KRATOS®

UNMANNED SYSTEMS DIVISION

2024 PRODUCT CATALOG

AIR | LAND | SEA

Registered to AS9100D: 2016 & ISO 9001: 2015

COMPANY OVERVIEW

To be the premier global supplier of unmanned vehicle systems, software products, and engineering services by continuously exceeding our customer's expectations by providing the highest degree of quality and customer service.

MICRO SYSTEMS, INC.
a KRATOS company

Micro Systems, Inc. is registered to AS9100D: 2016 & ISO 9001: 2015 and wholly owned subsidiary of Kratos Defense and Security Solutions (Nasdaq: KTOS), headquartered in Fort Walton Beach, Florida. Since 1976, we have been continuously exceeding our customers' expectations in engineering, production, and field services.

Our principal business is the design, development, and manufacture of sophisticated systems used in a broad range of advanced defense applications primarily in the unmanned systems segment of the aerospace and defense industry. In our over 30 year history, we have served the defense industry with a wide range of solutions and products for Command and Control, Flight Telemetry, Over-the-Horizon Communication, Electronic Warfare, Flight Line Test, and Range Safety.

We offer a broad range of products including Unmanned Vehicle Control Systems, Sophisticated Avionics, Radar Tracking and Datalink Transponders, Scoring Systems, Custom Test Equipment, and Advanced Flight Termination Systems.

This catalog contains just a few of the many products that we offer to the industry. If you do not find a product that meets the exact needs of your requirements please contact us and we can discuss options to modify an existing product or design a new product.

Our experienced team of management, engineering, and production personnel are goal oriented, recognized leaders in the defense industry. They follow through from design, prototype, qualification, manufacturing, test to final delivery.

We are dedicated to providing total customer satisfaction and have a team in-place with the resources, commitment, and Total Quality mind-set necessary to provide high-performance, high-reliability products to the Aerospace and Defense Industry.

We are proud to serve you.

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Terms & Conditions of Sale

***Note to exporters**: MSI products are controlled by the U.S. Government and may not be exported without the required approval from the U.S. Government or as otherwise authorized by U.S. law and regulations. In addition, the items may not be resold, transferred, or otherwise be disposed of, to any other country or to any person other than the authorized ultimate consignee or end-user(s), either in their original form or after being incorporated into other items, without first obtaining the necessary approvals from the U.S. Government. All sales are contingent upon receipt of a valid export license*

UNMANNED AERIAL SYSTEMS

Kratos has been developing advanced systems for airborne command and control since 1976. Over the years, Kratos has offered the aerospace and defense industry a broad range of products-including sophisticated avionics, ground control systems, data link and radar tracking transponders, flight and range safety systems, and custom test equipment. Kratos' electronic systems are used on high-performance aerial platforms that fly in excess of Mach 1, with requirements for performing advanced maneuvers at both high and low altitude extremes. Kratos provides high reliability products and systems that can meet military standards and be designed to operate and survive the extreme environments defined by the mission requirements.

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AVIONICS COMPONENTS

Autopilots | Nodes | Flight Controller | Mission Computer
Power Management | Electro-Explosive Device Controller

Autopilots/Mission Computers

Kratos has developed advanced autopilots and mission computers for a range of Unmanned Aerial Vehicles (UAV), high-performance aerial targets, and unmanned aerial combat systems for the U.S. Department of Defense and allied military forces worldwide.

Our airborne vehicle control systems provide varying levels of integration and capability, such as full manual vehicle control from the Command and Control (C2) system on the ground or complete flight profiles that can be pre-programmed to provide fully autonomous operation for more advanced mission requirements. These robust vehicle control systems are available in a variety of configurations, ranging from processing-only units with external radio frequency (RF) modules (data link transponders) to fully integrated units with RF transceivers and global positioning receivers.

Transponders

Subsystem Electronics

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Fort Walton Beach, FL 32548
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UNMANNED GROUND VEHICLE SYSTEMS

Kratos offers diverse ADS Technology deployment experiences leveraged from a history of several military and commercial ADS technology deployments.

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AUTONOMOUS SOLUTIONS

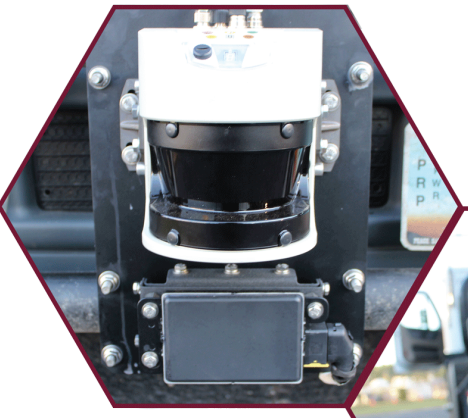
High Mobility Ground Vehicle Solutions
Autonomous Truck Mounted Attenuator
Leader/Follower Platooning

Technology Configuration

- Leader/Follower Platooning
- Driver and Driverless Modes
- Redundant Navigation, V2V Communications, Obstacle Detection, Sensor, Control, and User Interface systems
- Dynamic RTK GPS and Inertial Navigation Systems
- Enhanced Obstacle and Vehicle Intrusion Detection
- Robust User Interface
- Retrofit "bolt-on" kits
- GPS-Denied/Degraded Navigation Capability
- Encrypted Frequency-Hopping V2V Communications
- Cybersecurity Hardened

Operational Deployment

- Truck and Trailer agnostic system
- Operational Day/Night/Twilight and in harsh environment
- Requires no modification to infrastructure
- Day/Night/Twilight and Harsh Environment operation



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DEVELOPED FOR DEFENSE

The ADS Technology was originally developed to support various military defense applications for weapon system evaluation and tactical deployments where self-driving technology could reduce warfighter exposure in dangerous resupply or route clearance missions.

Operation – High/slow speed (up to 70 mph), various terrains (gravel, improved, unimproved, etc.), day/night

Wheeled/Tracked – Retrofit automated vehicles (commercial vehicles, HMMWV, T-72 tank, etc.)

Common Control Platforms – Silhouette vehicle representations on an automated platform

Multi-Vehicle Missions – Individual vehicle control, formation, and coordinated time of arrival

GPS-Denied – Advanced INS and wide-angle video streams

Autonomous – Pre-programed path following, system health telemetry, or sensor enabled

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ADAPTED FOR SAFETY AND LOGISTICS

Kratos adapted its technology to design the world's first **Autonomous Truck Mounted Attenuator (ATMA)** as a commercially deployed self-driving truck using LFP ADS Technology to eliminating the need for humans to drive crash-barrier vehicles called Truck Mounted Attenuators.

Kratos adapted its **Leader/Follower Platooning** ADS Technology for semi-tractor trailer deployments to harden agriculture and renewable energy supply chains with a solution for maintaining haul productivity when qualified drivers were unavailable. Kratos LFP Plans were the first plans approved by North Dakota Department of Transportation (NDDOT) and Minnesota Department of Transportation (MnDOT) for two (2) milestone LPF Semi-tractor/trailer pilot deployments in Northwest Passage locations.

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COMMAND & CONTROL SYSTEMS

Kratos Unmanned Vehicle Command and Control (C2) Systems are robust architectures with variations currently fielded and supporting unmanned air, land, and sea surface mission requirements for the U.S. Navy, the U.S. Army, the U.S. Air Force and several international defense organizations. These C2 systems offer advanced features with the flexibility to support multi-vehicle mission profiles, manual and autonomous control, and detailed mission planning capability. A variety of different hardware configurations are available to support fixed-site command center installations, mobile S280 shelters (manufactured by our C5ISR division), and fully-portable laptop based systems. Kratos' Unmanned Vehicle Control Systems features best-in-class high performance hardware and software that has been system engineered to meet the demanding requirements of customers and has successfully supported over 3,000 operational missions worldwide.

The system operates independent of Data Link types and can accommodate multiple data links and/or multiple frequencies simultaneously. The RF module can be connected directly via Ethernet, or remotely to network through a router (e.g. T1, ISDN, microwave, etc.).

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UNMANNED VEHICLE CONTROL SYSTEM

Features

- Simultaneous Multi-vehicle control
- Modular "Plug and Play" System
- Vehicle Independent Datalink
- Interface to range infrastructure for mission information sharing
- Ruggedized Transportable System

Highly Integrated Consoles and Open System Architecture

- Fast and Easy Set-up (Typically less than 30 minutes) Minimal inter-module connections
- Choice of single or dual console Target Control
- Groups TCP/IP interface between consoles and modules
- Supports remote location of "Building Blocks" (location transparency)

Vehicle and Datalink Independent

- Configure with multiple datalinks simultaneously
  - High Capacity – for full scale vehicle
  - Reduced Capacity (reduced cost) – for subscale vehicles (MQM-107, BQM-167, Medium size UAV, UGV, USV)
  - Simultaneous Vehicle Operation – for multi-vehicle missions

Field Upgradeable

- Additional consoles and modules can easily be added (up to 8 vehicles)
- Temporary expansion for special mission requirements

Range Independent

- No range specific functions for vehicle command and control
- Range interface available for collecting/ monitoring mission data

Modular Systems Approach

- Distributed Multi-processor System
- Configurable using "Building Blocks – Purchase only as much capability as needed
- Highly Cost Effective
- High Capability Configurations Available

Fixed site system configurations are available.

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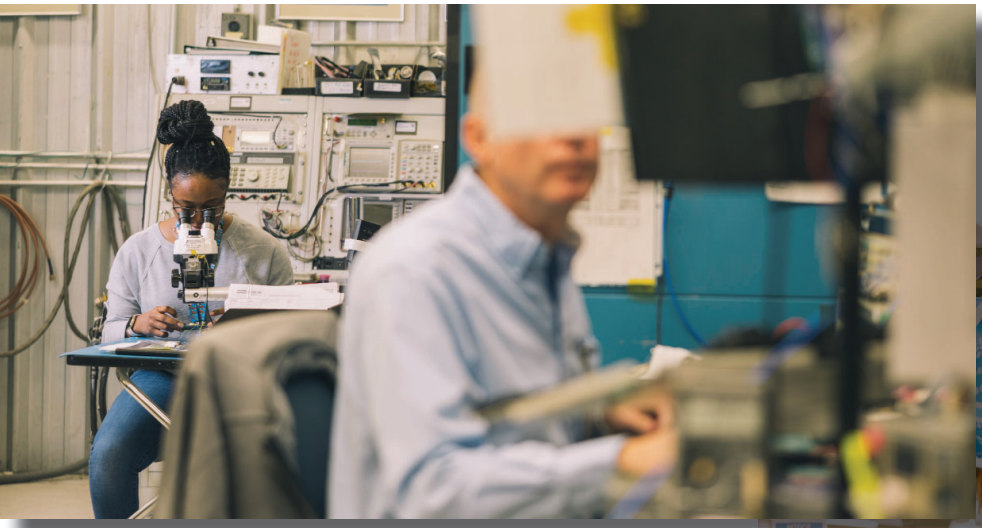
TRANSPONDERS

C-Band | IFF | Datalink

Kratos offers a series of solid state, high reliability transponders for command and control data links, radar tracking, and Identify Friend or Foe (IFF) applications. Transponders are available to support a number of different frequency bands, including UHF, C-Band, and L-Band. We also support various command message data link formats, such as the Gulf Range Drone Control System (GRDCS), and a variety of custom message data link formats that defined to support specific mission requirements. Our robust systems support Line of Sight (LOS) communication as well as radio-relay message transmitting for Over-The-Horizon capability. Kratos can also provide custom designed transponders based on customer specific requirements.



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MODEL KX50 MICRO-TRANSPONDER

50-Watt C-Band Radar Transponder

Features

- Industry leading reduced SWaP
- 3.5 cubic inch volume
- Ideal for small missiles and UAS
- Fully Programmable
- 50 Watts minimum peak power output
- -68dBm Receiver Sensitivity
- Solid State Design
- RCC262-14 Compliant

Applications

- Missiles
- Guided Weapons
- Manned Aircraft
- UAS
- Aerial Targets
- Space Launch Vehicles

The Kratos KX50 Micro-Transponder is the next generation of C-Band Radar Transponders. It is a micro-compact, precision augmentation system for enhancing the tracking capability of C-Band Radars. The KX50 is particularly suitable for small missiles, guided weapons, and UAS where size, weight and power are at a premium.

The Kratos KX50 provides a reliable solid state transmitter using the latest in GaN technology. The result is low modulation pulse voltages, increased reliability, infinite shelf life, and no maintenance requirements. The transmit frequency, receive frequency, single / double pulse interrogation, code spacing, reply delay, and transmit pulse width are externally programmable.

The Kratos KX50 Micro-Transponder provides users with unparalleled ease of use and substantial cost savings for testing, systems maintenance, and operational parameter changes. The KX50 is compatible with Kratos' Model 38-4 C-Band Mini Tester and Model 41 C-Band Transponder Test Set.

Kratos C-Band Transponders provide enhanced pulse parameters capabilities incorporating the latest range requirements to expand the operational capability of existing C-Band radar systems.

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PRELIMINARY

MODEL KX50 C-BAND MICRO-TRANSPONDER

Electrical / Performance

Input Voltage:	10 to 34 VDC
Reverse Polarity:	Series diode protection
Impedance:	50 ohms
Power Consumption:	14.4 Watts maximum
Transmitter Power Output:	50 Watts peak minimum
Receiver Dynamic Range:	-68 dBm to +20 dBm
Transmit / Recieve Frequency Range:	5.4 to 5.9 GHz programmable

Environmental

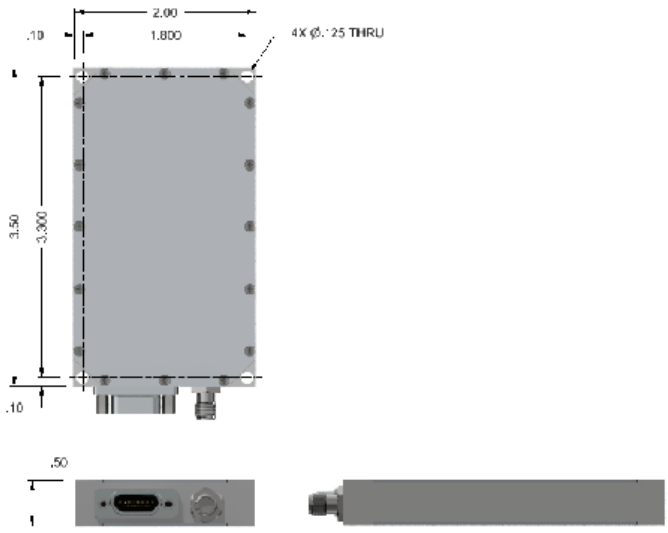
Temp, Operating:	-40°C to +85°C
Temp, Storage:	-54°C to +95°C
Vibration:	MIL-STD-810
Altitude:	85,000 feet
Acceleration:	50 G's all axis 1 minute
Shock:	100 G's all axis 6 msec, 120 G's all axis 4 msec
Humidity:	100%
EMI/RFI:	MIL-STD-461, Class A1 equipment, IAW MIL-STD-462

Physical

Size:	2.0" W x 3.5" L x 0.5" H (5.08cm x 8.89cm x 1.27cm) excluding connectors
Volume:	3.5 cubic inches
Weight:	8 ounces max (227 grams)
Power / Interface Connector:	15-Socket Micro-D
RF Connector:	SMA Female

Part Number

- AY21200, Model KX50-1



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C-BAND RADAR TRACKING TRANSPONDERS

MODELS 252 & 253

DATA SHEET & TECHNICAL SPECIFICATIONS

Features

- Small footprint ideal for missiles and smaller unmanned vehicles.
- Enhanced Pulse parameter capabilities
- 30% smaller than comparable units
- Minimum peak power outputs of 20 Watts or 50 Watts
- Infinite Shelf Life
- Reliable Solid State Transmitter using the latest GaAs technology

Applications

- Vehicle Tracking

The C-Band Radar Tracking Transponders are compact precision augmentation systems for enhancing the tracking capability of C-Band Radars. It is particularly suitable for small missiles, targets, and aerial vehicles where weight and space are of a premium.

These units offer an industry first, providing a reliable solid state transmitter and using the latest in GaAs technology. The result is low modulation pulse voltages, increased reliability, infinite shelf-life, and no maintenance requirements. The transmit frequency, receive frequency, and all pulse code parameters are externally programmable using a standard PC – another industry first. This series of transponders provides a substantial savings of time and money for testing, systems maintenance, and operational parameter changes. Minimum peak power outputs of 20 or 50 watts are available.

Our C-Band Transponders provide enhanced pulse parameter capabilities incorporating the latest range requirements in an effort to expand the operational capability of existing C-Band radar systems.

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Electrical

DC Power:	22 to 34 VDC (28 VDC nominal)
Reverse Polarity:	Series diode protection
Impedance:	50 ohms
Power Consumption:	11 Watts maximum (393 mA @ 28 VDC)

Environmental

Temp, Operating:	-40°C to +71°C; -54°C to +85°C
Temp, Storage:	-62°C to +95°C
Vibration:	MIL-STD-810C
Altitude:	85,000 feet
Acceleration:	50 G's all axis 1 minute
Shock:	100 G's all axis 6 msec, 120 G's all axis 4 msec
Humidity:	100%
EMI/RFI:	MIL-STD-461C, Class A1 equipment, IAW MIL-STD-462

Physical

Size:	3.50" W x 1.40" T x 3.95" D (8.9 x 3.6 x 10 centimeters)
Weight:	18 ounces (510 grams)
Volume:	18 cubic inches (295 cubic cm)
Power Connector:	MS2746Y08D35P

Programmable:

- **Transmit Frequency**
- **Receive Frequency**
- **Reply Delay**
- **Pulse Coding Type (Single/Double)**
- **Pulse Spacing**
- **Pulse Width**

Models included: 252-2, 252-3, 253-2, 253-3

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MODEL MD500L IFF TRANSPONDER

DATA SHEET & TECHNICAL SPECIFICATIONS

Features

- Operates in 1, 2, 3/A, or C Modes
- 400 Watt Peak Power Output (typ.)
- 100% Solid State for High Reliability
- IFF/TACAN Blanking & Suppression
- Interrogation side lobe suppression for use in busy air corridors
- Front panel and remote reply code selection
- Weighs less than 4 pounds
- Built-in duplexer for single antenna operation

Applications

- Radar Identification
- Vehicle Tracking

The Model MD500L IFF Transponder is an L-Band augmentation device ideally suited for use in aerial target drones, unmanned vehicles, and cruise missiles as a radar enhancement device to provide automatic radar identification in response to interrogations from L-Band IFF and Air Traffic Control (ATC) radars. It also supports Mode C (altitude reporting) operation.

It features a modern compact design with less than 90 cubic inches (1475 cubic centimeters) volume and weighs 3.02 pounds (~1.4 kilograms) which is 35% smaller than previous versions. The transponder incorporates the latest in solid state electronics design and features a 400 watts nominal peak power output. It also features IFF/TACAN blanking and suppression, reverse polarity power lead protection, and has a built in duplexer for single antenna operation. Also, the transponder was designed with both front panel and remote reply code selection for greater convenience and ease of use. The L-Band IFF meets the requirements of MIL-STD-810 and is designed to operate over the temperature range of -40° C to +70° C.

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Environmental

- Temp, Operating: -40 ° C to +70 ° C
- Temp, Storage: -80 ° F (-62° C) to 185 ° F (+85 ° C)
- Altitude: Sea Level to 100,000 feet
- Vibration: Random, 9.3 Grms max from 10 to 2000 Hz
- Acceleration: 20 G in each of 6 direction for 1 min per axis while operating
- Shock: 20 G (11 ms), 3 shocks each axis

Electrical

- Frequency: 1030 / 1090 MHz
- Impedance, Input/Output: 50 ohms nominal
- Protection: Built-in series diode protection against from DC input power reversal
  Input Voltage: 24 to 32 VDC, common GND
  Quiescent Current: 0.4 Amp nominal
- Input Current: 1.1 Amp typical @ 2500 prf
- Input Power: 40 Watts max, all conditions
- Suppression Modes:
  (1) Decoding suppression during transmission
  (2) Interrogation Side Lobe Suppression (ISLS)
  (3) Over-interrogation reply limiting
  (4) Suppression from an external IFF or TACAN system
  (5) Provides suppression pulse to an IFF or TACAN system

Physical

- Size: 5.00" W x 2.52" T x 5.13" D (12.7 x 6.40 x 13.03 cm)
- Weight: < 4 pounds
- Antenna Connector: TNC Female
- Pwr/Remote Connector: MS27474E14B35P
- IFF/TACAN Connector: BNC female
- Installation: Flange Mount Base Plate

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MULTI-SERVICE DATA LINK TRANSPONDER

DATA SHEET & TECHNICAL SPECIFICATIONS

Features

- Field Proven Hardware
- Modular Design
- Up to 99 Available Frequency Channels in the range of 359.5 MHz to 375 MHz
- GMSK Modulation
- Up to 35 watts RF Output Power
- 3 antenna ports
- Ruggedized Aluminum Chassis

Applications

- Autopilot Interface
- Command and Telemetry

The Multi-Service Data Link (MSDL) transponder is a command receiver, digital command decoder, digital telemetry encoder, telemetry transmitter, and target interface enclosed in a single lightweight package. The transponder receives commands transmitted by the ground control station and interfaces with the vehicle management computer or autopilot.

Uplink UHF command messages from the ground control station are received by the transponder in the frequency band of 359.5 MHz to 375 MHz. The RF data is converted to a serial data stream that is digitally transmitted to the vehicle autopilot for processing. The autopilot can then send a serial data stream back to the transponder where the telemetry downlink is then transmitted down to the ground control station. The MSDL has three antenna ports to support multiple antenna inputs via the vehicle RF switch. Multiple antenna inputs can be toggled through for the strongest signal.

MSDL has also been qualified per MIL-STD-461 (EMI), MIL-STD-810 (Environmental), MIL-HDBK-781 (Reliability) making it one of the most capable devices in the industry.

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Environmental

Temperature:	Operating: -40°C to +71°C
Vibration:	Random, 20 to 2000 Hz, 11.514 G 48 minutes per orthogonal axis
Altitude:	50,000 ft
Shock:	Sawtooth, 20 G for 11ms, 18 shocks total
Humidity:	Saturation @ 40°C
EMI/RFI:	Certified to MIL-STD-461F

Power Requirements

DC Power:	22 VDC to 32 VDC (28 VDC Nominal)
Reverse Polarity:	Yes
Power Consumption:	55 Watts maximum (1.8 amps @ 28 VDC)

Physical

Size:	7.50" W x 3.50" H x 7.00" D
Weight:	<8 pounds
Connectors:	Circular, N-Type Female, SMA Female
Finish:	Black Surf Paint
Installation:	Flange Mount Base Plate

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MODEL 290 UHF DATA LINK TRANSPONDER

DATA SHEET & TECHNICAL SPECIFICATIONS

Features

- Field Proven Hardware
- Modular Design
- 16 Available Frequency Channels in the range of 358 MHz to 380 MHz
- GMSK Modulation
- Greater than 3W RF Output Power
- 3 antenna ports
- Ruggedized Aluminum Chassis

Applications

- Autopilot Interface
- Command and Telemetry

The Model 290 UHF datalink transponder is a command receiver and telemetry transmitter enclosed in a single lightweight package. The transponder receives commands transmitted by the ground control station and interfaces with the vehicle management computer or autopilot.

Uplink UHF command messages from the ground control station are received by the transponder in the frequency band of 358 MHz to 380 MHz. The RF data is converted to a serial data stream that is digitally transmitted to the vehicle autopilot for processing. The autopilot can then send a serial data stream back to the transponder where the telemetry downlink is then transmitted down to the ground control station. It also has three antenna ports to support multiple antenna inputs via the vehicle RF switch. Multiple antenna inputs can be toggled through for the strongest signal.

The Model 290 has been qualified per MIL-STD-810 (Environmental) making it one of the most capable devices in the industry.

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Environmental

- Temperature: Operating: -40° C to +71° C
- Vibration: Random, 15 to 2000 Hz, 9.3 G 30 minutes per orthogonal axis
- Altitude: 50,000 ft
- Shock: Sawtooth, 20 G for 11ms, 18 shocks total
- Humidity: Up to 95% @ 40° C (all boards are conformal coated)

Power Requirements

- DC Power: 22 VDC to 32 VDC (28 VDC Nominal)
- Reverse Polarity: Yes
- Power Consumption: 80 Watts maximum (2.9 amps @ 28 VDC)

Physical

- Size: 5.00" W x 2.95" T x 6.00" D
- Weight: 6 pounds
- Connectors: Circular, SMA Female x3
- Finish: Black Paint
- Installation: Flange Mount Base Plate

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MODEL 280 TRANSPONDER

DATA SHEET & TECHNICAL SPECIFICATIONS

Features

- Field Proven Hardware
- Modular Design
- 16 Available Frequency Channels in the range of 435 MHz to 450 MHz
- GPS Receiver
- GMSK Modulation
- Greater Than 3 Watt RF Output Power
- Ruggedized Aluminum Chassis Qualified to MIL-STD-461D (EMI), MIL-STD-810 (Env)

The Model 280 Transponder is a command receiver, digital command decoder, digital telemetry encoder, telemetry transmitter, and target interface enclosed in a single lightweight package.

The transponder receives commands transmitted by the controlling station or the target drone set. Implementation of commands occurs only after verification of the address, parity, and message integrity checks. After verifying the address in the command uplink message, the transponder initiates the transmission of a telemetry reply. The self-contained GPS receiver provides excellent position accuracy during all vehicle maneuvers.

The Model 280 allows multiple targets to be flown on the same frequency and can be used as a target relay. This transponder is currently used on the U.S. Navy's family of target vehicles including the BQM-34 and BQM-74 aerial targets, MST-35 and HSMST sea surface targets, and international vehicles like the Chukar III.

Applications

- Autopilot Interface
- Command and Telemetry
- Vehicle Payload Interface

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Environmental

- Temperature: Operating: -40° C to +71° C
- Cooling: Passive Conductive (no moving parts)
- Vibration: Random, 15 to 2000 Hz, 9.3 G 30 minutes per orthogonal axis
- Altitude: 50,000 ft
- Shock: Sawtooth, 20 G for 11ms, 18 shocks total
- Humidity: Up to 95% @ 40° C (all boards are conformal coated)
- EMI/RFI: Certified to MIL-STD-461D, Class A1

Power Requirements

- DC Power: 22 VDC to 32 VDC (28 VDC Nominal)
- Reverse Polarity: Series diode protection
- Power Consumption: 55 Watts maximum (1.8 amps @ 28 VDC)

Physical

- Size: 10.0" W x 4.25" T x 8.50" D
- Weight: 7.8 pounds
- Connectors: MIL-C38999
- Finish: Black Paint
- Installation: Flange Mount Base Plate

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GRDCS/DFCS DATALINK TRANSPONDER

DATA SHEET & TECHNICAL SPECIFICATIONS

Features

- Operates with single power supply
- Designed for extended temperature range Power consumption < 100 Watts
- Bi-phase modulated 915 MHz Transmit/Receive
- Direct Sequence Spread Spectrum (DSSS)
- Peak RF Output Power of ≥ 200 Watts
- Communication to IFC via RS-422 Channel

Applications

- Vehicle Tracking
- Distance Measurement Equipment

The Gulf Range Drone Control System (GRDCS) / Drone Formation Control System (DFCS) Datalink Transponder is an L-Band transmitter/receiver designed to function as a Distance Measuring Equipment (DME) to support GRDCS/DFCS navigation requirements.

The use of Time-Of-Arrival (TOA) measurements to compute distances requires the transponder to reply to uplinked command messages from ground control stations with precisely timed downlink telemetry messages. The update rate for the datalink messages is nominally 10 messages/second.

The GRDCS/DFCS RF Transponder is capable of interrogation rates from 20 Hz (50 milliseconds) to 2 Hz (500 milliseconds).

The GRDCS/DFCS RF Transponder supports datalink message communication by decoding and transferring uplink command data to the Integrated Flight Controller (IFC) system, and by encoding downlink telemetry data representing aircraft flight control mode status and sensor readings from the IFC. The GRDCS/DFCS RF Transponder communicates with the IFC via EIA RS-422

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Environmental

Random Vibration:	Operating: 0.015g2/Hz 20 to 100 Hz 0.04g2/Hz 100 to 2000 Hz for 5 minutes in each orthogonal direction (8.8 Grms)
Temperature:	Operating: -40° C to +71° C Storage: -54° C to +125° C
Cooling:	Passive Conductive (no moving parts)
Shock:	Half Sine, 20 G's peak, 11 ms, 3 axes
Altitude:	Sea level up to 50,000 feet
Humidity:	To 95% at any temperature forming frost or condensation

Physical

Size:	9.75" W x 7.42" T x 4.00" D
Weight:	less than 13 pounds (excluding the mounting brackets)
Connectors:	J1 = TNC; J2 = MS27474Y12B35P

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C-BAND RADAR TRANSPONDER PROGRAMMING SET

DATA SHEET & TECHNICAL SPECIFICATIONS

Features

- USB Computer Interface
- Windows XP and later operating system compatibility
- Multiple Programming options.

Applications

- C-Band Transponder/Beacon Programming
- Mini-Tester Programming

The C-Band Transponder Programming Set provides the user with the capability to field program the operational parameters of our Models 252 and 253 C-Band Radar Tracking Transponders. When connected to a user supplied laptop computer, and a compatible transponder, the programmer enables the user to set the following operational parameters:

- Transmit Frequency
- Receive Frequency
- Reply Delay
- Pulse Coding Type (Single or Double Pulse)
- Pulse Spacing
- Pulse Width

The programming set also enables field programming of the transmit frequency of our Models 38-2, 38-4, and 38-5 Mini-Testers. The programming set includes software, USB Interface Cable, Programming Cable, and AC Power Adapter.

Characteristics

PC Interface:	USB
Compatible with:	Transponders: Model 252-3, 253-3 Test Sets: Model 38-4
Operating System:	Windows

Physical

Size:	5" W x 1.5" T x 2.0" D
Weight:	less than 18 ounces (510 grams)

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TEST SETS

Kratos is a leading global provider of turnkey solutions for a full range of Flight Termination Systems (FTS) and ancillary devices. The line-up of products includes: Portable Flight Termination Systems, Dual Redundant 200 Watt to 1.5kW FTS, Receiver/Decoder FTS Test Sets, IRIG Tone Generators/ Exciters, Command Sequencers, Auto Switchover Units, and FTS Receiver Monitors. All of the products can be customized to meet any specific requirements. Kratos also offers full system integration and training for quick and easy implementation.

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MODEL 38-4 C-BAND MINI TESTER

DATA SHEET & TECHNICAL SPECIFICATIONS

Features

- Small handheld device
- PC Programmable Transmit Frequency
- Includes Antenna, Rechargeable Battery, and Charger

Applications

- "Go/No-Go" Test C-Band Transponders

The C-Band Mini-Tester (Model 38-4) is a handheld battery powered unit that provides go/no-go testing for the Micro Systems Models 252 and 253 C-Band transponders and the C-Band transponders.

The Mini-Tester verifies proper transponder operation by interrogating a transponder installed in and powered by a platform. It is capable of testing compatible transponders at distances of up to 350 feet. Indicator lights verify the transmission of signals and the received reply.

The Mini-Tester Kit includes the Mini-Tester, power supply, programming set, cables, and carry case. The components are also available separately.

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MODEL 38-4 C-BAND MINI TESTER
DATA SHEET & TECHNICAL SPECIFICATIONS

Receiver

Frequency:	5.4 GHz to 5.9 GHz
Frequency Adjustment:	Manually tuned
Transmitter Category:	5.4 to 5.9 GHz, programmed in 1 MHz steps

Environmental

Temperature, Operating:	0ºC to +50ºC
Temperature, Storage:	-20ºC to +65ºC

Power Requirements

Power Source:	Internal rechargeable battery with separate plug-in charger
Battery Life:	4 hours with 1 test per minute

Physical

Dimension:	2.50" W x 1.45" T x 6.25" D (excluding knobs)
Weight:	25 ounces

Options

- Universal Charger for International Use (reference Model 38-4i)
- Carrying Case
- Programming Set for programming transmit frequency in the field

C-Band Mini Tester Kit (KT 11075) includes:

38-4 Mini Tester

+

USB Programmer

+

Carrying Case

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MULTI-PLATFORM VEHICLE TEST SET

DATA SHEET & TECHNICAL SPECIFICATIONS

Features

- Easy to use Graphical User Interface
- Automated and Manual Testing
- L-Band or UHF RF Communication
- Operate in Direct or Radiate Mode
- Analog and Discrete Input/Output
- Hi-current I/O
- Rugged Transportable Design

Applications

- Pre-mission Vehicle Checkout
- "Go/No-Go" & Bench Testing
- LRU Troubleshooting

The Multi-Platform Vehicle Test Set (MPVTS) is a self-contained portable equipment rack test instrument for performing vehicle electrical system verification. Kratos can develop a custom MPVTS software application designed specifically to perform complete pre-mission verification of your airborne, ground, or marine vehicle. The MPVTS is the first test set designed to be completely vehicle platform independent.

The MPVTS is used to provide control and monitoring of the communication and input and/or output (I/O) signals to and from various vehicle platforms. It can display vehicle telemetry and system status while allowing the test operator to transmit vehicle commands in either direct link or radiate mode. Radiate Mode is RF Communication for UHF or L-Band datalinks. An embedded RF Power Meter can be used to measure signal strength of radiated datalink. Direct link uses Ethernet, USB, RS-232, or RS-422. Multiple Analog and Relay I/O channels are available for monitoring and providing stimulus to vehicle systems. The MPVTS can also provide power to vehicle systems for testing and verification. An embedded Oscilloscope can be used to monitor any analog, discrete, or power signals.

The MPVTS is a turn-key system that can be used to perform full Go/No-Go vehicle verification in either manual or automated test modes. All equipment is encased in a portable, ruggedized transit case that is quick and easy to setup to support any mission

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Electrical

- Input Power: MPVTS uses two primary power sources; 1 for internal components and the second for vehicle power
- MPVTS Input Power: 115VAC +/- 10 VAC, 60Hz, 15 Amps
  MPVTS Vehicle Power Supply Input: 115VAC +/- 10 VAC, 60 Hz, 30 Amps
- Vehicle Power:
  6 High Current Outputs: 0 – 36VDC, 10A
  4 Low Current Outputs: 0 – 20 VDC, 5A
- Analog I/O:
  34 Inputs: 0 – 40 VDC (4kohm nominal load)
  10 Inputs: 0 – 20 VDC (4kohm nominal load)
  6 Outputs: -10 – 10 VDC
- Relay Closures:
  9 Relay Closures: 8 Normally Open (NO),
  1 Normally Closed (NC)
- Serial Communication:
  RS-422: 5 wire, 115,200 baud, 8, N, 1
  RS-232: 9 pin
  RS-485: 2 wire ,19.2 baud, 8, Odd parity, 1
  USB: 3 ports on front panel
  Ethernet: TCP/IP

Physical

- Size: 8U, E.I.A. Rackmount Transit Case - 30"W x 30"D x 23"H
- Weight: Less than 150lbs
- Temperature: +5° C to +40° C
- Reliability (MTBF): 1000hrs

Options

- RF Modules
- Interface Cables
- Rack Configuration

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FLIGHT TERMINATION SYSTEM TEST SET

DATA SHEET & TECHNICAL SPECIFICATIONS

Features

- Portable
- 8 Tones (1 - 8 standard)
- IRIG 313-01 Compliant
- Variable RF Output Level
- Variable Carrier Frequency
- 20 Tone model also available
- Antenna and Coaxial Cable included

Applications

- Range Safety
- Test

The Model FTTS-P-8 Flight Termination Test Set (FTTS) is a portable unit used for flight-line checkout of flight termination receivers and/or command receiver/decoders.

The FTTS accepts AC power and generates a modulated RF output suitable for interrogation of flight termination receivers and/or command receiver/decoders.

The FTTS can transmit up to 6 tones simultaneously and the RF output power is adjustable from 0 to -127 dBm. The IRIG tones can be switched ON/OFF independently from the control panel.

A 20 Tone version of the FTTS is also available.

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FLIGHT TERMINATION SYSTEM TEST SET

DATA SHEET & TECHNICAL SPECIFICATIONS

Specifications

Size:	9.00" H x 12" W x 5" D (Standard EIA 19" Rack Mount)
Weight:	Approximately 10 pounds
Power Input:	Universal Input: 115 VAC to 230 VAC, 50 to 60 Hz
Carrier Frequency:	406 to 450 MHz in 100 kHz steps
Carrier Frequency Stability:	±.0005%
Power Output:	0 to -127 dBm
Output Impedance:	50 ohms
Output Connection:	Type N Female
Modulation:	Wideband FM, ±30 kHz per tone
Tone Frequencies:	Any combination of up to 8 tones per IRIG 313-01 (maximum of 6 tones ON simultaneously)
Remote Control:	RS-232 (other options available)
Spurious Outputs:	-50 dBc
Harmonic Distortion:	< 2%

Options

- Rackmount
- Select any 8 of 20 available Tones
- 20 Tone model available (FTTS-P-20)
- Local/Remote: RS-232, GPIB, or 10Base100 Ethernet
- Customizable to fit your needs

20 Tone

Ready to Transport

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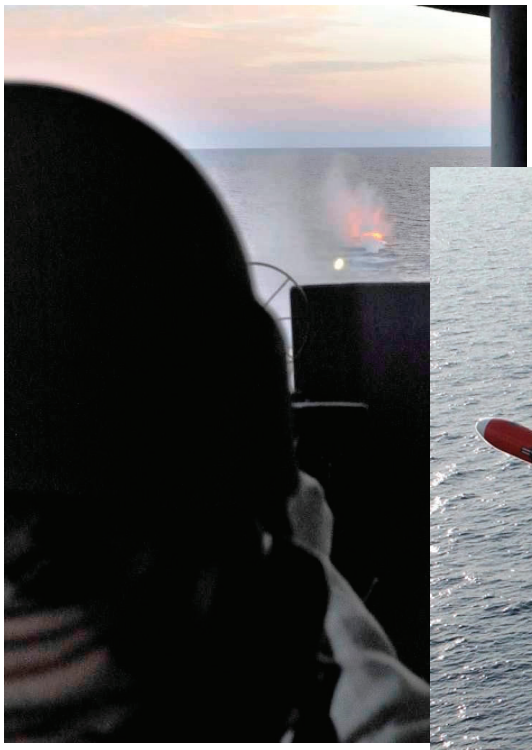
USAF


06
04

SCORING SYSTEMS

Kratos offers a series of solid state, high reliability transponders for command and control data links, radar tracking, and Identify Friend or Foe (IFF) applications. Transponders are available to support a number of different frequency bands, including UHF, C-Band, and L-Band. We also support various command message data link formats, such as the Gulf Range Drone Control System (GRDCS), and a variety of custom message data link formats that defined to support specific mission requirements. Our robust systems support Line of Sight (LOS) communication as well as radio-relay message transmitting for Over-The-Horizon capability. Kratos can also provide custom designed transponders based on customer specific requirements.



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AN/DSQ-50A MISS DISTANCE SCORING SYSTEM

DATA SHEET & TECHNICAL SPECIFICATIONS

Features

- 0 to 75 feet scoring range
- 1 foot scoring accuracy
- Multiple target application
- Environmentally qualified to MIL-STD-810
- EMI qualified to MIL-STD-461
- Sea Skimming or High Altitude

Applications

- Vehicle Miss Distance Scoring

The AN/DSQ-50A Miss Distance Sensor is the airborne element of the AN/USQ-104 RF Scalar Scoring System. Tracking data from the AN/DSQ-50A is transferred in real time to the Scoring Ground Control System, where it is captured and processed to produce scores for the user.

The AN/DSQ-50A was designed for installation in all US Navy targets to acquire scoring information on passing projectiles and missiles. This unit is ideally suited for installation into subscale targets where available space and weight are a concern. It is a non-cooperative, scalar miss-distance indicator (MDI) system capable of providing near real-time, accurate miss-distance, time, and closing velocity data for high altitude and low altitude intercept scenarios.

The AN/DSQ-50A operates against high performance missiles as well as ballistic projectiles as small as 76 mm. It has the capability to operate in live-fire training mission environments containing up to six target vehicles, with each vehicle equipped with a MDI system. Each MDI operates without concern of interference from other MDIs. It consists of two functional elements; a MDI radar sensor to acquire the scoring information and a telemetry transmitter downlink to send the scoring information to a ground set.

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Approved for Public Release: DOPSR 18-S-2400

AN/DSQ-50A MISS DISTANCE SCORING SYSTEM

DATA SHEET & TECHNICAL SPECIFICATIONS

Characteristics

Type:	RF, Non-cooperative, Scalar
Scoring:	Missiles and Projectiles (76 mm and larger)
Scoring Rate:	90 projectiles per minute
Scoring Range:	0 to 75 feet (0 to 22.86 meters)
Closing Velocity:	200 to 8,000 ft/sec (60.96 to 2438.4 m/sec)
Accuracy Miss Distance:	1.0 ft (rms) for 0 to 75 ft scoring range
Accuracy Velocity:	25 ft/sec (7.62 m/sec or 1% (rms))

Power Requirements

DC Power:	22 to 32 VDC (28 VDC Nominal)
Consumption:	65 Watts max
Protection:	Reverse polarity protected

Electrical

Radar Transmitter	
Frequency:	2433.077 – 2433.913 MHz (6 channels)
Power (peak pulse):	20 Watts maximum at antenna
Pulse Width:	220 ns nominal
PRF:	1 MHz nominal
Telemetry	
Format:	NRZL
Bit Rate:	700 kb/s
Bandwidth:	1 MHz
Frequency (tunable):	1435.5 – 1535.5 MHz (L-Band) and 2200.5 – 2289.5 MHz (S-Band)
Power:	2 Watts minimum
Number of Targets:	6 simultaneous max with 200 feet minimum separation

Environmental

Temperature, Operating:	-40°F to +159°F (-40°C to +71°C)
Temperature, Storage:	-65°F to +203°F (-54°C to +95°C)
Cooling:	Passive Conductive (no moving parts)
Vibration:	MIL-STD-810G, Method 514.7, Equipment Category 12, Procedure I
Temp/Humidity/Alt:	MIL-STD-180G, Method 520.4, Procedure III
Shock:	MIL-STD-810G, Method 516.4, Procedure I
Salt Fog:	MIL-STD-180G, Method 509.6, Procedure I
Acoustical Noise:	MIL-STD-180G, Method 515.7, Procedure II
Reliability:	500 hours Mean Time Between Failure

Physical

Size:	9.06" L x 6.33" W x 3.00" H (23.01 cm x 16.08 cm x 7.62 cm)
Weight:	9 pounds
Installation:	Flange Mount Base Plate

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Registered to AS9100D: 2016 & ISO 9001: 2015

SCORING GROUND CONTROL STATION

DATA SHEET & TECHNICAL SPECIFICATIONS

Features

- Auto-scoring
- 0 to 75 feet scoring range
- 1 foot scoring accuracy
- Multiple target application
- EMI qualified to MIL-STD-461
- Sea Skimming or High Altitude

Applications

- Vehicle Miss Distance Scoring

This easy-to-use Miss Distance Scoring System that provides high accuracy auto-scoring with minimal training requirements. The system is a rugged complete scoring solution that is field proven and ideal for gunnery training and weapons assessment for surface and dynamic airborne targets. It is a highly portable system that can be easily set up and ready to support mission operations in less than 5 minutes.

Offering a complete turn-key scoring system that includes the miss distance scoring ground system and DSQ-50 scoring sensor. The scoring sensor transmits a Doppler radar signal and then detects the radar reflection from a projectile as it passes by. The radar reflection data is then telemetered in real-time to the miss distance ground system which allows the scoring system operator to analyze the data and determine the miss distance score within seconds. This is a scalar system which enables the operator to determine how close the projectile actually came to the target.

This scoring system is a necessity for advanced training and weapon assessment. Scoring data is obtained by the system in seconds which provides for extremely efficient training and evaluation missions. As a training tool users will get immediate feedback of their firing performance as well as objective measurement weapon system operator skills.

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SCORING GROUND CONTROL SYSTEM
DATA SHEET & TECHNICAL SPECIFICATIONS

Characteristics

Time to Display Score:	Within 5 minutes of each scoring event
Range:	Line Of Sight (LOS) system to 5mi (8km) – dependent on altitude, obstacles, etc.
Accuracy:	+/- 1 ft RMS (.30m)
Projectile Passage Range:	0 to 75 ft (0 to 23 m)
Rate:	Up to 90 projectiles per minute
Minimum Projectile Size:	From 50 Caliber and up (12.7mm and up)
Closing Velocity:	60 m/s (135 mph) to 2500 m/s (5600 mph)
Time of Miss Distance:	+/- 0.5 msec
Operator Displays:	Miss Distance, Time of Miss Distance, Plot of Closing Velocity vs. Time
Data Storage:	All raw telemetry data and calculated parameters are stored for each scoring event
Telemetry Frequency Range:	1429 MHz to 1545 MHz (L-Band) or 2185 MHz to 2485 MHz (S-Band)
Telemetry Sensitivity:	-85 dBm
Telemetry Demodulation:	PCM NRZ-L, Up to 7 Mbps
Temperature:	Operating: +5 deg C to +40 deg C
Input Voltage:	115 VAC, Single Phase
Power:	200 Watts
Dimensions:	19" x 7" x 24.5"

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FLIGHT TERMINATION SYSTEMS

Kratos is a leading global provider of turnkey solutions for a full range of Flight Termination Systems (FTS) and ancillary devices. The line-up of products includes: Portable Flight Termination Systems, Dual Redundant 200 Watt to 1.5kW FTS, Receiver/Decoder FTS Test Sets, IRIG Tone Generators/ Exciters, Command Sequencers, Auto Switchover Units, and FTS Receiver Monitors. All of the products can be customized to meet any specific requirements. Kratos also offers full system integration and training for quick and easy implementation.

KRATOS®
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FLIGHT TERMINATION SYSTEM

High-Power Flight Termination System

The Kratos Flight Termination System (FTS) is a turnkey system capable of transmitting MONITOR, ARM, and TERMINATE flight termination encoded command signals, as well as 20 individual IRIG tones (up to 6 simultaneously). The system can be manually or automatically switched between transmitters, and it includes fault monitoring, audio alarms, data recording, system time stamping, and full remote control operation and configuration. The system is ready for installation in E.I.A. 19 inch standard racks for mobile platforms or in transportable cases for high portability.

Dual Vehicle Flight Termination System

Kratos developed a 200W Dual Vehicle FTS that was specifically designed for use with Unmanned Aerial Vehicles (UAVs), missile systems, and aerial target drones, and it is currently in operation supporting various mission requirements worldwide. Designed to be IRIG 313 and 319 compliant, it is a rack mount unit used for flight termination and command. The unit accepts AC power and generates a modulated RF output FM signal, suitable for interrogation of Flight Termination Receivers and a variety of command receiver/decoders.

5GAT Flight Termination System

The AY18500 is a 50 watt flight termination transmitter portable ground station. Separate pre-defined tones are generated when the unit is power on, and when hold to arm, arm, and destroy switches are activated. The center frequency output is field adjustable from 406.0 to 450.0 MHz in 1 kHz increments.

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20 TONE RECEIVER/DECODER

DATA SHEET & TECHNICAL SPECIFICATIONS

Features

- EIA 19" Standard Rackmount
- 20 Tones
- IRIG 313-01 Compliant
- Signal Strength Display Meter
- Variable Carrier Frequency
- Local and Remote Control

Applications

- Range Safety
- Test

The Model TRD-20 Tone Receiver/Decoder (TRD) is a rack mount RF receiver that will display the presence of any of the 20 individual tones or combination command tones.

The unit was designed to conform with the requirements set forth in the IRIG Standard 313-01 of the Range Commanders Council (RCC) and to detect and display up to 6 tones simultaneously.

The rear panel connections include RF IN, Signal Strength, and Decoded Channel outputs of the 20 tone detector circuits.

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20 TONE RECEIVER/DECODER
DATA SHEET & TECHNICAL SPECIFICATIONS

Specifications

Size:	3.50" H x 18.75" D (Standard EIA 19" Rack Mount)
Power Input:	Universal Input: 115 VAC to 230 VAC, 50 to 60 Hz
Carrier Detect:	Front Panel LED display and discrete output on rear panel
Channel Deviation Threshold:	± 10 to ± 15 kHz
Channel Bandwidth:	± 1% Minimum @ 2 dB Bandwidth ± 4% Maximum @ 14 dB Bandwidth
RF Input:	406 MHz to 450 MHz, 50 ohm BNC female connector
RF Sensitivity:	- 100 dBm
Decoded Channel Output:	DB-37 Female output connector driven by an Open Collector, DC output module
Remote Control:	RS-232 (other options available)
Signal Strength:	Voltage ranges from 0 VDC to 5 VDC

Options

- Portable
- IF Input
- Audio Input
- Compact hard case for portable use
- Local/Remote: RS-232, GPIB, or 10Base100 Ethernet
- Decoded Channel Output – TTL Logic or Contact Closures
- Customizable to fit your needs

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COMMAND ENCODER/EXCITER - 5 WATT

DATA SHEET & TECHNICAL SPECIFICATIONS

Features

- EIA 19" Standard Rackmount/Portable
- Individual Tone Control: 1, 2, 5 (standard)
- IRIG 313-01 Compliant
- RF Output Power of 5 Watts (options available)
- Carrier ON/OFF Switch
- Adjustable Carrier Frequency
- Local/Remote: RS-232, GPIB

Applications

- Range Safety
- Test

The Model CEE-XRXA5W was specifically designed for use with Unmanned Aerial Vehicles (UAV's), missile systems, and aerial target drones and is currently in operation supporting various missions worldwide. Designed to be IRIG 313-01 and 319-14 compliant, it is a rack mount unit used for flight termination and command. The unit accepts AC power and generates a modulated RF output FM signal suitable for interrogation of IRIG standard flight termination receivers and a variety of command receiver/decoders.

The basic CEE-XRXA5W features three tone switches on the front panel that can be factory set to the frequencies of your choice. The unit also features thumbwheel switches for setting the carrier frequency from 406 MHz to 450 MHz in 100 kHz steps as well as a carrier ON/OFF switch.

Internally generated command tones modulate the synthesized RF carrier to produce a 5 Watt (minimum) RF output. Upon power up, the CEE-XRXA5W will immediately transmit the FM carrier frequency and the three tone switches can be turned ON/OFF independently to allow the operator to output any command tone sequence. There are many different variations of the unit available. Individual tone selection, FTS command tone sequences, switch configuration, RF output power, and many other options are available to meet any mission requirement.

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COMMAND ENCODER/EXCITER - 5 WATT

DATA SHEET & TECHNICAL SPECIFICATIONS

Specifications

Power Input:	Universal Input: 115 VAC to 230 VAC, 50 to 60 Hz
Carrier Frequency:	406 to 450 MHz in 100 kHz steps
Tone Frequencies:	1 through 20 are available per IRIG 313-01
Carrier Frequency Stability:	±.0005%
Power Output:	5 Watts (minimum) and higher power options are available
Output Impedance:	50 ohms
Output Connection:	Type N Female
Modulation:	Wideband FM, ±30 kHz per tone
Spurious Outputs:	-50 dBc
Commands (Optional):	FTS Commands MONITOR – Tone 5 OPTIONAL – Tone 4 ARM – Tone 5 + Tone 2 DESTRUCT – Tone 2 + Tone 1 minus Tone 5
Size:	5.25" H x 18.75" D (Standard 3U EIA 19" Rack Mount)
Weight:	Less than 20lbs

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COMMAND ENCODER/EXCITER

DATA SHEET & TECHNICAL SPECIFICATIONS

Features

- EIA 19" Standard Rackmount/Portable
- IRIG 313-01 Compliant
- Variable RF Output Level
- Variable Carrier Frequency
- Carrier ON/OFF Switch
- Local and Remote Control
- 8 or 20 Tone models available

Applications

- Range Safety
- Test

The Model CEE-8-I/CEE-20-R Command Encoder/Exciter (CEE) units are rack mount portable units used for Flight Termination Systems for checkout of flight termination receivers and/or command receiver/decoders.

The CEE accepts AC power and generates a modulated RF output suitable for interrogation of flight termination receivers and/or command receiver/decoders.

The CEE can transmit up to 6 tones simultaneously and the RF output power is adjustable from 0 to -127 dBm. The IRIG tones can be switched ON/OFF independently from the control panel. The CEE can be controlled in Local mode using the front panel switches or in Remote mode using an RS-232 or GPIB interface.

This CEE is available in both 8 tone and 20 tone models.

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Specifications

Size:	3.50" H x 18.75" D (Standard EIA 19" Rack Mount)
Power Input:	Universal Input: 115 VAC to 230 VAC, 50 to 60 Hz
Carrier Frequency:	406 to 450 MHz in 100 kHz steps
Carrier Frequency Stability:	±.0005%
RF Power Output:	0 to -127 dBm
Output Impedance:	50 ohms
Output Connection:	Type N Female
Modulation:	Wideband FM, ±30 kHz per tone
Tone Frequencies:	Any combination of up to 8 tones per IRIG 313-01 Or 20 tones per IRIG 313-01 (maximum of 6 tones ON simultaneously)
Remote Control:	RS-232 (Options: RS-232, GPIB, or 10Base100 Ethernet)
Spurious Outputs:	-50 dBc
Harmonic Distortion:	< 2%

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