



Fiber-Span

Installation Guide and User Manual

AC3101-BTR-4
Fiber Optic Transmission System
1U, 19" Subrack Enclosure

AC3101-BTR-RM
Fiber Optic Transmission System
NEMA Type 4X Enclosure

Fiber-Span
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Introduction

This high performance Analog RF Fiber Optic Transmission System converts RF signals into intensity modulated light to be carried through standard single mode optical fiber to the Optical Receiver. The Receiver converts the modulated light back to the original RF signal. Fiber-Span uses high performance optical components to ensure maximum dynamic range.

1 Warnings

Warning: Invisible radiation exits from areas labeled “Aperture”



A US standard 120V AC 60 Hz to 12VDC power supply powers the units. Use precautions to prevent electrical shock hazards. Always terminate the RF connections before applying power to the unit.

2 Product overview

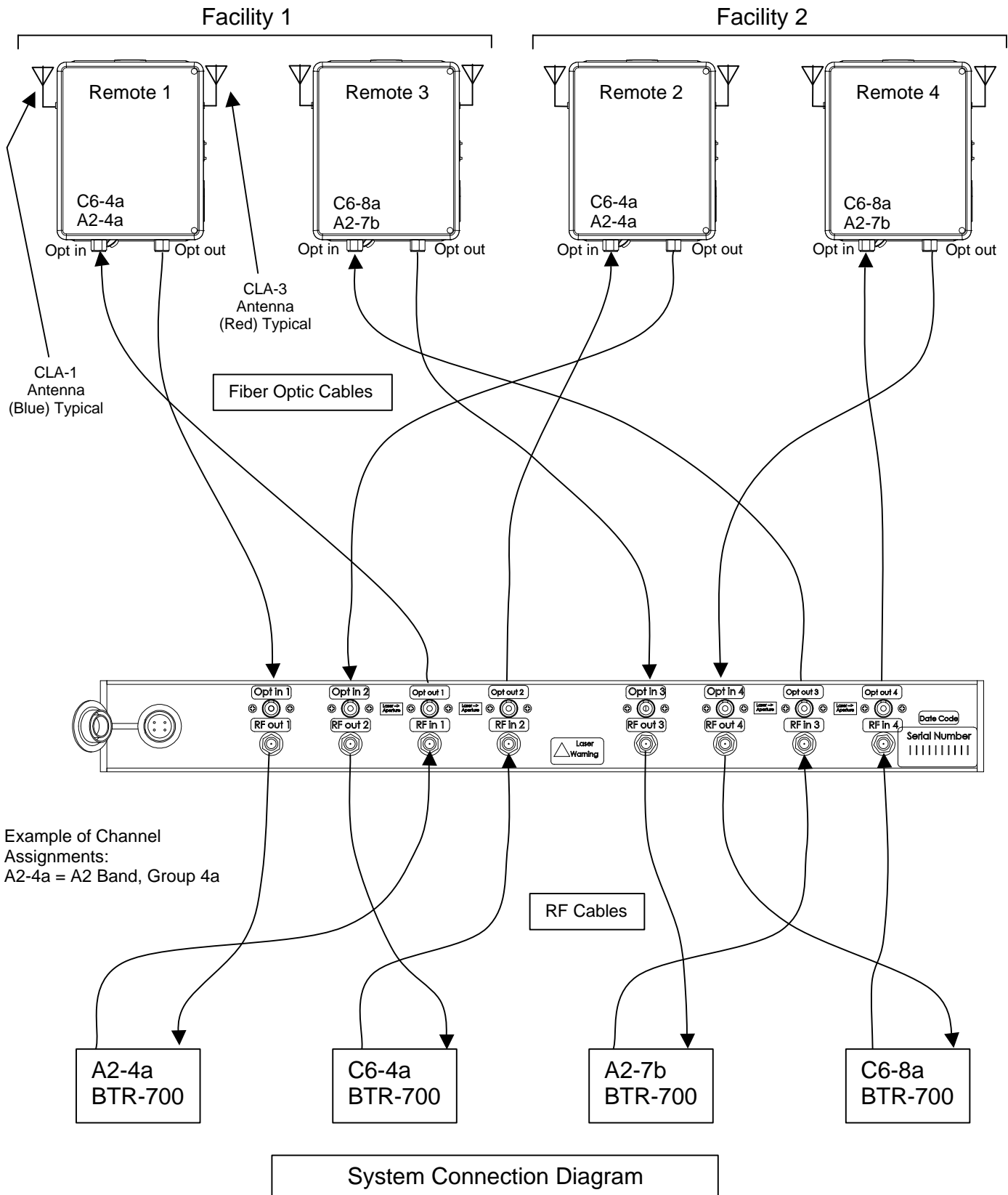
The optical transmission system is comprised of one AC3101-BTR-4 base subrack with four AC300T and four AC300R modules internally installed and front panel LED power indicator, and four AC3101-BTR-RM remote Nema Type 4X enclosures. Each AC3101-BTR-RM contains one AC106 fiber optic transceiver, one FS-LNA1 low noise amplifier, one FS-PA1 power amplifier, one band pass filter, one low pass filter, and one removable 3dB RF attenuator. In addition, both the subrack and remote units are supplied with an external power supply and locking cable, which is interchangeable between units of all types.

3 Installation

This transmission system is designed to be setup by professional communications systems installers. System installers should be from, a public utility, Nuclear Power Plant, or other qualified personnel.

The AC3101-BTR-4 subrack is compatible with a standard 19” 1U rack, and mounts on the rack system using standard hardware and practices. AC3101-BTR-RM remote units should be mounted securely using the four enclosure mounting holes provided. AC3101-BTR-RM units should be mounted flat against a wall or column with the long dimension perpendicular to the floor, hinge on the left,

enclosure latch on right, and vent at top. Provide adequate airflow to the lower right and top vents. Connect RF and Optical cables before powering up the modules. Connect fiber optic and RF cables as shown below:



Setup Program BTR-700 Radios and Beltpacks to frequency groups as indicated in System Connection Diagram. See appendix for BTR frequency charts for reference. Set the transmitter RF output power for 100 mW. Be sure to terminate the transmitter RF output before power up.

To install fiber optic cable to subrack, remove dust covers, clean optical connector, align FC/APC connector key and hand tighten. **Do not overtighten.**

To install fiber optic cable to remote units, see attached fiber installation guide. This guide is also provided on the inside lid label of remote units. Clean optical connectors prior to installation.

To power up subrack and remote units, unsnap dust cover from power supply receptacle and insert the provided power supply plug into the receptacle on the unit. Align plug key, and push plug into receptacle. Tighten the locking ring on plug. Power supplies are interchangeable between all units.

To remove optional 3dB attenuator from remote unit, refer to attached remote unit diagram, or remote unit lid diagram. Remove power from remote unit. With 3/16" open end crescent wrench, loosen both ends of 3 dB attenuator from attached RF cable and power amplifier. Remove attenuator, and directly re-connect RF cable to power amplifier.

Installation Verification

Remote Transceivers To verify correct installation: LED's L,M,N,O,and P should all be green when the system is in normal operation. See Remote Transceiver diagram for LED functions. This system has been designed to provide 20 mW of RF power at each remote when the BTR-700 set to 100 mW. RF output power can be increased 3dB by removing the optional 3dB attenuator. See Remote Transceiver diagram for the location. Power must be removed from the unit before this option is exercised.

Keep transmit and receive antennas separated 3 feet minimum. One antenna extension kit is provided for each Remote Transceiver. **DO NOT INSTALL HARDWARE (ANTENNA OR POWER AMPLIFIER) TO BOOST RF OUTPUT POWER. THIS MAY VIOLATE FCC RULES AND REGULATIONS.**

Base Station Transceiver To verify correct installation: Verify system is connected as shown in System Connection Diagram before power up. On the front panel a Green LED will indicate that power is present in normal operation.

4 Maintenance

Precaution: All units should be handled observing ESD precautions to prevent electro-static damages. Disconnect power prior to opening remote units.

FC/APC and RF connections should be cleaned using optics grade Isopropyl alcohol prior to coupling.

CAUTION: Do not over-tighten connections. Connections should be hand-tightened plus 1/4 turn.

5 **Company Information**

Fiber-Span designs and manufactures fiber optic modules used in the transmission and distribution of RF and wireless signals. Fiber-Span's fiber optic transmitters, receivers and transceivers are widely used in wireless and RF systems worldwide by wireless systems OEM's, systems integrators and military systems designers to capitalize on the inherent advantages of fiber. Fiber has extremely low RF attenuation (< 1dB/km), very high bandwidth, immunity to EMI, no signal egress, flat broadband delay characteristics plus a cable design that is light weight and small size.

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Attached Drawings / Documents:

Remote Unit Component Diagram
Remote Unit Fiber Installation Guide
700-800_frequency_Plan
BTR-TR-700-800_Freq_Info

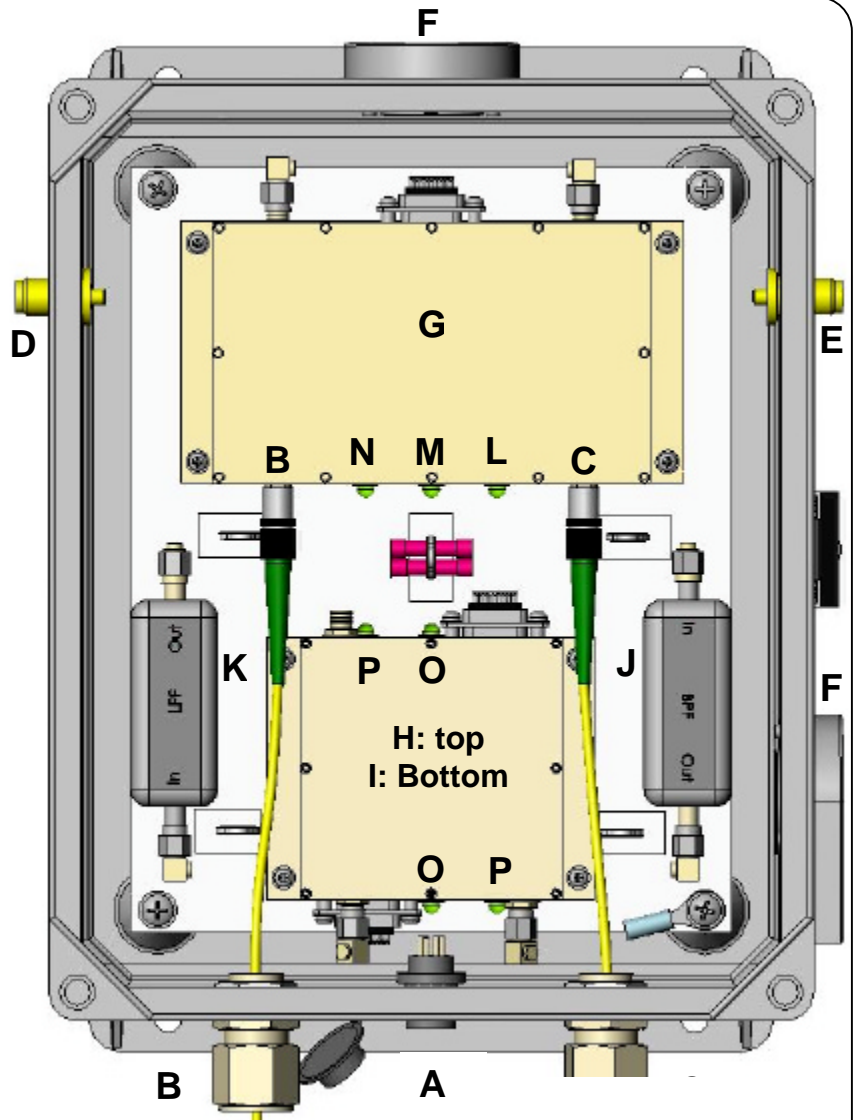
Fiber-Span LLC
www.fiber-span.com

AC3101-BTR-RM Fiber Optic Remote Transceiver

Lid and cabling not shown for clarity.

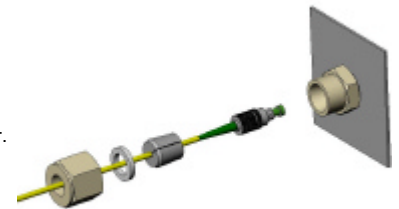
Remove power at "A" before servicing.

- A. Power Connection: +12V
- B. Optical In
- C. Optical Out
- D. Transmit TNC RF Out
- E. Receive TNC RF In
- F. Vents
- G. Fiber Optic Transceiver
- H. Low Noise Amplifier (LNA)
- I. Power Amplifier (PA)
- J. Band Pass Filter (BPF)
- K. Low Pass Filter (LPF)
- L. Laser Overcurrent Alarm LED
On: No Alarm
Off: Laser Overcurrent Alarm
- M. Transceiver DC Power LED
On: DC Power On
Off: DC Power Off
- N. Received Optical Power LED
On: No Alarm
Off: Low Optical Input Power
- O. Amplifier DC Power LEDs
On: DC Power On
Off: DC Power Off
- P. Amplifier Failure Status LEDs
On: No Alarm
Off: Amplifier Failure

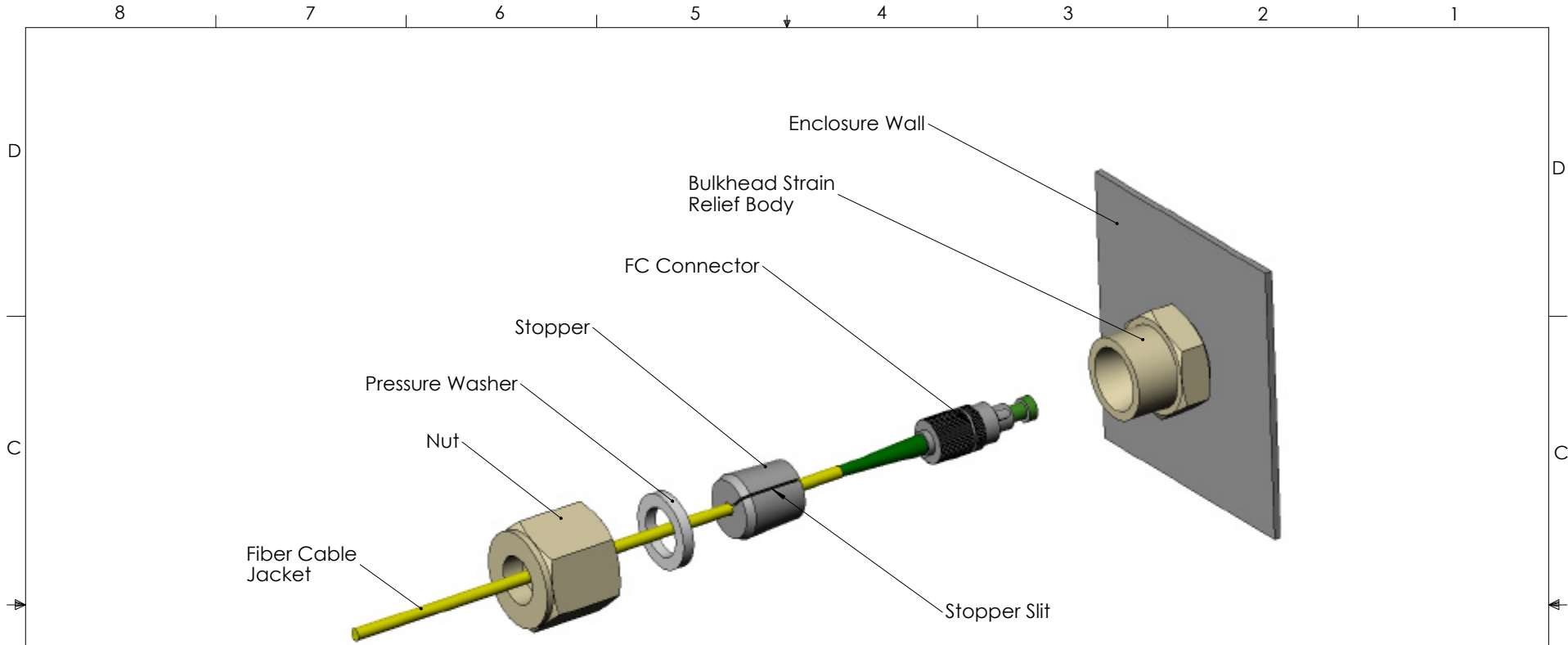


Fiber Installation Guide:

- a) Unscrew large nut from bulkhead strain relief body.
- b) Remove pressure washer and stopper from bulkhead.
- c) Do not remove bulkhead strain relief body from enclosure.
- d) Pass FC connector through nut and pressure washer.
- e) Pull open slit in stopper, and pass fiber jacket to center of stopper. Use care to prevent damage to fiber.
- f) Seat stopper into bulkhead.
- g) Adjust fiber to desired length inside enclosure by carefully pulling fiber cable through stopper. Allow slight fiber slack in enclosure.
- h) Insert pressure washer into nut.
- i) Tighten nut onto bulkhead body until fiber cable cannot move.
- j) To prevent damage to fiber cable, do not over tighten nut. Snug finger tight is sufficient to hold cable in place.

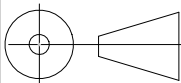


Fiber Installation Guide



Notes:

- a) Unscrew large nut from bulkhead strain relief body.
- b) Remove pressure washer and stopper from bulkhead.
- c) Do not remove bulkhead strain relief body from enclosure.
- d) Pass FC connector through nut and pressure washer.
- e) Pull open slit in stopper, and pass fiber jacket to center of stopper. Use care to prevent damage to fiber.
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- g) Adjust fiber to desired length inside enclosure by carefully pulling fiber cable through stopper. Allow slight fiber slack in enclosure.
- h) Insert pressure washer into nut.
- i) Tighten nut onto bulkhead body until fiber cable cannot move.
- j) To prevent damage to fiber cable, do not overtighten nut. Snug finger tight is sufficient to hold cable in place.

Units are inches unless otherwise noted. Tolerances as shown unless noted: Tol. Linear: X.XXX ± 0.005 Tol. Angle: 1° Material:	 Third Angle Projection	Fiber-Span, LLC 1 Possumtown Road Piscataway, NJ 08854		
		Procedure, Assembling FC Fiber Connectors Through Bulkhead Strain Relief Type 5540-6003		
Date Created: 27-Mar-03 Drawn by: J. McSpirtt Sheet 1 of 1	Size A	CAGE 0Z4Y2	Dwg No. 7010-0027	Rev 1

700/800 Systems Frequency Selection Rules

1. **Frequency Spacing**.....Keep all BTR/TR receive and transmit frequencies at least 300kHz away from each other, >400kHz preferred. Both the transmitters and receivers should be at least 400kHz away from other RF equipment.
2. **IM Products**..... 2 transmitter 3rd orders by at least 100kHz (200kHz preferred)
3 transmitter 3rd orders by at least 50kHz (100kHz preferred)
2 transmitter 5th orders by at least 50kHz (100kHz preferred)
3. **Transmitter Sidebands**..... Avoid base and beltback carrier sidebands: +/-200kHz, +/-400 and +/-600. Keep at least 50kHz away from these frequencies.
4. **Bandwidths**..... Transmitter bandwidth = 150kHz
Receiver bandpass = 230kHz
5. **Base RX 4MHz Image Harmonics**. C6 frequencies to avoid are 704.4, 708.4, 712.4, 716.4, 720.4. A2 frequencies to avoid are 632.4, 636.4, 640.4, 644.4, 648.4. Avoid the frequencies, by at least 50kHz
6. **Base LO₁ Xtal harmonics**..... Avoid C6 Xtal harmonics; 524.667, 655.833, 787.000 by at least 50kHz .
Avoid A2 Xtal harmonics; 476.667, 595.833, 715.000 by at least 50kHz.

FYI

TR-700/800 Oscillators/IFs – Dual Conversion Superheterodyne, Synthesized, FM

LO₁..... Synthesized (If set on correct frequency then, $LO_1 = RF_{IN} - 65.7$)

LO₂..... 55MHz, Xtal, Fixed

Master Oscillator..... 4MHz, Xtal, trimmer adjust

IF₁..... 65.7MHz

IF₂..... 10.7MHz

Transmitter.....Synthesized, FM

BTR-700/800 Oscillators/IFs - Dual Conversion Superheterodyne, Synthesized, FM

LO₁..... X MHz, x6 Xtal Osc., Fixed

1 Band..... X = 697MHZ

2 Band..... X = 715MHZ

3 Band..... X = 733MHZ

4 Band..... X = 751MHZ

5 Band..... X = 769MHZ

6 Band..... X = 787MHZ

7 Band..... X = 805MHZ

Examples: A C6 system's LO₁ is set to the Band 6 (787MHz) frequency. An A2 system's LO₁ is set to the Band 2 (715MHz) frequency.

LO₂..... Synthesized, 75.8 to 93.6MHz. (If set on correct frequency then, $LO_2 = LO_1 - RF_{IN} + 10.7$)

Master Oscillator..... 4MHz, Xtal, trimmer adjust

IF₁..... 65 – 83MHz

IF₂..... 10.7MHz

Transmitter(s)..... Synthesized, FM