



FRMUC-AR440 KIT

FREQUENCY MULTIPLIER UP CONVERTER
FOR THE AR-400 GEMINI NODE

INSTRUCTION MANUAL

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TABLE OF CONTENTS

| | |
|-----------------------------|--------|
| SPECIFICATIONS | Page 3 |
| INSTALLATION GUIDE | Page 4 |
| OPERATIONAL SETUP | |
| 1. Operational setup for RF | Page 6 |

FRMUC-AR440 Specifications

| ITEM | Specification |
|---|--|
| Number of Inputs | 4 |
| Input Frequency Range | 5–42MHz |
| Output Spectrum (inverted on bands 2, 3 and 4) | 5-206.5MHz |
| Band 1 | 5-42MHz (not converted) |
| Band 2 | 51.5-88.5MHz |
| Band 3 | 121.5-158.5MHz |
| Band 4 | 169.5-206.5MHz |
| Frequency Accuracy | Phase-locked to internal 4.5MHz pilot |
| Gain (each input to combined output) | 15dB +/- 1dB, each input combined to output |
| Gain Flatness | <3dB in any band |
| Noise Figure | 14dB Maximum |
| Maximum Input Signal | +15dBmV per Carrier, 6 Carriers |
| Phase Noise | > -110dBc/Hz @10KHz |
| Input Return Loss | 15dB Minimum, 5-42MHz |
| Output Return Loss | 15dB Minimum, 5-206.5MHz |
| 3 rd Order IM @ +15dBmV Input per Carrier | >55dB, >60dB Typical, 6 Carriers |
| 2 nd Order IM @ +15dBmV per Carrier | >55dB, 6 Carrier |
| LO Rejection, Measured relative to input carriers @ +15dBmV per Carrier | Band 2: 93.5162MHz > 15dB Band 3: 163.5469MHz > 15dB Band 4: 211.500MHz > 15dB |

The Arris 400 Gemini node used in this installation procedure may differ in configuration, adjustments to the install procedure may required.

NOTE: The FRMUC-AR440 kit uses 75Ω type SMB connections on the RF cables. These connections (and those they mate with) can be damaged if inadvertently abused. Use caution in handling and plugging/unplugging these. Always press them straight in and pull them straight out.

Step 1: Loosen the 5 captive screws holding on the metal cover underneath the metal tray. (See Figure 1)

Figure 1:



Figure 2:



Step 2: Remove the cover plate.

Step 3: Locate TX "A" IN and TX "B" IN port (See Figure 2). Remove the two Standard SMB cables from these ports. Zip tie the two cables to the power supply cables to keep them out of the way (Figure 3). Then plug in the Standard SMB cable which is supplied with the kit, at SWITCHED IN. (See Figure 4). Then place the metal cover back into position. Be sure to not pinch any fiber optic cable that may be in the way.

Figure 3:



Figure 4:



Step 4: Install the upconverter onto the top of the metal tray using the 6 screws which attach from the under side as shown and tighten firmly (See Figure 5). Plug the transmitter cable assembly from SWITCHED IN into the RF OUT port on the upconverter

Figure 5:



Figure 6:

| Up-Converter | P7RCM Module |
|---------------------|---------------------|
| Band 1 ————— | Port 1 |
| Band 2 ————— | Port 3 |
| Band 3 ————— | Port 4 |
| Band 4 ————— | Port 6 |

Step 5: Feed the RF cables through the slot between the top tray and the main housing as shown (Figure 7). The cables are marked on each end to show where they connect. (Figure 6) Example: A cable marked with 2 and 3, will connect to band 2 on the upconverter, and port 3 on the P7RCM module (Figure 8).

Figure 7:



Figure 8:



Step 6: The RF cables can now be zip tied into place. There is a white cable hold down, place the RF cables into this, and slide one of the supplied zip ties through the two slots in the hold down, and around the cables, tighten until snug (Figure 9). The RF cables are then secured to the wiring harness where shown. (Figure 10)

Figure 9:



Figure 10:



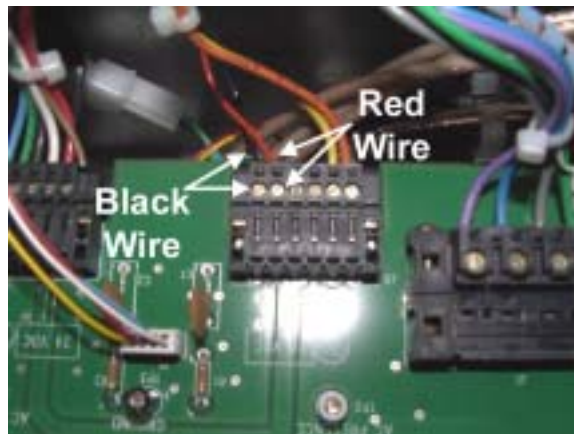
Step 9: Carefully check cable flexing and fit by closing the housing several times. Arrange cables as necessary to ensure there are no problems. Be sure cables do NOT get pinched by the black tray that the upconverter mounts to.

Step 10: Connect the two power lead wires coming from the upconverter to the terminals on the power distribution board located at J3 (Figure 9). Loosen the screw and slide the black wire (Ground) into the left most connection as shown. (Figure 10). The red wire (24V) will go into the slot just to the right of the ground as shown (Figure 10)

Figure 9:



Figure 10:



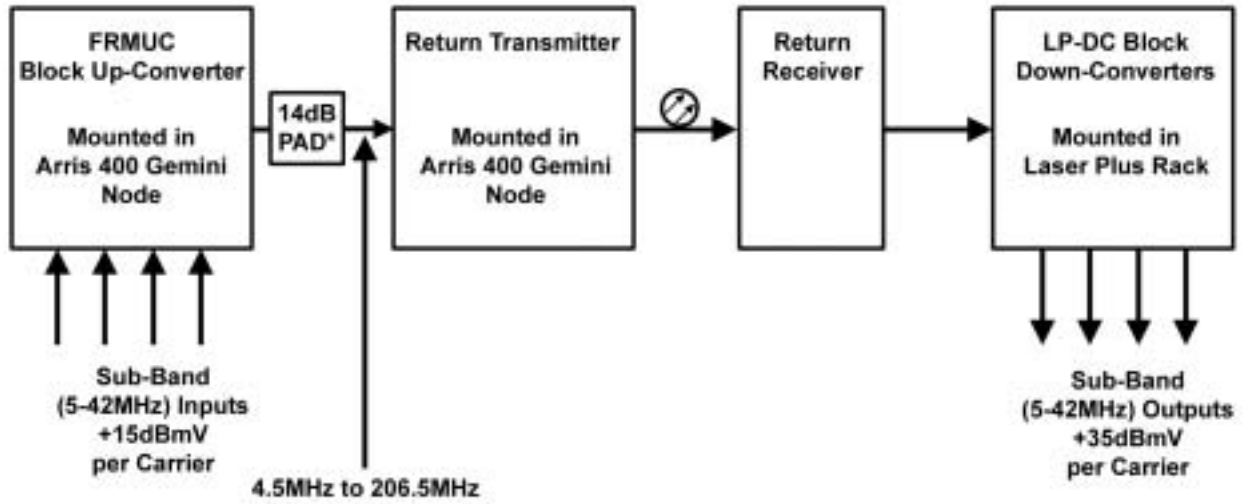
OPERATIONAL SETUP - RF

- The converter accepts four separate return inputs, one from each feeder leg. It up-converts three of them to three different bands, and combines them with one un-converted band. This combination of four bands plus a pilot carrier at 4.5MHz is fed into the laser transmitter of the Arris Gemini Node for return transmission via fiber.
- If the FRMUC-AR440 is installed properly, the frequencies of the four bands and their relationship to the four feeder legs are as follows:

| | | |
|-------------------|------------|----------------------|
| FEEDER PORT THREE | BAND ONE | 5MHz to 42MHz |
| FEEDER PORT FOUR | BAND TWO | 51.5MHz to 88.5MHz |
| FEEDER PORT FIVE | BAND THREE | 121.5MHz to 158.5MHz |
| FEEDER PORT SIX | BAND FOUR | 169.5MHz to 206.5MHz |

- The return carrier levels from each feeder leg into the converter should be checked and adjusted if necessary. The levels from the four feeders can be checked on the P7RCM module at the 4 reverse path test points. The specification for MAXIMUM carrier level into each converter band is defined as +15dBmV per (CW) carrier with six carriers present. For best return optical system performance, the input level should be a MINIMUM of +12dBmV per (CW) carrier with six carriers present. The carrier levels may be adjusted as necessary to provide channel-loading equivalent to the six-carrier levels. Padding can be applied at the PAD 1 to Pad 4 locations.
- Remember to factor-in the test point value when making carrier level measurement at the test points. The levels mentioned above are ACTUAL levels at the feeder legs/converter inputs.

Operational System Diagram



* 14dB PAD in transmitter cable assembly