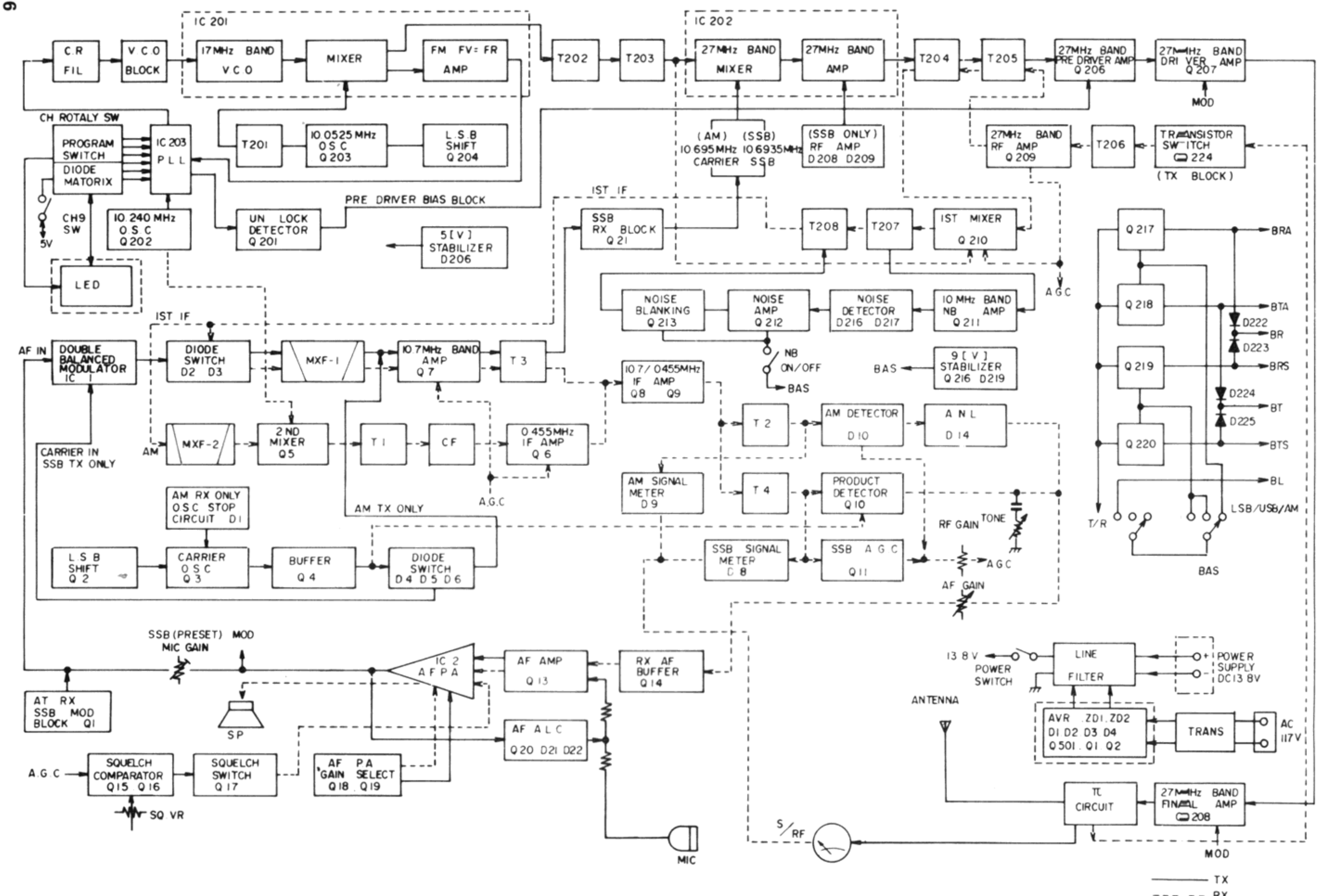


FIGURE 9. ENTIRE CIRCUIT BLOCK DIAGRAM

4.2 RECEIVER

GENERAL

[AM RECEIVER CIRCUITRY]:

A received signal passes T206, then amplified in Q209, and again passes the band pass filter consisting of T204 and T205, then, enters into the 1st Mixer stage of Q210. On the other hand the first RX local signal frequency is applied to the base of Q210 through the coupling capacitor C227. Then, both signals are mixed by Q210 and converted into the first IF signal (10.695 MHz) in passing through the T207 and T208. The 10.695 MHz signal and 10.240 MHz signal generated in Q202 are applied to the 2nd Mixer Q5 and 455 kHz 2nd IF frequency will result.

This frequency is led to the T1, CF (Ceramic Filter), Q6, Q8, Q9 (amplified), T2 and finally led to the detector D10 (AM Detector). The audio signal is then applied to the AF amplifier Q13 and AF power amplifier IC2 through ANL (D14) circuit and RX AF buffer Q14. The IC2 output drives the built-in speaker.

To improve signal over load distortion, which would be caused when the receiver is subjected to a strong signal, three stages of AGC loops, each for Q209, Q210 and Q6 are provided.

Q224 is a switching transistor to short-circuit the primary circuit of T206 during transmit operation, thus disabling the receiver circuit. Refer to Figure 5.

[SSB RECEIVER CIRCUITRY]:

In the receive mode, an incoming signal induced on the antenna is fed to T206 and then to Q209 and amplified. The amplified output is applied to the Q210 1st Mixer through a band pass filter consisting of T204 and T205. While the first local frequency (fRL) is being applied to the base of the same transistor, both frequencies are mixed with each other and first IF frequency will result (10.695 MHz for AM/USB, 10.692 MHz for LSB). This IF signal then amplified in passing through the T207 and T208, Diode switch D22 and D23, crystal filter MXF-1, Q7, T3, Q8 and Q9 and finally detected into the audio signal with the product detector consisting of Q10.

The audio signal is fed to the Power IC (IC2) to drive the built-in speaker. To reduce the signal over load distortion in the SSB mode of operation, peak-value type AGC circuitry consisting of Q11 is employed for exclusive use in SSB operation.

Refer to the block diagram shown in Figure 6.

NOISE BLANKER CIRCUIT

An impulse signal included in the IF signals will be picked up through capacitor C272 and applied to D216 & D217.

The rectified positive-half voltage is then applied to the transistor Q212 and amplified to the enough level capable of turning the transistor Q213. The amplified impulse signal makes Q212 turn on while the impulse is being applied. In other word, the primary circuit of T208 is grounded to the chassis through emitter-collector of Q213, so no mixer output will be obtained during this period. In this way the impulse noise will be blanked out.

D217 is the diode provided to control the bias voltage to the Q212 in according to the signal strength of the normal signals received, thus avoiding operation error which would be caused by normal signals.

Refer to the Block Diagram shown in Figure 9.

SQUELCH CIRCUIT

When the AGC voltage lowers with a weak received signal, transistor Q15 and Q16 turn on and this makes Q17 turn off, controlling the bias voltage to the AF Power Amp. (IC2) and disabling the amplifier. On the other hand when the transistor Q17 is turned on, the amplifier will start to operate.

REGULATED POWER SUPPLY CIRCUIT

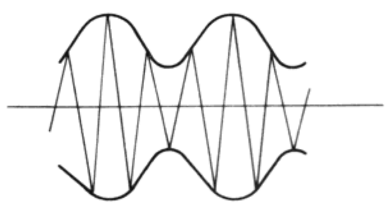
This circuit consists of Q216 and D219 and supplies the regulated voltage through switching transistors Q217, Q218, Q219 and Q220 depending upon the mode of operation.

AUDIO DETECTOR

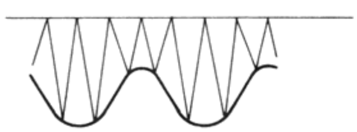
The AUDIO DETECTOR demodulates the AM received signal by rectifying the IF signal.

The detected audio signal is as follows:

[1] The secondary of T4 transformer output waveform



[2] The anode of D10 output waveform



[3] C36 output waveform

PRODUCT DETECTOR

The product detector demodulates the SSB received signal by mixing the IF signal with 10.695 MHz and selecting the audio frequency. The IF signal is fed to the base of Q10, detector amp through C44. On the other hand, the 10.695 MHz signal from OSC3 (Q3) is also fed to the emitter of Q10 through C80 and thus both signals are mixed at Q10 and the demodulated signal is obtained.

The audio output is as follow;

USB mode: 10.695 MHz – IF signal = 10.695 – (10.695 – audio frequency) = audio signal.
LSB mode: IF signal – 10.692 MHz = (10.692 + audio frequency) – 10.692 = audio signal.

AUTOMATIC GAIN CONTROL CIRCUIT

The AGC circuit reduces the gain of the receiver in respond to a strong signal by lowering the bias on the RF and IF amplifier stages. The bias point of AGC is decided within 1.8 – 2.0V by R57 and R55. This bias voltage is fed to each base of Q209, Q210 & Q6 and this variation of AGC bias makes the gain control. When the reception signal comes on, the variation in AGC bias voltage brings a negative potential to the anode of D9 and increase the negative potential in accordance with incomming signal strength and thus occured bias voltages are fed to each base of Q209, Q210 & Q6 through R55.

The more the negative potential increases, the more the AGC potential decreases, therefore each base bias is lower and this makes the overall gain reduce [AM AGC].

SSB AGC circuit also adopts a base bias methode. The bias voltage is fed to the base of Q7, Q209 & Q210. The operation of AGC is just same as AM AGC. The IF signal fed to D12 and D13 through C43.

Both diodes rectify the signal and the voltage produced by D12 & D13 is fed to the gate of Q11. This AGC bias at the gate of Q11 automatically controlles the gain of SSB RF/IF stages.

4.3 TRANSMITTER

GENERAL

[AM TRANSMITTER CIRCUITRY]:

The first local oscillator frequency (fRL) 37 MHz band and 10.695 MHz frequency generated in the Q3 through buffer transistor Q4 and Diodes Gate D5 & D6 are fed to the PIN No. 4 and PIN No. 1 of IC202, respectively, and mixed with each other, resulting in 27 MHz band transmit frequency. The 27 MHz output is fed to Q206 through T204 and T205, then fed to Q207 and Q208 in this order and amplified up to the high level necessary for transmission.

Thus amplified power output is applied to the Antenna Connector through a band pass filter consisting of L212, L215, L214, etc..

On the other hand, the microphone input signal enters into the AF power IC (IC2, No. 6 PIN terminal) and amplified output is applied to the collectors of Q207 and Q208 through transformer T5 and diode D23 to modulate the transmit carrier frequency.

Transistor Q20 and Diode D22 are automatic level controller provided to suppress the audio input level to IC2 properly to avoid over modulation. D22 output controls Q20, thus keeping modulation signal level to a relatively constant value.

Refer to the block diagram shown in Figure 7.

[SSB TRANSMITTER CIRCUITRY]:

In the SSB mode of operation, either of the first local oscillator frequency of 37.660 – 37.100 MHz (AM/USB) or 37.657 – 38.097 MHz (LSB) will be led to the IC202, No. 1 PIN terminal. On the other hand the 10.695 MHz (in LSB mode, this will be shifted to 10.692 MHz as previously mentioned) generated by Q3 is fed to the balanced modulation IC (IC1). IC-1 is designed to produce carrier-suppressed double side band signals when an audio signal amplified by IC2 is supplied to the PIN No. 1. The DSB signal is fed to diode switch D2 & D3, then to MXF-1 (crystal filter) to remove the unwanted side band.

The side band signal is fed to Q7 and amplified, then, the output is fed to the PIN No. 4 of IC202 and mixed with the first local oscillator signal to produce the 27 MHz transmit signal.

The 27 MHz SSB output is fed to T204 and T205 and then to the liner amplifiers, Q206, Q207 and Q208.

The amplified RF output is finally fed to the antenna terminal through the band pass and low pass networks provided between Q208 and antenna connector.

To avoid over modulation distortion, an ALC circuitry consisting of Q20, D21 and Q13 is provided in the microphone amplifier circuit. Another ALC circuit (D208, D209) is also employed in the RF circuit (from Q208 to IF amp. Q7) to reduce the distortion in the RF stages. Transistor Q18 and Q19 are switching circuits to operate IC2 as a microphone amplifier.

Refer to the block diagram shown in Figure 8.

RF ALC CIRCUIT

RF output from C259 is fed to D208 and D209 which provides rectifying and switching.

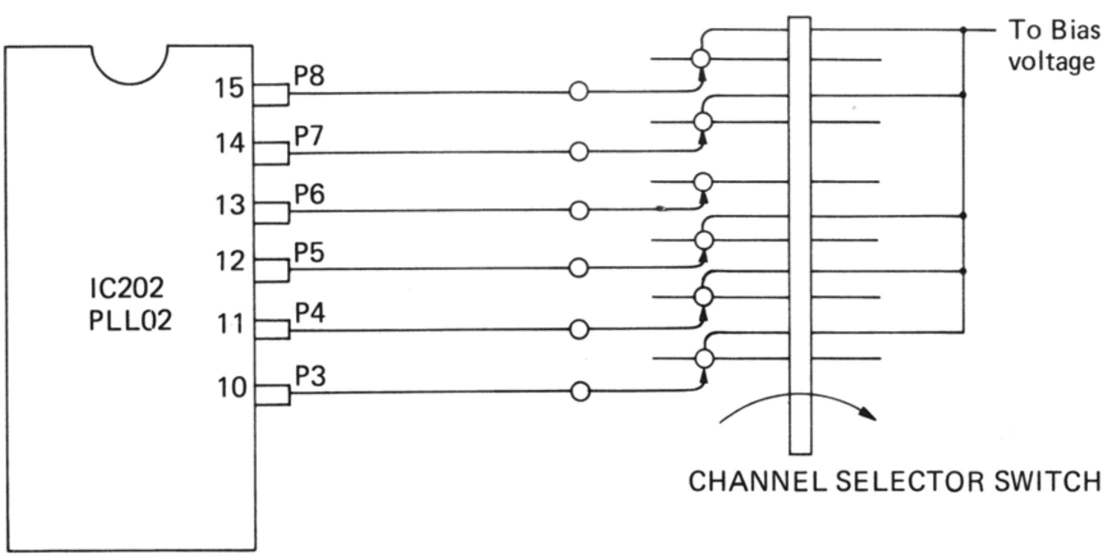
The DC negative potential produced by D208 and D209 is fed to IC202, pin No. 7 through R263 and this variation of DC potential is used to control the RF ALC level.

As the DC 8.5V from BTS line is supplied to D211 during the SSB transmit mode, the cathode potential of D209 will be varied by adjusting RV201. When the anode potential of D209 is lower than the cathode, D209 operates ON and then D208 also operates ON. While the D208 operates ON, the negative potential is supplied to R263.

Adjusting RV201 produces the variation of R263 DC potential so that the ALC level is controlled. Since the cathode potential is kept 8.5V through D210 in AM transmit mode, D209 operates OFF and thus RF ALC action is disable.

* Frequency Determining Digital Codes and Preset Selector Switch Connections.

— Example at CH 4 —



Refer to the Channel selector/Divisor-Code chart

SECTION 5
SERVICING

5.1 INTRODUCTION

Read this section carefully before attempting any repair of the LCBS-4 Refer to the circuit description, PLL circuit block diagram, each circuit block diagram for operating mode (AM/USB/LSB, TX/RX), entire circuit block diagram, PC Board component parts layout, Exploded view and Schematic diagram. The transistor and IC case diagram are shown on the schematic diagram. Refer to these diagrams before checking transistors or ICs. Component layout are provided to aid troubleshooting and alignment. Use only recommended replacement parts. Refer to the parts list in the back of this book. Never replace blown fuses with higher rated ones or fast acting with slow blow. To check operation of the unit, refer to Figure 5-2, Performance Verification Procedure, Figure 5-3, 5-4, Transmitter Test Connection and Receiver Test Connection respectively, show the proper manner to connect the unit to test instruments for performance verification or alignment. Figure 5-1 lists Recommended Test Instruments. Figure 5-7, 5-10 show proper Transmitter Alignment Procedure and Receiver Alignment Procedure respectively. Figure 5-11, Alignment Layout is placed next to the alignment procedures to show alignment adjustments at a glance.

5.2 TEST SIGNALS

Oscilloscope Waveforms are shown which were taken at various points in the LCBS-4 during normal operation into a dummy load. Check point numbers next to the wave form pictures correspond to numbers in boxes on both the schematic diagram and component layout drawing. Some waveform are shown in Figure 5-7, 5-8. Figure 5-8 shows RF amplification through a properly aligned transmitter. Figure 5-9 shows 50%, 100% and overmodulation respectively. Notice that the waveform at the base of Q206 – the TX predriver through the Mixer provided inside IC202 – contains several frequency components. Also notice that the waveforms at the collector of Q206. Next, notice that the waveforms at the base and the collector of Q207 RF Driver, and notice that the waveform at the base and the collector of Q208 – the TX Final.

This is proper since the TX final operates class C for greater efficiency. Figure 5-8F shows how the output should look at the collector of Q208.

Voltage measurement are shown on the schematic diagram for normal operation. All voltage were measured with a VTVM. Voltage measurements on high impedance RF points should be taken through a probe.

Mini-test clips are very usefull for making voltage measurements in hard to reach places.

Receiver Injection Voltage are given in Figure 5-12 together with check point numbers which correspond to numbers in boxes on both the schematic diagram and component layout drawings. This specifies the voltage level, carrier frequency and particular points in the receiver string at which a 30% – 1 kHz modulated signal injected through a .01 μF capacitor should produce at least 2V AC of audio across the speaker or 8 ohm load plugged into the speaker jack, EXT SP. While the value of this capacitor is not critical, capacitive coupling of the signal generator to the circuit is necessary to prevent grounding out the transistor biases.

Before setting up to measure Receiver Injection Voltages, small handheld "all purpose signal generators" can be used to provide a quick check of the receiver string. Basically, these devices generate pulses rich in harmonics from AF to RF to test whether a stage in working.

Figure 5-13, PLL Synthesizer Troubleshooting Procedure, should be used as a guide to locating problems in the PLL Frequency Synthesizer.

Figure 5-5, Channel Selector/Divisor-Code Chart shows a string reference of PLL frequency synthesizer, namely, channel No., channel frequency, select sw. output ("N" code), TX VCO frequency & divisor and RX VCO frequency & divisor which are assigned and selected by "N" code (preset) of channel selector.

ICs equivalent circuit provided inside Integrated Circuits in this model LCBS-4 show in Figure 5-14.

The Exploded View shows in Figure 5-15 and Component Layout (PC Board) shown in Figure 5-16.

FIG. 5-1 RECOMMENDED TEST INSTRUMENTS

TEST INSTRUMENT	REQUIRED SPECIFICATIONS	USE	RECOMMENDED INSTRUMENT TYPE
R.F. Signal Generator	Output frequency: **26.965 to 27.405 MHz.** Output level calibrated from .1 micro-volts to 500,000 microvolts. Internal modulation capability of 30% minimum at 1 kHz. (Calibrated)	Receiver service and alignment.	Hewlett-Packard Model 606A or B. Wavetek Model 3000.
Oscilloscope	Vertical bandwidth of 25 MHz or greater at 3 dB point. Triggered sweep capability.	Transmitter and receiver test and alignment.	Tektronics Model T932. Tektronics Model 465. Hewlett-Packard Model 180. Phillips Model PM3260E.
Frequency Counter	Frequency range DC to 30 MHz. Sensitivity: 10mV R.M.S. at 30 MHz. Overall timebase accuracy ±.002%, 6 digit resolution.	Transmitter frequency check and synthesizer troubleshooting.	Heath-Schlumburger Model SM128A.
Wattmeter	25 watts full scale into 50 ohm load ±5% accuracy.	Measure power output and S.W.R.	Bird Model 43 with type 25A element. (May be terminated with antenna load.
AC VTVM	–40 to +20 dB range.	Measure audio output.	Heath Model IM-21.
Audio Oscillator	400 Hz to 4000 Hz output: Adjustable level, 0-1 volt output impedance 600 ohm.	Audio and modulator tests.	Hewlett-Packard Model 204C. Heath Model SG18A.
DC Power Supply	13.8 volt DC ±10% at 4 amperes.	Voltage for servicing.	Heath Model SP2720 (SBE Model SBE-4AC may be used if available.)
Pulse Generator	Repeat Frequency 10–500 Hz Variable, Impedance 50 ohm unbalanced.		
Spectrum Analyzer	Band width, nearby Sprious, measurable.		

FIG. 5-2 PERFORMANCE VERIFICATION PROCEDURE

TRANSMITTER

INITIAL SET-UP

Connect the LCBS-4 to 117V AC. Connect a wattmeter, dummy load and oscilloscope to the antenna connector on rear panel.
Adjust RV1 (on PC Board, PTPW007COX) to obtain 13.8V DC at PIN terminal No. 3 with AC voltage of 117V supplied.
Place the Band Mode switch in AM position and set the Channel Selector to CH19.

STEP 1

Key the transmitter and check that the TX lamp "TRANSMITING" comes on. Observe that the wattmeter indicates an output of at least 3.6 – 3.9 watts and that the S-RF meter indicates about the same.

STEP 2

Whistle into the microphone with transmitter keyed and verify that 90 – 100% modulation capability is obtained.
(Modulation sensitivity may be adjusted by RV9).

STEP 3

Couple the frequency counter through the coupling coil to the dummy load and check the transmit frequencies on all channels.
The frequency should be within ±800 Hz from each center channel frequency. (See the Channel Selector/Divisor-Code Chart).

STEP 4

Key the transmitter in LSB without modulation. Check for less than 0.1 Vp-p carrier on scope.

STEP 5

Whistle into microphone with transmitter keyed and observe that the wattmeter indicates an output of at least 12 watts output.

STEP 6

Repeat steps 4 and 5 in USB.

SYNTHESIZER

STEP 1

Connect a frequency counter to the test point TP2, (couple the probe of frequency counter to TP2). This frequency reading should be 10.240000 MHz ± 50 Hz. [10.240 MHz X'TAL reference oscillator check].

STEP 2

Set the unit into receive mode and connect a digital voltmeter (DC 12V range) between TP1 and ground. Verify that the meter reading obtains 3.6V ± 0.1V on CH1. Next, set the channel selector to CH40 and verify that the reading is 1.4 — 2.3V. [VCO Circuit check].

RECEIVER

INITIAL SET-UP

Connect LCBS-4 to 117V AC. (See the transmitter step).
Connect RF signal generator to the antenna jack and set to 27.185 MHz. Set the unit to channel 19. Turn the volume control to fully clockwise, the squelch control to fully counterclockwise, and set the clarifier control in 12 o'clock position. Connect 8 ohm load to the external speaker jack, EXT SP, and connect AC VTVM across the dummy load resistor. Place the NL switch in NL, the NB switch in OFF, the CB-PA switch in CB positions. (See Figure 5-6).

STEP 1

Set the Mode switch in AM position. Adjust signal generator for 1 μV output with 30%, 1 kHz modulation. Verify that at least 7.5V AC appear across the 8 ohm load.

STEP 2

Increase signal generator output level 40 dB. Check for "S" meter indication of approximately "S9"

STEP 3

Observe the meter lamp, RX lamp "RECEIVING" and channel LED to insure that each are operational.

STEP 4

Increase signal generator output level to 500 μV. Rotate squelch control fully clockwise and verify squelch of the receiver with input of 500 μV.

(continued)

STEP 5

Decrease signal generator output level to 1 μV, adjust squelch control to the point that the receiver is just muted.
Increase signal generator output level by 0.7 μV and verify that the squelch opens.

STEP 6

Remove connection from external speaker jack if used. Adjust signal generator for 0.7 μV output with no modulation. Set the Mode switch to LSB position. Rotate the Clarifier control right and left directions. Tone should be heard at one end of the Clarifier.

STEP 7

Repeat step 6 in USB mode of operation.

FIG. 5-3 TRANSMITTER TEST CONNECTION

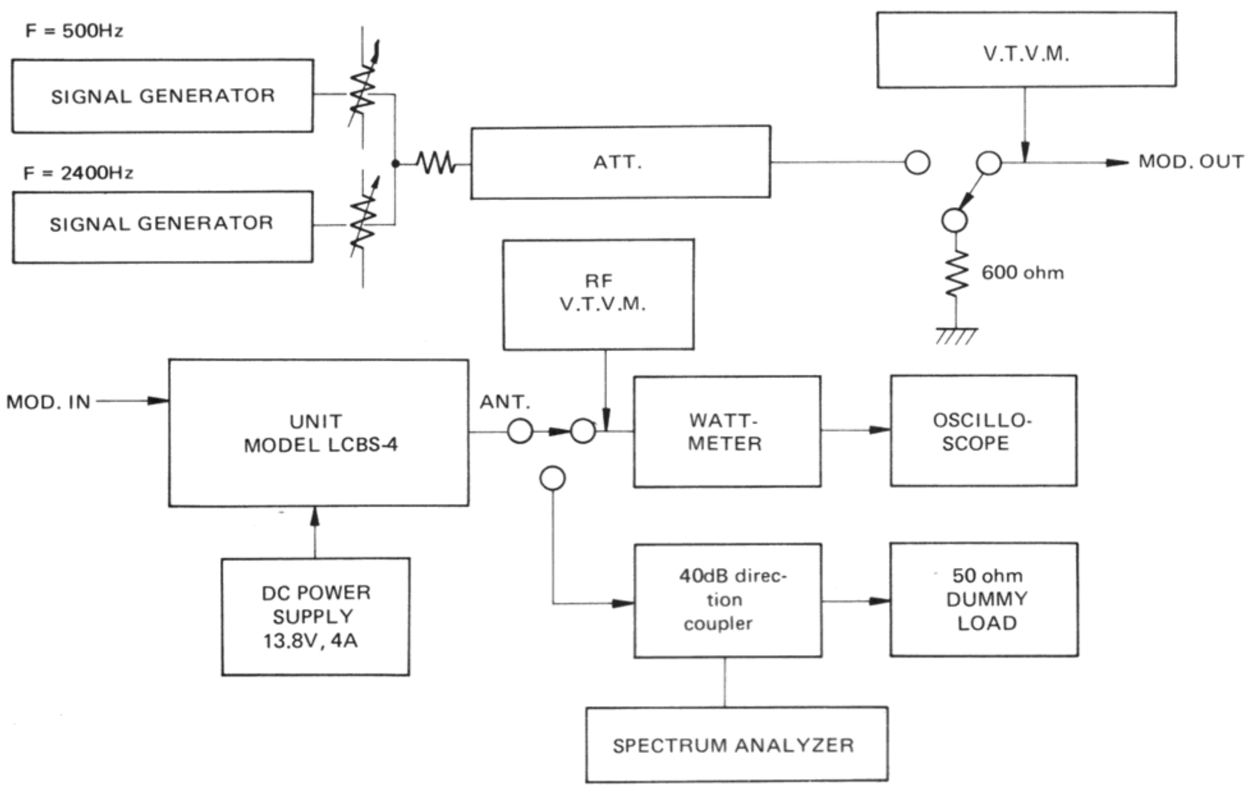
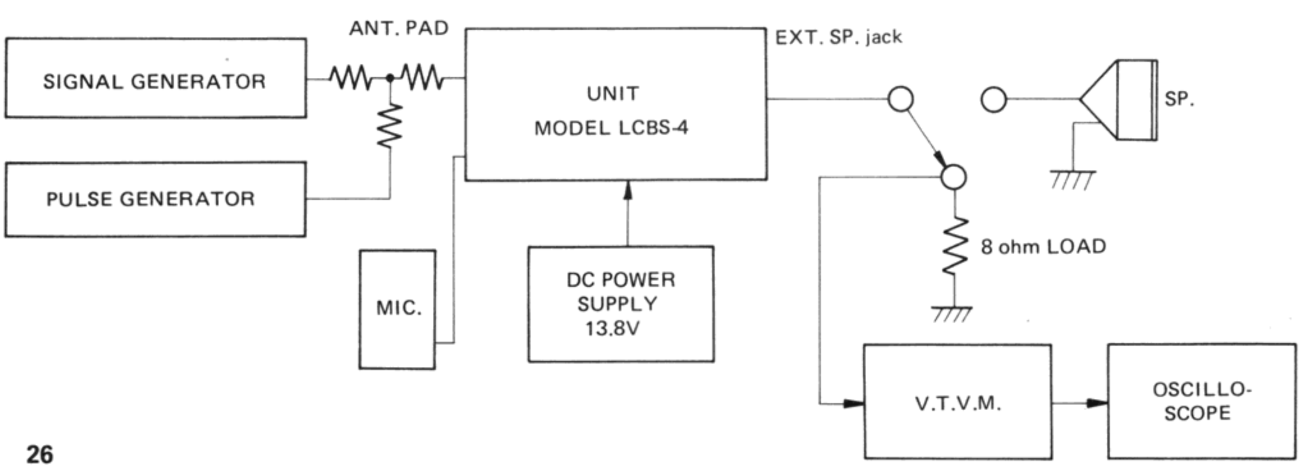


FIG. 5-4 RECEIVER TEST CONNECTION



CHANNEL SELECTOR/DIVISOR-CODE CHART

Channel No.	Channel Freq. (MHz)	"N" Digital Code	VCO Freq. (MHz)		Channel Sw. Output						RX 1st Local Freq. (MHz)	
			AM/USB	LSB	P8	P7	P6	P5	P4	P3	AM/USB	LSB
1	26.965	255	17.555	17.5535	1	1	1	1	1	1	37.66	37.657
2	26.975	254	17.565	17.5635	0	1	1	1	1	1	37.67	37.667
3	26.985	253	17.575	17.5735	1	0	1	1	1	1	37.68	37.677
4	27.005	251	17.595	17.5935	1	1	0	1	1	1	37.70	37.697
5	27.015	250	17.605	17.6035	0	1	0	1	1	1	37.71	37.707
6	27.025	249	17.615	17.6135	1	0	0	1	1	1	37.72	37.717
7	27.035	248	17.625	17.6235	0	0	0	1	1	1	37.73	37.727
8	27.055	246	17.645	17.6435	0	1	1	0	1	1	37.75	37.747
9	27.065	245	17.655	17.6535	1	0	1	0	1	1	37.76	37.757
10	27.075	244	17.665	17.6635	0	0	1	0	1	1	37.77	37.767
11	27.085	243	17.675	17.6735	1	1	0	0	1	1	37.78	37.777
12	27.105	241	17.695	17.6935	1	0	0	0	1	1	37.80	37.797
13	27.115	240	17.705	17.7035	0	0	0	0	1	1	37.81	37.807
14	27.125	239	17.715	17.7135	1	1	1	1	0	1	37.82	37.817
15	27.135	238	17.725	17.7235	0	1	1	1	0	1	37.83	37.827
16	27.155	236	17.745	17.7435	0	0	1	1	0	1	37.85	37.847
17	27.165	235	17.755	17.7535	1	1	0	1	0	1	37.86	37.857
18	27.175	234	17.765	17.7635	0	1	0	1	0	1	37.87	37.867
19	27.185	233	17.775	17.7735	1	0	0	1	0	1	37.88	37.877
20	27.205	231	17.795	17.7935	1	1	1	0	0	1	37.90	37.897
21	27.215	230	17.805	17.8035	0	1	1	0	0	1	37.91	37.907
22	27.225	229	17.815	17.8135	1	0	1	0	0	1	37.92	37.917
23	27.255	226	17.845	17.8435	0	1	0	0	0	1	37.95	37.947
24	27.235	228	17.825	17.8235	0	0	1	0	0	1	37.93	37.927
25	27.245	227	17.835	17.8335	1	1	0	0	0	1	37.94	37.937
26	27.265	225	17.855	17.8535	1	0	0	0	0	1	37.96	36.957
27	27.275	224	17.865	16.8635	0	0	0	0	0	1	37.97	37.967
28	27.285	223	17.875	17.8735	1	1	1	1	1	0	37.98	37.977
29	27.295	222	17.885	17.8835	0	1	1	1	1	0	37.89	37.987
30	27.305	221	17.895	17.8935	1	0	1	1	1	0	38.00	37.997
31	27.315	220	17.905	17.9035	0	0	1	1	1	0	38.01	38.007
32	27.325	219	17.915	17.9135	1	1	0	1	1	0	38.02	38.017
33	27.335	218	17.925	17.9235	0	1	0	1	1	0	38.03	38.027
34	27.345	217	17.935	17.9335	1	0	0	1	1	0	38.04	38.037
35	27.355	216	17.945	17.9435	0	0	0	1	1	0	38.05	38.047
36	27.365	215	17.955	17.9535	1	1	1	0	1	0	38.06	38.057
37	27.375	214	17.965	17.9635	0	1	1	0	1	0	38.07	38.067
38	27.385	213	17.975	17.9735	1	0	1	0	1	0	38.08	38.077
39	27.395	212	17.985	17.9835	0	0	1	0	1	0	38.09	38.087
40	27.405	211	17.995	17.9935	1	1	0	0	1	0	38.10	38.097

Note: 1; High Level = 4.5-5.5V
0; Low Level = 0.05-0.4V

FIG. 5-5

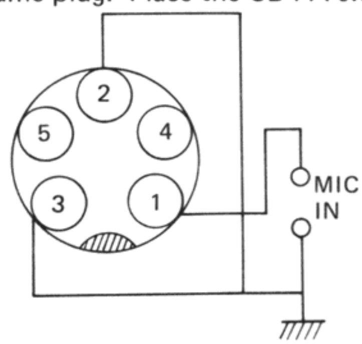
FIG. 5-6 PLL SYNTHESIZER/OSC ALIGNMENT PROCEDURE

PRELIMINARY

Connect the unit to 117V AC power source. Place the unit into receive mode. Verify that the voltage at PIN terminal No. 3 on PC Board, PTSW007COX is 13.8V with AC voltage of 117V supplied.
If not, adjust RV1 to obtain that voltage. (Alignment of Regulated Voltage Power Supply).

INITIAL SET-UP

Connect the test equipment to the unit as shown in Figure 5-3.
Place the unit into transmit mode without the microphone, insert the plug wired as shown below into the MIC jack on the transceiver. When applying the audio modulation signal to the microphone input circuit, also use the same plug. Place the CB-PA switch in CB.



STEP 1

Set the power supply voltage to 13.8V DC. Couple a High Input Impedance Probe to the frequency counter. Place the channel selector switch within CH1 – CH40, as desired position.
NOTE: This alignment should be conducted with the frequency counter having high sensitivity and high input impedance.

STEP 2 : PLL Circuit Alignment

Place the unit into the transmit mode or receive mode, as desired. Connect a frequency counter to the test point TP2, (couple the probe of frequency counter to TP2), and adjust the trimming capacitor CT201 to obtain a frequency reading of;

10.240000 MHz ± 50 Hz

STEP 3 : 10.0525 MHz Frequency Alignment

1. Place the Mode switch in the USB position and set the transceiver into the transmit mode. Couple the probe of frequency counter to the test point TP3 and adjust CT203 to obtain a frequency reading of;

   20.105 MHz ± 20 Hz

2. Reset the Mode switch in the LSB position and also set the unit into transmit mode.

Couple the probe of frequency counter to the test point TP3 and adjust CT202 to obtain a frequency reading of;

20.1035 MHz ± 20 Hz

NOTE: Verify that the frequency counter reading exactly indicates 20.1035 ± 20 Hz, even through vary clarifier control to right and left towards during the above step (2).

3. Next, place the Mode switch in USB position and set the unit into receive mode.
When the clarifier control is placed within "11 o'clock – 1 o'clock" position, verify a frequency reading of;

20.105 MHz ± 20 Hz

When the clarifier control is placed to the fully clockwise position, verify a frequency reading of;

20.105 MHz + [500 Hz – 1000 Hz]

When the clarifier control is placed to the counterclockwise position, verify a frequency reading of;

20.105 MHz – [500 Hz – 1000 Hz]

4. Next, place the Mode switch in LSB position.
When the Clarifier control is place within "11 o'clock – 1 o'clock" position, verify a frequency reading of;

20.1035 MHz ± 20 Hz

When Clarifier control is placed to the fully clockwise position, verify a frequency reading of;

20.1035 MHz + [500 – 1000 Hz]

When the Clarifier control is placed to the counterclockwise position, verify a frequency reading of;

20.1035 MHz – [500 – 1000 Hz]

STEP 4 : 10.692 MHz Frequency Alignment

1. Place the Mode switch in USB and set the unit to receive mode.
Connect a probe of frequency counter to the emitter of Q10 and adjust CT1 to read 10.695 MHz ± 50 Hz.
2. Place the Mode switch in LSB and adjust CT2 to read 10.692 MHz ± 50 Hz.
3. Verify that the oscillator ceases in AM mode.

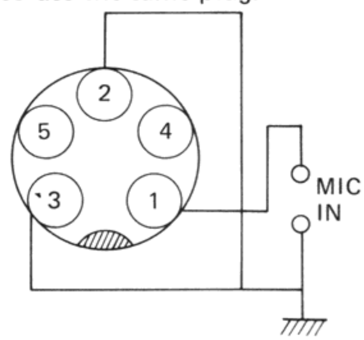
STEP 5 : VCO Circuit Alignment

1. Place the unit into transmit or receive mode, as desired.
2. Connect a VTVM or VOM (DC 12V range) between TP1 and chassis.
3. Place the channel selector in CH1.
4. Adjust core provided in the VCO block to obtain 3.6V ± 0.1V, starting from top to bottom when turning the core (the VTVM or VOM used in this alignment should be calibrated and has an input impedance of 20 kohm/V or higher).
5. Next, place the channel selector in CH40 and verify that the reading is within 1.4 – 2.3V.

FIG. 5-7 TRANSMITTER ALIGNMENT PROCEDURE

PRELIMINARY

Place the RV201 & RV204 in the counterclockwise position, RV3 in the center position, L214 in the fully downward, T209, L209 and L212 in the flat position.
Place the Mode switch in LSB position. Unsolder either emitter or collector and insert a milliamp meter in series with the un-soldered lead. Key the transmitter and adjust RV204 for a current reading of 150 mA. Remove meter and re-solder lead.
To set the transceiver into the transmit mode without the microphone, insert the plug wired as shown below into the MIC jack on the front panel. When applying the audio modulation signal to the microphone input circuit, also use the same plug.



STEP 1 : Carrier Suppression Alignment

1. Set the unit into the transmit mode with no modulation.
2. Place the Mode switch in LSB and alternately adjust RV1 & RV2 to obtain maximum level on the scope display.
3. Next, place the Mode switch in USB and readjust RV1 & RV2 to obtain minimum level on the scope display.

STEP 2 : Pre-driver Stage Alignment

1. Apply 500 Hz audio signal to the microphone input circuit and increase or decrease audio signal level so that RF power indicates 2 watts.
2. Change the audio signal generator frequency from 500 Hz to 2400 Hz and then increase or decrease audio signal level until RF power obtaines 2 watts.
3. Next, feed two tone (500 Hz and 2400 Hz) signals to the microphone input circuit and adjust T3 and T201 to obtain maximum amplitude of scope display in a desired channel within CH1 – CH40.
4. Place the channel selector in CH40 and adjust T202 to obtain maximum amplitude of scope display.
5. Place the channel selector in CH1 and adjust T203 to obtain maximum amplitude of scope display.
6. Repeat above steps (4) and (5) until further maximum amplitude is obtained.
7. Place the channel selector in CH40 and adjust T204 to obtain maximum amplitude of scope display.
8. Place the channel selector in CH1 and adjust T205 to obtain maximum amplitude of scope display.
9. Also repeat above steps (7) and (8) until further maximum amplitude is obtained on the scope.

(continued)