



INSTRUCTION MANUAL

FRRA Series

Fiber Optic Receiver/Distribution Amplifiers

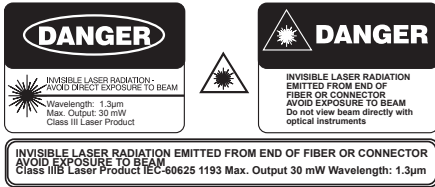
Model	Stock No.
FRRA-S4A-860-43P	7411-P84-B
FRRA-S4S-860-43P	7411-P84-BS

WARNING!

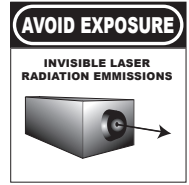
The optical emission from the units are laser-based and may present eye hazards if improperly used. As always, be careful when working with optical fibers. Fibers can cause painful injury if they penetrate the skin.

**NEVER USE ANY KIND OF OPTICAL INSTRUMENT
TO VIEW THE OPTICAL OUTPUT OF THE UNIT.**

651210200B



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 Class IIIb, 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 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.

Laser safety classes for the FRRA are as follows:

Class	Wavelength Range	Optical Power Accession Limits
IIIb	180 nm to 400 nm 400 nm to 10 ⁶ nm	Varies with λ and exposure time. 0.5 Watt

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.

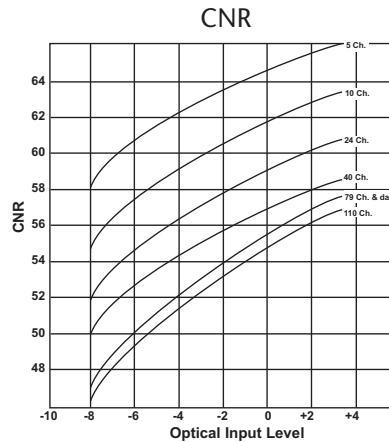
Description

The FRRR is a fiber optic receiver integrated with the Blonder Tongue RMDA rack mount distribution amplifier. The FRRR may be used as a launch amplifier in a coaxial distribution network after networking with fiber. The fiber receiver provides a robust system for transferring 110 channels (depending on model) VSB/AM modulated signals over a single mode fiber. The FRRR operates with the FIBT Series of transmitters as well as with the transmitters of many other leading manufacturers. The FRRR-S4A-860-43-PA can transfer 79 channels of VSB/AM signals, plus 57 digital QAM channels in the upper frequency range.

Specifications-LINK(d) @ 25°C, Single-mode Fiber (Typical)

Optical Receiver

Bandwidth: 47 to 860 MHz
 Bandpass Flatness: 2.0 dB P/V
 Operating Wavelength: 1310/1550 nm
 Optical Input Range: -6.0 to +3.0 dBm
 Output Impedance: 75 ohm
 CNR -1 dBm Input, 40 Ch. Load: 57 dB
 CNR -1 dBm Input, 79 Ch.+ Data: 55 dB
 CNR -1 dBm Input, 110 Ch. Load: 54 dB
 Input Connector: FRRR-S4A-xx: FC/APC
 FRRR-S4S-xx: SC/APC



Distribution Amplifier

Impedance - All Ports: 75 ohm
 Return Loss Output: 16 dB
 RF Gain: 43 dB
 Test Port: -20, ±2 dB
 Gain Control Range: 10 dB
 Slope Control Range: 8 dB
 Operating Temperature: -20 to +45°C
 Power Supply Requirements 117 VAC, 60 Hz: 28 W
 Size (W x H x L): 19 x 1.75 x 6.25 in., 48.26 x 4.45 x 15.88 cm
 Weight: 5.75 lbs., 2.61 kg
 Number Of Hybrids: 2
 Hybrid Technology: Power Doubling

Varying Specifications

Channel Loading:	110
Flatness:	± 0.5
Output Level (Low/High)	34/42
Composite Triple Beat (CTB) ^(a,b,c) :	-60
Composite Second Order (CSO) ^(a,b,c) :	-58
Hum Modulation:	-70

NOTES:

- (a) At specified channel loading at rated output capability
- (b) Distortion levels improve as output level is reduced
- (c) Distortion specifications at 8 dB sloped output
- (d) Assumes FIBT transmitter link and -1 dBm optical input

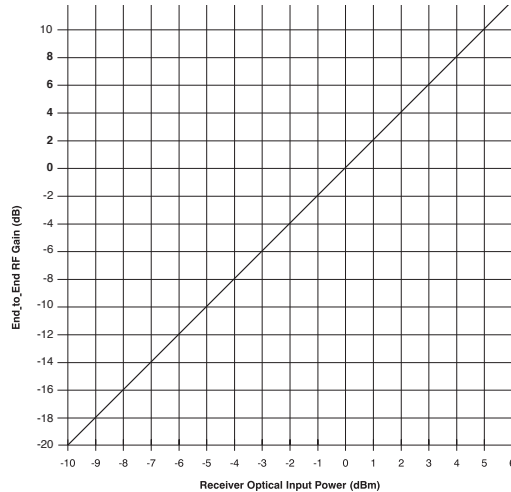


Figure 1 - End-to-End Link

Figure 1 shows the end-to-end RF gain of the Transmitter/Receiver combination. The main factor that determines the end-to-end gain is the amount of light that reaches the receiver. A typical transmitter/receiver combination will have unity gain (0 dB) at a received optical power of 0 dBm (1 milliwatt). The RF gain changes by 2 dB for every 1 dB change in received optical power. This curve will shift up and down by 3 or 4 dB due to variations in the lasers and amplifiers, however the slope will always be 2.

The receiver contains a tri-colored indicator LED that may be used to determine the optical signal strength reaching the receiver. When the LED is green, the signal is at optimum input levels. When the LED is yellow, the optical signal has dropped to insufficient levels (<-6 dBm), and when the LED is red, the signal is overloading the receiver (>+3 dBm). Because the LED is always lit, it also serves as a positive indication that the unit is turned on.

The Fiber Optic Link is optimized for single-mode operation only. Use of multi-mode fiber is not recommended, even for short distances, because of the large amount of modal noise that could result.

This product conforms to European Community Directive #89-336-EE-C for electromagnetic compatibility requirements.

Operating Instructions

WARNING!

The optical emission from the units are laser-based and may present eye hazards if improperly used. As always, be careful when working with optical fibers. Fibers can cause painful injury if they penetrate the skin.

NEVER USE ANY KIND OF OPTICAL INSTRUMENT TO VIEW THE OPTICAL OUTPUT OF THE UNIT.

Input Optical Power

The FRRR's power monitor provides a proportional DC voltage output to optical milli-Watt input. The scale is 1 Volt DC equals 1 mW or 0 dBm of optical input. A standard voltmeter can be used to accurately determine the optical input level into the node. Prior to applying AC power, make sure the gain and slope controls are fully counter-clockwise. Connect the optical input and apply AC power. Insert the voltmeter's positive probe into the jack marked "optical power 1V/mW", and the negative probe into the "ground" jack (see Figure 3). Measure the DC voltage and refer to the FRRR Configuration Table in Figure 4 for the corresponding optical input level conversion to mW and dBm.

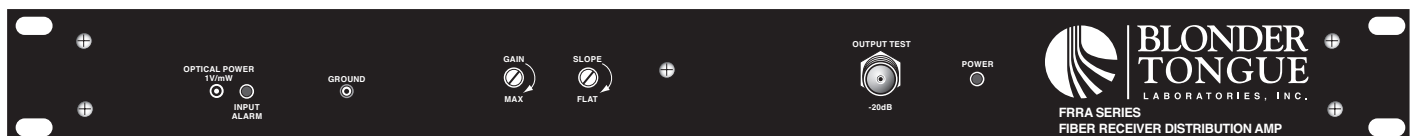


Figure 3 - Rack Mount Front Panel

Attenuator Selection

The RF output level from the optical receiver module varies considerably over its operational optical input range. It is also dependent upon the transmitter's channel loading, its resultant RF input level and the FRRR's RF output capability. In order not to overload the amplifier section input, an attenuator must be installed in the "RF Loop" on the rear panel. With the optical source and AC power connected, measure the RF signal level at "RF Loop" output connector. Choose the appropriate attenuator value to set this level to +5 dBmV, ± 5 dB. A Blonder Tongue model FAM-xx (Stock No. 4006A-xx) or equivalent attenuator can be used for this application. Install the attenuator on the RF loop output connector. Check that the desired +5 dBmV nominal signal level has been obtained, or change value accordingly. Install a coaxial jumper between the attenuator and the RF Loop input. Note that measured levels below 0 dBmV (without attenuator) indicates a low optical input and should therefore be investigated. The FRRR gain and slope controls can now be adjusted for desired output.

Model		FRRR-S4A-860P		
Ch. Loading		110 Ch.		
Output Level		34/42		
Optical Input		Increase Optical Input Power Orange Optical LED Indication		
dBm	mW			
-10	0.10			
-9	0.13			
-8	0.16			
G R E E N L E D	-6	0.25	0 dB	
	-5	0.32	2 dB	
	-4	0.40	4 dB	
	-3	0.50	6 dB	Approximate
	-2	0.63	8 dB	External
	-1	0.79	10 dB	Attenuator Value
	0	1.00	12 dB	Required
	1	1.26	14 dB	
	2	1.58	16 dB	
	3	2.00	18 dB	
4		2.51		Decrease Optical Input Power Red Optical LED Indication
5		3.16		

Figure 4 - Configuration Table

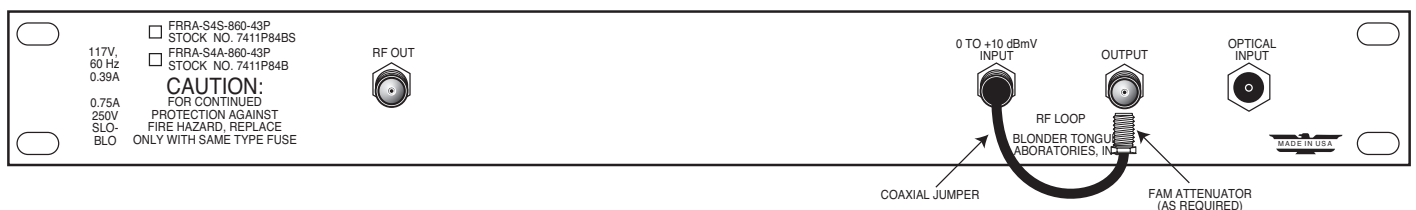


Figure 5 - Rack Mount Rear Panel

Maintenance

Cleaning

If the units need to be cleaned, avoid the use of all solvents and use low-pressure clean air to remove loose dirt. Use low-pressure clean air to clear the connectors of any debris. Dirty or scratched connector end faces will greatly reduce the unit's performance. Foam-tipped swabs such as the 2.5mm Mini Foam Swab offered by Fiber Instrument Sales (P/N F1-0005) may be saturated with denatured alcohol* and inserted into the optical port for cleaning. **DO NOT INSERT A DRY SWAB INTO THE OPTICAL PORT AS THIS MAY DAMAGE THE FIBER END FACE.** Many fiber optic installations experience degraded performance due to dirty optical connector end faces. The following procedure should be used to properly clean the optical connector end faces.

Required Cleaning Equipment

- Kimwipes® or any lens-grade, lint-free tissue. The type sold for eyeglasses work quite well.
- Denatured Alcohol.*
 - * NOTE: Use only industrial grade 99% pure isopropyl alcohol. Commercially available isopropyl alcohol is for medicinal use and is diluted with water and a light mineral oil. Industrial grade isopropyl alcohol should be used exclusively.
- 30X Microscope.
- Canned Dry Air.

Directions for Cleaning

- 1) Fold the tissue twice so it is four layers thick.
- 2) Saturate the tissue with alcohol.
- 3) First clean the sides of the connector ferrule. Place the connector ferrule in the tissue, and apply pressure to the sides of the ferrule. Rotate the ferrule several times to remove all contamination from the ferrule sides.
- 4) Now move to a clean part of the tissue. Be sure it is still saturated with alcohol and that it is still four layers thick. Put the tissue against the end of the connector ferrule. Put your fingernail against the tissue so that it is directly over the ferrule. Now scrape the end of the connector until it squeaks. It will sound like a crystal glass that has been rubbed when it is wet.
- 5) Use the microscope to verify the quality of the cleaning. If it isn't completely clean repeat the steps with a clean tissue.
- 6) Mate the connector immediately! Don't let the connector lie around and collect dust before mating.
- 7) Air can be used to remove lint or loose dust from the port of a transmitter or receiver to be mated with the connector. Never insert any liquid into the ports.

Connector Handling

- 1) **NEVER TOUCH THE FIBER END FACE OF THE CONNECTOR.**
- 2) Connectors not in use should be covered over the ferrule by a plastic dust cap. It is important to note that inside of the ferrule dust caps contains a sticky gelatinous residue that is the by-product of the making of the dust cap. This residue will remain on the ferrule end after the cap is removed. Therefore it is critical that the ferrule end be cleaned thoroughly BEFORE it is mated to the intended unit.

Troubleshooting

Commercially available test equipment such as an Optical Signal Locator (OSL) is an effective tool for locating problems with the fiber optic cables. The OSL can also be used to verify that the transmitter is indeed putting out light. Other common problems include using a transmitter as a receiver and vice versa, lack of continuity in the optical fiber, lack of power, or improper input levels. If problems persist contact Blonder Tongue's Technical Solutions Department.

Problems and Comments

Problem	LED Status-Check	Comments
No optical power at the Node. Orange Optical Power LED	Check power at the Tx.	If there is power at the Tx, verify proper fiber is connected to the node. If the proper fiber is connected, ensure the integrity of the fiber.
Signal out of node is noisy. Orange Optical Power LED	Check optical power input via power monitor jack at the node.	See Specifications on Page 3 for proper minimum levels (≥ 6 dBm).
No RF signal out of node. Green Optical Power LED	Check the node power connection. Check attenuator/jumper installation	Check 117 VAC at the power supply.
Signal out of node is distorted. Status LED - Green or Red	Verify RF input signal on Tx.	Fiber must be 9/125 μ m. The Rx optical input power and RF output level are within specifications. If RF output is >48 dBmV, the RF amplifier is being overdriven. Use an attenuator (Stock No. 4006A-xx) to decrease RF output from optical board to the RF amplifier stage. Refer to "Attenuator Selection" on page 6.
	Verify fiber size/singlemode. Check optical power at the node input. Verify RF output level.	
	Verify RF output level.	

Returning Product for Repair (or Credit)

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 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.

OTHER THAN THE WARRANTIES SET FORTH ABOVE, BT MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND, EXPRESS OR IMPLIED, AS TO THE CONDITION, DESCRIPTION, FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY OR AS TO ANY OTHER MATTER, AND SUCH WARRANTIES SUPERSEDE ANY ORAL OR WRITTEN WARRANTIES OR REPRESENTATIONS MADE OR IMPLIED BY BT OR BY ANY OF BT'S EMPLOYEES OR REPRESENTATIVES, OR IN ANY OF BT'S BROCHURES, MANUALS, CATALOGS, LITERATURE OR OTHER MATERIALS. IN ALL CASES, BUYER'S SOLE AND EXCLUSIVE REMEDY AND BT'S SOLE OBLIGATION FOR ANY BREACH OF THE WARRANTIES CONTAINED HEREIN SHALL BE LIMITED TO THE REPAIR OR REPLACEMENT OF THE DEFECTIVE PRODUCT F.O.B. SHIPPING POINT, AS BT IN ITS SOLE DISCRETION SHALL DETERMINE. BT SHALL IN NO EVENT AND UNDER NO CIRCUMSTANCES BE LIABLE OR RESPONSIBLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, PUNITIVE, DIRECT OR SPECIAL DAMAGES BASED UPON BREACH OF WARRANTY, BREACH OF CONTRACT, NEGLIGENCE, STRICT TORT LIABILITY OR OTHERWISE OR ANY OTHER LEGAL THEORY ARISING DIRECTLY OR INDIRECTLY FROM THE SALE, USE, INSTALLATION OR FAILURE OF ANY PRODUCT ACQUIRED BY BUYER FROM BT.

All claims for shortages, defects and non-conforming goods must be made by Buyer in writing within five (5) days of receipt of merchandise, which writing shall state with particularity all material facts, concerning the claim then known to Buyer. Upon any such complaint, Buyer shall hold the goods complained of intact and duly protected, for a period of up to sixty (60) days. Upon the request of BT, Buyer shall ship such allegedly nonconforming or defective goods, freight prepaid to BT for examination by BT's inspection department and verification of the defect. BT, at its option, will either repair, replace or issue a credit for products determined to be defective. BT's liability and responsibility for defective products is specifically limited to the defective item or to credit towards the original billing. All such replacements by BT shall be made free of charge f.o.b. the delivery point called for in the original order. Products for which replacement has been made under the provisions of this clause shall become the property of BT. Under no circumstances are products to be returned to BT without BT's prior written authorization. BT reserves the right to scrap any unauthorized returns on a no-credit basis. Any actions for breach of this contract must be commenced by Buyer within thirteen (13) months after the cause of action has accrued. A copy of BT's standard terms and conditions of sale, including the limited warranty, is available from BT upon request. Copies of the limited warranties covering third party proprietary sub-assembly modules and private label products manufactured by third parties are also available from BT on request. VideoCipher® & DigiCipher® are registered trademarks of Motorola Corp.



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