# LB-1 RF Alignment Procedure

Set Up ::

1. Set up LB-1 RF-Functional tester as shown in Functional Test Block Diagram.

2. Connect power supply to rear of LB-1 RF-Functional tester, the power supply should be set to 8 Volts and OFF (reference Functional Test Block Diagram).

3. Calibrate spectrum analyzer (to be performed once per 8hr/shift minimum). Connect the spectrum analyzer to the radio test set with a 50 Ohm cable.

   3a. Radio Test Set set up ::

   Recall 02, or set up as noted below and save as '02'

   Rx test mode
   Set generator frequency to 170 MHz.
   Set generator level to - 30 dBm
   Set Modulation Frequency to 1 kHz
   Set Modulation Level to 0 Hz.
   Select the 0 - 5 Watt RF port

   3b. Spectrum Analyzer set up (see Figure Four) ::

   Ref. level .....10 dbm, 10dB/div., Input Atten pad 30 dB
   Res. BW.....1 MHz. Time/Div .....Auto
   Span/Div .....20 MHz. Trigger .....Free Run
   Trace A ....Clear/Write, Trace B .....Store/Blank

   Position center frequency to 170 MHz., as shown in Figure Four.

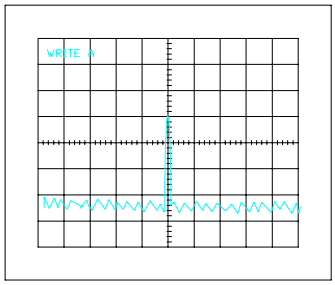



Figure Four: Position the calibration signal marker in the center as shown above. This will center the analyzer at 170 MHz

4. Set the LB-1 RF-Functional tester switches to the following ::

   4a. TEST/PROG - TEST
   TEST - ON
   BRAKE WIRE - OFF
   LOW BATT - OFF
   METER - INT
   STAND BY - ON

5. Press and release RESET button.

6. Radio Test Set set-up ::

Recall 01 or set up as noted below and save as '01'

Select Tx test mode
Press the green Rx - Tx button
Press the orange Frequency button
Enter 169.850 MHz.

| Step | Procedure | Measure Point | Measure Device | Notes |
|---|---|---|---|---|
| | Note :: it may be nessasary to reset the spectrum analyzer reference level, as noted in Section 4b | | | |
| 1 | Place UUT onto LB-1 RF-Functional tester bed of nails (BON), | | | |
| | Connect UUT test cable to 10 dB attenuator, 50 Ohm cable and spectrum analyzer | | | |
| 2 | Turn the power supply ON observe UUT current draw | | AMP Meter | Test current should not exceed 80 mA |
| | NOTE: It may be necessary to stabilize the oscillator by combining steps 3 & 4 and repeating if necessary | | | |
| | Set all variable capacitors to mid point, C11, C17, C20, C27, C29 | | | Reference 'Before Starting' |
| 3 | Tune C11, C17, C20 to maximize the signal level that is aligned in the middle of the display, minimize side band levels | | Spectrum Analyzer | |
| | Change the Ref. scale to 1dB/div., Span to 500kHz. And Res. BW to 3 MHz. Adjust the Ref. Level to center the center aligned signal to the vertical center of the display. | | | |
| 4 | Adjust C27, C29 to maximize the signal level that is aligned in the center of the display. Adjust vertical level as required. | | Spectrum analyzer | |
| | Turn the power supply OFF | | | |

| | | | | |
|---|---|---|---|---|
| | Disconnect the 50 Ohm cable and attenuator from the UUT. Connect the 50 Ohm cable from the radio test set to the UUT. | | | |
| | Turn the power supply ON | | | |
| 5 | Tune C27 and C29 to maximize the output power | Output cable | Radio Test Set, Pwr meter | The output power will be > 45 mW |
| | Note: It may be necessary to re-adjust C11, C17, C20 to fine to the output power. If C11, C17, C20 are changed significantly, return to Step 3 | | | |
| 6 | Tune C27 to set output power | | Radio Test Set | Maintain power: 45 - 50 mW<br>Current: 24 mA max. |
| | Repeat 5 & 6 as required, to ensure specified power and current. Record Power & Current readings on data spreadsheet | | | |
| 7 | Adjust RV1 to set frequency<br><br>** Confirm frequency does not drift | | Radio Test Set | Freq.: 169.850 MHz. ± 300 Hz.<br><br>Drift < 300 Hz. |
| | Change BRAKE WIRE switch to ON | | | Observe a 1 kHz. tone |
| 8 | Adjust RV2 to set FM deviation | | Radio Test Set | Deviation.: 2500 - 3000 Hz. |
| | Change the following switches ::<br>BRAKEWIRE TO OFF<br>LOW BATT to ON<br>STANDBY to OFF<br>TEST/PROG to TEST<br>TEST to OFF | | | |
| | Press and release the RESET switch | | | |
| | Confirm that the UUT transmits a Low Battery tone, after approximately five confidence tones | | | |

Turn power supply OFF, remove UUT from tester.

# LB-1A Final Alignment With Loop Antenna

Solder 'R68' onto Unit Under Test (UUT).
Configure the Final Test Fixture switches as follows:

TEST/PROG - TEST STDBY - ON
BRAKE - OFF

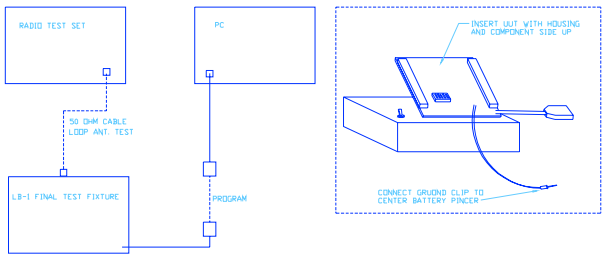
Spectrum Analyzer set up ::

Ref. level .....-10 dBm, 10dB/div., Input Atten 30 dB
Res. BW.....3 MHz.
Span/Div .....20 MHz.
Time/Div .....Auto
Trigger .....Free Run
Trace A ....Clear/Write, Trace B .....Store/Blank
Position center frequency to 170 MHz., as shown in Figure Four.

Radio Test Set set-up ::

Select Tx test mode
Press the green Rx - Tx button
Press the orange Frequency button
Enter 169.850 MHz.

Launch MSDOS on the PC.
Type lb1dtc <Enter>.




Confirm the 9 Volt battery in the LB-1A Final Test Fixture is new.
Place the test housing on the UUT.

| | | | | |
|---|---|---|---|---|
| | Connect Final Test Fixture to the spectrum analyzer with a 50 Ohm cable | | | |
| 1 | Slide UUT with the test housing into Final Test Fixture, observe 'D5' | | Final Test Fixture | Confirm that D5 is ON |
| | Adjust 'C1' to mid-point | | | |
| | Adjust the spectrum analyzer to display received signal in vertical center screen with 1 dB resolution | | Spectrum analyzer | |
| 2 | With objects, hands etc. clear of loop antenna on UUT using tuning tool adjust 'C1' to maximize received signal level | | Spectrum analyzer | Confirm that the measured level is from -10 to +2dbm and the signal level doesn't change more than 1db when the tool is removed |
| | Disconnect the spectrum analyzer and connect the radio test set to the Final Test Fixture | | | |
| 3 | Confirm that Frequency output of UUT is still within specification, adjust RV1 if necessary | | Radio Test Set | Frequency.: 169.850 MHz. $\pm$ 100 Hz. |
| | Enter Frequency onto data sheet | | | |
| | Change the BRAKE switch to ON | | | |
| 4 | Confirm that the FM deviation is still within specification adjust RV2 if nessasary | | | Deviation : 2500 - 3000 Hz. |
| | Enter Modulation onto data sheet | | | |
| | Change the TEST/PROG switch to PROG | | | |
| 5 | Press and release the Reset switch on the LB-1 Final Test Fixture | | | Observe the UUT emits DTMF confidence tones. |
| 6 | Lift the entire test system off the work surface and rotate the system in a circular motion | | | Observe that the UUT emits a motion tone between the confidence tones. |
| 7 | Using a large paperclip press SW1 for one second | | | Observe D5 flashes once and the UUT restarts, as noted in Step 7 |

Remove UUT from the LB-1A Final Test Fixture