FCC TYPE ACCEPTANCE REPORT

430B

1000 WATT HIGH-BAND
VHF TRANSMITTER

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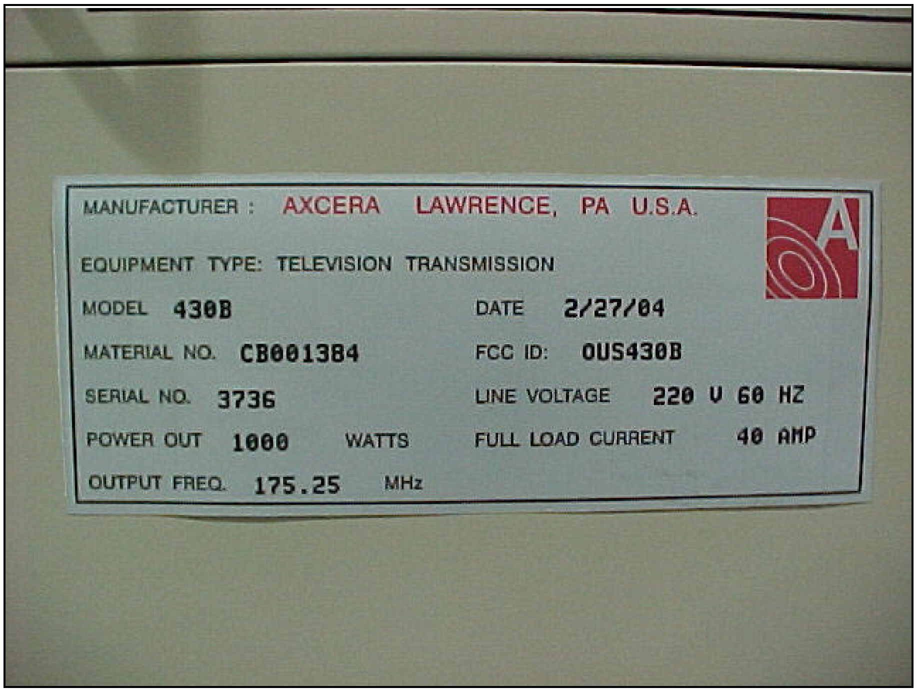
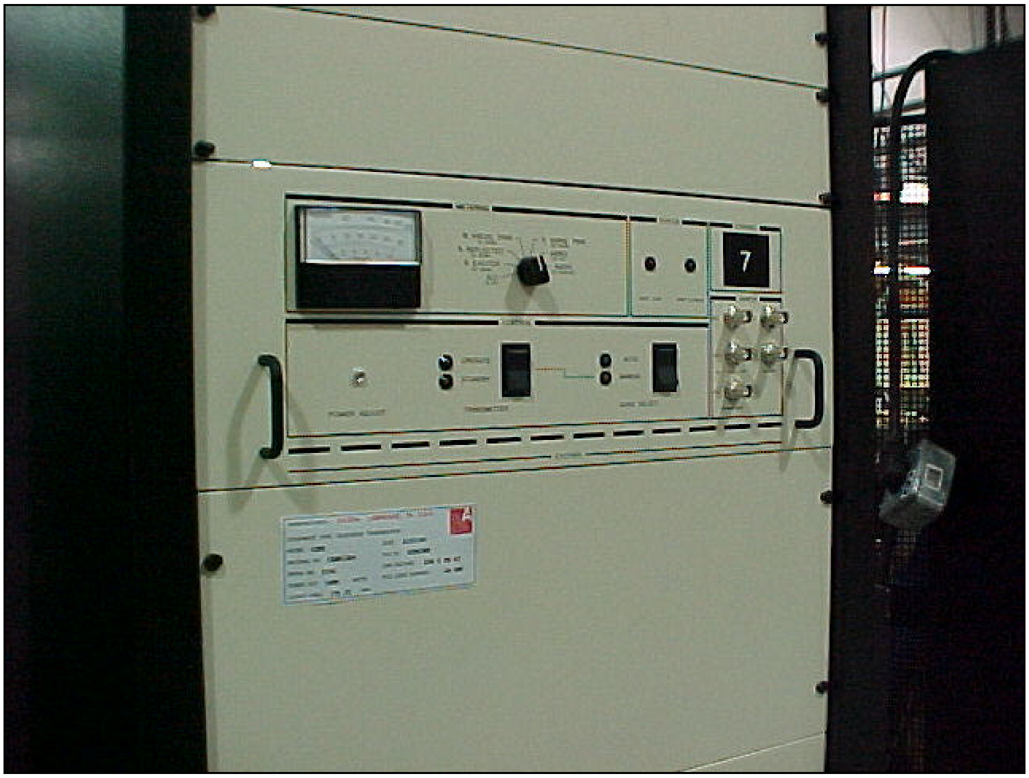
1. ID LABEL/LOCATION INFO

1.1 Front Panel FCC Label

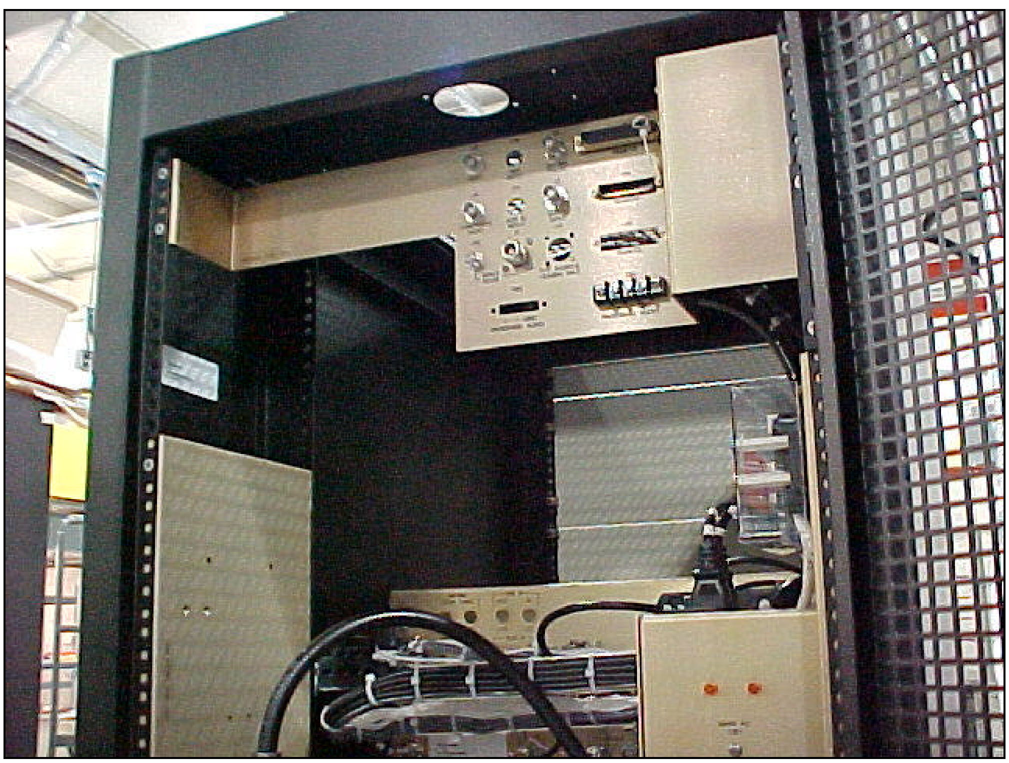


1.2 Rear Panel Manufacturer's Label

1.3 Front view, Axcera-430B Transmitter with FCC ID Label



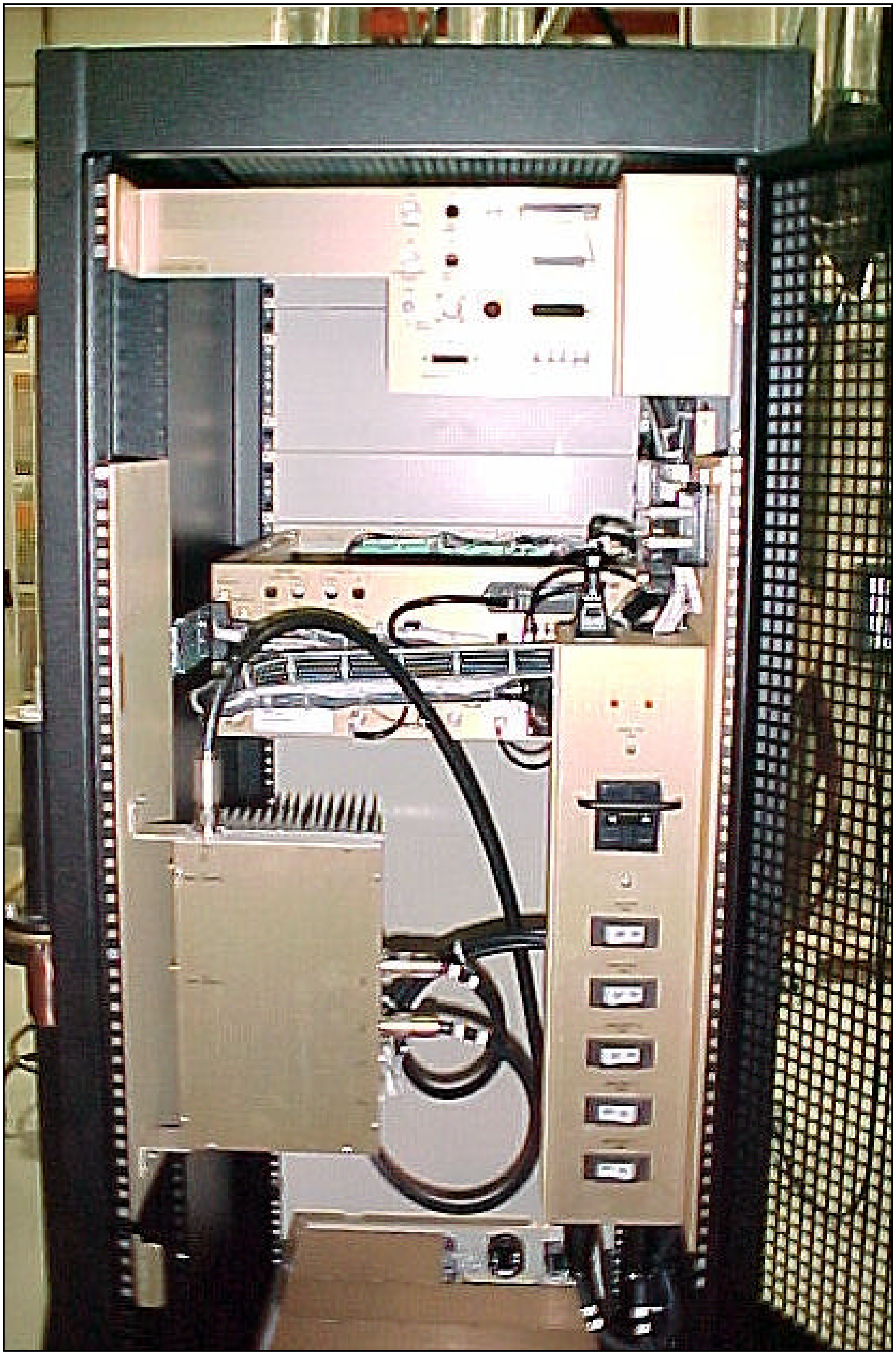
1.4 Rear view, Axcera-430B Transmitter with Manufacturer's Label



2. EXTERNAL PHOTOS

2.1 Front view, complete Axcera-430B Transmitter

2.2 Rear view, Axcera-430B Transmitter (rear top of cabinet)



2.3 Rear view, Axcera-430B Transmitter (rear bottom of cabinet)

2.4 Output Bandpass Filter Assembly

3. SCHEMATICS

The schematics for the Axcera-430B system are provided as separate PDF files.

4. TEST REPORT

4.1 RF Power Measurements

Figure 4-1 shows the test equipment setup for the RF power measurements.

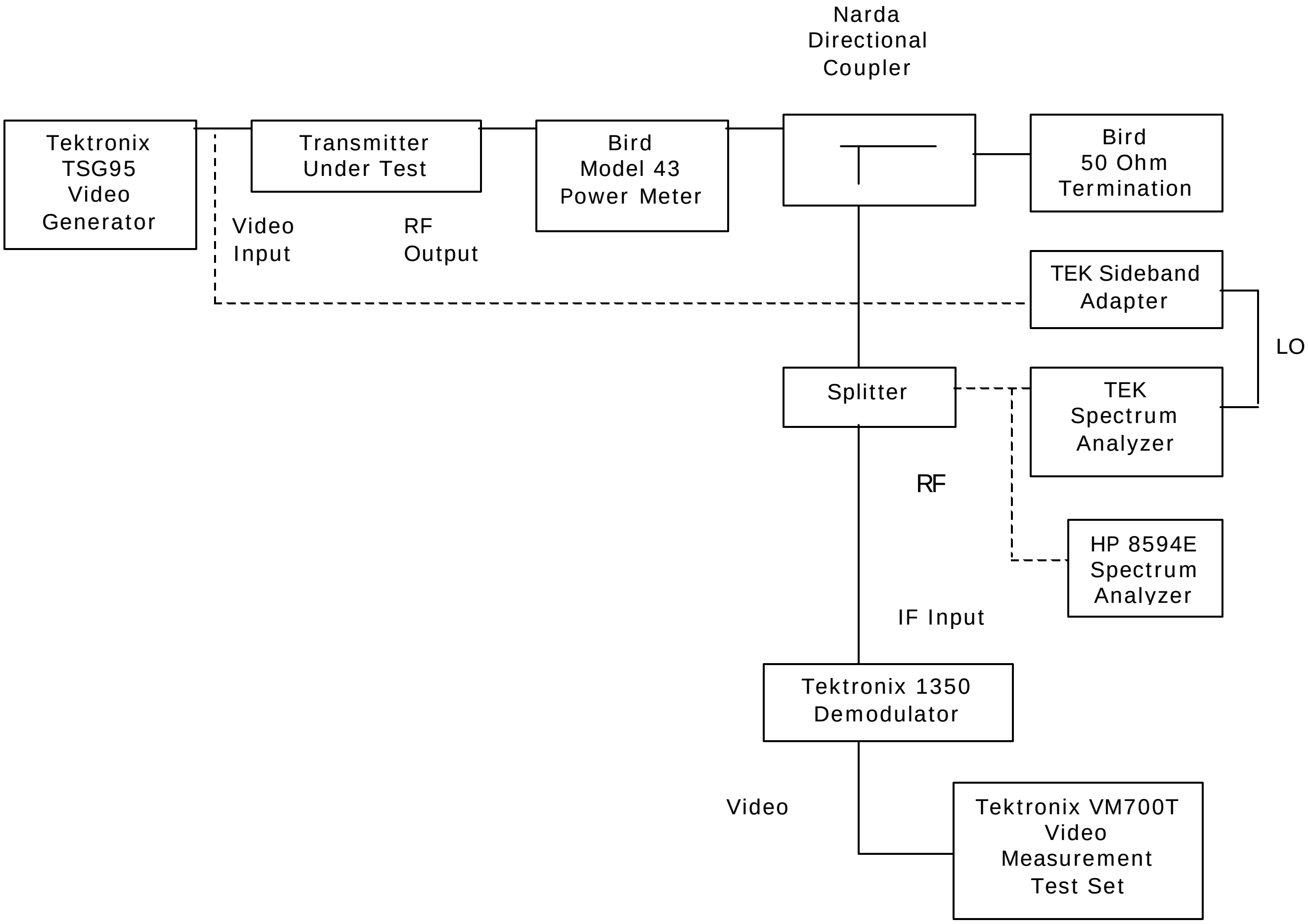


Figure 4-1. Test Equipment Setup for RF Power Measurements

The video modulation was adjusted for 25% with sync and blanking video signals and the aural power was turned off. The power was then adjusted to obtain 600 watts of average visual RF output (1000 watts peak sync at the output connector). This level was used to establish a reference on the spectrum analyzer.

Next, the aural power was turned on and adjusted to 10 dB below the visual power. The following operating parameters were recorded:

Peak Visual Power:/100%=1000 Watts Aural Power:/100%=100 Watts continuous wave (CW)
Reflected Power: <1%

4.2 Modulation Characteristics

4.2.1 Video Modulation

The test setup shown in Figure 4-1 was used to adjust the video signal to obtain a white picture level. Using the Tektronix 1350 demodulator chopper function, the modulation was accurately measured to be 87.5% while maintaining a depth of modulation at blanking.

Next, the video was adjusted for modulated staircase and the differential phase and gain were measured and recorded as follows:

- Differential phase: +/-1.8°
- Differential gain : 2.5%

Figure 4-2 shows the substantially linear transfer characteristics of the transmitter as a demodulated video waveform.

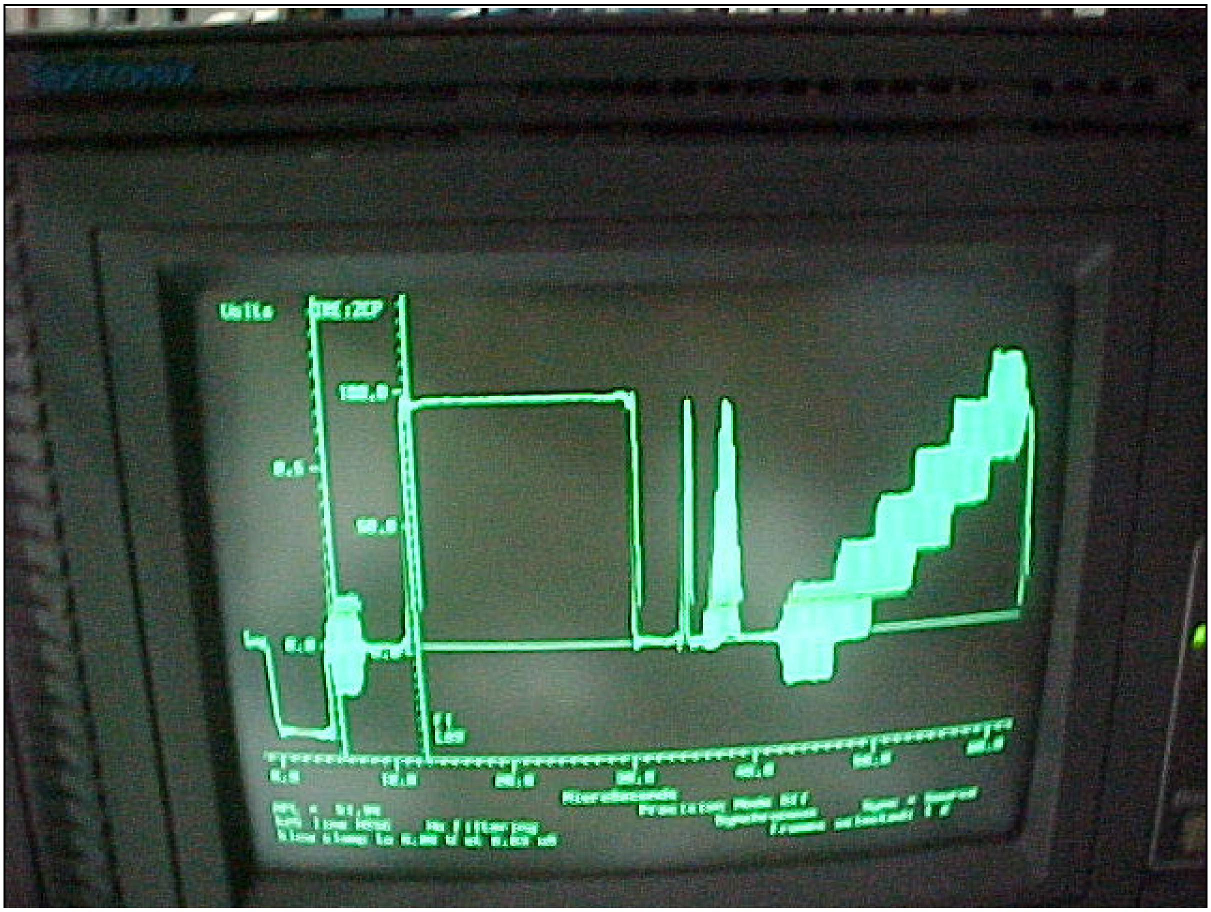


Figure 4-2. Substantially Linear Transfer Characteristics of the Transmitter as a Demodulated Video Waveform

4.2.2 Video Envelope Delay

Using the test setup in Figure 4-1, the envelope delay was measured and the data recorded as shown in Table 4-1. A sinx/x test pattern was used.

Table 4-1. Envelope Delay Measurements

VIDEO FREQUENCY (kHz)	DELAY (ns)
200	-1
500	+41
1000	+11
1500	+5
2000	-2
2500	+16
3000	+49
3500	- 135
3580	- 158
4000	- 350
4180	- 428

4.2.3 Video Noise

The test setup in Figure 4-1 was used to observe the video on the waveform monitor. The video was set for 1 volt peak-to-peak. The noise was observed to be less than 8 mV peak-to-peak on one step of the 5-step staircase. This is a video-to-peak noise ratio of 125=42 dB or, using the standard conversion factor of peak to RMS noise of 14 dB, about 64 dB S:N rms.

Observing the video at the field rate on the waveform monitor, the low-frequency noise (AC line related) was observed to be approximately 6 mv peak-to-peak or 2.1 mv rms (using the sinusoidal conversion of AC peak-to-peak to rms for a low-frequency S:N rms of about 62 dB).

4.2.4 Video Frequency Response

The test setup shown in Figure 4-1 was used to record the detected video frequency response; the results are shown in Table 4-2 and Figure 4-3.

Note: For this test, the video signal was adjusted to provide a 50% average picture level and the video sweep signal level was set to cover the range from black to white picture.

Table 4-2. Detected Video Frequency Response

VIDEO FREQUENCY	RELATIVE RESPONSE
200 kHz	+2 dB
500 kHz	0 dB
750 kHz	0 dB
1.0 MHz	+0.1 dB
1.25 MHz	0 dB
1.5 MHz	0 dB
2.0 MHz	+0.2 dB
2.5 MHz	+0.4 dB
3.0 MHz	0 dB
3.5 MHz	+0.3 dB
3.58 MHz	+0.1 dB
4.0 MHz	+1.0 dB
4.18 MHz	-1.0 dB
4.5 MHz	-20 dB
4.75 MHz	-30 dB
5.0 MHz	-44 dB

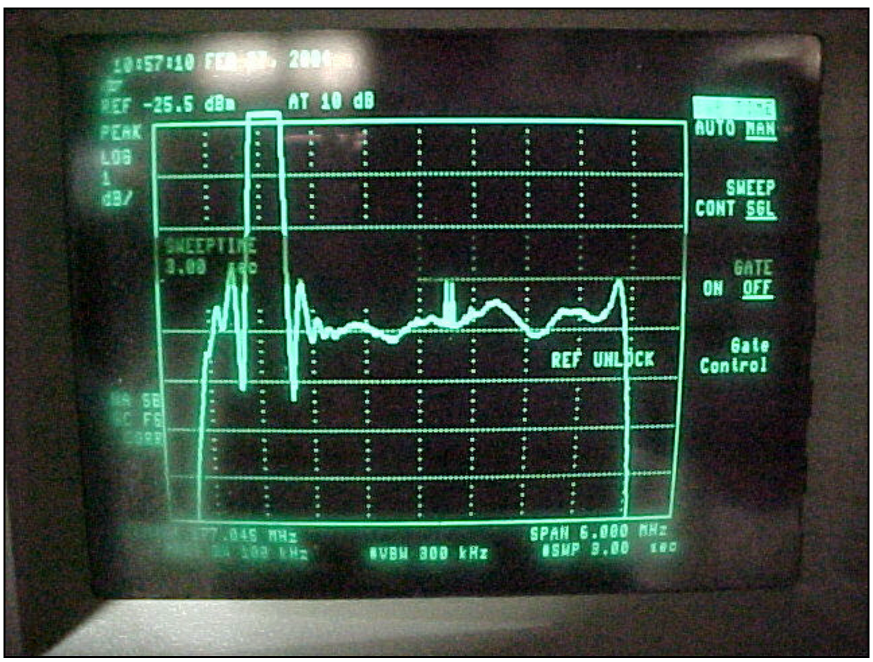


Figure 4-3. Graph of Detected Video Frequency Response

4.2.5 RF Sideband Response

The RF sideband response was recorded using the test setup shown in Figure 4-1. With the output power set to 1000 watts peak of sync, the Tektronix TSG95 video generator was adjusted to provide a cable sweep test signal and the RF sideband response was recorded. Data from this test is provided in Table 4-3.

Photographs of the spectrum analyzer results are shown in Figure 4-4.

Table 4-3. RF Sideband Response

OUTPUT FREQUENCY (MHz)	VIDEO FREQUENCY	RESPONSES
175.25	Carrier	--
175.45	+200 KHz	0 (reference)
175.50	+250	-1.0
175.75	+500	-4.0
176.00	+750	-4.1
176.25	+1000	-4.0
177.25	+2000	-4.0
178.25	+3000	-4.4
179.25	+4000	-4.0
179.75	+4500	-9
180.00	+4750	-24
180.25	+5000	-50
175.00	-250	-0.5
174.75	-500	-4.0
174.50	-750	-4.6
174.25	-1000	-10.5
174.00	-1250	-24.5
173.75	-1500	-34
173.50	-1750	-35
173.25	-2000	-36
172.25	-3000	-48
171.67	-3580	-54
171.25	-4000	-56
170.25	-5000	-64
181.00	+5750	-64

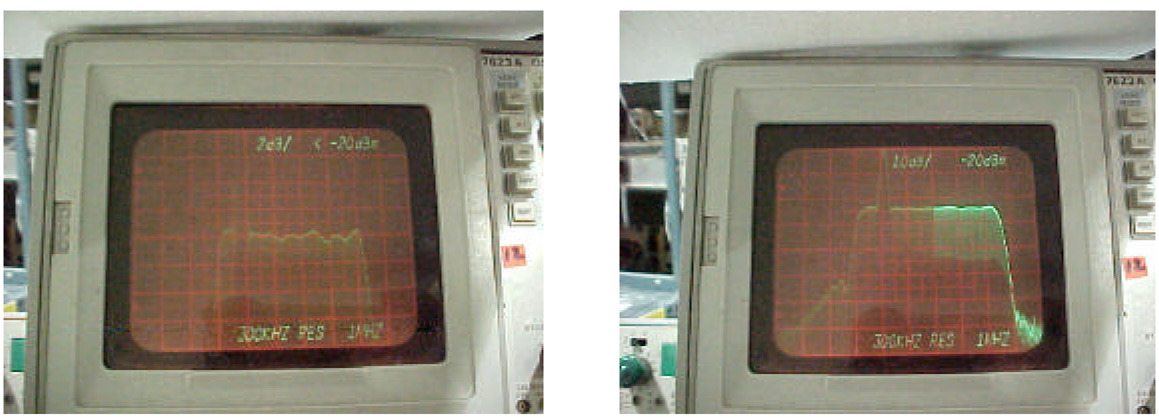


Figure 4-4. Spectrum Analyzer Results

4.2.6 Audio Modulation

The FM deviation and distortion was measured using the test setup shown in Figure 4-5.

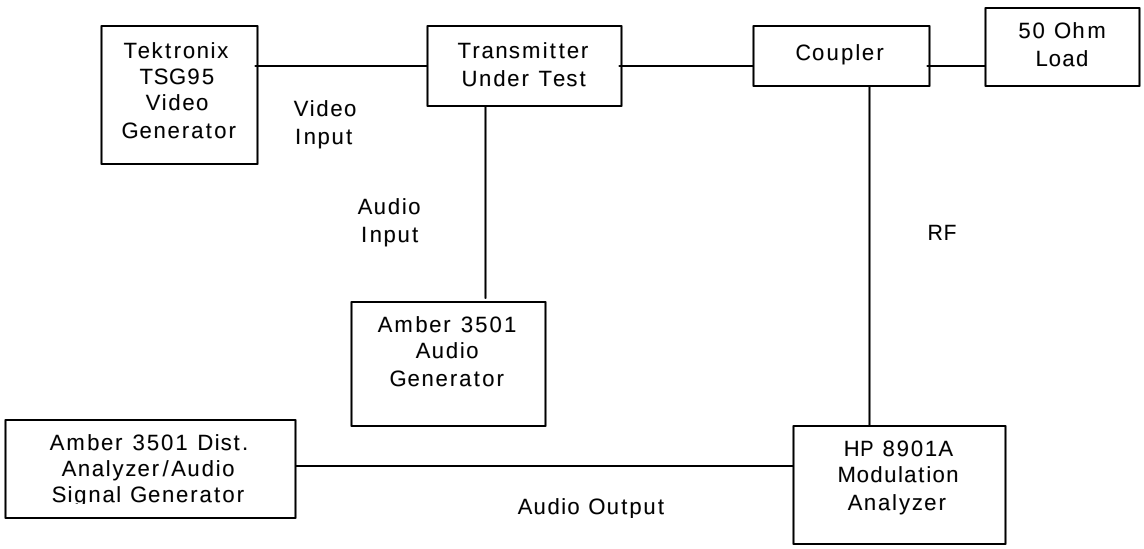


Figure 4-5. Test Setup for Measuring FM Deviation and Distortion

The results of measuring the FM deviation and distortion are shown in Table 4-4.

Table 4-4. Results of FM Deviation and Distortion Measurements

AUDIO FREQUENCY	DEVIATION 6.25-KHz DISTORTION	DEVIATION 12.5-KHz DISTORTION	DEVIATION 25-KHz DISTORTION	DEVIATION 40-KHz DISTORTION
100 Hz	0.25%	0.12%	0.09%	0.06%
1000 Hz	0.28%	0.15%	0.09%	0.07%
5000 Hz	0.31%	0.16%	0.12%	0.09%
15000 Hz	0.39%	0.23%	0.24%	0.12%

While maintaining ±25-KHz deviation, the audio input frequency and level were varied and the response was recorded. The results are shown in Table 4-5.

Table 4-5. Results of Varying the Audio Input Frequency and Level

AUDIO FREQUENCY	RESPONSE (RELATIVE TO 100 Hz)
50 Hz	-0.1 dB
100 Hz	0
400 Hz	+0.2 dB
1000 Hz	+1.1 dB
2000 Hz	+2.9 dB
5000 Hz	+8.0 dB
10000 Hz	+13.5 dB
15000 Hz	+16.6 dB

Note: The HP modulation analyzer provides a calibrated audio output level that is suitable for determining the FM deviation. De-emphasis can be switched on or off for this measurement; it was switched off for the purposes of these tests. For the distortion measurements, the de-emphasis was switched on (pursuant to 73.687.b.3[I] of the FCC rules).

4.2.7 AM and FM Noise

The AM noise and the FM noise were recorded using the test setup shown in Figure 4-5.

Dotted lines were used for the AM tests and solid lines were used for the FM tests with the following results:

- AM noise: -56 dB
- FM noise: -69 dB

4.3 Occupied Bandwidth

Using the test setup in Figure 4-6, with the transmitter operating at maximum power, photographs of the transmitter-occupied bandwidth spectrum were taken and are shown in Figures 4-7 and 4-8.

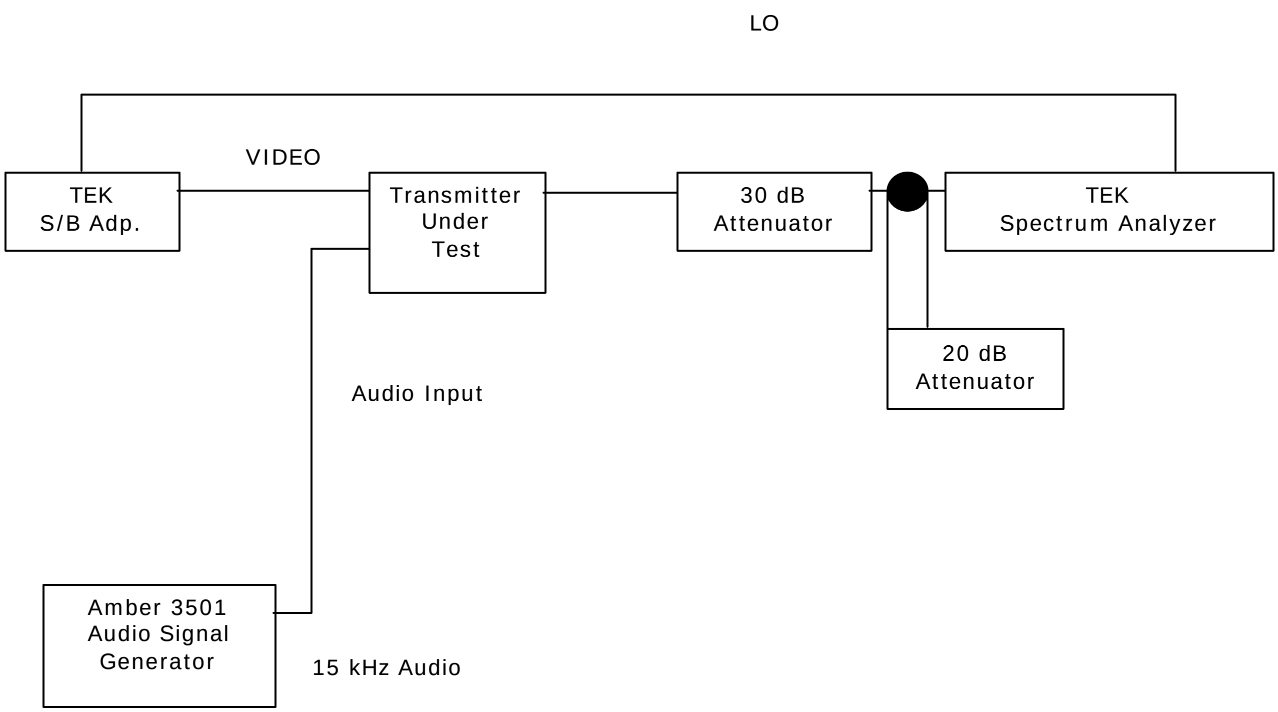


Figure 4-6. Test Setup for Occupied Bandwidth Spectrum Analysis

Note: Using the test setup shown in Figure 4-1, the visual modulation was adjusted to 87.5% at white with the modulated staircase waveform and the aural deviation adjusted to ±25 kHz (100%) with the 400-Hz audio tone.

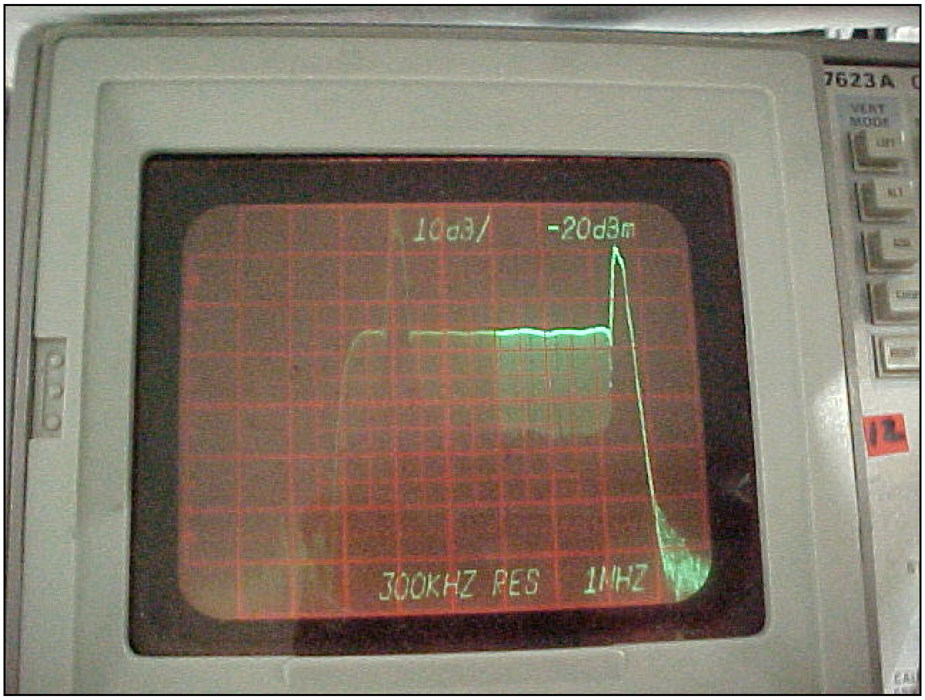


Figure 4-7. Channel-Occupied Bandwidth

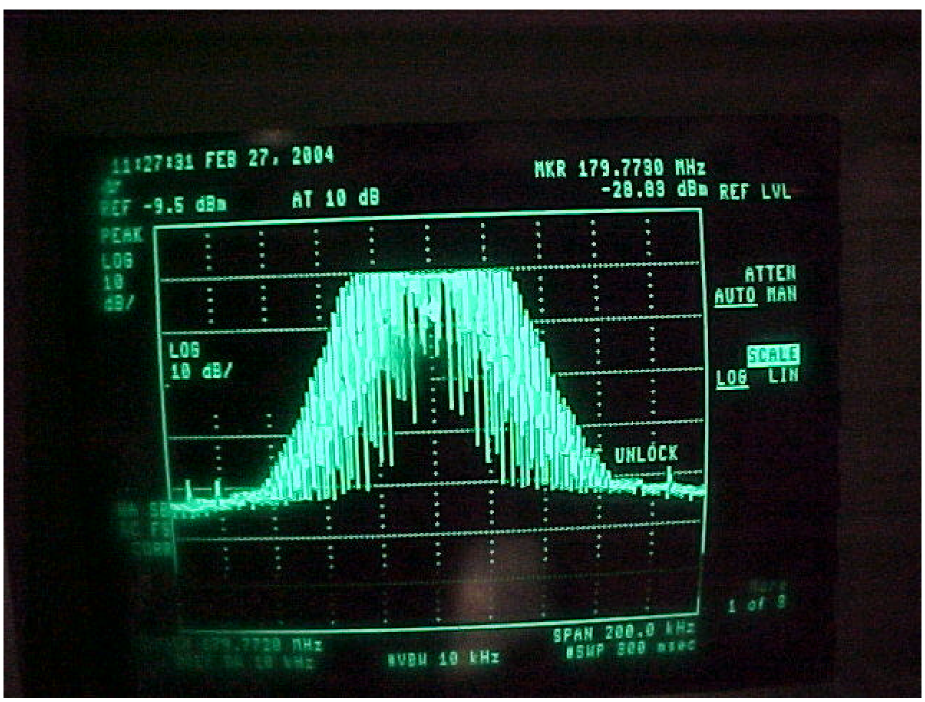


Figure 4-8. Aural Carrier-Occupied Bandwidth

4.4 Conducted Spurious Emissions

Using the test setup shown in Figure 4.1, the spectrum outside of the specified channel was observed and the data was recorded on all products above the 70-dB noise floor of the spectrum analyzer. This data is shown in Table 4-6 and is presented as graphs in Figures 4-9 and 4-10.

Table 4-6. Products Above the 70-dB Noise Floor of the Spectrum Analyzer

FREQUENCY (MHz)	SOURCE	PEAK LEVEL OBSERVED (dB)
266.75	Image Visual Carrier	None observed
262.25	Image Aural Carrier	None observed
221.00	Local Oscillator	None observed
166.25	-9-MHz Product	None observed
170.75	-4.5-MHz Product	-69
179.75	Aural Carrier	-10
175.25	Visual Carrier	0
182.45	+7.2-MHz Product	None observed
186.05	+10.8-MHz Product	None observed
184.25	+9-MHz Product	None observed
183.33	+8.08-MHz Product	None observed
180.67	+5.42-MHz Product	-60
171.67	-3.58-MHz Product	None observed
359.50	Second Harmonic-Aural Carrier	None observed
350.50	Second Harmonic-Visual Carrier	None observed
539.25	Third Harmonic-Aural Carrier	None observed
525.75	Third Harmonic-Visual Carrier	None observed

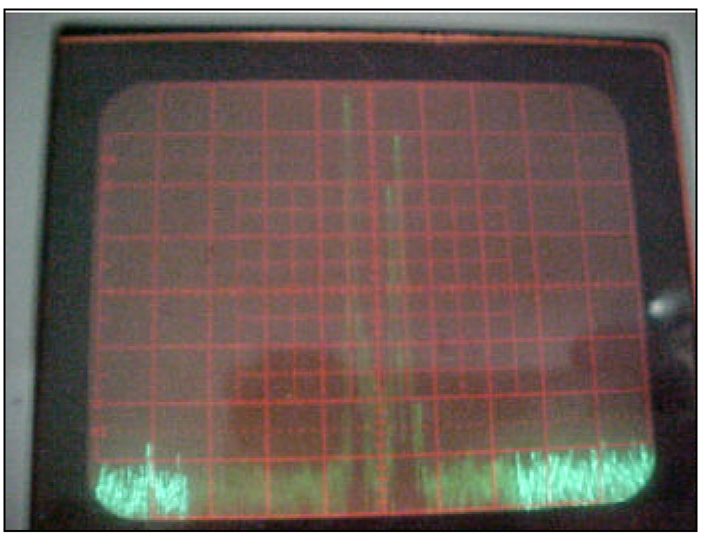


Figure 4-9. Products Above the 70-dB Noise Floor of the Spectrum Analyzer (1 of 2)

Figure 4-10. Products Above the 70-dB Noise Floor of the Spectrum Analyzer (2 of 2)

4.5 Radiated Emissions

Using the test setup shown in Figure 4-11, with the transmitter operating at full power, the spectrum analyzer was moved 20 meters from the transmitter and connected to a dipole antenna cut to 175 MHz. This antenna was oriented to maximize the received level and the data was recorded. The antenna was then cut to the local oscillator frequency and the second and third harmonic frequencies of the transmitter, and all of the signals received, were maximized by antenna orientation and their absolute levels were recorded.

With these various antennas, and with an adjustable length dipole for 40 to 650 MHz, the frequency spectrum from 40 MHz to 13,000 MHz was observed. The only measurable levels observed were at 175.25 MHz and 179.75 MHz. These levels are shown below in Table 4-8 and an analysis of the relative field and strength is provided in the following paragraphs.

Table 4-8. Measurable Levels Observed in Frequency Spectrum

FREQUENCY	MEASURED LEVEL (INTO 50 W)
175.25	-36 dBm
179.75	-51 dBm

The spectrum analyzer had a maximum sensitivity of -110 dBm during these tests.

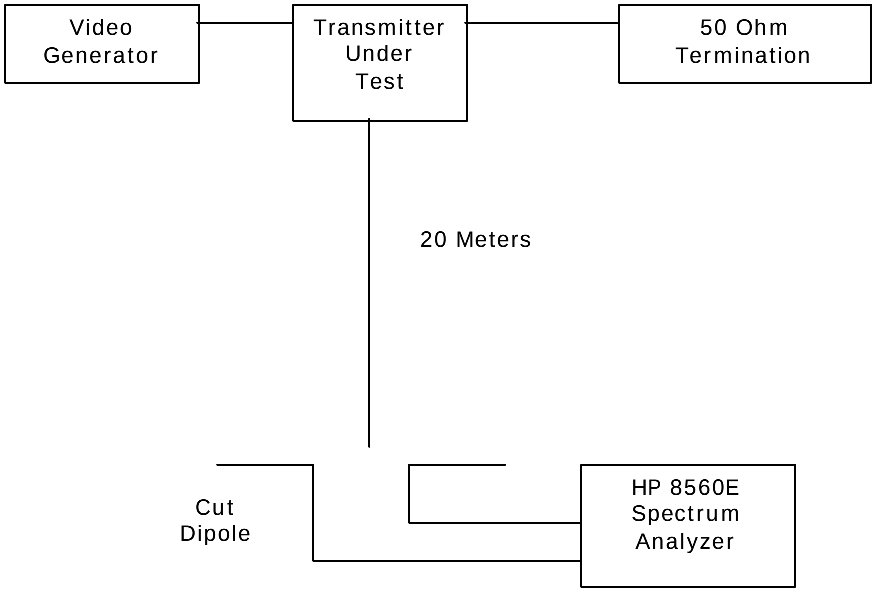


Figure 4-11. Test Setup for Measuring Radiated Emissions

Three levels were compared to the following reference level.

If all of the power of the transmitter was radiated by an isotropic radiator, the power density at 20 meters would be:

$$P = Pt/4\pi R^2 = 1000/4\pi \bullet (20)^2 = .2 \text{ w/m}^2$$

Using a dipole-transmitting antenna increases this by 1.64 to:

$$1.64 \text{ x } .2 = .32 \text{ w/m}^2$$

If a dipole-receive antenna of area 1.64 x $\lambda^2/4\pi$ is used to receive the signal, the received level would be:

320 mw = +25 dBm

The receive levels at –36 dBm and –51 dBm were therefore at –61 dB and –76 dB relative to this level.

The receive levels were therefore at the relative levels shown in Table 4-9.

Table 4-9. Receive Levels

FREQUENCY	(REF = +22 dBm) RELATIVE MEASURED LEVEL
175.25	-61 dB
179.75	-76 dB

With the receive dipole antenna cut to 175.25 MHz, the cabinet radiation was also checked, within very close proximity to the trays of the transmitter, and the received level that was recorded, and is shown below, did not exceed a power density above -6dBm:

$$Pr/A = 0.025 \ mw/cm^2$$

This level is far less than the current or proposed standard for safe radiation levels.

4.6 Frequency Stability

The output carrier frequencies are determined by the IF crystal oscillator, IF aural oscillator, and the crystal oscillator/multiplier of the exciter. Because the IF aural oscillator at 4.5 MHz is phase locked to the IF crystal oscillator at 45.75 MHz, the error in visual/aural separation is very small.

All three oscillators and the related phase-locked loop circuitry were placed in a temperature-controlled chamber and the temperature was varied from –30° C to +50° C. The chamber was slowly heated and the frequency was measured at 10° C increments up to +50° C. The oscillators were allowed to stabilize at each temperature before measurements were recorded.

Tables 4-10, 4-11, and 4-12 provide data on the individual oscillator frequencies; a calculation of the output frequency error indicates that the output frequency of the transmitter is well within the FCC tolerance for this service.

Table 4-10. Oscillator Data

TEMP (°C)	45.75-MHz CRYSTAL OSCILLATOR	4.5-MHz AURAL OSCILLATOR (PHASE LOCKED TO 45.75 MHz)	OVEN-CONTROLLED EXCITER CRYSTAL OSCILLATOR (MHz)	VISUAL/ AURAL FREQUENCY SEPARATION (MHz)
-30	45.750100	4.500011	81.124932	4.500011
-20	45.750061	4.500006	81.124968	4.500006
-10	45.750057	4.500006	81.124969	4.500006
0	45.750043	4.500005	81.124975	4.500005
10	45.750023	4.500003	81.124986	4.500003
20	45.750000	4.500000	81.125000	4.500000
30	45.749974	4.499998	81.125031	4.499998
40	45.749945	4.499994	81.125057	4.499994
50	45.749917	4.499996	81.125070	4.499996

Table 4-11. Calculated Frequency Errors

TEMP (°C)	45.75-MHz OVEN OSCILLATOR ERROR D kHz	DUAL OVEN OSCILLATOR ERROR D^1 KHz	TOTAL OUTPUT ERROR (kHz)
-30	0.1	-0.068	-0.644
-20	0.061	-0.032	-0.371
-10	0.057	-0.031	-0.305
0	0.043	-0.025	-0.243
10	0.023	-0.014	-0.135
20	0.0	0.0	0.0
30	-0.026	0.031	0.274
40	-0.055	0.057	0.511
50	-0.083	0.070	0.643

Table 4-12. Frequency Stability Versus Line Voltage

LINE VOLTAGE	45.75-MHz OSCILLATOR	4.5-MHz OSCILLATOR	OSCILLATOR (MHz)	TOTAL OUTPUT ERROR kHz
95V	45.750007	4.5000007	81.125000	0.01
115V	45.750007	4.5000007	81.125000	0.01
135V	45.750007	4.5000007	81.125000	0.01

4.7 Test Equipment

The test equipment that was used to analyze the Axcera-430B system is listed in Table 4-13.

Table 4-13. Test Equipment

MODEL	MANUFACTURER	DESCRIPTION	SERIAL #
TSG95	Tektronix	Video Generator	10647
1350	Tektronix	Demodulator	10656
43	Bird	Power Meter	278801
1000C	Bird	1000W Power Meter VHF Element	
8892-300	Bird	50 Ω Termination	2867
7L12	Tektronix	Spectrum Analyzer	804392
5253B	Hewlett-Packard	Frequency Counter	716-18295
VM-700T	Tektronix	Delay and Test Set	10654
ZFM-15	Mini-Circuits	Mixer	
3501	Amber	Distortion Analyzer	20014
1405	Tektronix	Sideband Adapter	20159
7623A	Tektronix	Spectrum Analyzer	20092
8901A	Hewlett-Packard	Modulation Analyzer	00553
8560E	Hewlett-Packard	Spectrum Analyzer	10706

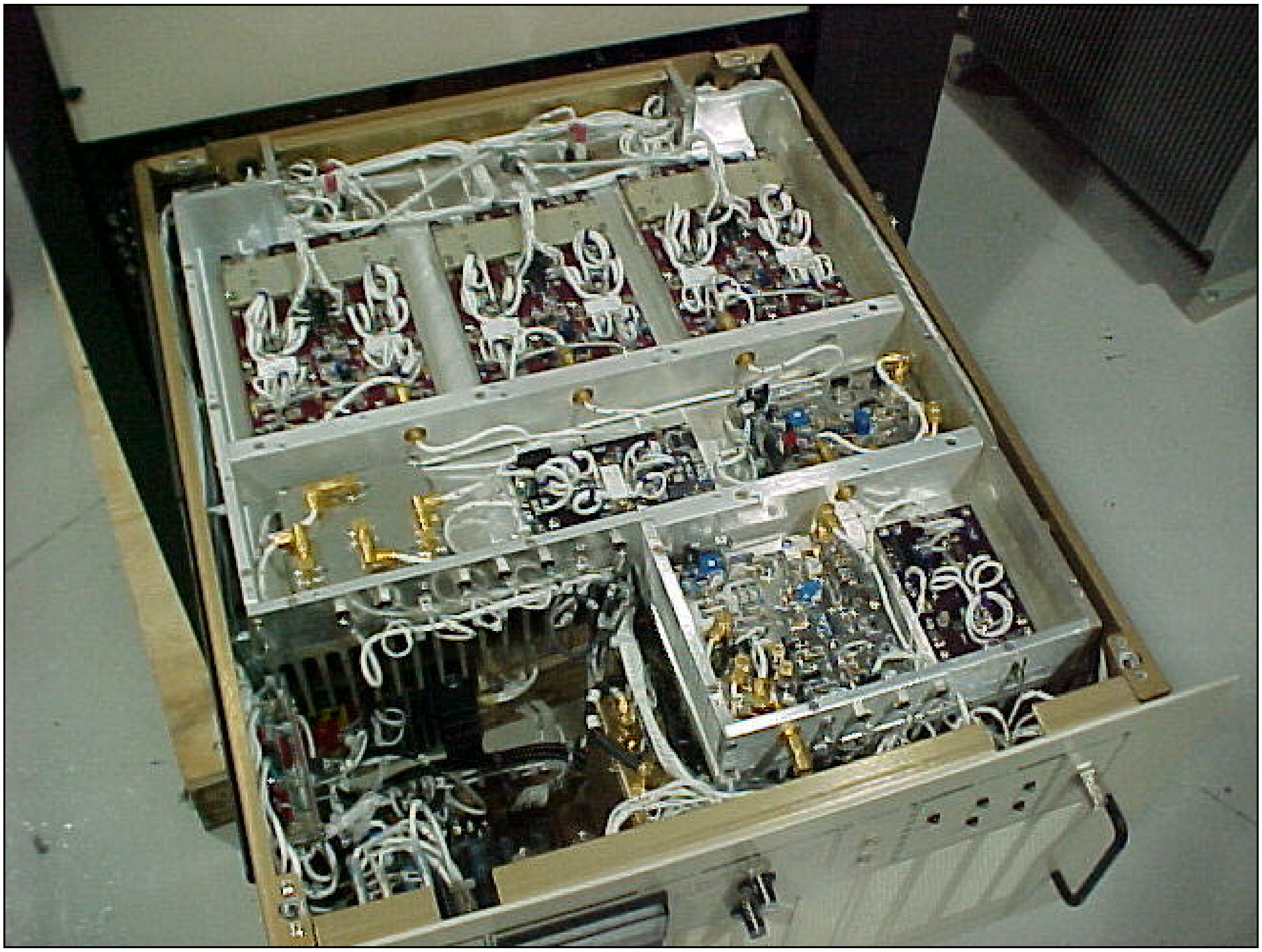
5. USER'S MANUAL

The user's manual for the Axcera-430B system is provided as separate Word and PDF files.

6. INTERNAL PHOTOS

6.1 Top view, Exciter Tray

6.2 Top view, 600-watt Amplifier Tray



7. PARTS LIST/TUNE-UP INFO

7.1 Parts List

The exciter, amplifier trays, and the output filter assembly can be subdivided as follows:

Exciter:
- Video input
- Audio input
- Sync-tip clamp/modulator with SAW filter
- AM FCC identifier
- IF crystal oscillator
- Phase correctors
- Aural frequency modulated oscillator
- Automatic level control
- Linearity correctors
- Channel crystal oscillator
- Frequency multiplier
- Filter/mixer
- Filter/amplifier
- Metering circuits
- Control and protection circuits
- Power supply

VHF High Band Amplifier Trays:
- AGC control
- Phase shifter
- Filter/amplifier
- High-band driver pallet
- Overdrive protection
- High-band VHF amplifier pallet
- 3-way splitter
- VHF amplifier pallets
- 3-way combiner
- Power supply

Output filter assembly:
- Bandpass filter with traps
- VHF coupler
- VHF splitter/combiner assemblies

7.2 Tune-up Information

The 430B transmitter was aligned at the factory and should not require additional alignments to achieve normal operation.

This transmitter operates 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.

Check that the RF output at J2 of (A9-A5) the coupler is terminated into a dummy load of at least 500 watts. While performing the alignment, refer to the Test Data Sheet for the transmitter 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 VHF exciter circuit breakers on the AC distribution panel behind the rear cabinet door.

7.2.1 High-Band VHF Exciter Tray with Baseband Video and Audio Inputs

The (A4) high-band VHF exciter tray (1070901) has adjustments for video levels, audio modulation levels, and other related parameters.

Connect an NTSC baseband video test signal input (1 Vpk-pk) to transmitter video input jack J2 on (A12) the remote interface panel. Jacks J1 and J2 on the VHF exciter tray are loop-through connected and 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). If stereo/composite audio is provided, connect it to BNC jack J6, the composite audio input jack on the remote interface panel. Jacks J3 and J13 on the rear of the exciter panel are loop-through connected and 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.

Look at the front panel meter on the VHF 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 the sync tip clamp/modulator board.

Switch the meter to the Audio position to show 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 at not the correct level, adjust balanced audio gain pot R13 on the aural IF synthesizer board, as needed, 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 needed, for the ±75 kHz deviation.

7.2.2 VHF Exciter Tray with the 4.5-MHz Composite Input Kit

With the 4.5-MHz composite input kit, (A4) the VHF exciter tray (1070901) is able to 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 4.5-MHz filter board (1227-1244) and a 4.5-MHz bandpass filter board (1265-1307).

To align the VHF exciter using baseband video and audio, refer to the alignment instructions described in Section 7.2.1. 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.

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 rear interface panel at J2. On (A24) the composite 4.5-MHz filter board (1227-1244), connect an oscilloscope between J7, the center pin, and pin 1 or 3, which are ground. Adjust C21, if necessary, 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 on the board, should be video-only with a minimum 4.5-MHz aural subcarrier.

On (A25) the 4.5-MHz bandpass filter board (1265-1307), adjust the filter with L2, C3, L4, and C7 for a frequency response of no greater than ±.3 dB from 4.4 MHz 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.

7.2.3 VHF Exciter Tray with either Baseband or 4.5-MHz Composite Input

The IF section of (A4) the VHF exciter tray (1070901) includes adjustments for automatic level control (ALC), linearity (amplitude predistortion), and phase (phase change vs. level) predistortion for the 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 require adjustments at this time.

Move the Operate/Standby switch on the VHF exciter tray to Standby. The setup of the RF output includes an adjustment to the drive level of the two VHF amplifier trays, the adjustment of the linearity and phase predistortion (which compensate for any nonlinear responses of the amplifier trays), and the gain and phasing adjustments of the two VHF amplifier trays.

Verify that all of the red LEDs on the ALC board are extinguished. The following list describes the meaning of each LED when they are 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. This is normally 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 has been selected (this is only used if a receiver tray is present in the system). DS5 is always on with no receiver.

The ALC is muted when the transmitter is in Standby. To monitor the ALC, turn off the (2) amplifier on/off circuit breakers on the AC input assembly in the rear of the cabinet and switch the transmitter to Operate. Adjust the power adjust gain pot on the front panel of the VHF exciter tray to obtain +0.8 VDC on the front panel meter in the ALC position. On the ALC board (1265-1305), 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 of the ALC board is connected to the transmitter control board that distributes the level to the two VHF amplifier trays where it is used as a reference for the automatic gain control (AGC) in each amplifier tray.

7.2.4 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 not require additional adjustments.

Locate (A9) the IF phase corrector board (1227-1250) mounted in the VHF exciter. The amplitude correction portion of the board is not utilized in this configuration. As a result, jumper W3 on J10 should be in the Disable position, to +6.8 VDC, and R35 and R31 should be fully counter-clockwise (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 input video test source to select an NTSC 3.58-MHz modulated staircase or ramp test waveform. 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. Adjust the R3 threshold for the cut-in point of the correction and the R7 magnitude for the amount of the correction that is needed.

Jumper W1 on J8 is set to give the desired polarity of the correction shaped by the threshold R11 and the 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.**

7.2.5 Linearity Corrector Adjustment

The IF linearity correction function consists of three non-linear cascaded stages, each having magnitude and threshold adjustments, 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 VHF exciter tray control locations drawing, ALC board (1265-1305), to find 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 transmitter is operating at full power with the desired A/V ratio. Check that jumper W1 on J4 of the ALC board is enabled between pins 1 and 2. Make sure 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 transmitter. Demodulate the output signal of the transmitter 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 pots R34, R37, and R40 (threshold) fully CCW and the magnitude adjustments R13, R18, and R23 fully clockwise (CW). 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 volts. Center the display to the blanking level (approximately).

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

Adjust pots R34, R37, and R40 CW on the IF ALC board, as needed, to give correction at sync or at low luminance levels as viewed at the left-most edge of the waveform monitor.

The intermodulation beat products between the colorburst 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 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 IRE. Pot R31 on the IF phase corrector board is used for any extra intermodulation correction that may be needed.

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

If the transmitter 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.

Switch the transmitter to Standby.

7.2.6 Phase and Gain Adjustment of the VHF Amplifier Trays

The following procedure was completed at the factory and should only be performed if one of the VHF amplifier trays is replaced.

Preset the phase and gain potentiometer on each VHF amplifier tray fully CCW. Switch the transmitter to Operate and adjust the gain pot on each tray for 25% Output Power. Adjust the phase control CW on the left VHF amplifier tray. If the % Visual Output Power goes up, continue to adjust the phase control 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 VHF 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-inch length of cable to the input of the affected VHF amplifier tray at J1. Readjust the phase of that tray until a peak is reached or until the end-of-travel is achieved. If the end-of-travel is reached, repeat the above procedure and replace the 2-inch length of cable with a 4-inch length of cable. Once a peak has been reached, move the phase control that is fully CCW up two turns and repeak it using the phase control on the other tray. This allows both trays to have some range of adjustment.

Adjust the gain of both VHF amplifier trays for 90% Output Power. Readjust each phase control to peak the combined output; the phase should only have been slightly affected. Although it may take a few turns to notice a change, there should be a definite peak that is achieved while adjusting the phase of each tray. Raise or lower the output power of each tray to achieve 100% Output Power. The output power of each tray should be 90% to 100%.

7.2.7 Calibration of the Forward Output Power Level of the Transmitter

Note: The following procedure should only be performed if the power calibration is suspect.

Switch the transmitter to Standby and preset R51, the aural null pot on the visual/aural metering board (1265-1309), fully CCW. Adjust R48, the null offset pot on the visual/aural metering board, for 0% Visual Output. Perform the following adjustments with no aural present; this is accomplished by removing jumper cable W1, the aural IF loop-through, that is connected to J16 on (A5) the sync tip clamp/modulator board (1265-1302). Connect a sync and black test signal to the video input jack of the VHF exciter tray. Switch the transmitter to Operate.

Set up the transmitter for the appropriate average output power level: sync + black 0 IRE setup/wattmeter=595 watts; sync + black 7.5 IRE setup/wattmeter=545 watts.

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

With the front panel meter in the % Visual Output position, adjust R28, visual calibration, on (A19) the visual/aural metering board (1265-1309) for 100%.

With the spectrum analyzer set to the zero span mode, obtain a peak reference on the screen. Reconnect jumper cable W1 to J16 on (A5) the sync tip clamp/modulator board. While in the Visual Output Power position, adjust L3 for a 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 a maximum aural power reading and then also adjust R20 for a 100% Aural Power reading. Switch the transmitter to the Visual Output Power position and adjust R51, the aural null pot, for 100% Visual Power.

7.2.8 Calibration of the Reflected Output Level of the Transmitter

On the meter, in the Visual Power position, turn the power adjust pot to 20%. Check that the jumper is in Manual on the VHF filter/amplifier board (1064252). Reverse the cables on A9-A5, J3 and J4, 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 this LED is not lit, adjust R22 on the transmitter control board in the VHF exciter tray 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 transmitter to Standby. Move the cables on A9-A5, J3 and J4, to their original positions. Switch the transmitter to Operate and adjust the front panel power pot for a 100% Visual Power reading.

7.2.9 2-Way Combiner Assembly

There are no adjustments to (A8) the VHF combiner assembly (1219-1006).

Note: The bandpass filter is factory swept and should not be tuned without the proper equipment. Do not attempt to tune the filters without a sweep generator or, preferably, a network analyzer. If tuning is required, consult the Axcera Field Support Department before attempting to make any adjustments.

7.2.10 Bandpass Filter Assemblies

The input to (A13) the bandpass filter assemblies (1076294 through 1076297) is the output of the VHF combiner assembly, which is the combined output of the VHF amplifier trays. The filter is made of aluminum waveguide and has five resonant cavities. The filter has five bolts for tuning adjustments. The bandpass filter also utilizes two integral traps at -4.5 MHz and +9 MHz from F_V. 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.

Table 7-1 contains typical values for the bandpass filter.

Table 7-1. Bandpass Filter Typical Values

FREQUENCY	INSERTION LOSS (DB)	RETURN LOSS (DB)
F_V-4.5	≥ 35	
F_V-0.5		≥ 20
F_V	≤ 0.8	≥ 20
F_a	≤ 0.8	≥ 20
F_V+8.08	≥ 15	
F_V-9	≥ 30	
2F_V	≥ 30	

7.2.11 VHF High-Band Amplifier Trays

The (A6 and A7) 600-watt high-band VHF amplifier trays (1301169) 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 (A13) the AGC control board (1142-1601) in Manual. The idling current for the amplifier boards is adjusted with no RF drive applied. S1 should be in the Auto AGC position for the normal operation of the transmitter.

Connect a dummy load with a rating of a least 300 watts to J2, the RF output jack of each tray.

7.2.11.1 AGC Control Board

Using a calibrated wattmeter, check that the tray is operating at the rated power. Remove the sample forward power connection J4 from (A13) the AGC control board (1142-1601). The output power level should drop to 20% because of the VSWR cutback and DS4 should be illuminated. The front panel Module Status LED should not be lit.

Reconnect J4 and adjust R59 to begin cutting back on the output power level when the reflected level increases above 20%.

In the Power Supply Voltage position, the front panel meter is calibrated to +28 VDC using R86 on the AGC control board.

7.2.11.2 Phase Shifter Board

There are no adjustments to (A1-A1) the phase shifter board (1198-1603). The front panel has adjustments for phase that are made during the amplifier array setup procedure.

7.2.11.3 VHF Filter/Amplifier Board

The (A2-A1) VHF filter/amplifier board has approximately 5 dB of gain. Tune the channel filter capacitors C20 and C29 (loading), C23 and C26 (center frequency), and C24 (coupling) at J6 on the board for the best response.

The idling current, no RF drive applied, of the device Q1 is set for 250 mA. To set the current, remove the RF drive, measure the voltage across R20 (two 1Ω resistors in parallel on the filter/amplifier board) and adjust R13 for .125 volts (using Ohms' Law: [E=I x R] : [E=250 mA x .5 Ω] : E=125 mV).

7.2.11.4 High-Band VHF Driver Pallet

This board is supplied by Delta RF Technology, Inc. Refer to the data sheets in the subassembly section of this manual for more information. The board has approximately 19 dB of gain and the output is typically +31 dBm.

7.2.11.5 Overdrive Protection Board

The level of the RF input and output of (A3-A1) the overdrive protection board (1198-1601) should be +31 dBm during normal operation.

To set up the overdrive circuit, check that the output power level of the transmitter is at 100% and adjust R11 on the board for a reading of .4 VDC at TP1. Increase the output power level of the transmitter to 110%, sync only, and adjust R12 until the output power begins to drop off. Return the output power level of the transmitter to 100%.

7.2.11.6 High-Band VHF Amplifier Pallet

This board is supplied by Delta RF Technology, Inc. Refer to the data sheets in the subassembly section of this manual for more information. The board has approximately 14 dB of gain and the output is typically +45 dBm.

7.2.11.7 3-Way Splitter Board

This board contains no tuning adjustments. The board takes the +45 dBm input and splits it into three equal +40 dBm outputs.

7.2.11.8 VHF Amplifier Pallets

These boards are supplied by Delta RF Technology, Inc. Refer to the data sheets in the subassembly section of this manual for more information. Each board has approximately 13 dB of gain and the output is typically +53.3 dBm.

7.2.11.9 3-Way Combiner Board

There are no adjustments to the (A5-A1) 3 way combiner assembly. The three +53.3 dBm inputs are combined to produce the 600 watts peak of sync + aural output (+57.8 dBm) at the RF output jack J5 of the combiner.

J5 of the combiner connects to J2 the RF Output Jack of the VHF Amplifier Tray.

7.2.11.10 Calibration of the Visual Plus Aural Output Power and VSWR Cutback

Check that a dummy load of at least 600 watts is connected to the output of the tray that is to be calibrated. Place switch S1 on the AGC control board in the Manual position before beginning the setup.

To adjust the visual output power levels:

1. Remove the J16 cable from (A5) the sync tip clamp/modulator board (1265-1302) in the exciter tray. Set Manual AGC switch S1, on (A13) the AGC control board (1142-1601) in the 600-watt amplifier, to the Manual position. Turn the transmitter to the Operate position.

2. Connect a sync and black test signal to the video input jack of the remote interface panel.

3. Adjust manual gain pot R5 on the AGC control board for:

- Sync + black 0 IRE setup; wattmeter=360 watts
- Sync + black 7.5 IRE setup; wattmeter=325 watts

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

4. Obtain a zero span reference of the visual-only carrier on a spectrum analyzer. Replace the J16 connector on the sync tip clamp/modulator board in the exciter tray. Adjust R5 on the AGC control board until the same visual reference is obtained. Adjust R44 on the AGC control board for 100% Forward Power.

Lower the forward power reading to 80% on the front panel meter using R5, the manual gain adjust on the AGC control board. Tune R65, the AGC fault adjust on the AGC control board, until the green Module LED DS3 on the front panel just begins to light. Use R5 to re-adjust the forward power to 100%.

Switch off the tray and reverse the J6 and J7 cables on the 3-way combiner board. Switch on the tray and adjust the front panel meter, in the Reflected Output Power position, to a 100% reading using R53, the reflected power meter adjust on the AGC control board. Adjust the reflected output power to a 20% reading using R5 on the AGC control board. Tune R59, the VSWR cutback adjust on the AGC control board, until the red VSWR Cutback LED DS4 on the front panel lights. This sets up the VSWR cutback circuitry.

Readjust R5 for 100% on the meter to achieve a 600 watts peak of sync + aural output. However, if the system requires less output power per amplifier tray, adjust each tray by the same amount to give the desired total output power.

Switch off the tray and return the J6 and J7 cables on the 3-way combiner board back to their original positions. If the tray was originally operating below 100% output power, the AGC fault adjust was set for 20% below the operational % Output Power of the tray. See the Test Data Sheet for the transmitter for the actual readings for the tray.

Place S1 on the AGC control board in the AGC position. This is the normal operating position after the setup is completed.

There are spare 1-amp and 10-amp fuses on the top, right-hand side of the tray. These are replacements for fuses on the current metering board.

At this point, the 600-watt amplifier tray is aligned, calibrated, and ready for normal operation.

7.2.12 Board Level Alignment Procedures

7.2.12.1 (Optional) 4.5-MHz Composite Input Kit

If the (optional) 4.5-MHz composite input kit is purchased, the tray is capable of operating by using either the 4.5-MHz composite input or the baseband audio and video inputs. The kit adds (A24) the composite 4.5-MHz filter board (1227-1244) and (A25) the 4.5-MHz bandpass filter board (1265-1307) to the transmitter. When the 4.5-MHz intercarrier signal generated by the 4.5-MHz composite input has been selected by the 4.5-MHz composite input kit, the 4.5-MHz generated by the aural IF synthesizer board is not used. When the 4.5-MHz intercarrier signal generated by the baseband video and audio inputs with baseband has been selected by the 4.5-MHz composite input kit, the composite 4.5-MHz filter board and the 4.5-MHz bandpass filter board are not used.

The tray has been factory tuned and should not need any alignments to achieve normal operation. To align the tray for the 4.5-MHz composite input, apply the 4.5-MHz composite input, with the test signals used as needed, to the video input jack (J1 or J2 [loop-through connections]) on the rear of the tray. Select the 4.5-MHz composite input by removing the baseband select from J18-6 and J18-7 on the rear of the tray.

To align the exciter using baseband video and audio inputs, apply the baseband video, with the test signals used as needed, to the video input jack (J1 or J2 [loop-through connections]) and the baseband audio to the proper baseband audio input on the rear of the tray. For balanced audio input, connect TB1-1(+), TB1-2(-), and TB1-3 (GND). For composite/stereo audio, connect the composite audio input jack (J3 or J13 [loop-through connections]) and connect a baseband select from J18-6 and J18-7 on the rear of the tray.

7.2.12.2 Delay Equalizer Board

The jumper W1 on J5 of the sync tip clamp/modulator board, if present, must be in the Enable position between pins 2 and 3.

Note: This board has been factory tuned and should not be re-tuned without the proper equipment.

To tune this board:

1. Connect a sinX/X test signal into jack J1-2 on the delay equalizer board.

2. Monitor the video output of the board, at video sample jack J2, with a video measuring set, such as the VM700, adjusted to measure group delay.

3. Tune the four stages of the board using the variable inductors (L1 to 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 out of the board as into the board.

7.2.12.3 Composite 4.5-MHz Filter Board

This board is part of the 4.5-MHz input kit and will only function properly with a 4.5-MHz composite input signal and the 4.5-MHz composite input selected. To align this board:

1. Connect the test signal from an envelope delay measurement set to the video input of the tray at J1 or J2.
2. 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 on the board should be video-only, without the 4.5-MHz aural subcarrier.

7.2.12.4 (Optional) 4.5-MHz Bandpass Filter Board

This board is part of the 4.5-MHz input kit and will only function properly with a 4.5-MHz composite input signal and the 4.5-MHz composite input selected. To align this board:

1. Adjust the filter with L2, C3, L4, and C7 for a frequency response of no greater than ±0.3 dB from 4.4 MHz to 4.6 MHz.

2. Adjust C19 for an overall peak-to-peak variation of less than ±0.3 dB from 4.4 MHz to 4.6 MHz.

3. Recheck the frequency response; it may have changed with the adjustment of the envelope delay. If necessary, re-tune the board.

7.2.12.5 IF Carrier Oven Oscillator Board

To align this 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, which is the aural phase lock loop (PLL) reference.

7.2.12.6 Sync Tip Clamp/Modulator Board

To align this board:

1. Determine if jumper W4 on jack J3 is present. Jumper W4 terminates the video input into 75Ω. Remove jumper W4 if a 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 full CCW position. Set R48, the sync magnitude, fully CW and place the jumper W7 on jack J4 to the Clamp-Off, Disable, position.

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

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

5. 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.

6. Monitor TP2 with an oscilloscope. Adjust pot R41, manual offset, for a blanking level of -0.8 VDC. The waveform shown in Figure 7-1 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.

Note: This waveform represents the theoretical level for proper modulation depth.

Step 9 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.

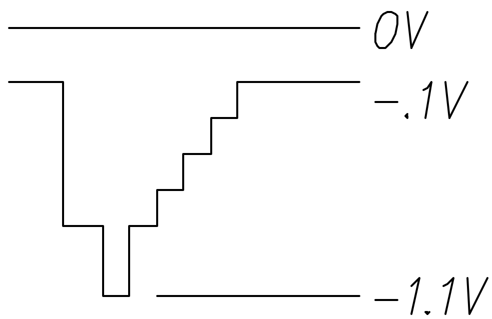


Figure 7-1. Waveform

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

   A. Remove the cable that is on J18 and 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 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 to the following:

      Detector mode – Cont
      Sound trap – In
      Zero carrier – On
      Auto – Sync
      Audio source – Split
      De-emphasis – In

8. 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.

9. Check the demodulated video for a 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 needed, for the correct depth of modulation.

10. Move jumper W7 on J4 to the Clamp Enable position. Readjust pot R152, depth of modulation, for the correct depth of modulation.

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

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

13. On a spectrum analyzer, adjust pot R70 for a level of approximately -10 dBm at J18.

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

15. Replace the input video 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 1 volt (10 on the 0 to 10 scale). This board does not have sync metering.

16. Reconnect the plug to J18 and move the spectrum analyzer test cable to the 41.25 IF output jack J16. Tune C59 and L17 to 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.

17. 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 of the range. Insert a multiburst test signal into the transmitter 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).

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

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

7.2.12.7 Aural IF Synthesizer Board, 4.5 MHz

1. To set up the test equipment for this board:

   A. Connect the 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 (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. At the front of the demodulator, connect a short cable 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, re-tune L5 for a locked condition.

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

5. Check the distortion on the aural distortion analyzer (THD=< 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 procedures in the stereo generator instruction manual for matching the level of the generator to the exciter. Use R17 to adjust the composite audio gain.

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

7.2.12.8 ALC Board (Part 1 of 2)

Table 7-2 describes the functions of each LED on (A8) the ALC board.

Table 7-2. ALC Board LEDs

LED	FUNCTION
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 level requested by the ALC reference due to excessive attenuation in the linearity or the IF phase corrector signal path or because 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
DS5 (Green LED)	Indicates that the output from the modulator is selected as the input to the board

1. To align the ALC board, preset the following controls on the tray:

   A. ~~ALC Board (1265-1305)~~

   Connect jumper W1 on J4 to Disable, between pins 2 and 3 (to disable linearity correctors). Connect jumper W3 on J6 to Manual, between pins 2 and 3 (for manual gain control).

   Adjust R87, the manual gain pot, to mid-range.

   B. ~~IF Phase Corrector Board (1227-1250)~~

   Move W2 on J9 to Phase Correction: Enable. Move W3 on J10 to 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 look to see if DS1, the Input Fault LED, is illuminated. Reconnect J32 and make sure 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 the second part of the ALC board alignment, check to see that the IF phase corrector board (1227-1250) is functioning properly.

7.2.12.9 IF Phase Corrector Board

See Section 7.2.4 of this chapter for the system alignment procedures for 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 J3, the IF O/P jack of (A8) the ALC board. The IF output jack of the IF phase corrector board is fed to J7, the IF I/P jack of (A8) the ALC board.

7.2.12.10 ALC Board, NTSC (Part 2 of 2)

To align this board:

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

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

3. Place jumper W3 on jack J6 in the Manual mode and adjust R87 for 0.5 volts at TP4.

4. 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, then adjust switch S1 on the board to maximum voltage at TP4. Adjust R74, the range adjust, for 1 volt at TP4.

5. Tune front panel power adjust control A20 for 0.5 VDC at TP4. If the (optional) remote power raise/lower kit is present, move switch S1 on the board to mid-range and then tune (A20) the front panel power adjust control for 0.8 VDC at TP4.

6. Disconnect the plug that is on J12, the IF output, and monitor J12 with a spectrum analyzer. Verify an output of approximately 0 dBm. If necessary, adjust R99 to increase the output level. If less of an output level is needed, move jumpers J27 and J28 to pins 2 and 3 and then adjust R99. Reconnect J12.

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

Caution: The following step affects the response of the entire transmitter.

8. 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 are used to adjust the frequency of the correction notch that is 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 Section 7.2.5 of this chapter for the system alignment procedures for the linearity correctors. Controls R13, R18, and R23, the magnitude controls, should be set fully CW. Controls R34, R37, and R40 are the linearity cut-in adjustments.

7.2.12.11 Channel Oscillator Board, Dual Oven

This board is mounted in (A14) the channel oscillator assembly (1145-1202). To align the board:

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 digital voltmeter (DVM) to TP1 on the x4 multiplier board. Tune capacitors C6 and C18 for maximum voltage, then also tune L2 and L4 for a 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.

Note: Do not re-peak C6, C18, L2, or L4. This may change the output level.

Note: While adjusting C9 and C11 to the crystal frequency, the peak voltage monitored at TP1 of the x4 multiplier board should not decrease. If a decrease does occur, there may be a problem with the crystal. Contact ADC Field Support for further instructions.

Note: If the VCXO board (1145-1204) in the VCXO assembly (1145-1206) is used, the fine-frequency adjust C9 is not located on the VCXO board. Use R9 on the FSK with EEPROM board.

3. Reconnect the main output (J1) of the channel oscillator to the input (J1) of the x4 multiplier.

7.2.12.12 FSK Identifier Board with EEPROM

The FSK identifier board with EEPROM generates a Morse code identification call sign by controlling the shifting of the amplitude of the aural carrier in the exciter tray. This gives the station a means of automatically repeating its identification call sign at a given time interval to meet FCC requirements.

The starting circuit is made up of U1B and U1D, which are connected as a flip-flop, with gate U1A used as the set. U1A automatically starts the flip-flop each time U3 completes its timing cycle. At the start of a cycle, U1B enables clock U2. U2 applies the clock pulses that set the speed, which is adjusted by R2, and the identification code is sent to 12-bit binary counter U4. R2 fully CW is the fastest pulse train and R2 fully CCW is the slowest pulse train. U4 provides binary outputs that address EEPROM U5.

The data output of U5, which is serial, is connected to U6A, whose output shifts low and high. This output is applied to the IF attenuator board, which shifts the amplitude of the aural carrier according to the programming of U5.

7.2.12.13 IF Attenuator Board

The IF attenuator board is operated with the FSK identifier board to produce an amplitude-modulated aural IF signal for broadcasting the required FCC station identification call sign at the proper time intervals.

The board contains a PIN attenuation circuit consisting of CR1 and the two resistors R2 and R3. The bias output of the FSK identifier board is applied to J3 of the IF attenuator board. As the bias applied to J3 increases and decreases, the amplitude of the aural IF signal that enters the board at J1 and exits at J2 will increase and decrease. This produces an amplitude-modulated IF signal at J2, the aural IF output jack of the board.

7.2.12.14 x4 Multiplier Board

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

1. Monitor TP1 with a DVM and tune C4 for maximum voltage. Monitor TP2 with a DVM and tune C6 and C10 for maximum voltage. Monitor TP3 with a DVM and tune C12; re-peak C4, C6, and C10 for maximum voltage.

2. Connect a spectrum analyzer, tuned to four times the crystal frequency, to the x4 multiplier output jack J2. While trying to keep the out-of-band products to a minimum, monitor the output and peak the tuning capacitors for maximum output.

Connect a spectrum analyzer to J6. Adjust C23 and C26 to determine the center frequency. Use C2 and C7 to locate the upper and lower channel-edge shaping. C24 is used to determine the channel bandwidth.

The output of the x4 multiplier connects to (A11-A1) the filter/mixer board.

7.2.12.15 VHF Filter/Mixer Board

To align the board:

1. Monitor J4, the LO output of the board, with a spectrum analyzer and adjust C12 and C18 for maximum output (+14 dBm) at the LO frequency and minimum out-of-band products. Adjust C13 and C17 for the best frequency response for the LO frequency.

2. Adjust C3 and C6 to determine the center frequency. Use C2 and C7 to locate the upper and lower channel-edge shaping. C4 is used to determine the channel bandwidth.

7.2.12.16 High-Band VHF Filter/Amplifier Board

The filter/amplifier board has been factory swept and adjusted for a 6-MHz bandwidth.

Note: This board should not be tuned without the proper equipment.

The filtered output connects to J1 of the board and is amplified by U1 to a nominal +8 dBm visual and -2 dBm aural level by adjusting R9. The output at J2 is fed to J4 on the A11 enclosure and from there to J15 on the rear of the tray.

To align the board, use a multiburst or sweep video signal inserted into the exciter tray.

Reconnect the cable from J6 to J1 on the filter/amplifier board. Monitor J2, the RF output of the board, and peak C17 for the maximum signal level. Tune manual gain adjust R9 for a +8 dBm peak visual output.

This completes the tune-up procedures for the 430B transmitter.

8. OPERATIONAL DESCRIPTION - MODEL AXCERA-430B

8.1 General Description

The 430B is a complete 1000-watt VHF solid-state internally diplexed television transmitter. It operates at a nominal visual output power of 1000 watts peak sync and an average aural output power of 100 watts, at an A/V ratio of 10 dB, 10% sound, or 50 watts at 13 dB, 5% sound.

8.2 Technical Specifications

Type of Emissions:
- Visual...5M75C3F
- Aural...250KF3E

Frequency Range ....174 MHz to 216 MHz (any 6-MHz channel)

Output Power
- Visual........... 250 to 1000 watts peak sync (front panel adjustable)
- Aural... ≤100 watts average

Maximum Power Rating
- Visual.. 1000 watts peak visual
- Aural.. 100 watts average aural

Power Consumption ....3000 watts

8.3 Performance Specifications

<u>Visual Performance</u>

Operating Frequency Range....................................174 MHz to 216 MHz

RF output - Nominal:
- Power.. 1000 watts peak sync
- Impedance...50 ohms
- Connector .... Type N

Video Input:
- Level...1 volt peak to peak
- Impedance..75 ohms bridging

Visual Sideband Response:
- Below -1.25 MHz ....-20 dB
- From -0.75 MHz to –0.5 MHz .... +0.5, -2.0dB
- From -0.5 MHz to +3.58 MHz .... ±0.5 dB
- 3.58 MHz to 4.18 MHz .... +0.5, -1.0 dB
- Below -1.25 MHz ....-20 dB

Variation of Frequency Response with Brightness..........................+0.5 dB
Differential Phase .... ±3°
Incidental Phase Modulation .... ±3°
Differential Gain 5%

Low Frequency Linearity 5%
Intermodulation Distortion ....-52 dB
Amplitude Variation Over One Field 2%
Regulation Of Output 3%
Envelope Delay vs. Frequency..Per FCC curves
2T Pulse 2%
12.5T Pulse..5%
Modulation Capability..1%
AM Noise .... -55 dB
Harmonic Emission ....-60 dB
Spurious Emission ....-60 dB
Carrier Frequency Stability..±250 Hz

Aural Performance

RF Output – Nominal
- Power..≤100 watts
- Impedance..50 ohms
- Connector .... Type N

Aural Input:
- Impedance.. 600 ohms
- Level..0 to +10 dBm

Amplitude vs. Frequency Response ...75 microseconds pre-emphasis ±0.5 dB
Audio Harmonic Distortion..0.5%
Noise:
- AM..-55 dB
- FM..-60 dB

Aural to Visual Carrier Separation ....4.5 MHz, ±100 Hz
Modulation Capability.. ±100 kHz
Subcarrier Input.. +10 dBm for 25 kHz deviation

Electrical Requirements

Power Line Voltage..230 volts, ± 10%, 50/60 Hz
Power Consumption .... 3000 watts, 50% APL

Environmental

Maximum Altitude ....8,500 feet
Ambient Temperature ....0°C to +50°C

Mechanical

Dimensions:
- Width.. 22 inches
- Depth.. 34 inches
- Height .... 69 inches
- Weight .... 400 lbs

8.4. System Overview

The 430B (1303854) is made up of the trays and assemblies listed in Table 8-1.

Table 8-1. 430B Major Trays and Assemblies

MAJOR ASSEMBLY DESIGNATOR	TRAY/ASSEMBLY NAME	DRAWING NUMBER
A2	AC distribution panel	1265-1600
A4	VHF exciter	1070901
A6 and A7	Two VHF amplifier trays	1301169
A8	VHF combiner assembly	1219-1006
A9	Bandpass filter assembly	1067297
A12	Remote interface assembly	1083510

The (A4) VHF exciter can operate using either the baseband audio and video inputs alone or, if the (optional) 4.5-MHz composite input kit is purchased, the 4.5-MHz composite input or the baseband video and audio inputs to produce a diplexed, modulated, and on-channel frequency visual + aural RF output. The switching is accomplished by a relay on the sync tip clamp/modulator board that uses a baseband select to control a relay that chooses either the 4.5 MHz generated from the baseband inputs or from the 4.5-MHz composite input.

To operate the transmitter with the (optional) 4.5-MHz composite input kit using baseband inputs, the baseband video must be connected to J1 or J2; the baseband audio must be connected to the proper input jack; and a baseband select must be connected from J7-6 and J7-7. To operate the transmitter with the (optional) 4.5-MHz composite input kit using the 4.5-MHz composite input, the 4.5-MHz composite input must be connected to J1 or J2 and the baseband select must be removed from J7-6 and J7-7.

The RF output of the VHF exciter is split two ways in (A5) the 2-way power splitter assembly (ZFSC-2-2). The outputs of the splitter feed the two (A6 and A7) VHF amplifier trays that amplify the RF signals to approximately 300 watts each. The outputs of the two VHF amplifier trays are combined in (A8) the VHF combiner that provides approximately 600 watts peak of sync output. The 600-watt output is connected to (A9) a bandpass filter assembly. The bandpass filter is tuned to provide the high out-of-band rejection of unwanted products. The filtered signal is connected to A9-A5, a coupler assembly that provides a forward and a reflected power sample to the visual/aural metering board in the VHF exciter. The forward sample is processed to provide peak detected visual and aural power output samples to the transmitter control board in the VHF exciter. The reflected power sample is also peak detected and wired to the transmitter control board. The transmitter control board connects the visual, aural, and reflected power output samples to the front panel meter to monitor the system.

In the VHF amplifier tray, a forward power sample and a reflected power sample from the 4-way combiner board are connected to the dual peak detector board, single supply. This board provides peak-detected forward samples to the amplifier control board and supplies the samples to the front panel meter of the tray.

8.5 Control and Status

Control and status information for the transmitter is provided by the meter and LED indicators on the front panel of the VHF exciter. The switches and LED indicators are part of (A17) the transmitter control board that is mounted so that the switches and LEDs can be operated or viewed from the front panel of the VHF exciter.

Switch S1 is an Operate/Standby switch that controls the output of the transmitter by providing the enables that, when the transmitter is in Operate, are needed to turn on the switching power supplies in the two VHF amplifier trays. In Operate, the green LED DS2 is on and in Standby the amber LED DS1 is on. If the transmitter does not switch to Operate when S1 is switched to Operate, check that a dummy jumper plug, with a jumper between pins 23 and 24, is connected to jack J11 on the back of the tray. The jumper plug must be connected to A12-J9 when the (optional) remote interface panel is used. This jumper provides the interlock needed for the transmitter to operate. If the interlock is present, the green LED DS5 should be lit.

Switch S2 is an Automatic/Manual switch that controls the operation of the transmitter by the presence of the video input signal. When the switch is in Automatic, the green LED DS3 is lit and, if the video input signal to the transmitter is lost, the transmitter will automatically switch to Standby. When the video input signal returns, the transmitter will automatically switch back to Operate. In Manual, the amber LED DS4 is lit and the operation of the transmitter is controlled by the front panel switches. During normal operation of the transmitter, switch S2 should be in the Auto position. The front panel of the VHF exciter also has LEDs that indicate a Video Fault (Loss; red LED DS9) and VSWR Cutback (amber LED DS7).

8.5.1 VHF Exciter Tray

Table 8-2. VHF Exciter Tray Meters

METER	FUNCTION	
Meter (A4-A18)	This meter reads power in terms of a percentage of the calibrated output power level on the upper scale. The voltage level or frequency level is read on one of the bottom two scales. A full-scale reading on the top scale is 120%. 100% is equivalent to the full-rated 500 watts peak of sync visual. The meter also reads % Aural Power, % Exciter Power, % Reflected Power, audio levels, video levels, and the ALC reading.	
	With Switch S3 in Position	*Display*
	Switch S3, Meter	Selects the desired ALC voltage reading, % Exciter Power, % Reflected Power, % Visual Power, % Aural Power, video level, or audio level.
	Audio (0 to 100 kHz)	Reads the audio level, ±25 kHz balanced or ±75 kHz composite, on the 0 to 10 scale. Will indicate baseband audio, if it is connected to the transmitter, even with the video + 4.5-MHz SCA input selected.
	ALC (0 to 10 volts)	Reads the ALC voltage level, .8 VDC, on the 0 to 10 scale.
	% Exciter (0 to 120)	Reads the % Exciter Output Power Level needed to attain 100% output of the transmitter on the top scale.
	% Aural Power (0 to 120)	Reads the % Aural Output Power of the transmitter, 100% = 100 watts at 10 dB A/V ratio, on the top scale.
	% Visual Power (0 to 120)	Reads the % Visual Output Power of the transmitter, 100% = 500 watts peak of sync, on the top scale.
	% Reflected (0 to 120)	Reads the % Reflected Output Power, <5%, on the top scale.
	Video (0 to 1 volt)	Reads the video level, at white, on the bottom 0 to 10 scale.

Table 8-3. VHF Exciter Tray Switches

SWITCH	FUNCTION
Transmitter S1 Operate/Standby	The momentary switch S1 applies a ground to K1, a latching relay on the transmitter control board. K1 will switch either to Operate or to Standby depending on which direction S1 is pushed. When switched to Operate, the low, Enable commands are applied to the four VHF amplifier trays. These enables will turn on the VHF amplifier trays. The opposite occurs when the switch is turned to Standby.
Mode Select S2 Auto/Manual	The momentary switch S2 applies a ground to K2, a latching relay on the transmitter control board. K2 will switch the transmitter to Automatic or Manual depending on which direction S2 is pushed. In Automatic, the video fault command from the ALC board will control the operation of the transmitter. The transmitter will switch to Standby, after a slight delay, if the input video is lost and will switch back to Operate, quickly, when the video is restored. In Manual, the transmitter is controlled by the operator using the front panel Operate/Standby switch or by remote control.
Power Adjust (R1)	The 5-kΩ pot A20 sets the ALC level on the ALC board that sets the output power of the transmitter.

Table 8-4. VHF Exciter Tray Fault Indicators

INDICATOR	DESCRIPTION
Video Loss (DS9 Red)	Indicates that the video input to the transmitter has been lost. The fault is generated on the ALC board in the VHF exciter tray.
VSWR Cutback (DS7 Amber)	Indicates that the reflected power level of the transmitter has increased above 20%; this automatically cuts back the output power level to 20%. The fault is generated on the transmitter control board in the VHF exciter tray.

Table 8-5. VHF Exciter Tray Samples

SAMPLE	DESCRIPTION
f(IF)	A sample of the visual IF that is taken from the sample jack on the IF carrier oven oscillator board.
f(IC)	A sample of the intercarrier signal that is taken from the sample jack on the aural IF synthesizer board.
f(s)	A sample of the channel oscillator output that is taken from the sample jack of the channel oscillator assembly.
Exciter O/P	An output power sample of the exciter that is taken from the VHF filter/amplifier board.
Transmitter O/P	A forward power sample of the transmitter that is taken from the visual/aural metering board.

8.5.2 VHF High High Band Amplifier Tray

Table 8-6. VHF High Band Amplifier Tray Switches

<table>
<tr><th>SWITCH</th><th colspan="2">FUNCTION</th></tr>
<tr><td>On/Off Circuit Breaker CB1</td><td colspan="2">Switches 220 VAC through a 15-amp circuit breaker-type protection device. The switch lights if AC is present. The AC is applied to the switching power supply in the tray.</td></tr>
<tr><td rowspan="7">Switch S1, Meter</td><td colspan="2">Selects the desired % Visual Forward Output Power, % Visual Reflected Power reading, AGC Voltage, Power Supply Voltage, or Current</td></tr>
<tr><td>With Switch S1 in Position</td><td>Display</td></tr>
<tr><td>% Forward</td><td>Reads the % Forward Output Power of the tray (100%= 600 watts peak of sync + aural)</td></tr>
<tr><td>% Refl (Reflected)</td><td>Reads the % Reflected Output Power (<10%)</td></tr>
<tr><td>AGC Voltage</td><td>Reads the AGC level of the tray (1 to 2 VDC)</td></tr>
<tr><td>Power Supply</td><td>Reads the voltage from the switching power supply (+28 VDC)</td></tr>
<tr><td>Current</td><td>Uses switch S2 to indicate the current of transistor devices</td></tr>
<tr><td rowspan="6">Switch S2, Meter</td><td colspan="2">Selects the current of the transistor devices on the high band amplifier boards. S1 must be in the Current position.</td></tr>
<tr><td>With Switch S2 in Position</td><td>Display</td></tr>
<tr><td>I_1</td><td>Reads the current of (A4-A1) the high band amplifier board (idling current = 6 amps and operating current = 12 amps)</td></tr>
<tr><td>I_2</td><td>Reads the current of (A4-A2) the high band amplifier board (idling current = 6 amps and operating current = 12 amps)</td></tr>
<tr><td>I_3</td><td>Reads the current of (A4-A3) the high band amplifier board (idling current = 6 amps and operating current = 12 amps)</td></tr>
<tr><td>I_4</td><td>Reads the current of (A3-A2) the high band driver board (idling current = 3 amps and operating current = 6 amps)</td></tr>
</table>

Table 8-7. VHF High-Band Amplifier Tray Fault Indicators

INDICATOR	DESCRIPTION
Overdrive (DS1)	Indicates that the level of drive is too high. The protection circuit will limit the drive level to the set threshold. The fault is generated on the overdrive protection board.
Enable (DS2)	Indicates that the enable supplied by the exciter tray is present
Module Status (DS3)	Indicates that the forward power sample level is lower than the set reference level
VSWR Cutback (DS4)	Indicates that the reflected level of the tray has increased above 20%; this will automatically cut back the output power of the tray. The fault is generated on the AGC control board.
Overtemp (DS5)	Indicates that the temperature of (A4-A5, A4-A6, or A5-A2) the thermal switch is above 80° C. When this fault occurs, the enable to the switching power supply is immediately removed.

Table 8-8. VHF High Band Amplifier Tray Control Adjustments

ADJUSTMENT	DESCRIPTION
Phase (A7-R2)	Adjusts the phase of the RF output by approximately 70%
Gain (A6-R3)	Adjusts the gain of the RF output when the amplifier control board is in the AGC mode

Table 8-9. VHF High Band Amplifier Tray Sample

SAMPLE	DESCRIPTION
RF Front Panel Sample	Forward power sample of the tray from the AGC control board

8.6 Input and Remote Connections

The baseband video and audio inputs alone or, if the (optional) 4.5-MHz composite input kit is purchased, the 4.5-MHz composite input or the baseband video input and audio input to the transmitter, connect to the rear of the VHF exciter tray. The baseband video input or the 4.5-MHz composite input connects to jacks J1 or J2, which are loop-through connected. The baseband audio input connects to TB1 for balanced audio or to jacks J3 or J13, which are loop-through connected, for composite, stereo, audio. To use the 4.5-MHz composite input kit, the baseband audio can remain connected to the VHF exciter even if the 4.5-MHz composite input kit is used, but the baseband video must be disconnected from J1 or J2 and the 4.5-MHz composite input must be connected to J1 or J2. The baseband select command must be removed from J7-6 and J7-7.

The remote connections listed in Table 8-10 are made to (A12) the A/V input and remote interface assembly. The remote connections are made to jacks J9 and J10 on the assembly. Refer to the interconnect drawing (1076203) for the proper pin remote connections.

Table 8-10. VHF Exciter Remote Interface Connections with the A/V Input and Remote Interface Assembly

FUNCTION	REMOTE JACK/PIN NUMBER	INTERFACE TYPE
Transmitter Enable Interlock	J9-21	J9-21 and J9-22 must be jumpered together for normal operation; (1176-1038) the jumper jack should be used.
Transmitter Enable Interlock Rtn.	J9-22	
Remote Control Commands		
Transmitter Standby (Disable)	J9-9	Contact closure
Transmitter Standby/Operate Rtn.	J9-10	
Transmitter Operate (Enable)	J9-11	Contact closure
Transmitter Manual	J9-15	Contact closure
Transmitter Auto/Manual Rtn.	J9-16	
Transmitter Auto	J9-17	Contact closure
Power Level Raise (Optional)	J9-27	Contact closure
Pwr Lvl Raise/Lower Rtn (Optional)	J9-28	
Power Level Lower (Optional)	J9-29	Contact closure
Modulator Select (Optional)	J9-31	Contact closure
Modulator Select Rtn (Optional)	J9-32	
Remote Status Indications		
Transmitter Operate (Enable) Ind.	J9-12	50 mA max current sink
Operate/Standby Ind. Return	J9-13	
Transmitter Standby (Disable) Ind.	J9-14	50 mA max current sink
Transmitter Auto Indicator	J9-18	50 mA max current sink

FUNCTION	REMOTE JACK/PIN NUMBER	INTERFACE TYPE
Auto/Manual Indicator Return	J9-19	
Transmitter Manual Indicator	J9-20	50 mA max current sink
VSWR Cutback Indicator	J9-23	50 mA max current sink
VSWR Cutback Indicator Return	J9-24	
Video Loss (Fault) Indicator	J9-25	50 mA max current sink
Video Loss (Fault) Ind. Rtn.	J9-26	
Receiver Fault (Optional)	J9-30	
	Remote Metering	
Visual Output Power	J9-1	1V full scale at 1kΩ source resistance
Visual Output Power Rtn	J9-2	
Aural Output Power	J9-3	1V full scale at 1kΩ source resistance
Aural Output Power Rtn	J9-4	
Reflected Power	J9-5	1V full scale at 1kΩ source resistance
Reflected Power Rtn	J9-6	
Exciter Output Power	J9-7	1V full scale at 1kΩ source resistance
Exciter Output Power Rtn	J9-8	

The remote connections shown in Table 8-11 are made to (A12) the A/V input and remote interface assembly. These remote connections are made to jacks J9 and J10 on the assembly. Refer to the interconnect drawing (1076203) for the proper pin remote connections.

Table 8-11. VHF Amplifier Tray Remote Interface Connections with the A/V Input and Remote Interface Assembly

FUNCTION	REMOTE JACK/PIN NUMBER	INTERFACE TYPE
Forward Output Power (A6) VHF Amp	J10-1	1V full scale at 1kΩ source resistance
Forward Output Power (A6) Rtn	J10-2	
Reflected O/P Power (A6) VHF Amp	J10-3	1V full scale at 1kΩ source resistance
Reflected O/P Power (A6) Rtn	J10-4	
Forward Output Power (A7) VHF Amp	J10-6	1V full scale at 1kΩ source resistance
Forward Output Power (A7) Rtn	J10-7	
Reflected O/P Power (A7) VHF Amp	J10-8	1V full scale at 1kΩ source resistance
Reflected O/P Power (A7) Rtn	J10-9	

8.7 AC Input

The transmitter needs an AC input of 220 VAC at 40 amps connected to it in order to operate. The 220 VAC input connects to (A2) the AC distribution panel in the upper-middle rear of the cabinet. The panel contains terminal block TB1 that connects to the 220 VAC.

The AC distribution panel contains four circuit breakers that supply the AC to the rest of the transmitter. The input AC is connected to the main AC circuit breaker CB1 (40 amps) that distributes the 220 VAC to the terminal block TB2. TB2 has three metal-oxide varistors (MOVs), VR1, VR2, and VR3, mounted to the terminal block: one MOV is connected from each leg of the input AC to ground and another is connected across the two legs. The input AC is wired from TB2 through three circuit breakers, CB2, CB3, and CB4, to the rest of the transmitter. CB2 is a 10-amp circuit breaker that supplies the AC voltage to (A2-A1) the IEC outlet strip that is connected into the VHF exciter, the (optional) receiver tray, and any other optional accessories. CB3 is a 20-amp circuit breaker that supplies AC through J5 to (A6) the VHF amplifier tray. CB4 is a 20-amp circuit breaker that supplies AC through J6 to (A7) the VHF amplifier tray. When the VHF exciter circuit breaker is switched on, +12 VDC is supplied to the VHF amplifier trays for the operation of the LED status indicators in the tray.

9. CERTIFICATION OF TEST DATA

This equipment has been tested in accordance with the requirements contained in the appropriate Commission regulation. To the best of my knowledge, these tests were performed using measurement procedures consistent with the industry or Commission standards and demonstrate that the equipment complies with the appropriate standards. Each unit manufactured, imported or marketed, as defined in the Commission's regulations, will conform to the sample(s) tested within the variations that can be expected due to quantity production and testing on a statistical basis. I further certify that the necessary measurements were made by Axcera, LLC, 103 Freedom Drive, P.O. Box 525, Lawrence, PA 15055-0525

Kenneth Foutz
Chief Operations Officer

Lance Trussa
Engineer

James Mounts
Engineer