FIBERLINK®
XT-1000A, XT-1000A/MCR, RT-1000A, RT-1000A/MCR
TELEPHONE TRANSMISSION SYSTEM

USER'S MANUAL

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SECTION I
GENERAL INFORMATION

INTRODUCTION

The Fiberlink® XT-1000A Telephone Transmitter is designed to convert the audio and DTMF signaling signals to and from a standard U.S. tone type telephone to modulated light for transmission over a fiber optic cable.

The Fiberlink® RT-1000A Telephone Receiver is designed to interface with the XT-1000A and a standard U.S. telephone line ("POTS").

Both units are powered from low voltage AC and have been designed in accordance with FCC Part 68 regulations for such devices. The "/MCR" versions of both units are designed for use in a Fiberlink® MCR-1000A rack mountable card-cage enclosure.

TECHNICAL SPECIFICATIONS

Audio Bandwidth	300 Hz to 3000 Hz
Input Compatibility	Western Electric type 2500 series DTMF tone-type telephone set
Output Compatibility	Standard U.S. telephone line
Noise Level	-50 dB typical
Ringing Voltage	90 volts nominal, 20 Hz
Optical Loss Budget	50u Fiber, 0-10 dB 62.5u Fiber, 0-13 dB 8/10u Fiber, 0-10 dB
Operating Wavelength	850 nm or 1300 nm
Optical Connectors	Multimode or ST Single-mode, FCPC
Telephone Connectors	RJ-11 Modular type
Operating Temperature Range	0 to +50 degrees C

SECTION II
OPERATING INSTRUCTIONS FOR XT-1000A

INSTALLATION AND ALIGNMENT

The XT-1000A is supplied pre-aligned for use with a standard U.S. telephone line and a compatible tone type telephone set, such as the Western Electric 2500 series. As it is designed to operate with this type of telephone, other types, such as solid state units or sets designed for PBX applications or telephone network use, where the telephone set impedance is not necessarily 600 ohms, may not operate properly. In addition, only one telephone set may be operated by the unit. Two or more sets, connected in parallel, will not operate properly.

Installation is as follows:

1. It will be necessary to have a source of 14 to 18 volts AC 50/60 Hz. Connections are given in section IV. As an alternative, an XP-1000A plug-in adapter may be used. Be certain to make all connections carefully and check that the correct pins are being used.

2. Install the XT-1000A conveniently near the telephone.

3. Plug the telephone into the modular jack on the XT-1000A using a standard RJ-11 modular extension cable. If using a non-telephone line compatible telephone set, be certain that the telephone set used has a nominal onhook resistance of 600 ohms nominally.

4. The balance of the installation must be done with the companion RT-1000A and will be covered in section III of this manual.

The transmitting element in the "-7" single mode version of the XT-1000A uses a solid state Laser Diode located in the optical connector on the unit. This device emits invisible infrared electro-magnetic radiation which can be harmful to human eyes. The radiation from this optical connector, if viewed at close range without a fiber optic cable connected to the optical connector, may be of sufficient intensity to cause instantaneous damage to the retina of the eye. As a result, direct viewing of this radiation should be avoided at all times.

OPERATING POINTERS

Input: The input to the XT-1000A is a 600 ohm balanced hybrid configuration. It is specifically designed for use with 600 ohm impedance telephone sets, such as the Western Electric 2500 series, and matches those impedances properly. Telephones with impedances that differ from 600 ohms (nominal) will not allow the sensing circuitry for off-hook detection and the interface for ringing voltages to operate properly.

Power Supplies: The AC input to the XT-1000A is applied to an internal rectifier and regulator where the proper voltages are derived. The AC input is also used to generate the ringing voltage. The input can be anything between 14 and 18 volts AC, 50/60 Hz. This voltage can be obtained from an inexpensive transformer or from an XP-1000A plug-in adapter.

Optical Fiber: The XT-1000A will successfully drive most multimode optical fibers with core diameters greater than 50 microns. The larger the diameter of the fiber, the greater the amount of light applied to the fiber. A "-7" version of this unit is available for use with single mode optical fiber.

A functional block diagram of the XT-1000A is given in Section III of this manual.

SECTION III
OPERATING INSTRUCTIONS FOR RT-1000A

INSTALLATION AND ALIGNMENT

The RT-1000A is designed to interface with a standard U.S. telephone line sometimes referred to as "POTS". Installation must be done with an operating XT-1000A in accordance with the following procedure.

1. Continuing from step 4 of the procedure given for the XT-1000A, connect two optical fibers between the XT-1000A and RT-1000A. The "T" connector on the XT-1000A should connect to the "R" connector on the RT-1000A and the "R" connector on the XT-1000A should connect to the "T" connector on the RT-1000A. Do not connect the telephone line at this time.

2. With the telephone handset off hook, turn the adjustment potentiometers on the XT-1000A and RT-1000A fully clockwise (CW). These adjustments are located in a white plastic sleeve on each unit.

3. Next turn the adjustment on the RT-1000A counter clockwise (CCW) until the LED indicator on the housing just comes on.

4. Now turn the adjustment on the XT-1000A CCW until its LED is lit. At this time, there may be a squealing sound from the telephone. If so, ignore it. This is normal and will disappear when the telephone line is connected.

5. Connect the RJ-11 modular jack on the RT-1000A to the telephone line. The system should now be operational.

Note: If any indicator LED "blinks" during operation, turn the respective adjustment potentiometer slightly CW or CCW until the LED is steady.

The transmitting element in the "-7" single mode version of the RT-1000A uses a solid state Laser Diode located in the optical connector on the unit. This device emits invisible infrared electro-magnetic radiation which can be harmful to human eyes. The radiation from this optical connector, if viewed at close range without a fiber optic cable connected to the optical connector, may be of sufficient intensity to cause instantaneous damage to the retina of the eye. As a result, direct viewing of this radiation should be avoided at all times.

OPERATING POINTERS

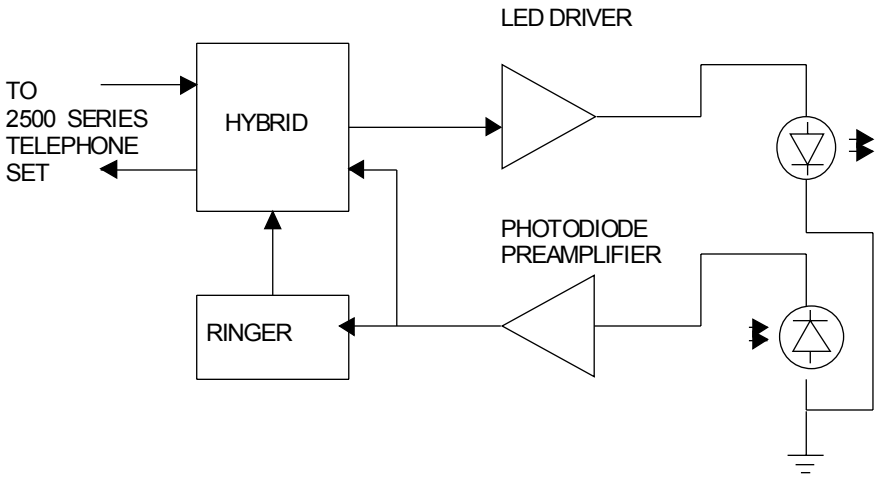
Output: The output of the RT-1000A is designed to interface with a standard US telephone line. It is also designed to accept the ringing voltage from this line and convey it to the XT-1000A. The RT-1000A may not operate properly with non-standard telephone lines, PBX systems or digital telephone equipment.

Power Supplies: The AC input to the RT-1000A is applied to an internal rectifier and regulator where the proper voltages are derived. The input can be anything between 14 and 18 volts AC, 50/60 Hz. This voltage can be obtained from an inexpensive transformer or from an XP- 1000A plug-in adapter.

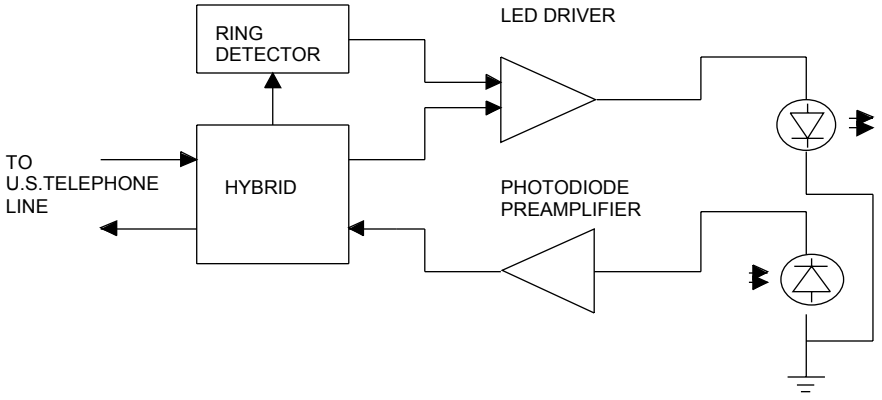
Optical Fiber: The RT-1000A will operate with multimode optical fiber having core diameters greater than 50 microns. The allowable transmission loss with the various fibers are given in the Technical Specification section of this manual. The "-7" version of the RT-1000A is designed for operation with single mode fiber.

A functional block diagram of the RT-1000A is shown on the following page.

FUNCTIONAL BLOCK DIAGRAM OF XT-1000A



FUNCTIONAL BLOCK DIAGRAM OF RT-1000A



SECTION IV
POWER SUPPLY AND SIGNAL CONNECTIONS AND CONSIDERATIONS

The XT-1000A and RT-1000A are furnished with internal DC power regulators. Connections are as follows:

Pin A 14 to 18 VAC 50/60 Hz
Pin B No Connection
Pin C No Connection
Pin D AC Return
Pin E No Connection

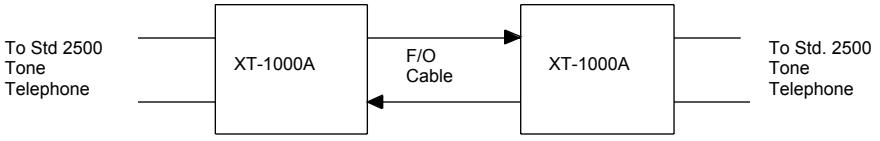
Please note that the AC common is connected to the enclosure. The mating power connector for this system is an Amphenol 126-223 connector.

The XT-1000A/MCR and RT-1000A/MCR obtain all operating power from the MCR-1000A card-cage enclosure.

Signal connections for both versions are made via RJ-11 modular type telephone connectors wired in accordance with standard U.S. telephone standards.

The normally installed system is shown below:

Two XT-1000A units may be connected together to form a simple 2 channel intercom, as shown below. Lifting one telephone handset will cause the other to ring and vice versa. Lifting both handsets will allow two way communications to occur.



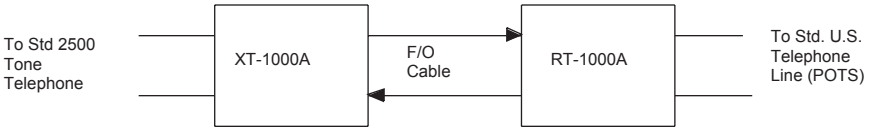
SECTION V
OPERATING INSTRUCTIONS FOR FIBER OPTIC CABLE

The XT/RT-1000A series is supplied with ST or FCPC type optical connectors and will operate with most common fiber optic cables. Since the system operates at wavelengths of 850 nm or 1300 nm, the fiber optic cable should be optimized for use at the desired wavelength.

When using any type of fiber optic cable, be careful not to cause excessive strains, especially at the cable-to-connector junctions. Also, do not subject the cable to sharp bends or pull around sharp corners. Whenever possible, service loops or extra slack should be provided in any installation.

While excessive precautions are not necessary, fiber optic cable should still be treated with moderate care, as it does contain thin, fragile strands of glass.

Please note that complete cable assemblies with connectors installed are available from Communications Specialties, Inc.



SECTION VI
OVERALL SYSTEM CHECKOUT AND TROUBLESHOOTING TECHNIQUES

Occasionally, during the installation of a fiber optic system, difficulties arise that are the result of factors beyond the control of the installer. These difficulties are usually subtle and result from a less than thorough understanding of the unique nature of electro-optical technology.

In an attempt to simplify the task of the installer, the following checkout procedure is included. The procedure is in the form of an outline which should be followed until the difficulty is located and corrected.

A. Check Transmitter or Transmit Section of a Transceiver

1. Is operating power (DC, AC, Voltages) correct?

2. Are the correct pins on the connector or terminal block being used?

3. Is the correct signal level present at transmitter input?

4. Does the transmitting LED glow dimly when a signal is applied? Note that this is only true for an operating wavelength of 850 nm. Units at 1300 nm are totally invisible.*

5. If the unit is an analog or video transmitter (at 850 nm), is there a continuous dim glow from the transmitting LED? *

6. Is the optical connector on the transmitting LED clear of any obstruction or minute dirt particles?

7. Does it matter that the power ground and signal ground of many systems are common?

8. Does the fact that the power ground, signal ground, and case are common cause a short circuit anywhere in the system?

* The above visual check should only be attempted with LEDs.

NEVER LOOK DIRECTLY AT AN OPERATING LASER DIODE REGARDLESS OF THE OF THE OPERATING WAVELENGTH!!!

US Government regulations require that all equipment using Laser Diodes be clearly identified with warning labels.

B. Check Optical Connectors

1. If stepped 906 type SMA optical connectors are being used, are the short plastic alignment sleeves normally supplied with the connectors being used? If they are not present, the system may not work properly!

2. Are the connectors being used the correct size for the fiber being used?

3. Are the ends of the connectors free of all dust or dirt? If not, gently clean the tip of the connector with a clean cloth or gauze moistened with alcohol.

4. Is the fiber broken in the connector? A quick inspection with an inexpensive jeweler's loop can determine this.

5. Is the fiber protruding from the tip of the connector? If so, refinishing will be necessary.

C. Check Fiber Optic Cable

1. Is the fiber optic cable pulled too tightly around a sharp corner?

2. Is the correct fiber size being used with the correct transmitter/receiver combination?

3. Does the fiber pass light at all? A small penlight or flashlight can usually be used for this test.

4. Does the fiber have too much attenuation for the system? The attenuation measured on the reel will always be different after the cable is installed.

5. When using lengths shorter than 10 meters (30 feet), overloading of the receiver may occur. The shorter the length of the fiber, the greater the possibility for this condition. Be sure there is adequate attenuation in any system. If this seems to be the case, or if operation with a meter or so of fiber is required, contact the factory.

D. Check Receiver or Receiving Section of a Transceiver

1. Is the operating power (DC, AC, Voltages) correct?

2. Are the correct pins on the connector or terminal block being used?

3. Is light coming out of the fiber optic cable? This may be difficult to see in many cases, but a dim glow may be present with 850nm light. Other wavelengths, such as 1300 nm, are totally invisible.

4. Is the optical connector on the receiver optical port clear of any obstruction or minute dirt particles?

5. Does it matter that the power ground and signal ground of many systems are common?

6. Does the fact that the power ground, signal ground, and case are common cause a short circuit anywhere in the system?

OVERALL FIBER OPTIC CABLE CONSIDERATIONS

A. Fiber optic cable contains an optical fiber with a light carrying "core" that is only .002" in diameter for 50 micron fiber and .0004" in diameter for single-mode fiber. This is smaller than a human hair! Any small particle of dirt or dust can easily block this fiber from accepting or radiating light. *As a result, the key word is cleanliness.* Always use the dust caps provided with all optical connectors whenever they are exposed to air. Also, it is a good idea to gently clean the tip of an optical connector with alcohol whenever dust is suspected.

B. Since the dimensions involved are so small, any alignment sleeves or other devices supplied by the connector manufacturers must always be used.

C. Mechanical butt splices or optical feedthru mating sleeves must be installed properly. The correct size for the fiber in use must be employed and any alignment devices (such as the long bushings on stepped 906 type SMA connectors) must be in place in order for the splice to operate properly. Butt splices can easily add more attenuation than specified, resulting in improper operation of a system.

D. For proper operation, do not interchange multimode transmitters and receivers with single-mode equipment or overloading may occur.

SECTION VII
MAINTENANCE

The Fiberlink® XT-1000A and RT-1000A have been manufactured using the latest semiconductor devices and techniques that electronic technology has to offer. They have been designed for long, reliable, and trouble free service and are not normally field repairable. Should difficulty be encountered, Communications Specialties maintains a complete service facility to render accurate, timely and reliable service of all products.

The only maintenance that can be provided by the user is to ascertain that optical connectors are free of dust or dirt that could interfere with light transmission and that electrical connections are secure and accurate. All other questions or comments should be directed to our trained sales engineers or directly to our Customer Service Department.

WARRANTY

Communications Specialties warrants that for a period of three years after purchase by the Buyer, all Math Fiber Optics transmission systems will be free from defects in material and workmanship under normal use and service. A Return Material Authorization (RMA) number must be obtained from Communications Specialties before any equipment is returned by the Buyer. All material must be shipped to Communications Specialties at the expense and risk of the Buyer.

Communications Specialties' obligation under this warranty will be limited, at its option, to either the repair or replacement of defective units., including free materials and labor. In no event shall Communications Specialties be responsible for any incidental or consequential damages or loss of profits or goodwill.

Communications Specialties shall not be obligated to replace or repair equipment that has been damaged by fire, war, acts of God, or similar causes, or equipment that has been serviced by unauthorized personnel, altered, improperly installed or abused.

RMA numbers and repairs can be obtained from:

Communications Specialties, Inc.
55 Cabot Court
Hauppauge, N.Y. 11788 USA.

Tel: (631) 273-0404 **Internet: www.commspecial.com**
FAX: (631) 273-1638 **Email: info@commspecial.com**

Customers in the Asia Pacific Region should contact Communications Specialties Pte Ltd, located in Singapore. See the cover of this manual for address and phone number.

Please have your serial number available when contacting us.