7. PARTS LIST/TUNE-UP INFO

7.1 Parts List

The translator, can be subdivided as follows:

Receiver Tray:
-VHF filter
-Dual stage amplifier board
-Channel oscillator assembly
-Channel oscillator multiplier board
-Downconverter/amplifier board
-IF filter/ALC board
-SAW filter amplifier board
-Power supply board

UHF Exciter Tray:
-ALC board
-IF phase corrector
-UHF upconverter board
-Channel oscillator board
-X8 multiplier board
-Visual/aural metering board
-Power supply board

Amplifier Tray:
-Variable gain/phase board
-1 watt UHF amplifier board
-UHF filter
-Single stage amplifier assembly, class A
-Coupler board assembly
-Dual stage amplifier assembly, class AB
-4 Way splitter assembly
-Dual stage amplifier assemblies, class AB
-4 Way combiner assembly
-Circulator
-Dual peak detector board
-Amplifier protection board
-Amplifier control board
-Switching power supply

7.2 Tune-up Information

The 836A translator was aligned at the factory and should not require additional alignments to achieve normal operation.

The UHF/VHF Receiver Tray w/(Optional) Frequency Correction selects the desired UHF or VHF On Channel Input Signal and converts it to a Combined IF Signal of 45.75 MHz Visual + 41.25 MHz Aural. The Tray also has provisions for a Frequency Correction Option that consists of a VCXO Channel Oscillator Assembly with a PLL Circuit which maintains an exact IF Output Frequency, over the capture range of the PLL circuit, even if the Input UHF or VHF Frequency may vary.

7.2.1 RF Input Signal Path (Receiver)

The RF Input to the Tray, (-61 dBm to -16 dBm in Level), is fed through J1 for 50Ω to (A7) the input 50Ω Filter, DC Multiplexed (1035-1204 UHF, 1035-1902 VHF LB or 2065-1024 VHF HB) or through J5 for 75Ω to (A7) the 75Ω input Filter, DC Multiplexed (1035-1207 UHF, 1035-1903 VHF LB or 2065-1023 VHF HB), which is of a double tuned design that is adjusted to the desired Input UHF or VHF Channel Frequency. Note: If the input signal is greater then -25dBm, an attenuator should be used to limit the level to -25dBm. +12 VDC, for use by an (Optional) external Preamplifier Assembly, connects to the filter through F1 a 1 Amp Fuse. This +12 VDC is DC Multiplexed onto the input signal cable from the Preamplifier. DS1 a Red LED located on TB1 in the Tray will be lit if the +12 VDC is present on the input cable. If a Preamplifier is not used, F1 should be removed and DS1 should not be lit.

The signal is next amplified +12 dB to approximately the -49 to -4 dBm level by a low noise amplifier located on (A8-A1) the Dual Stage Amplifier Board (1227-1501) that is contained in (A8) the Dual Stage Amplifier Assembly (1227-1503). The board has approximately +13 dB or +26 dB of gain, depending on whether Jumper W1 on J5 is in place. The signal is then filtered in (A9) a Channel Filter (1007-1101 UHF, 1034-1202 VHF LB or 2065-1000 VHF HB) and then applied back to (A8-A1) the Dual Stage Board where the same amplification takes place. Jumper W1 on J7, located on the Dual Stage Board, should be removed if the Receiver Input level is greater than -40dBm. The output is connected to (A10) the Downconverter Amplifier Assembly (1227-1505) that contains (A10-A1) the Downconverter Amplifier Board (1227-1502). The RF, at the -47 dBm to -2 dBm Level, connects to the "R" Input Jack of the Mixer Z1 located on the Downconverter Amplifier Board.

7.2.2 Local Oscillator Signal Path (Receiver)

The Local Oscillator Signal is derived from a cut to channel crystal mounted in an oven that is factory set at 45° C. The Oscillator operates at 1/8 for UHF, 1/4 for VHF High Band or 1/2 for VHF Low Band of the desired local oscillator frequency. The crystal is mounted on (A4-A1) the Channel Oscillator Board, Dual Oven (1145-1201), that is part of the Channel Oscillator Assembly (1145-1202). The oscillator circuitry is a modified Colpitts design operating in a separate oven set at 50° C. for improved stability. If the Frequency Correction Option is purchased, the VCXO Channel Oscillator Assembly (1145-1206), which contains the VCXO Channel Oscillator Board (1145-1204), is used in place of the standard Channel Oscillator Assembly, and an AFC voltage from the PLL circuit maintains the frequency of the VCXO.

The output of the Channel Oscillator is connected to the (A5-A1) the x8 Multiplier Board (1227-1002) for UHF, the x4 Multiplier Board (1227-1525) for VHF HB or the x2 Multiplier Board (1227-1524) for VHF LB, which is located in (A5) the Multiplier Enclosure (1265-1125). The proper multiplier board takes the output of the Channel Oscillator (+3 dBm) and multiplies it eight, four or two times by a series of three, two or one x2 Broadband Doublers (2x2x2 = x8), which produces the L.O. signal on the desired frequency needed for the upconversion process. The signal is then amplified to the +16 dBm level. A sample of the multiplied L.O. Signal is fed to a detector circuit which lights the Green LED DS1 that indicates that the L.O. is present at the Output Jack J2 of the Multiplier Board. This Green LED is seen through a hole the lid of the Multiplier Assembly and is an indication, when lit, that there is a signal present at the output of the Multiplier Board. The L.O. signal is filtered in (A6) a L.O. Filter 1007-1101 UHF, 2065-1000 VHF HB or 1034-1211 VHF LB) and then sent (+15 dBm) to J2 on (A10-A1) the Downconverter

Amplifier Board. The L.O. Input to the Downconverter Amplifier Board is connected thru a 3 dB matching pad to the "L" Input of the Mixer (Z1) at a +12 dBm level.

7.2.3 Combined IF Signal Path (Receiver)

The L.O. and the RF signals are mixed in the Mixer Stage of the Downconverter Amplifier Board to produce the desired IF difference frequency at -55 dBm to -10 dBm in level, depending on the RF Input Level. The Combined IF Signal is routed to (A11-A1) the IF Filter/ALC Board (1227-1504), which is mounted in (A11) the IF Filter/ALC Enclosure (1265-1105). The IF Filter/ALC Board contains a Pin Diode Attenuator circuit which is part of the Automatic Level Control (ALC) that controls the level of the IF Signal to the two stage amplifier ICs U1 and U2.

The (Optional) (A11-A2) SAW Filter/Amplifier Board (1035-1211) is also contained in the IF Filter/ALC Enclosure. The SAW Filter/Amplifier Board connects to J5 and J6 of the IF Filter/ALC Board if more attenuation of the Out Of Band products is needed. If the SAW Filter/Amplifier Board is not needed, a jumper connects the Combined IF from J5 to J6 on the IF Filter/ALC Board.

The Combined IF is then bandpass filtered to the needed 6 MHz IF bandwidth around the 41.25 MHz + 45.75 MHz Combined IF signal and amplified by U3 to the -41 dBm to +4 dBm Level before it is split. One output is detected by U4 for use as the ALC reference level to the Pin Diode Attenuator Circuit. The ALC comparator drives the Pin Diode Attenuator Circuit to maintain the desired output level, typically +2 dBm. The other split output connects to J2 the Combined IF Output of the board that is cabled to the IF Output Jack of the Tray at J4 (+2 dBm).

7.2.4 Frequency Correction Option (Receiver)

If the Frequency Correction Option (1227-1528) is purchased, (A13) the IF Filter/Limiter Board (1109-1001), (A14) the IF PLL Board (1109-1002), the (A15) IF Carrier Oven Oscillator Board (1100-1206), (A4) the VCXO Channel Oscillator Assembly (1145-1206) and (A16) an IF Amplifier Board, High Gain (1197-1126) are part of the System.

A Sample of the amplified and ALC controlled signal from the IF Filter/ALC Board is directed to the IF Amplifier Board, High Gain (1197-1126) where it is amplified and connected to J2 on (A13) the IF Filter/Limiter Board (1109-1001). The IF is filtered by a SAW Filter, which passes Visual Carrier and Aural Carrier only, and amplified before it is split. The Aural IF Output is not used in this Tray. The other output of the splitter is amplified and applied to a Notch Filter. The Notch Filter is tuned to the Aural Frequency by C17 and R10 which reduces or eliminates the Aural IF from the Visual IF signal. The Visual IF Only signal then connects to a video detector circuit which in conjunction with U5 strips the video from the Visual IF signal. The IF CW Signal is amplified and buffered before it is connected to the output of the board at J6. The IF CW connects to J2 of (A14) the IF PLL Board (1109-1002).

The IF CW Signal (+3 dBm) on the IF PLL Board is wired to U1 a Divider IC which, in conjunction with U2, sets up one of the reference signals to the comparator circuit. The other reference signal is derived from the 50 kHz reference Input at J4 which is a divided down 50 kHz sample of the 38.9 MHz signal generated on (A15) the IF Carrier Oven Oscillator Board (1100-1206). The 38.9 MHz IF Carrier Oven Oscillator Board is used instead of the 45.75 MHz IF Carrier Oven Oscillator Board to minimize the interference between the generated 45.75 MHz IF and the signal generated on the (A15) IF Carrier Oscillator Board. The 38.9 MHz signal itself is not used, just the divided down 50 kHz reference of the 38.9 MHz Signal is used. The two reference signals applied to the IF PLL Board are compared by U2 and a difference voltage (AFC) is produced. The difference voltage (AFC), approximately -3 VDC, is fed from J3 of the board to FL2 of (A4) the VCXO Assembly. If the frequency of the VHF or UHF Input to the Tray should drift, the ALC voltage will change to increase or decrease the output frequency of the VCXO Assembly which increases or decreases the L.O. Frequency that maintains the IF Frequency at the standard 45.75 + 41.25 MHz Frequency. If the frequency of the Input Signal should drift out of the capture range of the PLL Circuit, DS1 the Red LED Unlock Indicator, located on the IF PLL Board, lights.

7.2.5 Voltages for Operation of the Tray (Receiver)

The AC input to the Tray is 117 VAC or 230 VAC and is directed thru Jack J2, of the (A1) Power Entry Module (1265-1104), to the step down Toroid (A2). The Power Entry Module contains an On/Off Switch, a 4 Amp Slo-Blo Fuse and three MOVs which protect the Tray from transients or surges which may occur on the AC Input Lines. When the On/Off Switch is switched On, AC is applied to the (A2) Toroid. The Toroid steps down the voltage into two 16 VAC outputs which are fed to (A3) the +12V(3A)/-12V Power Supply Board (1092-1206). The 16 VAC Inputs are connected to the two full wave bridge networks one for +12 VDC and one for -12 VDC. The output of the +12 VDC rectifier is fed to three 7812 IC regulators (U1, U2 and U3) and the output of the -12 VDC rectifier is fed to one 7912 IC regulator (U4). The ±12V Power Supply Board provides the voltage regulated and current limited +12 VDC and -12 VDC to the rest of the boards in the Tray.

7.2.6 +12VDC for External Preamplifier (Receiver)

+12 VDC is also applied through a 1 Amp Fuse F1 to (A7) the input DC Multiplexed UHF or VHF Filter. The +12 VDC is multiplexed in the Filter onto the input coaxial cable that connects from the (Optional) Remote Preamplifier Unit to the Receiver Tray. This supplies the Preamplifier with the +12 VDC needed for operation. The Red LED DS1 mounted on the Terminal Block TB1 will be lit if the +12 VDC is applied to the coaxial cable. **Note**: If the Red LED, DS1, is lit, the +12 VDC may damage Test Equipment that is connected to the input of the Receiver Tray. If a Preamplifier Assembly is not part of your System, F1 should be removed, therefore DS1 should not be lit and the +12 VDC is not multiplexed onto the input coaxial cable. A spare Fuse for F1 is supplied and stored near the fuse holder for F1.

Connect a UHF or VHF Input with a Multiburst Test signal applied, that is at the desired Channel Frequency, to J1 50Ω or J5 75Ω located on the rear of the (A3) VHF/UHF Receiver Tray. Check that the On/Off Switch located on the rear of the Tray is On.

Note: If the Red LED, DS1 is lit, +12 VDC is present at the input of the Receiver Tray and may damage any test equipment connected to it. Remove the fuse F1, DS1 will not be lit, before connecting test equipment to the input jack of the Receiver Tray.

7.2.6.1 (A7) UHF Filter, DC Multiplexed (1035-1204, 50Ω or 1035-1207, 75Ω), VHF Filter, LB, DC Multiplexed (1035-1902, 50Ω or 1035-1903, 75Ω) or VHF Filter, HB, DC Multiplexed (2065-1024, 50Ω or 2065-1023, 75Ω)

The input UHF or VHF signal (-61 dBm to -16 dBm) is fed to the filter which has been factory swept for 6 MHz Bandwidth at the Channel frequency and should not be tuned in the field. The output of the filter is directed to the J1 input of (A8) the Dual Stage Amplifier Assembly.

7.2.6.2 (A8-A1) Dual Stage Amplifier Board (1227-1501)

Mounted in: (A8) a Dual Stage Amplifier Assembly (1227-1503). The Dual Stage Amplifier Board has been factory set to the channel frequency and contains no customer tuning adjustments. The board has approximately +13 dB or +26 dB of gain, depending on whether Jumper W1 on J5 is in place.

7.2.6.3 (A9) UHF Filter (1007-1101), VHF LB Filter (1034-1202) or VHF HB Filter (2065-1000)

The UHF or VHF Filter has been factory swept for 6 MHz Bandwidth at the Channel Frequency and should not be tuned in the field. The output of the filter (-50 dBm to -5 dBm) is fed either through the additional amplifier stage on the Variable Gain Amplifier Board or to (A10-A1) the Downconverter/Filter Board.

7.2.6.4 (A4) Channel Oscillator Assembly, Dual Oven (1145-1202)

Contains: The Channel Oscillator Board, Dual Oven (1145-1201).

1. Connect the main output of the Channel Oscillator (J1) to a spectrum analyzer, adjusted to view the crystal frequency, and peak the tuning capacitors C6 and C18 for maximum output. Then tune L2 and L4 for maximum output. The output level should be approximately +5 dBm and the Oven Temperature should be maintained at 50°C.

   If a spectrum analyzer is not available, connect a DVM to TP1 on the x8, x4 or x2 Multiplier Board. Tune capacitors C6 and C18 for maximum voltage at TP1. Then tune L2 and L4 for maximum voltage at TP1.

2. Connect the sample output of the Channel Oscillator at J2 to a suitable counter and tune C11, Coarse Adjust, and C9, Fine Adjust, to the crystal frequency. Do not re-peak C6, C18, L2 or L4 because this may change the output frequency.

Note: While adjusting C9 and C11 to the crystal frequency the peak voltage monitored at TP1 of the Multiplier Board should not decrease. If a decrease does occur a problem with the crystal is likely.

3. Reconnect the main output at J1 of the Channel Oscillator to the Input Jack J1 of the Multiplier Board.

Note: If the Optional Frequency Correction Kit is purchased a VCXO Assembly (1145-1206), containing a VCXO Board (1145-1204), will be used instead of the standard Channel Oscillator Board. The adjustment will be the same as above except that the frequency is adjusted by moving the Jumper W1 on Jack J6, located on the IF PLL Board (1109-1002), to Pins 2 & 3, Fixed Bias, and adjusting R15 on the IF PLL Board for -3 VDC at FL2 of the VCXO Assembly. Move the Jumper W1 on Jack J6 to between Pins 1 & 2, AFC. Connect the Oscillator Sample output, at (J2) of the Channel Oscillator or the Front Panel Sample Jack (J9), to a suitable Frequency Counter and tune C11, Coarse Adjust, to the desired frequency. Do not re-peak C6, C18, L2 or L4 because it may change the output frequency.

Reconnect the main output (J1) of the Channel Oscillator (+5 dBm) to the input

(J1) of the Multiplier Board. DS1 the Red Unlock Indicator, located on the IF PLL Board, should not be lit.

7.2.6.5 (A5-A1) x8 Multiplier Board (1227-1002), x4 Multiplier Board (1227-1525) or x2 Multiplier Board (1227-1524)

Mounted in (A5) a Multiplier Enclosure (1265-1125). During Normal operation, the Green LED DS1, which can be seen through the access hole in the Enclosure Assembly, will be lit to indicate that the L.O. is present at the output of the x8 Multiplier Board.

1. Connect a Spectrum Analyzer to the Output Jack (J2) of the board.

2. Tune C4, C6, C10, C12, C18 and C20 on the x8 and the appropriate caps on the other boards for maximum output. Readjust all the Capacitors to minimize the seventh and the ninth harmonics, they should be at least -30 dB down, without affecting the x8 Multiplier Output.

If a Spectrum Analyzer is not available a DC voltmeter can be used as follows but the harmonic frequencies must be minimized to prevent interference with other Channels.

1. While Monitoring each Test Point with a DC voltmeter, maximize the voltage by tuning the Broadband Multipliers in the following sequence.

2. For x8 Multiplier Board: Monitor TP1 with a DVM and tune C4 for maximum. (Typical .6 VDC)
   Monitor TP2 and tune C6 and C10 for maximum. (Typical 1.2 VDC)
   Monitor TP3 and tune C12 and C18 for maximum. (Typical 2 VDC)
   Monitor TP4 and tune C20 for maximum.
   Re-peak C12 and C10 while monitoring TP4. (Typical 3.5 VDC)

   For x4 Multiplier: Monitor TP1 with a DVM and tune C4 for maximum. (Typical .6 VDC)
   Monitor TP2 and tune C6 and C10 for maximum. (Typical 1.2 VDC)
   Monitor TP3 and tune C12 for maximum.
   Re-peak C12 and C10 while monitoring TP3. (Typical 2 VDC)

   For x2 Multiplier: Monitor TP1 with a DVM and tune C4 for maximum. (Typical .6 VDC)
   Monitor TP2 and tune C6 for maximum.
   Re-peak C4 and C6 while monitoring TP2. (Typical 1.2 VDC)

The Green LED DS1 should be lit which indicates that the L.O. is present at the Output Jack J2 of the Multiplier Board. The output of the Multiplier at J2 is connected to (A6) a UHF or VHF Filter.

7.2.6.6 (A6) UHF Filter (1007-1101), VHF LB Filter (1034-1211) or VHF HB Filter (2065-1000)

This filter has been factory swept at the L.O. frequency and should not be tuned without proper equipment. The output of the filter (+15 dBm) is connected to J2 on (A10) the Downconverter/Filter Assembly.

7.2.6.7 (A10-A1) Downconverter/Amplifier Board (1227-1502)

Mounted in: The (A10) Downconverter/Amplifier Assembly (1227-1505).

The Mixer contains no adjustments and has a L.O. input of approximately +12 dBm in level applied to J2 and a -47 dBm to -2 dBm RF input applied to J1. The output IF level at J3 will be -55 dBm to -10 dBm.

1. Connect a Spectrum Analyzer to the Output Jack J3 and adjust L1, C2 and L3 for best frequency response.

2. Adjust C8 and R3 to notch out the Aural IF Frequency.

The IF output at J3 (-55 dBm to -10 dBm) is fed to the IF Filter/ALC Board. If needed a 10 dB Pad can be added to the circuit by moving the jumpers on J4 and J5 to the In position.

7.2.6.8 (A11-A1) IF Filter/ALC Board (1227-1504)
Mounted in: The (A11) IF Filter/ALC Enclosure (1265-1105).

1. Check that Switch S1, located on the IF Filter/ALC Board, is in the Auto ALC and that the output of the Board at J2 is approximately 0 dBm Output, adjust R23 if needed.

7.2.6.9 (Optional) (A11-A2) SAW Filter/Amplifier Board (1035-1211)
Mounted in: The (A11) IF Filter/ALC Enclosure (1265-1105).

This board is used for additional adjacent Channel rejection only if needed and may not be part of the Tray.

The board contains no tuning adjustments. The Jumpers W1 and W2 on J4 and J5 are placed for Attenuator In or Attenuator Out as needed to give the same output level at J2 as was at J1.

7.2.6.10 (A2) ±12V Power Supply Board (1092-1206)

This board contains no adjustments.

<u>Note</u>: If the (Optional) Frequency Corrector Kit is part of the tray, perform the following adjustments. If the Frequency Corrector Kit is not part of the tray, the tray is aligned and ready for normal operation.

7.2.7 IF Signal Path (UHF Exciter)

If the UHF Exciter Tray is used in a Translator System with a Receiver Tray it does not contain (A5) a Sync Tip Clamp/Modulator Board, (A4) an Aural IF Synthesizer Board or (A6) a Delay Equalizer Board. The Combined IF Output of the Receiver Tray connects to J6 on the UHF Exciter which is cabled to the IF Relays located on the ALC Board. To operate using the IF output of the Receiver Tray, the Modulator Select must not be present, jumper removed from J11-10 and 28, on the rear of the UHF Exciter. The alignment of the UHF Exciter in a Translator System starts with (A8) the ALC Board.

Alignment of the Tray

The Exciter Tray has been factory tuned and should need no alignment to achieve normal operation.

Begin here The Alignment of UHF Exciter Tray with the Combined IF from Receiver Tray Selected, which is Modulator Select Not Present at J11-10 & 28 or continue the Alignment for Internally Generated IF Selected, which is the Modulator Select Present at J11-10 & 28.

7.2.7.1 (A8) ALC Board (Part 1 of 2)

The following details the meaning of each LED of the ALC Board (A8) when illuminated.

DS1 - Red LED, Indicates an abnormally low IF signal level is present at IF input connector J1.
DS2 - Red LED, Indicates that the ALC circuit is unable to maintain the signal level requested by the ALC reference, usually due to excessive attenuation in the linearity, or the IF Phase Corrector signal path, or the Jumper W3 on J6 is in Manual Gain.
DS3 - Red LED, Indicates a Video Loss Fault.
DS4 - Red LED, Indicates a Mute Command is present.
DS5 - Green LED, Indicates the output from the Modulator is selected as the input to the board.

1. To align the ALC Board, preset the following controls in the UHF Exciter Tray:

   <u>ALC Board</u>

   Jumper W1 on J4 to Disable, between Pins 2 & 3. (to disable linearity correctors)
   Jumper W3 on J6 to Manual, between Pins 2 & 3. (for manual gain control)
   R87 the Manual Gain Pot adjusted to mid-range

   <u>IF Phase Corrector Board</u>

   W2 on J9 in Phase Correction Enable
   W3 on J10 in Amplitude Correction Disable.

2. The combined IF output of the Sync Tip Clamp Modulator Board is cabled to Jack J32 of the ALC Board. Remove J32 from the board, and observe that DS1, Input Fault, is illuminated. Reconnect J32 and observe that DS1 is extinguished.

3. Jumper W3 on J6 should be in the MANUAL position, monitor Jack J3 with a spectrum analyzer.

4. With a multiburst video signal present, tune C4 for flat frequency response ±0.5 dB.

5. Before proceeding with Part 2 of the ALC Board Alignment, check the IF Phase Corrector Board for proper functioning.

7.2.7.2 (A9) IF Phase Corrector Board

Refer to the System Alignment Procedure for the set up of the IF Phase Corrector Board. The signal level into the board should be approximately the same as the output of the board.

The IF Input Jack of the IF Phase Corrector Board is fed from the J3 IF O/P Jack of the ALC Board (A8).

The IF Output Jack of the IF Phase Corrector Board is fed to the J7 IF I/P Jack of the ALC Board (A8).

7.2.7.3 (A8) ALC Board, NTSC (Part 2 of 2)

1. Input a multiburst video test signal. Connect a spectrum analyzer to J11. Tune C63 for a flat frequency response ±0.5 dB.

2. Move the OPERATE/STANDBY switch located on the Front Panel to the OPERATE position.

3. Place Jumper W3 on Jack (J6) in the Manual Mode and adjust R87 for 0.8 Volts at TP4.

4. Place Jumper W3 on J6 in the Auto Mode and adjust the Front Panel Power Adjust control A20 full clockwise (CW). If the Optional Remote Power Raise/Lower Kit is present, then adjust Switch S1 on the Board to maximum voltage at TP4. Adjust R74, the Range Adjust, for 1 Volt at TP4.

5. Adjust the Front Panel Power Adjust control A20 for 0.8 VDC at TP4. If the Optional Remote Power Raise/Lower Kit is present, adjust Switch S1 on the Board to mid range of its travel, then adjust the Front Panel Power Adjust control (A20) for 0.8 VDC at TP4.

6. Disconnect the plug now on J12 (IF Output) and monitor with a spectrum analyzer. Verify an output of approximately 0 dBm. Adjust R99 if needed to increase output level. If less output level is needed, move the Jumpers J27 and J28 to Pins 2 and 3, then adjust R99 as needed. Reconnect J12.

7. Move W2 on J5 to the Cutback Enable position. Remove the input video signal and verify the output of the Transmitter drops to 25%. Adjust R71, the Cutback Level, if necessary. Restore the input video.

8. **Notice**: This step affects the Response of the entire Transmitter. Connect a video sweep signal to the input of the Tray. Monitor the output of the System with a spectrum analyzer. Adjust C71 with R103 and C72 with R106 as needed to flatten the response. C71 and C72 adjust for the frequency of the Correction Notch being applied to the Visual response of the Transmitter. R103 and R106 are used to adjust the Depth and Width of the Correction Notch.

9. Refer to the System Alignment Procedure for the set up of the Linearity Correctors. Controls R13, R18, and R23, the Magnitude controls, should be set full CW. Controls R34, R37 and R40 are the linearity Cut In adjustments.

7.2.7.4 (A11) UHF Upconverter Board

W1 on J10 in Manual. R10 is a gain control which is adjusted to give approximately +17 dBm Output at J5 of the Board with 0 dBm of IF into it.

7.2.7.5 (A14-A1) Channel Oscillator Board

This Board is mounted in (A14) the Channel Oscillator Assembly.

1. Connect the main output of the Channel Oscillator (J1) to a spectrum analyzer, tuned to the crystal frequency, and peak the tuning capacitors C6 and C18 for maximum output. Tune L2 and L4 for maximum output. The output level should be about +5 dBm. The Channel Oscillator should maintain an oven temperature of 50° C.

   If a spectrum analyzer is not available, connect a DVM to TP1 on the x8 Multiplier Board. Tune capacitors C6 and C18 for maximum voltage, then tune L2 and L4 also for maximum voltage output at TP1.

2. Connect the sample output of the Channel Oscillator (J2) to a suitable counter and tune C11, Coarse Adjust, and C9, Fine Adjust, to the crystal frequency. Do Not Re-peak C6, C18, L2 or L4 because this may change the output level.

   Notes: While adjusting C9 and C11 to the crystal frequency, the peak voltage monitored at TP1 of the x8 Multiplier Board should not decrease. If a decrease does occur, a problem with the crystal is possible. Contact Axcera Field Support for further instructions.

   If the VCXO in the VCXO Assembly is used, the C9 Fine Frequency Adjust is not located on the VCXO Board it is located on the FSK w/EEPROM Board by using R9.

3. Reconnect the Main Output (J1) of the Channel Oscillator to the Input (J1) of the x8 Multiplier.

7.2.7.6 (A15-A1) x8 Multiplier Board

The Board is mounted in a x8 Multiplier Enclosure Assembly.

During Normal operation, the Green LED DS1, which can be seen through the access hole in the Enclosure Assembly, will be lit to indicate that the L.O. is present at the output of the x8 Multiplier Board.

1. Connect a Spectrum Analyzer to the Output Jack (J2) of the board.

2. Tune C4, C6, C10, C12, C18 and C20 for maximum output.
   Readjust all the Capacitors to minimize the seventh and the ninth harmonics of the Channel Oscillator Frequency. They should be at least -30 dB down, without affecting the x8 Multiplier Output.

If a Spectrum Analyzer is not available a DC voltmeter can be used as follows but the harmonic frequencies must be minimized to prevent interference with other Channels.

1. While monitoring each test point with a DC voltmeter, maximize each test point by tuning the broadband multipliers in sequence.

2. Monitor TP1 with a DVM and tune C4 for maximum. (Typical 0.6 VDC)
   Monitor TP2 and tune C6 and C10 for maximum. (Typical 1.2 VDC)
   Monitor TP3 and tune C12 and C18 for maximum. (Typical 2.0 VDC)
   Monitor TP4 and tune C20 for maximum.
   Re-peak C12 and C10 while monitoring TP4. (Typical 3.5 VDC)

Typical output level is +15 dBm.

7.2.7.7 (A19) Visual/Aural Metering Board

The board is adjusted to give a peak detected output indication to the Front Panel Meter for Combined Output, Visual Only Output, Aural Only Output and Reflected Output and should need no adjustments to achieve normal operation. Refer to the System Section for Calibration of the Front Panel Meter.

7.2.7.8.(A3) +12VDC(4A)/-12VDC(1A) Power Supply Board

The board has no adjustments. DS1 will be lit if a +12 VDC output is connected to J6. DS2 will be lit if a +12 VDC output is connected to J3. DS3 will be lit if a +12 VDC output is connected to J4. DS4 will be lit if a +12 VDC output is connected to J5. DS5 will be lit if a -12 VDC output is connected to J7 and J8.

This completes the Detailed Alignment Procedure for the UHF Exciter Tray.

7.2.8 RF Signal Path (UHF Amplifier Tray)

The Tray has been adjusted at the factory to meet all specifications, including Phase Adjustment with the other UHF Amplifier Tray in the Transmitter and should not need adjusted to attain normal operation. During adjustments of the Amplifier Boards, S1 on the Amplifier Control Board should be in the Manual Gain position. Normal operation of the Tray is in the Auto position.

7.2.8.1 (A2-A1) Variable Gain/Phase Board

The board is mounted in (A2) the Variable Gain/Phase Enclosure.

This board contains no adjustments and has an AGC adjustable gain of 0 - 20 dB.

7.2.8.2 (A3-A1) 1 Watt UHF Amplifier Board

The board is mounted in (A3) the 1 Watt UHF Amplifier Enclosure.

This board has approximately 10 dB of gain and contains no adjustments.

7.2.8.3 (A1) UHF Filter

Apply a multiburst test signal to the Translator. Monitor J2 with a Spectrum Analyzer and tune C1 and C3 for peak output with a flat frequency response.

7.2.8.4 (A4-A1) Single Stage Amplifier Assembly, Class A

Made from the Generic Single Stage Amplifier Board, Class A w/Frequency Determining Kit.

This board operates Class A and has a gain of approximately 11 dB. The Bias of the Transistor is set by the on board biasing circuit. Adjust R6 for 5 Amps of idle current, no RF Drive applied. Connect a Voltage Meter across E1 and E2 on the Amplifier Protection Board and switch S1 to the I1 Position and adjust R6 for a reading of 50 mV. Connect a Sweep Test Signal to J1 the RF Input Jack of the UHF Amplifier Tray and monitor the output of the Board at J2 with a padded input Spectrum Analyzer. Tune Capacitors C5 for peak output then tune C6 for peak output power with a flat frequency response at J2.

7.2.8.5 (A4-A2) Coupler Board Assembly

This board contains no adjustments.

7.2.8.6 (A4-A3) Dual Stage Amplifier Assembly, Class AB

Made from the Generic Dual Stage Amplifier Board, Class AB w/Frequency Determining Kit.

This board operates Class AB and has a gain of approximately 9 dB. The Biases of the Transistors are set by the on board biasing circuits. Adjust R106 and R206 for 300 milliamps of idle current per side, no RF Drive applied. Connect a Voltage Meter across E1 and E2 on the Amplifier Protection Board and switch S1 to the I3 Position and adjust R106 for a reading of 3.0 mV. Switch S1 to the I2 Position and adjust R206 for a reading of 3.0 mV. These transistors may have 600 mA of bias depending on the linearity of Tray. Connect a Sweep Test Signal to J1, the RF Input Jack of the UHF Amplifier Tray, and monitor the output of the Board at J2 with a padded input Spectrum Analyzer. Tune Capacitors C105 and C205 for peak output, then tune C119 and C219 for peak output with a flat frequency response and minimum current at J2.

7.2.8.7 (A5-A1) 4 Way Splitter Assembly

This board contains no adjustments.

7.2.8.8 (A5-A2, A5-A3, A5-A4 & A5-A5) Dual Stage Amplifier Assemblies, Class AB

Each Board is made from a Generic Dual Stage Amplifier Board, Class AB w/Frequency Determining Kit.

These boards Operate Class AB and have a gain of approximately 9 dB. The Idling Current for each of the Transistors is set to 300 mA.

<u>To adjust the Idling Currents, no RF applied to the Tray, of the Devices on (A5-A2):</u> Connect a Voltage Meter across E1 and E2 on the Amplifier Protection Board and switch S1 to the I5 Position and adjust R106 for a reading of 3.0 mV. Switch S1 to the I4 Position and adjust R206 for a reading of 3.0 mV.

Connect a Sweep Test Signal to J1 the RF Input Jack of the UHF Amplifier Tray. On the (A5-A2) Amplifier Board tune Capacitors C105 and C205 for peak output power then tune C119 and C219 for peak output power with a flat frequency response and minimum current.

<u>To adjust the Idling Currents, no RF applied to the Tray, of the Devices on (A5-A3):</u> Connect a Voltage Meter across E1 and E2 on the Amplifier Protection Board and switch S1 to the I7 Position and adjust R106 for a reading of 3.0 mV. Switch S1 to the I6 Position and adjust R206 for a reading of 3.0 mV.

Connect a Sweep Test Signal to J1 the RF Input Jack of the UHF Amplifier Tray. On the (A5-A3) Amplifier Board tune Capacitors C105 and C205 for peak output power then tune C119 and C219 for peak output power with a flat frequency response and minimum current.

<u>To adjust the Idling Currents, no RF applied to the Tray, of the Devices on (A5-A4):</u> Connect a Voltage Meter across E1 and E2 on the Amplifier Protection Board and switch S1 to the I9 Position and adjust R106 for a reading of 3.0 mV. Switch S1 to the I8 Position and adjust R206 for a reading of 3.0 mV.

Connect a Sweep Test Signal to J1 the RF Input Jack of the UHF Amplifier Tray. On the

A5-A4 Amplifier Board tune Capacitors C105 and C205 for peak output power then tune C119 and C219 for peak output power with a flat frequency response and minimum current.

To adjust the Idling Currents, no RF applied to the Tray, of the Devices on (A5-A5): Connect a Voltage Meter across E1 and E2 on the Amplifier Protection Board and switch S1 to the I11 Position and adjust R106 for a reading of 3.0 mV. Switch S1 to the I10 Position and adjust R206 for a reading of 3.0 mV.

Connect a Sweep Test Signal to J1 the RF Input Jack of the UHF Amplifier Tray. On the (A5-A5) Amplifier Board tune Capacitors C105 and C205 for peak output power then tune C119 and C219 for peak output power with a flat frequency response and minimum current.

7.2.8.9 (A5-A6) 4 Way Combiner Assembly
Contains: (A5-A6-A1) A 4 Way Combiner Board.

This board contains no adjustments.

7.2.8.10 (A5-A6-A2) Circulator

The circulator contains no adjustments.

7.2.8.11 (A6-A1) Dual Peak Detector Board, Single Supply
Is mounted in (A6) a Dual Peak Detector Enclosure.

This board contains no adjustments.

7.2.8.12 (A7) Amplifier Protection Board

This board contains no adjustments.

7.2.8.13 (A8) Amplifier Control Board

To check the operation of the Overdrive circuit. Increase the gain pot of the UHF Amplifier Tray to approximately 110 %. The Overdrive LED DS2 should light and the output power should not increase above the 110 % level. Adjust the Overdrive Threshold as needed, if the LED does not light.

7.2.8.14 (A12) Pioneer Magnetics +26.5V/2000W Switching Power Supply

This Switching Power Supply contains no customer repairable items, if the Power Supply should malfunction, do not attempt to repair the power supply without first consulting Axcera Field Support Dept. The Power Supply is adjusted to provide +26.5 VDC output.

7.2.8.15 Calibration of Output Power and VSWR Cutback

Place a Wattmeter and Dummy Load of at least 600 Watts at the Output of the Tray that is to be calibrated and switch the front panel meter to the % Output Power position. Preset R16 Manual Gain, located on (A8) the Amplifier Control Full CCW. Switch S1 located on the Amplifier Control Board to the **Manual** position. Insert a Visual Only with Sync Only Test Signal to the System and verify 40 IRE Units of Sync Test Signal. Adjust R16 for 360 Watts Sync on the Wattmeter.

The following Test using Zero Span and Aural addition is for Analog only. Monitor a sample of the output with a Spectrum Analyzer set to the 0 Span position and adjust the Spectrum Analyzer so that the level of the output is at the top line of the graticule. Insert -10 dB of Aural to the Visual Sync Only Test Signal and adjust R16 for the same reference level on the Spectrum Analyzer as with the Visual Only input. The output power on the Wattmeter should be approximately 550 Watts Visual & -10 dB Aural. Calibrate the Front Panel Output Power Meter to 100% with R2, Forward Calibration, located on the Amplifier Control Board.

Reduce the Manual Gain Pot R16 to a 50 % reading on the front panel meter in the % Output Power position. Turn the Tray Off. Remove the Load from the output of the Tray and switch the front panel meter to the Reflected Output Power Position. Switch the Tray On. Adjust the Reflected Power adjust Pot R22 located on the Amplifier Control Board to a 50% reading. Then adjust R29, the VSWR Threshold Cutback Pot located on the Amplifier Control Board until the VSWR Cutback LED DS1 located on the front panel just lights. This sets up the VSWR Cutback Circuitry. After the set up is completed, switch S1 located on the Amplifier Control Board to **Automatic Gain Control**, which is the normal operating position for the switch.

The UHF Amplifier Tray is aligned and calibrated and ready for normal operation.

7.2.10 System Alignment

Perform the following Alignment only if determined to be needed. The system alignment includes adjustment of linearity to compensate for any amplifiers nonlinear responses. The Transmitter should be switched On initially into a 2000 Watt dummy load to verify that the system is functioning properly.

7.2.10.1 (A3) UHF/VHF Receiver Tray (1265-1100)

Connect a UHF Input (-61 dBm to -16 dBm), with a Multiburst Test signal applied, that is at the On Channel Frequency to Jack J5, "F" type connector for 75Ω or Jack J1, "N" type connector for 50Ω located on the Receiver Tray. Check that the On/Off Circuit Breaker, located on the rear of the Receiver Tray, is On. If the Optional Remote Preamplifier is purchased, the Fuse F1 located in the Receiver Tray must be removed to eliminate the +12 VDC from the input to the Receiver Tray to prevent damage to the Test equipment. Check the Front Panel Sample Jack (J6) with a Frequency Counter. The signal should be at the needed frequency, check the top of the Channel Oscillator Assembly for the actual frequency, to produce the IF Outputs.

7.2.10.2 (A4) UHF Exciter Tray (1300-1020)

The IF Section of the UHF Exciter Tray includes adjustments for automatic level control (ALC), linearity (amplitude predistortion) and phase (phase change vs. level) predistortion for correction of the nonlinearities of the RF Amplifier Trays. The Upconverter Section also includes adjustments of the local oscillator chain tuning and also the local oscillator center frequency tuning. Both of these were completed at the factory and should not require adjustment at this time.

Move the Operate/Standby Switch located on the UHF Exciter Tray to Standby. The set up of the RF Output, includes adjustment of the drive level to the four UHF Amplifier Trays, the adjustment of the Linearity and Phase Predistortion which compensate for any nonlinear response of the Amplifier Trays and also the gain and phasing adjustments of the four UHF Amplifier Trays.

Verify that all **Red** LEDs located on the ALC Board are extinguished. The following list details the meaning of each LED when illuminated.

DS1 (Input Fault) Indicates abnormally low or no IF is present at the Input of the ALC Board.

DS2 (ALC Fault) Indicates that the ALC circuit is unable to maintain the signal level requested by the ALC reference. Normally this is due to excessive attenuation in the linearity signal path, the IF Phase corrector signal path or that Jumper W3 on J6 is in the Manual ALC Gain position.

DS3 (Video Loss) Indicates a loss of Video at the Input of the ALC Board.

DS4 (Mute) Indicates a Visual Mute Command is present. **Not used in this configuration**.

DS5 (Modulator Enable) Indicates Modulator IF Output is selected. Will be Off if the output of the Receiver Tray is selected.

The ALC is Muted when the Translator is in Standby. To monitor the ALC, turn Off the front panel On/Off circuit breaker located on the Amplifier Trays and switch the Translator to Operate. Adjust the Power Adjust Gain Pot, located on the Front Panel of the UHF Exciter Tray, to obtain +0.8 VDC on the Front Panel Meter in the ALC Position. On the ALC Board (1265-1305), move the Jumper W3 on J6 to the Manual Position, between Pins 2 & 3, and adjust R87 on the ALC Board for +0.8 VDC on the Front Panel Meter in the ALC Position. Move the Jumper W3 back to Auto, between Pins 1 & 2, which is the normal operating position. The detected IF signal level at J19-2 of the ALC Board is connected to the Transmitter Control Board that distributes the level to the Four UHF Amplifier Trays where it is used as a reference for the automatic gain control (AGC) in each Amplifier Tray. Xxxxxx

7.2.10.3 (A6, A7, A8 & A9) UHF Amplifier Trays (1294-1112 Low Band, 1294-1113 Mid Band, or 1294-1114 High Band)

Check that the output power of the Translator is 100 %, if it is not, adjust the Power screwdriver Adjust Pot located on the front panel of the UHF Exciter Tray as needed to achieve 100%.

When testing one of the UHF Amplifier Trays the other circuit breakers, located on the AC Distribution Panel, should be turned Off. The Amplifier 1 Circuit Breaker applies power to the Top left UHF Amplifier Tray, the Amplifier 2 Circuit Breaker applies power to the bottom left UHF Amplifier Tray, the Amplifier 3 Circuit Breaker applies power to the bottom left UHF Amplifier Tray and the Amplifier 4 Circuit Breaker applies power to the bottom right UHF Amplifier Tray. The UHF Amplifier Trays should be turned on into a dummy load of at least 600 Watts to verify that the Tray is functioning. Preset the AGC Switch on (A8) the Amplifier Control Board (1265-1414) to the AGC On position. The four UHF Amplifier Trays are set up in pairs, the top two A6 with A7 and the bottom two A8 with A9. Switch On the Amplifier 1 Circuit Breaker, located on the AC Distribution Panel. Switch to Operate the Translator Operate/Standby Switch, located on the UHF Exciter, and observe the power supply metering position on the UHF Amplifier Tray. It should read +26.5 VDC when the Tray is switch On and the Translator is in Operate.

Switch the Tray to the % Output Power Meter Position and adjust the front panel Gain pot located on that Amplifier Tray to 100% on the Meter, then back off the Gain Pot to the reading as written on the Test Data Sheet for your Translator. Repeat for the Amplifier 2 Tray of the pair. Switch the Translator to Standby and reconnect the UHF Amplifier Trays to the (A10) UHF Tee Assembly. Repeat the above procedure for Amplifier 3 and Amplifier 4. After the setup of all four Amplifier Trays, switch the Translator to Operate and adjust the Phase Controls on each of the Amplifier Trays to give maximum Output Power on the Front Panel of the UHF Exciter. The Output Power reading on the front panel of the UHF Exciter should be 100%, if it is not, adjust the Power screwdriver Adjust Pot located on the front panel of the UHF Exciter Tray as needed to achieve the 100% Output.

Switch the Input Test source to select a NTSC 3.58 MHz Modulated Staircase or Ramp Test waveform and set up the station demodulator and monitoring equipment to monitor the differential gain and differential phase of the RF Output signal.

If a synchronous demodulator having a quadrature video output is available, it can be used with an X-Y Oscilloscope to display incidental carrier phase modulation (ICPM). As shipped, the Exciter was preset to include linearity (gain vs. level) and incidental phase (carrier phase vs. level) predistortion. The predistortion was adjusted to approximately compensate the corresponding non-linear distortions of the Amplifier which is driven to place the Sync Level near saturation. Move the Jumper W1 on J4 on the ALC Board to the Enable Position. Refer to the Test Data Sheet for your Translator for the final test readings on each Amplifier Tray. Adjust the Phase Pot located on each UHF Amplifier Tray to obtain maximum % Visual Output Power. Adjust each of the Gain Pots, on the UHF Amplifier Trays, equally, as needed to obtain 100% Visual Output Power on the Front Panel Meter of the UHF Exciter.

7.2.10.4 System Set-up of Linearity

On the IF Phase Corrector Board (1227-1250), preset the Pots R7, R15, R23 & R35 full CW, and R3, R11, R19 & R31 full CCWThe IF linearity correction function consists of three non-linear cascaded stages, each having adjustable magnitude and threshold or cut-in points located on the ALC Board. The threshold adjustment determines at what IF signal level the corresponding corrector stage begins to increase gain. The magnitude adjustment determines the amount of gain change for the part of the signal which exceeds the corresponding threshold point. Refer to the UHF Exciter Tray Assembly Drawing (1265-5300), or the Assembly Drawing for (A8) ALC Board (1265-5305), to locate the adjustments for the first through third linearity corrector stages. Because the stages are cascaded, the order of correction is important. The first stage should cut-in near white level, with the cut-in point of the next stage toward black and with the last stage primarily stretching sync.

To adjust the linearity correctors from scratch. Ensure that the Translator is operating at full power with the desired A/V Ratio. Check that the Jumper W1 on J4 on the ALC Board is Enabled, between Pins 1 & 2. Check that the ALC Voltage is set to +0.8 VDC as monitored on the Front Panel Meter in the ALC Position.

Insert a modulated ramp video test signal into the Translator. Demodulate the output signal of the Translator and observe the waveform on a Waveform Monitor while also looking at the signal on a Spectrum Analyzer. On the IF ALC Board (1265-1306), preset the Pots R34, R37 & R40 (Threshold) full CCW, and the Magnitude Adjustments R13, R18

& R23 full CW.

Set the Waveform Monitor to Differential Step Filter and the Volts/Division scale to .1V. Center the display around Blanking.

Gradually adjust pots R3, R11 and R19 Clockwise on the IF Phase Corrector Board as needed to minimize the observed thickness of the intermod as seen on the display.

Adjust the pots R34, R37 and R40 Clockwise on the IF ALC Board needed to give correction at Sync or at low luminance levels, which are viewed at the rightmost edge of the Waveform Monitor.

The intermod beat products between the Color Burst and the Aural Carrier at 920 kHz above Visual Carrier should also be observed on the Spectrum Analyzer while performing the preceding adjustments. The frequency will vary for PAL Systems. When the adjustments are performed properly, the intermod products on the Spectrum Analyzer should be at least -52 dB down, with a Red Field input, from peak visual carrier and the Intermod Distortion as displayed on the Waveform Monitor should be no more than 1 IRE. The pot R31 on the IF Phase Corrector Board is used for any extra Intermod correction that may be needed.

It should be noted that any adjustment of the above pots affects other visual parameters and some slight adjustments of all the pots may be needed to meet all specifications simultaneously.

If the Translator is being driven very hard, it may not be possible to get enough Sync Stretch while maintaining a flat differential gain. In this case, some Video Sync Stretch may be used from the Sync Tip Clamp/Modulator Board. The Sync Stretch adjustment is R48 located on the Sync Tip Clamp/Modulator Board. Switch the Translator to Standby.

7.2.10.5 Phase and Gain Adjustment of the UHF Amplifier Trays

The following procedure was completed at the factory and should only be followed if one of the UHF Amplifier Trays is replaced.

Preset the Phase and Gain potentiometer located on each UHF Amplifier Tray Full CCW. Switch the Translator to Operate and adjust the Gain Pot on each Tray for 25% Output Power. Adjust the Phase Control CW on the Left UHF Amplifier Tray. If the % Visual Output Power goes UP, continue to adjust until either the Peak is reached or the End of Travel is reached. If the % Output Power goes Down, Reset the Phase Control on the UHF Amplifier Tray Fully CCW and repeat the above procedure with the Phase Control of the other Amplifier Tray.

If the End of Travel is reached on the Phase Adjust, Reset the Phase Control CCW and add a 2" length of Cable to the output of the (A5) Splitter Module which connects to the effected UHF Amplifier Tray at J1. Readjust the Phase of that Tray until a Peak is reached or until End of Travel is achieved. If End of Travel is reached, repeat the above procedure replacing the 2" length cable with a 4" length of cable. Once a Peak is reached, move the Phase Control, that is Full CCW, Up 2 Turns and re-peak using the Phase Control located on the other Tray. This allows both Trays to have some range of adjustment.

Adjust the Gain of both UHF Amplifier Trays for 90% Tray Output Power. Readjust each Phase Control to Peak the Combined Output, the Phase should only have been effected slightly. There should be a definite Peak that is achieved while adjusting the Phase of each Tray though it may take a few Turns to notice a change. Raise or Lower the Output Power of each Tray to achieve 100% Output Power. The Output Power of each Tray should be 90% - 100%.

7.2.10.6 Calibration of the Forward Output Power Level of the Translator

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

Switch the Translator to Standby and preset R51, Aural Null pot, located on the Visual/Aural Metering Board (1265-1309), full CCW. Adjust R48, the Null Offset pot, located on the Visual/Aural Metering Board, for 0% Visual Output. Do the following adjustments with no Aural present, by removing the Aural from the RF Input Test Signal. Connect a Sync and Black Test Signal to the Input of the UHF Exciter Tray. Switch the Translator to Operate.

Next Set the Translator up for the appropriate Average Output Power Level. (Sync + Black 0 IRE Setup Wattmeter = 1190 Watts). (Sync + Black 7.5 IRE Setup Wattmeter = 1090 Watts). **Note:** Must have 40 IRE Units of Sync. Adjust R28, Visual Calibration, located on (A19) the Visual/Aural Metering Board (1265-1309) for 100% on the front panel meter in the % Visual Output Position.

With the Spectrum Analyzer set to Zero Span Mode, obtain a peak reference on the screen. Reinsert the Aural to the RF input test Signal. While in the Visual Output Power position, adjust L3 for minimum visual power reading. Turn the power adjust pot on the front panel until the original peak reference level is attained. Peak L1 and C8 for maximum Aural Power reading, then adjust R20 also for 100% Aural Power reading. Then switch to Visual Output Power position and adjust R51 for 100% Visual Power.

7.2.10.7 Calibration of the Reflected Output Level of the Translator

Turn the Power Adjust Pot to 20% on the Meter in the Visual Power position, check that the Jumper is in Manual on the UHF Upconverter Board (1265-1310). Unterminate the Translator and adjust R39 on the Visual/Aural Metering Board (1265-1309) for a 20% reading in the Reflected Power position. At this 20% Reference Power reading, the VSWR LED mounted on the front panel of the Exciter should be illuminated. If not adjust R22 on the Transmitter Control Board until the VSWR LED just turns On. Turn the Power Adjust pot slightly CCW and the LED should go out, turn the pot CW until the LED just turns On. The Reflected Output Power is now calibrated. Switch the Translator to Standby. Re-terminate the Translator. Switch the Translator to Operate and adjust the front panel power pot for 100% Visual Power reading.

7.2.10.8 IF Phase Corrector Adjustment

As shipped, the Exciter was preset to include linearity (gain vs. level) and phase (phase vs. level) predistortion. The predistortion was adjusted to approximately compensate the corresponding non-linear distortions of the Amplifier Trays and should need no additional adjustment.

Locate (A9) the IF Phase Corrector Board (1227-1250) mounted in the UHF Exciter. The Amplitude Correction portion of the Board is not utilized in this configuration, therefore the Jumper W3 on J10 should be in the Disable Position, to +6.8 VDC, and R35 & R31 should be full CCW. R68 is the Range Adjustment and should be set in the Middle. The Phase

Correction Enable/Disable Jumper W2 on J9 should be in the Enable Position, to Ground. Switch the Input Video Test source to select a NTSC 3.58 MHz Modulated Staircase or Ramp Test waveform and set up the station demodulator and monitoring equipment to monitor the Differential Phase or Intermod Products of the RF Output signal. There are three corrector stages, located on the IF Phase Corrector Board, each with a Magnitude and a Threshold Adjustment which are adjusted as needed to correct for any Differential Phase or Intermod problems. Adjust R3 Threshold, for the cut in point of the correction and R7 Magnitude, for the amount of the correction as needed.

The jumper W1 on J8 is set to give the desired polarity of the correction shaped by the Threshold R11 and Magnitude R15 adjustments. After setting the polarity, adjust R11 Threshold, for the cut in point of the correction and R15 Magnitude, for the amount of the correction as needed. Finally, adjust R19 Threshold, for the cut in point of the correction and R23 Magnitude, for the amount of the correction as needed. **Note:** Adjusting these pots changes all Visual parameters and should be used cautiously.

7.2.10.9 (A10 & A11) UHF High Power Tees

The inputs to the (A10) UHF Tee are the outputs of the (A6 & A7) UHF Amplifier Trays and the inputs to the (A11) UHF Tee are the outputs of the (A8 & A9) UHF Amplifier Trays. The inputs to the UHF Tees are 50 ohm impedances to match the output impedance of the UHF Amplifier Trays. The two inputs to each of the UHF Tees are combined and then sent through a piece of transmission line 1/4 of a wavelength long to transform the output impedance of the Tees to 50 ohms. The outputs of the (A10 & A11) UHF Tee are then sent to (A12) a Hybrid Combiner which combines the two inputs. The output of the Hybrid is connected to (A13) a Bandpass Filter.

The Bandpass Filter and (Optional) Trap Filter are factory swept and should not be tuned without the proper equipment. Do not attempt to tune the filters without a sweep generator and preferably a network analyzer. If you think tuning is needed consult Axcera Field Support Department before beginning.

7.2.10.10 (A13) Bandpass Filter

The input to this filter is output of the Hybrid Combiner that is the combined output of the UHF Amplifier Trays. The filter is made of aluminum waveguide and has five resonant cavities. The filter has five bolts for tuning adjustments, three located in the middle on left and two on the right, and four or six rods, depending upon the channel, for coupling adjustments between the sections, located on the front of the Bandpass Filter. The Bandpass Filter also utilizes two integral traps at -4.5 MHz and +9 MHz from F_V at the top and bottom respectively of the left hand side of the Bandpass Filter, looking from the rear of the Cabinet. Refer to the Bandpass Filter Drawing for the location of the adjustments.

To tune the filter, connect a sweep signal to the input of the filter and adjust the five tuning bolts for a 6 MHz bandwidth and a flat frequency response across the desired band. **Note**: The Bandpass Ripple should be ≤0.25 dB. The 6 MHz Band should also have a minimum of 20 dB return loss across the pass band.

Refer to the Table below for typical values.

Frequency	Insertion Loss (dB)	Return Loss (dB)
F_V-4.5	≥35	
F_V-0.5		≥20

F_V	≤0.6	≥20
F_a	≤0.6	≥20
F_V+8.08	≥15	
F_V-9	≥30	
$2F_V$	≥30	

7.2.10.11 (Optional) (A14) One or Two Section Trap Filter

The Trap Sections have been factory tuned and should not need major adjustments. The Trap Filter is Optional and may not be part of your System. The input to the One or Two Section Trap Filter is the output of the Coupler Assembly. The Trap Filter is comprised of 3-1/8" EIA standard transmission line sections connected to the main transmission line. The transmission line assembly consists of 7/8" EIA standard rigid coaxial components.
The Traps on the output Trap Filter 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 UHF 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.

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 Translator 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.

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. **Note**: The Trap Filter is typically adjusted for a notch depth of 10 dB.

The Effects of tuning the Output Trap Filter

Lengthening Outer Conductor Only..Notch Frequency Up, Shallower Notch.
Shortening Outer Conductor Only..Notch Frequency Down, Deeper Notch.
Inserting Inner Conductor Deeper.......................................Notch Frequency Down, Deeper Notch.
Inserting Less Inner Conductor..Notch Frequency Up, Shallower Notch.
Tuning Bolt In ....Notch Frequency Down.
Tuning Bolt Out ....Notch Frequency Up.
Moving both Inner and Outer Conductors
to keep the Same Gap inside.................................Center Frequency Moves Notch Stays the Same.

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

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

This completes the alignment of the Translator. If more detailed information is needed, refer to the Section in the Instruction Manual on the Tray or the board.