



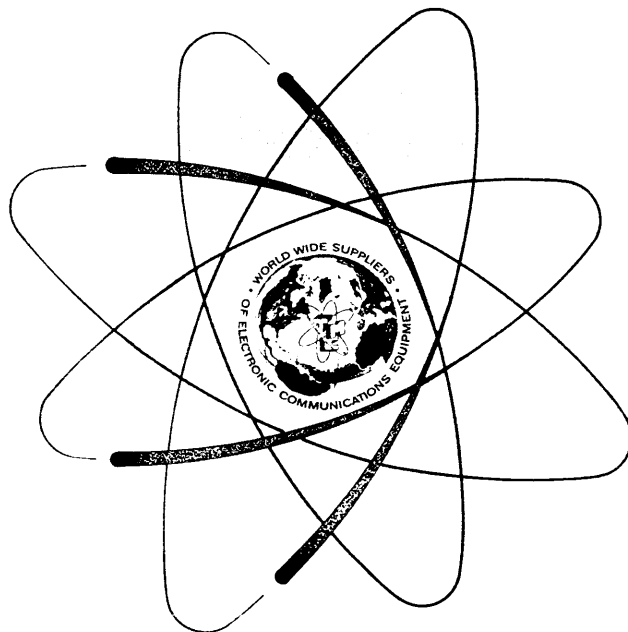
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TECHNICAL MANUAL SUPPLEMENT

LF/MF COMMUNICATION RECEIVER

Model VLRB-1

Test, Alignment and Troubleshooting



THE TECHNICAL MATERIEL CORPORATION
MAMARONECK, N.Y. OTTAWA, ONTARIO

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IN

Issue Date:

1. PURPOSE: This technical manual supplement is issued for the purpose of test, alignment and troubleshooting, and authorizes for use the commercial publication identified as follows:

CONTRACTOR: THE TECHNICAL MATERIEL CORPORATION
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TITLE: TECHNICAL MANUAL FOR LF/MF COMMUNICATION
RECEIVER MODEL VLRB-1

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2. SUPPLEMENTARY INFORMATION: The information contained in the above-listed commercial publication is supplemented as follows for official use:

1. ALIGNMENT
2. MAINTENANCE
3. TROUBLESHOOTING

3. ALIGNMENT PROCEDURES: The following provides step by step alignment procedures and lists the test equipment required to perform alignment of the VLRB-1 MF Communications Receiver.

3.1 Equipment Required

| | |
|--------------------|--|
| Frequency Counter: | HP Model 5244L or equivalent |
| Signal Generator: | HP-606B, or equivalent |
| Oscilloscope: | Tektronix Model 543A with L-Type Plug-in head, or equivalent |
| VTVM: | Millivac 28B, or equivalent |
| Audio VTVM: | Billantine Model 314A, or equivalent |
| VOM: | Simpson Model 260, or equivalent |

3.2 Initial Control Settings

| | |
|-----------------|-----------------|
| BAND SELECTOR: | 30-55 KC BAND 1 |
| TUNE: | 55 KC |
| NOISE SILENCER: | OFF |
| METER SWITCH: | 0 DBM |
| BFO SWITCH: | CCW |
| RF GAIN: | CW |
| AGC DECAY: | MANUAL |
| MODE: | AM |
| SYNTH SWITCH: | OFF |
| I.F. SELECTOR: | 8.0 KC |
| LINE LEVEL: | FULLY CW |
| AF GAIN: | FULLY CCW |
| POWER: | OFF |

3.3 A3634 Power Supply and Audio Amplifier

- a. Plug in A3634 card.
- b. Turn POWER switch to ON.

c. With VTVM, check for +12 VOLTS DC on pin 1 of printed circuit connector sockets, and for -12 VOLTS DC on pin 2 of printed circuit sockets as listed below:

| | |
|-------|--------------------------------|
| A3638 | BFO-Product Detector |
| A3653 | 100 KC IF |
| A3661 | AGC, NOISE SILENCER, 6.4 MC IF |
| A3655 | 6.5 MC OSC & 5.8 - 6.37 MC IF |

3.4 LOCAL Oscillator Alignment

- a. Insert the Local Oscillator Card.
- b. With Band 1 selected and the tune dial set at 55 KC,
- c. connect the Ballantine Meter to TP-1.
- d. Adjust C941 to mid capacitance.
- e. Adjust L903 for 155 KC.

NOTE

The frequency counter should be connected to the "AMP" output of the Ballantine. The meter function switch may be shifted from METER to AMP, as frequency or amplitude measurements are desired.

- f. Tune the receiver dial to 30 KC.
- g. Adjust C941 for 130 KC.
- h. Tune the receiver to 55 KC.
- i. Adjust L902 for 155 KC.
- j. Tune the receiver to 30 KC.
- k. Adjust C941 for 130 KC.

NOTE

Repeat steps h through k until the required frequencies are obtained at each end of Band 1. The RF output at TP-1 should be 5 millivolts RMS +3 db.

- l. Place the BANDSWITCH to Band 2 (55-100 KC)
- m. Tune the receiver to 100 KC.
- n. Set C942 to mid capacitance.
- o. Adjust L906 for a reading of 200 KC at TP-1.
- p. Tune the receiver to 55 KC.
- q. Adjust C942 for 155 KC.
- r. Tune the receiver to 100 KC.
- s. Adjust L905 for 200 KC.
- t. Tune the receiver to 55 KC.
- u. Adjust C942 for 155 KC.

NOTE

Repeat steps 3.4 r through 3.4 u until the required frequencies are obtained at each end of Band 2. The RF output at TP-1 should be 5 millivolts +3 db.

- v. Set the BANDSWITCH to Band 3 (100-180 KC)
- w. Adjust C943 to approximate mid capacitance.
- x. Adjust L909 for 280 KC.
- y. Tune the receiver to 100 KC.
- z. Adjust C943 for 200 KC.
- aa. Tune the receiver to 180 KC.
- ab. Adjust L908 for 280 KC.
- ac. Tune the receiver to 100 KC.
- ad. Adjust C943 for 180 KC.

NOTE

Repeat steps 3.4 z through 3.4 ab until the required frequencies are obtained at each end of Band 3. The RF output at TP-1 should be 5 millivolts +3 db.

- ae. Tune the receiver to 330 KC.
- af. Adjust L912 for 430 KC.
- ag. Tune the receiver to 180 KC.
- ah. Adjust C944 for 280 KC.
- ai. Tune the receiver to 330 KC.
- aj. Adjust L911 for 430 KC.
- ak. Tune the receiver to 180 KC.
- al. Adjust C944 for 280 KC.

NOTE

Repeat steps 3.4 ai through 3.4 al until the required frequencies are obtained at each end of Band 4. The RF output at TP-1 should be 5 millivolts +3 db.

- am. Set the Bandswitch to Band 5 (330-600 KC).
- an. Adjust C945 for approximate mid capacitance.
- ao. Tune the receiver to 600 KC.
- ap. Adjust L915 for 700 KC.
- aq. Tune the receiver to 330 KC.
- ar. Adjust C945 for 430 KC.
- as. Tune the receiver to 600 KC.
- at. Adjust L914 for 700 KC.
- au. Tune the receiver to 330 KC.
- av. Adjust C945 for 430 KC.

NOTE

Repeat steps 3.4 ar through 3.4 av until the desired frequencies are obtained at each end of the band. The RF output at TP-1 should be 5 millivolts +3 db.

3.5 RF ALIGNMENT: Connect the counter, Ballantine VTVM and Signal Generator as shown on Figure 3-1.

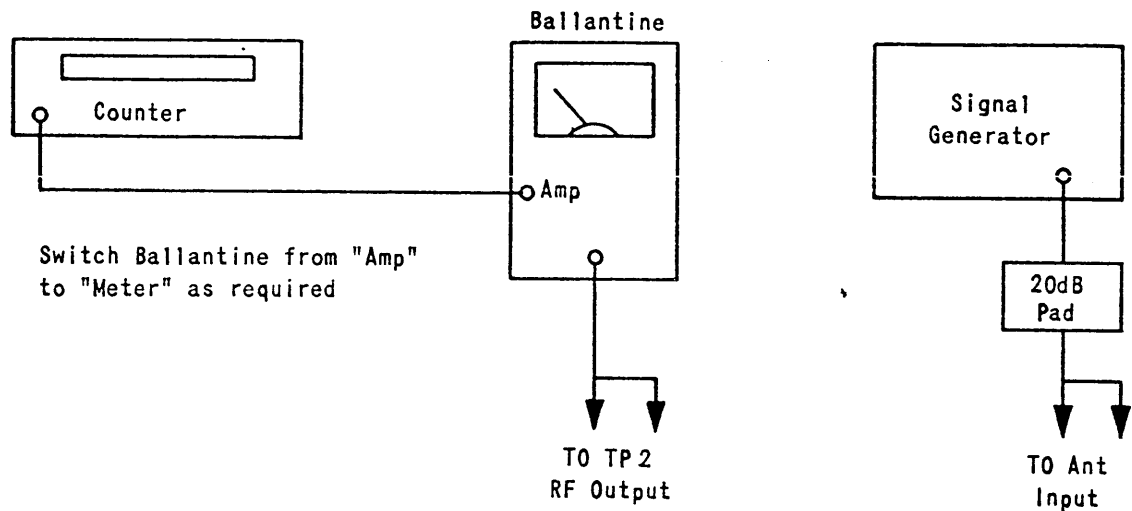


FIGURE 3-1

- a. Plug A3662 Band 1 and 2 cards into extender and plug into proper chassis slot.
- b. Connect signal generator via 20 db pad to antenna input.
- c. Place BANDSWITCH to Band 2 (55-100 KC).
- d. Tune the receiver to 75 KC.
- e. Set the signal generator to 75 KC. Use only that output required for a usable indication on the VTVM.
- f. Adjust T701, T702, T703 for maximum indication.
- g. Tune receiver and generator to 100 KC. Adjust L701, L702, L703 for maximum output.
- h. Tune receiver and signal generator to 55 KC.
- i. Adjust C711, C705, C708 for maximum indication.

NOTE

Repeat steps 3.5 g through 3.5 i until maximum output has been achieved.

- j. Place BANDSWITCH to Band 1 (30-55 KC).
- k. Tune receiver and signal generator to 30 KC.
- l. Adjust C9A, C8A, C20A for maximum indication.
- m. Disconnect VTVM from TP-2. Plug PC card directly into chassis.
- n. Place BANDSWITCH to Band 3 (100-180 KC).
- o. Plug in A3662 Band 3 card into extender and insert in proper chassis slot.
- p. Connect VTVM and counter to TP-2.
- q. Tune the receiver and signal generator to 145 KC.
- r. Adjust T704, T705, T706 for maximum output.
- s. Tune the receiver and signal generator to 180 KC.
- t. Adjust L701, L702, L703 for maximum output.
- u. Tune the receiver and signal generator to 100 KC.
- v. Adjust C711, C705, C718 for maximum output.

NOTE

Repeat steps 3.5 s through 3.5 v until maximum output has been achieved. Remove VTVM & counter. Plug the Band 3 circuit boards directly into its chassis slot.

- w. Place BANDSWITCH to Band 4 (180-330 KC).
- x. Insert A3662 Band 4 card into extender and plug into the proper chassis slot.
- y. Connect VTVM and counter to TP-2.
- z. Tune receiver and signal generator to 260 KC.
- aa. Adjust T707, T708, T709 for maximum output.
- ab. Tune the receiver and signal generator to 330 KC.

- ac. Adjust L701, L702, L703 for maximum output.
- ad. Tune the receiver and signal generator to 180 KC.
- ae. Adjust C711, C705, C718 for maximum output.

NOTE

Repeat steps 3.5 ab through 3.5 ae until maximum output is achieved. Disconnect VTVM and counter from TP-2. Place Band 4 PC cards directly into its proper chassis slot.

- af. Place BANDSWITCH to Band 5 (330-600 KC).
- ag. Insert A3662 Band 5 card into extender and plug into proper chassis slot.
- ah. Connect VTVM and Counter to TP-2.
- ai. Tune the receiver and signal generator to 470 KC.
- aj. Adjust T710, T711, T712 for maximum output.
- ak. Tune the receiver and signal generator to 600 KC.
- al. Adjust L701, L702, L703 for maximum output.
- am. Tune the receiver and signal generator to 330 KC.
- an. Adjust C711, C705, C718 for maximum output.

NOTE

Repeat steps 3.5 ak through 3.5 an until maximum output has been achieved. Disconnect the VTVM and counter. Place Band 5 card directly into its proper chassis slot.

3.6 A3655 6.5 MC OSC and I.F. Module

- a. Place A3655 card into extender and plug into proper chassis slot.
- b. Connect the Ballantine VTVM to TP-1. Connect the frequency counter to the "AMP" jack of the Ballantine. The meter function switch may now be used to shift from "METER" to "AMP" as required.

- c. Adjust C502 for exactly 6.5 mcs.
- d. Switch the VTVM to "METER" function.
- e. Adjust L501 for a DIP in the 6.5 mc signal. The amplitude should be about 14 mv RHS.
- f. Connect VTVM to pin 22 of A3655. The signal amplitude should be about 9.0 millivolts RMS.
- g. Connect VTVM to TP-4.
- h. Pull out the Local Oscillator Board A3681.
- i. Adjust R513 for minimum 6.5 mc signal.
- j. Adjust C529 for minimum 6.5 mc signal.
- k. Connect the VTVM to TP-5.
- l. Adjust C539 for minimum 6.5 mc signal.
- m. Connect Ballantine VTVM and Counter to TP-6.
- n. Insert Local Oscillator Boards
- o. Set BANDSWITCH to Band 5 (330-600 KC). The frequency at TP-6 should be between 5.8 mc and 6.37 mc.
- p. Tune the receiver to 600 KC. The frequency at TP-6 should be 5.8 mcs.
- q. Adjust T501, L506 for maximum signal.
- r. Without moving the receiver TUNE control, set the BANDSWITCH to Band 1. (Dial should be at 55 KC).
- s. Adjust T502, T503 for maximum signal. The frequency should be 6.345 mcs.
- t. Repeat steps 3.6 p through 3.6 s until optimum results have been obtained.
- u. Set BANDSWITCH to Band 4, and tune the receiver to 300 KC.
- v. Adjust T504 for maximum signal.

- w. Insert a 50 ohm load at J118 on the rear apron of the receiver. Connect the VTVM & counter to the dummy load. As the receiver is tuned from 30 KC to 600 KC, the output frequency should change from 6.37 mc to 5.8 mc, and the amplitude should be between 12 and 18 millivolts RMS.
- x. Remove the test equipment.
- y. Insert the A3655 card directly into its chassis slot.

3.7 100 KC IF Card A3653

- a. Insert the A3653 card into the extender and plug into proper chassis slot.
- b. Connect the oscilloscope across C441. (emitter of Q401 to ground)
- c. Adjust L407 for maximum 6.5 mc signal. Connect a short from TP-6 to ground and TP-3 to ground. Connect a signal generator to TP-1. Set the frequency to 100 KC, unmodulated.
- d. Connect the Ballantine VTVM and counter to TP-2.
- e. With the signal generator at 100 KC and with just enough output to obtain a discernable indication at TP-2, adjust L401 for maximum signal.
- f. Disconnect the ground from TP-3.
- g. Adjust L402 for MINIMUM signal at TP-2.
- h. Connect the VTVM and counter to TP-5.
- i. Adjust the signal generator for 100 KC. Adjust the generator amplitude to provide 50 mv RMS at TP-5.
- j. Set the receiver selectivity switch to .5 KC position.
- k. Adjust R421 for a 500 cycle bandwidth at the three db points.
- l. Set the receiver selectivity switch to 2.0 KC position.
- m. Adjust R443 for a 2 KC bandwidth at the three db points.

- n. Set the receiver selectivity switch to 4.0 KC position.
- o. Adjust R443 for a 4 KC bandwidth at the 3 db points.
- p. Remove the ground from TP-6.
- q. Remove the signal generator from TP-1.
- r. Remove the VTVM & counter from TP-5.
- s. Place the A3653 card directly into its chassis slot.

3.8 BFO & Detector Board A3638

- a. Place the A3638 card into extender and plug into proper chassis slot.
- b. Place BFO control fully CCW.
- c. Set MODE switch to CW position.
- d. Ground TP-1.
- e. Connect scope and counter to TP-3.
- f. Adjust L304 for 97 KC at TP-3.
- g. Place BFO control fully CW. The frequency at TP-3 should be 103 KC MINIMUM.
- h. Place A3638 board directly into its proper chassis slot.

3.9 AGC, Noise Silencer, 6.4 MC IF Module A3661

- a. Place A3661 card in extender and plug into proper chassis slot.
- b. Turn NOISE SILENCER switch to ON.
- c. Place AGC DELAY Control to MANUAL.
- d. Place RF GAIN control fully CW.
- e. Connect VOM to TP5, +DC VOLTS FUNCTION.
- f. Adjust R637 for 0.55 VOLTS DC.
- g. Connect a signal generator at 6.4 mc, 100 mv RMS, across R647.
- h. Connect Ballantine VTVM & counter to TP-4.

- i. Adjust T601 for maximum signal.
- j. Connect the signal generator to the antenna input at 0.3 microvolts RMS, at any frequency within the range of the receiver.
- k. Tune the receiver to the signal generator frequency.
- l. Measure the signal at TP-5, card A3653. It should be about 25 millivolts RMS.
- m. Under the condition enumerated in steps 3.11 j through 3.11 i, switch the AGC DECAY switch to FAST and adjust R646 on A3661 module until the signal at TP-5 (A3653) just begins to drop from full RF gain condition. For rapid comparison, switch the AGC DECAY control between MANUAL and FAST.
- n. Change the signal generator output from 0.3 microvolts to 1.0 volt. The maximum variation of voltage at TP-5 A3653 should be no greater than 1 db.

3.10 Audio Meter Adjustment

- a. Connect a 600 ohm resistor to the 600 ohm output terminals on the receiver rear panel.
- b. Connect the signal generator to the antenna input at any frequency in the receiver range, at 10 microvolts.
- c. Tune the receiver to the generator frequency.
- d. Place the MODE switch to CW.
- e. Adjust the BFO control for a 1 KC tone, monitored at the audio output.
- f. Connect the Ballantine VTVM across the 600 ohm load.
- g. Adjust the AUDIO GAIN control for +3 dbm, or 1.1 VOLTS RMS on the VTVM.
- h. Adjust R349 on A3638 boards for +3 dbm on the front panel meter.
- i. Remove test equipment.

4.0 MAINTENANCE: The VLRB-1 receiver has been designed to provide long term, trouble-free operation under continuous duty conditions. However, in order to prevent failure or operational inefficiency it is suggested that a definite schedule of preventive maintenance be followed. This section will discuss aspects of both mechanical and electrical maintenance.

4.1 Mechanical Maintenance: At quarterly intervals the equipment should be removed from its mounting to a service bench for cleaning and inspection. All accessible covers should be removed and all removable circuit boards should be slipped from their sockets. Examine carefully each circuit board for obviously deteriorating components such as charred and discolored resistors. With a pencil eraser clean the board contacts where they mate with their sockets. Remove dust and dirt with a soft brush or vacuum cleaner. Take care during the cleaning and inspection procedure not to disturb variable inductor, capacitor or potentiometer adjustments. After cleaning and inspecting the removable circuit boards, set them aside where they cannot be damaged and where they will not absorb dust, dirt or grease.

4.2 Carefully clean the main body of the equipment, top, bottom and inside. When all dirt has been removed spray with an approved spray cleaner, the following control switches:

AGC DECAY

BAND

MODE

I.F. SELECTIVITY

SYNTH

Work the switches through their several positions rapidly as the spray cleaner is applied.

- 4.3 Examine the mechanical gear train thoroughly by running the TUNE control from one end to the other. Apply a very small amount of lubricating compound such as DOW CORNING #4 or LUBRIPLATE to the active mechanical parts. DO NOT OVERLUBRICATE. , DO NOT USE MACHINE OIL.
- 4.4 Examine the tightness of all rear panel coaxial jacks.
- 4.5 Tighten all front panel knobs.
- 4.6 Remove the fuseholders and insure that the proper size fuses are enclosed before reinserting them.
- 4.7 On the underside of the chassis, examine the wiring leading to circuit boards for fraying.
- 4.8 Check screws, bolts and nuts for tightness.
- 4.9 Check the spade lug connectors inside the console which connect to terminal board E-101 on the rear of the receiver. Re-solder any spade lugs which are not mechanically and electrically perfect. At the same time, check the main power card and all coaxial connectors leading to the receiver. If cable markers have deteriorated, mark the cables with cloth tape, properly labelled.
- 4.10 Insure that the BATTERY IN-OUT switch is in the OUT condition (unless the battery provision is being utilized).

- 4.11 When the mechanical maintenance has been completed, replace all cards in their proper slots, but do not replace the top cover.
- 4.12 Electrical Maintenance: Before returning the VLRB-1 to its console, the following minimum electrical maintenance should be accomplished:
- a. Connect the main power cards and apply primary power.
 - b. On the local oscillator module, connect a sensitive VTVM to TP-1. On any band at any frequency, the output should be 5 millivolts, ± 3 db.
 - c. On the A3655 module, connect a Ballantine 314A VTVM to TP-1. Connect a counter to the AMP output of the Ballantine. Adjust C502 for 6.5 MC exactly. The amplitude should be 14 mv RMS.
 - d. On the BFO - Product Detector Card, connect the Ballantine VTVM and counter to TP-3. With the MODE switch to CW and the BFO control at CENTER position, adjust L304 for 100 KC. The amplitude should be about 1.3 VOLTS RMS.
 - e. Measure the following DC Voltages:

| | |
|-----------------------|----------------|
| Anode CR-206 (A3634): | -10V REGULATED |
| PIN 1 A3638: | +12V |
| PIN 2 A3638: | -12V |
 - f. Should the receiver not be performing according to specifications, consult the alignment and troubleshooting sections. Determine which section, module, component, function or band is at fault and perform the required adjustments. Consult FO-1, which is a wiring diagram of the receiver, for the complete interconnection arrangement.

4.13 Maintenance Checks: The following maintenance checks are described in detail and may be used to gauge the overall performance of the receiver:

- a. Sensitivity and AGC
- b. BANDWIDTH (SELECTIVITY)
- c. 600 ohm OUTPUT AUDIO CALIBRATION

4.17 Sensitivity & AGC and Audio Output Calibration

- a. Connect a signal generator to the antenna input at any frequency, at 10 microvolts output, unmodulated.
- b. Connect a 600 ohm non-inductive load from 3 to 5 of terminal board E-1.
- c. With AGC DECAY to FAST, MODE to CW, SELECTIVITY to 8 KC, and METER SWITCH to 0 DBM, tune the receiver to the signal generator frequency.
- d. Use the BFO control to provide a 1 KC tone at the OUTPUT.
- e. With the LINE LEVEL control adjust the output for a VTVM reading of 775 millivolts.
- f. The front panel meter should read 0 DBM. If it does not, adjust R349. Increase the signal generator output to 1.0 volt. After 5 seconds decrease it to .3 microvolts. The audio output should remain within +3 db of 0 DBM.

4.18 Selectivity

- a. Connect a signal generator to the antenna input at any frequency, at 10 microvolts output, unmodulated.
- b. Connect a 600 ohm non-inductive load from 3 to 5 of terminal board E-1.
- c. Connect a Frequency Counter across the load.

- d. With AGC to FAST, MODE to CW, METER switch to 0 DBM and SELECTIVITY to 8 KC, tune the receiver to the signal generator frequency.
- e. Adjust the BFO for a 1 KC tone in a speaker connected to the speaker terminals at E-101. Set the AUDIO OUTPUT for a convenient listening level and the LINE LEVEL adjust for 0 DBM. Then adjust the BFO for audio zero beat. Carefully change the signal generator frequency above and below zero beat, until the output falls -3 db. Record the difference in frequency. It should be at least 8 KC.
- f. Repeat the selectivity check with the selectivity control in 4 KC, 2 KC and .5 KC positions. The frequency difference should be 4 KC, 2 KC and .5 KC respectively. If it is not, consult the alignment instructions.

5.0 TROUBLESHOOTING: Troubleshooting is greatly facilitated when the operator can describe to the repair technician the characteristics of the equipment in all modes, bands and functions. Frequently, the technician can rapidly isolate a problem simply by noting what the receiver can and cannot do under specific operating conditions.

EXAMPLES:

a. The receiver works well in all functions and modes except for Bank 3:

These indications clear the I.F., DETECTOR, AUDIO and POWER SUPPLY circuits. Band 3 RF cards may be at fault, or the LOCAL OSCILLATOR may be inoperative only on BAND 3. Both of these possibilities should be investigated.

b. The receiver works well in CW and SSB mode but not in the AM MODE. This situation would point to trouble in the AM detection circuits, probably CR-301.

c. The receiver operates properly in all modes and functions, except that there is no output from the front monitor jack. This trouble is easily isolated to C208, R219 or associated wiring.

d. The receiver operates on all functions and modes except SSB. The trouble is probably in the product detector circuit. The BFO circuit may be eliminated because the receiver operates in the cw mode.

e. The receiver operates in the AM mode on all bands, but does

not operate in the CW or SSB modes. The trouble is most probably in the BFO circuit, which is common to both CW and SSB operation.

f. The local oscillator circuits are inoperative on all five bands, but the RF, IF, detector, audio and + and - 12 volt power supply circuits appear normal. The trouble, although not limited to this cause, probably originate in the -10 volt regulated supply. The supply is applied via the bandswitch, and is used to switch local oscillator bands.

5.1 The following section describes a general troubleshooting procedure for technicians, which may be carried out with the equipment on a service bench.

a. Connect the receiver and test equipment as shown in Figure 5-1.

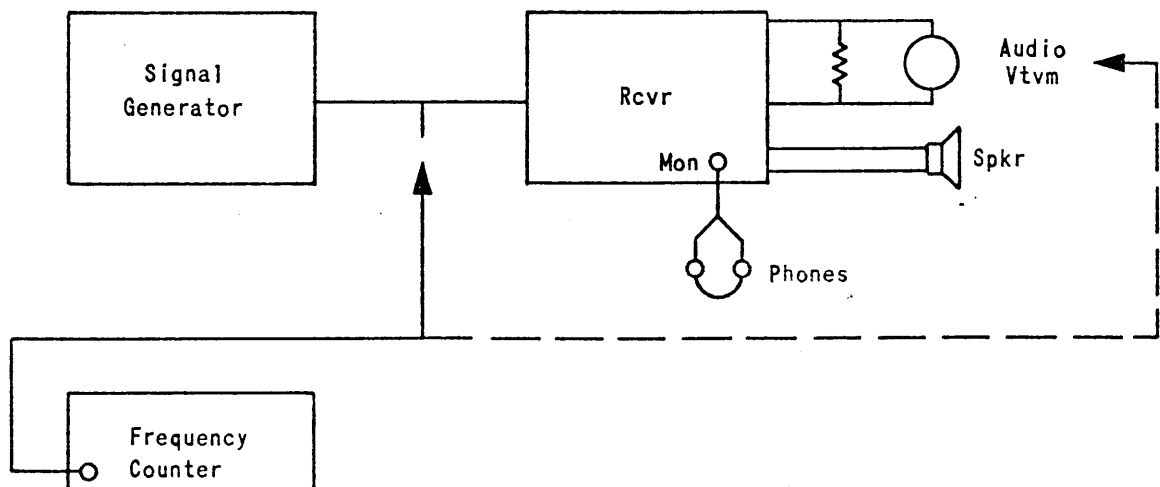


FIGURE 5-1

b. Set the signal generator to a frequency in Band 1, modulated 50% with internal audio, at 100 uv output.

c. Tune the receiver to the frequency selected. Check the AM function, the MONITOR OUTPUT, the SPEAKER output and the 600 ohm output, with associated AUDIO GAIN and LINE LEVEL controls.

Check the meter in 0 DBM and SIGNAL positions.

d. With the AGC DELAY control in MANUAL, check the operation of the RF GAIN control.

e. With the signal generator unmodulated, check the CW function with BFO control, and the SSB function in the same manner.

f. Switch receiver and signal generator to Bands 2, 3, 4 and 5. Only AM function need be checked, since previous checks have established the condition of audio, power supply, I.F., detector and BFO circuit.

5.2 To check AGC action insert a 1.0V signal and have the audio gain advanced for convenient speaker listening level. Place the AGC DELAY control to SLOW. Quickly reduce the signal generator output to zero. Count the number of seconds for the noise level to rise appreciably. It should be about 16 seconds. Repeat for MEDIUM (about 9 seconds) and FAST (about 3 seconds).

5.3 The procedure just described is a rapid troubleshooting procedure for technician to assess, roughly, the performance of the VLRB-1 receiver on the service bench without removing the cover.

5.4 The following table lists symptoms and possible causes of trouble. Since, in most cases, several possible causes are listed, the technician must investigate each possibility to further limit the trouble area.

TABLE 5-1 GENERAL CIRCUITRY

| Step | Symptom | Probable Cause | Remedy |
|------|--|---|--|
| 1 | Insufficient Bandwidth; selectivity at 4 KC | R443 Misadjusted | Realign IF-101 100 KC IF card. |
| 2 | No 6.4 MC input to 100 KC I.F. card | No RF amplification arriving at Q601. No 5.8-6.37 MC signal arriving at Q605 | 1. Repair band 1 and 2 RF card 2. Insure that an antenna is connected. 1. Repair IF-102 card 2. Repair connection between IF-102 card and AGC card. |
| 3 | No 100 KC I.F. with selectivity control at .5KC, 2KC, 4KC. | Q406, Q407 | Replace defective component. |
| 4 | No operation of receiver in any mode on Bands 1, 2. | RF circuit Board A3662 Band 1 & 2 (Same Board) | Align and troubleshoot A3662 card. |
| 5 | No 6.5 MC oscillator | Q501, R504, Y501 | Replace defective component. |
| 6 | No 5.8-6.37 MC I.F. 6.5 MC osc operative | Q502, Q503, Q504, Q505, no local oscillator output, Q506, Q507, Q508 | 1. Troubleshoot local oscillator card. 2. Replace defective component. |
| 7 | 6.5 MC leakage in 5.8-6.37 MC I.F. output | R513, C529, C539 misadjusted | Realign IF-102. |
| 8 | No 100 KC I.F. with selectivity at 8 KC only. | Q402 | Replace Q402. |
| 9 | Insufficient bandwidth; selectivity at .5KC | R421 misadjusted | Adjust R421 for proper bandwidth. |
| 10 | Insufficient bandwidth; selectivity at 2 KC | R441 misadjusted | Adjust R441 for proper bandwidth. |

TABLE 5-2 POWER SUPPLY

Power Supply Circuits

| Step | Symptom | Probable Cause | Remedy |
|------|---|---|--|
| 1 | No + and - 12 volts and -10 volts to bandswitch | F101, T101, C101, CR201, CR202, CR203, CR204 | Replace defective components. |
| 2 | No +12 volts | F103 | Change F-103. |
| 3 | No -12 volts | F102 | Change F-102. |
| 4 | No regulation -10v supply | CR-206 | Change CR-206. |
| 5 | Poor regulation +12v, -12v supplies | CR-103, CR-102. Severely reduced line voltage. | Replace CR-102 and CR-103. Increase line voltage. Change voltage taps on T101. |

TABLE 5-3 LOCAL OSCILLATOR

Local Oscillator Circuits

| Step | Symptom | Probable Cause | Remedy |
|------|----------------------------------|--|-------------------------------|
| 1 | No oscillator output any band | Q906, R938, R937, R936 R226, CR-206 | Replace defective components. |
| 2 | No oscillator output Band 1 only | Q901, R907 | Replace Q901, R907. |
| 3 | No oscillator output Band 2 only | Q902, R913 | Replace Q902, R913. |
| 4 | No oscillator output Band 3 only | Q903, R919 | Replace Q903, R919. |
| 5 | No oscillator output Band 4 only | Q904, R925 | Replace Q904, R925. |
| 6 | No oscillator output Band 5 only | Q905, R931 | Replace Q905, R931. |

TABLE 5-4 AUDIO

Audio Circuits

| Step | Symptom | Probable Cause | Remedy |
|------|---|---|---|
| 1 | 600 ohm output operative speaker and monitor output inoperative. | Q102, Q103, Q202, Q203, Q204, R210, T102, T201. | Replace defective component. |
| 2 | 600 ohm output operative speaker and monitor output weak or distorted. | Q202, Q203, Q204, Q102, Q103 | 1. Replace speaker or headphones. 2. Replace defective components. |
| 3 | Speaker and monitor output normal, 600 ohm output inoperative. | Q307, T302, T303, R340 | Replace defective component. |
| 4 | Speaker and monitor output normal, 600 ohm output weak or distorted. | Q307, Q308, Q309, R339 | 1. Check for proper 600 ohm termination. 2. Replace defective component. |
| 5 | All audio outputs normal, no indication on front panel level meter. | CR-304, CR305. R-349 misadjusted. | Realign R-349. Replace defective component. |
| 6 | Receiver circuitry normal except no audio output from 600 ohm line, monitor, speaker. | Q201 | Replace Q201. |