storage, mission computers, mission displays, networking displays, program specific systems, radar processing & recording systems and video systems can shorten development time and speed deployment. Our proven systems also have comprehensive lifecycle services to help keep your systems running for the long haul. In this regard, air data computers.

**[www.curtisswright.com](http://www.curtisswright.com)**



## AEROSPACE INSTRUMENTATION SOLUTIONS

### Space Instrumentation

- COTS Data Acquisition
- Radiation Tolerant COTS Data Acquisition
- Network Switches

### Telemetry

- RPV Control & Communications
- Secure Data/Video Transmission
- Ground Station Reception

### Flight Test

- Prototype Testing
- Production Testing
- Flight Line Checkout

### Flight Safety

- Flight Termination
- Missile Performance Testing
- Portable Testers



### System Monitoring

- Predictive Maintenance
- Prognostic Health Monitoring

### Structural Monitoring

- Operational Loads Monitoring
- Structural Health Monitoring
- Condition Based Maintenance

### Mission Recording

- Tactical Data Capture
- Data Encryption

### Interface Units

- Flight Data Acquisition
- Remote Interfacing
- Data Concentration



## TOTAL SYSTEM SOLUTIONS

### NETWORK SWITCHES

- Stand-alone and module options
- Deterministic and reliable
- Highly rugged with rapid boot-up
- IEEE-1588 V1/2 PTP support and grandmaster

### RECORDERS

- Comprehensive range of stand-alone recorders
- Wide range of interfaces
- Removable solid state media
- Designed for flexibility and reliability

### DATA ACQUISITION

- #1 supplier of rugged airborne DAS worldwide
- Most advanced data acquisition platform available
- Support virtually all sensors and interfaces
- Rugged for the harshest of environments
- Rock solid reliability

### SOFTWARE

- Simple and powerful setup and management software
- Ethernet technology allows simplified integration of 3<sup>rd</sup> party hardware

### GROUND STATIONS

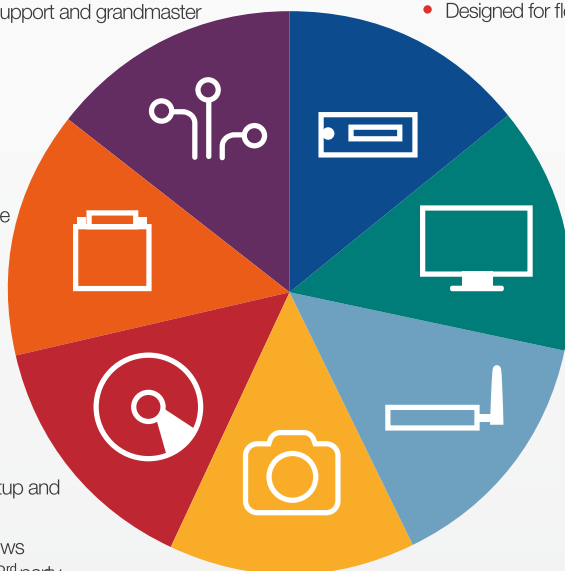
- Real time analysis, pre-flight check-out, post mission processing
- Integrated solutions portable or server/client
- RF component or standalone subsystems
- Transmitters, receivers and smart source selection
- IFIG, iNET and network packet processing compliant

### TELEMETRY

- Flight termination receivers
- Airborne telemetry receivers
- Radar transponders
- Telemetry transmitters
- Smart antenna

### IMAGING

- Rugged HD and high-speed cameras
- Supports large networks of synchronized cameras
- Camera controllers and managers simplify operation



## DATA ACQUISITION CHASSIS



Axon

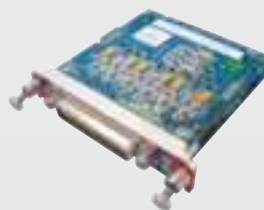


KAM-500

## ETHERNET SWITCHES

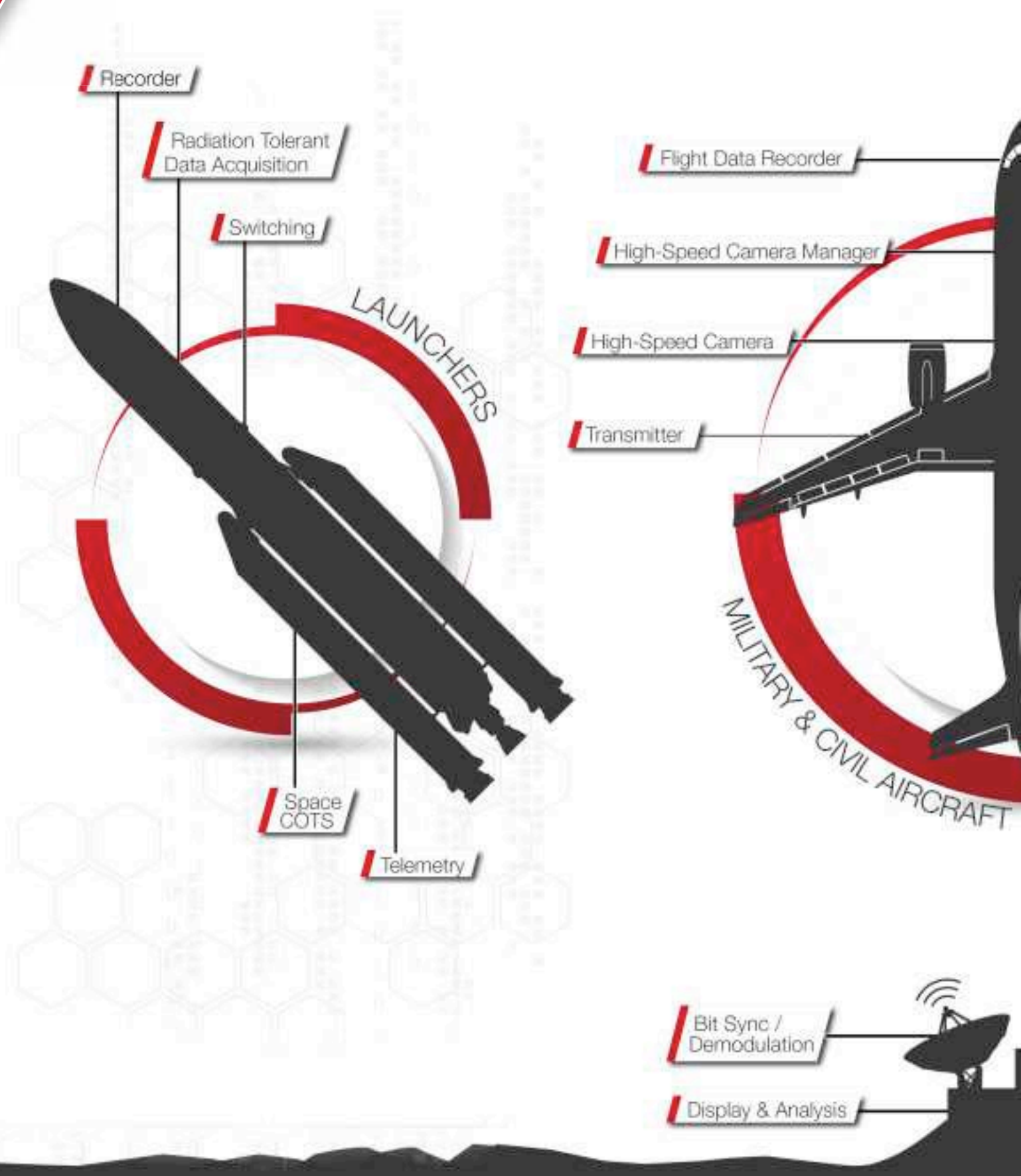


ETHERNET SWITCH

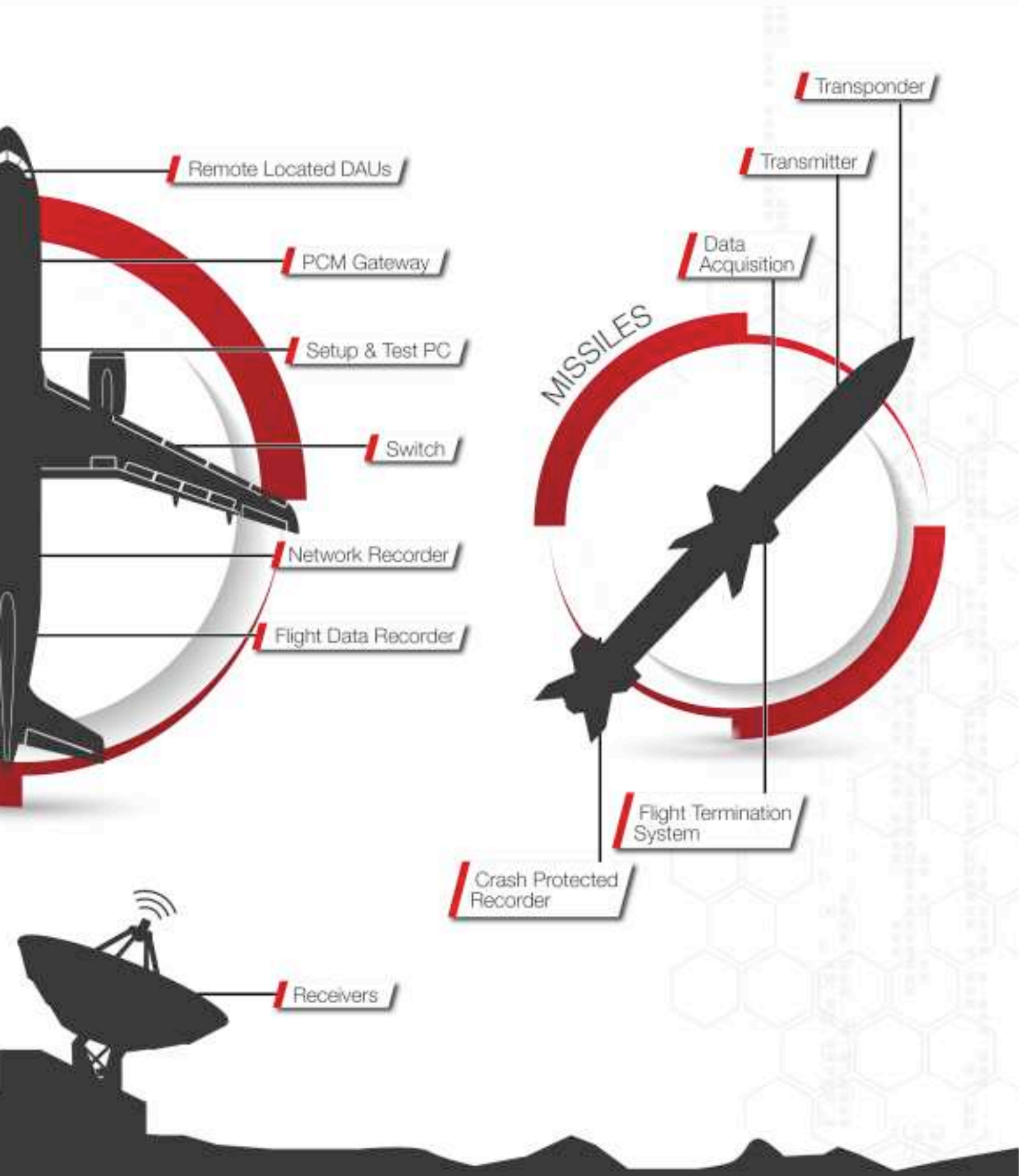


SWITCH MODULE

## TOTAL DATA ACQUISITION SYSTEM SOLUTIONS

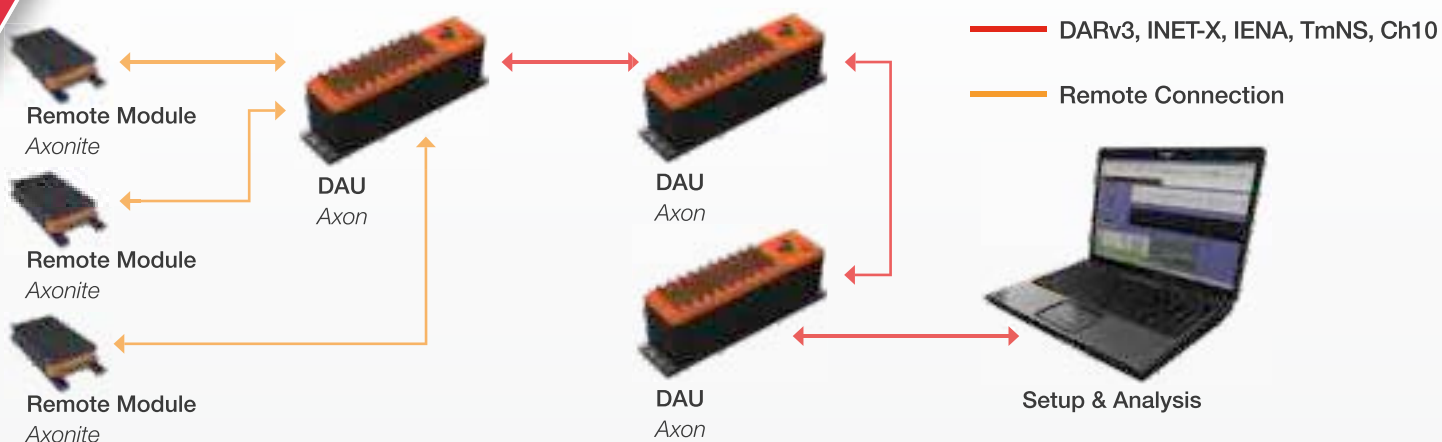


## Seamless Integration



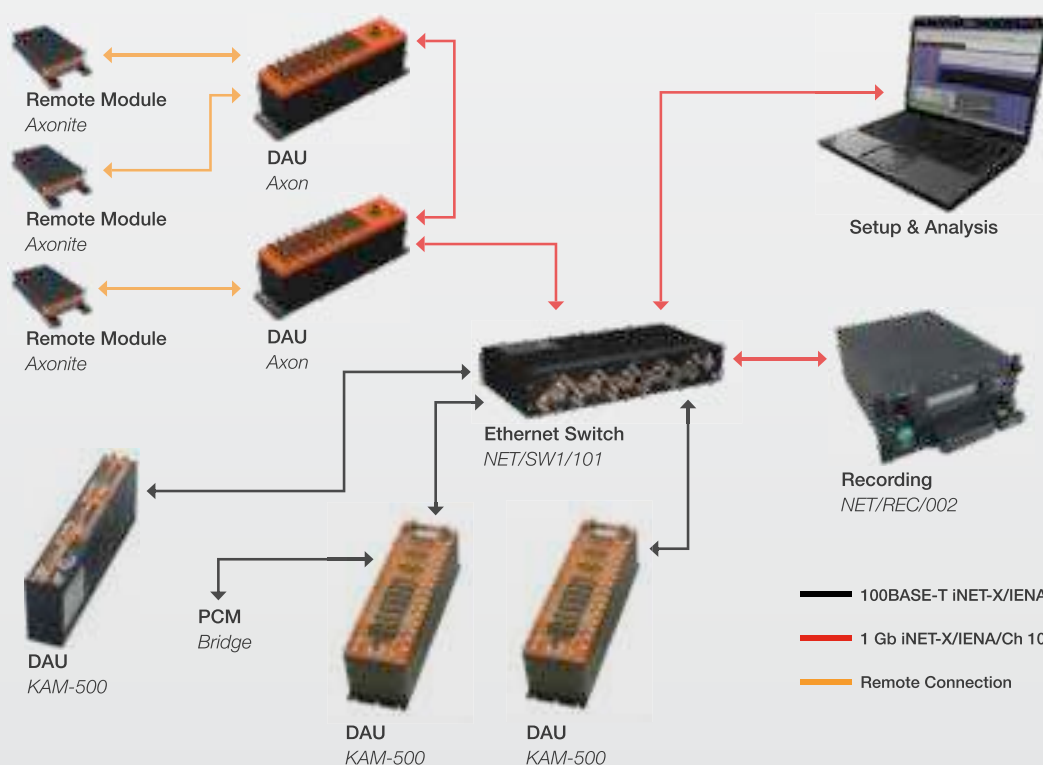


## AXON ONLY SYSTEM



PRODUCT NAME	IMAGE	TYPE	PRODUCT NAME	IMAGE	TYPE
Axon Quick Start Kit		Quick Start Kit	AW4ADC04B - 400 S-Phase Power Monitor Module - 8 analog channels		ADC Module
AW4CHS01U - Axon chassis, 8 user slots		Chassis	AW4TDC01T - Thermocouple ADC Module - 12 channels		ADC Module
AW4CHS02U - Axon chassis, 8 user slots		Chassis	AW4EDC01T - Axon EPG-106 PCM encoder		CPU Module
AW4CHS03U - Axon chassis, 16 user slots		Chassis	AW4NEM01T - 34 Channel APAC-018 Bus Memo Processor		Bus monitor
AW4GC01T - Axon backplane controller		Backplane Controller	AW4DS01T - 34 Channel Diode Input		Bus monitor
AW4ADC01T - Flexible ADC Module - 8 analog channels		ADC Module	AW4LBB01T - 16 Channel Sine Bus Phase Processor		Bus Phase Processor
AW4ADC02B - Differential input ADC @ 400 kHz - 32 analog channels		ADC Module	AW4TR01U - Remote housing for Axon module		Remote Housing
			AW4EXT01T - Axon Extender Card		Extender Card

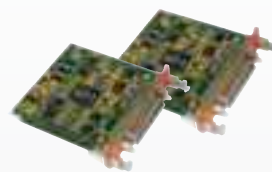
## ACRA KAM-500 SYSTEM



## RECORDERS



ADSR-4003F-3



SSR-CHS AND MODULES

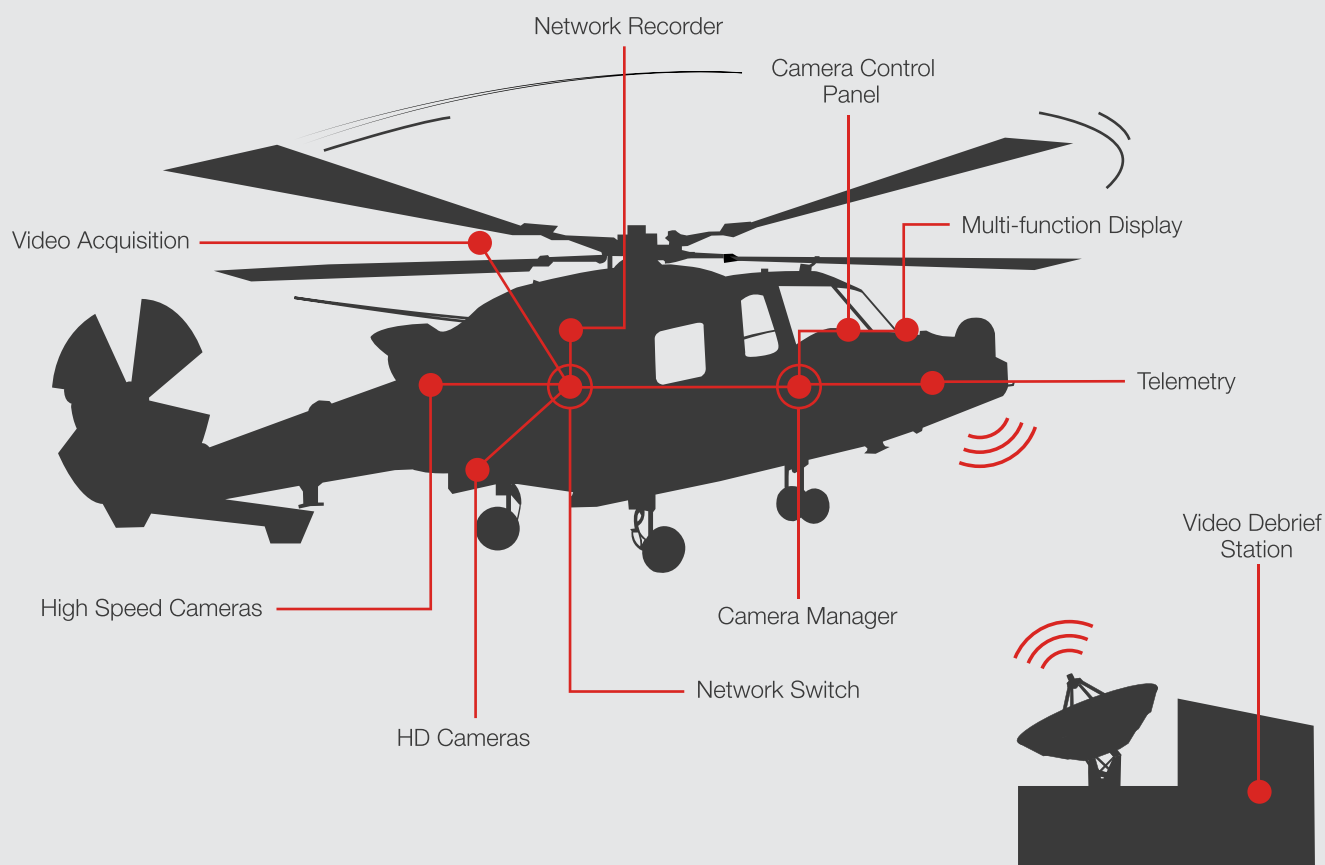
## HIGH DEFINITION CAMERAS



HDC-330-2



HDC-430-1



## FLIGHT TERMINATION SYSTEMS



FLIGHT TERMINATION RECEIVER

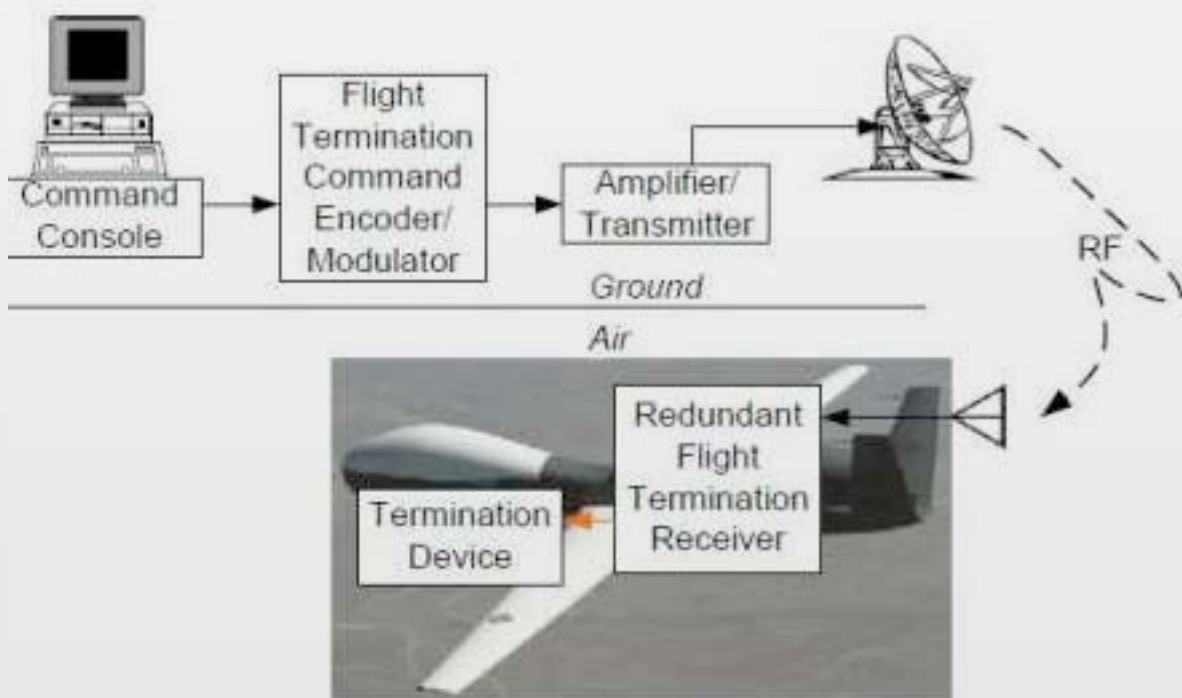


FLIGHT TERMINATION RECEIVER TESTER



FINAL ACCEPTANCE TESTING

Figure 1. FTS System Diagram

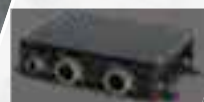




**Data  
Storage**



**Video  
Management**



**Flight Data  
Recorders**



**Network  
Switches**



**Data  
Acquisition**



**Air Data  
Computers**



**Mission  
Computers**

**Mission  
Displays**



**NETWORK RECORDERS****nREC-4000S-2****Data Transfer Unit - DTU-4500S-2****ADSR-4003X-X**  
**Advanced Data Server & Recorder****ADSR-4003F-1 – Ethernet Recorder****nREC-6000****DTU-2000**

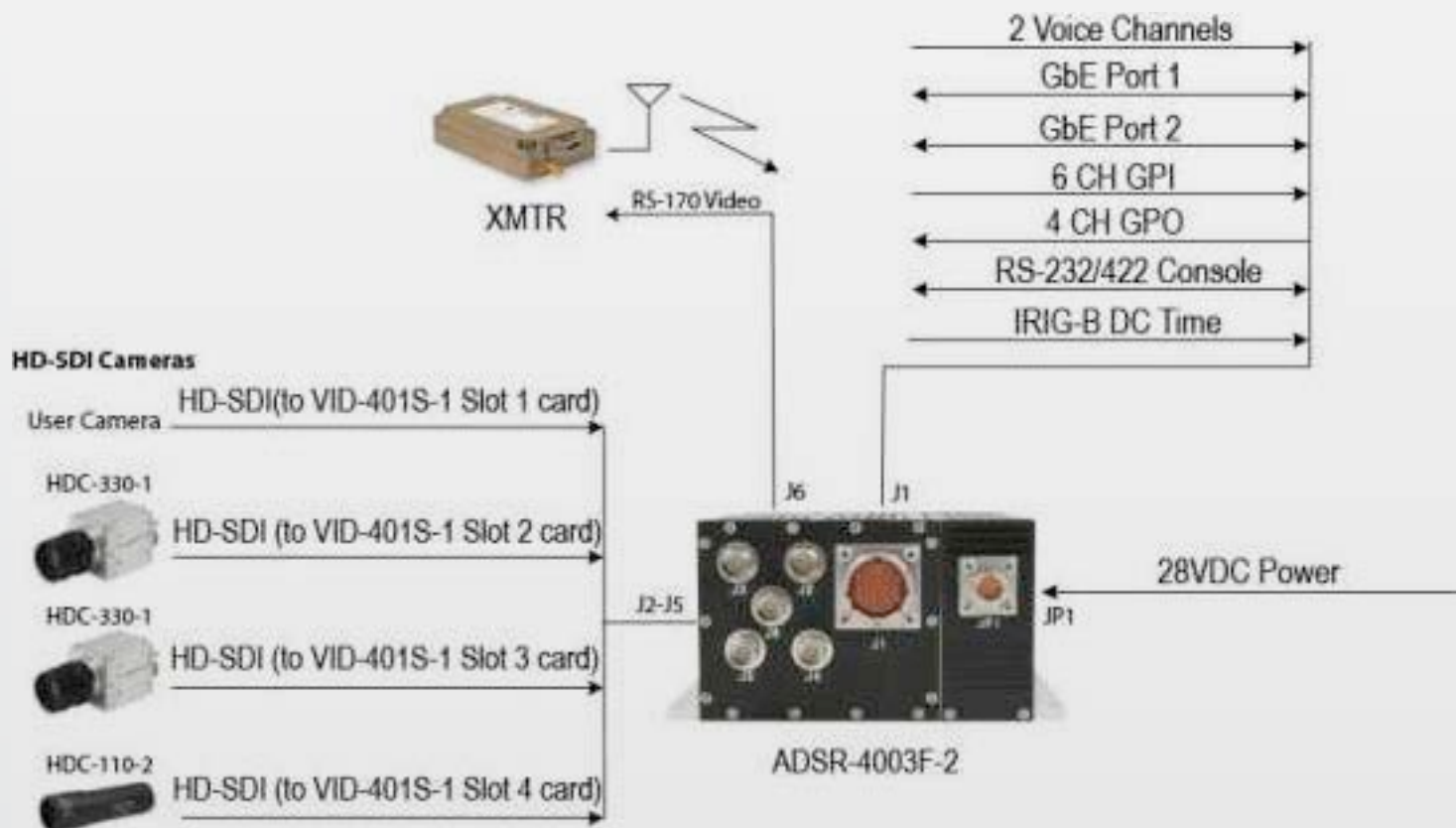
## NETWORK RECORDERS

PAGE  
41

### ADSR Ethernet recording



### ADSR-4003F-2 – Video Recorder





## NETWORK SWITCHES

### Gigabit Managed Network Switches



5-Port Switch

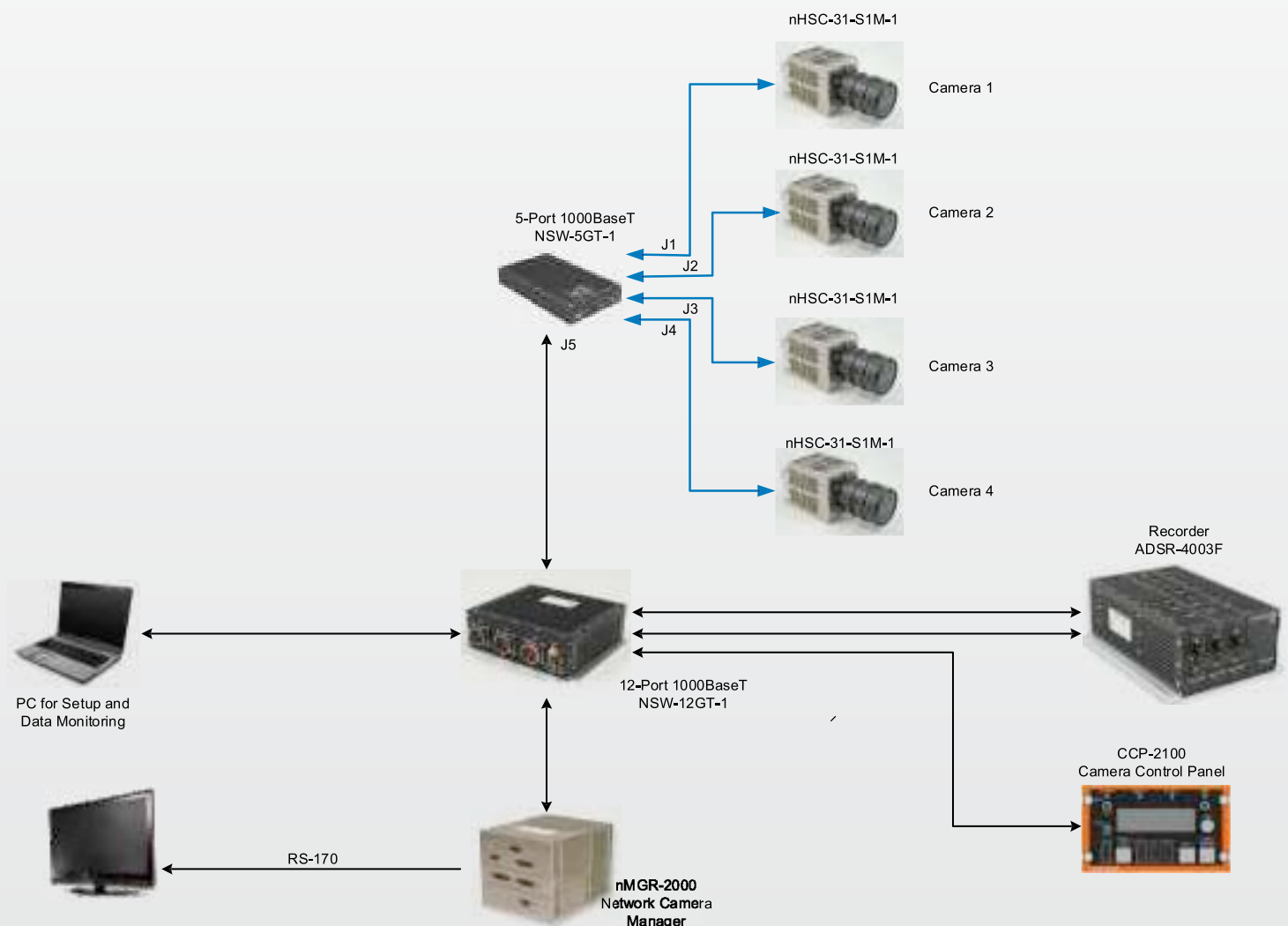


12-Port Switch



16-Port Switch  
(12-Port Electrical with 4-Port Optical)

### Unmanaged Network Switches



## RF PRODUCTS

### Airborne Receiver Products



### Transceiver Products



nXCVR-2120A  
nXCVR-2130A  
nXCVR-2150A **NEW!**

### Transponders



XPDR-2400



XPDR-2150



XPDR-520-2



XFT-100-1 **NEW!**

### Transmitters



## SPACE SYSTEMS



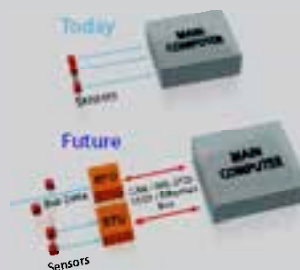
DATA  
ACQUISITION UNIT



MODULE



RADIATION TOLERANT  
SOLUTION



RUGGED NETWORKING  
PRODUCTS



RUGGED RECORDING PRODUCTS  
RUGGED PROCESSORS





## AIR DATA COMPUTERS

PAGE  
45



Enhanced Software Configurable Air Data Unit (ESCADU) • Air Data Computer Module (ADCM) • Computer Controlled Air Data Test Set (CCADTS)

## DATA STORAGE



Compact Network Storage  
(4 slot)



3 Slot Data  
Transport System



1 Slot Data  
Transport System



Removable Memory  
Cartridge

## FLIGHT DATA RECORDERS



MCSR



VRDV



FORTRESS

## NETWORKING



Mission Computer and  
Switch/Router



6U Physical  
Layer Switch



Ultra Small Form  
Factor Switch



**ANODYNE  
ELECTRONICS  
MANUFACTURING CORP.**

The background for the 'Leading by Design' section is a split image. The left side shows a helicopter in flight over a forest, and the right side shows two men in a cockpit wearing headsets.

## LEADING BY DESIGN

Avionics solutions for rotary- and fixed-wing aircraft.  
Designed for pilots and integrators. Built for demanding environments.

The background for the 'Custom Avionics' section is a split image. The left side shows a dense array of aircraft wiring and components, and the right side shows a close-up of an aircraft engine.

## CUSTOM AVIONICS

Since inception AEM has been a reliable resource for tailor-made avionics, satisfying the unique needs of pilots and the diverse functions of special-role aircraft.

The background for the 'Dependable Solutions' section is a split image. The left side shows a detailed view of an aircraft cockpit with various instruments and displays, and the right side shows a pilot in a flight suit and helmet.

## DEPENDABLE SOLUTIONS

Our support department has over 70 cumulative years of aircraft and avionics expertise providing you with solutions that get you off the ground and into the air.

## ABOUT



**ANODYNE  
ELECTRONICS  
MANUFACTURING CORP.**

Starting with quality and customer service as core values, AEM has grown into a family of over 90 people working together in a 32,000 square foot facility in the Okanagan Valley of British Columbia, Canada. We are a committed team, taking pride in our origin while we continue to grow our combined skills, experience, and capabilities within the aviation and avionics industries.

The most valid measure of our work is our customers—we serve them by being a leader in the design, development and manufacture of aircraft communication systems, loudspeaker systems, caution/warning panels and illuminated panel products. Dedicated troubleshooting, repair, and refurbishment services complement our product lines, providing customers with a reliable resource for their avionics needs.

AEM also provides comprehensive electronics manufacturing services for emerging companies with STEM products, addressing solutions for the unique challenges of lower volume, high-mix product configurations, and accelerating the go-to-market process.

**[www.aem-corp.com](http://www.aem-corp.com)**





# Loudspeaker Systems

Demanding environments and missions call for clear, effective communication. AEM's external PA and loudspeaker systems meet the sound quality, reliability, and functionality needs of special-role aircraft. We make intelligible air-to-ground communication possible.

## LSS440

- Includes: LSC22-001N, LSA400-001, LS300-200, Connector Kits
- Weight: 19.9 Lbs
- Peak Power: 440 Watts
- DO-160G Qualified



## LSS880

- Includes: LSC22-001N, LSA400-001, LS600-200, Connector Kits
- Weight: 32.9 Lbs
- Peak Power: 880 Watts
- DO-160G Qualified



## LSS1320

- Includes: LSC22-001N, LSA800-001, LS600-200, LS300-200, Connector Kits
- Weight: 50.5 Lbs
- Peak Power: 1,320 Watts
- DO-160G Qualified



## LSS1760

- Includes: LSC22-001N, LSA800-001, LS600-200 (x2), Connector Kits
- Weight: 63.5 Lbs
- Peak Power: 1,760 Watts
- DO-160G Qualified



## Specialty Audio

Backed by decades of aviation and design experience, AEM uses leading technology to provide specialized audio solutions for today's avionics market. Versatile and functional, our audio products satisfy the considerable demands of special-role aircraft.

### AWG08

## Audio Warning Generator

- Industry-leading with eight 90-second slots
- Priority warning management
- Field-programmable via USB input and intuitive programming application
- Qualified to DO-160G and DO-214A, CAN-TSO-C139a



### RTS01

## Remote Transmit Selector

- Supports up to seven transmitters
- Snap-in legends
- Optional NVIS-compliant lighting
- DO-160F Qualified



### LSA100

## Cabin PA Amplifier

- Easy to configure and install - designed for new and retro-fit applications
- Integrates with cockpit audio system, cabin briefer, in-flight entertainment
- Low-noise and high-efficiency Class D outputs
- Qualified to DO-160G and DO-214A



### LS150

## Cabin Speaker

- 150W+ power handling capacity
- DO-160G and MIL-STD qualified
- Water resistant cone
- In/out wiring interface for easy system configuration



## Caution Warning Panels

AEM designs, develops, and manufactures aircraft caution/warning panels to suit both flight crew and integrators alike. Reliable and modern, our master caution panels are a straight-forward upgrade from antiquated OEM units.

New electronics package, LED display technology, and mechanical packaging

Optional NVIS-compliant lighting

DO-160G Qualified

### MCP01

- Cockpit upgrade for the B212, AB212 and Legacy B412 Helicopters
- Reduced weight and electrical consumption and operating temperature



### MCP02

- Cockpit upgrade for the S-61/Sea King Helicopter
- Integrated state recorder registers over 2000 events



### MCP03

- Cockpit upgrade for the Twin Otter 100-, 200- and 300- Aircraft
- Centralizes the various caution/warning lights into a single component



### MCP50

- Cockpit upgrade for the Falcon 50 Aircraft
- Improved optics, additional legends and substantially increased MTBF

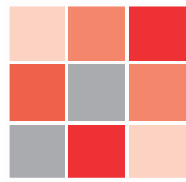






bupat

**COMPONENT COMPANIES**



**AOS**  
Technologies AG

## AOS Q-MIZE EM: high resolution airborne camera



The Q-MIZE EM digital high-speed camera is specifically made for airborne and defense applications. Some of the outstanding features are: high image resolution, frame rates up to 100,000 fps, built-in image memory (up to 10.4 GB), models with connectors on the back or on the side.

## High Resolution High Speed Cameras



### Crash Test insights with **1920 x 1080 @ 2500 frames / sec**

With AOS you are always  
on the winner side

## L-VIT and Micro-G1 – High Speed Cameras



### L-VIT and Micro-G1 from AOS Technologies

2500 frames/sec. @ 1920x1080 pixel  
Ultra-compact high speed cameras.

## ASTREC – Airborne High Speed Streaming



### ASTREC-4 from AOS Technologies:

Streaming Controller and H-EM  
Cameras.

The ultimate solution for recording  
a complete flight trial in high speed

## ABOUT



In 1998, AOS was originally founded as GmbH (LLC). To expand AOS capacities in both engineering and manufacturing the GmbH (LLC) was incorporated into AOS Technologies AG in 2002 and became a member of HT-Holding AG. HT-Holding is a privately owned Hi-Tech Holding based in Baden, Switzerland.

AOS Technologies AG is a worldwide leading manufacturer of high speed cameras, high speed streaming systems, and fast industrial vision systems offering turnkey installations for its broad customer base. AOS products are used by leading companies in their industrial applications, by world class automotive manufacturer around the globe, in in-depth research projects of renowned Universities and last but not least serve as the high speed measurement device in demanding defence applications such as airborne store separation tests.

**[www.aostechnologies.com](http://www.aostechnologies.com)**







## Non High-G Rated High Speed Cameras

Easy to operate high speed cameras where crisp clear images are the input for motion analysis. The working horse for University, industrial research and factory floor trouble shooting.



**L-PRI**  
1920x1080 / 2800 fps



**M-PRI**  
1280x800 / 4000 fps



**Q-PRI**  
1696x1710 / 1500 fps



**S-MOTION**  
1280x1024 / 500 fps



**S-PRI**  
900x700 / 1000 fps



## High-G Rated High Speed Cameras

High speed cameras for use in demanding environments such as automotive on-board crash test and sled tests. Ruggedness up to 150g but reliable operation paired with excellent image quality are key factors.



**L-VIT 2500**  
1920x1080 / 2500 fps



**L-VIT 1000**  
1920x1080 / 1000 fps



**M-VIT 4000**  
1280x800 / 4000 fps



**C-VIT**  
2048x2048 / 1000 fps



**Micro-G1**  
1920x1080 / 200 fps

IN STOCK



**Q-MIZE**  
1696x1710 / 500 fps



**S-MIZE**  
1280x1024 / 500 fps



**Q-VIT**  
1696x1710 / 500 fps



**S-VIT**  
1280x1024 / 500 fps

## Defense and Airborne High Speed Cameras

High speed cameras with MIL 810 / MIL 461 test certificate, where rugged design and use under the most severe environmental conditions is a must. AOS EM cameras, we are talking rugged!



**Q-MIZE EM**  
1696x1710 / 500 fps



**S-MIZE EM**  
1280x1024 / 500 fps



**Q-EM**  
1696x1710 / 500 fps



**S-EM**  
1280x1024 / 500 fps



**H-EM 501**  
**MIL Streaming Camera**  
2048x1088 / 85 fps



**ASTREC-4**  
**MIL Certified Streaming Controller**  
2048x1088 / 85 fps

## High Speed Streaming Cameras & Systems

Be it a mobile system with a 4 hour battery live and 80 minutes recording time or a camera solution that works with your existing Laptop or PC the PROMON Cameras are an excellent solution. Available as single camera solution or as a synchronized multi camera setup for 3D analysis. All easy parameterizing with our AOS Imaging Studio v4 that comes with every AOS Camera as part of the package. .



**PROMON U1000**  
1920x1200 / 150 fps



**PROMON U750**  
1280x1024 / 203 fps



**PROMON 501**  
2048x1088 / 85 fps



**PROMON 502**  
2048x1088 / 170 fps



**PROMON STREAMER G1**  
1280x1024 / 203 fps



**PROMON WRC**  
2048x1088 / 80 fps



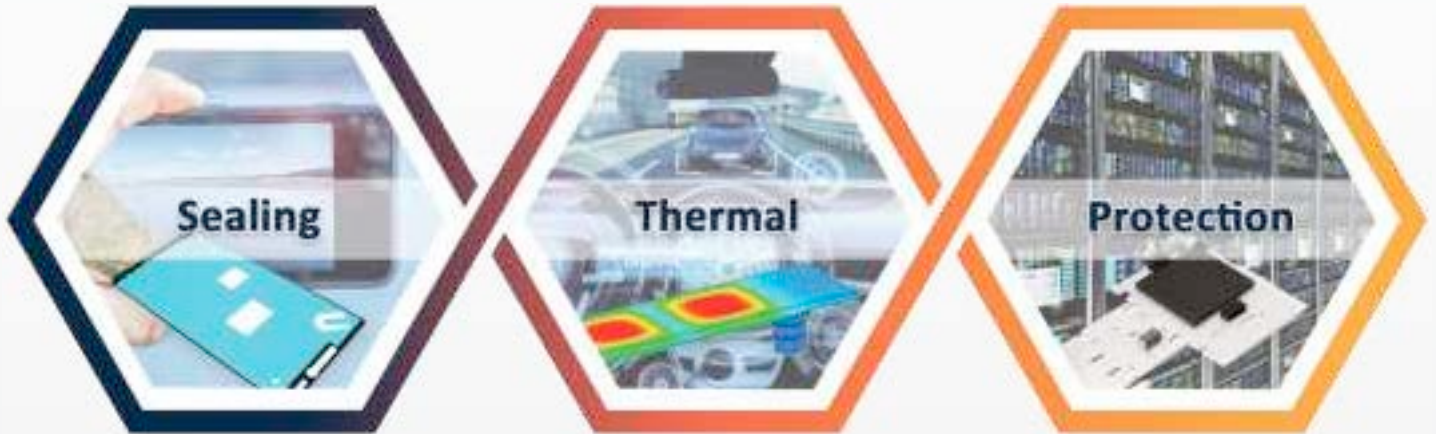
**PROMON SCOPE G3 TWIN**  
2048x1088 / 85 fps



**PROMON SCOPE G2**  
2048x1088 / 85 fps

# AAVID

THERMAL DIVISION OF **BOYD**  
CORPORATION



## SEALING

Bonding and Adhesive Systems

Extrusions and Linear Seals

Gaskets and Face Seals

O-Rings and Radial Seals

Molded and Environmental Seals



## THERMAL

Air Cooling

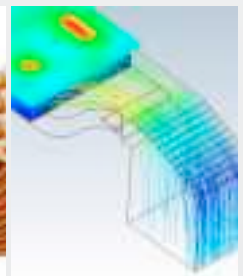
Conduction Cooling

Liquid Cooling

Two Phase Cooling

Accessories & Components

Software



## PROTECTION

Surface Protection & Enhancement

Environmental Protection Solutions

Insulation & Shielding

Information & Labeling

Health & Safety





## ABOUT



Aavid, Thermal Division of Boyd Corporation has a long history of developing, designing, testing, optimizing, and fabricating reliable high-performance cooling solutions across all industries. Through consistent innovation in engineering and manufacturing, Aavid provides optimized, cost-efficient thermal solutions and systems utilizing the largest range of traditional and advanced cooling technologies.

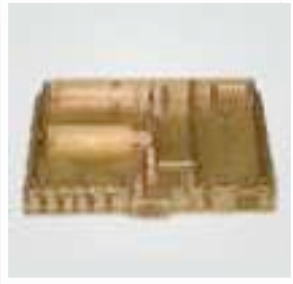
By choosing, integrating, or developing the right technology, whether it be a two phased, air cooled, or liquid system, Aavid delivers thermal management solutions that can increase power, improve functionality and reliability, and reduce the cost and size of our customers' applications.

Aavid's solutions extend from traditional and advanced air cooling and liquid cooling systems and heat exchangers, to more advanced conduction cooling and two phase heat transfer. Aavid is on the cutting edge of immersion cooling boiler plates, ultra thin vapor chambers, thermosiphons, and complex heat pipe assemblies for high heat flux applications. We work with unique materials such as titanium and graphite to produce lightweight, high performance thermal straps, heat spreaders, chassis and enclosures and CTE-matched surfaces for applications that push industry standards.

[www.boydcorp.com](http://www.boydcorp.com)



## ADVANCED SOLID CONDUCTION



k-Core®



Spreaders



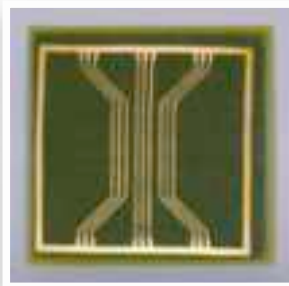
Radiator Panels



Thermal Straps



Components,  
Heat Shields, Chassis



CTE-Matched  
Solid Conduction

## PASSIVE TWO-PHASE DEVICES



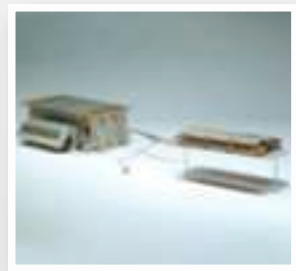
Heat Pipe  
Assemblies



Heat Spreaders



Vapor Chambers



Loop Heat Pipes



Axially Grooved  
Heat Pipes



Isothermal  
Furnace Liners



Heat Pipes

## AIR COOLING



Heat Sinks



Fans & Blowers



Air to Air  
Heat Exchangers



Air Cooled  
Chassis and Enclosures

## LIQUID COOLING



Liquid Cold Plates



Liquid Heat  
Exchangers



Ambient Liquid  
Cooling Systems

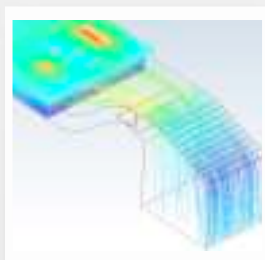


Recirculating  
Chillers

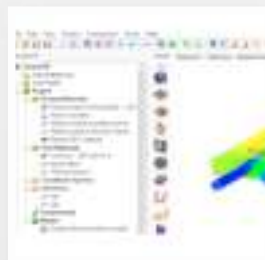


Liquid Cooled  
Chassis & Enclosures

## SOFTWARE



AAVID SmartCFD



AAVID Genie

## TECHNOLOGIES & PRODUCTS



Cold Plate  
Technologies



Liquid Cooling  
Systems



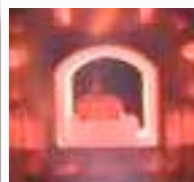
Aluminum Vacuum  
Brazement Services



Enclosure and  
System Level Cooling



Custom Thermal  
Engineering Services



Materials Technology  
Capabilities



Thermal Solutions



# **COBHAM**

Microwave Components and Systems



**SILICON  
DIODES FOR  
MICROWAVE  
SYSTEMS**

**MICROWAVE  
FILTERS AND  
DUPLEXERS**



**MICROWAVE  
ISOLATORS AND  
CIRCULATORS**

**MICROWAVE  
SYSTEMS AND  
TEST BENCHES**



**MICROWAVE  
WAVEGUIDES  
COUPLERS AND  
ADAPTERS**

**RF AND  
MICROWAVE  
MODULES**



## ABOUT

# ***COBHAM***

Microwave Components and Systems

### **(Annemasse-France)**

Cobham Microwave France has a long term experience in design and manufacture of Microwave Components and Systems for space, defense & security, industrial, scientific and medical applications. Our areas of capabilities are Silicon Diodes, RF & Microwave Modules, Isolators & Circulators, Filters & Duplexers, Waveguides and Systems. Our products are qualified and embedded on major space, defense & security, industrial, scientific and medical programmes and platforms worldwide.

**[www.cobham.com/microwave](http://www.cobham.com/microwave)**





## SILICON DIODES FOR MICROWAVE SYSTEMS

Cobham offers a broad range of high reliability Silicon Diodes for microwave systems dedicated to space, defence, medical and industrial markets.



## MICROWAVE FILTERS AND DUPLEXERS

Cobham's Microwave Filters and Duplexers offer high reliability for space, defence, avionics, communications and industrial markets.



**AIR CAVITY FILTERS**



**LUMPED ELEMENT FILTERS**



**CERAMIC FILTERS**





## MICROWAVE ISOLATORS AND CIRCULATORS

Cobham is a world leading manufacturer of Microwave Isolators and Circulators, Loads and phase shifters for space, defence, industrial and scientific applications



WAVEGUIDE PRODUCTS



COAXIAL PRODUCTS



DROP IN PRODUCTS



SMD PRODUCTS



## MICROWAVE SYSTEMS AND TEST BENCHES

Cobham designs, manufactures and supports Microwave Systems and Test Benches for space, defence, industrial, communications and scientific markets



RECEIVER UNIT



RECEIVE ANTENNA



PORTABLE UNIT



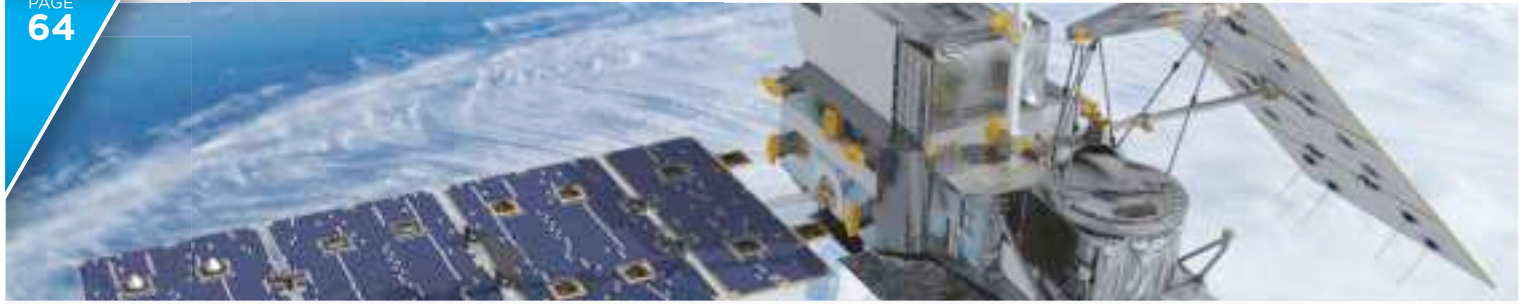
RADAR TESTER,  
AIRBORNE RADAR



SWITCHING MATRIX,  
TELEPORT



DIVIDER ASSEMBLY



## MICROWAVE WAVEGUIDES COUPLERS AND ADAPTERS

Cobham designs and manufactures Waveguides and Waveguide Components to the highest quality standards for space, defence, avionics, industrial, scientific and medical applications



WAVEGUIDES



WAVEGUIDES COUPLERS

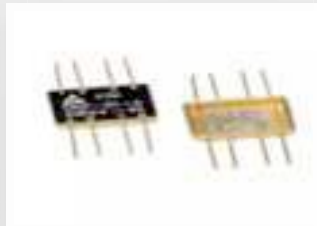
WAVEGUIDES TO COAX  
ADAPTERSCOBHAM MICROWAVE  
PRODUCT SELECTION GUIDE

## RF AND MICROWAVE MODULES

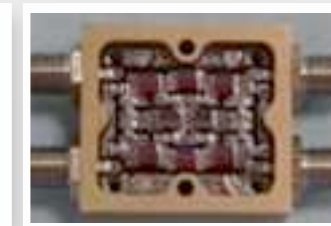
Cobham designs and manufactures a full range of passive and PIN Diode Modules for space, defence, communications and industrial applications



MIXERS

MODULATORS  
DEMODULATORS

POWER DIVIDERS



HYBRID COUPLERS





## ***Advanced Capacitors for Demanding Applications***



## ***The Industry's Most Power-Dense Capacitor Technology***

**EVANS**  
CAPACITOR COMPANY

EVANSCAPS' trusted and proven hybrid technology is perfectly suited for defense & aerospace applications requiring high power in a rugged compact hi-rel hermetic package.



2018 National  
Subcontractor  
of the Year



[www.Evanscap.com](http://www.Evanscap.com)



## ABOUT



Evans Capacitor Company is a privately held, AS9100/ISO 9001 certified, ITAR registered, small business headquartered in East Providence, RI USA. Evans develop and manufacture advanced capacitors for aerospace, defense, and other demanding applications.

Evans was founded in 1996 by Dave Evans (President) and Charlie Dewey (CEO). After extensive research and experimentation, Dave Evans found that combining the two capacitor technologies tantalum and ruthenium oxide yielded the most power dense capacitor in the industry. These hybrid capacitors, known as EVANSCAPS, provide significant savings of space and weight compared to other capacitor technologies, in a high reliability ruggedized package providing MTBF > 5 million hours.

EVANSCAPS are specified for demanding aerospace, defense, and energy exploration applications including radar, laser, power hold-up/bridge power, downhole drilling, electronic warfare and many more. They replace standard military capacitors, or augment batteries and power supplies where size, weight, reliability and quality are important factors of component selection.

**[www.evanscap.com](http://www.evanscap.com)**



## TANTALUM HYBRID CAPACITORS



THQ-Series



TDD Series - very low ESR (NEW)

## HyCAP / THQ-A2 SERIES



THQA2/THQM2 Series



HyCap High Temperature  
"H1" Series



THQA2-HT  
High Temperature



HyCap Series

## CAPACITOR MODULE / BANKS



Packaged THQ3 Capacitors



Capattery Series  
EDLC Capacitors



3STHQ3 or 3PTHQ3 Series



HQ Series



6PTHQ3 Series

### The EVANSCAP Advantage...

- Ultra Low ESR and Inductance
- Withstands High Current, Temperature, Shock, and Vibration
- Rugged Hermetically Sealed Hi-Rel Design
- Unlimited Shelf Life
- Robust Design Allows for Extreme Duty Cycles
- Competitive Lead Times



### DC Storage Power for Your...

- Radar (T/R Modules)
- Power Hold Up/Bridge Power (MIL-STD 704 / DO-160)
- Pulsed Laser
- Downhole Drilling
- Directed Energy
- Space Applications (Qualified to NASA INST-002)
- Electronic Warfare
- Many More



### What are EVANSCAPS?

EVANSCAPS are hybrid wet tantalum capacitors. The operating principal lies within the combination of a Tantalum ( $Ta_2O_5$ ) anode and a Ruthenium Oxide ( $RuO_2$ ) cathode.



- Two electrodes are connected in series by an electrolyte
- The  $Ta_2O_5$  dielectric allows the capacitor to withstand high voltages
- The high capacitance  $RuO_2$  cathode increases volumetric efficiency

EVANSCAPS' unique chemistry and construction make it the most power dense capacitor in the industry.



**EVANS**  
CAPACITOR COMPANY

www.evanscap.com



## CAN-BUS KEYPADS & JOYSTICKS / VEHICLE DISPLAYS & DISPLAY CONTROLLER



## TOUCH ENCODERS



## PUSH BUTTON SWITCHES / JOYSTICKS / ROTARY SWITCHES





## ABOUT



Grayhill, Inc. designs and manufactures a broad line of intuitive human interface components and custom solutions that make life simpler, safer and more efficient. We understand the importance of the haptics, ergonomics and styling of your product. As importantly, we understand the evolving needs and expectations of end-product users in our target markets: Medical electronic devices, Military applications and MMIs for Off-Highway Vehicles.

Standard products include optical encoders, rotary switches, keypads, joysticks and pushbuttons. Our components can be customized for your application or integrated into a complete front panel solution. Grayhill specializes in creating custom operator interface panels and portable product shells that integrate our components, displays and wired or wireless communications into an ergonomic, user-friendly device. This allows Grayhill to design solutions that provide an intuitive interface between your technology and your users.

With headquarters just outside of Chicago, and multiple state-of-the-art facilities around the world, Grayhill's team has the engineering, development and manufacturing expertise to deliver both standard and customized products quickly and cost-effectively. Select one of our dependable standard products, or let our team design, qualify and manufacture the perfect solution for your needs.

**[www.grayhill.com](http://www.grayhill.com)**



## INSTINCT TOUCH TECHNOLOGY

**NEW**



Touch Encoder



PCAP Touch Panel



Multi-Touch  
ControlWheel



50mm Multi-Touch  
Ring Encoder



Instinct Software Development Kit (SDK)

## CANBUS DISPLAYS, CONTROLLERS AND KEYPADS



3D2104 Series Display



3D70 Series Display



3D50 Series Display



3D32 Series Display

**NEW**



3J Gen 2

**NEW**



3K Gen 2

**IN STOCK**



3J Series



3K Series

## ROTARY SWITCHES



19



24



56



77



75



50/51



08/09



53/57/59



71



42/43/44/54



58



44L



71J, L

## OPTICAL ENCODERS



## MECHANICAL ENCODERS

## JOYSTICKS



## HALL EFFECT SWITCHES





## KEYPADS



82



83



84



84BL



84S



84LS



86



87



88



96

## PUSHBUTTONS



7



30/46



10/4000



46



23



14



## TACT, TOGGLE ROCKER & SLIDE SWITCHES



95C04

95C05

95C06

95C12

95CW06



34A

34B

34C

34D

34E



47A

47B

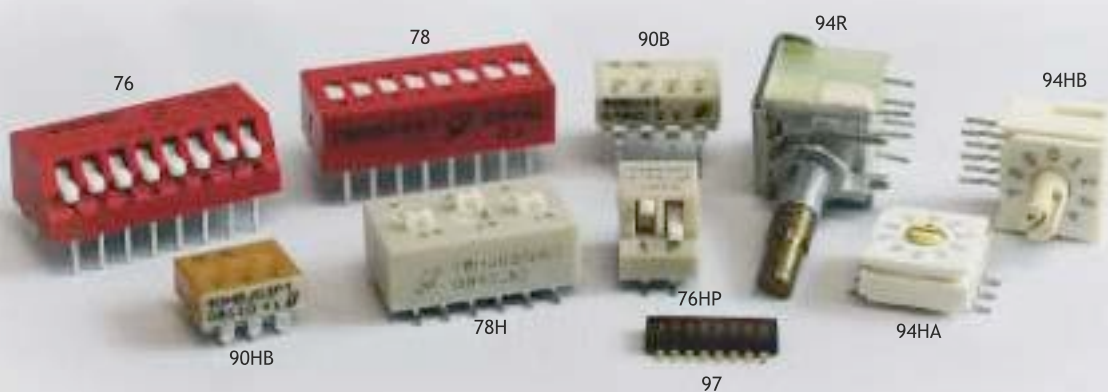
47C

47D

48A

48B

## DIP SWITCHES



76

78

90B

94R

94HB

76HP

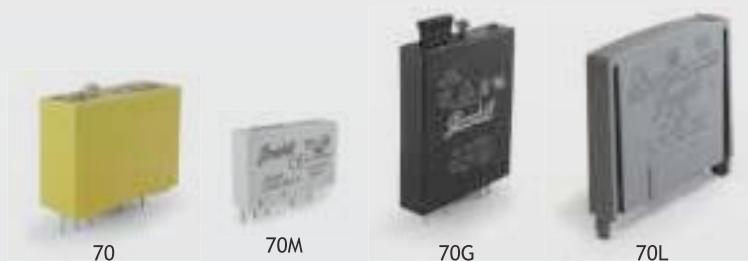
94HA

78H

90HB

97

## I/O MODULES AND RACKS



70

70M

70G

70L



**high-performance inertial sensors, including tactical grade, Coriolis vibratory gyroscopes and navigation grade, quartz servo accelerometers.**

## **SPACE**

InnaLabs® is a world leader in the use of inertial sensor technology for low earth orbit applications. Our experienced engineering teams use proprietary ITAR-Free Coriolis sensor technology which delivers high reliability and robustness with proven space heritage.

## **AEROSPACE**

InnaLabs® inertial sensors are found across all market segments and support a number of platforms. Applications include inertial navigation systems, flight control, aircraft monitoring and maintenance, airborne platform stabilisation, aircraft flight testing and flight data recording.

## **LAND**

InnaLabs® inertial sensors deliver a wide range of solutions for land system applications. Our high-performance tactical grade gyroscopes and navigation and control grade accelerometers provide exceptional accuracy and reliability for the most demanding applications.

## **MARINE**

Using well-known sensors principles and technology, InnaLabs® develops solutions catering for stabilization needs to cover a wide range of marine platforms. Merchant ships, or surface military vessels, submarines or navigation and Optronics, InnaLabs provides high-level innovative skill and knowledge to support maritime needs and requirements.



## ABOUT



InnaLabs® develops and manufactures tactical grade Coriolis Vibratory Gyroscopes (CVG) and high-performance, Quartz Servo Accelerometers for a wide range of demanding applications.

InnaLabs is a European, high technology Company built on decades of proven and practical experience in the field of inertial sensors technology.

InnaLabs® high performance accelerometers and gyroscopes meet the stringent requirements of InnaLabs customers for precision guidance, stabilisation, navigation and orientation applications. InnaLabs® provide high quality robust solutions to industrial, oil and gas, marine, subsea, aerospace, land, civil engineering, transportation and space applications.

InnaLabs is headquartered in Dublin Ireland, which is home to our world class R&D and manufacturing facility. InnaLabs hold 29 US and international patents for our best in class products.

**[www.innalabs.com](http://www.innalabs.com)**



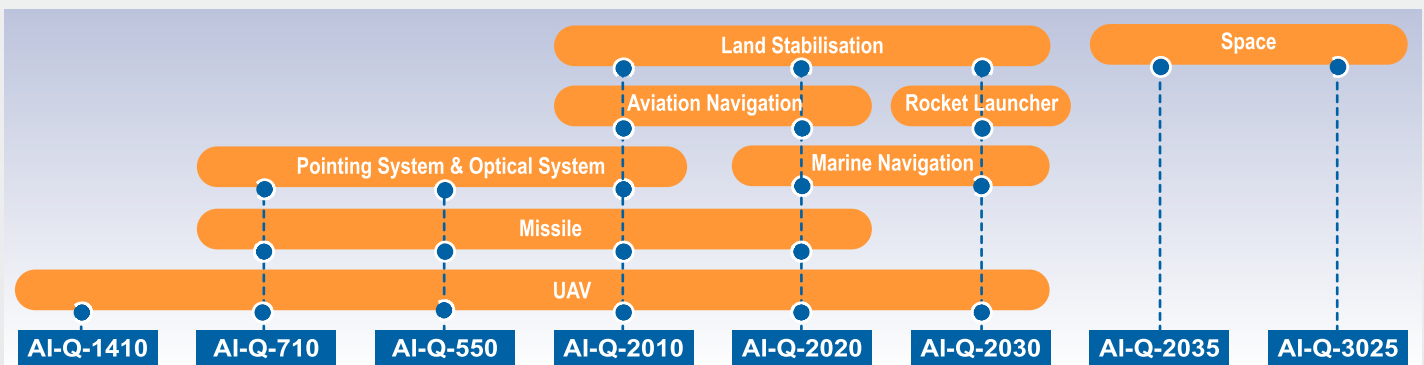
# ITAR-Free Tactical & Navigation Grade QUARTZ SERVO ACCELEROMETERS

## LAND - AIR - SPACE - MARINE



## InnaLabs® design and manufacture high performance tactical and navigation grade quartz pendulous accelerometers

InnaLabs® AI-Q-Series Quartz Servo Accelerometers provide navigation, control and measurement solutions across all market segments and support a number of platforms across a global customer base. Based on proven quartz servo technology they provide high accuracy, repeatability and stability even in the harshest of environments.



AI-Q-1410



AI-Q-710



AI-Q-550



AI-Q-2010



AI-Q-2020



AI-Q-2030

# CVG SERIES GYROSCOPES



**The most accurate Gyroscope in the field  
for EOS, RCWS and Turret Stabilisation.**



**B-SERIES**



**C-SERIES**



**D-SERIES**



**N-SERIES**



**U-SERIES**

## GYROSCOPES FOR SPACE APPLICATIONS



**ARIETIS**



**ARIETIS-NS**



## ACCELEROMETER AI-Q-550 SERIES



Very compact tactical grade quartz pendulous sensors for piloting and guidance systems.



## ACCELEROMETER AI-Q-2030 SERIES



Navigation grade quartz pendulous sensors for high-end navigation systems. (INS)



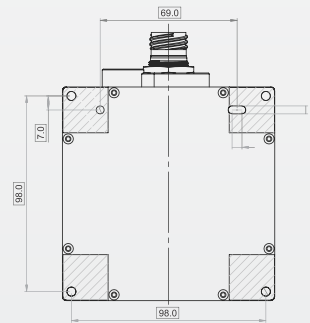
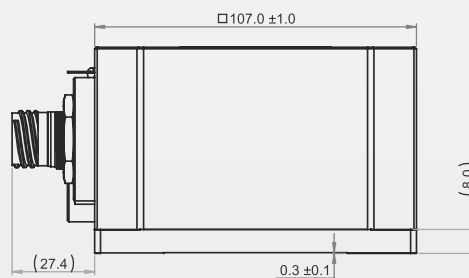
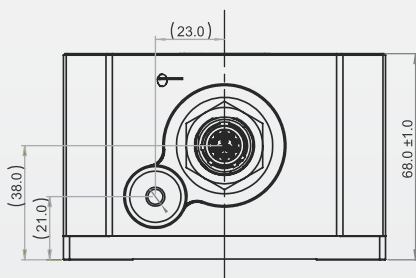
## 3-Axis Gyroscope with 'best in class' tactical grade performance GI-CVG-A23XXD

**The GI-CVG-A23XXD is a 3-axis gyroscope with digital output, which allows the user to make accurate measurements of three orthogonal rate rotations.**

It is suitable for a range of applications, requiring tactical performance, very low noise, and high MTBF in a compact design coupled with low power consumption.

### Applications include:

- Platform stabilisation
- Stabilisation of optical systems or other implementations on airborne, land-based, and marine programs
- Stabilisation of pointing and directional systems
- Stabilisation of antenna/radar



DUNS: 985077255 | NAICS: 334511 | CAGE Code: SDYY3

## RELATED PRODUCTS



GI-CVG-N2100A



GI-CVG-N1100A



GI-CVG-N1200A



GI-CVG-U2X00D

## TRACTION

ISO 14001 | ISO 9001



## TELECOM

ISO 14001 | ISO 9001



## MEDICAL

ISO 14001 | ISO 9001



## SPACE & AVIATION

AS 9100



## DEFENCE

AS 9100



## AUTOMOTIVE

TS 16949





## ABOUT



Payton is an international group of companies handling and promoting magnetic components, with sales offices and plants in Israel, Europe, United States and the Far East. As a global leader of both conventional and planar transformers, with more than 25 years of research and development experience, Payton offers a wide range of custom designed products that meet all the requirements and standards for a variety of specific product applications.

Payton unique patented technology used in designing planar magnetics (Planetics®) will reduce the size and weight of present transformer by up to 80%, while increasing the product efficiency and its power density. Payton developed a proven winning technology that is evident in the superior quality of its conventional and planar transformers. This technological breakthrough is continuously enhanced by our devotion to further research and development that will enable Payton to meet and exceed customer's expectations.

Payton is already ISO 9001 certified and on May 2002 received the certification for ISO 14001.

**[www.paytongroup.com](http://www.paytongroup.com)**



## PLANAR TRANSFORMERS FAMILY



5 to 15W  
Planar Transformers



10 to 40W  
Planar Transformers



25 to 100W  
Planar Transformers



25 to 140W  
Planar Transformers



50 to 400W  
Planar Transformers



80 to 600W  
Planar Transformers



30 to 500W  
Planar Transformers



200 to 1000W  
Planar Transformers



200 to 1400W  
Planar Transformers



300 to 1000W  
Planar Transformers



500 to 2.6kW  
Planar Transformers



1kW to 10kW  
Planar Transformers



500 to 5kW  
Planar Transformers



250W to 2.1kW  
Planar Transformers



500W to 3.5kW  
Planar Transformers



1.8 to 7.5 kW  
Planar Transformers



1kW to 10kW  
Planar Transformers



5kW to 20kW  
Planar Transformers

## OFF THE SHELF SMT PLANAR TRANSFORMERS



40W SMT  
standard transformers



100W SMT  
standard transformers



100W SMT  
standard transformers



Up to 140W SMT  
Standard transformers



Up to 350W SMT  
Standard transformers

## INDUCTORS



Common Mode Chock





**ACTIVE OPTICS**



**ANTENNAS**



**MULTIPIN  
AEROSPACE  
CONNECTORS**



**MULTIPIN  
INDUSTRIAL  
CONNECTORS**



**OPTICAL CABLE  
ASSEMBLIES**



**OPTICAL  
CONNECTORS**



**OUTDOOR  
CONNECTORS**



**RF & MICROWAVE  
SWITCHES**



**RF CABLE  
ASSEMBLIES**



**RF COAXIAL  
CONNECTORS**



**RF MICROWAVE  
COMPONENTS**



**SPACE QUALIFIED  
COMPONENTS**

## ABOUT



Radiall was founded in France in 1952. Since 1952, Radiall has been enabling the future and collaborating with customers to succeed. Radiall has developed an award winning reputation and established strong relationships with customers by providing innovative solutions. Part of being the best is supplying products that customers can trust for unrivalled repeatability and reliable performance. That's why Radiall has invested in facilities around the world that specialize in manufacturing capabilities critical to manufacturing the finest interconnect components to support your most demanding applications.

Radiall is a global manufacturer of high reliability interconnect components such as RF coaxial connectors and cable assemblies, active optics, optical cable assemblies, RF&Microwave switches for numerous industries including Aerospace, Defense, Maritime, Industrial, Medical and Telecommunications.

**[www.radiall.com](http://www.radiall.com)**



## ACTIVE OPTICS



S-LIGHT



D-LIGHT



F-LIGHT



EVALUATION BOARDS  
AND TOOLING

## ANTENNAS



DEFENSE & SECURITY  
ANTENNAS



INDUSTRIAL  
ANTENNAS



TELECOM  
ANTENNAS

## MICROWAVE COMPONENTS



TERMINATIONS



ATTENUATORS



COUPLERS, POWER  
DIVIDERS / COMBINERS



SPECIAL MICROWAVE  
COMPONENTS

## MULTIPIN INDUSTRIAL CONNECTORS



## MULTIPIN AEROSPACE CONNECTORS



RACK AND PANEL  
CONNECTORS



MODULAR  
CONNECTORS



QUICKMATE  
CONNECTORS



MINIATURE  
CONNECTORS



BOARD LEVEL AND  
INDUSTRIAL

## OUTDOOR CONNECTORS



I/O RUGGEDIZED  
INTERCONNECT



HIGH POWER&ANTENNA  
RF CONNECTORS

## OPTICAL CONNECTORS



MIL AERO FIBER  
OPTIC CONNECTORS



TACTICAL FIBER OPTIC  
CONNECTORS



I/O RUGGEDIZED  
INTERCONNECT



INDOOR FIBER OPTIC  
CONNECTORS



BOARD-TO-BOARD  
FIBER OPTIC  
CONNECTORS



HIGH DENSITY MT  
BASED CONNECTORS



EXPANDED BEAM  
CONNECTORS



HERMETIC FIBER  
OPTIC CONNECTORS



FIBER OPTIC  
SERVICES & TOOLING



RECTANGULAR MULTIPIN  
CONNECTORS WITH  
LUXCIS® ARINC 801



## OPTICAL CABLE ASSEMBLIES



MIL AERO FIBER OPTIC  
CABLE ASSEMBLIES



TACTICAL FIBER OPTIC  
CABLE ASSEMBLIES



OUTDOOR FIBER OPTIC  
CABLE ASSEMBLIES



HARNESSES AND  
OPTICAL SYSTEMS



INDOOR FIBER OPTIC  
CABLE ASSEMBLIES

## RF CABLE ASSEMBLIES



STANDARD FLEXIBLE  
CABLE ASSEMBLIES



LOW LOSS FLEXIBLE  
CABLE ASSEMBLIES



HAND-FORMABLE AND  
SEMI-RIGID  
CABLE ASSEMBLIES



CORRUGATED  
CABLE ASSEMBLIES



LOW LOSS HIGH FREQ.  
FLEXIBLE CABLE  
ASSEMBLIES (SHF RANGE)



TESTPRO  
CABLE ASSEMBLIES

## RF & MICROWAVE SWITCHES



HIGH PERFORMANCE  
MODULAR SWITCHES



HIGH REPEATABILITY  
SWITCHES



SUBMINIATURE  
SWITCHES



SURFACE MOUNT  
RELAYS



LOW INTERMODULATION  
SWITCHES



TVAC SWITCHES



USB COAXIAL  
SWITCHES



SPACE SWITCHES

## SPACE QUALIFIED COMPONENTS



SPACE COAXIAL  
CONNECTORS



SPACE COAXIAL  
ATTENUATORS



SPACE COAXIAL  
TERMINATIONS



SPACE COAXIAL  
COUPLERS/DIVIDERS



SPACE COAXIAL FLEXIBLE  
CABLE ASSEMBLIES



SPACE COAXIAL SEMI-RIGID  
CABLE ASSEMBLIES



SPACE COAXIAL  
SWITCHES



SPACE COAXIAL  
PHASE SHIFTERS

## RF COAXIAL CONNECTORS



SNAP-ON CONNECTORS



QUICK LOCK AND SECURE  
CONNECTORS



SCREW-ON CONNECTORS



BAYONET CONNECTORS



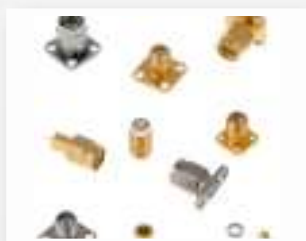
LOW INTERMODULATION  
CONNECTORS



RF BOARDS-TO-BOARD  
CONNECTORS



BLIND MATE CONNECTORS



HERMETIC CONNECTORS



HIGH VOLTAGE CONNECTORS



HIGH FREQUENCY CONNECTORS



HIGH POWER & ANTENNA  
CONNECTORS



WATERPROOF CONNECTORS



SWITCHING CONNECTORS



TEST PROBES & ADAPTERS



75 OHM CONNECTORS



MULTI-PORT CONNECTORS



NON MAGNETIC CONNECTORS



SPACE COAXIAL CONNECTORS



CONNECTORS FOR  
CIVIL AEROSPACE

SHF Cable Range

Ultra low loss flexible cable



<sup>(1)</sup> SPC: Silver Plated Copper

Cable	VP	Max. Dia.	Attenuation	Bending Radius	Weight
<b>SHF2.2UF</b>	79%	2.25mm	5.20 dB/m @ 40 GHz	10 mm	14 g/m
DC - 40 GHz		0.089in.	158 dB/100ft	0.394in.	4.3 g/ft
<b>SHF2.4M</b>	76%	2.45mm	4.59 dB/m @ 40 GHz	10 mm	20 g/m
DC - 40 GHz		0.095in.	139 dB/100ft	0.394in.	6.1 g/ft
<b>SHF3</b>	76%	3.50mm	3.7 dB/m @ 40 GHz	12.5 mm	29 g/m
DC - 40 GHz		0.138in.	113 dB/100ft	0.492in.	8.8 g/ft
<b>SHF3M</b>	76%	3.64mm	2.76 dB/m @ 40 GHz	12.5 mm	35 g/m
DC - 40 GHz		0.139in.	139 dB/100ft	0.492in.	10.6 g/ft
<b>SHF4M</b>	84%	4.15mm	2.05 dB/m @ 40 GHz	20 mm	40 g/m
DC - 40 GHz		0.160in.	62 dB/100ft	0.788in.	12.2 g/ft
<b>SHF4.2M</b>	76%	4.20mm	1.96 dB/m @ 26.5 GHz	25 mm	45 g/m
DC - 26.5 GHz		0.165in.	62 dB/100ft	0.984in.	13.6 g/ft
<b>SHF4.6M</b>	84%	4.65mm	1.69 dB/m @ 32 GHz	25 mm	41 g/m
DC - 32.3 GHz		0.183in.	51 dB/100ft	0.984in.	12.5 g/ft
<b>SHF5</b>	78%	5.25mm	1.55 dB/m @ 26.5 GHz	25 mm	72 g/m
DC - 26.5 GHz		0.203in.	47 dB/100ft	0.984in.	21.8 g/ft
<b>SHF5M</b>	84%	5.20mm	1.27 dB/m @ 26.5 GHz	25 mm	60 g/m
DC - 26.5 GHz		0.201in.	39 dB/100ft	0.984in.	18.2 g/ft
<b>SHF5UF</b>	77%	5.47mm	1.63 dB/m @ 26.5 GHz	25 mm	72 g/m
DC - 26.5 GHz		0.215in.	50 dB/100ft	0.984in.	21.8 g/ft
<b>SHF8</b>	78%	7.80mm	0.9 dB/m @ 18 GHz	40 mm	140 g/m
DC - 18 GHz		0.303in.	27 dB/100ft	1.575in.	42.4 g/ft
<b>SHF8M</b>	84%	7.78mm	0.68 dB/m @ 18 GHz	40 mm	130 g/m
DC - 18 GHz		0.302in.	21 dB/100ft	1.575in.	39.4 g/ft
<b>SHF13</b>	85%	13.8mm	0.3 dB/m @ 8 GHz	60 mm	280 g/m
100 kHz - 9.5 GHz		0.543in.	9 dB/100ft	2.362in.	84.8 g/ft

Stranded inner conductor cable



Using stranded center conductor allow better flexibility while keeping good IL performance level

**Longer flex life**  
SHF3, SHF5, SHF8

Ultra Flexible cable



Unique design of center conductor as well as braiding and jacketing provide a unique flexibility behavior to SHF UF

**Low bending moment**  
Up to 1 million flexures

Armored cable



In many customer applications mechanical stress may damage cable assemblies. Radiall has designed several levels of armored structures embedding SHF core lines.

**Crush resistant**  
**Abrasion resistant**  
**UV resistant**  
**Watertightness**

Outdoor cable



Designed to be used in outdoor environments, Radiall's Outdoor cables are typically chosen for Ground Radars and Navy systems.

**UV resistant**  
**Watertightness**

Light Weight & Air Frame cable



Radiall's LightWeight range is the best choice for on-board equipments, where weight and density are critical. SHF AirFrame cables motivate: Robustness for long life in extreme condition. Radiall's AirFrame cables are used in non-pressurized or not-protected areas.

**30% weight saving**  
**Hermetically sealed**  
**15 Km (50,000 ft) - 150°C**  
**Fluid resistant**

Space qualified cable



To resist to the extreme conditions in space, Space qualified range includes several jacket material options. Our cable radiation resistance is up to 50Mrads with Fluorinated ethylene propylene (FEP) jackets, whilst ETFE version resist to more than 120Mrads.

**Ultra-low weight**  
**Non-outgassing materials**  
**High radiation resistance**

Connectors

The unique design of SHF cables dictates the use of custom-designed connectors. We pay particular attention to design of the compensation area and to termination techniques to ensure low VSWR and thus to complement our superior cable performance.

Our Cable/Connector terminations are designed to maintain shield integrity into the connectors to get the lowest leakage attainable in a flexible assembly. All electrical connections (center contact and inner tape shield) are soldered.

Most popular connector interfaces fitting to SHF cables are SMPM, SMP, SSMA, SMA, QRE, TNC and N-Type.





BAYONET CONNECTORS FOR RAILWAY APPLICATIONS



CIRCULAR CONNECTORS  
THREADED OR BAYONET VERSIONS



MODULAR CONNECTORS  
POWER & SIGNAL



ATEX CONNECTORS



DATA TRANSMISSION



CIRCULAR CONNECTORS  
THERMOELASTIC INSERTS



CIRCULAR POWER CONNECTORS



MULTIPOLES POWER CONNECTORS



POWERBOX



CUSTOM CONNECTORS



SINGLE POLE POWER CONNECTORS

# TECHNOLOGY <sup>AND</sup> BUSINESS DAYS

Exclusive to Engineers from Aviation and Aerospace Industries

## Who Attends?

- Design Engineers
- Hardware / Software Engineers
- Project and Team Leaders
- Procurement Specialists

## Topics Include

- Flight Test Instrumentation
- Advanced Communication Systems
- RF & MW Technologies
- Power Electronics
- MEMS products
- Video / Graphics Capture & Processing



## ABOUT



SLOAN AG was founded in 1967 in Basle/Switzerland as a sister of the SLOAN Company in California/USA.

Ever since SLOAN AG designs, manufactures and distributes electronic and electro optical components which meet the highest standards for quality, durability and performance. In more than 30 years of service to the military and commercial markets SLOAN has developed the largest range of quality indicators and continues to introduce new, up-to-date products.

A development department, innovative and quickly responding can realise designs off optoelectronic products according to customer's specifications. Sloan offers an extensive range of waterproof devices for security equipment's Rugged metal housings, shock and vibration proof, ultra-bright LED indicators, sunlight visibility, viewing angle of more than 180° with LED's, are further advantages of the SLOAN range with which we satisfy our customers' demands. SLOAN's longstanding experience and innovations is a guarantee to provide customers with superior products, standard or custom designed, at reasonable cost.

**[www.sloan.ch](http://www.sloan.ch)**





## FLAT INDICATOR LIGHTS



Sloan Series 343-344-348

Sloan Series 349

Sloan Series 183-184-188

Sloan Series 193-194-198

Sloan Series 962

Sloan Series 200

Led for Lampholders

## INDICATOR LIGHTS WITH REFLECTOR



Sloan Series 333-334-338

Sloan Series 13C-14C

Sloan Series 134-135-138

Sloan Series 133R-134R-138R

Sloan Series 353-354-358

Sloan Series 144-145-148

Sloan Series 153-154-158

## PLASTIC INDICATOR LIGHTS



Sloan Series 948

Sloan Series 951

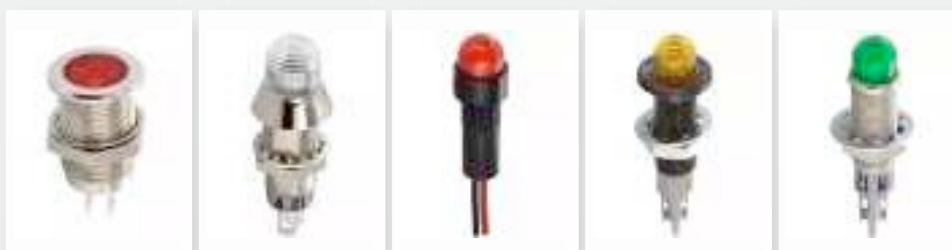
Sloan Series 941

Sloan Series 943

Sloan Series 955

Sloan Series 956

## INDICATOR LIGHTS WITH COLOUR CAP



Sloan Series 974-978

Sloan Series 174-177-178

Sloan Series 175-179

Sloan Series 117-119

Sloan Series 114

## INDICATOR REPLACEABLE FROM THE FRONT



Sloan Series 855

Sloan Series 876, 877, 886, 887

## INDICATOR LIGHTS WITH COLOUR CAP



Sloan Series 952

Criss-cross Indicator

## ABOUT



Soliani EMC srl was founded in Italy in 1984 as S.I.R.I. sas. to create the first Italian production of articles for the electromagnetic shielding, designed to meet the growing demand on the market. The Soliani EMC shielding products, for the ability to offer a high degree of protection from electromagnetic interference, allowing the safe operation of facilities and electronic equipment for numerous industries including Aerospace, Defense, Maritime, Industrial, Medical and Telecommunications.

[www.solianiemc.com](http://www.solianiemc.com)



IN STOCK



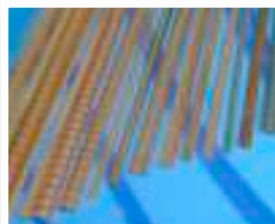
EMI/RFI Shielding gaskets



IP65 / EMI EMC IP 65 Sealed gaskets



EPDM conductive gasket EMC/NBC



EMI/EMC fingers strip



Electrically conductive silicone gasket



Automatic deposition of  
conductive silicone



Conductive adhesives and sealants



EMC Electrically conductive paints



Shielding conductive textile fabrics



Conductive Non-Woven



EMI Shielded Windows



Shielded Honeycomb air vent



HEMP EMC TEMPEST RFI EMP  
Shielded Doors



Shielded Tent



Shielded Rooms



Shielding Cable



Radar Absorbent Materials



Electromagnetic Shielding Test



Shielding of Magnetic fields



Shielding Rfid cards



Thermally conductive silicone



Conductive mask tape EMI/EMC



EMI/EMC shielded bellows





## HEATING

### PROTECTION AGAINST FROST AND CONDENSATION

Optimised temperatures are of utmost importance in switch cabinets: STEGO heaters and fan heaters prevent dangerously low temperatures and ensure equal distribution of warm air.



## COOLING

### PROTECTION AGAINST OVERHEATING

To protect installations from excessively high temperatures STEGO filter fans ensure efficient cooling by circulating air.



## REGULATING/MONITORING

### CONSTANT MONITORING

STEGO's temperature and humidity control systems perfect operating conditions for electric and electronic installations and therefore safeguard their performance.



## LIGHTING

### IDEAL LIGHTING SOLUTIONS

Our lighting solutions ensure that maintenance on electronic installations can be carried out night and day.



## ACCESSORIES

### COMPLEMENTARY ELECTRONICS PROTECTION

Accessory products from STEGO expand the climatisation portfolio appropriately and offer more specific solutions for individual needs.



## EX PROTECTION

### EXPLOSION PROTECTION EQUIPMENT

Specific requirements apply to the operation of electrical equipment in hazardous areas. STEGO heaters and thermostats meet international and European standards.

## ABOUT



Founded in Germany in 1980, STEGO consistently manufactures products for a wide range of requirements in enclosure climatisation for numerous industries including Defense, Medical and Industrial. STEGO temperature and humidity control systems are the recognized original in the market and thus the “go to” reference for thermal management. STEGO thermal management products such as filter fans, enclosure thermostats, regulators, sensors are safe, reliable, efficient and integration friendly. As a result, you get an innovative, durable solution which in turn adds value to your own product, which is SIMPLY INNOVATIVE and BETTER FOR SURE.

**[www.stego.de](http://www.stego.de)**



## HEATERS



RCE 016, 5 W - 9 W



RC 016, 8 W - 13 W



CSK 060, 10 W - 20 W



HGK 047, 10 W - 30 W



HG 140, 15 W - 150 W



CS 060, 50 W - 150 W



CSF 060, 50 W - 150 W

## FAN HEATERS



HV 031/HVL 031,  
100 W - 400 W



CS 028/CSL 028,  
150 W - 400 W



CSF 028,  
250 - 400 W



HGL 046,  
250 W - 400 W



CR 027,  
UP TO 650 W



HVI 030 W/O FAN,  
500 W - 700 W



HVI 030,  
500 W - 700 W



CR 030, 950 W



CR 130, 950 W



CS 032/CSF 032, 1000 W



CS 030, 1200 W



CS 130, 1200 W

## FILTER FAN PLUS



FPI/FPO 3.62 X 3.62"



FPI/FPO 4.88 X 4.88"



FPI/FPO 6.93 X 6.93"



FPI/FPO 8.78 X 8.78"



FPI/FPO 11.46 X 11.46"

## FILTER FANS



FF 018, 14-69 CFM



FF 018, 136 CFM



FF 018, 202 CFM



FF 018, 373 CFM



FF 018 OUTDOOR, 14 CFM



RFP 018, 203 CFM & 338 CFM



## FILTER FAN PLUS - DC LINE

## HOSE-PROOF HOOD

PAGE  
99



FPI/FPO DC LINE  
3.62X3.62"



FPI/FPO DC LINE  
4.88X4.88"



FPI/FPO DC LINE  
6.93X6.93"



FFH 086 | IP56

## REGULATORS



ELECTRONIC HYGROSTAT  
EFR 012



ELECTRONIC HYGROSTAT  
EFL 012 (DC)



HYGROTHERM  
ETF 012



HYGROTHERM  
ETF 012 W/SENSOR



SWITCH MODULE  
SM 010



THERMOSTAT ZR 011



THERMOSTAT  
FTD 011



THERMOSTAT  
FZK 011



ELECTRONIC THERMOSTAT  
ETR 011



ELECTRONIC THERMOSTAT  
ET 011 (DC)



ELECTRONIC THERMOSTAT  
ETL 011 (DC)



HYGROSTAT  
MFR 012

## REGULATORS

## 19" FAN TRAY



THERMOSTATS KTO  
011/KTS 011



THERMOSTATS STO  
011/STS 011



THERMOSTATS FTO  
011/FTS 011



LE 019, 286-1017 CFM

## ENCLOSURE LIGHTS



LED 025



LED 025 ECOLINE



SL 025 (ON/OFF SWITCH)



SO 025 (MOTION SENSOR)



KL 025

# Capacitor Applications

Power Hold-up, RADAR and Laser



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arif@bupatltd.com*

### POWER HOLD-UP APPLICATIONS

$I = 1A$ ,  $\Delta T = 200msec$ ,  $T = 1sec$   
 $f = 1Hz$ , Duty Cycle = 20 %

### RADAR APPLICATIONS

$I = 20A$ ,  $\Delta T = 200\mu sec$ ,  $T = 0.002sec$   
 $f = 500Hz$ , Duty Cycle = 10 %

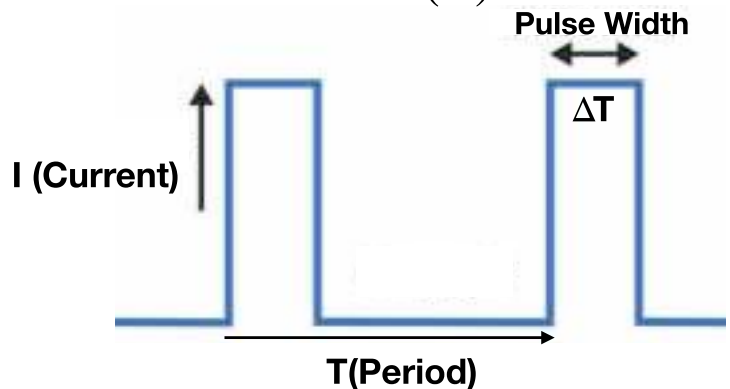
### LASER APPLICATIONS

$I = 200A$ ,  $\Delta T = 10\mu sec$ ,  $T = 0.1sec$   
 $f = 10Hz$ , Duty Cycle = 0.01 %

$$Duty\ Cycle\ (\%) = \frac{\Delta T}{T} \times 100$$

- Caps are used in Power Hold-up, Radar and Laser Applications
- Caps store energy to be supplied during the transmit cycle.
- In certain applications (such as High Power Radar), a lot of DC Power may be needed during the transmit cycles.
- Calculation to determine capacitance (**C**) for energy storage requirements is given in terms of current (**I**), pulse width ( $\Delta T$ ) and allowable voltage droop ( $\Delta V$ ):

$$C\ (F) = \frac{I\ (A) \times \Delta T\ (sec)}{\Delta V\ (V)}$$



### APPLICATION EXAMPLE

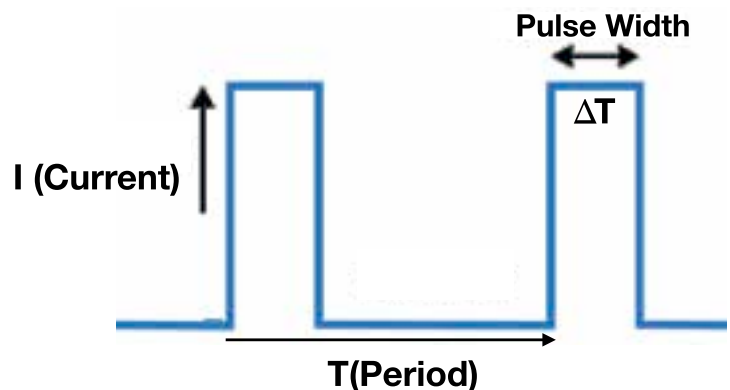
In a power hold-up application, let's suppose the operating voltage is **28V** and the acceptable voltage droop across the capacitor terminals is **5V**. Identify the capacitance value that you need to use and compare different capacitor products in the market.

#### Choosing a Cap for this Application

$$C = I * \Delta T / \Delta V = 1A * 200msec / 5V = 40,000\mu F$$

Applying a safe de-rate,

- We can choose from **40 - 50 V caps**
- We should maintain **C = 40,000μF**



### POWER HOLD-UP APPLICATIONS

$I = 1A$ ,  $\Delta T = 200msec$ ,  $T = 1sec$   
 $f = 1Hz$ , Duty Cycle = 20 %

$$C\ (F) = \frac{I\ (A) \times \Delta T\ (sec)}{\Delta V\ (V)}$$

$$Duty\ Cycle\ (\%) = \frac{\Delta T}{T} \times 100$$



## CAPACITOR SOLUTIONS - Power Hold-Up Application Example



Representative picture.  
Not image of actual part.

**Standard Aluminum**  
101C403U050ED2B  
**50V and 40,000µF per unit**  
**1 required**  
1.75" D x 4.625" H  
Volume ≈ 11 in<sup>3</sup>  
Footprint = 3.0 in<sup>2</sup>  
Weight = 255g



**Aluminum Flat Pack**  
MLP113M050EB0  
**50V and 11,000µF per unit**  
**4 required**  
1.75" x 3.00" x 0.5"  
Volume = 10.5 in<sup>3</sup>  
Footprint = 3.5 in<sup>2</sup>  
Weight = 264g



**Aluminum Flat Pack  
Stainless Steel Case**  
MLS113M040EB0C  
**50V and 11,000µF per unit**  
**4 required**  
1.75" x 0.5" x 3.00"  
Volume = 10.5 in<sup>3</sup>  
Footprint = 3.5 in<sup>2</sup>  
Weight = 368g



**Aluminum Flat Pack  
Stainless Steel + Hermetic**  
MLSH222M040JK0C  
**48V and 2,200µF per unit**  
**18 required**  
1.5" x 1.0" x 0.5"  
Volume = 13.5 in<sup>3</sup>  
Footprint = 9.0 in<sup>2</sup>  
Weight = 576g



**EXTENDED RANGE  
WET TANTALUM**  
EVANS HC3D050222  
DLA 10004-15  
**50V and 2,200µF per unit**  
**18 required**  
0.375" D x 1.062" L  
Volume = 2.1 in<sup>3</sup>  
Footprint = 7.1 in<sup>2</sup>  
Weight = 270g



**HYBRID WET TANTALUM**  
EVANS TDD4050443  
DLA 15010-20  
**50V and 44,000µF per unit**  
**1 required**  
1.4" x 1.4" x 0.755"  
Volume ≈ 1.5 in<sup>3</sup>  
Footprint = 2.0 in<sup>2</sup>  
Weight = 134g

## 50V and 40,000µF Capacitor Solutions

## QUESTIONS

How critical is the ...

- SIZE (Volume) ?
- WEIGHT ?
- ESR ?
- Reliability ?
- Hermeticity ?
- Cost Effectiveness ?
- Shelf Life ?
- Temperature Performance ?
- High Current Capability ?

## 50V and 40,000µF Capacitor Solutions

Part Number	Quantity Required	Volume (in <sup>3</sup> )	Weight (g)	Hermetic	Estimated Cost
101C403U050ED2B Aluminum	1	11	255		\$100
MLP113M050EB0 Aluminum Flat Pack	4	10.5	264		\$350
MLS113M040EB0C Stainless Steel "Flatpack"	4	10.5	368		\$760
MLSH222M040JK0C Stainless Steel "Flat Pack"	18	13.5	576	✓	\$2,250
EVANS HC3D050222 DLA 10004-15	18	2.1	270	✓	\$2,250
EVANS TDD4050443 DLA 15010-20	1	1.5	134	✓	\$950

## RADAR APPLICATIONS

$I = 20A$ ,  $\Delta T = 200\mu sec$ ,  $T = 0.002sec$   
 $f = 500Hz$ , Duty Cycle = 10 %

$$C (F) = \frac{I (A) \times \Delta T (sec)}{\Delta V (V)}$$

$$Duty Cycle (\%) = \frac{\Delta T}{T} \times 100$$

## APPLICATION EXAMPLE

High power Amplifiers in modern phased array radars are in the range of 1KW – 10 KW. These systems need very high power pulses to transmit and must maintain that power throughout the pulse without voltage droop (**0.5V - 1 V is acceptable**). The operating voltage can be as high as **50V**.

### MAIN CHALLENGES

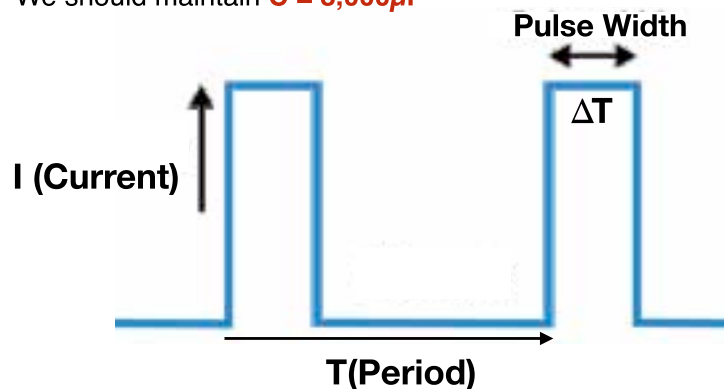
- Highest Power for Longest Pulse Width
- Light Weight / Compact Design
- Cooling Requirements
- Increasing Duty Cycles

### Choosing A Cap for this Application

$$C = I * \Delta T / \Delta V = 20A * 200\mu sec / 0.5V = 8,000\mu F$$

Applying a very safe de-rate,

- We can choose from **100 V caps**
- We should maintain **C = 8,000μF**



## CAPACITOR SOLUTIONS - High Power Radar Application Example



Representative picture.  
Not image of actual part.

**Standard Aluminum**  
381LX392M100K052  
**100V and 3,900μF per unit**  
**2 required**  
1.2" D x 2.0" H  
Volume ≈ 4.5 in<sup>3</sup>  
Footprint = 2.9 in<sup>2</sup>  
Weight = 106g



**Traditional Wet Tantalum**  
DLA-93026  
**100V and 220μF per unit**  
**36 required**  
0.375" D x 1.062" L  
Volume ≈ 4.2 in<sup>3</sup>  
Footprint = 14.3 in<sup>2</sup>  
Weight = 648g



**Aluminum Flatpack**  
**Stainless Steel Cased**  
MLSG132M100EB0D  
**100V and 1,300μF per unit**  
**6 required**  
1.75" x 0.5" x 3.0"  
Volume ≈ 15.8 in<sup>3</sup>  
Footprint = 5.3 in<sup>2</sup>  
Weight = 558g



**Extended Range**  
**Wet Tantalum**  
DLA-10004  
**100V and 470μF per unit**  
**17 required**  
0.375" D x 1.062" L  
Volume ≈ 2.0 in<sup>3</sup>  
Footprint = 6.7 in<sup>2</sup>  
Weight = 255g



**Aluminum Flatpack**  
**Stainless Steel + HERMETIC**  
MLSH401M100JK0C  
**100V and 400μF per unit**  
**20 required**  
1.0" x 0.5" x 1.5"  
Volume ≈ 15 in<sup>3</sup>  
Footprint = 10.0 in<sup>2</sup>  
Weight = 640g



**HYBRID WET TANTALUM**  
EVANS TDD4100882  
**100V and 8,800μF per unit**  
**1 required**  
1.4" x 1.4" x 0.75"  
Volume ≈ 1.5 in<sup>3</sup>  
Footprint = 2.0 in<sup>2</sup>  
Weight = 145g

## QUESTIONS

How critical is the ...

- SIZE (Volume) ?
- WEIGHT ?
- ESR ?
- Reliability ?
- Hermeticity ?
- Cost Effectiveness ?
- Shelf Life ?
- Temperature Performance ?
- High Current Capability ?

## 100V and 8,000μF Capacitor Solutions

Part Number	Quantity Required	Volume (in^3)	Weight (g)	Hermetic	Estimated Cost
381LX392M100K052 Aluminum	2	4.5	106		\$30
DLA-93026 Traditional Wet Tantalum	36	4.2	648	✓	\$3,200
MLSG132M100EB0D Stainless Steel "Flatpack"	6	15.8	558		\$960
DLA-10004 Extended - Wet Tantalum	17	2.0	255	✓	\$1,700
MLSH401M100JK0C Stainless Steel + Hermetic "Flatpack"	20	15	640	✓	\$2,400
TDD4100882 EVANSCAP "Hybrid"	1	1.5	145	✓	\$950

### LASER APPLICATIONS

$I = 200A$ ,  $\Delta T = 10\mu sec$ ,  $T = 0.1sec$   
 $f = 10Hz$ , Duty Cycle = 0.01 %

$$C (F) = \frac{I (A) \times \Delta T (sec)}{\Delta V (V)}$$

$$Duty Cycle (\%) = \frac{\Delta T}{T} \times 100$$

### APPLICATION EXAMPLE

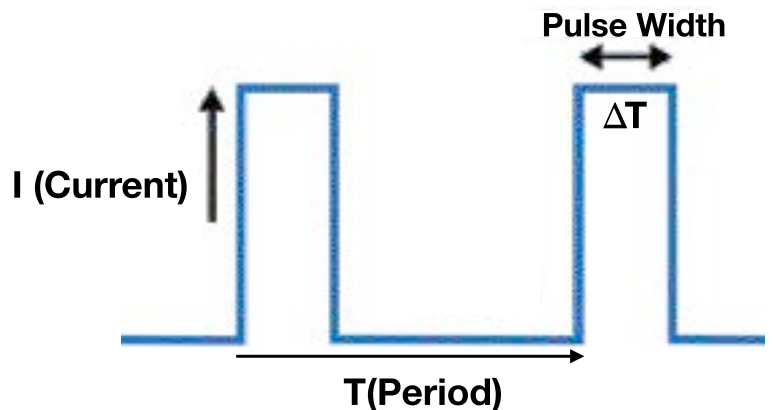
In a generic Pulsed Laser Application, a cap solution operating at 75V with an allowable 1% voltage droop is needed. For a safe de-rate, one can choose a solution operating at 100V.

#### Choosing a Cap for this Application

$$C = I * \Delta T / \Delta V = 200A * 10\mu sec / 1V = 2,000\mu F$$

Applying a safe de-rate,

- We can choose from **100 V caps**
- We should maintain **C = 2,000μF**





## CAPACITOR SOLUTIONS - High Power Radar Application Example



Representative picture.  
Not image of actual part.

**Standard Aluminum**  
381LX222M100A022  
**100V and 2,200µF per unit**  
**1 required**  
1.38" D x 1.18" H  
Volume ≈ 1.8 in<sup>3</sup>  
Footprint = 1.9 in<sup>2</sup>  
Weight = 48g



**Traditional Wet Tantalum**  
DLA-93026  
**100V and 220µF per unit**  
**10 required**  
0.375" D x 1.062" L  
Volume ≈ 1.2 in<sup>3</sup>  
Footprint = 4.0 in<sup>2</sup>  
Weight = 180g



**Aluminum Flatpack  
Stainless Steel Cased**  
MLSG501M100EK0A  
**100V and 500µF per unit**  
**4 required**  
1.75" x 0.5" x 1.5"  
Volume ≈ 5.25 in<sup>3</sup>  
Footprint = 3.5 in<sup>2</sup>  
Weight = 192g



**Extended Range  
Wet Tantalum**  
DLA-10004  
**100V and 470µF per unit**  
**5 required**  
0.375" D x 1.062" L  
Volume ≈ 0.6 in<sup>3</sup>  
Footprint = 2.0 in<sup>2</sup>  
Weight = 75g



**Aluminum Flatpack  
Stainless Steel + HERMETIC**  
MLSH401M100JK0C  
**100V and 400µF per unit**  
**5 required**  
1.0" x 0.5" x 1.5"  
Volume ≈ 3.75 in<sup>3</sup>  
Footprint = 2.5 in<sup>2</sup>  
Weight = 160g



Representative picture.  
Not image of actual part.

**HYBRID WET TANTALUM**  
EVANS TDD1100222  
**100V and 2,200µF per unit**  
**1 required**  
1.4" D X 0.31" H  
Volume ≈ 0.6 in<sup>3</sup>  
Footprint = 1.96 in<sup>2</sup>  
Weight = 60g

## QUESTIONS

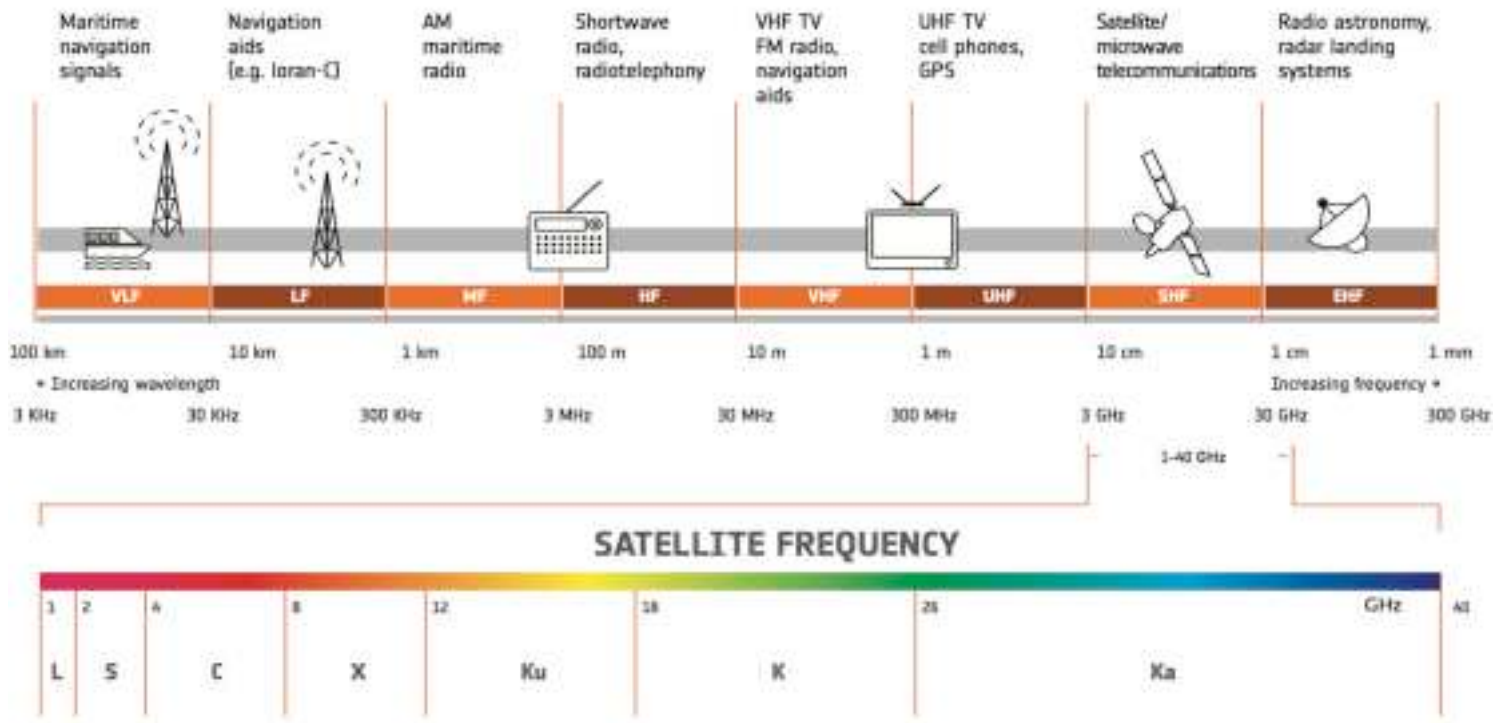
How critical is the ...

- SIZE (Volume) ?
- WEIGHT ?
- ESR ?
- Reliability ?
- Hermeticity ?
- Cost Effectiveness ?
- Shelf Life ?
- Temperature Performance ?
- **High Current Capability ? (200A>)**

## 100V and 2,000µF Capacitor Solutions

Part Number	Quantity Required	Volume (in <sup>3</sup> )	Weight (g)	Hermetic	Estimated Cost
381LX222M100A022 Aluminum	1	1.8	48		\$5
DLA-93026 Traditional Wet Tantalum	10	1.2	180	✓	\$950
MLSG501M100EK0A Stainless Steel "Flatpack"	4	5.25	192		\$560
DLA-10004 Extended - Wet Tantalum	5	0.6	75	✓	\$500
MLSH401M100JK0C Stainless Steel + Hermetic "Flatpack"	5	3.75	160	✓	\$600
TDD1100222 EVANSCAP "Hybrid"	1	0.6	60	✓	\$550

## FREQUENCY BANDS



## TYPICAL VALUES OF THERMAL RESISTANCE FOR VARIOUS ELECTRONICS PACKAGES

Package	Junction to Case (°C/Watt)	Junction to Air (°C/Watt)
TO-3	5	60
TO-39	12	140
TO-220	3	62.5
TO-220FB	3	50
TO-223	30.6	53
TO-252	5	92
TO-263	23.5	50
D2PAK	4	35

## THERMAL RESISTANCE FOR PCB COPPER

Heat Sink	Thermal Resistance (°C/Watt)
1 sq inch of 1 ounce PCB copper	43
.5 sq inch of 1 ounce PCB copper	50
.3 sq inch of 1 ounce PCB copper	56
Aavid Thermalloy, SMT heat sink: PN: 573400D00010	14

## BASIC FORMULAS

### REACTANCE FORMULAS

$$C = \frac{1}{2\pi f X_C} \quad X_C = \frac{1}{2\pi f C}$$

$$L = \frac{X_L}{2\pi f} \quad X_L = 2\pi f L$$

### RESONANT FREQUENCY FORMULAS

$$F = \frac{1}{2\pi\sqrt{LC}} \quad f_{MHz} = \frac{159.2}{\sqrt{LC}}$$

$$L = \frac{1}{4\pi^2 f^2 C} \quad L_{\mu H} = \frac{25,330}{f^2 C}$$

$$C = \frac{1}{4\pi^2 f^2 L} \quad C_{pF} = \frac{25,330}{f^2 L}$$

Where f is in kHz  
L is in microhenries  
C is in microfarads

### CONVERSION FACTORS

$$\pi = 3.14 \quad 2\pi = 6.28$$

$$\pi^2 = 9.87 \quad \log \pi = 0.497$$

1 meter = 3.28 feet  
1 inch = 2.54 centimeters  
1 radian = 57.3°

### FREQUENCY AND WAVELENGTH FORMULAS

$$f_{MHz} = \frac{3 \times 10^5}{\lambda_{METERS}} \quad \lambda_{METERS} = \frac{3 \times 10^5}{f_{MHz}}$$

$$f_{MHz} = \frac{984}{\lambda_{FEET}} \quad \lambda_{FEET} = \frac{984}{f_{MHz}}$$

0.625λ = 225° = 5/8 WAVE  
0.5λ = 180° = HALF WAVE  
0.311λ = 112°  
0.25λ = 90° = QUARTER WAVE

### RESISTORS IN SERIES

$$R_{TOTAL} = R_1 + R_2 + R_3 + \dots$$

### RESISTORS IN PARALLEL

#### EQUAL RESISTORS

$$R_{TOTAL} = \frac{R}{n} \quad \text{Where n is the total number of resistors}$$

#### UNEQUAL RESISTORS

$$R_{TOTAL} = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots}$$

$$R_{TOTAL} = \frac{R_1 R_2}{R_1 + R_2} \quad R_1 = \frac{R_1 R_2}{R_2 - R_1}$$

If the current through a resistor doubles, the power dissipated quadruples

### IMPEDANCE FORMULAS

#### SERIES CIRCUITS — R & X IN SERIES

$$Z = \sqrt{R^2 + (X_L - X_C)^2}$$

#### PARALLEL CIRCUITS — R & X IN PARALLEL

$$Z = \frac{RX}{\sqrt{R^2 + X^2}}$$

### DIRECT POWER FORMULA

$$P = I^2 R$$

Where I is the common point or base current in amperes, and R is the common point or base resistance in ohms

### INDIRECT POWER FORMULA

$$P = IE(eff)$$

Where I is the final P.A. current in amperes, E is the final P.A. voltage in volts, and eff is the transmitter efficiency expressed in decimal form (79% = 0.79)

### SINE WAVE CONVERSION

Effective Value = 0.707 × Peak Value  
Average Value = 0.637 × Peak Value  
Peak Value = 1.414 × Effective Value (RMS)  
Effective Value = 1.11 × Average Value  
Peak Value = 1.57 × Average Value  
Average Value = 0.9 × Effective Value (RMS)

### OHM'S LAW FORMULAS FOR DC CIRCUITS



### ONE CYCLE TIME DURATION

10kHz = 100μsec  
20kHz = 50μsec  
100kHz = 10μsec  
200kHz = 5μsec  
250kHz = 4μsec  
1MHz = 1μsec  
4MHz = 0.25μsec  
10MHz = 0.1μsec

### BINARY TO BASE 10 CONVERSION

$$1(2^7) = 8$$

$$0(2^7) = 0$$

$$1(2^6) = 2$$

$$1(2^5) = + 1$$

$$11$$

### DECIBEL FORMULAS

Where impedances are equal

$$dB = 10 \log \frac{P_1}{P_2} = 20 \log \frac{E_1}{E_2} = 20 \log \frac{I_1}{I_2}$$

Where impedances are unequal

$$dB = 10 \log \frac{P_1}{P_2} = 20 \log \frac{E_1 \sqrt{Z_2}}{E_2 \sqrt{Z_1}} = 20 \log \frac{I_1 \sqrt{Z_1}}{I_2 \sqrt{Z_2}}$$

0dBm (1mW) = 0.774 volts across 600 ohms  
0.387 volts across 150 ohms  
0.224 volts across 50 ohms

### TRANSFORMER TURNS RATIOS

$$\text{Primary Power} = \text{Secondary Power}$$

$$\frac{N_p}{N_s} = \frac{E_p}{E_s} = \frac{I_s}{I_p} = \sqrt{\frac{Z_p}{Z_s}}$$



# TAKVİM 2020 CALENDAR

## OCAK JANUARY

	PAZARTESİ MONDAY	SALI TUESDAY	ÇARŞAMBA WEDNESDAY	PERŞEMBE THURSDAY	CUMA FRIDAY	CUMARTESİ SATURDAY	PAZAR SUNDAY
1			1	2	3	4	5
2	6	7	8	9	10	11	12
3	13	14	15	16	17	18	19
4	20	21	22	23	24	25	26
5	27	28	29	30	31		

## ŞUBAT FEBRUARY

	PAZARTESİ MONDAY	SALI TUESDAY	ÇARŞAMBA WEDNESDAY	PERŞEMBE THURSDAY	CUMA FRIDAY	CUMARTESİ SATURDAY	PAZAR SUNDAY
1						1	2
2	3	4	5	6	7	8	9
3	10	11	12	13	14	15	16
4	17	18	19	20	21	22	23
5	24	25	26	27	28	29	

## MART MARCH

	PAZARTESİ MONDAY	SALI TUESDAY	ÇARŞAMBA WEDNESDAY	PERŞEMBE THURSDAY	CUMA FRIDAY	CUMARTESİ SATURDAY	PAZAR SUNDAY
1							1
2	2	3	4	5	6	7	8
3	9	10	11	12	13	14	15
4	16	17	18	19	20	21	22
5	23/30	24/31	25	26	27	28	29

## NİSAN APRIL

	PAZARTESİ MONDAY	SALI TUESDAY	ÇARŞAMBA WEDNESDAY	PERŞEMBE THURSDAY	CUMA FRIDAY	CUMARTESİ SATURDAY	PAZAR SUNDAY
1			1	2	3	4	5
2	6	7	8	9	10	11	12
3	13	14	15	16	17	18	19
4	20	21	22	23	24	25	26
5	27	28	29	30			

## MAYIS MAY

	PAZARTESİ MONDAY	SALI TUESDAY	ÇARŞAMBA WEDNESDAY	PERŞEMBE THURSDAY	CUMA FRIDAY	CUMARTESİ SATURDAY	PAZAR SUNDAY
1					1	2	3
2	4	5	6	7	8	9	10
3	11	12	13	14	15	16	17
4	18	19	20	21	22	23	24
5	25	26	27	28	29	30	31

## HAZİRAN JUNE

	PAZARTESİ MONDAY	SALI TUESDAY	ÇARŞAMBA WEDNESDAY	PERŞEMBE THURSDAY	CUMA FRIDAY	CUMARTESİ SATURDAY	PAZAR SUNDAY
1	1	2	3	4	5	6	7
2	8	9	10	11	12	13	14
3	15	16	17	18	19	20	21
4	22	23	24	25	26	27	28
5	29	30					

## TEMMUZ JULY

	PAZARTESİ MONDAY	SALI TUESDAY	ÇARŞAMBA WEDNESDAY	PERŞEMBE THURSDAY	CUMA FRIDAY	CUMARTESİ SATURDAY	PAZAR SUNDAY
1			1	2	3	4	5
2	6	7	8	9	10	11	12
3	13	14	15	16	17	18	19
4	20	21	22	23	24	25	26
5	27	28	29	30	31		

## AĞUSTOS AUGUST

	PAZARTESİ MONDAY	SALI TUESDAY	ÇARŞAMBA WEDNESDAY	PERŞEMBE THURSDAY	CUMA FRIDAY	CUMARTESİ SATURDAY	PAZAR SUNDAY
1						1	2
2	3	4	5	6	7	8	9
3	10	11	12	13	14	15	16
4	17	18	19	20	21	22	23
5	24/31	25	26	27	28	29	30

## EYLÜL SEPTEMBER

	PAZARTESİ MONDAY	SALI TUESDAY	ÇARŞAMBA WEDNESDAY	PERŞEMBE THURSDAY	CUMA FRIDAY	CUMARTESİ SATURDAY	PAZAR SUNDAY
1			1	2	3	4	5
2	6	7	8	9	10	11	12
3	13	14	15	16	17	18	19
4	20	21	22	23	24	25	26
5	27	28	29	30	31		

## EKİM OCTOBER

	PAZARTESİ MONDAY	SALI TUESDAY	ÇARŞAMBA WEDNESDAY	PERŞEMBE THURSDAY	CUMA FRIDAY	CUMARTESİ SATURDAY	PAZAR SUNDAY
1				1	2	3	4
2	5	6	7	8	9	10	11
3	12	13	14	15	16	17	18
4	19	20	21	22	23	24	25
5	26	27	28	29	30	31	

## KASIM NOVEMBER

	PAZARTESİ MONDAY	SALI TUESDAY	ÇARŞAMBA WEDNESDAY	PERŞEMBE THURSDAY	CUMA FRIDAY	CUMARTESİ SATURDAY	PAZAR SUNDAY
1							1
2	2	3	4	5	6	7	8
3	9	10	11	12	13	14	15
4	16	17	18	19	20	21	22
5	23/30	24	25	26	27	28	29

## ARALIK DECEMBER

	PAZARTESİ MONDAY	SALI TUESDAY	ÇARŞAMBA WEDNESDAY	PERŞEMBE THURSDAY	CUMA FRIDAY	CUMARTESİ SATURDAY	PAZAR SUNDAY
1			1	2	3	4	5
2	6	7	8	9	10	11	12
3	13	14	15	16	17	18	19
4	20	21	22	23	24	25	26
5	27	28	29	30	31		

1 Ocak Yılbaşı // 23 Nisan Ulusal Egemenlik ve Çocuk Bayramı // 1 Mayıs Emek ve Dayanışma Günü  
19 Mayıs Atatürk'ü Anma, Gençlik ve Spor Bayramı // 24-25-26 Mayıs Ramazan Bayramı // 15 Temmuz Demokrasi Bayramı  
31 Temmuz - 1-2-3 Ağustos Kurban Bayramı // 30 Ağustos Zafer Bayramı // 29 Ekim Cumhuriyet Bayramı

# TAKVİM 2021 CALENDAR

## OCAK JANUARY

Pis Mon	Sa Tue	Çar Wed	Per Thu	Cu Fri	Çts Sat	Pz Sun
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

## ŞUBAT FEBRUARY

Pis Mon	Sa Tue	Çar Wed	Per Thu	Cu Fri	Çts Sat	Pz Sun
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

## MART MARCH

Pis Mon	Sa Tue	Çar Wed	Per Thu	Cu Fri	Çts Sat	Pz Sun
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

## NİSAN APRIL

Pis Mon	Sa Tue	Çar Wed	Per Thu	Cu Fri	Çts Sat	Pz Sun
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

## MAYIS MAY

Pis Mon	Sa Tue	Çar Wed	Per Thu	Cu Fri	Çts Sat	Pz Sun
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

## HAZİRAN JUNE

Pis Mon	Sa Tue	Çar Wed	Per Thu	Cu Fri	Çts Sat	Pz Sun
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

## TEMMUZ JULY

Pis Mon	Sa Tue	Çar Wed	Per Thu	Cu Fri	Çts Sat	Pz Sun
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

## AĞUSTOS AUGUST

Pis Mon	Sa Tue	Çar Wed	Per Thu	Cu Fri	Çts Sat	Pz Sun
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

## EYLÜL SEPTEMBER

Pis Mon	Sa Tue	Çar Wed	Per Thu	Cu Fri	Çts Sat	Pz Sun
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

## EKİM OCTOBER

Pis Mon	Sa Tue	Çar Wed	Per Thu	Cu Fri	Çts Sat	Pz Sun
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

## KASIM NOVEMBER

Pis Mon	Sa Tue	Çar Wed	Per Thu	Cu Fri	Çts Sat	Pz Sun
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

## ARALIK DECEMBER

Pis Mon	Sa Tue	Çar Wed	Per Thu	Cu Fri	Çts Sat	Pz Sun
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29



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- Aviation Development Training & Workshops:
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- Gap Analysis for DO-178C, DO-254, DO-326A, ARP4754A
- Aviation Development Plans, Checklists & Templates:
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