

# **Ortel (Lucent) Fiber Optic Interface**

## **144-701**

**Serial Number** \_\_\_\_\_  
**December 17, 2001**  
**Revision B**

# ORTEL (LUCENT) FIBER OPTIC INTERFACE

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# 1. **GENERAL INFORMATION**

## 1.1. SCOPE OF OPTION

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

## 1.2. PURPOSE OF EQUIPMENT

The Model 144-701 Option provides a secure, low loss method of interconnecting a standard TrueTime antenna and an NTS-200 or TimeVault (hereafter identified as NTS/TV for brevity). It can be employed wherever a security boundary must be entered, when protection against lightning strikes is desired, or where the antenna must be located a long distance from the NTS/TV.

### 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. OPTIONAL 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  $\pm$ 10% (supplied by external supply)  
Power: <1 Watt

### 1.2.5.2. NTS/TV-CONNECTED LINK

Voltage: 12 VDC (supplied by NTS/TV)  
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  $\Omega$   
Connector: SMA

## 2. **INSTALLATION AND OPERATION**

### 2.1. INSTALLATION

#### 2.1.1. GENERAL

The TrueTime Model 144-701 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 NTS/TV 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'. TrueTime 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. ANTENNA-CONNECTED FIBER OPTIC SUPPLY

The power supply is a desktop unit that will accept 110 VAC, 60 Hz power. It is not designed for extreme environmental conditions and therefore must be located in a benign location. See Section 1.2.4, Environmental Specifications, for more information. The power supply cable comes with an installed connector for direct connection to the antenna-connected Fiber Optic Transmitter.

### 2.1.3. FINISH

Install the NTS/TV and antenna according to their manuals. Install the NTS/TV-connected Fiber Optic Link near the NTS/TV and connect it to the antenna input of the NTS/TV with the provided coax cable. The NTS/TV-connected Fiber Optic Link is powered by the NTS/TV.

## 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 NTS/TV. 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  $\cong 180$  ns. Do not forget to add in any coax between the down converter and the NTS/TV. In addition, remember that the position the NTS/TV reports is the position of the antenna, not the NTS/TV, 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.

#### 3.2.1. 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.

#### 3.2.2. GENERAL TROUBLESHOOTING PROCEDURES

Since an apparent problem may actually be the result of operator error, misunderstanding, or misuse, the technician will need a thorough understanding of the normal operation. Thoroughly evaluate the procedures used by the operator when the malfunction occurred.

4. **DETAILED DRAWINGS**

4.1. 144-701 FIBER OPTIC OPTION

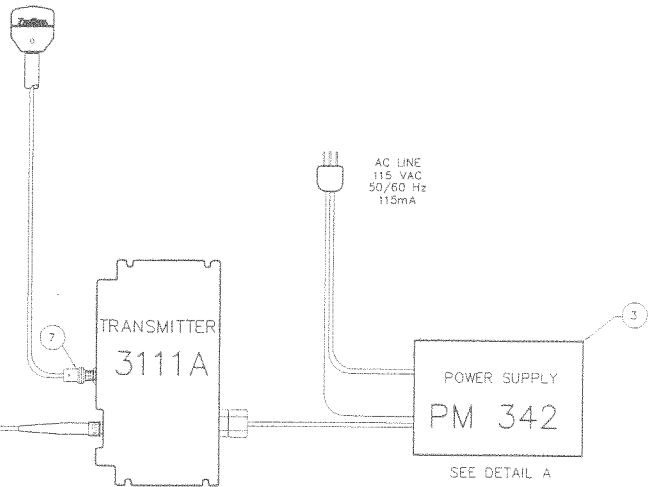
5. **APPENDIX A**

5.1. RECOMMENDED FIBER OPTIC CABLE

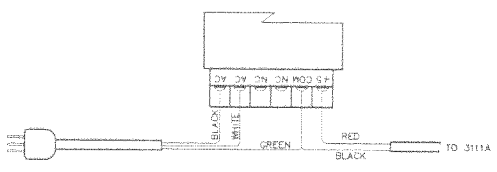
The fiber optic cable recommended for most indoor/outdoor installations is: **Single Mode Fiber, Connector Type FC/APC Type 'R', 60 dB optical return loss.**

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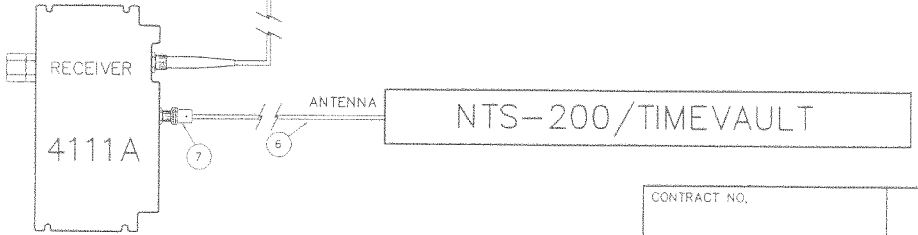
REVISIONS			
REV	DESCRIPTION	DATE	APPROVED



\*CUSTOMER SUPPLIED FIBER  
 WaveLength: 1310 ±30nm  
 FIBER: SINGLE MODE  
 CONNECTOR: FC/APC TYPE 'R'  
 PER IEC 1754-10-1<sup>3</sup>  
 60dB OPTICAL RETURN LOSS



DETAIL A



CONTRACT NO.	
APPROVALS	DATE
DRAWN BY RNR	01/01
CHECKED BY <i>SK</i>	
APPROVED BY <i>SK</i>	2.1.01
NEXT ASSY	

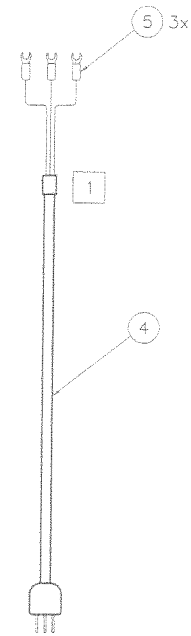
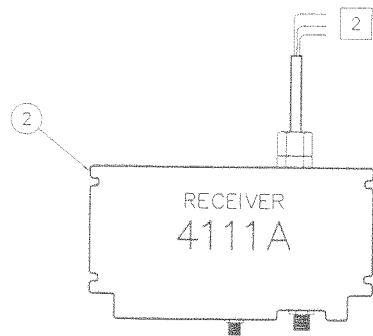
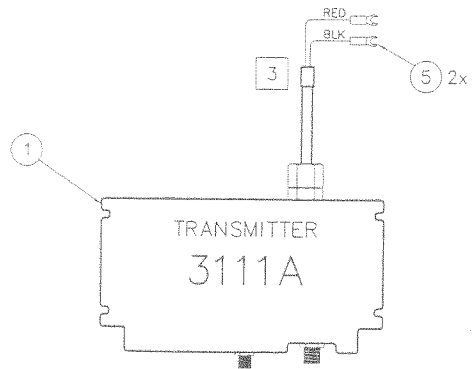
**TrueTime**  
3750 Westwind Blvd, Santa Rosa, CA 95403

**FIBER OPTIC OPTION**

SIZE	CODE IDENT NO.	DRAWING NO.	REV
B		144-701	A

SCALE NONE | SHEET 1 OF 2

FILENAME: \\100\144-701A  
 DATE: 01-31-01



- 3 CUT OFF ALL CONDUCTORS EXCEPT RED AND BLACK AND ADD HEAT SHRINK AS SHOWN.
- 2 CUT OFF BARE WIRE ENDS AND ADD HEAT SHRINK SEPERATELY TO COVER. LEAVE POWER WIRES IN BUNDLE.
- 1 CUT BACK SUPPLY CORD APPROXIMATELY 3 INCHES TO EXPOSE 3 CONDUCTOR AC LINE POWER. ADD HEAT SHRINK AS SHOWN.

NOTES: UNLESS OTHERWISE SPECIFIED

<b>TrueTime</b> <small>1750 Westwind Blvd. Santa Rosa, CA 95403</small>			
SIZE	CODE IDENT NO.	DRAWING NO.	REV
B		144-701	A
SCALE NONE		SHEET 2 OF 2	

FILENAME: \\100\144-701B  
DATE: 01-10-01



ORIGINAL

Parent Item	Parent Description	Batch Quantity	Bubble			Effective						
Component Item	Component Description	Quantity Per	UM	Seq No	Remarks	Level	Ty	Seq	T	From	Thru	
144-701	FIBER OPTIC OPTION		EA	Type	M							
0000-PL	PARTS LIST REV LEVEL	1.00	EA		REV A (01-30-01)	1	S	2.0	M	1/1/00	12/31/10	
0000-PRINT	REFERENCE PRINT	1.00	EA		144-701 REV A	1	S	3.0	M	1/1/00	12/31/10	
048-005	MODULE, TRANSMITTER FOL	1.00	EA	1		1	S	4.0	P	1/1/00	12/31/10	
048-009	MODULE, RCVR FOL 8-24V	1.00	EA	2		1	S	13.0	P	1/30/01	12/31/10	
088-001	PWR SUP 5VDC 5W	1.00	EA	3		1	S	6.0	P	1/1/00	12/31/10	
273-022	LUG SPADE AWG 22-16 NO.6	5.00	EA	5		1	S	7.0	P	1/1/00	12/31/10	
326-001	SHRINK TUBING CLR 3/32 IN	.30	FT		APPLY PER DWG NOTES	1	S	8.0	P	1/1/00	12/31/10	
326-006	SHRINK TUBING CLR 3/8 IN	.10	FT		APPLY PER DWG NOTES	1	S	9.0	P	1/1/00	12/31/10	
332-002	CORD POWER	1.00	EA	4		1	S	10.0	P	1/1/00	12/31/10	
338-001	CABLE GPS-56K	1.00	EA	6		1	S	11.0	M	1/1/00	12/31/10	
381-018	ADPTR,SMA PLUG TO BNC FEM	2.00	EA	7		1	S	12.0	P	1/1/00	12/31/10	

ORIGINAL