Chapter 5
Detailed Alignment Procedures

The 837B translator was aligned at the factory and should not require any additional alignments to achieve normal operation.

This translator takes the On channel RF input to the Receiver Tray and converts it to the desired UHF On Channel RF Output at the systems output power level.

If the (Optional) Modulator Kit is purchased, this translator can also operate using the baseband audio and video inputs or, if the (Optional) 4.5-MHz composite input kit is purchased, either a single composite video + 4.5-MHz input or separate baseband video and audio inputs.

Make sure that the RF output at J2 of the (A11) coupler is terminated into a dummy load of 4000 to 6000 watts, depending on your systems output power. While performing the alignment, refer to the test data sheet for the translator and compare the final readings from the factory with the readings on each of the trays. They should be very similar. If a reading is off by a significant amount, the problem is likely to be in that tray.

Switch on the main AC and the UHF exciter circuit breakers on the AC distribution panel behind the rear cabinet door of the Exciter Cabinet.

5.0 UHF/VHF Receiver Tray.)(1142479 or 1265-1100; Appendix C)

Connect a UHF or VHF Input that is at the desired Channel Frequency, to J1 50Ω or J5 75Ω located on the rear of the (A7) 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.

5.0.1 (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); Appendix D)}

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.

5.0.2 (A8-A1) Dual Stage Amplifier Board (1227-1501; Appendix D)

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.

5.0.3 (A9) UHF Filter {(1007-1101), VHF LB Filter (1034-1202) or VHF HB Filter (2065-1000); Appendix D}

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.

5.0.4 (A4) Channel Oscillator Assembly, Dual Oven (1145-1202; Appendix D)

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.
   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.

5.0.5 (A5-A1) x8 Multiplier Board {(1227-1002), x4 Multiplier Board (1227-1525) or x2 Multiplier Board (1227-1524); Appendix D}

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.

5.0.6 (A6) UHF Filter {(1007-1101), VHF LB Filter (1034-1211) or VHF HB Filter (2065-1000); Appendix D}

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.

5.0.7 (A10-A1) Downconverter/ Amplifier Board (1227-1502; Appendix D)

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.

5.0.8 (A11-A1) IF Filter/ALC Board (1227-1504; Appendix D)

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.

5.0.9 (A11-A2) (Optional) SAW Filter/Amplifier Board (1035-1211; Appendix D)

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.

5.0.10 (A2) ±12V Power Supply Board (1092-1206; Appendix D)

This board contains no adjustments.

Note: 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.

5.0.11 (A15) (Optional) IF Carrier Oscillator Board (1100-1206; Appendix D)

1. Monitor J3 with a Spectrum Analyzer and observe the 38.9 MHz Visual IF signal at +5 dBm.

2. Connect a Frequency Counter to J2 on the board or to J9 on the Front Panel and adjust C17 for 38.9 MHz.

3. Connect a Frequency Counter to J1 and check for the 50 kHz signal. Adjust C17, if needed, to attain the 50 kHz frequency. Remove the Jack on J5. DS2 the Unlock Indicator should light. Replace the Jack onto J5.

5.0.12 (A13) (Optional) IF Filter/ Limiter Board (1109-1001; Appendix D)

1. Monitor the Aural Notch Test Output of the board at J5 and move the Jumper W1 on Jack J4 to between Pins 2 & 3, Test Position. Adjust C17 to the Aural IF Frequency, then adjust R10 to eliminate or minimize the Aural IF signal. Move the Jumper W1 on Jack J4 back to between Pins 1 & 2, Operate Position.

2. Monitor the IF CW Output of the board at J6 with an Oscilloscope and adjust R12 and C21 for maximum Video Signal or connect a Spectrum Analyzer, in Zero Span, to J6 and adjust R12 and C21 for Minimum Video Signal amplitude ripple on the displayed signal.

3. Adjust R15 for +3 dBm or Maximum output level if +3 dBm cannot be attained.

5.0.13 (A14) (Optional) IF PLL Board (1109-1002; Appendix D)

Check that the Red LED DS1, Unlock Indicator, located on the board is not lit.

If DS1 is lit, follow the alignment procedure for setting up the VCXO Channel Oscillator using R9 on the IF PLL Board to set up the AFC Voltage for the Frequency of the VCXO. If it is still lit, check the 50 kHz reference output of the (A15) IF Carrier Oven Oscillator. If needed, follow the alignment procedure for the IF Carrier Oven Oscillator Board.

5.0.14 (A16) (Optional) IF Amplifier Board, High Gain (1197-1126; Appendix D)

This board contains no customer adjustments. The amplified IF output from the IF Filter/ALC Board connects to the IF Filter Limiter Board.

The Receiver Tray is now set up and ready for normal operation.

5.1 UHF Exciter Tray with Baseband Video and Audio Inputs (Must have Optional Modulator Kit.)(1142458 or 1245-1100; Appendix C)

This tray has adjustments for video levels, audio modulation levels, and other related parameters.

Connect an NTSC baseband video test signal input (1 Vpk-pk) to the translator video input jacks J2 or J1 on the rear of the tray. Jacks J1 and J2 are loop-through connected; the unused jack can be used as a video source for another transmitter by removing jumper W4 on jack J3 on (A5) the sync tip clamp/ modulator board (1265-1302). Connect a baseband audio input (+10 dBm) to the balanced audio input terminal block TB1-1 [+], TB1-2 [-], and TB1-3 [ground] or, if stereo/composite audio is provided, connect it to BNC jack J3 or J13, the composite audio input jack. Jacks J3 and J13 are loop-through connected; the unused jack can be used as an audio source for another transmitter by removing jumper W1 on jack J15 on the aural IF synthesizer.

Select the baseband input operation by applying a baseband select, using a jumper or closed contacts, connected between J7-6 and J7-7 on the rear of the tray. Look at the front panel meter on the UHF exciter tray. In the video position, the meter indicates active video from 0 to 1 Vpk-pk. The normal video input level is 1 Vpk-pk on the meter. If this reading is not at the proper level, the overall video level can be changed by adjusting video level control R12 on (A5) the sync tip clamp/modulator board (1265-1302).

Switch the meter to the audio position that indicates the audio deviation (modulation level) of the signal from 0 to 100 kHz. The aural IF synthesizer board was factory set for a ±25-kHz deviation with a balanced audio input of +10 dBm. If the reading is not at the correct level, adjust balanced audio gain pot R13 on the aural IF synthesizer board, as necessary, to attain the ±25-kHz deviation. The aural IF synthesizer board was factory set for a ±75-kHz deviation with a composite audio input of 1 Vpk-pk. If this reading is not correct, adjust composite audio gain pot R17 on the aural IF synthesizer board, as necessary, for the ±75-kHz deviation.

5.2 UHF Exciter Tray with (Optional) 4.5-MHz Composite Input Kit

With the (Optional) 4.5-MHz composite input kit, the UHF exciter can operate using either the separate video and audio baseband inputs or the single 4.5-MHz composite input. The 4.5-MHz composite input kit includes a composite (A24) 4.5-MHz filter board and (A25) a 4.5-MHz bandpass filter board.

To operate the transmitter using the 4.5-MHz composite input, remove the baseband select command from J7-6 and J7-7 on the rear of the tray.

Connect a multiburst test signal from an envelope delay measurement, set to the input of the tray, at J1 or J2. On (A24) the composite 4.5-MHz filter board, connect an oscilloscope between J7, the center pin, and pin 1 or 3, which are ground. If necessary, adjust C21 for the best frequency response. Adjust R32 for a signal level of 1 Vpk-pk on the oscilloscope. The output, as measured at J6 and J7 of the board, should be video only, with a minimum 4.5-MHz aural subcarrier.

On (A25) the 4.5-MHz bandpass filter board, adjust the filter with L2, C3, L4, and C7 for a frequency response of no greater than ±.3 dB from 4.4 to 4.6 MHz. Adjust C19 for an overall peak-to-peak variation of less than ±.3 dB from 4.4 MHz to 4.6 MHz. Recheck the frequency

response; it may have changed with the adjustment to the envelope delay.

5.3 UHF Exciter Tray with Receiver Tray, or either (Optional) Baseband or (Optional) 4.5-MHz Composite Input

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 to the local oscillator chain tuning and the local oscillator center frequency tuning. Both of these were completed at the factory and should not need to be adjusted at this time.

Move the Operate/Standby switch on the UHF exciter tray to Standby. The setup of the RF output includes adjustments to the drive level for the UHF amplifier trays, the adjustment of the linearity and phase predistortion that compensate for any nonlinear response of the amplifier trays, and the gain and phasing adjustments of the UHF amplifier trays.

Verify that all red LEDs on the ALC board are extinguished. The following list describes the meaning of each LED when it is illuminated:

- DS1 (Input Fault) – Indicates that an abnormally low or no IF is present at the input of the 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 or the IF phase corrector signal path or because jumper W3 on J6 is in the Manual ALC gain position.
- DS3 (Video Loss) – Indicates a loss of video at the input of the board
- DS4 (Mute) – Indicates that a visual Mute command is present (not used in this configuration)
- DS5 (Modulator Enable) – Indicates that the modulator IF output is selected. This LED is only used if a receiver tray is present in the system. DS5 is always on when there is no receiver.

The ALC is muted when the translator is in Standby. To monitor the ALC, check that the on/off circuit breakers on the AC input assembly in the rear of the Amplifier Array Cabinets are Off and switch the translator to Operate. Adjust the power adjust gain pot on the front panel of the UHF exciter tray to obtain +0.8 VDC on the front panel meter in the ALC position. On (A8) the ALC board, move jumper W3 on J6 to the Manual position, between pins 2 and 3, and adjust R87 on the ALC board for +0.8 VDC on the front panel meter in the ALC position. Move jumper W3 back to Auto, between pins 1 and 2; this is the normal operating position. The detected IF signal level at J19-2 on the ALC board is connected to the transmitter control board that distributes the level to the UHF amplifier trays. The level is used as a reference for the automatic gain control (AGC) in each amplifier tray.

5.3.1 (A6) (Optional) Delay Equalizer Board (1227-1204; Appendix D)

This board has been factory tuned and should not be retuned without the proper equipment. If it is necessary to tune the board:

1. Select a sinX/X test signal as the video source to the delay equalizer board.
2. Monitor the video output of the board at video sample jack J2 with a video measuring set (VM700) that has been adjusted to measure group delay.

3. Tune the four stages of the board using the variable inductors (L1-L4) and potentiometers (R7, R12, R17, and R22) until the signal attains the FCC group delay curve. The stages are arranged in order of increasing frequency. Adjust R29 as needed to attain the same level coming out of the board as is going into the board.

5.3.2 (A24) (Optional) Composite 4.5-MHz Filter Board (1227-1244; Appendix D)

The (A24) (optional) composite 4.5-MHz filter board will only function properly with a 4.5-MHz composite input signal and with the 4.5-MHz composite input selected.

Connect the test signal from an envelope delay measurement set to the video input of the tray at J1 or J2.

Connect an oscilloscope to jack J7, video out, between the J7 center pin and pin 1 or 3 ground. Adjust C21, frequency response, if needed, for the best frequency response. Adjust R32, video gain, for a signal level of 1 Vpk-pk on the oscilloscope.

The output at J6 and J7 of the board should be video only with no 4.5-MHz aural subcarrier.

5.3.3 (A25) (Optional) 4.5-MHz Bandpass Filter Board (1265-1307; Appendix D)

The (A25) (optional) 4.5-MHz bandpass filter board will only function properly with a 4.5-MHz composite input signal and with the 4.5-MHz composite input selected.

Adjust the filter with L2, C3, L4, and C7 for a frequency response of no greater than ±.3 dB from 4.4 to 4.6 MHz.

Adjust C19 for an overall peak-to-peak variation of less than ±.3 dB from 4.4 MHz to 4.6 MHz.

Recheck the frequency response; it may have changed with the adjustment of the envelope delay. If necessary, retune the board.

5.3.4 (A7) (Optional) IF Carrier Oscillator Board (1191-1404; Appendix D)

To align (A7) the IF carrier oscillator board:

1. While monitoring J3 with a spectrum analyzer, observe the 45.75-MHz visual IF (typical +5 dBm).

2. Connect a frequency counter to J3 and adjust C17 for 45.750000 MHz.

3. Connect a frequency counter to J1 and check for 50 kHz; this is the aural phase lock loop (PLL) reference.

5.3.5 (A5) (Optional) Sync Tip Clamp/ Modulator Board (1265-1302; Appendix D)

To align (A5) the sync tip clamp/ modulator board:

1. Determine if jumper W4 on jack J3 is present. Jumper W4 terminates the video input into 75Ω. Remove jumper W4 if the video loop-through is required on the rear chassis at jacks J1 and J2.

2. Set the controls R20, the white clip, R24, the sync clip, and R45, the sync stretch cut-in, to their fully counter-clockwise (CCW) position. Set R48, the sync magnitude, fully clockwise (CW).

3. Place the jumper W7 on jack J4 to the clamp off, disable, position.

4. Connect a 5-step staircase video test signal to the input of the transmitter.

5. Monitor TP2 with an oscilloscope. Adjust R12, the video gain pot, for 1 Vpk-pk.

6. Change the video input test signal to a multiburst test pattern. While monitoring TP2, adjust C8 and R32 for a flat-frequency response. Change the input video test signal back to the 5-step staircase.

7. Monitor TP2 with an oscilloscope. Adjust the pot R41, manual offset, for a blanking level of -0.8 VDC. The waveform in Figure 5-1 should be observed at this point. Move jumper W2 on J4 to the clamp enable position. Adjust pot R152, depth of modulation, for a blanking level of -0.8 VDC.

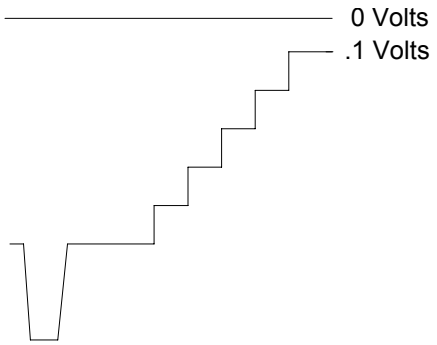

Figure 5-1. Waveform at TP2.

Note: The waveform in Figure 5-1 represents the theoretical level for proper modulation depth. Step 8 below describes how to set the modulation depth through the use of a television demodulator or a zero-spanned spectrum analyzer tuned to the visual IF frequency.

8. The following test setup is for the adjustment of the depth of modulation and ICPM at IF:

A. Remove the cable that is now on J18. Connect the double sideband 45.75-MHz visual IF signal from J18 to a 10-dB splitter/coupler. Connect the coupled port of the splitter/ coupler to the RF input of a television demodulator. Connect the direct port to a spectrum analyzer.

B. Connect the 75-Ω video output of the demodulator to the video input of a waveform monitor. For incidental carrier phase modulation (ICPM) measurements, also connect the quadrature output of the demodulator to the horizontal input of the waveform monitor using a 250-kHz low-pass filter. (An oscilloscope can be used in place of a waveform monitor).

C. Set the controls of the demodulator as follows:

- Detector Mode: Cont
- Sound Trap: In
- Zero Carrier: On
- Auto: Sync
- Audio Source: Split
- De-Emphasis: In

9. Move jumper W7 on J4 to the clamp disable position. Readjust pot R41,

manual offset, for the correct depth of modulation by observing the demodulated waveform on the waveform monitor or on the spectrum analyzer set to zero span.

10. Check the demodulated video for the proper sync-to-video ratio (sync is 28.6% of the total white video signal). If sync stretch is needed, adjust R45, sync stretch cut-in, until sync stretch occurs. Adjust R48, sync stretch magnitude, for the proper amount of stretch. Readjust R41, manual offset, if necessary, for the correct depth of modulation.

11. Move jumper W7 on J4 to the clamp enable position. Readjust pot R152, the depth of modulation, for the correct depth of modulation.

12. Set the waveform monitor to display ICPM. Preset R53 fully CCW, adjust C78 for the greatest effect at white on the ICPM display, and adjust R53 for minimum ICPM.

13. Recheck the depth of modulation and, if necessary, adjust R152, depth of modulation.

14. Adjust pot R70 for a level of approximately -10 dBm on the spectrum analyzer at J18.

15. Remove the video input. Place the front panel meter in the video position and, while monitoring the meter, adjust pot R144, zero adjust, for a reading of zero.

16. Replace the video input test signal (the 5-step staircase). Turn the front panel meter to the Video position and adjust R20 on the transmitter control board for a reading of 100 (10 on the 0-to-10 scale). This board does not have sync metering.

17. Reconnect the plug to J18 and move the spectrum analyzer test cable to 41.25 IF output jack J16. Tune C59 and L17-L20 to maximize the 41.25-MHz aural IF signal and minimize the out-of-band products. Adjust pot R97 for -20 dBm at J16.

18. Reconnect the plug to J16 and move the spectrum analyzer test cable to IF output jack J20. Preset R62, the visual IF gain pot, to the middle. Insert a multiburst test signal into the translator and observe the visual frequency response with the spectrum analyzer set at 1 dB/division. Tune R63 and C30, the IF frequency response adjustments, for a flat-frequency response (±0.5 dB).

19. While still monitoring J20 with a spectrum analyzer, readjust R62, visual IF gain, for a visual output level of 0 dBm. Adjust R85, A/V ratio, for a -10 dB aural-to-visual ratio or to the needed A/V ratio. Reconnect the plug to J20.

20. Using an input video test signal (the 5-step staircase) with a 100 IRE white level, monitor TP2 with an oscilloscope. Set the control R24, the sync clip, just below the point where sync clipping begins to occur. Also, set R20, the white clip, to the point just below where the white video begins to clip.

Note: This procedure should be performed after the system setup or if linearity problems occur.

5.3.6 (A4) (Optional) Aural IF Synthesizer Board, 4.5 MHz (1265-1303, Appendix D)

1. The test equipment setup for (A4) the aural IF synthesizer board, 4.5 MHz, is as follows:

   A. Connect a 600-Ω balanced audio output from an audio oscillator to the balanced audio

input terminals of the tray at TB1-1 (+), TB1-2 (-), and TB1-3 (ground) on the rear chassis.

B. Connect the combined IF output at J21, the IF sample on the clamp modulator board, to the input of an IF splitter. Connect one output of the splitter to the video demodulator and the other output to the spectrum analyzer.

C. Connect a short cable at the front of the demodulator from the RF-out jack to the IF-in jack.

D. Connect a cable from the 600-Ω audio output jack of the demodulator to the input of an audio distortion analyzer.

2. Set the output frequency of the audio oscillator to 400 Hz and the output level to +10 dBm.

3. Center the aural carrier on the spectrum analyzer with the spectrum analyzer set to the following:

- Frequency/Division: 10 kHz
- Resolution Bandwidth: 3 kHz
- Time/Division: 50 msec
- Trigger: Free run

A. Adjust L5 for approximately +3.5 VDC at TP2.

B. The green LED DS1 should be illuminated, indicating a locked condition. If not, retune L5 for a locked condition.

4. Adjust R13, balanced audio gain, on the aural IF synthesizer board for ±25 kHz deviation.

5. Check the distortion on the aural distortion analyzer (< 0.5%).

6. Disconnect the 600-Ω balanced audio input to the tray. Connect a 75-Ω stereo audio input (400 Hz at 1 Vpk-pk) to composite audio input jack J3 on the rear of the tray. Follow the procedure in the stereo generator instruction manual for matching the level of the generator to the exciter. R17 is used to adjust the composite audio gain.

7. Check the distortion level on the distortion analyzer (< 0.5%).

5.3.7 (A8) ALC Board (1265-1305; Appendix D) (Part 1 of 2)

The following details the meaning of each LED of (A8) the ALC board when it is illuminated:

- DS1 - Red LED: Indicates that 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; this is usually due to excessive attenuation in the linearity or the IF phase corrector signal path, or because the jumper W3 on J6 is in manual gain

- DS3 - Red LED: Indicates a video loss fault

- DS4 - Red LED: Indicates that a Mute command is present (not used in this configuration)

- DS5 - Green LED: Indicates that the output from the modulator is selected as the input to the ALC board

1. To align the ALC board, preset the following controls in the UHF exciter tray:

- ALC board – Move jumper W1 on J4 to disable, between pins 2 and 3 (to disable linearity correctors); move jumper W3 on J6 to manual, between pins 2 and 3 (for manual gain

control); adjust R87, the manual gain pot, to mid-range.

- IF phase corrector board – Move jumper W2 on J9 to the phase correction enable position; move the jumper W3 on J10 to the amplitude correction disable position.

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 check to see that DS1, Input Fault, is illuminated. Reconnect J32 and check to see 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 a flat-frequency response of ±0.5 dB.

5. Before proceeding with part 2 of the ALC board alignment (described in section 5.1.10), check the IF phase corrector board to make sure that it is functioning properly.

5.3.8 (A9) IF Phase Corrector Board (1227-1250; Appendix D)

Refer to the system alignment procedures at the end of this chapter for the set up of (A9) the IF phase corrector board in the exciter tray. 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 J3, the IF output jack of (A8) the ALC board.

The IF output jack of the IF phase corrector board is fed to J7, the IF input jack of (A8) the ALC board.

5.3.9 (A8) ALC Board, NTSC (1265-1305; Appendix D) (Part 2 of 2)

Input a multiburst video test signal at the baseband video input. Connect a spectrum analyzer to J11. Tune C63 for a flat-frequency response of ±0.5 dB.

Move the Operate/Standby switch on the front panel of the translator to the Operate position.

Place jumper W3 on jack J6 in the Manual mode and adjust R87 for 0.8 volts at TP4.

Place jumper W3 on J6 in the Auto mode and adjust the front panel power adjust control A20 fully CW. If the optional remote power raise/lower kit is present, adjust switch S1 on the board to maximum voltage at TP4. Adjust R74, the range adjust, for 1 volt at TP4.

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 the mid-range of its travel and then adjust the front panel Power Adjust control (A20) for 0.8 VDC at TP4.

Disconnect the plug that is now on J12 (IF output) and monitor the output with a spectrum analyzer. The output should be approximately 0 dBm. Adjust R99, if necessary, to increase the output level. If a smaller output level is needed, move the jumpers J27 and J28 to pins 2 and 3 and adjust R99 as needed. Reconnect J12.

Move W2 on J5 to the cutback enable position. Remove the input video signal and verify that the output of the translator drops to 25%. Adjust R71, the cutback level, if necessary. Restore the video input signal.

Note: This step affects the response of the entire translator. 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 can be

adjusted for the frequency of the correction notch being applied to the visual response of the translator. R103 and R106 are used to adjust the depth and width of the correction notch.

Controls R13, R18, and R23, the magnitude controls, should be set fully CW. Controls R34, R37, and R40 are the linearity cut-in adjustments.

5.3.10 (A11) UHF Upconverter Board (1265-1310; Appendix D)

To align (A11) the UHF upconverter board, place W1 on J10 in the Manual position. R10 is a gain control that is adjusted to give a maximum output of approximately +17 dBm at J5 of the board with an input of 0 dBm of IF.

5.3.11 (A14-A1) Channel Oscillator Board (1145-1201; Appendix D)

The (A14-A1) channel oscillator board is mounted in (A14) the channel oscillator assembly. To align this board:

1. Connect J1, the main output of the channel oscillator, to a spectrum analyzer tuned to the crystal frequency. 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 digital voltmeter (DVM) to TP1 on the x8 multiplier board. Tune capacitors C6 and C18 for maximum voltage and tune L2 and L4 for maximum voltage output at TP1.

2. Connect J2, the sample output of the channel oscillator, to a suitable counter and tune C11, coarse adjust, to the crystal frequency. Tune C9 for the fine-frequency adjustment.

Caution: Do not repeak C6, C18, L2, or L4. This can change the output level.

Note: 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, there may be a problem with the crystal. Contact the Axcera Field Service Department for further instructions.

Note: If the VCXO oscillator in the channel oscillator assembly is used, the C9 fine-frequency adjust is not on the channel oscillator board. It can be found on the FSK w/EEPROM board by using R9.

3. Reconnect J1, the main output of the channel oscillator, to J1, the input of the x8 multiplier.

5.3.12 (A15-A1) x8 Multiplier Board (1227-1002; Appendix D)

The (A15-A1) x8 multiplier board is mounted in an 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 LO is present at the output of the x8 multiplier board.

Connect a spectrum analyzer to output jack J2 of the board.

Tune C4, C6, C10, C12, C18, and C20 for maximum output.

Readjust all of 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. When a voltmeter is used, the harmonic

frequencies must be minimized to prevent interference with other channels.

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

- 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.
- Repeak C12 and C10 while monitoring TP4 (typical 3.5 VDC).
- The typical output level is +15 dBm.

5.3.13 (A3) +12 VDC (4A)/-12 VDC (1A) Power Supply Board (1265-1312; Appendix D)

There are no adjustments that need to be made to (A3) the +12 VDC (4A)/-12 VDC (1A) power supply board. 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.

5.3.14 (A17) Transmitter Control Board (1245-1101; Appendix D)

To align the video metering, insert a composite or some other 100-IRE test signal into the exciter tray. Adjust R20 for a full-scale reading (1 volt) on the bottom scale of the front panel meter of the exciter tray in the video metering position.

To align the audio metering, adjust the audio input level for a ±25 kHz deviation using a spectrum analyzer. Adjust R19 on the board for a 25-kHz reading on the bottom scale of the front panel meter of the exciter tray.

This completes the detailed alignment procedures for the UHF exciter tray.

5.4 (A1, A2, A3 & A4 and A5(5kW) & A6(6kW) UHF Amplifier Trays, LDMOS (1301560, low band/1301561, mid band/1301562, high band; Appendix C)

The UHF amplifier trays have been adjusted at the factory to meet all specifications, including phase adjustment, to match the multiple trays in an amplifier array when they are combined. The trays should not need to be adjusted to attain normal operation. Any adjustments to the boards in the trays should be performed in the Manual Gain position, with S1 on (A8) the amplifier control board (1265-1414) in Manual. The idling current for the amplifier boards are adjusted with no RF drive applied. S1 should be in the Auto AGC position for the normal operation of the translator.

Connect a dummy load with a rating of a least 600 watts to J2, the "N" connector RF output jack of the tray being tested.

5.4.1 (A2-A1) Variable Gain/Phase Board (1301549; Appendix D)

The board is mounted in (A2) the variable gain/phase enclosure. There are no adjustments to this board; it has an AGC adjustable gain of 0 to 20 dB. Typically with an input of +3 dBm output is set at +19 dBm.

5.4.2 (A3-A1) 1-Watt UHF Amplifier Board (1301547; Appendix D)

The board is mounted in (A3) the 1-watt UHF amplifier enclosure. There are no adjustments to this board; it has approximately 10 dB of gain.

5.4.3 (A1) UHF Filter (1007-1101; Appendix D)

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. There is approximately 1 dB loss through the filter.

5.4.4 (A4-A1) 40-Watt Amplifier Module, (51-5379-308-00; Appendix D)

The module is part of the 40 Watt UHF amplifier assembly (1206693).

Gain adjustment (for the complete amplifier), as well as quiescent current setting by means of potentiometers R807 and R808, is factory implemented and should not be altered.

5.4.5 (A4-A2) Coupler Board Assembly (1227-1316; Appendix D)

There are no adjustments to this board.

5.4.6 (A4-A3) LDMOS Amplifier Module, (51-5379-309-00; Appendix D)

The module is part of the LDMOS amplifier assembly (1301556).

The working point setting is factory implemented by means of potentiometers R9, R11 and R12 and should not be altered.

5.4.7 (A5-A1) 4-Way Splitter Assembly (1301580; Appendix D)

There are no adjustments to this assembly.

5.4.8 (A5-A2, A5-A3, A5-A4 & A5-A5) LDMOS Amplifier Modules, (51-5379-309-00;Appendix D)

Each module is part of a LDMOS amplifier assembly (1301556).

The working point setting is factory implemented by means of potentiometers R9, R11 and R12 and should not be altered.

5.4.9 (A5-A6) 4-Way Combiner Assembly, (1301557, low band/1301558, mid band/1301559, high band; Appendix D)

This assembly contains (A5-A6-A1) a 4-way combiner board. There are no adjustments to the board.

5.4.10 (A5-A6-A2) Circulator

There are no adjustments to the circulator.

5.4.11 (A6-A1) Dual Peak Detector Board (1227-1333;Appendix D)

This board is mounted in (A6) a Dual Peak Detector enclosure (1227-1317). There are no adjustments to this board.

5.4.12 (A7) Amplifier Protection Board (1207117;Appendix D)

There are no adjustments to this board.

5.4.13 (A8) Amplifier Control Board (1265-1414;Appendix D)

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. If the LED does not light, adjust the overdrive threshold as needed.

5.4.14 (A12) +32V/2000W Switching Power Supply

This switching power supply does not contain any customer repairable items. If the power supply should malfunction, do not attempt to repair the power supply without first consulting the Axcera Field Support Department. The power supply is adjusted to provide an output of +32 VDC.

5.4.15 Calibration of Output Power and VSWR Cutback of the Tray

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, on (A8) the amplifier control board fully CCW. Move switch S1 on the amplifier control board to the Manual position. Insert a visual-only with a sync-only test signal to the system and verify 40 IRE units of sync or insert a digital test signal. Adjust R16 for 360 watts sync-only analog, 300 watts 64 QAM or 8-VSB digital.

To test for analog, using zero span and aural addition, 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 and -10 dB aural or 300 watts 64 QAM or 8-VSB digital. Calibrate the front panel output power meter to 100% with R2, forward calibration, on the amplifier control board.

Reduce manual gain pot R16 to a 50% reading on the front panel meter in the % Output Power position. Turn off the tray. Remove the load from the output of the tray and switch the front panel meter to the Reflected Output Power position. Switch on the tray. Adjust reflected power adjust pot R22 on the amplifier control board to a 50% reading. Then adjust R29, the VSWR threshold cutback pot, on the amplifier control board until the VSWR Cutback LED DS1 on the front panel just lights. This sets up the VSWR cutback circuitry. After the setup is completed, move switch S1 on the amplifier control board to the Automatic Gain Control position; this is the normal operating position for the switch. The UHF amplifier tray is now aligned, calibrated, and ready for normal operation. Repeat as needed for the other Amplifier Trays in the System

5.5 Phase and Gain Adjustment of the UHF Amplifier Trays in each Amplifier Array

Switch the Translator to Standby and switch Off the Main AC Circuit Breaker located on each of the AC Distribution Assemblies in the Amplifier Array Assemblies. Switch Off all the AC Circuit Breakers, located on the AC Distribution Assembly, for the individual Amplifier Trays.

1. Adjust all gain controls located on the UHF Amplifier Trays full CCW.

2. Switch On the Main AC Circuit Breaker for the Side A Amplifier Array Assembly and switch On the AC Circuit Breaker for Amplifier #1.

3. Place the Translator in Operate and adjust the Gain control on the Amplifier Tray for 50% output power and adjust the Phase control to mid range.

4. Monitor the output power of the Translator by connecting a Spectrum Analyzer to the Sample Jack located on the Metering Panel. Adjust the Spectrum Analyzer for Zero Span operation. The power could be monitored by watching the meters on the panel but the power change is easier to see on the analyzer.

5. Turn On the AC to Amplifier Tray #2 and adjust its' output power to 50%.

6. While monitoring the output power of the Translator, adjust the Phase Control until the power reaches a peak. If the Phase adjust reaches its end of travel, add a 2 inch cable

to the RF Input (J1) of the amplifier. Re-adjust the Phase to peak the System output power. If the Phase Control again reaches its end of travel before a peak in power is reached, remove the 2 inch cable and add a 3 inch cable to J1 of amplifier and readjust phase for peak output power. The adding of cables should be done during the adjustment anytime the range of the phase adjust needs extended.

7. Repeat steps 5 and 6 for the remaining Amplifiers.

8. Increase the output power on Amplifier #1 and Amplifier #2 to 90%.

9. Adjust the Phase Control on Amplifier #2 to peak the System output power.

10. Increase the output power on Amplifier #3 to 90% and adjust the Phase control for maximum System output power.

11. Increase the output power on Amplifier #4 to 90% and adjust the Phase control for maximum System output power.

12. Increase the output power on Amplifier #5, if present, to 90% and adjust the Phase control for maximum System output power.

13. Increase the output power on Amplifier #6, if present, to 90% and adjust the Phase control for maximum System output power.

14. Monitor the Reflected Power on all of the UHF Amplifier Trays. The Reflected Power should read <5%. If an amplifier is showing high reflected power adjust the Phase control to minimize Reflected Power. Be careful not to increase Reflected Power on the other Amplifier Trays. The Amplifier Trays should interact in such a way that the phasing of any one Amplifier will affect the Reflected on the other Amplifiers.

5.6 Calibration of the Side A and Side B Amplifier Arrays Forward Output Power Level

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

Perform the following adjustments with no aural present by removing jumper cable W1, the aural IF loop-through that is connected to J16 on (A5) the sync tip clamp/modulator board. Connect a sync and black test signal to the video input jack of the UHF exciter tray. Switch the translator to Operate.

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

- Sync + black 0 IRE setup/wattmeter = (1309 watts for 4kW) or (1636 watts for 5kW) or (1964 watts for 6kW)

- Sync + black 7.5 IRE setup/wattmeter = (1200 watts for 4kW) or (1499 watts for 5kW) or (1799 watts for 6kW)

(2200 Watts peak of sync Visual + 10% Aural for 4 kW transmitter), or (2750 Watts peak of sync Visual + 10% Aural for 5 kW transmitter) or (3300 Watts peak of sync Visual + 10% Aural for 6 kW transmitter)

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

With the spectrum analyzer set to zero span mode, obtain a peak reference on the screen. Reconnect jumper cable W1 to J16 on (A5) the sync tip clamp/ modulator board. Turn the gain adjust pot, located on the front panel of the Phase/Gain Tray, until the original peak reference level is attained.

Begin the power calibration with the Amplifier Array adjusted to {2200 Watts (4kW) or 2750 Watts (5kW) or 3300 Watts peak of sync Visual + 10% Aural for 6 kW transmitter)}.

Side A Forward Power Calibration.
In (A6) the Metering Control Panel, located in the UHF Exciter Cabinet, find the (A9) Dual Peak Detector Board (1159965). Adjust R9 for 100% on the Side A Power Meter.

Side B Forward Power Calibration.
In (A6) the Metering Control Panel, located in the UHF Exciter Cabinet, find the (A8) Dual Peak Detector Board (1159965). Adjust R9 for 100% on the Side B Power Meter.

5.7 Calibration of the Side A and Side B Amplifier Arrays Reflected Output Level

Monitor the Side A Power Meter, in the Forward Power position, and turn the power adjust pot, located on the (A4) Phase/Gain Tray, to 20%. Move the cable connected to J3, located on the (A8) Output Coupler, inside the Side A Amplifier Cabinet, to Jack J6 and the cable on J6 to J3. Adjust R10 on (A9) the Dual Peak Detector Board, located in the Metering Control Panel, 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 Tray should be illuminated. If the VSWR LED is not illuminated, adjust R5 on (A18) the Detector Threshold Board, located in the Metering Control Panel, until the LED just begins to turn on. Turn the power adjust pot slightly CCW and the LED should go out. Turn the pot CW until the LED just begins to turn on. The reflected output power for the amplifier array is now calibrated. Move the cable connected to J6 back to J3 and the cable on J3 back to J6, on the (A8) Coupler.

Monitor the Side B Power Meter, in the Forward Power position, and turn the power adjust pot, located on the (A5) Phase/Gain Tray for Side B, to 20%. Move the cable connected to J3, located on the (A8) Output Coupler, inside the Side B Amplifier Cabinet, to Jack J6 and the cable on J6 to J3. Adjust R10 on the (A8) Dual Peak Detector Board, located in the Metering Control Panel, 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 Tray should be illuminated. If the VSWR LED is not illuminated, adjust R12 on (A18) the Detector Threshold Board, located in the Metering Control Panel, until the LED just begins to turn on. Turn the power adjust pot slightly CCW and the LED should go out. Turn the pot CW until the LED just begins to turn on. The reflected output power for Side B is now calibrated. Move the cable connected to J6 back to J3 and the cable on J3 back to J6, on the (A8) Coupler.

5.8 Phase and Gain Adjustment Procedure for entire Amplifier Array Assembly

1. Begin the alignment with all Amplifier Trays up and running. Monitor the Reject Power by setting the Combined Metering switch to the Reject position and adjusting the Phase Control on either, or both, of the Phase/Gain Modules to minimize the Reject reading.

2. Adjust the Amplifier Gain controls so that all amplifiers have equal output power.

3. The Gain control on the Phase/Gain Module can be used to balance the output power between Sides A and B. This adjustment has a 10% range. If the end of its' range is reached, you must adjust the gain of each amplifier in the Amplifier Side to balance the power of each Side.

5.9 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) in the Metering Panel, 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 Jumper Cable W1, Aural IF Loop-Thru, connected to J16, located on the Sync Tip Clamp/Modulator Board (1265-1302) in the selected UHF Exciter. Connect a Sync and Black Test Signal to the Video Input Jack J2 on the Remote Interface Assembly of the UHF Exciter Tray. Switch the Translator to Operate.

Next, set the Translator up for the appropriate Average Output Power Level. Peak of Sync Visual + Black 0 IRE Setup equals; for 4 kW 2380 Watts, for 5 kW 2975 Watts and for 6 kW 3570 Watts. Peak of Sync + Black 7.5 IRE Setup equals; for 4 kW 2180 Watts, for 5 kW 2725 Watts and for 6 kW 3270 Watts. NOTE: Must have 40 IRE Units of Sync. Adjust R28, Visual Calibration, located on (A10) the Visual/Aural Metering Board (1265-1309) in the Metering Panel, for 100% on the front panel Combined Meter in the % Visual Position.

With the Spectrum Analyzer set to Zero Span Mode obtain a peak reference on the screen. Reconnect the Jumper Cable W1 to J16 located on (A5) the Sync Tip Clamp/Modulator Board in the UHF Exciter. While in the Combined Visual Output Power position, adjust L3 for minimum visual power reading. Turn the power adjust pot on the front panel of the Exciter until the original peak reference level is attained. Switch to the Combined Aural Output Power position and peak L1 and C8 for maximum Aural Power reading. Then adjust R20 also for 100% Aural Power reading. Switch to Combined Visual Output Power position and adjust R51 for 100% Visual Power.

5.10 Calibration of the Reflected Output Level of the Translator

Turn the Power Adjust Pot on the UHF Exciter to 20% on the Metering Panel Combined Meter in the Visual Power position. NOTE: Check that the Jumper is in Manual on the UHF Upconverter Board (1265-1310) in the UHF Exciter.

On (A11) the Output Coupler for the Translator, move the cable on J6 to J5 and the Termination on J5 to J6. Adjust R10 on the (A7) Dual Peak Detector Board (1159965), in the Metering Panel, for a 20% reading in the Combined Reflected Power position. At this 20% Reference Power reading, the VSWR LED mounted on the front panel of the UHF Exciter should be illuminated. If not adjust R19 on the Detector Threshold Board, in the Metering Control Panel, 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. Move the cable on J5 to J6 and the Termination on J6 back to J5. Switch the Translator to Operate and adjust the front panel power pot for 100% Visual Power reading on the Combined Meter.

5.11 Calibration of the Reject Power of the Translator

Check that the System is operating at 100% Output Power. Remove the AC power to the Side A Amplifier Array by switching Off CB1 the Main AC circuit breaker, located on the AC Distribution Panel for the Side A Amplifier Array. Adjust R9 on the (A7) Dual Peak Detector Board, located in the Metering Control Panel, for a 25% Power reading in the reject power position. The Reject power is now calibrated.

Return CB1, the Main AC circuit breaker for the Side A Amplifier Array, to the On position.

5.12 IF Phase Corrector Adjustment of the Translator

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 not require additional adjustments.

Locate (A9) the IF phase corrector board (1227-1250) mounted in the UHF exciter. Because the amplitude correction portion of the board is not utilized in this configuration, the jumper W3 on J10 should be in the disable position, to +6.8 VDC, and R35 and R31 should be fully CCW. R68 is the range adjustment and should be set in the middle of the range. The phase correction enable/disable jumper W2 on J9 should be in the enable position to ground.

Switch the video input test source to select an 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 intermodulation products of the RF output signal. There are three corrector stages on the IF phase corrector board, each with a magnitude and a threshold adjustment, that are adjusted as needed to correct for any differential phase or intermodulation problems. If necessary, adjust the R3 threshold for the cut-in point of the correction and the R7 magnitude for the amount of the correction.

Jumper W1 on J8 is set to give the desired polarity of the correction that has been shaped by the threshold R11 and magnitude R15 adjustments. After setting the polarity, adjust the R11 threshold for the cut-in point of the correction and the R15 magnitude for the amount of the correction that is needed. Finally, adjust the R19 threshold for the cut-in point of the correction and the R23 magnitude for the amount of the correction that is needed.

Note: Adjusting these pots changes all visual parameters and should be done cautiously.

On the IF phase corrector board (1227-1250), preset pots R7, R15, R23, and R35 fully CW and R3, R11, R19, and R31 fully CCW.

Set the waveform monitor to differential step filter and the volts/division scale to .1 volt. Center the display around blanking.

Gradually adjust pots R3, R11, and R19 CW, as needed, on the IF phase corrector board to minimize the observed thickness of the intermodulation as seen on the display.

While performing the preceding adjustments, the intermodulation beat products between the colorburst and the aural carrier at 920 kHz above visual carrier should be observed on the spectrum analyzer. The frequency will vary for different video systems. When the adjustments are performed properly, the intermodulation products on the spectrum analyzer should be at least -52 dB down, with a red field input, from peak visual carrier. The intermodulation distortion, as displayed on the waveform monitor, should be no more than 1 unit of IRE. The pot R31 on the IF phase corrector board is used for any extra intermodulation corrections that may be needed.

Note: Any adjustment to the above pots affects other visual parameters and some slight adjustments to all of the pots may be needed to simultaneously meet all of the specifications.

5.13 Linearity Corrector Adjustment for Translator

The IF linearity correction function consists of three non-linear cascaded stages, each having adjustable magnitude and threshold, or cut-in points, 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 that exceeds the corresponding threshold point. Refer to the UHF exciter tray assembly drawing (1245-1100) and the ALC board parts location drawing (1265-5305) for 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 initially adjust the linearity correctors, make sure 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 and 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 video input connector on the remote interface panel of 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 (1265-1305), preset pots R34, R37, and R40 (threshold) fully CCW, and the magnitude adjustments R13, R18, and R23 fully CW.

Adjust pots R34, R37, and R40 CW on the IF ALC board, as necessary, to give correction at sync or at low luminance levels; these are viewed at the right-hand edge of the waveform monitor.

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 on the modulator board. The sync stretch adjustment is R48 on the sync tip clamp on the modulator board. Switch the translator to Standby.

The Translator is fully aligned and ready for normal operation.