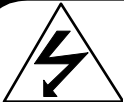


Fiber Optic Antenna Splitter

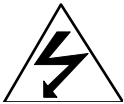
User Manual
P/N: 900000140

**For Brandywine Communications products with the
following Part Numbers:
032000XXX**



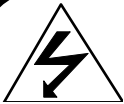
WARNING:

This unit contains lethal AC voltages. Disconnect the unit from the AC supply before removing the cover.



WARNING:

This unit contains dual power supplies. Isolate BOTH power supplied from AC Power before removing the top cover.



WARNING:

The lightning flash with an arrowhead inside of an equilateral triangle is intended to alert the user to the presence of un-insulated “dangerous voltage” within the product’s enclosure. The “dangerous voltage” may be of sufficient magnitude to constitute a risk of electrical shock to people. Do not attempt to repair the unit without first unplugging it.



CAUTION:

The exclamation point inside of an equilateral triangle is intended to alert the user to the presence of important operation and maintenance instructions in the user guide. This unit should only be repaired by qualified personnel. Several board assemblies contain static sensitive devices. Appropriate procedures must be used when handling these board assemblies.

Revision	Date	Comments
A	8/29/13	Initial Release

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1. Introduction



Figure 1 - FOA-160 Unit

The Brandywine Communications Model FOA-160 is a specialized distribution amplifier system used to distribute GPS or GLONASS signals over fiber optic cable to up to 16 receivers. The Model FOA-160 head-end unit connects to a standard GPS antenna/preamplifier, which receives the GPS/GLONASS signals, transmitted from the satellites. The FOA-160 converts the received signal to an optical intensity modulated signal, and routes it through a passive optical splitter to 16 outputs. These signals are available at the rear panel for distribution throughout a building or campus over single mode fiber optic cable. The low loss characteristics of fiber optic cable overcome the traditional distance limitations encountered with direct electrical distribution of low power GPS/GLONASS signals. A companion optical receiver module, installed at the other end of the optical cable, converts the optical signal back to the electrical domain and provides a RF output format for use by a standard GPS or GLONASS receiver. The 16 output ports of the head-end unit support flexible point-to-multipoint distribution architecture.

The Model FOA-160 contains redundant power supplies, which may be either AC or 24/48VDC or a combination of both. The FOA-160 includes an RS232 interface for remote control monitoring, as well as alarm contact closure. The FOA-160 Receiver Module is a small wall or shelf mounted module that requires only 15VDC for operation. Optional rack mounting packaging is available.

2. Specifications

Head-End Specifications

Inputs

Antenna Input:

Connector	BNC
Preamplifier	5V 100mA center conductor
Power	1000MHz to 3000MHz
Frequency Range	1000MHz to 3000MHz
Small Signal Gain	0.0 ±dB
VSWR (max)	2:1
Burnout Protection	1.0W, CW in-band

Control and Alarm Functions

Control Interface	RS-232C 19200, N, 8, 1
Control Functions	Transmitter status
Alarm Interface	Dry contact relay closure form C
Alarm Type	Critical Alarm, Alarm
Alarm Functions	Transmitter Power (Critical) Loss of Redundant Power (Minor)
Display	Power LED Fault LED

Optical Outputs

No of Outputs	16
Operating Wavelength	1319nm ±5nm
Optical Power	-13.0dBm (min.)
Optical Reflections	<-55dB
Laser Type	Distributed feedback
Connector Type	FC/APC

Physical

Size	19" rack-mount 1U high (1.75") 9" deep
Weight	5 lbs. nominal

Receiver Specifications

Inputs

Optical Input:	-15 dBm
Operating wavelength:	1310nm ±25nm
Optical Power	+3.0dBm, max
Optical Fault Threshold	-18 dBm factory set
Connector Type	FC/APC

Receiver Control and Alarm Functions

Control Interface	RS-232C 19200, N, 8, 1
Control Functions	Set Attenuator Set Alarm Threshold
Alarm Interface	Open Collector
Alarm Functions	Received power

RF Outputs

No of Outputs	1
Connector Type	SMA

Physical

Size	3.7" x 3.0" x 1.26"
Weight	8 oz nominal

Environmental Conditions

Temperature

Operating	-20°C to +50°C
Storage	-55°C to +85°C

Humidity	Up to 85% RH (non-condensing)
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Power

No of Power Supplies	2 Hot Swappable
AC Power	85-264VAC (50/60Hz) 10W Max IEC320 connector Fuse 0.2A 250V UL60950
DC Power	18-36 to 36-72VDC
Altitude	30,000 ft
Vibration	MIL-STD-167-1
Shock	20g/15ms per MIL-STD-810F
EMC	FCC Part 15

Ordering Information

FOA-160 Head-End P/N 032000001
(Includes GPS Antenna, 50' lead-in cable)

Must specify up to two power supply modules at the time of ordering

85-264VAC	P/N 002-0224
18-36VDC	P/N 002-0225
36-72VDC	P/N 002-0226
Blank Panel	P/N 003001051
FOA-160 Receiver	P/N 032000002

3. Rear Panel Connections

CONNECTOR REFERENCE	CONNECTOR TYPE	CONNECTOR PIN	SIGNAL
J1 GPS ANTENNA	BNC FEMALE	CENTER	ANTENNA
		SHIELD	GROUND
J2 RS-232	DB-9 MALE	1	-
		2	RXD
		3	TXD
		4	-
		5	GROUND
		6	-
		7	-
		8	-
		9	-
J3	FC	OUTPUT	OPTICAL RF ANTENNA OUTPUT
J4	FC	OUTPUT	OPTICAL RF ANTENNA OUTPUT
J5	FC	OUTPUT	OPTICAL RF ANTENNA OUTPUT
J6	FC	OUTPUT	OPTICAL RF ANTENNA OUTPUT
J7	FC	OUTPUT	OPTICAL RF ANTENNA OUTPUT
J8	FC	OUTPUT	OPTICAL RF ANTENNA OUTPUT
J9	FC	OUTPUT	OPTICAL RF ANTENNA OUTPUT
J10	FC	OUTPUT	OPTICAL RF ANTENNA OUTPUT
J11	FC	OUTPUT	OPTICAL RF ANTENNA OUTPUT
J12	FC	OUTPUT	OPTICAL RF ANTENNA OUTPUT
J13	FC	OUTPUT	OPTICAL RF ANTENNA OUTPUT
J14	FC	OUTPUT	OPTICAL RF ANTENNA OUTPUT
J15	FC	OUTPUT	OPTICAL RF ANTENNA OUTPUT
J16	FC	OUTPUT	OPTICAL RF ANTENNA OUTPUT
J17	FC	OUTPUT	OPTICAL RF ANTENNA OUTPUT
J18	FC	OUTPUT	OPTICAL RF ANTENNA OUTPUT

Table 1 - Rear Panel Connections

4. Unpacking and Installation

4.1. Unpacking

Remove the FOA-160 from the shipping carton. The following items should be included in the shipment:

- 1 FOA-160
- 1 GPS antenna
- 1x 100 feet of coaxial antenna cable
- 1 user guide (CD-ROM)

4.2. Installation

4.2.1. Mounting

The FOA-160 can be installed into a 19" rack mount cabinet either using rack slides or only using the front panel flanges. For static applications, the short depth and light weight of the FOA-160 ensures that the front panel is not stressed when only the front panel is used for support.

If the FOA-160 is installed on a mobile platform and must survive shock and vibration, the use of slides is required. Slides are installed using 10-32 UNF-2B hardware.



Optional Rack Mount Slides:

P/N 002000123, SLIDE, RACK, 24", 21" TRAVEL, 85 LB

P/N 002000150, SLIDE, RACK, 28", 27" TRAVEL, 80 LB

Original Manufacturer: General Devices Chassis Trak Type C300.

4.2.2. Power

Insert the power cord of the FOA-160 into an electrical socket to power up the unit. The Power LED indicator will illuminate green.

If dual redundant power is required, connect both power sources to independent power sources

4.2.3. Input Reference Connections

4.2.3.1. GPS Antenna

Connect the GPS antenna to the J1 Antenna BNC connector on the rear panel of the unit. The GPS antenna must be located in a suitable location with a clear view of the sky. In most cases, the GPS signals do not penetrate buildings. Use the cable provided in the shipment to connect the GPS antenna and FOA-160. In the event that a longer cable is required, a low loss cable must be used so that the total signal attenuation at 1575 MHz is < 20 dB. For more information on suitable cables contact Brandywine Communications.

- Location

Several factors need to be considered when installing the GPS antenna. In most cases, the antenna is mounted externally (outdoor) and exposed to the elements. A good quality coaxial cable of 50 ohm impedance is required to connect the GPS antenna to the FOA-160. The cable provides two functions, which are to conduct the GPS RF signals (1575.42 MHz) that are received from the GPS antenna to the FOA-160 and to conduct the DC bias voltage (5 VDC) provided by the FOA-160 to the LNA (low noise amplifier) contained inside of the GPS antenna. The antenna should be mounted securely, with a clear view of the sky, and with the top of the antenna pointing upward. In some installations it may not be possible to mount the antenna such that the antenna has a clear 360 degree view of the sky. In such cases pick the location with the best view of the sky.

- Exposure to High RF Fields

Some installations may occur in locations where a variety of high power transmitters and antennas are located. The GPS antenna should not be directly exposed to or bombarded with high-level RF energy. In such cases, the antenna



should be located above, below, or to the side of these high power RF transmission antennas.

- Lightning Protection

The FOA-160 does not provide any inherent protection against lightning strikes. In general, lightning protection (when desired or needed) is provided by an externally mounted protection device that is designed to shunt the high voltage transient to a well-established earth ground. Lightning arresting devices designed for use with the GPS antenna system are available at Brandywine Communications (P/N 001000914).

- RF Loss

The most important source of signal loss is the RF signal attenuation experienced in the cable. The amount of attenuation is related to the type (quality) of coaxial cable and cable length. The antenna provides about 30 dB of gain to the received GPS signal. The purpose of this gain is to offset the loss that is experienced in the cable between the GPS antenna and FOA-160. It is recommended that the overall antenna system gain (antenna gain - cable loss) be between 10 dB - 33 dB. Using an antenna with 30 dB of gain allows for about 20 dB of cable loss. The FOA-160 is shipped with 100' of Belden 8240 antenna cable with a cable loss of approximately 18 dB. For distances beyond 100', Brandywine recommends low loss Belden 9914 with a loss of 5.84 dB/100ft

Standard antenna cable using this configuration is available from Brandywine as shown in Table 2.

For distances beyond 330', an in-line amplifier is required.

PART NUMBER	CABLE LENGTH	CABLE TYPE
002-0037	100 feet	RG58 (supplied)
002-0040	150 feet	RG8
002-0052	250 feet	RG8
002-0039	330 feet	RG8
051000001	In-line amplifier 20 dB	TNC/TNC connectors

Table 2 - FOA-160 Antenna Cable options

4.3. Fiber Optic Outputs

Connect fiber cables to ports J-3 through J-18 as needed. Connect the other ends of the fiber cables to the receiver units. Verify that the receiver unit is connected and receiving a GPS signal.

5. Operation

A PC with a serial port can be used for communicating with the FOA-160 Transmitter or Receiver. The following serial port property settings and port settings are required for correct communications between the PC and the FOA-160

modules:

Serial Port Properties Settings	
Emulation:	“TTY”
Telnet Terminal ID:	“TELETYPE-33”
Serial Port Settings	
Bits/s:	19200
Data bits:	8
Parity:	None
Stop bits:	1
Flow control:	None

Table 3 - RS-232 Settings

5.1. RF Attenuation Adjustment

The FOA-160 receiver post-amplifier gain can be adjusted using the variable RF attenuator via the RS-232 serial communication port. Use the following procedures and figures to tune the attenuator to the desired setting.

- Plug in a suitable interface cable (not included, see Table 1 - Rear Panel Connections for RS-232 pinout) to connect the unit to DC power and to the host computer.
- Open a HyperTerminal window and set the properties according to the parameters stated in Table 3 - RS-232 Settings
- Power up the FOA-160 receiver unit, the terminal window should display the current status of the receiver updated once every second
- Be sure to engage CAPS LOCK and press ‘M’ to enter the monitor mode. Press ‘H’ to view a list of available commands (see Figure 3 - RS-232 Commands).
- In the monitor mode, press ‘A’ followed by the desired attenuator, in dB, followed by enter.
- To save the attenuation setting, press ‘S’ and answer ‘Y’ when prompted. Return to the status mode by pressing ‘Q’ to quit the monitor mode and answer ‘Y’ when prompted.

Note 1: Do not attempt to execute any other menu options or adjust any other parameters

Note 2: When adjusting attenuation, do not set the attenuation value to zero (0).

Note 3: When adjusting attenuation, always input value as a decimal, such as 1.0,

1.5, etc.

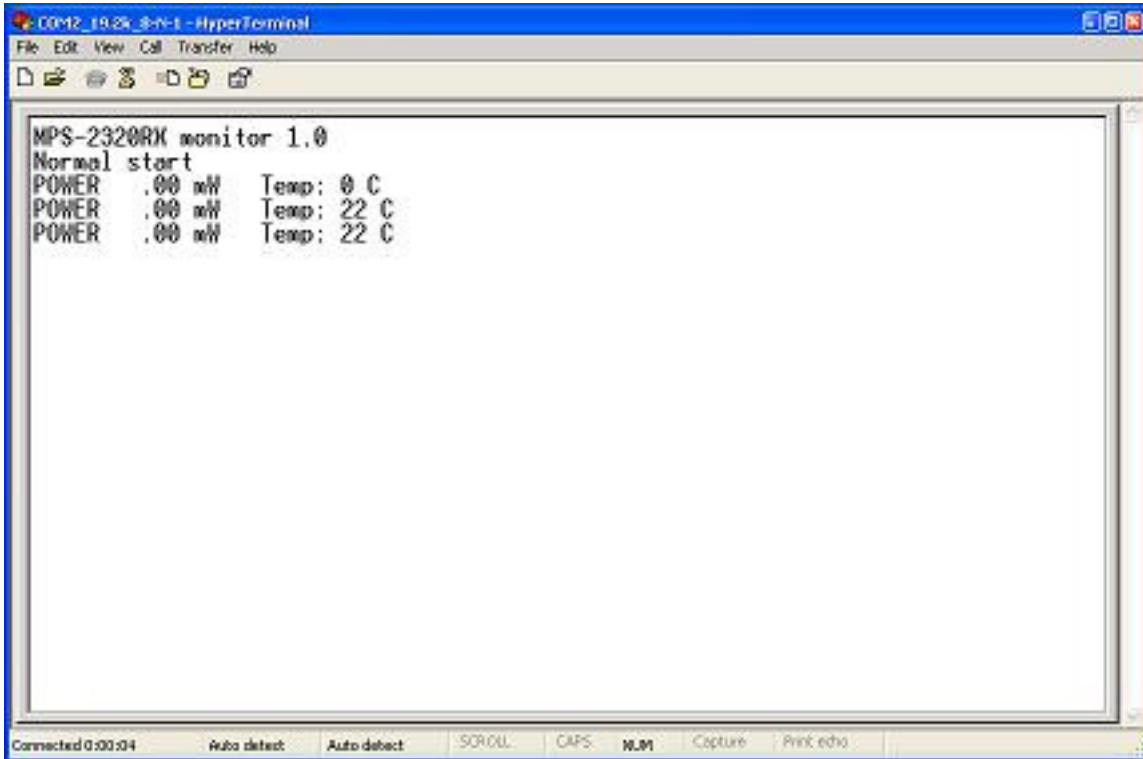


Figure 2 - RS-232 Interface

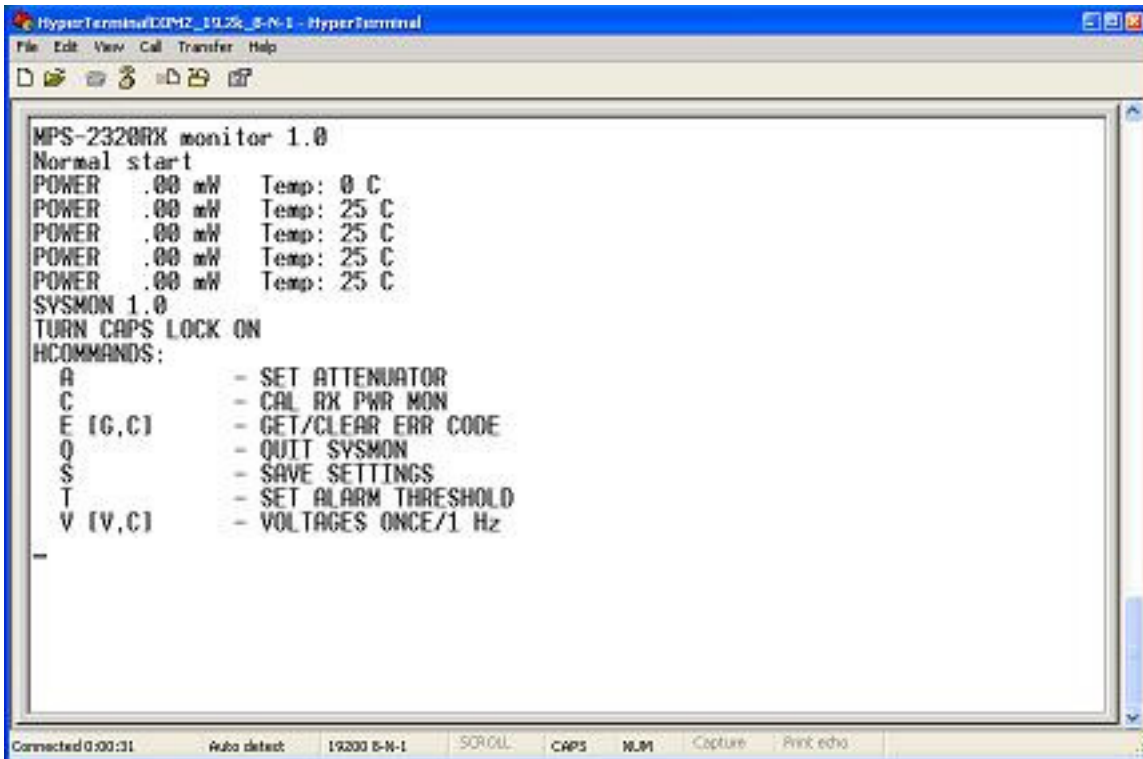


Figure 3 - RS-232 Commands

6. Troubleshooting

Problem Description	Solution
Unit does not power up	<ul style="list-style-type: none"> • Check that both power supplies are connected to a power source, and that both power sources are receiving electricity • Check the fuse.
Unit does not have a GPS signal	<ul style="list-style-type: none"> • Check that the GPS antenna is connected to the unit • Check that the GPS antenna is properly installed
GPS Signal is weak or intermittent	<ul style="list-style-type: none"> • Ensure that the GPS antenna is correctly positioned according to Brandywine Document 900000134
Unit does not communicate through RS232	<ul style="list-style-type: none"> • Check that the RS232 cable is securely connected at both ends. • Check the RS232 cable is straight serial cable. • Check that the Transmit was set: CR+LF • Check that the Baud rate: 19200,8,n,1,n.

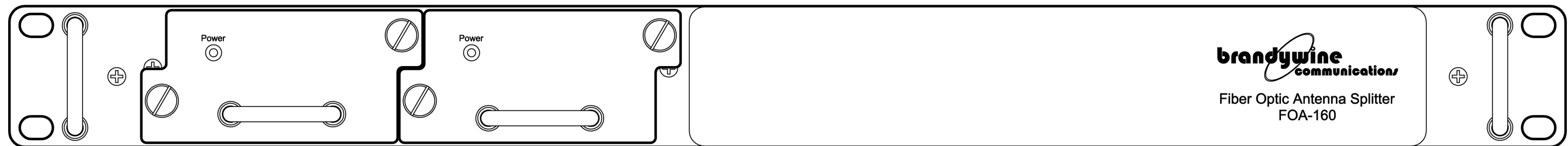
7. Support Information

All Brandywine Communications products come with a one-year warranty.

If your unit is still exhibiting problems not covered by the above troubleshooting guide, please contact us for technical support at support@brandywinecomm.com or call us at 714-755-1050.

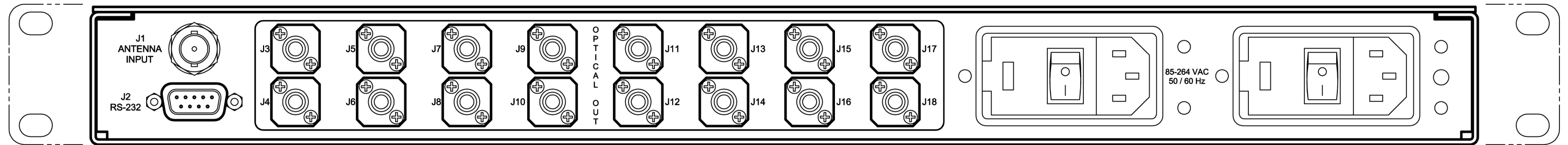
If it becomes necessary to return your unit to the factory for repairs, please call us at 714-755-1050 extension 113 to arrange an RMA.

8. Front Panel Drawing



FRONT VIEW

9. Rear Panel Drawing



REAR VIEW
ROTATED 180°