

The YED/NMEA-R1/A429-T1, NMEA 0183 to ARINC 429 converter employs an RS232/RS422 serial interface and an ARINC 429 transmitter. NMEA 0183 sentences are received and translated into a variety of standard ARINC 429 labels and transmitted. This converter will find applications where airborne systems that require parameters from a NMEA 0183 data source require the data to be in ARINC 429 format. Where the standard off the shelf product does not fulfil the required solution, customers can provide their custom requirements prior to placing an order. However, the standard data set usually provides the most commonly used parameters.



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The converter is housed in one of our proprietary standard ruggedised CNC machined blue anodised enclosures enabling it to comply with the most common requirements of the airborne standard of RTCA DO-160 for airborne environments.

We have been selling these converters for eleven years in this format without a single reported failure. Reliability is of paramount importance – not for the customer, but for us also.

Converter operation

The converter extracts received NMEA 0183 (v2.3) GPS navigational data and translates it into standard ARINC 429 Labels and transmits it. Depending upon the software version installed, the converter can process multiple different NMEA 0183 messages and transmit as many ARINC 429 labels as required. Supported serial baud rates for the reception of NMEA 0183 are 4800, 9600, 19200 and 38400 as standard and can be selected by means of a PCB mounted DIP switch. Custom baud rates can be configured at the time of placing an order. The converter can transmit either high or low data bit rate ARINC 429 and is configured by a small switch mounted on the PCB. The unit is powered from an external 28V DC (12-72V) nominal supply with internal current and thermal (150 °C) fuse. The power inputs are reverse polarity protected.

ARINC 429 Interface

- ✈ 1 x NMEA 0183 Rx channel.
- ✈ RS232 & RS422 serial interface.
- ✈ Serial baud rates: 4800, 9600, 19200 or 38400.
- ✈ 1 x ARINC 429 Tx channel.
- ✈ 12.5 / 100k/bps Tx bit rate.
- ✈ Industry standard ARINC 429 line driver.
- ✈ 256 Tx Label capability.
- ✈ Parity: ODD/EVEN/NONE.
- ✈ Autonomous periodic transmit scheduling.
- ✈ Real time update of Tx data.
- ✈ 15-way D-sub filtered connector.
- ✈ FLASH upgradable firmware.
- ✈ 72MHz 16-bit Cortex ARM M3

Physical

- ✈ Operating Temp -40°C to +70°C.
- ✈ Size: 28 x 68 x 136 mm CNC aluminium enclosure.
- ✈ Weight: 300g.

Power Supply

- ✈ +28V DC @ 35mA (12-72V)

ARINC 429 Transmitter

Parameters are extracted from the received NMEA 0183 sentences and placed into the respective ARINC 429 Labels within a transmitter table and transmitted at intervals according to the customers' specification or the ARINC 429 specification.

NMEA 0183 Serial Receiver

NMEA 0183 sentences are received through a standard RS232 or RS422 line receiver and processed by a USART on the microcontroller (RTCA DO-178C, Level E). Parameters are extracted as required and populate an ARINC 429 transmitter table, which are then transmitted at regular intervals. ARINC 429 labels are updated from the received NMEA 0183 in real time.

Environmental, Airworthiness and EMC

The YED/NMEA-R1/A429-T1 Converter has been designed to meet DO-160D test categories listed in the user manual. The unit has also been subjected to an Explosive Decompression test from 15,000 feet to 50,000 feet in a period of less than 100mS without effect.

Specification

The YED/NMEA-R1/A429-T1 has the following features: -

Physical

The YED/NMEA-R1/A429-T1 attaches to the airframe via four mounting holes. See last page titled "Enclosure Outline Drawing" for further details. The enclosure is a CNC machined aluminium box with Anodised and Iridite NCP finishes.

Height.....	28.0mm
Width.....	68.0mm
Length.....	136.0mm
Weight.....	300 grams (approx.)

Operating temperature range -40 to +70 degrees C.

Electrical

Input Voltage.....	28V DC (12 to 72V DC operational)
Input Current.....	40mA maximum at 28V DC
Reverse polarity protected	
Electrically fused	500mA (self-resetting)
Thermally fused	150 Degrees. C. (self-resetting)

Serial Input

Format.....	RS232 & RS422, NMEA 0183, 8 data-bits, 1-Stop, No Parity.
NMEA 0183 messages (standard set)	\$GPRMC, \$GPGGA, \$GPGSA.
Baud Rates.....	4800, 9600, 19200, 38400 (other baud rates available to order)
NMEA 0183 Update rate.....	1Hz
NMEA 0183 to ARINC conversion time.....	< 100uS (Typ.) (Latency)

ARINC 429 Output

Bit Rate	12.5k/bps or 100k/bps.
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Output is via an industry standard ARINC 429 line Driver.

ARINC 429 Output Labels (standard set)

L010: Present Position Latitude	BCD	180N-180S Degrees
L011: Present Position Longitude	BCD	180E-180W Degrees
L012: Ground Speed (GPS)	BCD	Knots
L014: Track Magnetic.....	BCD	0-359.9 Degrees
L076: Altitude (MSL)	BNR	Feet (Position Sense UP)
L110: Present Position Latitude	BNR	Degrees (Position Sense N)
L111: Present Position Longitude	BNR	Degrees (Position Sense E)
L112: Ground Speed (GPS)	BNR	Knots
L125: Time	BCD	0-23.59.9
L136: VFOM.....	BNR	0 – 32768 feet
L147: Magnetic Variation	BNR	+/- 180.00
L150: UTC (GPS)	BNR	Hr:Min:S (23:59.59)
L167: EPU	BNR	0 – 128 feet
L203: Altitude (MSL)	BNR	Feet (Position Sense UP)
L204: Altitude (MSL)	BNR	Feet (Position Sense UP)
L247: HFOM	BNR	0 - 16 feet
L260: Date (GPS)	BCD	Dy:Mo:Yr (dd:mm:yr)
L273: Sensor Status(No. of Sats Tracked)	DIS	
L310: Present Position Latitude	BNR	Degrees (Position Sense N)
L311: Present Position Longitude	BNR	Degrees (Position Sense E)
L312: Ground Speed (GPS)	BNR	Knots
L314: Track Magnetic.....	BNR	Degrees (Position Sense CW - N)
L370: GNSS Height (HAE)	BNR	+/- 131072 feet

Environmental, EMC, RTCA DO-160D

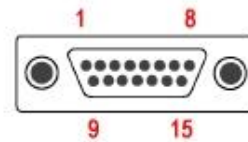
The YED/NMEA-R1/A429-T1 has been designed to meet the environmental test categories detailed below in accordance with RTCA DO-160D, Environmental Conditions and Test Procedures for Airborne Equipment.

Section	Category	Remarks
4.0 Temperature and Altitude	A1, A2	25,000 feet.
5.0 Temperature and variation	B, C	
6.0 Humidity	A	
7.0 Operational Shock and Crash Safety	B	
8.0 Vibration	C, M	
9.0 Explosion Proofness	X	Not tested – See Annex 1
10.0 Waterproofness	X	Not tested
11.0 Fluids susceptibility	X	Not tested
12.0 Sand and Dust	X	Not tested
13.0 Fungus Resistance	X	Not tested
14.0 Salt Spray	X	Not tested
15.0 Magnetic Effect	Z	
16.0 Power Input	A	
17.0 Voltage Spike	B	
18.0 AF Conducted Susceptibility – Power Inputs	A	
19.0 Induced Signal Susceptibility	A, Z	
20.0 Radio Frequency Susceptibility (Radiated and Conducted)	T, V	
21.0 Emission of Radio Frequency Energy	A, Z	
22.0 Lightning Induced Transient Susceptibility	X	Not tested
23.0 Lightning Direct Effects	X	Not tested
24.0 Icing	X	Not tested
25.0 ESD	X	Not tested

Connector, I/O and power (D-Sub Plug, 15 pin, filtered)



Micro D15 Connector



Pin	Signal	Function
1	+28V DC	Primary power
2	0V Ground	28V DC Return
3	A429 Tx +Ve	ARINC429 Transmit TXA
4	A429 Tx -Ve	ARINC429 Transmit TXB
5	A429 Rx +Ve	ARINC 429 Receive (input) RXA
6	A429 Rx -Ve	ARINC 429 Receive (input) RXB
7	A429 Ground (0V)	ARINC 429 Screen
8	FLASH Program Enable	Enable reprogram of FLASH ROM code
9	RS232 Tx Out	RS232 transmitter output
10	RS232/RS422 Gnd (0V)	RS232 / RS422 Signal/Screen ground
11	RS232 Rx In	RS232 receiver input
12	RS422 Tx +Ve Out	RS422 Tx output +Ve
13	RS422 Tx -Ve Out	RS422 Tx output -Ve
14	RS422 Rx +Ve In	RS422 Rx input +Ve
15	RS422 Rx -Ve In	RS422 Rx input -Ve

Enclosure outline drawing

