SECTION 1 - CALIBRATION

1-1 GENERAL

This section contains calibration procedures for the following assemblies and systems:

<table>
<thead>
<tr>
<th>PARA</th>
<th>TITLE</th>
<th>PAGE</th>
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</thead>
<tbody>
<tr>
<td>1-8-1</td>
<td>POWER SUPPLY CALIBRATION</td>
<td>1-5</td>
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<tr>
<td>1-8-2</td>
<td>TCXO/OCXO CALIBRATION</td>
<td>1.7</td>
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<tr>
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<td>DVM CALIBRATION</td>
<td>1.9</td>
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<tr>
<td>1-8-4</td>
<td>GENERATOR OUTPUT LEVEL CALIBRATION</td>
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<td>DISTORTION METER CALIBRATION</td>
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<td>1-8-6</td>
<td>SINAD METER CALIBRATION</td>
<td>1.16</td>
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<tr>
<td>1-8-7</td>
<td>RF GENERATE FM DEVIATION CALIBRATION</td>
<td>1.18</td>
</tr>
<tr>
<td>1-8-8</td>
<td>RF GENERATE PM DEVIATION CALIBRATION</td>
<td>1.21</td>
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<tr>
<td>1-8-9</td>
<td>RF GENERATE AM MODULATION CALIBRATION</td>
<td>1.23</td>
</tr>
<tr>
<td>1-8-10</td>
<td>RF GENERATE EXTERNAL MODULATION CALIBRATION</td>
<td>1.25</td>
</tr>
<tr>
<td>1-8-11</td>
<td>SPECTRUM ANALYZER CALIBRATION</td>
<td>1.29</td>
</tr>
<tr>
<td>1-8-12</td>
<td>MIXER NULL CALIBRATION</td>
<td>1.36</td>
</tr>
<tr>
<td>1-8-13</td>
<td>FM DEVIATION METER CALIBRATION</td>
<td>1.38</td>
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<tr>
<td>1-8-14</td>
<td>PM DEVIATION METER CALIBRATION</td>
<td>1.41</td>
</tr>
<tr>
<td>1-8-15</td>
<td>AM MODULATION METER CALIBRATION</td>
<td>1.43</td>
</tr>
<tr>
<td>1-8-16</td>
<td>POWER METER CALIBRATION</td>
<td>1.45</td>
</tr>
</tbody>
</table>

These procedures should be performed as a result of one or more of the following conditions:

- If, during the course of normal operation, the COM-120B or any major function thereof fails to meet the performance specifications.
- If a module is found to be defective and requires replacement.
- If the recommended 12 month calibration interval is due.

Figure 1-1 lists the calibration procedures required based on the replacement of a specific module. All procedures must be performed for the annual calibration.

1-1-1 SAFETY PRECAUTIONS

As with any piece of electronic equipment, extreme caution should be taken when working with "live" circuits. When performing the calibration procedures in this section, be sure to observe the following precautions:

**WARNING:** REMOVE ALL JEWELRY BEFORE PERFORMING ANY CALIBRATION PROCEDURES INVOLVING LIVE CIRCUITS.

HEED ALL WARNINGS AND CAUTIONS CONCERNING MAXIMUM VOLTAGES AND POWER INPUTS.
1-1-2 ESD PRECAUTIONS

CAUTION: THESE CALIBRATION PROCEDURES SHOULD ONLY BE PERFORMED IN AN ESD ENVIRONMENT AND ALL PERSONNEL PERFORMING THESE PROCEDURES SHOULD KNOW ACCEPTED ESD PRACTICES OR BE ESD CERTIFIED.

1-2 TEST EQUIPMENT REQUIREMENTS

Table 1-1 contains a comprehensive list of test equipment suitable for performing any of the procedures listed in this manual. Any other equipment meeting the specifications listed in Table 1-1 may be substituted in place of the recommended models.

NOTE: For certain procedures contained in this manual, the equipment listed in Appendix A may exceed the minimum required specifications.

1-3 DISASSEMBLY REQUIREMENTS

To perform the calibration procedures, the case assembly must be removed.

1-4 CALIBRATION ADJUSTMENTS

Before making adjustments, always observe the measurement. If the measurement is within the tolerances given, do not proceed with the adjustment. When an adjustment is required, attempt to obtain a precise measurement, instead of just within tolerance.

1-5 CONTROLS, CONNECTORS AND INDICATORS

The front and rear panel controls, connectors and indicators specified in the calibration procedures are followed by an item number. Refer to Figures 3-1 and 3-2 in the COM-120B Operation Manual for the location of these items.

1-6 COMPLETION OF CALIBRATION TEST PROCEDURES

Upon completion of a specific calibration procedure, the calibration procedure may be terminated. Control settings, operating commands and test equipment do not carry over from one procedure to another and are not assumed at the beginning of a procedure.

1-7 CALIBRATION RECORD

A Calibration Record is provided for recording the results obtained while performing the Calibration Procedures. It is recommended the technician reproduce the Calibration Record, rather than use the copy in this manual.
<table>
<thead>
<tr>
<th>Type</th>
<th>Model</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Multimeter (DMM)</td>
<td>HP34401A or equivalent</td>
<td>Frequency Range: 20 Hz to 20 kHz, Accuracy ±0.1 dB</td>
</tr>
<tr>
<td>Calibrator</td>
<td>Fluke 5100B or equivalent</td>
<td></td>
</tr>
<tr>
<td>Audio Analyzer</td>
<td>HP8903B or equivalent</td>
<td>Frequency: 10 Hz to 1.3 GHz, Resolution: ≥7 digits</td>
</tr>
<tr>
<td>Frequency Counter</td>
<td>Phillips PM6689 or equivalent</td>
<td></td>
</tr>
<tr>
<td>Measuring Receiver</td>
<td>HP8902A (opt. 30, 32, 37) or equivalent</td>
<td>RF Power: -20 to +30 dBm, RF Power Range: ≤-1 to 1 GHz, RF Level: Tuned 0 to -127 dBm, RF Power Accuracy: ±0.1 dB</td>
</tr>
<tr>
<td>Measuring Receiver Sensor</td>
<td>HP11722A or equivalent</td>
<td></td>
</tr>
<tr>
<td>Modulation Analyzer</td>
<td>HP8901A or equivalent</td>
<td>FM Meter Range: 20 Hz to 200 kHz, FM Meter Accuracy: ±1% ±1 digit, Phase Meter Range: to 200 Radians, Phase Meter Accuracy: ±3% ±1 digit</td>
</tr>
<tr>
<td>10 MHz Standard</td>
<td></td>
<td>Accuracy: ≤2 x 10^-9 (Traceable to NIST)</td>
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<tr>
<td>COM-120 Maintenance Kit</td>
<td>P/N 7001-8743-800</td>
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<tr>
<td>Signal Generator</td>
<td>HP8657A or equivalent</td>
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</tr>
<tr>
<td>10 W RF Amplifier</td>
<td>Amplifier Research 10W1000 or equivalent</td>
<td>Gain: 40 dB Nominal, Bandwidth: 1 MHz to 1 GHz</td>
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<tr>
<td>200 W RF Amplifier</td>
<td>ENI 5100L or equivalent</td>
<td>Gain: 50 dB Nominal, Bandwidth: 1.5 to 150 MHz</td>
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</tbody>
</table>

Table 1-1 Test Equipment Requirements
<table>
<thead>
<tr>
<th>Component</th>
<th>1-8-1</th>
<th>1-8-2</th>
<th>1-8-3</th>
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<th>1-8-14</th>
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<tr>
<td>Power Supply Calibration</td>
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<td>DVM Calibration</td>
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<td>Mixer Null Deviation Meter</td>
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<td>FM Deviation Meter Calibration</td>
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<td>PM Deviation Meter Calibration</td>
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<td>AM Deviation Meter Calibration</td>
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<tr>
<td>Power Meter Calibration</td>
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</tbody>
</table>

Figure 1-1  Module Replacement and Calibration Requirements
1-8 CALIBRATION PROCEDURES

1-8-1 POWER SUPPLY CALIBRATION

PREREQUISITES: NONE

EQUIPMENT REQUIRED: 1 DIGITAL MULTIMETER (DMM)

FIGURES: 1-2

STFP PROCEDURE

1. Apply Power to COM-120B. Allow 30 minute warm-up period.

2. Verify Voltages at Motherboard Connector 87A6J10 per Table 1-2 using DMM. Refer to Figure 1-2 for pin locations. Use Chassis for ground.

<table>
<thead>
<tr>
<th>Supply</th>
<th>Voltage</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>+13 V</td>
<td>+13 Vdc (±0.25 V)</td>
<td>87A6J10 PIN 1,13</td>
</tr>
<tr>
<td>+35 V</td>
<td>+35 Vdc (±1 V)</td>
<td>87A6J10 PIN 2,14</td>
</tr>
<tr>
<td>-10.5 V</td>
<td>-10.5 Vdc (±0.5 V)</td>
<td>87A6J10 PIN 3,15</td>
</tr>
<tr>
<td>+10.5 V</td>
<td>+10.5 Vdc (±0.25 V)</td>
<td>87A6J10 PIN 4,16</td>
</tr>
<tr>
<td>+5 V Analog</td>
<td>+5 Vdc (+0.2 V/-0.0 V)</td>
<td>87A6J10 PIN 5,17</td>
</tr>
<tr>
<td>+5 V Digital</td>
<td>+5 Vdc (+0.2 V/-0.0 V)</td>
<td>87A6J10 PIN 7,19</td>
</tr>
<tr>
<td>+12 V EL</td>
<td>+12 Vdc (±0.25 V)</td>
<td>87A6J10 PIN 9,21</td>
</tr>
</tbody>
</table>

Table 1-2 Power Supply Voltages and Locations

3. Set COM-120B to OFF and disconnect test equipment.
Figure 1-2 Power Supply Voltage Locations (87A6J10)
1-8-2 TCXO/OCXO CALIBRATION

PREREQUISITES: 1-8-1 POWER SUPPLY CALIBRATION

EQUIPMENT REQUIRED: 1 FREQUENCY COUNTER

FIGURES: 1-3

STEP PROCEDURE

1. Apply Power to COM-120B. Allow 5 minute warm-up period.

2. Connect Frequency Counter to AUX RF OUT Connector (13).

3. Press GEN Test Mode Key (3) to access RF Generate Operation Screen.

4. Set RF Field to 998.0000 MHz.

5. Set Output to AUX and Output Level to -13 dBm.

6. Set all Modulation Sources to OFF.

7. If OCXO is installed, go to Step 10.

8. Verify Frequency Counter reads 998.0000 (±199.6 Hz). Adjust 87A16A1R1 as required (Figure 1-3).

9. Set COM-120B Power to OFF and disconnect test equipment.

10. If OCXO is installed, verify Frequency Counter reads 998.0000 (±10 Hz). If not, go to Step 12.

11. Set COM-120B Power to OFF and disconnect test equipment.

12. Remove Protected Screw from OCXO to access adjustment. Adjust OCXO until Frequency Counter reads 998.0000 (±10 Hz).

13. Replace Protected Screw, set COM-120B Power to OFF and disconnect test equipment.
Figure 1-3 TCXO/OCXO Adjustments
1-8-3 DVM CALIBRATION

PREREQUISITES: 1-8-1 POWER SUPPLY CALIBRATION

EQUIPMENT REQUIRED: 1 CALIBRATOR

FIGURES: NONE

STEP PROCEDURE

1. Apply Power to COM-120B. Allow 5 minute warm-up period.

2. Connect Calibrator to SCOPE/DVM Connector (20).

3. Press MTRS Instruments Key (4).


5. Set Peak Hold to OFF.

6. Set Average to OFF.

7. Set Source to SC/DVM AC.

8. Set Meter Reading Units to Vrms.

9. Set Range as shown in Table 1-3. For each Range setting, set Calibrator for stated input. Verify Meter Reading matches input within specified tolerance. If not, go to Step 13.

<table>
<thead>
<tr>
<th>Range</th>
<th>Calibrator Input</th>
<th>Frequency</th>
<th>Reading Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 V</td>
<td>190 Vrms</td>
<td>50 Hz</td>
<td>±10.1 V</td>
</tr>
<tr>
<td>20 V</td>
<td>19 Vrms</td>
<td>1 kHz</td>
<td>±1.02 V</td>
</tr>
<tr>
<td>2 V</td>
<td>1.9 Vrms</td>
<td>20 kHz</td>
<td>±106 mV</td>
</tr>
</tbody>
</table>

Table 1-3 SC/DVM AC Range Settings

10. Set Source to SC/DVM DC.

11. Set Range as shown in Table 1-4. For each Range setting, set Calibrator for stated input. Verify Meter Reading matches input within specified tolerance. If not, go to Step 13.

<table>
<thead>
<tr>
<th>Range</th>
<th>Calibrator Input</th>
<th>Reading Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 V</td>
<td>190 Vdc</td>
<td>±10.1 V</td>
</tr>
<tr>
<td>20 V</td>
<td>19 Vdc</td>
<td>±1.02 V</td>
</tr>
<tr>
<td>2 V</td>
<td>1.9 Vdc</td>
<td>±106 mV</td>
</tr>
</tbody>
</table>

Table 1-4 SC/DVM DC Range Settings
12. Set COM-120B to OFF and disconnect test equipment.

PERFORM THE FOLLOWING ONLY WHEN REQUIRED.

13. Press SETUP MEMORY Key (21).
16. Select "1. DVM" to access DVM METER CALIBRATION Screen.
17. Move cursor to AC RANGE X1.
18. Set Calibrator to 1.000 Vrms at 60 Hz.
19. Press ENTER Key twice and wait until current Field displays CALIBRATED.
20. Move cursor to AC RANGE X10.
21. Set Calibrator to 10.00 Vrms at 60 Hz.
22. Press ENTER Key twice and wait until current Field displays CALIBRATED.
23. Move cursor to AC RANGE X100.
24. Set Calibrator to 100.0 Vrms at 60 Hz.
25. Press ENTER Key twice and wait until current Field displays CALIBRATED.
26. Move cursor to DC RANGE X1.
27. Set Calibrator to 2.000 Vdc.
28. Press ENTER Key twice and wait until current Field displays CALIBRATED.
30. Press MTRS Instruments Key (4).
31. Select "3. DVM" on Meters Menu.
32. Proceed at Step 7.
1-8-4 GENERATOR OUTPUT LEVEL CALIBRATION

PREREQUISITES: 1-8-1 POWER SUPPLY CALIBRATION

EQUIPMENT REQUIRED: 1 MEASURING RECEIVER

FIGURES: NONE

STEP PROCEDURE

1. Apply Power to COM 120B. Allow 5 minute warm up period.
2. Press GEN Tes: Mode Key (3) to access RF Generate Operation Screen.
3. Set RF Field to 405.5000 MHz.
4. Set all Modulation Sources to OFF.
7. Set Output Level to -90 dBm. Verify Measuring Receiver reads -90 dBm (±2 dB). If not, go to Step 14.
8. Set Output Level to -130 dBm. Verify Measuring Receiver reads -130 dBm (±2.5 dB). If not, go to Step 14.
9. Set Output to AUX and connect Measuring Receiver to AUX RF OUT Connector (13).
10. Set Output Level to -20 dBm. Verify Measuring Receiver reads -20 dBm (±2 dB). If not, go to Step 14.
12. Set Output Level to -130 dBm. Verify Measuring Receiver reads -130 dBm (±2.5 dB). If not, go to Step 14.
13. Set COM-120B to OFF and disconnect test equipment.

PERFORM THE FOLLOWING ONLY WHEN REQUIRED.

14. Press SETUP MEMORY Key (21).
17. Select “6. RF GENERATOR - OUTPUT LEVEL” to access RF GENERATOR LEVEL CALIBRATION Screen.
18. Press LEVEL Soft Function Key F2, if displayed.


20. Move cursor to -20 dBm Field. Press ENTER Key to access Data Field.

21. Edit Data Field using DATA SCROLL Keys (17) for Measuring Receiver reading closest to -20 dBm.

22. Press ENTER Key and wait until -20 dBm Field displays CALIBRATED.

23. Move cursor to -22 dBm Field. Press ENTER Key to access Data Field.

24. Edit Data Field using DATA SCROLL Keys (17) for Measuring Receiver reading closest to -22 dBm.

25. Press ENTER Key and wait until -22 dBm Field displays CALIBRATED.

26. Move cursor to -24 dBm Field. Press ENTER Key to access Data Field.

27. Edit Data Field using DATA SCROLL Keys (17) for Measuring Receiver reading closest to -24 dBm.

28. Press ENTER Key and wait until -24 dBm Field displays CALIBRATED.

29. Move cursor to -26 dBm Field. Press ENTER Key to access Data Field.

30. Edit Data Field using DATA SCROLL Keys (17) for Measuring Receiver reading closest to -26 dBm.

31. Press ENTER Key and wait until -26 dBm Field displays CALIBRATED.

32. Move cursor to -28 dBm Field. Press ENTER Key to access Data Field.

33. Edit Data Field using DATA SCROLL Keys (17) for Measuring Receiver reading closest to -28 dBm.

34. Press ENTER Key and wait until -28 dBm Field displays CALIBRATED.

35. Move cursor to -29.9 dBm Field. Press ENTER Key to access Data Field.

36. Edit Data Field using DATA SCROLL Keys (17) for Measuring Receiver reading closest to -29.9 dBm.

37. Press ENTER Key and wait until -29.9 dBm Field displays CALIBRATED.

39. Access each Data Field for frequencies 0.2500 to 999.9999 MHz. For each Data Field, perform following:
   - Press ENTER Key to access Data Field.
   - Edit Data Field using DATA SCROLL Keys (17) for Measuring Receiver reading closest to -20 dBm.
   - Press ENTER Key and wait until current Field displays **CALIBRATED**.
   - Continue with next Field.


41. Connect Measuring Receiver to AUX RF OUT Connector (13).

42. Access each Data Field for frequencies 0.2500 to 999.9999 MHz. For each Data Field, perform following:
   - Press ENTER Key to access Data Field.
   - Edit Data Field using DATA SCROLL Keys (17) for Measuring Receiver reading closest to -13 dBm.
   - Press ENTER Key and wait until current Field displays **CALIBRATED**.
   - Continue with next Field.

43. If Optional Amplifier is installed, press AUX AMP Soft Function Key F5.

44. Access each Data Field for frequencies 0.2500 to 999.9999 MHz. For each Data Field, perform following:
   - Press ENTER Key to access Data Field.
   - Edit Data Field using DATA SCROLL Keys (17) for Measuring Receiver reading closest to 0.0 dBm.
   - Press ENTER Key and wait until current Field displays **CALIBRATED**.
   - Continue with next Field.


46. Press GEN Test Mode Key (3).

47. Continue at Step 2.
1-8-5 DISTORTION METER CALIBRATION

PREREQUISITES: 1-8-1 POWER SUPPLY CALIBRATION

EQUIPMENT REQUIRED: 1 AUDIO ANALYZER

FIGURES: 1-4

![Diagram](image)

Figure 1-4 Distortion/SINAD Meter Test Equipment Setup

<table>
<thead>
<tr>
<th>STEP</th>
<th>PROCEDURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Apply Power to COM-120B. Allow 5 minute warm-up period.</td>
</tr>
<tr>
<td>2.</td>
<td>Connect Test Equipment as shown in Figure 1-4.</td>
</tr>
<tr>
<td>3.</td>
<td>Press AUDIO GEN Instruments Key (4).</td>
</tr>
<tr>
<td>4.</td>
<td>Set Audio Generator 2 to <strong>ON</strong>.</td>
</tr>
<tr>
<td>5.</td>
<td>If Optional Audio Generator 2 is installed, set Tone Frequency for <strong>1000.0 Hz</strong> and Shape to <strong>SINE</strong>.</td>
</tr>
<tr>
<td>6.</td>
<td>Set Audio Generator 2 Level for <strong>1.41 Vp</strong>.</td>
</tr>
<tr>
<td>7.</td>
<td>Set Audio Generator 1 to <strong>ON</strong>.</td>
</tr>
<tr>
<td>8.</td>
<td>Set Audio Generator 1 Format to <strong>TONE</strong>.</td>
</tr>
<tr>
<td>9.</td>
<td>Set Audio Generator 1 Tone Frequency to <strong>2800.0 Hz</strong>.</td>
</tr>
<tr>
<td>10.</td>
<td>Set Audio Generator 1 Shape to <strong>SINE</strong>.</td>
</tr>
<tr>
<td>11.</td>
<td>Set Audio Generator 1 Level to <strong>0.14 Vp</strong>.</td>
</tr>
<tr>
<td>12.</td>
<td>Set Audio Generator 1 Mode to <strong>CONT</strong>.</td>
</tr>
</tbody>
</table>
13. Set Audio Analyzer to measure Distortion with all filters off.
14. Verify Audio Analyzer reads approximately 10% Distortion.
15. Press MTRS Instruments Key (4).
17. Set Distortion Meter Source to AUDIO/DATA-IN.
18. Set Peak Hold to OFF.
19. Set Average to OFF.
20. Set Low-Pass Filter to 20 kHz.
21. Verify Distortion Meter Reading matches Audio Analyzer (±0.6%). If not, go to Step 23.
22. Set COM-120B Power to OFF and disconnect test equipment.

**PERFORM THE FOLLOWING ONLY WHEN REQUIRED.**

23. Set Audio Generator 2 for 1.41 Vp.
24. Set Audio Generator 1 for 0.14 Vp.
25. Press SETUP MEMORY Key (21).
28. Select “2. DISTORTION METER” to access DISTORTION METER CALIBRATION Screen.
29. Enter Audio Analyzer Reading using DATA ENTRY Keys (5). Press ENTER Key.
30. Go to Step 15.
1-8-6 SINAD METER CALIBRATION

PREREQUISITES: 1-8-1 POWER SUPPLY CALIBRATION

EQUIPMENT REQUIRED: 1 AUDIO ANALYZER

FIGURES: 1-4

STEP PROCEDURE

1. Apply Power to COM-120B. Allow 5 minute warm-up period.
2. Connect Test Equipment as shown in Figure 1-4.
3. Press AUDIO GEN Instruments Key (4).
4. Set Audio Generator 2 to ON.
5. If Optional Audio Generator 2 is installed, set Tone Frequency for 1000.0 Hz and Shape to SINE.
6. Set Audio Generator 2 Level for 1.41 Vp.
7. Set Audio Generator 1 to ON.
8. Set Audio Generator 1 Format to TONE.
9. Set Audio Generator 1 Tone Frequency to 2800.0 Hz.
10. Set Audio Generator 1 Shape to SINE.
11. Set Audio Generator 1 Level to 0.14 Vp.
12. Set Audio Generator 1 Mode to CONT.
13. Set Audio Analyzer tc measure SINAD with filters off.
14. Verify Audio Analyzer reads approximately 20 dB SINAD.
15. Press MTRS Instruments Key (4).
17. Set SINAD Meter Source to AUDIO/DATA-IN.
18. Set Peak Hold to OFF.
19. Set Average to OFF.
20. Set Low-Pass Filter to 20 kHz.
21. Verify SINAD Meter Reading matches Audio Analyzer (±1.1 dB). If not, go to Step 23.
22. Set COM-120B Power to OFF and disconnect test equipment.
PERFORM THE FOLLOWING ONLY WHEN REQUIRED.

23. Set Audio Generator 2 for 1.41 Vp.
24. Set Audio Generator 1 for 0.14 Vp.
25. Press SETUP MEMORY Key (21).
28. Select "3. SINAD METER" to access SINAD METER CALIBRATION Screen.
29. Enter Audio Analyzer Reading using Data Entry Keys (5). Press ENTER Key.
30. Go to Step 15.
1-8-7 RF GENERATE FM DEVIATION CALIBRATION

PREREQUISITES: 1-8-1 POWER SUPPLY CALIBRATION

EQUIPMENT REQUIRED: 1 MODULATION ANALYZER

FIGURES: NONE

STEP PROCEDURE

1. Apply Power to COM-120B. Allow 5 minute warm-up period.

2. Connect T/R Connector (12) to Modulation Analyzer Input.

3. Press GEN Test Mode Key (3) to access RF Generate Operation Screen.

4. Set RF Field to 101.0000 MHz.

5. Set Output to T/R and Output Level to -20.0 dBm.

6. Set All Modulation Sources to OFF.


8. Set GEN1 Modulation Type for FM.

9. Set Deviation for 10.0 kHz.


11. Set Tone Freq for 10.0 Hz.

12. Set Shape to SINE.

13. Verify Modulation Analyzer reads 10 kHz Deviation (±600 Hz + residual [Step 7]). If not, go to Step 45.


15. Set GEN1 Modulation Type to OFF. Record Residual on Modulation Analyzer.

16. Set GEN1 Modulation Type to FM.

17. Set Tone Freq to 1000.0 Hz.

18. Verify Modulation Analyzer reads 10 kHz Deviation (±600 Hz + residual [Step 15]). If not, go to Step 45.

19. Set Modulation Analyzer Low-Pass Filter to 20 kHz.

20. Set GEN1 Modulation Type to OFF. Record Residual on Modulation Analyzer.

21. Set GEN1 Modulation Type to FM.
22. Set Tone Freq to **10000.0 Hz**.

23. Verify Modulation Analyzer reads 10 kHz Deviation (±600 Hz + residual [Step 20]). If not, go to Step 45.

24. Set Tone Freq to **15000.0 Hz**.

25. Verify Modulation Analyzer reads 10 kHz Deviation (±600 Hz + residual [Step 20]). If not, go to Step 45.

26. Set Modulation Analyzer High-Pass Filter to NONE and Low-Pass Filter to 3 kHz.

27. Set GEN1 Modulation Type to **OFF**. Record Residual on Modulation Analyzer.

28. Set GEN1 Modulation Type to **FM**.

29. Set Tone Freq to **10.0 Hz**.

30. Set Deviation for **100.0 kHz**.

31. Verify Modulation Analyzer reads 100 kHz Deviation (±5.5 kHz + residual [Step 27]). If not, go to Step 45.

32. Set Modulation Analyzer High-Pass Filter to 300 Hz.

33. Set GEN1 Modulation Type to **OFF**. Record Residual on Modulation Analyzer.

34. Set GEN1 Modulation Type to **FM**.

35. Set Tone Freq to **1000.0 Hz**.

36. Verify Modulation Analyzer reads 100 kHz Deviation (±5.5 kHz + residual [Step 33]). If not, go to Step 45.

37. Set Modulation Analyzer Low-Pass Filter to 20 kHz.

38. Set GEN1 Modulation Type to **OFF**. Record Residual on Modulation Analyzer.

39. Set GEN1 Modulation Type to **FM**.

40. Set Tone Freq to **10 kHz**.

41. Verify Modulation Analyzer reads 100 kHz Deviation (±5.5 kHz + residual [Step 38]). If not, go to Step 45.

42. Set Tone Freq to **15000.0 Hz**.

43. Verify Modulation Analyzer reads 100 kHz Deviation (±5.5 kHz + residual [Step 38]). If not, go to Step 45.

44. Set COM-120B power to OFF and disconnect test equipment.
PERFORM THE FOLLOWING ONLY WHEN REQUIRED.

45. Set Modulation Analyzer for 300 Hz High-Pass Filter and 3 kHz Low-Pass Filter.

46. Press SETUP MEMORY Key (21).

47. Select “1. Calibration” from Setup Screen.


49. Select “7. RF GENERATOR - FM DEVIATION” to access RF GENERATOR - FM DEVIATION CALIBRATION Screen.

50. With cursor on “FM DEVIATION 50 kHz,” press ENTER Key.

51. Edit Data Field using DATA SCROLL Keys (17) for Modulation Analyzer reading closest to 50 kHz Deviation.

52. Press ENTER Key and wait until Field displays CALIBRATED.

53. With cursor on “FM DEVIATION 15 kHz,” press ENTER Key.

54. Edit Data Field using DATA SCROLL Keys (17) for Modulation Analyzer reading closest to 15 kHz Deviation.

55. Press ENTER Key and wait until Field displays CALIBRATED.

56. With cursor on “FM DEVIATION 10 kHz,” press ENTER Key.

57. Edit Data Field using DATA SCROLL Keys (17) for Modulation Analyzer reading closest to 10 kHz Deviation.

58. Press ENTER Key and wait until Field displays CALIBRATED.

59. With cursor on “FM DEVIATION 1 kHz,” press ENTER Key.

60. Edit Data Field using DATA SCROLL Keys (17) for Modulation Analyzer reading closest to 1 kHz Deviation.

61. Press ENTER Key and wait until Field displays CALIBRATED.

62. Repeat steps 50 through 61 then go to Step 63.

63. Press RETURN Soft Function Key F6 to return to Calibration Screen. Go to Step 3.
1-8-8  RF GENERATE PM DEVIATION CALIBRATION

PREREQUISITES:  1-8-1  POWER SUPPLY CALIBRATION

EQUIPMENT REQUIRED:  1  MODULATION ANALYZER

FIGURES:  NONE

STEP    PROCEDURE

1. Apply Power to COM-120B. Allow 5 minute warm-up period.
2. Connect T/R Connector (12) to Modulation Analyzer Input.
3. Press GEN Test Mode Key (3) to access RF Generate Operation Screen.
4. Set RF Field to 101.0000 MHz.
5. Set Output to T/R and Output Level to -20.0 dBm.
6. Set All Modulation Sources to OFF.
8. Set GEN1 Modulation Type for PM.
9. Set Deviation for 8.0 Rad.
11. Set Tone Freq for 5000.0 Hz.
12. Set Shape to SINE.
13. Verify Modulation Analyzer reads 8 Radians Deviation (±0.5 Radians + residual [Step 7]). If not, go to Step 15.
14. Set COM-120B power to OFF and disconnect test equipment.

PERFORM THE FOLLOWING ONLY WHEN REQUIRED.

15. Press SETUP MEMORY Key (21).
18. Set Modulation Analyzer for 300 Hz High-Pass Filter and 3 kHz Low-Pass Filter.
19. Select "8. RF GENERATOR - PM DEVIATION" to access RF GENERATOR - PM DEVIATION CALIBRATION Screen.

21. Edit Data Field using DATA SCROLL Keys (17) for Modulation Analyzer reading closest to 15 Radians.

22. Press ENTER Key and wait until Field displays CALIBRATED.

23. With cursor on "PM DEVIATION 10 RAD," press ENTER Key.

24. Edit Data Field using DATA SCROLL Keys (17) for Modulation Analyzer reading closest to 10 Radians.

25. Press ENTER Key and wait until Field displays CALIBRATED.

26. With cursor on "PM DEVIATION 1 RAD," press ENTER Key.

27. Edit Data Field using DATA SCROLL Keys (17) for Modulation Analyzer reading closest to 1 Radian.

28. Press ENTER Key and wait until Field displays CALIBRATED.

29. Press RETURN Soft Function Key F6 to return to Calibration Screen. Go to Step 3.
1-8-9 RF GENERATE AM MODULATION CALIBRATION

PREREQUISITES:  1-8-1 POWER SUPPLY CALIBRATION

EQUIPMENT REQUIRED:  1 MODULATION ANALYZER

FIGURES:  NONE

STEP  PROCEDURE

1. Apply Power to COM 120B. Allow 5 minute warm up period.

2. Connect T/R Connector (12) to Modulation Analyzer Input.

3. Press GEN Test Mode Key (3) to access RF Generate Operation Screen.

4. Set RF Field to 101.0000 MHz.

5. Set Output to T/R and Output Level to -20 dBm.

6. Set All Modulation Sources to OFF.


8. Set GEN1 Modulation Type for AM.

9. Set Modulation for 30%.


11. Set Tone Freq for 1000.0 Hz.

12. Set Shape to SINE.

13. Verify Modulation Analyzer reads 30% Modulation (±6% + residual [Step 7]). If not, go to Step 21.

14. Set Modulation to 50%.

15. Verify Modulation Analyzer reads 50% Modulation (±6% + residual [Step 7]). If not, go to Step 21.

16. Set Modulation to 70%.

17. Verify Modulation Analyzer reads 70% Modulation (±6% + residual [Step 7]). If not, go to Step 21.

18. Set Modulation to 90%.

19. Verify Modulation Analyzer reads 90% Modulation (±6% + residual [Step 7]). If not, go to Step 21.
20. Set COM-120B power to OFF and disconnect test equipment.

PERFORM THE FOLLOWING ONLY WHEN REQUIRED.

21. Set Modulation Analyzer for 300 Hz High-Pass Filter and 3 kHz Low-Pass Filter.

22. Press SETUP MEMORY Key (21).


25. Select “9. RF GENERATOR - AM MODULATION” to access RF GENERATOR - AM MODULATION CALIBRATION Screen.

26. Press ENTER Key. Edit Data Field using DATA SCROLL Keys (17) for Modulation Analyzer reading closest to 70% Modulation.

27. Press ENTER Key and wait until Field displays CALIBRATED.

28. Press RETURN Soft Function Key F6 to return to Calibration Screen. Go to Step 3.
1-8-10 RF GENERATE EXTERNAL MODULATION CALIBRATION

PREREQUISITES: 1-8-1 POWER SUPPLY CALIBRATION
1-8-7 RF GENERATE FM DEVIATION CALIBRATION
1-8-8 RF GENERATE PM DEVIATION CALIBRATION
1-8-9 RF GENERATE AM MODULATION CALIBRATION

EQUIPMENT REQUIRED: 1 AUDIO ANALYZER
1 MODULATION ANALYZER

FIGURES: 1-5

Figure 1-5 External Modulation Calibration Setup

STEP PROCEDURE

1. Apply Power to COM-120B. Allow 5 minute warm-up period.
2. Connect Test Equipment as shown in Figure 1-5.
3. Press GEN Test Mode Key (3) to access RF Generate Operation Screen.
4. Set RF Field to 101.0000 MHz.
5. Set Output to T/R and Output Level to -20 dBm.
6. Set All Modulation Sources to OFF.
7. Set Modulation Analyzer for 3 kHz Low-Pass Filter, 300 Hz High-Pass Filter, Peak+ and AM Measurement.
8. Set EXT Modulation Type for AM.
9. Set Audio Analyzer for 1 kHz tone at approximately 5.657 Vrms output. Adjust Audio Analyzer for Modulation Analyzer reading of 80%.
10. Verify COM-120B Modulation Reading is 80% (±10%). If not, go to Step 32.


12. Set Deviation Range for **NAR 1**.


14. Verify COM-120B Modulation Reading is 16 kHz (±1.6 kHz). If not, go to Step 32.

15. Set Deviation Range for **NAR 2**.

16. Adjust Audio Analyzer for Modulation Analyzer reading of 8 kHz.

17. Verify COM-120B Modulation Reading is 8 kHz (±0.8 kHz). If not, go to Step 32.

18. Set Deviation Range for **NAR 3**.

19. Adjust Audio Analyzer for Modulation Analyzer reading of 1.55 kHz.

20. Verify COM-120B Modulation Reading is 1.55 kHz (±0.155 kHz). If not, go to Step 32.

21. Set Deviation Range for **WIDE**.

22. Adjust Audio Analyzer for Modulation Analyzer reading of 80 kHz.

23. Verify COM-120B Modulation Reading is 80 kHz (±8 kHz). If not, go to Step 32.

24. Set EXT Modulation Type for **PM**. Set Modulation Analyzer for PM Measurement.

25. Set Deviation Range for **NAR 1**.

26. Verify COM-120B Modulation Reading is 16 Radians (±1.6 Radians). If not, go to Step 32.

27. Set Deviation Range for **NAR 2**.

28. Verify COM-120B Modulation Reading is 8 Radians (±0.8 Radians). If not, go to Step 32.

29. Set Deviation Range for **NAR 3**.

30. Verify COM-120B Modulation Reading is 1.55 Radians (±0.155 Radians). If not, go to Step 32.

31. Set COM-120B power to OFF and disconnect test equipment.

**PERFORM THE FOLLOWING ONLY WHEN REQUIRED.**

32. Press SETUP MEMORY Key (21).


35. Select "10. RF GENERATOR - EXTERNAL MODULATION" and press ENTER to access EXTERNAL MODULATION CALIBRATION SCREEN.

36. Cursor to EXTERNAL MODULATION Field and press ENTER.

37. Scroll to AM. Press ENTER.

38. Set Audio Analyzer 1 kHz tone to approximately 5.8 Vrms for 80% Modulation on the Modulation Analyzer. Adjust Audio Analyzer output as required.

39. Cursor to MEASURED MODULATION Field and press ENTER.

40. Use DATA ENTRY Keypad to enter Modulation Analyzer reading.

41. Press ENTER Key and wait until Field displays CALIBRATED.

42. Cursor to EXTERNAL MODULATION Field and press ENTER.

43. Scroll to FM NARR 1. Press ENTER.

44. Set Audio Analyzer 1 kHz tone to approximately 5.45 Vrms for 15 kHz Deviation on the Modulation Analyzer. Adjust Audio Analyzer output as required.

45. Cursor to MEASURED DEVIATION Field and press ENTER.

46. Use DATA ENTRY Keypad to enter Modulation Analyzer reading.

47. Press ENTER Key and wait until Field displays CALIBRATED.

48. Repeat Steps 43 through 47 for the remaining FM calibrations using this table as a guide:

<table>
<thead>
<tr>
<th>External Modulation</th>
<th>Deviation Range (kHz)</th>
<th>Audio Analyzer (=Vrms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FM NARR 2</td>
<td>10</td>
<td>7.20</td>
</tr>
<tr>
<td>FM NARR 3</td>
<td>1</td>
<td>3.63</td>
</tr>
<tr>
<td>FM WIDE</td>
<td>50</td>
<td>3.66</td>
</tr>
</tbody>
</table>

49. Cursor to EXTERNAL MODULATION Field and press ENTER.

50. Scroll to PM NARR 1. Press ENTER.

51. Set Audio Analyzer 1 kHz tone to approximately 5.45 Vrms for 15 Rad Deviation on the Modulation Analyzer. Adjust Audio Analyzer output as required.
52. Cursor to MEASURED DEVIATION Field and press ENTER.

53. Use DATA ENTRY Keypad to enter Modulation Analyzer reading.

54. Press ENTER Key and wait until Field displays **CALIBRATED**.

55. Repeat Steps 51 through 54 for the remaining PM calibrations using this table as a guide:

<table>
<thead>
<tr>
<th>External Modulation</th>
<th>Deviation Range (Rad)</th>
<th>Audio Analyzer (=Vrms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM NARR 2</td>
<td>10</td>
<td>7.20</td>
</tr>
<tr>
<td>PM NARR 3</td>
<td>1</td>
<td>3.66</td>
</tr>
</tbody>
</table>

56. Disconnect coaxial cable from EXT MOD IN Connector.

57. Perform procedures in para 1-8-7 through para 1-8-10 until no adjustments are required.

58. Set COM-120B power to OFF and disconnect test equipment.
1-8-11 SPECTRUM ANALYZER CALIBRATION

PREREQUISITES: 1-8-1 POWER SUPPLY CALIBRATION
1-8-2 TCXO/OCXO CALIBRATION

EQUIPMENT REQUIRED: 1 COM-120B MAINTENANCE KIT
1 DIGITAL MULTIMETER (DMM)
1 SIGNAL GENERATOR

FIGURES: 1-6
1-7

Figure 1-6 Analyzer Tray Calibration Points

STEP PROCEDURE

1. Apply Power to COM-120B. Allow 5 minute warm-up period.

2. Press ANLYZ Instruments Key (4) to access Spectrum Analyzer Operation Screen.

3. Set Spectrum Analyzer Fields as follows:
   
   Scan Width 1 kHz
   Logarithmic Function dBm
   Tracking Generator OFF
   Mode LIVE
   Attenuation 0 dB
   H+ Input ANT
   Scale 10 dB
   Center Frequency 100.0000 MHz

4. Verify top of screen is -30 dBm. If not, move cursor to Reference. Press ENTER Key.
   Press DATA SCROLL Keys (17) until -30 dBm is top of screen. Press ENTER Key.

5. Disconnect W24 from 87A12J1 (Figure 1-6).
6. Connect Signal Generator to 87A12J1 (Figure 1-6). Set Signal Generator for 10.7 MHz signal at -20 dBm.

7. Measure dc voltage at 87A12TP202 (Figure 1-6). Adjust Signal Generator Output for 1.4 Vdc on DMM.

8. Cursor to Center Frequency, press Set Ref Soft Function Key F1. Note Trace peak level.

9. Disconnect Signal Generator from 87A12J1 (Figure 1-6). Connect W24 to 87A12J1 (Figure 1-6).

10. Set Signal Generator for 100 MHz at -40 dBm. Connect Signal Generator to ANTENNA Connector (7).

11. Verify Trace peak level matches reference level from Step 8 (±2 dBm). Adjust 87A12R113 (Figure 1-6) as required. Labeled as Analyzer IF Gain.

12. With Cursor on Center Frequency, press Set Ref Soft Function Key F1.

13. Set Scan Width to 160 kHz. Note Signal Level.

14. Set Scan Width to 16 MHz, 500 kHz, 10 kHz and 1 kHz. Verify Signal Level matches Reference (Step 12) for each Scan Width setting (±2 dB). If in tolerance, go to Step 32.

**PERFORM STEPS 15 THROUGH 32 ONLY WHEN REQUIRED.**

15. Set COM-120B Main Power Switch to OFF.

16. Disconnect coaxial cables from Analyzer Tray.

17. Remove Analyzer Tray from COM-120B. Install Analyzer Tray Extender Card in COM-120B. Install Analyzer Tray on Analyzer Tray Extender Card.

18. Connect Extender Coaxial Cables to Analyzer Tray coaxial cables using SMB-SMB adapters. Install Extender Coaxial Cables to Analyzer Tray.

19. Set COM-120B Main Power Switch to ON. Apply Power to COM-120B. Allow 5 minute warm-up period.

20. Press ANLYZ Instruments Key (4) to access Spectrum Analyzer Operation Screen.

21. Set Scan Width to 160 kHz. Note Signal Level.

22. Set Scan Width to 500 kHz. Verify Signal Level matches Reference (Step 21) (±2 dB). Adjust 87A12R221 as necessary (Figure 1-7).

23. Set Scan Width to 10 kHz. Verify Signal Level matches Reference (Step 21) (±2 dB). Adjust 87A12R254 as necessary (Figure 1-7).

24. Set Scan Width to 1 kHz. Verify Signal Level matches Reference (Step 21) (±2 dB). Adjust 87A12R286 as necessary (Figure 1-7).

25. Set Scan Width to 16 MHz. Note Signal Level.
Figure 1-7  Extended Analyzer Tray Calibration Points
26. Set COM-120B Main Power Switch to OFF.

27. Disconnect coaxial cables from Analyzer Tray.

28. Remove Analyzer Tray from Analyzer Tray Extender Card. Remove Analyzer Tray Extender Card from COM-120B. Install Analyzer Tray in COM-120B.

29. Remove Extender Coaxial Cables and SMB-SMB Adapters from Analyzer Tray coaxial cables. Install Analyzer Tray Coaxial Cables to Analyzer Tray.

30. Set COM-120B Main Power Switch to ON. Apply Power to COM-120B. Allow 5 minute warm-up period.

31. Press ANLYZ Instruments Key (4) to access Spectrum Analyzer Operation Screen.

32. Go to Step 13.

33. Set Scan Width to 100 kHz.

34. Step Signal Generator from -30 to -90 dBm. Verify each 10 dB step decreases signal peak 10 dB (±2 dB) from previous step. Use -40 dBm as reference. If in tolerance, go to Step 50.

**PERFORM STEPS 35 THROUGH 49 ONLY WHEN REQUIRED.**

35. Set COM-120B Main Power Switch to OFF.

36. Disconnect coaxial cables from Analyzer Tray.

37. Remove Analyzer Tray from COM-120B. Install Analyzer Tray Extender Card in COM-120B. Install Analyzer Tray on Analyzer Tray Extender Card.

38. Connect Extender Coaxial Cables to Analyzer Tray coaxial cables using SMB-SMB adapters. Install Extender Coaxial Cables to Analyzer Tray.

39. Set COM-120B Main Power Switch to ON. Apply Power to COM-120B. Allow 5 minute warm-up period.

40. Press ANLYZ Instruments Key (4) to access Spectrum Analyzer Operation Screen.

41. Set Signal Generator for -40 dBm output. Adjust 87A12R377 (Figure 1-7), as needed, for proper display.

42. Set Signal Generator for -90 dBm output. Adjust 87A12R380 (Figure 1-7), as needed, for proper display. Repeat Steps 40 and 41 as needed for proper display.

43. Set COM-120B Main Power Switch to OFF.

44. Disconnect coaxial cables from Analyzer Tray.

45. Remove Analyzer Tray from Analyzer Tray Extender Card. Remove Analyzer Tray Extender Card from COM-120B. Install Analyzer Tray in COM-120B.
46. Remove Extender Coaxial Cables and SMB-SMB Adapters from Analyzer Tray coaxial
cables. Install Analyzer Tray Coaxial Cables to Analyzer Tray.

47. Set COM-120B Main Power Switch to ON. Apply Power to COM-120B. Allow 5 minute
warm-up period.

48. Press ANLYZ Instruments Key (4) to access Spectrum Analyzer Operation Screen.

49. Go to Step 34.

50. Set Signal Generator for -40 dBm.

51. Set Scan Width to 20 kHz.

52. Verify Signal Peak is on center graticule (±0.5 Major Divisions). If in tolerance go to Step
67.

PERFORM STEPS 53 THROUGH 66 ONLY WHEN REQUIRED.

53. Set COM-120B Main Power Switch to OFF.

54. Disconnect coaxial cables from Analyzer Tray.

55. Remove Analyzer Tray from COM-120B. Install Analyzer Tray Extender Card in
COM-120B. Install Analyzer Tray on Analyzer Tray Extender Card.

56. Connect Extender Coaxial Cables to Analyzer Tray coaxial cables using SMB-SMB
adapters. Install Extender Coaxial Cables to Analyzer Tray.

57. Set COM-120B Main Power Switch to ON. Apply Power to COM-120B. Allow 5 minute
warm-up period.

58. Press ANLYZ Instruments Key (4) to access Spectrum Analyzer Operation Screen.

59. Switch Scan Width between 20 kHz and 200 kHz, adjusting 87A12R440 for setting that
allows both settings to be closest to center graticule.

60. Set COM-120B Main Power Switch to OFF.

61. Disconnect coaxial cables from Analyzer Tray.

62. Remove Analyzer Tray from Analyzer Tray Extender Card. Remove Analyzer Tray Extender
Card from COM-120B. Install Analyzer Tray in COM-120B.

63. Remove Extender Coaxial Cables and SMB-SMB Adapters from Analyzer Tray coaxial
cables. Install Analyzer Tray Coaxial Cables to Analyzer Tray.

64. Set COM-120B Main Power Switch to ON. Apply Power to COM-120B. Allow 5 minute
warm-up period.

65. Press ANLYZ Instruments Key (4) to access Spectrum Analyzer Operation Screen.

66. Go to Step 52.
67. Press ANLYZ Instruments Key (4). Set Scan Width to 1 kHz.

68. Verify Signal Peak is on center graticule (±0.5 Major Divisions). If in tolerance, go to Step 76.

PERFORM STEPS 68 THROUGH 75 ONLY WHEN REQUIRED.

69. Press SETUP MEMORY Key (21).

70. Select "1. Calibration" from Setup Screen.


72. Select "5. SPECTRUM ANALYZER" to access SPECTRUM ANALYZER CALIBRATION Screen.

73. Press ENTER Key. Edit Data Field using DATA SCROLL Keys (17) until signal is centered.

74. Press ENTER Key and wait until Field displays CALIBRATED.

75. Press RETURN Soft Function Key F6 to return to Calibration Screen. Go to Step 68.

76. Set Signal Generator for 1 kHz tone at 5 kHz deviation.

77. Verify signal peaks on Major Divisions (±0.5 Major Divisions). If in tolerance, go to Step 92.

PERFORM STEPS 78 THROUGH 91 ONLY WHEN REQUIRED.

78. Set COM-120B Main Power Switch to OFF.

79. Disconnect coaxial cables from Analyzer Tray.

80. Remove Analyzer Tray from COM-120B. Install Analyzer Tray Extender Card in COM-120B. Install Analyzer Tray on Analyzer Tray Extender Card.

81. Connect Extender Coaxial Cables to Analyzer Tray coaxial cables using SMB-SMB adapters. Install Extender Coaxial Cables to Analyzer Tray.

82. Set COM-120B Main Power Switch to ON. Apply Power to COM-120B. Allow 5 minute warm-up period.

83. Press ANLYZ Instruments Key (4) to access Spectrum Analyzer Operation Screen.

84. Adjust 87A12R26 (Figure 1-7) until signal peaks on Major Divisions.

85. Set COM-120B Main Power Switch to OFF.

86. Disconnect coaxial cables from Analyzer Tray.

87. Remove Analyzer Tray from Analyzer Tray Extender Card. Remove Analyzer Tray Extender Card from COM-120B. Install Analyzer Tray in COM-120B.
88. Remove Extender Coaxial Cables and SMB-SMB Adapters from Analyzer Tray coaxial cables. Install Analyzer Tray Coaxial Cables to Analyzer Tray.

89. Set COM-120B Main Power Switch to ON. Apply Power to COM-120B. Allow 5 minute warm-up period.

90. Press ANLYZ Instruments Key (4) to access Spectrum Analyzer Operation Screen.

91. Go to Step 77.

92. Set COM-120B power to OFF and disconnect test equipment.
1-8-12 MIXER NULL CALIBRATION

PREREQUISITES: 1-8-1 POWER SUPPLY CALIBRATION
1-8-2 TCXO/OCXO CALIBRATION

EQUIPMENT REQUIRED: NONE

FIGURES: 1-8

STEP PROCEDURE

1. Apply Power to COM-120B. Allow 5 minute warm-up period.

2. Press ANLYZ Instruments Key (4) to access Spectrum Analyzer Operation Screen.

3. Set Spectrum Analyzer Fields as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Scan Width</td>
<td>1 MHz</td>
</tr>
<tr>
<td>Logarithmic Function</td>
<td>dBm</td>
</tr>
<tr>
<td>Tracking Generator</td>
<td>OFF</td>
</tr>
<tr>
<td>Mode</td>
<td>LIVE</td>
</tr>
<tr>
<td>Attenuation</td>
<td>0 dB</td>
</tr>
<tr>
<td>RF Input</td>
<td>ANT</td>
</tr>
<tr>
<td>Scale</td>
<td>10 dB</td>
</tr>
<tr>
<td>Center Frequency</td>
<td>0.2500 MHz</td>
</tr>
</tbody>
</table>

4. Verify Zero Frequency Response is ≥1.5 Major Divisions down from top of screen. If not, go to Step 6.

5. Set COM-120B power to OFF and disconnect test equipment.

   PERFORM THE FOLLOWING ONLY WHEN REQUIRED.

6. Set COM-120B Main Power Switch (25) to OFF.

7. Disconnect coaxial cables and remove Receiver Tray from COM-120B.

8. Install Receiver Extender Tray into COM-120B. Install Receiver Ribbon Cable between Receiver Extender Tray and Receiver Tray. Connect coaxial cables.

9. Apply Power to COM-120B. Allow 5 minute warm-up period.

10. Press ANLYZ Instruments Key (4) to access Spectrum Analyzer Operation Screen.

11. Set Spectrum Analyzer Fields as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Scan Width</td>
<td>1 MHz</td>
</tr>
<tr>
<td>Logarithmic Function</td>
<td>dBm</td>
</tr>
<tr>
<td>Tracking Generator</td>
<td>OFF</td>
</tr>
<tr>
<td>Mode</td>
<td>LIVE</td>
</tr>
<tr>
<td>Attenuation</td>
<td>0 dB</td>
</tr>
<tr>
<td>RF Input</td>
<td>ANT</td>
</tr>
<tr>
<td>Scale</td>
<td>10 dB</td>
</tr>
<tr>
<td>Center Frequency</td>
<td>0.2500 MHz</td>
</tr>
</tbody>
</table>
12. Adjust 87A13A1A3R5 and 87A13A1A3R7 (Figure 1-8) until Zero Frequency Response is ≥1.5 Major Divisions down from top of screen.

13. Set COM-120B Main Power Switch (25) to OFF.

14. Disconnect coaxial cables and Receiver Ribbon Cable from Receiver Tray. Remove Receiver Extender Card and Receiver Ribbon Cable from COM-120B.

15. Install Receiver Tray into COM-120B. Connect coaxial cables.

16. Go to Step 1.
1. Apply Power to COM-120B. Allow 5 minute warm-up period.

2. Press REC Test Mode Key (3) to access RF Receive Operation Screen.

3. Set Receive Operation Screen Parameters as follows:

   - **RF Field**: 101.0000 MHz
   - **Input**: ANT
   - **Attenuation**: 30 dB
   - **Demodulation Type**: FM
   - **IF Bandwidth**: 300 kHz

4. Move cursor to Line.

5. Press CONFIG Soft Function Key F6 to access Receiver Audio/Data Filters Setup Menu.


7. Set Modulation Meters Filter Line Low-Pass Filter for 4 kHz.

9. Press RETURN Soft Function Key F6 to return to RF Receive Operation Screen.

10. Connect Test Equipment as shown in Figure 1-9.

11. Access Full Screen Deviation Meter.

12. Set FM Deviation Meter Parameters as follows:

   Scope/Demod Coupling | AC
   Range               | 20 kHz
   Peak Hold           | OFF
   Average             | OFF

13. Set Signal Generator for 101 MHz Signal FM Modulated with 1 kHz tone at 10 kHz deviation at -10 output level.


15. Verify Modulation Analyzer reading and FM Deviation Meter Reading match (±1.1 kHz). If not, go to Step 18.

16. Set Range to 50 kHz.

17. Set Signal Generator for 20 kHz Deviation.

18. Verify Modulation Analyzer reading and FM Deviation Meter Reading match (±2.6 kHz). If not, go to Step 18.

19. Set Range to 100 kHz.

20. Set Signal Generator for 50 kHz Deviation.

21. Verify Modulation Analyzer reading and FM Deviation Meter Reading match (±5.1 kHz). If not, go to Step 18.

22. Set COM-120B power to OFF and disconnect test equipment.

**PERFORM THE FOLLOWING ONLY WHEN REQUIRED.**

23. Press SETUP MEMORY Key (21).


26. Select “11. FM DEVIATION METER” to access FM DEVIATION METER CALIBRATION Screen.

27. Set Signal Generator for 10 kHz deviation.
28. Move cursor to 10 kHz Field.

29. Enter Modulation Analyzer Reading in Data Field using DATA ENTRY Keys (5).

30. Press ENTER Key and wait until Field displays **CALIBRATED**.

31. Set Signal Generator for 20 kHz deviation.

32. Move cursor to 20 kHz Field.

33. Enter Modulation Analyzer Reading in Data Field using DATA ENTRY Keys (5).

34. Press ENTER Key and wait until Field displays **CALIBRATED**.

35. Set Signal Generator for 50 kHz deviation.

36. Move cursor to 50 kHz Field.

37. Enter Modulation Analyzer Reading in Data Field using DATA ENTRY Keys (5).

38. Press ENTER Key and wait until Field displays **CALIBRATED**.

39. Set Signal Generator for 100 kHz deviation.

40. Move cursor to 100 kHz Field.

41. Enter Modulation Analyzer Reading in Data Field using DATA ENTRY Keys (5).

42. Press ENTER Key and wait until Field displays **CALIBRATED**.

1-8-14  PM DEVIATION METER CALIBRATION

PREREQUISITES:  1-8-1  POWER SUPPLY CALIBRATION
                1-8-2  TCXO/OCXO CALIBRATION

EQUIPMENT REQUIRED:  1  MODULATION ANALYZER
                     1  SIGNAL GENERATOR

FIGURES:  1-9

STEP  PROCEDURE

1. Apply Power to COM-120B. Allow 5 minute warm-up period.

2. Press REC Test Mode Key (3) to access RF Receive Operation Screen.

3. Set Receive Operation Screen Parameters as follows:

   RF Field  101.0000 MHz
   Input     ANT
   Attenuation 30 dB
   Demodulation Type  PM
   IF Bandwidth  300 kHz

4. Move cursor to Line.

5. Press CONFIG Soft Function Key F6 to access Receiver Audio/Data Filters Setup Menu.


7. Set Modulation Meters Filter Line Low-Pass Filter for 4 kHz.


9. Press RETURN Soft Function Key F6 to return to RF Receive Operation Screen.

10. Connect Test Equipment as shown in Figure 1-9.

11. Access Full Screen Phase Meter.

12. Set Phase Meter Parameters as follows:

    Range        10 RAD
    Peak Hold    OFF
    Average      OFF

13. Set Signal Generator for 101 MHz Signal FM Modulated with 1 kHz tone at 5 kHz deviation at -10 dBm output level.


15. Verify Modulation Analyzer reading and Phase Meter Reading match (±0.7 Radians). If not, go to Step 12.
16. Set COM-1208 power to OFF and disconnect test equipment.

**PERFORM THE FOLLOWING ONLY WHEN REQUIRED.**

17. Press SETUP MEMORY Key (21).


20. Select “12. PM DEVIATION METER” to access PM DEVIATION METER CALIBRATION Screen.

21. Enter Modulation Analyzer Reading in Data Field using DATA ENTRY Keys (5).

22. Press ENTER Key and wait until Field displays *CALIBRATED*.

1-8-15 AM MODULATION METER CALIBRATION

PREREQUISITES: 1-8-1 POWER SUPPLY CALIBRATION
1-8-2 TCXO/OCXO CALIBRATION

EQUIPMENT REQUIRED: 1 MODULATION ANALYZER
1 SIGNAL GENERATOR

FIGURES: 1-9

STEP PROCEDURE

1. Apply Power to COM-120B. Allow 5 minute warm-up period.

2. Press REC Test Mode Key (3) to access RF Receive Operation Screen.

3. Set Receive Operation Screen Parameters as follows:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF Field</td>
<td>101 MHz</td>
</tr>
<tr>
<td>Input</td>
<td>ANT</td>
</tr>
<tr>
<td>Attenuation</td>
<td>30 dB</td>
</tr>
<tr>
<td>Demodulation Type</td>
<td>AM</td>
</tr>
<tr>
<td>IF Bandwidth</td>
<td>300 kHz</td>
</tr>
</tbody>
</table>


5. Connect Test Equipment as shown in Figure 1-9.

6. Access Full Screen Modulation Meter.

7. Set AM Modulation Meter Parameters as follows:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>100%</td>
</tr>
<tr>
<td>Peak Hold</td>
<td>OFF</td>
</tr>
<tr>
<td>Average</td>
<td>OFF</td>
</tr>
</tbody>
</table>

8. Set Signal Generator for 101 MHz Signal AM Modulated with 1 kHz tone at 70% Modulation at -10 dBm output level.


10. Verify Modulation Analyzer reading and AM Modulation Meter Reading match (±5.1%). If not, go to Step 12.

11. Set COM-120B power to OFF and disconnect test equipment.

PERFORM THE FOLLOWING ONLY WHEN REQUIRED.

12. Press SETUP MEMORY Key (21).


15. Select "13. AM MODULATION METER" to access AM MODULATION METER CALIBRATION Screen.

16. Enter Modulation Analyzer Reading in Data Field using DATA ENTRY Keys (5).

17. Press ENTER Key and wait until field displays CALIBRATED.

1-8-16 POWER METER CALIBRATION

PREREQUISITES:

1-8-1 POWER SUPPLY CALIBRATION
1-8-2 TCXO/OCXO CALIBRATION

EQUIPMENT REQUIRED:
1 10 W RF AMPLIFIER
1 20 dB ATTENUATOR
1 50 Ω TERMINATION
1 200 W RF AMPLIFIER
1 COAXIAL COUPLER
1 MEASURING RECEIVER
1 SIGNAL GENERATOR

FIGURES:

1-10

Figure 1-10 Power Meter Calibration Setup

<table>
<thead>
<tr>
<th>STEP</th>
<th>PROCEDURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Apply Power to COM-120B. Allow 5 minute warm-up period.</td>
</tr>
<tr>
<td>2.</td>
<td>Press REC Test Mode Key (3) to access RF Receive Operation Screen.</td>
</tr>
<tr>
<td>3.</td>
<td>Set Receive Operation Screen Parameters as follows:</td>
</tr>
<tr>
<td></td>
<td>RF Field</td>
</tr>
<tr>
<td></td>
<td>Input</td>
</tr>
<tr>
<td></td>
<td>Attenuation</td>
</tr>
<tr>
<td></td>
<td>IF Bandwidth</td>
</tr>
<tr>
<td>4.</td>
<td>Access Full Screen RF Power Meter.</td>
</tr>
</tbody>
</table>
5. Set Power Meter Parameters as follows:
   - Range: 20 mW
   - Peak Hold: OFF
   - Average: OFF
   - Cable Loss: 0.0 dB


7. Connect Test Equipment as shown in Figure 1-10.

8. Set Test Equipment for 101 MHz signal with 15 mW output level at connection to T/R Connector (7).

   **NOTE:** Test Equipment must be characterized for accuracy of 2.5% of required setting.

9. Verify Power Meter Reads 15 mW (±1.7 mW). If not, go to Step 21.

10. Set Range to 2 W.


12. Connect Test Equipment as shown in Figure 1-9.

13. Set Test Equipment for 1.5 W output level at connection to T/R Connector (7).

   **NOTE:** Test Equipment must be characterized for accuracy of 2.5% of required setting.

14. Verify Power Meter Reads 1.5 W (±0.3 W). If not, go to Step 21.

15. Set Range to 50 W.


17. Connect Test Equipment as shown in Figure 1-9.

18. Set Test Equipment for 40 W output level at connection to T/R Connector (7).

   **NOTE:** Test Equipment must be characterized for accuracy of 2.5% of required setting.


20. Set COM-120B power to OFF and disconnect test equipment.

   **PERFORM THE FOLLOWING ONLY WHEN REQUIRED.**

21. Press SETUP MEMORY Key (21).


24. Select “4. RF POWER METER” to access RF POWER METER CALIBRATION Screen.


26. Connect Test Equipment as shown in Figure 1-9.

27. Move Cursor to 15.0 mW Field.

28. Set Test Equipment for 101 MHz signal with 15 mW output level at connection to T/R Connector (7).

   NOTE: Test Equipment must be characterized for accuracy of 2.5% of required setting.

29. Enter Power Level applied in Data Field using DATA ENTRY Keys (5).

30. Press ENTER Key and wait until Field displays CALIBRATED.

31. Move Cursor to 1.50 W Field.

32. Set Test Equipment for 1.5 W output level at connection to T/R Connector (7).

   NOTE: Test Equipment must be characterized for accuracy of 2.5% of required setting.

33. Enter Power Level applied in Data Field using DATA ENTRY Keys (5).

34. Press ENTER Key and wait until Field displays CALIBRATED.

35. Move Cursor to 40 W Field.

36. Set Test Equipment for 40 W output level at connection to T/R Connector (7).

   NOTE: Test Equipment must be characterized for accuracy of 2.5% of required setting.

37. Enter Power Level applied in Data Field using DATA ENTRY Keys (5).

38. Press ENTER Key and wait until Field displays CALIBRATED.

# COM-120B CALIBRATION RECORD

<table>
<thead>
<tr>
<th>PARA</th>
<th>STEP</th>
<th>DATA</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-8-1</td>
<td>2.</td>
<td>+13 Vdc (±0.25 V), 87A6J10 PIN 1,13</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>+35 Vdc (±1 V), 87A6J10 PIN 2,14</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-10.5 Vdc (±0.5 V), 87A6J10 PIN 3,15</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>+10.5 Vdc (±0.25 V), 87A6J10 PIN 4,16</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>+5 Vdc (+0.2 V/-0.0 V), 87A6J10 PIN 5,17</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>+5 Vdc (+0.2 V/-0.0 V), 87A6J10 PIN 7,19</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>+12 Vdc (±0.25 V), 87A6J10 PIN 9,21</td>
<td></td>
</tr>
<tr>
<td>1-8-2</td>
<td>9.</td>
<td>998.0000 (±199.6 Hz)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10.</td>
<td>998.0000 (±10 Hz)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12.</td>
<td>998.0000 (±10 Hz) (Adjustment Required)</td>
<td></td>
</tr>
<tr>
<td>1-8-3</td>
<td>9.</td>
<td>190 Vrms (±10.1 V)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>19 Vrms (±1.02 V)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.9 Vrms (±106 mV)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11.</td>
<td>190 Vdc (±10.1 V)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>19 Vdc (±1.02 V)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.9 Vdc (±106 mV)</td>
<td></td>
</tr>
<tr>
<td>1-8-4</td>
<td>6.</td>
<td>-20 dBm (±2 dB)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7.</td>
<td>-90 dBm (±2 dB)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8.</td>
<td>-130 dBm (±2.5 dB)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10.</td>
<td>-20 dBm (±2 dB)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11.</td>
<td>-90 dBm (±2 dB)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12.</td>
<td>-130 dBm (±2.5 dB)</td>
<td></td>
</tr>
<tr>
<td>PARA</td>
<td>STEP</td>
<td>DATA</td>
<td>RESULT</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
<td>-----------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td></td>
<td>21.</td>
<td>Readings match (±0.6%).</td>
<td></td>
</tr>
<tr>
<td>1-8-6</td>
<td>14.</td>
<td>Audio Analyzer reads 20 dB SINAD.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21.</td>
<td>Readings match (±1.1 dB).</td>
<td></td>
</tr>
<tr>
<td>1-8-7</td>
<td>7.</td>
<td>Record Modulation Analyzer Residual.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>13.</td>
<td>10 kHz Deviation (±600 Hz + residual [Step 7])</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15.</td>
<td>Record Modulation Analyzer Residual.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18.</td>
<td>Readings match (±600 Hz + residual [Step 15])</td>
<td></td>
</tr>
<tr>
<td></td>
<td>23.</td>
<td>10 kHz Deviation (±600 Hz + residual [Step 20])</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25.</td>
<td>10 kHz Deviation (±600 Hz + residual [Step 20])</td>
<td></td>
</tr>
<tr>
<td></td>
<td>27.</td>
<td>Record Modulation Analyzer Residual.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>31.</td>
<td>100 kHz Deviation (±5.5 kHz + residual [Step 27])</td>
<td></td>
</tr>
<tr>
<td></td>
<td>33.</td>
<td>Record Modulation Analyzer Residual.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>36.</td>
<td>100 kHz Deviation (±5.5 kHz + residual [Step 33])</td>
<td></td>
</tr>
<tr>
<td></td>
<td>38.</td>
<td>Record Modulation Analyzer Residual.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>41.</td>
<td>100 kHz Deviation (±5.5 kHz + residual [Step 38])</td>
<td></td>
</tr>
<tr>
<td></td>
<td>43.</td>
<td>100 kHz Deviation (±5.5 kHz + residual [Step 38])</td>
<td></td>
</tr>
<tr>
<td>1-8-8</td>
<td>7.</td>
<td>Record Modulation Analyzer Residual.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>13.</td>
<td>8 Radians Deviation (±0.5 Radians + residual [Step 7])</td>
<td></td>
</tr>
<tr>
<td>1-8-9</td>
<td>7.</td>
<td>Record Residual on Modulation Analyzer.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>13.</td>
<td>30% Modulation (±6% + residual [Step 7])</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15.</td>
<td>50% Modulation (±6% + residual [Step 7])</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17.</td>
<td>70% Modulation (±6% + residual [Step 7])</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19.</td>
<td>90% Modulation (±6% + residual [Step 7])</td>
<td></td>
</tr>
<tr>
<td>1-8-10</td>
<td>10.</td>
<td>80% (±10%)</td>
<td></td>
</tr>
<tr>
<td>PARA</td>
<td>STEP</td>
<td>DATA</td>
<td>RESULT</td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
<td>-------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>14.</td>
<td></td>
<td>16 kHz (±1.6 kHz)</td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td></td>
<td>8 kHz (±0.8 kHz)</td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td></td>
<td>1.55 kHz (±0.155 kHz)</td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td></td>
<td>80 kHz (±8 kHz)</td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td></td>
<td>16 Radians (±1.6 Radians)</td>
<td></td>
</tr>
<tr>
<td>28.</td>
<td></td>
<td>8 Radians (±0.8 Radians)</td>
<td></td>
</tr>
<tr>
<td>30.</td>
<td></td>
<td>1.55 Radians (±0.155 Radians)</td>
<td></td>
</tr>
<tr>
<td>1-8-11</td>
<td>4.</td>
<td>Top of screen is -30 dBm.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td>Note Trace peak level.</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td></td>
<td>Trace peak level matches reference level from Step 8 (±2 dBm).</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td></td>
<td>Trace peak level matches reference level from Step 13 (±2 dBm).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>500 kHz</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 kHz</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>100 kHz</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 MHz</td>
<td></td>
</tr>
<tr>
<td>34.</td>
<td></td>
<td>-30 to -40 dBm, decreases 10 dB (±2 dB)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-40 to -50 dBm, decreases 10 dB (±2 dB)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-50 to -60 dBm, decreases 10 dB (±2 dB)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-60 to -70 dBm, decreases 10 dB (±2 dB)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-70 to -80 dBm, decreases 10 dB (±2 dB)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-80 to -90 dBm, decreases 10 dB (±2 dB)</td>
<td></td>
</tr>
<tr>
<td>52.</td>
<td></td>
<td>Peak is on Center Graticule (±0.5 Major Divisions).</td>
<td></td>
</tr>
<tr>
<td>68.</td>
<td></td>
<td>Peak is on Center Graticule (±0.5 Major Divisions).</td>
<td></td>
</tr>
<tr>
<td>77.</td>
<td></td>
<td>Peaks are on Major Divisions (±0.5 Major Divisions).</td>
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</tr>
<tr>
<td>1-8-12</td>
<td>4.</td>
<td>Zero Frequency Response is ≥1.5 Major Divisions down from top of screen.</td>
<td></td>
</tr>
<tr>
<td>1-8-13</td>
<td>10.</td>
<td>Readings match (±1.1 kHz)</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td></td>
<td>Readings match (±2.6 kHz)</td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td></td>
<td>Readings match (±5.1 kHz)</td>
<td></td>
</tr>
<tr>
<td>PARA</td>
<td>STEP</td>
<td>DATA</td>
<td>RESULT</td>
</tr>
<tr>
<td>------</td>
<td>------</td>
<td>------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>1-8-14</td>
<td>10.</td>
<td>Readings match (±0.7 Radians)</td>
<td>______</td>
</tr>
<tr>
<td>1-8-15</td>
<td>10.</td>
<td>Readings match (±5.1%)</td>
<td>______</td>
</tr>
<tr>
<td>1-8-16</td>
<td>9.</td>
<td>15 mW (±1.7 mW)</td>
<td>______</td>
</tr>
<tr>
<td></td>
<td>14.</td>
<td>1.5 W (±0.3 W)</td>
<td>______</td>
</tr>
<tr>
<td></td>
<td>19.</td>
<td>40 W (+4.1 W)</td>
<td>______</td>
</tr>
</tbody>
</table>