



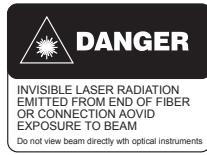
## INSTRUCTION MANUAL

# L-Band Fiber Optic Link

For Direct Broadcast Satellite Distribution  
250-3500 MHz

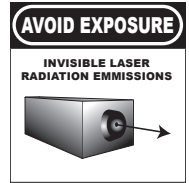
<b>Model</b>	<b>Stock No.</b>	<b>Description</b>
FILT-S3A-3000	7531C	Transmitter
FILR-S4A-3000	7532C	Receiver

651194700E



INVISIBLE LASER RADIATION EMITTED FROM END OF FIBER OR CONNECTION  
 AVOID EXPOSURE TO BEAM  
 Class 3B Laser Product IEC-60825 1993 Max. Output: 30mW Wavelength: 1.3µm

**Warning: The optical emissions from the units are laser-based and present eye hazards. Follow all safety precautions.**



**TO REDUCE THE RISK OF ELECTRICAL SHOCK, DO NOT REMOVE COVER FROM THIS UNIT. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.**

## Safety Precautions

The optical emissions from the units are laser-based and may present eye hazards if improperly used. **NEVER USE ANY KIND OF OPTICAL INSTRUMENT TO VIEW THE OPTICAL OUTPUT OF THE UNIT.** As always, be careful when working with optical fibers. Fibers can cause painful injury if they penetrate the skin.

## Laser Safety Procedures

**ALWAYS** read the product data sheet and the laser safety label before powering the product. Note the operating wavelength, optical output power, and safety classifications.

If safety goggles or other eye protection are used, be certain that the protection is effective at the wavelength(s) emitted by the device under test **BEFORE** applying power.

**ALWAYS** connect a fiber to the output of the device **BEFORE** power is applied. Power should never be applied without an attached fiber output. If the device has a connector output, a connector should be attached that is connected to a fiber. This ensures that all light is confined within the fiber waveguide, virtually eliminating all potential hazard.

**NEVER** look in the end of a fiber to see if light is coming out. **NEVER!** Most fiber optic laser wavelengths (1310 nm and 1550 nm) are totally invisible to the unaided eye and will cause permanent damage. Shorter wavelength lasers (e.g. 780 nm) are visible and are very damaging. Always use instruments, such as an optical power meter, to verify light output

**NEVER, NEVER, NEVER** look into the end of a fiber on a power device with ANY sort of magnifying device. This includes microscopes, eye loupes, and magnifying glasses. This WILL cause a permanent, irreversible burn on your retina. Always double check that power is disconnected before using such devices. If possible, completely disconnect the unit from any power source.

If you have questions about laser safety procedures, please call Blonder Tongue before powering your product.

## Storing the Unit

If a unit is to be out of use for an extended period of time, the following steps should be taken to ensure the preservation of the unit:

1. The storage temperature range is -20°C to +70°C.
2. A low humidity environment is preferable for long term storage.
3. All connectors should be covered with active device receptacle caps.

**Description**

The Blonder Tongue FILT-S3A-3000 linear fiber optic transmitter and the FILR-S4A-3000 linear fiber optic receiver form the basic building blocks of an L-Band fiber distribution system. The wide extended bandwidth of 250 to 3500 MHz supports the latest in LNB stacking applications for accommodating additional satellite transponders containing enhanced DBS services (HDTV, local channels, etc.) over single-mode fiber.

These standalone versions are designed for mounting in outdoor enclosures or indoors on a shelf, panel or backboard. FILT/FILR powering can be either through the wire leads or from the coax connector. Refer to page 4 for configuring the powering method.

**Specifications**

The specifications are cited below with 12 dB link optical loss and >55 dB optical return loss. RF input level to TX @12 dBmV, the level to RX is -9dBm Optical Power unless otherwise specified.

- |  |   |
|--|---|
| <p><b>RF</b></p> <p>Frequency Range: 250-3500 MHz</p> <p>Amplitude Flatness:<br/>         ± 1.5 dB for any 500MHz, ± 0.35 dB for any 40 MHz</p> <p>Return Loss: 9 dB</p> <p>I/O Connector:<br/>         F-Type Female (75 Ω) Standard,</p> <p>Link Gain @ 25° C: -4 ± 5 dB</p> <p>Noise Figure with -9dBm Optical Pwr to RX:<br/>         45 dB MAX, typically better than 32 dB</p> <p>CNR @12 dBmV IN, 27 MHz BW: Better than 17.7</p> <p>Input 1 dB Compression to -20° C: &gt; 17dBm</p> <p>Input IP3 to -20° C: -9.5 dBm</p> <p>Gain vs. Temperature:<br/>         TX = 0.12 dB/°C<br/>         RX = 0.09 dB/°C</p> <p>Max. Total RF Power In: -14dBm</p> | <p><b>Optical Performance</b></p> <p>Optical Fiber:<br/>         Single Mode 9/125 ( Corning SMF-28 or Equivalent)</p> <p>TX/RX Optical Return Loss: &gt;55 dB</p> <p>TX/RX Optical Connector: FC/APC</p> <p>RX Wavelength: 1270-1610 nm</p> <p>RX Optical Input Power: -15 to +3 dBm</p> <p>RX Alarm Standalone:<br/>         Optical Input Power Low (Open Collector Output)<br/>         Trip level set for optical levels less than -15dBm</p> <p>TX Laser Type: Fabry-Perot</p> <p>TX Output Power: 3 dBm</p> <p>TX Wavelength: 1310</p> <p>TX/RX Link Optical Budget: 0 to -18 dB</p> <p>DC Powering and Alarms<br/>       The current requirements for the TX and RX units are as follows:</p> |
|--|---|

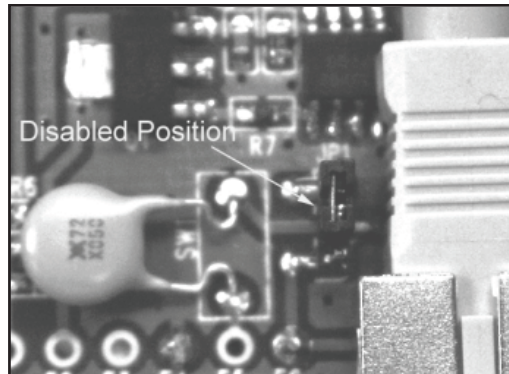
Input Voltage	TX	RX
8 VDC:	250ma	200ma
12 VDC:	170ma	150ma
15 VDC*:	135ma	120ma
18 VDC:	115ma	100ma
24 VDC:	85ma	70ma

\* 15 Volts may be provided by Blonder Tongue's ACCS-PS-170 (Stock No. 7419) Power Supply



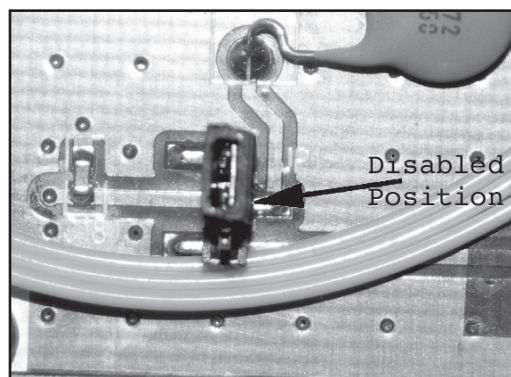
The standalone packages possess the flying leads which carry DC inputs and alarms. When connecting to these leads, any unused wires should be wrapped with electrical tape to avoid shorting that could damage the unit.

The TX standalone unit has built-in bias-T for remote powering of the LNB or could be used to power the TX through the RF connector. This feature can be enabled or disabled (Factory Preset) by moving internal jumper, see picture below. The TX unit is normally fed via the two flying leads. The **Red Wire** is +8 VDC to +24 VDC and the **Black Wire** is ground or -. The flying cable also has a shield wire that can be connected to the ground to help shield any external signals.



### **TX Jumper JP1**

The RX standalone unit can be powered through the RF connector. This feature can be enabled or disabled (Factory Preset) by moving internal jumper, see picture below. The RX unit is normally fed via the two flying leads, the Red Wire is +8VDC to +24 VDC and the Black Wire is ground or -. The flying cable also has a shield wire that can be connected to ground to help shield any external signals. The Brown or White Wire is an Open Collector Low Optical Level Alarm that is activated when the optical level falls below -15 dBm.



### **Flying Lead Signal Description**

Color	TX/RX	Signal Description
Red	TX	DC Input, 8-24 VDC
Black	TX	Ground, DC Return
Silver	TX	Shield wire, connect to Ground
Red	RX	DC Input, 8-24 VDC
Black	RX	Ground, DC Return
Silver	RX	Shield wire, connect to Ground
Brown or White	RX	Open Collect Output for Low Received Optical Power

**Installation**

**Optical Connectors**

There are many optical connectors available on the market, and one of the most common errors encountered in the field is the use of wrong connector types. The optical fiber can be terminated with either a "Flat" or "Angled" finish. FILT's and FILR's use only FC- APC type connectors (Angled Precision Connector). Typically an FC-APC will have a green boot around the connector body. A "Flat" (PC) connector will mate, however the optical loss will be very high (~50 dB).

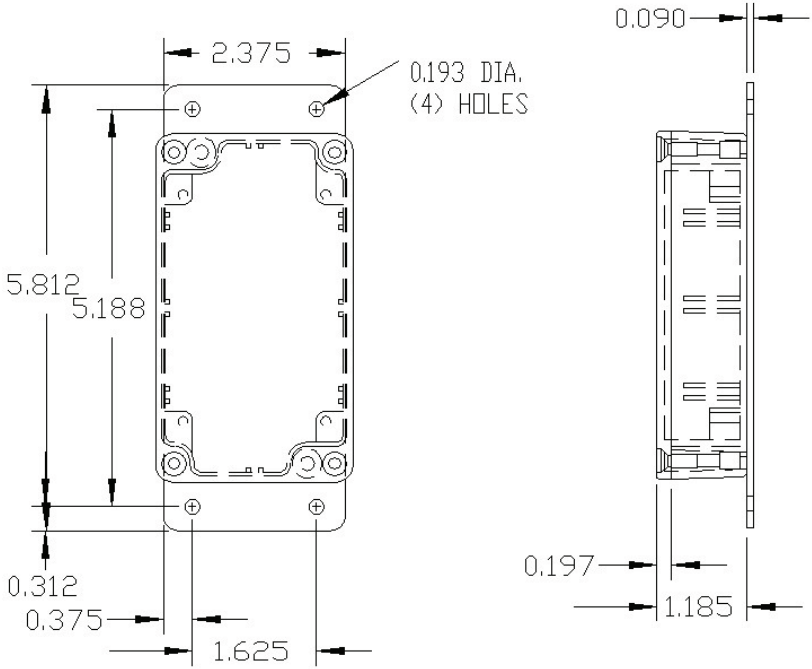
**Cleaning Optical Connectors**

Fiber optic connectors on the cable come pre-terminated and should be clean and capped, so one can usually remove the cap and make the connection without cleaning the connector. However, if there is any doubt it is good practice to clean the optical connectors before making the connection. Once the connection is made, there should be no need clean the connector as long as the connector remains connected.

Use caution when handling the connectors. Any grease from your finger, scratch or small piece of dust or dirt can effect the optical performance. To clean use a lint free wipe such as Kimwipes or cotton swab, moisten with alcohol and gently wipe the tip of the connector. Let the connector air dry completely or use dry compressed air to dry.

When making the connection be sure the key is aligned with the bulkhead connector. In the case of SC connectors, gently press in until the connector "clicks" in to place.

**Physical Size**



**Mounting**

Mount modules in enclosure using #8 screws and split lock washers. It is suggested that the modules be mounted with the RF and Optical connectors mounted down to prevent moisture from entering. For a watertight seal, pot the optical connectors with RTV. If the enclosure provides enough water protection you can skip this step.

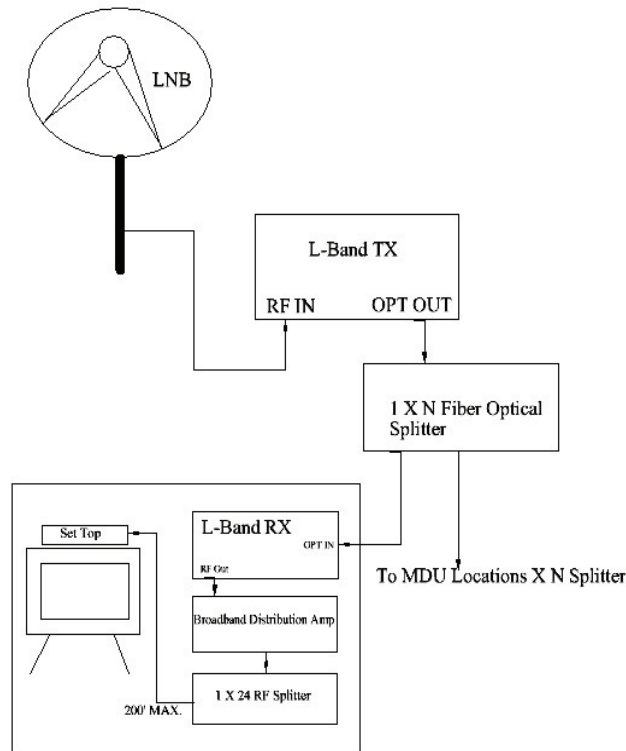
**Connecting**

There are no user adjustments on the modules. To optimize TX RF input, external attenuators maybe required.

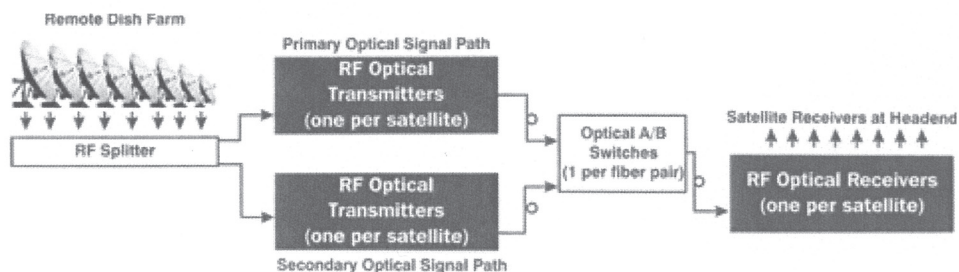
- Connect the optical fiber to both the transmitter and receiver. Insure the optical loss to the receiver is less than the maximum allowed.
- Verify the proper RF level out of the LNB and connect the LNB output to the RF input of the transmitter.
- Connect the RF out of the receiver to a distribution amplifier or satellite receiver as required.
- Apply power to both modules, the system should now be operational since no user adjustments are required on the modules.

**TYPICAL Applications**

MDU (Multiple Dwelling Unit)



**Antenna Remoting**



## **Troubleshooting and Maintenance**

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Once the fiber optic link has been installed, there is no need for any regular maintenance. However, if problems do arise the most common cures are listed here.

### **Low or No RF Gain**

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For low RF gain, first check the optical loss and then verify that the correct gain is being measured. If the gain is lower than it should be, first verify that the DC power to the optical transmitter and receiver has the correct voltage and current. Another possibility is that the receiver is being saturated by a transmitter which has too much optical power (approximately 3 dBm or greater) or the link has an excessive RF input level. The transmitter in this manual emits less than 3 dBm of optical power - low enough to never saturate the receivers.

### **High Noise or Intermodulation Distortion**

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For a system with good gain but poor noise or intermods, the most likely cause is RF inputs that are either too high or too low. Determine the optimal RF power and adjust as necessary. High optical back reflections into the laser also can degrade noise and linearity, so verify that the FC/APC style connector is used to connect to the transmitters and receivers. Also check that all other connectors and splices between the transmitter and receiver also have good optical return loss.

### **Low Optical Power at the Receiver**

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If it appears that low gain or poor noise is due to low received optical power, be sure that the optical connectors and fibers are used properly. The most common problem, and easiest to fix, is that the connector key is not aligned with the mating slot. Other common causes include dirty connectors, bent fibers, broken fibers, disconnected connectors and overly tightened optical connectors. To determine exactly where light is being lost, start at the transmitter and work forward to the receiver, measuring or detecting power along the way.

Another good clue is the power alarm and/or photodiode current monitor outputs from the receiver. Bear in mind though that the power alarm triggers at approximately -15dBm, therefore this only gives an indication of extreme cases. Also, some applications expect and can tolerate high optical losses, so in such cases if the RF performance is OK, the optical alarm may be ignored.

### **Damage in Shipment**

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Should damage be discovered after unpacking the system, immediately file a claim with the carrier. A full report of the damage shall be made and a copy forwarded to Blonder Tongue Laboratories, Inc. The company will then advise what disposition is to be made of the equipment.

### **If You Need Help**

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If you need additional help in installing or using the system, need additional copies of this manual, or have questions about system options, please call Blonder Tongue's Systems Engineering Department at 732-679-4000.

### **Returning Product for Repair (or Credit)**

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Do not attempt to modify or service any part of the system other than in accordance with procedures outlined in this Operator's Manual. If the system does not meet its warranted specifications, or if a problem is encountered that requires service, contact the Blonder Tongue Service Department before sending the equipment back to the factory.

**A Return Material Authorization (RMA) Number is required on all products returned to Blonder Tongue**, regardless if the product is being returned for repair or credit. Before returning product, please contact the Blonder Tongue Service Department at 1-800-523-6049, Ext. 4256 or visit our website: [www.blondertongue.com](http://www.blondertongue.com) for further information.

## Limited Warranty

Blonder Tongue Laboratories, Inc. (BT) will at its sole option, either repair or replace (with a new or factory reconditioned product, as BT may determine) any product manufactured by BT which proves to be defective in materials or workmanship or fails to meet the specifications which are in effect on the date of shipment or such other specifications as may have been expressly agreed upon in writing (i) for a period of one (1) year from the date of original purchase (or such shorter period of time as may be set forth in the license agreement specific to the particular software being licensed), with respect to iCentral™ (hardware and software) and all other software products (including embedded software) licensed from BT, (ii) for a period of one (1) year from the date of original purchase, with respect to all MegaPort, IPTV products and fiber optics receivers, transmitters, couplers and integrated receivers/distribution amplifiers (including TRAILBLAZER™, RETRO-LINX™ and TWIN STAR™ products) as well as for VideoCipher® & DigiCipher® satellite receivers, and (iii) for a period of three (3) years from the date of original purchase, with respect to all other BT products. Notwithstanding the foregoing, in some cases, the warranty on certain proprietary sub-assembly modules manufactured by third party vendors and contained in BT products and on certain private-label products manufactured by third parties for resale by BT are of shorter duration or otherwise more limited than the standard BT limited warranty. In such cases, BT's warranty with respect to such third party proprietary sub-assembly modules and private-label products will be limited to the duration and other terms of such third party vendor's warranty. In addition, certain products, that are not manufactured but are resold by BT, carry the original OEM warranty for that product. The limited warranty set forth in this paragraph does not apply to any product sold by BT, which at the time of sale constituted a Closeout Product.

BT will at its sole option, either repair or replace (with a new or factory reconditioned product, as BT may determine) any product sold by BT which at the time of sale constituted a refurbished or closeout items ("Refurbished Product" and "Closeout Product"), which proves to be defective in materials or workmanship or fails to meet the specifications which are in effect on the date of shipment or such other specifications as may have been expressly agreed upon in writing, for a period of ninety (90) days from the date of original purchase. Notwithstanding the foregoing, in some cases, the warranty on third party software and on certain proprietary sub-assembly modules manufactured by third party vendors and contained in BT products and on certain private-label products manufactured by third parties for resale by BT are of shorter duration or otherwise more limited than the BT limited warranty for Closeout Products. In such cases, BT's warranty for Closeout Products constituting such third party software, third party proprietary sub-assembly modules and private-label products will be limited to the duration and other terms of such third party vendor's warranty. In addition, notwithstanding the foregoing, (i) certain Closeout Products that are not manufactured (but are resold) by BT, carry the original OEM warranty for such products, which may be longer or shorter than the BT limited warranty for Refurbished or Closeout Products. All sales of Refurbished or Closeout Products are final.

To obtain service under this warranty, the defective product, together with a copy of the sales receipt or other satisfactory proof of purchase and a brief description of the defect, must be shipped freight prepaid to: Blonder Tongue Laboratories, Inc., One Jake Brown Road, Old Bridge, New Jersey 08857.

This warranty does not cover damage resulting from (i) use or installation other than in strict accordance with manufacturer's written instructions, (ii) disassembly or repair by someone other than the manufacturer or a manufacturer-authorized repair center, (iii) misuse, misapplication or abuse, (iv) alteration, (v) lack of reasonable care or (vi) wind, ice, snow, rain, lightning, or any other weather conditions or acts of God.

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