DOCUMENT NUMBER: TP1910125 REV. A

DESCRIPTION: VTX-250 FINAL ALIGNMENT TEST PROCEDURE

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Proj Eng. ___D. 11/26/97___

Man Mgr. ______ 11/26/97___

Documentation VCB 11/97

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Scope:

Test Equipment Required:

Item	Critical Parameter	Suggested
DC power supply	0-15 Vdc, 500 mA	
DC ammeter	Rs ≤ 0.5 Ω	Fluke 8062
Digital voltmeter	none	Fluke Model 73
Spectrum analyzer	2.5 GHz	Advantest R3361
Audio signal generator	1Vp-p, 600 Ω	Marconi 2955
Video signal generator	1 MHz, 1Vp-p, 75 Ω	Wavetek Model 90
Video pattern generator	none	Tektronix TGS-100
LTC Time Code Generator	none	Horita PG-2100
AC voltmeter	1MΩ input	HP 3400A
Frequency counter	2.5 GHz	HP 5350B
RF power meter	none	HP 432
Oscilloscope	none	Tektronix 2215
RF signal generator	2500 MHz	Marconi 2041
Video demodulator	70 MHz I/O	HP 3717A
Audio demodulator	custom	DTC P/N 1086340
Double balanced mixer	2500 MHz	Mini Circuits ZFM-15
Universal test input cable	custom	See figure 6
20 dB attenuator	none	
30 dB attenuator	none	
5MHz lowpass filter	Zin=Zo=75 Ω	Alan Avionics NW200

Preliminary Setup:

1.) Connect the universal input cable to the side connector of the device under test.

2.) Connect the power supply leads of the universal input cable to the dc power supply. Set the power supply voltage to 15 Vdc. Set the power supply to OFF.

3.) Set the DUT panel switches as follows:

CHANNEL switch to **A**
POWER switch to **OFF**
TIMECODE switch to **OFF**.

Legend to Abbreviations:

F_{oA} = Channel A nominal frequency

F_{oB} = Channel B nominal frequency

F_{oC} = Channel C nominal frequency

Final Test Procedure:

STEP	PROCEDURE	MEASURED AT	USING	NOTES
1.	Set up the test equipment as shown in figure 1.			There should be nothing connected to the video input port on the universal cable or the video input BNC connector on the DUT.
2.	Set the DUT **POWER** switch to **ON**.			
3.	Observe that the **POWER** LED glows green indicating that the power is on.			
4.	Switch through each of the channels and observe that the channel indicating LEDs glow yellow and indicate the correct channel.			
5.	Set the **CHANNEL** selector switch to channel A.			
6.	Measure the voltage on the 11.5Vdc bus.	Q4/drain	DVM	The voltage should be 11.5 ±0.4Vdc.
7.	Install a jumper shunt to connect pins 8 and 10 on J3 to enable the transmitter.			
8.	Measure the RF output power on each of the three channels. Set the DUT to the channel with the lowest output power.			
9.	Set the RF output power level.	J5	RF power meter	**VTX-250:** If the output power is less than 280 mW or greater than 310 mW, adjust RV3 on the power amplifier board to set the output power to 290 - 300 mW. **VTX-100:** If the output power is less than 10 mW, refer to the exciter test procedure to adjust the output power.
10.	Measure the total current drain.	J13	Ammeter	Total current drain must be less than: **VTX-250:** 550 mA. **VTX-100:** 350 mA.
11.	Remove the jumper shunt from pins 8 and 10 on J3.			
12.	Measure the total current drain.	J13	Ammeter	Total current drain should be; **VTX-250:** 250 - 300 mA. **VTX-100:** 200 - 250 mA.
13.	Measure the RF output power.	J5	RF power meter	Output power should be < 1 mW.
14.	Connect a video pattern generator to the universal input cable.			Any video pattern is acceptable. The purpose of this test is to confirm the operation of the video detector circuitry.
15.	Measure the RF output power.	J5	RF power meter	Output power must be ≥290 mW.

STEP	PROCEDURE	MEASURED AT	USING	NOTES
16.	Set up the test equipment as shown in figure 2.			
17.	Install a jumper shunt to connect pins 8 and 10 on J3 to enable the transmitter.			
18.	Set the **CHANNEL** selector switch to channel A.			
19.	With no video input signal, adjust the spectrum analyzer display so that the carrier peak is at the top of the display.			
20.	Set the video signal generator to apply a 761.6 kHz signal into 75 ohms. Set the generator level according to the required transmitter deviation.			If the desired transmitter deviation is 4.0 MHz peak, set the generator level to 457 mVp-p. If the desired transmitter deviation is 7.5 MHz peak, set the generator level to 244 mVp-p.
21.	Observe the carrier amplitude on the spectrum analyzer.			The amplitude of the main carrier with modulation should be at least 30 dB below the spectrum analyzer reference level. If not, locate the modulation compensation daughter board on the exciter board; adjust the channel A potentiometer to null the main carrier.
22.	Set the **CHANNEL** selector switch to channel B.			
23.	Observe the carrier amplitude on the spectrum analyzer.			The amplitude of the main carrier with modulation should be at least 30 dB below the spectrum analyzer reference level. If not, locate the modulation compensation daughter board on the exciter board; adjust the channel B potentiometer to null the main carrier.
24.	Set the **CHANNEL** selector switch to channel C.			
25.	Observe the carrier amplitude on the spectrum analyzer.			The amplitude of the main carrier with modulation should be at least 30 dB below the spectrum analyzer reference level. If not, locate the modulation compensation daughter board on the exciter board; adjust the channel C potentiometer to null the main carrier.
26.	Remove the jumper shunt from pins 8 and 10 on J3.			
27.	Set up the test equipment as shown in figure 3.			There should be nothing connected to the video input port on the universal cable or the video input BNC connector on the DUT.
28.	Install a jumper shunt to connect pins 8 and 10 on J3 to enable the transmitter.			

STEP	PROCEDURE	MEASURED AT	USING	NOTES
29.	Set the **CHANNEL** selector switch to channel A.			
30.	Measure the transmit frequency (F_o).	J5	Frequency counter	Output frequency must be in the range $F_{oA}\pm$ 100 kHz.
31.	Set the **CHANNEL** selector switch to channel B.			
32.	Measure the transmit frequency (F_o).	J5	Frequency counter	Output frequency must be in the range $F_{oB}\pm$ 100 kHz.
33.	Set the **CHANNEL** selector switch to channel C.			
34.	Measure the transmit frequency (F_o).	J5	Frequency counter	Output frequency must be in the range $F_{oC}\pm$ 100 kHz.
35.	Set up the test equipment as shown in figure 2.			Omit the video signal generator from the test setup. Adjust the spectrum analyzer display such that the individual FM sidebands can be observed.
36.	Set the **CHANNEL** selector switch to channel A.			
37.	Measure the level of the audio subcarrier sidebands.	J5	Spectrum analyzer	Subcarrier sidebands should be -22 to -25 dBc, 6.0 MHz and 6.5 MHz above and below the main carrier.
38.	Set the **CHANNEL** selector switch to channel B.			
39.	Measure the level of the audio subcarrier sidebands.	J5	Spectrum analyzer	Subcarrier sidebands should be -22 to -25 dBc, 6.0 MHz and 6.5 MHz above and below the main carrier.
40.	Set the **CHANNEL** selector switch to channel C.			
41.	Measure the level of the audio subcarrier sidebands.	J5	Spectrum analyzer	Subcarrier sidebands should be -22 to -25 dBc, 6.0 MHz and 6.5 MHz above and below the main carrier.
42.	Set up the test equipment as shown in figure 4.			
43.	Set the **CHANNEL** selector switch to channel A.			
44.	Set the level and frequency of the test setup local oscillator generator.			RF output level = +10 dBm. Set the frequency 70 MHz below the output frequency of the DUT.
45.	Observe the demodulated video signal.	Demodulator video output	Oscilloscope	Select the 5 step video patten . The demodulated video signal should be 1 Vp-p, The sync pulse must be square, each luminance level must be flat.
46.	Observe the demodulated video picture.	Demodulator video output	Video monitor	The picture should be clean and smooth with no motion, smearing, or distortion. Cycle the pattern generator through all patterns.

STEP	PROCEDURE	MEASURED AT	USING	NOTES
47.	Set the **CHANNEL** selector switch to channel B.			
48.	Set the local oscillator level and frequency.			RF output level = +10 dBm. Set the frequency 70 MHz below the output frequency of the DUT.
49.	Observe the demodulated video signal.	Demodulator video output	Oscilloscope	Select the 5 step video patten . The demodulated video signal should be 1 Vp-p, The sync pulse must be square, each luminance level must be flat.
50.	Observe the demodulated video picture.	Demodulator video output	Video monitor	The picture should be clean and smooth with no motion, smearing, or distortion. Cycle the pattern generator through all patterns.
51.	Set the **CHANNEL** selector switch to channel C.			
52.	Set the local oscillator level and frequency.			RF output level = +10 dBm. Set the frequency 70 MHz below the output frequency of the DUT.
53.	Observe the demodulated video signal.	Demodulator video output	Oscilloscope	Select the 5 step video patten . The demodulated video signal should be 1 Vp-p, The sync pulse must be square, each luminance level must be flat.
54.	Observe the demodulated video picture.	Demodulator video output	Video monitor	The picture should be clean and smooth with no motion, smearing, or distortion. Cycle the pattern generator through all patterns.
55.	Disconnect the video pattern generator from the universal input cable and connect it to the **VIDEO** input BNC connector on the bottom of the DUT.			<u>**Note:**</u> Not all units are equipped with the video input BNC connector. If there is no BNC connector on the DUT, skip the following two steps.
56.	Observe the demodulated video picture.	Demodulator video output	Video monitor	The picture should be clean and smooth with no motion, smearing, or distortion. Cycle the pattern generator through all patterns.
57.	Reconnect the video pattern generator to the universal input cable.			
58.	Enable the timecode window in the video output by setting the **TIMECODE** switch on the DUT to **ON**.			
59.	Observe that the **TIMECODE** LED glows yellow indicating that TIMECODE is active.			If the DUT is not equipped to transmit LTC data, the **TIMECODE** LED should not illuminate.

STEP	PROCEDURE	MEASURED AT	USING	NOTES
60.	Turn the timecode generator on.			**NOTE** : This applies to units with TIMECODE feature only. If the DUT is not equipped to tranmit LTC data, skip to step 65. To turn the timecode generator on, press and hold the generator POWER switch in the ON position until the LED starts flashing slowly, then release. The LED should continue flashing slowly. Briefly depress the switch once again. The LED should now flash rapidly indicating that LTC data is being generated.
61.	Confirm that the video output signal is correct.	Demodulator video output	Video monitor	There should be a black window in the lower portion of the frame numbers in the format 00:00:00:00. The numbers should count upwards rapidly. Some wavering along the edge of the black window is normal.
62.	Disconnect the timecode generator from the universal input cable and connect it to the **TIMECODE** input BNC connector on the bottom of the DUT.			Note: Not all units are equipped with the timecode input BNC connector. If there is no BNC connector on the DUT, skip the following step.
63.	Confirm that the video output signal is correct.	Demodulator video output	Video monitor	There should be a black window in the lower portion of the frame numbers in the format 00:00:00:00. The numbers should count upwards rapidly. Some wavering along the edge of the black window is normal.
64.	Set the timecode generator to OFF.			Turn off the timecode generator to conserve the battery. To turn off, press and hold the POWER switch until the LED is no longer lit.
65.	Set up the test equipment as shown in figure 5.			
66.	Set the audio signal generator to 1 kHz tone, 1Vp-p.	J13	AC voltmeter	The input impedance of the audio line level inputs is 600Ω. 1Vp-p is equivalent to 354mVrms.
67.	Connect the audio signal generator to the left audio input on the universal input cable.			
68.	Observe the audio output signal.	Audio demodulator LEFT output	Oscilloscope	The level of the audio signal should be 1.0± 0.1 Vp-p. The signal should be a clean sign wave without visible distortion.
69.	Disconnect the audio signal generator from the universal input cable and connect it to the **LEFT AUDIO** input BNC connector on the bottom of the DUT.			Note: Not all units are equipped with the LEFT audio input BNC connector. If there is no BNC connector on the DUT, skip the following step.

STEP	PROCEDURE	MEASURED AT	USING	NOTES
70.	Observe the audio output signal.	Audio demodulator LEFT output	Oscilloscope	The level of the audio signal should be 1.0± 0.1 Vp-p. The signal should be a clean sign wave without visible distortion.
71.	Disconnect the audio signal generator and connect it to the RIGHT audio input on the universal input cable.			
72.	Observe the audio output signal.	Audio demodulator RIGHT output	Oscilloscope	The level of the audio signal should be 1.0± 0.1 Vp-p. The signal should be a clean sign wave without visible distortion.
73.	Disconnect the audio signal generator from the universal input cable and connect it to the **RIGHT AUDIO** input BNC connector on the bottom of the DUT.			Note: Not all units are equipped with the RIGHT audio input BNC connector. If there is no BNC connector on the DUT, skip the following step.
74.	Observe the audio output signal.	Audio demodulator RIGHT output	Oscilloscope	The level of the audio signal should be 1.0± 0.1 Vp-p. The signal should be a clean sign wave without visible distortion.
75.	Set the audio signal generator to 1 kHz tone, 10 mVp-p.	J13	AC voltmeter	The input impedance of the audio mic level inputs is 10kΩ. 10mVp-p is equivalent to 3.54mVrms.
76.	Disconnect the audio signal generator from the BNC connector on the bottom of the DUT and connect it to the LEFT BALANCED input on the universal input cable.			
77.	Observe the audio output signal.	Audio demodulator LEFT output	Oscilloscope	The level of the audio signal should be 1.0± 0.1 Vp-p. The signal should be a clean sign wave without visible distortion.
78.	Disconnect the audio signal generator from the LEFT BALANCED input and connect it to the RIGHT BALANCED input on the universal input cable.			
79.	Observe the audio output signal.	Audio demodulator RIGHT output	Oscilloscope	The level of the audio signal should be 1.0± 0.1 Vp-p. The signal should be a clean sign wave without visible distortion.
80.	Set the DUT **POWER** switch to **OFF**. Set the DUT **CHANNEL** selector switch to channel **A**.			
81.	END OF TEST.			

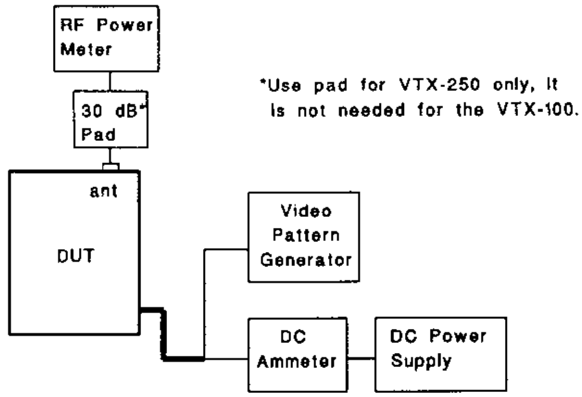


Figure 1

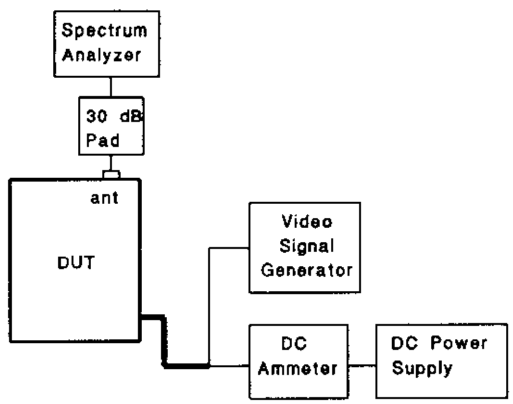


Figure 2

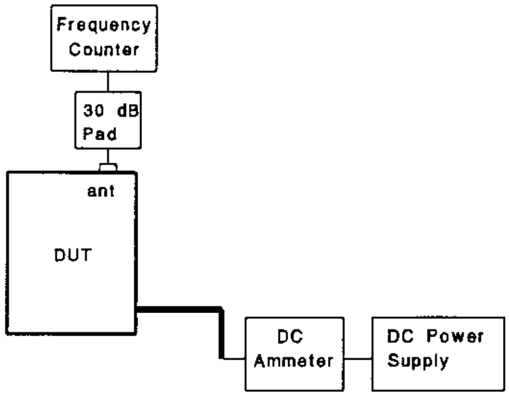
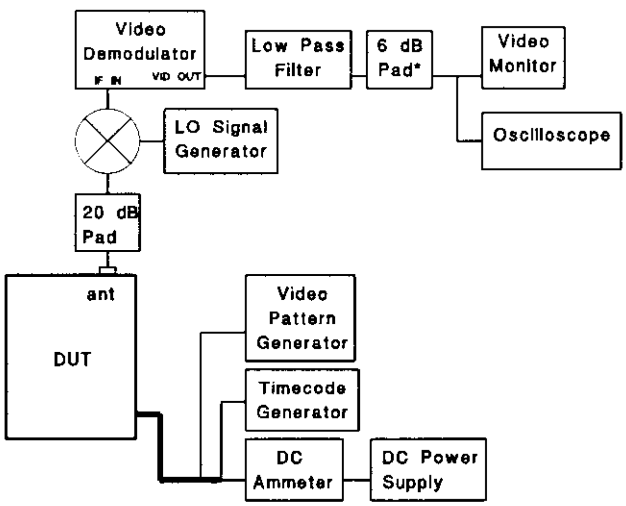
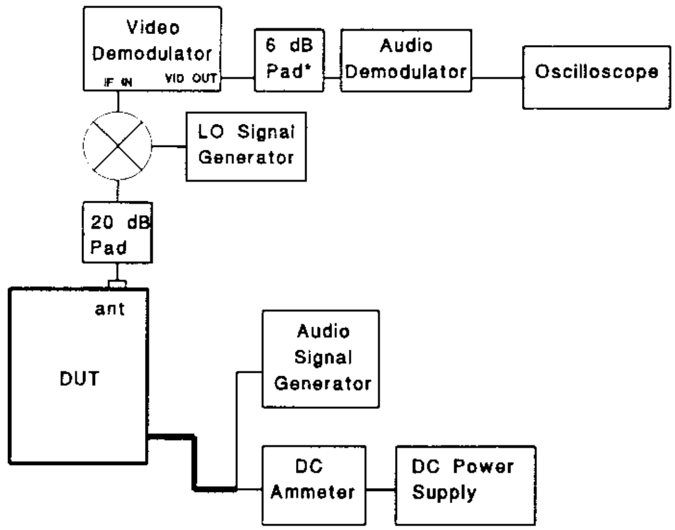


Figure 3



* Use pad only when system deviation is 7.5 MHz.

Figure 4



* Use pad only when system deviation is 7.5 MHz.

Figure 5

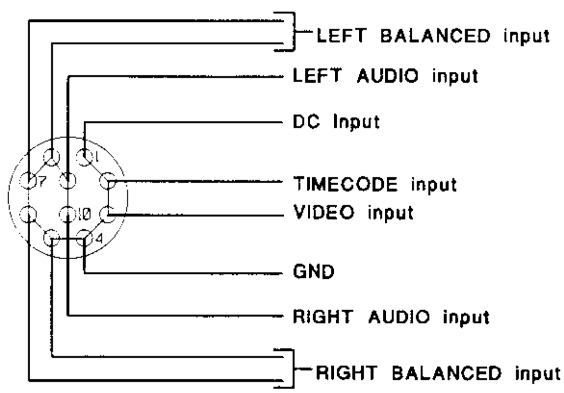


Figure 6