7. PARTS LIST/TUNE-UP INFO

7.1 Parts List

The translator, can be subdivided as follows:

20-Watt Exciter Tray:
- Receiver Module
- IF Processor Module
- VHF/UHF Upconverter Module
- Control & Monitoring / Power Supply Module
- Power Amplifier Module

7.2 Tune-up Information

The LHV20AL translator was aligned at the factory and should not require additional alignments to achieve normal operation.

The UHF/VHF Receiver converts a low level RF input signal to an IF frequency of 44 MHz, filters off any unwanted out of band energy, and normalizes the level so that it can be applied to the IF processor assembly. It consists of three boards. The RF input is applied first to the UHF/VHF preamplifier board, which filters off out of channel energy and amplifies the input signal. The RF output is applied to the Mixer/PLL board, which converts the signal down to an IF frequency of 44 MHz. The IF output is applied to the IF ALC board, which amplifies the signal, filters off any unwanted out of band energy and controls its own IF gain to make sure that the IF output level is constant.

There is also a provision to apply +12V to the RF input center conductor to power an external preamplifier.

7.2.1 Exciter Chassis Assembly

The exciter chassis assembly operates using an IF input from the receiver module. The IF source connects to J6, the modulated IF Input jack, on the rear of the chassis assembly, which is cabled to the IF Processor Module.

On the LCD Display, located on the Controller/Power Supply Module, push the button to switch the translator to Operate. The setup of the RF output includes adjustments to the drive level of the Power Amplifier, the adjustment of the linearity and phase predistortion to compensate for any nonlinear response of the Power Amplifier on the front panel of the IF Processor module.

Verify that all red LEDs located on the IF Processor front panel are extinguished. The following details the meaning of each LED when illuminated:

- DS1 (input fault) – Indicates that either abnormally low or no IF is present at the input of the module.

- DS2 (ALC fault) – Indicates that the ALC circuit is unable to maintain the signal level requested by the ALC reference. This is normally due to excessive attenuation in the linearity signal path or the IF phase corrector signal path, or that switch SW1 is in the Manual ALC Gain position.

- DS4 (Mute) – Indicates that a Mute command is present to the system.

Switch the translator to Standby. The ALC is muted when the translator is in Standby. To monitor the ALC, preset R3, manual gain adjust, on the front panel of the Upconverter module, fully CCW. Move switch SW1, Auto/Man AGC, on the front panel of the Upconverter module, to the Manual position. Place the translator in Operate. Adjust the ALC GAIN pot on the front panel of the IF Processor to obtain +0.8 VDC on the LCD Display on the Controller/Power Supply in the ALC screen. Move the MAN/AUTO ALC switch back to Auto, which is the normal operating position.

To adjust the AGC Cutback setting, raise the output power of the translator to 110%. Adjust R2, AGC Cutback, located on the front panel, CCW until the LED DS1, AGC Cutback, just starts to flash. Return the output power of the translator to 100%.

7.2.2 Linearity Correction Adjustment

As shipped, the exciter was preset to include amplitude and phase pre-distortion. The pre-distortion was adjusted to approximately compensate the corresponding non-linear distortions of the Power Amplifier.

NOTE: On the IF processor board inside the module the correction enable/disable jumper W12 on J30 will be in the Enable position, on pins 2 & 3.

Set up a spectrum analyzer with 100 kHz resolution bandwidth and 100 kHz video bandwidth to monitor the intermodulation products of the RF output signal of the Power Amplifier. There are three Linearity Corrector stage adjustments located on the front panel of the IF Processor Module. The adjustments are threshold settings that are adjusted as needed to correct for any amplitude or phase intermod problems. Adjust the top linearity correction adjustment R211 threshold cut in for the in phase amplitude distortion pre-correction that is needed. Next adjust the middle linearity correction adjustment R216 threshold cut in also for the in phase amplitude distortion pre-correction that is needed. Finally adjust the bottom linearity correction adjustment R231 threshold cut in for the quadrature phase distortion pre-correction that is needed. The above pots are adjusted for the greatest separation between the peak visual carrier and the intermod products.

7.2.3 Frequency Response Delay Equalization Adjustment

The procedure for performing a frequency response delay equalization adjustment for the translator is described in the following steps:

The center frequency for the first stage is 46.5 MHz. Adjust R103, the top frequency response equalizer pot, located on the front panel of the IF Processor Module, for the best depth of frequency response correction at 46.5 MHz.

The center frequency for the second stage is 41.5 MHz. Adjust R106, the middle frequency response equalizer pot, located on the front panel of the IF Processor Module, for the best depth of frequency response correction at 41.5 MHz.

The center frequency for the second stage is 44 MHz. Adjust R274, the bottom frequency response equalizer pot, located on the front panel of the IF Processor Module, for the best depth of frequency response correction at 44 MHz.

After the three delay attenuation equalizers have been adjusted, fine tune, as needed, for the best frequency response across the channel.

7.2.4 Calibration of Output Power and Reflected Power of the translator

Note: Perform the following procedure only if the power calibration is suspect.

Switch the transmitter to Standby and preset R205, the aural null pot on the Amp Control board, fully CCW. Adjust R204, the null offset pot on the Amp Control board, for 0% visual output. Perform the following adjustments with no aural present by removing the aural carrier from the test modulator. Connect a sync and black test signal to the video input jack of the test modulator. Switch the transmitter to Operate.

Next, set up the transmitter for the appropriate average output power level:

- Sync + black 0 IRE setup/wattmeter=11.9 watts
- Sync + black 7.5 IRE setup/wattmeter=10.9 watts

Note: The transmitter must have 40 IRE units of sync.

Adjust R28, visual calibration, on the (A4) visual/aural metering board for .8V, at TB30-14 and TB30-12 return, on the exciter/driver assembly, then adjust display to read 100% on the front panel meter in the System Forward Power position.

With the spectrum analyzer set to zero span mode, obtain a peak reference on the screen. Reconnect jumper cable on the rear of the exciter/driver. While in the Visual Output Power position, adjust L3 for a minimum visual power reading on the LCD display. Turn the power adjust pot on the LO/Upconverter sled front panel until the original peak reference level is attained. Peak L1 and C8 for a maximum aural power reading, then adjust R20 for .8V, at TB30-15 and TB30-12 return, on the exciter/driver assembly, then adjust LCD display for 100% system aural power reading. Switch to the Visual Output Power position and adjust R51 for 100% visual power on system LCD display.

Adjust R202, visual calibration, on the Amp Control board for 100% on the front panel display in the % Visual Output position.

With the spectrum analyzer set to zero span mode, obtain a peak reference on the screen. Reconnect the aural carrier from the test modulator. Turn the power adjust pot on the front panel until the original peak reference level is attained. Adjust R203 for a 100% aural power reading. Switch to the Visual Output Power position and adjust R205 (aural null pot) for 100% visual power.

To calibrate the reflected output power reading of the translator. Reduce manual gain pot R3 to a 10% reading on the LCD front panel display in the % Output Power position. Place the translator in Standby. Remove the load from J4 on the (A4) Direction Coupler Board and switch the LCD Display screen to the Reflected Output Power position. Switch the translator to operate. Adjust the reflected power calibration adjust pot R163 on the power amplifier module to a 10% reading. Reconnect the load to J4.

After this calibration is completed, move switch SW1 on the upconverter module to the Automatic AGC position. This is the normal operating position for the switch.

The Translator is now aligned, calibrated, and ready for normal operation. This completes the detailed alignment procedures for the Pioneer Series translator.

7.2.5 *Alignment Procedure for the Bandpass Filter Assembly*

The Bandpass Filter Assembly is tuned to reject unwanted distortion products generated when the signals are diplexed and also during the amplification process.

The Bandpass Filter is factory tuned to the proper bandwidth and should not need tuned. If you think tuning is needed consult Axcera Field Support Department before beginning.

The Traps are labeled with their Center Frequency relative to the Frequency of the Carrier. (For Example: The Traps labeled -4.5 MHz are tuned for a Center Frequency of 4.5 MHz Lower than the Frequency of the Visual Carrier.)

The Trap Sections are Reflective Notches, adjustable across the entire VHF Frequency Band. The electrical length of the Outer Sleeve and the Center Rod of the Notch can be adjusted to Tune the Notch Frequency. The Depth of the Notch is set by the gap between the Center Conductor of the Trap Section and the Center Conductor of the Main Line. Tight Coupling makes a Deep Notch, while Loose Coupling makes a Shallow Notch.

The Trap Sections have been factory tuned and should not need major adjustments. The Frequency, relative to Visual Carrier, that the Trap is tuned to is marked on the Notch. Fine Tuning of the Notches Center Frequency can be accomplished with the Tuning Bolts located on the side of the Filter Section. Loosen the nut locking the Bolt in place and adjust the Bolt to change the Frequency of the Notch. Monitor the output of the Transmitter with a Spectrum Analyzer and Null the Distortion Product with the Bolt. Red Field is a good Video Test Signal to use to see the +8.08 MHz Product. Tighten the nut when the tuning is completed. Hold the bolt in place with a screwdriver as the nut is tightened to prevent it from slipping.
For major tuning, such as changing the Notch Depth or moving the Notch Frequency more than 1 MHz, the Outer Conductor and the Center Conductor of the Trap Section must both be moved. This requires an RF Sweep Generator to accomplish. Apply the Sweep signal to the Input of the Trap Filter and monitor the Output. Loosen the Clamp holding the Outer Conductor in place and make the length longer to Lower the frequency of the Notch or shorter to Raise the frequency of the Notch. Loosen the Center Conductor with an Allen Wrench and move it Deeper for a Lower Frequency Notch or out for a Higher Frequency Notch. These adjustments must both be made to change the Notch Frequency. Moving only the Center Conductor or the Outer Conductor will effect the Notch Depth in addition to the Center Frequency. The variable that is being adjusted with this procedure is the length of the Center Conductor inside the Trap Filter. The gap between the Trap and the Main Line should not be changed. Moving only the Inner or the Outer Conductors by itself will effect the Gap and the Notch depth.

To effect the Notch Depth Only, both sections will have to be moved. The Notch Depth is controlled by the Gap between the Center Conductor and the Trap Section. This Gap also has an effect on the Center Frequency. To Deepen the Notch, Shorten the Outer Conductor and pull the Center Conductor Out until the Notch is back in the same place. Move the Sections in the opposite direction to make a Shallow Notch.

After tuning has been completed, tighten the Clamp and the Allen Screws, which hold the Conductors. Use the Fine Tuning Bolts to bring the Frequency In. The Final Tuning Adjustments should be completed with the Transmitter driving the Output Trap Filter for at least one hour to allow for warm-up drift.

This completes the Alignment Procedure for the Bandpass Filter Assembly.