

ICARUS INSTRUMENTS, INC.

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Model 3000U Altitude Serializer for GPS Receivers

**STC and FAA PMA
Installation Notes REV 2.5 May 1998**

Introduction

The Model 3000U Altitude serializer connects to the existing Mode C encoder in the aircraft. It converts the gray code into a decimal format and sends it to the GPS receiver using a serial connection. It will function with Trimble, Garmin 150, Northstar, and Apollo GPS receivers.

Note: Contact ICARUS if transponder is a Narco AT-50 or 50A. or a Wilcox 1014

Northstar has tested and approved the 3000U for use with its GPS receivers.

Garmin has tested and approved the 3000U for use with its approach approved GPS receivers.

Trimble Navigation has tested and approved the Model 3000U for use with its GPS aviation receivers.

IIMorrow has tested and approved the Model 3000U for use with all of its GPS aviation receivers.

Encoder/ Transponder Connections

The Model 3000U is connected in parallel with the existing code lines from the encoder. Use the primary encoder if there is more than one in the aircraft.

The two 15 pin connectors (P1 and P2) on the serializer are wired in **parallel** (pin for pin) using the defacto standard encoder pin out. In many cases, you will be able to plug the cable that now goes to the encoder directly into the serializer. You can then make a short cable between the other 15 pin connector and the encoder. Be sure to check that the encoder wiring matches the pinouts on the Model 3000U.

Note that power is also bussed through the two connectors. Power to the encoder will be on either the 28 vdc pin or the 14 vdc pin, but not both. The serializer gets its power (only 20 ma.) from one of the two pins supplying power to the encoder. The encoder's circuit breaker can be used since the serializer uses only 20 ma.

The two AUX pins are wired through from one connector to the other and are not used in the Model 3000. Sometimes the encoder enable (strobe) line is in the harness so that the encoder output can be enabled by grounding this line. The AUX pins can be used to pass this signal through.

The 3000U must see the encoder output at all times, even if Mode C is turned off. The transponder must be on to provide a pull-up voltage for the encoder open collector transistors; otherwise the 3000U will not function.

Pin	Signal
1 leave this	D4 If encoder does not go above 30,700 feet, pin open
2	A1
3	A2
4	A4
5	B1
6	AUX (wired thru)
7	AUX (wired thru)
8	Power input 28 VDC at 125 ma must be fused or protected with circuit breaker and go to <u>avionics</u> bus, not master bus
9	B2
10	B4
11	C1

- 12 C4 **this is correct despite illogical order**
- 13 C2 **this is correct despite illogical order**
- 14 Power input 14 volts DC (must be fused or CB protected)
- 15 To aircraft ground

Note that the C1, C2, and C4 code lines are not in a logical order, but that happens to be the way many encoders are configured so we kept the same pinout to be consistent! Most installation problems relate to miswired connections to the serializer. If you see -2500 feet on the GPS receiver as the encoder altitude, the 3000U is seeing an invalid gray code from the encoder. Check your wiring and that the transponder is on.

Serializer will not work with transponders using a pulsed strobe line. Most modern transponders do not use a pulsed strobe. The serializer must "see" Mode C data at all times.

Serializer will not function with King KXP-750 transponder.

Consult factory if transponder is Narco AT-50 or AT-50A or Wilcox 1014. There are two mods for these Narco units that are required.

If a separate **dedicated encoder** is used to drive the serializer, pullup resistors must be provided on all code lines. A 33K 1/4w resistor to buss voltage will work fine. These resistors can be located either at the encoder or at the serializer. They may be placed inside a DB15 hood and plugged into P1 or P2.

How to use the Model 3000U with various GPS receivers

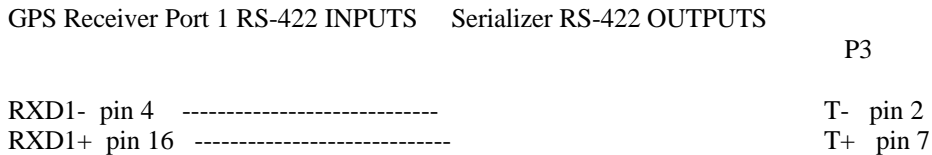
The Model 3000U will function as an altitude input for Trimble, Northstar, Garmin 150, Magellan, and the Apollo FlyBuddy and 2001 GPS receiver.

Northstar GPS Receivers (all models)

To connect the 3000U to a Northstar GPS, see the Northstar GPS installation manual. Note that pins 8 and 9 on P3 of the serializer must be jumpered for the Northstar configuration. Pins 2 and 7 on P3 supply the RS-422 data to the receiver.

Trimble GPS receivers (models 1000, 2000, and 3000)

Use the RS-422 input pins on the #1 serial port on the Trimble GPS receiver.



Altitude Source must be set for **ENCDR INPUT**. See Trimble manual for details.

Apollo Receivers

To connect the serializer to the Apollo receivers, **jumper pins 3 and 8 on P3 (the DB-9)**. Connect pin 2 on P3 to the RS-232 Altitude Input on the GPS. Pin 5 on P3 should be connected to ground on the receiver. A shielded cable is recommended.

The 3000U will completely emulate the Apollo Altitude Converter. It will also function as a replacement for the Apollo Encoder, but with 100 foot increments since the raw data is coming from the aircraft's encoder. The jumper on pins 3 and 8 will cause the 3000U to produce the Apollo compatible data stream at 1200 baud for any Apollo GPS equipment.

Garmin GPS Receivers (Model 150/155)

For Garmin receivers, no jumpers are required for 9600 baud. For 2400 baud, jumper 8 and 9 on P3. See Garmin manual for details.

How to test installation

Turn on the encoder, transponder, and GPS receiver. Look at the altitude page. The source should show that it is from the encoder and the altitude should correspond roughly with field elevation. The altitude shown is the raw encoder output uncorrected for the local altimeter setting.

Specifications:

Weight 5 oz

Size: 4.2" by 3.00" by 1.00"

Operating temperature -20C to +55C

Power requirements 10 to 30 vdc at 20 ma. **(must be fused)**

Mounts in any orientation using four screws

Converts altitude from -1200 feet to 62,000 feet

Greater than 100K input impedance on all code lines

Baud rate: 9600/2400/1200 baud One reading per second

Data Format: RS-422 balanced output and TTL output suitable for RS-232

Protocols: Trimble, Northstar, Garmin, and Apollo GPS receivers

P1 on unit DB15M, P2 on unit DB15M, P3 on unit DB9M