

TEST EQUIPMENT

Distortion Analyzer	Krohn-Hite Model 6801
Oscillator	Krohn-Hite Model 4500
Attenuator Set	Hewlett-Packard Model 3500
Frequency Counter	Hewlett-Packard Model 5383A (option 001)
Digital Multimeter	Beckman Model 3030
Analog Multimeter	Triplett Model 630
RF Attenuator	Kay Model 437A (adjustable 0-110 dB)
RF Signal Generator	Marconi Model 2022C
Spectrum Analyzer	Hewlett-Packard Model 8558B
Wattmeter (50 ohms impedance)	Bird Model 43
25 watt element	100-250 MHz., 250-500 MHz., or 400-1000 MHz. Bird
Automatic Modulation Meter	Wavetek Model 4101
50 watt RF Load	Microwave Associates Model 44003
Stereo Monitor	Belar Model FMS-2
Stereo Generator	Aphex Model AX400
Oscilloscope	Tektronix Model 2215

TOOLS FOR ALIGNMENT

Type of Tool	Manufacturer's No.	Marti Part No.
Tuning Tool	GC 9300	930-037
Tuning Tool	GC 9440	930-069
Tuning Tool	Spectrol 8T000	930-100
Tuning Tool	Sprague-Goodman	930-062
Tuning Tool	Johanson 8762	930-096 (yellow)
Tuning Tool	Johanson 8766	930-076 (blue)

The **STL-20C/R-15C Alignment Tool Kit (Marti Part No. 704-175)** containing all the above tools may be obtained from the factory for \$19.83.

STL-15C Transmitter Test Report

Customer: _____

Address: _____

Serial #: _____

Frequency: _____

Jumpers set for:	<input type="checkbox"/> Composite	<input type="checkbox"/> Monaural
		Pre-emphasis
		<input type="checkbox"/> 75 microseconds
		<input type="checkbox"/> 50 microseconds
		<input type="checkbox"/> 25 microseconds
		<input type="checkbox"/> 0 microseconds
Modulation meter calibrated	<input type="checkbox"/>	100% \pm _____ KHz deviation

TEST METER READINGS

Forward Power Calibrated	<input type="checkbox"/>	
Reverse Power Calibrated	<input type="checkbox"/>	
P.A. Current Calibrated	<input type="checkbox"/>	0 VU - _____ Amps
Sub Level Calibrated	<input type="checkbox"/>	0 VU - 10% injection
+13 Volt Supply	<input type="checkbox"/>	+2 VU - 13.5 Volts DC
AFC Level	<input type="checkbox"/>	0 VU - VCO Frequency Set
Modulator Bias:	_____	

System Test results are recorded on the Receiver Test Report

Test Equipment

Frequency Counter, HP Model 5383A
Deviation Monitor, Wavetek Model 4101

Date: _____

Signature: _____

TUNE-UP AND ADJUSTMENTS

Refer to Location of Adjustments Drawing No. 597-6020-2 and appropriate schematic diagrams for each module.

NOTE: For all adjustments the STL-20C's cover must be removed and then re-installed upon completion

FREQUENCY CHANNEL CHANGE

1. Read and refer to the SENDING AN INSTRUCTION section.
2. Refer to the FREQUENCY DIP-SWITCH SETTINGS section.

FREQUENCY FINE-TUNE ADJUST

This adjustment has been set at the factory and should NOT require any adjustments.

1. Remove the T/R SYNTHESIZER cover.
2. On the T/R SYNTHESIZER board tweak the FREQ ADJ TCXO (U15) while viewing a frequency counter.
3. Re-install the T/R SYNTHESIZER cover.

FORWARD POWER FRONT PANEL METER

This adjustment is also made during the FORWARD POWER CALIBRATION adjustment, but it is not necessary nor is it recommended to perform the FORWARD POWER CALIBRATION adjustment just to calibrate the FRONT PANEL METER FORWARD POWER.

1. With the STL-20C powered on and transmitting, tweak the front panel POWER ADJUST pot fully clockwise for maximum power out.
2. Turn the front panel knob to FORWARD POWER.
3. On the METER BOARD tweak the FORWARD pot (R8) to correlate the front panel meter to the Bird Watt Meter.

REVERSE POWER FRONT PANEL METER

This adjustment can only be made during the REVERSE POWER CALIBRATION adjustment. If the REFLECTED pot (R9) on the METER BOARD has not been tweaked, then it is probably not necessary to perform this adjustment.

PA CURRENT FRONT PANEL METER

1. With the STL-20C powered on and transmitting, tweak the front panel POWER ADJUST pot fully clockwise for maximum power out.
2. On the METER BOARD measure the voltage across P1 pin 7 and P1 pin 3, with the positive lead on P1 pin 7.
3. Divide this voltage by 0.05. The result is the PA current.
4. Turn the front panel knob to PA CURRENT.
5. On the METER BOARD adjust the CURRENT pot (R10) to set the front panel meter to equal the calculated current.

B+ ADJUST

This adjustment has been set at the factory and should NOT require any adjustments.

1. Using a VOLT METER, with negative lead connected to ground (chassis), connect the positive lead to a B+ location (refer to any schematic - B+ wiring is red and goes to every PC board).
2. On the TWO-STAGE RF POWER AMPLIFIER board adjust B+ ADJUST (pot R5) in the direction required to achieve a B+ reading of 14 volts. This voltage should be adjusted with the TRANSMIT switch off.

FORWARD POWER CALIBRATION

This adjustment has been set at the factory and should NOT require any adjustments.

Read the SENDING AN INSTRUCTION section before proceeding and refer to that section as needed.

Read and study this section before actually proceeding.

1. Power down the STL transmitter (i.e., un-plug from AC outlet).
2. Make sure that the Bird Watt Meter is connected to the output of the STL-20C and that the Watt meter is terminated with a 50-Ohm load.
3. Remove cover from T/R SYNTHESIZER.
4. On the T/R SYNTHESIZER remove jumper from the RP position and put in the FP position (if not already in the FP position - FP is the normal position).
5. On the PA board, tweak the FP pot (R20) fully counter-clockwise (approximately 20 turns).
6. On the T/R SYNTHESIZER board, tweak the MAX PWR pot (R74) fully clockwise (approximately 20 turns).
7. Power up STL transmitter (i.e., plug in AC outlet), but leave front panel TRANSMIT switch off.
8. Measure the B+ voltage. Adjust the voltage to 14 volts if not already close to that voltage. Refer to B+ ADJUST procedure. It is recommended that the volt meter is monitoring B+ throughout this procedure.
9. Send the "Forward Power Calibration" instruction to the T/R SYNTHESIZER.
10. Send the "Power Control = Max" instruction to the T/R SYNTHESIZER.
11. Turn on the front panel TRANSMIT switch. The output power (as indicated by the Bird Watt Meter) should approach or exceed 25.6 Watts. If it doesn't quite get there, adjust B+ up to 15 volts if necessary but **do not exceed 15 volts!**
12. The front panel TRANSMIT LED should be off. On the PA board, tweak the FP pot (R20) clockwise until the TRANSMIT LED just comes on.
13. On the T/R SYNTHESIZER board, tweak the MAX PWR pot (R74) counter-clockwise (slowly) until the TRANSMIT LED just turns off.
14. On the PA board, tweak the FP pot (R20) in a direction such that the output power reads as high as it can go but not to exceed 25.6 Watts. **The FP pot is now calibrated, do not tweak it anymore!**
15. Send the "Store Raw Power Into Cal Position 0" instruction to the T/R SYNTHESIZER.
16. On the T/R SYNTHESIZER, tweak the MAX PWR pot (R74) such that the output power reads 22.4 Watts.
17. Send the "Store Raw Power Into Cal Position 1" instruction to the T/R SYNTHESIZER.

18. On the T/R SYNTHESIZER, tweak the MAX PWR pot (R74) such that the output power reads 19.2 Watts.
19. Send the "Store Raw Power Into Cal Position 2" instruction to the T/R SYNTHESIZER.

At this point we will now calibrate the front panel METER BOARD forward power.

20. Turn the front panel knob to FORWARD POWER.
21. On the METER BOARD tweak the FORWARD pot (R8) to correlate the front panel meter to the Bird Watt Meter.
22. On the T/R SYNTHESIZER, tweak the MAX PWR pot (R74) such that the output power reads 16.0 Watts.
23. Send the "Store Raw Power Into Cal Position 3" instruction to the T/R SYNTHESIZER.
24. On the T/R SYNTHESIZER, tweak the MAX PWR pot (R74) such that the output power reads 12.8 Watts.
25. Send the "Store Raw Power Into Cal Position 4" instruction to the T/R SYNTHESIZER.
26. On the T/R SYNTHESIZER, tweak the MAX PWR pot (R74) such that the output power reads 9.6 Watts.
27. Send the "Store Raw Power Into Cal Position 5" instruction to the T/R SYNTHESIZER.
28. On the T/R SYNTHESIZER, tweak the MAX PWR pot (R74) such that the output power reads 6.4 Watts.
29. Send the "Store Raw Power Into Cal Position 6" instruction to the T/R SYNTHESIZER.
30. On the T/R SYNTHESIZER, tweak the MAX PWR pot (R74) such that the output power reads 3.2 Watts.
31. Send the "Store Raw Power Into Cal Position 7" instruction to the T/R SYNTHESIZER.
32. On the T/R SYNTHESIZER, tweak the MAX PWR pot (R74) such that the output power reads 0.0 Watts.
33. Send the "Store Raw Power Into Cal Position 8" instruction to the T/R SYNTHESIZER.
34. Adjust the B+ voltage to 14 volts if not already close to this voltage.
35. On the T/R SYNTHESIZER board, tweak the MAX PWR pot (R74) clockwise to the *desired* maximum output power.
36. Send the "Normal Operation" instruction to the T/R SYNTHESIZER. The power may change depending on the position of the front panel POWER ADJUST pot.

37. Tweak the front panel POWER ADJUST pot fully clockwise to verify that the output power goes to the set maximum power. Tweak the POWER ADJUST pot counter-clockwise verifying that the output power drops as tweaking. The output power should be close to 0 Watts when the POWER ADJUST pot is fully counter-clockwise.
38. Adjust the POWER ADJUST pot to the desired output power.
39. Re-install the T/R SYNTHESIZER's cover.

REVERSE POWER CALIBRATION

This adjustment has been set at the factory and should NOT require any adjustments.

Read the SENDING AN INSTRUCTION section before proceeding and refer to that section as needed.

Read and study this section before actually proceeding.

1. Power down the STL transmitter (i.e., un-plug from AC outlet).
2. Make sure that the Bird Watt Meter is connected to the output of the STL-20C.
3. Disconnect the 50-Ohm load from Bird Watt Meter.
4. Rotate the element in the Bird Watt Meter 180 degrees counter-clockwise for measuring reverse power.
5. Remove cover from T/R SYNTHESIZER.
6. On the T/R SYNTHESIZER remove jumper from the FP position and put in the RP position.
7. On the PA board, tweak the RP pot (R17) fully counter-clockwise (approximately 20 turns).
8. On the T/R SYNTHESIZER board, tweak the MAX PWR pot (R74) fully clockwise (approximately 20 turns).
9. Power up STL transmitter (i.e., plug in AC outlet), but leave front panel TRANSMIT switch off.
10. Measure the B+ voltage. Adjust the voltage to 14 volts if not already close to that voltage. Refer to B+ ADJUST procedure. It is recommended that the volt meter is monitoring B+ throughout this procedure.

11. Send the "Reverse Power Calibration" instruction to the T/R SYNTHESIZER.
12. Send the "Power Control = Max" instruction to the T/R SYNTHESIZER.

DO STEPS 13 – 16 QUICKLY. DO NOT SPEND MORE THAN 5 MINUTES ON THESE STEPS. IF FOR SOME REASON IT TAKES LONGER, THEN TURN OFF TRANSMIT SWITCH, REMOVE POWER FROM STL, WAIT FOR ABOUT 10 MINUTES, THEN RESTART PROCEDURE FROM STEP 1.

13. Turn on the front panel TRANSMIT switch. The reverse output power (as indicated by the Bird Watt Meter) should exceed 6.4 Watts. If it doesn't quite get there, adjust B+ up to 15 volts if necessary but **do not exceed 15 volts!**
14. The front panel TRANSMIT LED should be off. On the PA board, tweak the RP pot (R17) clockwise until the TRANSMIT LED just comes on.
15. On the T/R SYNTHESIZER board, tweak the MAX PWR pot (R74) counter-clockwise (slowly) until the TRANSMIT LED just turns off.
16. On the PA board, tweak the RP pot (R17) in a direction such that the reverse output power reads 6.4 Watts. **The RP pot is now calibrated, do not tweak it anymore!**
17. Send the "Store Raw Power Into Cal Position 0" instruction to the T/R SYNTHESIZER.

At this point we will now calibrate the front panel METER BOARD reverse power.

18. Turn the front panel knob to REVERSE POWER.
19. On the METER BOARD tweak the REFLECTED pot (R9) to correlate the front panel meter to the Bird Watt Meter.
20. On the T/R SYNTHESIZER, tweak the MAX PWR pot (R74) such that the reverse output power reads 5.6 Watts.
21. Send the "Store Raw Power Into Cal Position 1" instruction to the T/R SYNTHESIZER.
22. On the T/R SYNTHESIZER, tweak the MAX PWR pot (R74) such that the reverse output power reads 4.8 Watts.
23. Send the "Store Raw Power Into Cal Position 2" instruction to the T/R SYNTHESIZER.
24. On the T/R SYNTHESIZER, tweak the MAX PWR pot (R74) such that the reverse output power reads 4.0 Watts.

25. Send the "Store Raw Power Into Cal Position 3" instruction to the T/R SYNTHESIZER.
26. On the T/R SYNTHESIZER, tweak the MAX PWR pot (R74) such that the reverse output power reads 3.2 Watts.
27. Send the "Store Raw Power Into Cal Position 4" instruction to the T/R SYNTHESIZER.
28. On the T/R SYNTHESIZER, tweak the MAX PWR pot (R74) such that the reverse output power reads 2.4 Watts.
29. Send the "Store Raw Power Into Cal Position 5" instruction to the T/R SYNTHESIZER.
30. On the T/R SYNTHESIZER, tweak the MAX PWR pot (R74) such that the reverse output power reads 1.6 Watts.
31. Send the "Store Raw Power Into Cal Position 6" instruction to the T/R SYNTHESIZER.
32. On the T/R SYNTHESIZER, tweak the MAX PWR pot (R74) such that the reverse output power reads 0.8 Watts.
33. Send the "Store Raw Power Into Cal Position 7" instruction to the T/R SYNTHESIZER.
34. On the T/R SYNTHESIZER, tweak the MAX PWR pot (R74) such that the reverse output power reads 0.0 Watts.
35. Send the "Store Raw Power Into Cal Position 8" instruction to the T/R SYNTHESIZER.
36. Adjust the B+ voltage to 14 volts if not already close to this voltage.
37. Turn off the TRANSMIT switch.
38. On the T/R SYNTHESIZER remove jumper from the RP position and put in the FP position.
39. Send the "Normal Operation" instruction to the T/R SYNTHESIZER.
40. Tweak the front panel POWER ADJUST pot fully clockwise.
41. Re-install the 50-Ohm load onto the Bird Watt Meter.
42. Rotate the element in the Bird Watt Meter 180 degrees clockwise for measuring forward power.
43. Turn on the TRANSMIT switch.
44. On the T/R SYNTHESIZER board, tweak the MAX PWR pot (R74) clockwise to the *desired* maximum output power.
45. Tweak the POWER ADJUST pot counter-clockwise verifying that the output power drops as tweaking. The output power should be close to 0 Watts when the POWER ADJUST pot is fully counter-clockwise.
46. Adjust the POWER ADJUST pot to the desired output power.
47. Re-install the T/R SYNTHESIZER's cover.

MONO AND COMPOSITE AUDIO

This adjustment has been set at the factory and should NOT require any adjustments.

Adjustments for monophonic mode

1. Apply a +8 dBm tone at 60 Hz to the 600 ohm mono input. Move both jumpers from JP3 to JP4 for mono operation.
2. Adjust R20 for maximum common mode rejection. To do this, short the audio input terminals together and apply the 60 Hz signal between the audio terminals and ground. Measure the output at P1 - pin 6 and adjust R20 for minimum output.
3. Connect an audio oscillator to the input terminals for normal operation at +8 dBm, 400 Hz. Plug in jumpers at JP5 and JP6. Measure the audio level at P1, pin 6. This is the reference level for setting 75 microsecond pre-emphasis. Next, set the audio oscillator to 15 KHz and reduce the level by 17 dB. Now adjust R24 for the same level as the 400 Hz. reference. Return to the original oscillator setting at 400 Hz, +8 dBm and the reference level at J1, pin 6 should be the same.
4. With the audio oscillator set to 400 Hz and at +8 dBm output, adjust R34 to calibrate the front panel modulation meter (LED bar graph) to read 100% modulation.
5. Adjust R63 on the 800-375 T/R Synthesizer board for the proper deviation using a deviation meter. The deviation setting will depend on the

allowable channel bandwidth. Normally it will be set for 50 KHz deviation.

6. Remove jumpers JP5 and JP6 for "flat" operation. Install JP5 ONLY for 25 μ vs pre-emphasis. Install JP6 ONLY for 50 μ vs pre-emphasis. Install BOTH JP5 and JP6 for 75 μ v pre-emphasis.

THIS COMPLETES THE MONO SET UP

Adjustments for composite mode

1. Move both jumpers from JP4 to JP3 for composite operation.
2. Connect a subcarrier generator to J1 or J3 (rear panel BNC jacks) of the STL-20C. Adjust the output of the generator so that the TEST METER reads "0 VU" in the SUB LEVEL position. Adjust R42 for 10% injection. R20, R29, R34, and R42 are factory adjusted, sealed in place, and should not require re-adjustment. R41 is adjusted for maximum separation at 100 Hz, at the factory, and should not be adjusted.
3. Connect the output of a stereo generator to J2 and adjust its output level until the "100%" LED on the STL-20C bar graph display flashes. This will be 100% modulation of the STL-15C.

THIS COMPLETES THE COMPOSITE SET UP

BROADCAST ELECTRONICS

FCC ID : DDE-STL-20W-950S

JOB # : 250U1

EXHIBIT # : SE