Ortel (Lucent) Fiber Optic Interface

144-701-1

Serial Number _____

August 30, 2007
Revision A

ORTEL (LUCENT) FIBER OPTIC INTERFACE

1. GENERAL INFORMATION

1.1. SCOPE OF OPTION

This manual contains the information necessary to operate and maintain a Symmetricom Model 144-701-1 Fiber Optic Link Option.

1.2. PURPOSE OF EQUIPMENT

The Model 144-701-1 Option provides a secure, low loss method of interconnecting a standard Symmetricom antenna and a GPS clock. It can be employed wherever a security boundary must be entered, when protection against lighting strikes is desired, or where the antenna must be located a long distance from the GPS Clock.

1.2.1. PHYSICAL SPECIFICATION

Form:	Two small enclosures
Dimensions (each):	4.28” w x 1.50” h x 2.13” d (10.87 cm w x 3.81 cm h x 5.41 cm d)
Weight (each):	Approximately 12 ounces (342 g)
Fiber Length:	1 to 2000 meters (6560 feet)

1.2.2. POWER SUPPLY

Form:	Plastic desktop enclosure
Dimensions:	2.00” w x 4.00” h x 1.45” d (5.08 cm w x 10.16 cm h x 3.68 cm d)
Weight:	Approximately 1.04 pounds

1.2.3. OUTSIDE ENCLOSURE

Form:	Fiberglass enclosure, hermetically sealed
Dimensions:	6.50” w x 8.00” h x 5.38” d (16.51 cm w x 20.32 cm h x 13.67 cm d)
Weight:	Approximately 10 lbs (4.54 kg)
Standard:	NEMA 4X

1.2.4. ENVIRONMENTAL SPECIFICATIONS

1.2.4.1. FIBER OPTIC INTERFACE 3111A / 4111A

Operating Temp:	-40° to +60°C
Storage Temp:	-45° to +65°C
Humidity:	95% relative, non-condensing
Cooling Mode:	Convection

1.2.4.2. POWER SUPPLY

Operating Temp:	-25° to +71°C
Storage Temp:	-25° to +85°C
Humidity:	20-90% relative, non-condensing
Cooling Mode:	Convection

1.2.5. POWER REQUIREMENTS

1.2.5.1. ANTENNA-CONNECTED LINK

Voltage:	5 VDC ±10% (supplied by external supply)
Power:	<1 Watt

1.2.5.2. GPS CLOCK-CONNECTED LINK

Voltage:	12 VDC (supplied by GPS CLOCK)
Power:	<1 Watt

1.2.6. SIGNAL SPECIFICATIONS

1.2.6.1. OPTICAL PARAMETERS

Type:	Optical fiber, 1310 nm wavelength
Fiber:	Single mode
Connector:	FC/APC TYPE 'R'

1.2.6.2. RF PARAMETERS

Type:	Coaxial
Impedance:	50 Ω
Connector:	SMA

2. INSTALLATION AND OPERATION

2.1. INSTALLATION

2.1.1. GENERAL

The Symmetricom Model 144-701-1 Fiber Optic Link requires some planning and careful consideration of certain parameters prior to installation. The simplest installation requires installing a suitable length of optical fiber between the GPS Clock site and the antenna site, mounting the units on a suitable surface, connecting the optical fiber and the coax cables and, in the case of the antenna-connected link, installing the power supply and hooking up its power cables. Be careful to allow enough room for the fibers to make any required bends in a very gentle radius. Typically the bend radius should be greater than ten times the cable outside diameter at least. The optical connectors are FC/APC Type 'R'. Symmetricom may also have supplied cable or cable assemblies as part of the order. Be especially careful when handling the optical fibers to avoid getting dirt or other contaminants in the optical fiber connectors since this will result in poor system performance.

2.1.2. OUTSIDE AND OTHER CHALLENGING LOCATIONS

The (144-701-1) Antenna-Connected Fiber Optic Transmitter is housed in an Outside Enclosure that will allow it to be installed in an unprotected location such as a warehouse or bunker.

Install the Fiber Optic Enclosure in the most favorable location you can. Consider such factors as service access (especially in inclement weather), power availability, and vandalism. No attempt has been made to make this installable device vandal-proof. The recommended optical fiber and power cable can both be used outdoors in aerial or direct burial applications without any additional protection from the elements. Aerial installations should use a suitable messenger wire to support them. Take wind and ice loading into account when sizing the messenger. Follow the assembly instructions on sheet 2 of 4, print 144-701-1 for proper installation connections. The recommended

optical fiber is a tightly coupled product that can be installed with regular wire pulling techniques and can be installed in long vertical runs without problem. It is UL listed and Riser rated so that it does not require a splice box or vault when coming inside a building. Terminate the power, coax, and fiber connectors per standard practice and connect them to the Fiber Optic module inside the box. Tuck all loops neatly inside the box and close it and secure it with the screws provided. Be very careful not to kink either the fibers or the coax cables as you do this. Note that where lightning is a problem, the use of a properly installed coaxial lightning arrester outside of the box may extend the useful life of this product. In an extensive antenna farm the use of lightning dissipative systems may be economically advisable.

2.1.3. FINISH

Install the Clock and Antenna according to their manuals. Install the Clock-Connected Fiber Optic Link near the Clock and connect it to the antenna input of the Clock with the provided coax cable. The Clock-Connected Fiber Optic Link is powered by the Clock.

2.2. OPERATION

Aside from ensuring that power is applied to the Fiber Optic Link, there are no other operating instructions. However, if the fiber is long you will want to compensate for its length by using the standard cable length compensation function (51) of the GPS Clock. The propagation delay of the fiber is roughly the same as the coax that would normally be installed. The propagation delay of the Fiber Optic modules themselves is ≅180 ns. Do not forget to add in any coax between the down converter and the GPS Clock. In addition, remember that the position the GPS Clock reports is the position of the antenna, not the GPS Clock, since they may be physically quite a distance apart.

3. MAINTENANCE AND TROUBLESHOOTING

3.1. INTRODUCTION

Effective maintenance and troubleshooting of this equipment requires a thorough understanding of equipment characteristics, operating procedures, theory of operation, and knowledge of both linear and logic circuit elements. A working knowledge of Fiber Optics theory and connection methods is also required.

3.2. PREVENTIVE MAINTENANCE

A systematic preventive maintenance routine can reduce the possibility of a malfunction. This routine should include inspection, qualification, and cleaning of the instrument.

3.3. INSPECTION

Exercise care when handling this equipment. It contains sensitive parts that can be damaged by improper handling. Do not touch connector pin surfaces because of the danger of static discharge, also deposits on contact surfaces can cause corrosion, resulting in equipment damage or failure. Inspect the unit for damaged components, loose or frayed connections, and corrosion on metal surfaces. If damage is found, correct it immediately. Be especially careful not to get any foreign material into fiber optic connections as it will degrade or destroy the connection. Keep in mind that the active signal path in the fiber is only 62.5 microns in diameter, which is thinner than a ***thin*** human hair, and so requires only a very tiny speck of whatever to disrupt it.

3.4. GENERAL INSTALLATION & TROUBLESHOOTING PROCEDURES

It is recommended that all individual fiber optic components be bench tested before installation to assure trouble free operation.

3.4.1. Configure the GPS receiver with the standard antenna, temporarily placing the antenna with a view of the sky to receive satellites. Verify the GPS receivers ability to track satellites with appropriate signal levels. Refer to the GPS receiver manual for specified signal level strength.

3.4.2. Configure the GPS receiver with the fiber link making all power and antenna connections on the bench. This may require obtaining a 2-meter test fiber cable.

3.4.3. Verify the receivers ability to track satellites with appropriate signal levels using the fiber optic link. If the receiver is not tracking satellites adequately check the following connections;

Verify the +5V is present at the BNC of the Fiber Optic Transmitter. Check the AC connections to the +5V power supply (red/black wire orientation). If the power supply +5V is present, check that there is +5V on the center conductor of the cable end that connects to the antenna.

If the voltage levels are correct, check the Receiver's Antenna Status to determine if the connection is "Good" or "OK". If the status is not "Good", inspect the cable ends to verify the fiber optic receiver is disconnected from the cable the GPS is reporting to be open. If shorted, then remove the cable and verify the receiver's status changes to "Open". If the cable is connected and the receiver status reports "Open", replace the cable. Once the problem has been identified and repaired, reconnect the receiver and check the Antenna Status. Verify correct tracking and signal strengths.

3.4.4. Once the configuration is verified to be tracking satellites with proper signal levels, replace any test components with the final installation components one at a time. If any component is found to degrade the system's performance, repair or replace it.

3.4.5. Once system configuration is verified, proceed with the final installation. If the configuration is not tracking satellites appropriately after verifying antenna status and transmitter output voltage contact Symmetricom for repair or return. Symmetricom offers installation services for this product.

4. DETAILED DRAWINGS

4.1. 144-701-1 FIBER OPTIC OPTION ENCLOSURE W / 12V RCVR

5. APPENDIX A

5.1. RECOMMENDED FIBER OPTIC CABLE

The fiber optic cable recommended for most indoor/outdoor installations is: **Single Mode Fiber, Connector Type FC/APC Type 'R', 60 dB optical return loss.**