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GENERAL SUPPORT MAINTENANCE PROCEDURES PAGE 6-12

RADIO SETS
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RECEIVER-TRANSMITTERS
RADIO RT-246/VRC AND RT-246A/VRC (NSN 5820-00-892-0623)
AND
RT-542/VRC AND RT-524A/VRC (NSN 5820-00-892-0622)
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16 APRIL 1984
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VOLUME 2 of 2

RADIO SETS
AN/VRC-12 (NSN 5820-00-223-7412), AN/VRC-43 (NSN 5820-00-223-7415),
AN/VRC-44 (NSN 5820-00-223-7417), AN/VRC-45 (NSN 5820-00-223-7418),
AN/VRC-46 (NSN 5820-00-223-7433), AN/VRC-47 (NSN 5820-00-223-7434),
AN/VRC-48 (NSN 5820-00-223-7435), AND AN/VRC-49 (NSN 5820-00-223-7437)

RECEIVER-TRANSmitters, RADIO
RT-246/VRC (NSN 5820-00-892-0623) AND RT-246A/VRC (NSN 5820-00-140-9071)
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Figure FO-15 | Figure FO-15

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Direct Support and General Support
Maintenance Manual

Volume 2 of 2

RADIO SETS: AN/VRC-12 (NSN 5820-00-223-7412), AN/VRC-43 (NSN 5820-00-223-7415), AN/VRC-44 (NSN 5820-00-223-7417), AN/VRC-45 (NSN 5820-00-223-7418), AN/VRC-46 (NSN 5820-00-223-7433), AN/VRC-47 (NSN 5820-00-223-7434), AN/VRC-48 (NSN 5820-00-223-7435), AND AN/VRC-49 (NSN 5820-00-223-7437)

RECEIVER-TRANSMITTERS, RADIO RT-246/VRC (NSN 5820-00-892-0623) AND RT-246A/VRC (NSN 5820-01-140-9071) AND RT-524/VRC AND RT-524A/VRC (NSN 5820-00-892-0622)

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AND THE NAVY
Washington, DC, 1 February 1986

Direct Support and General Support
Maintenance Manual

Volume 2 at 2

RADIO SETS: AN/VRC-12 (NSN 5820-00-223-7412), AN/VRC-43
(NSN 5820-00-223-7415), AN/VRC-44 (NSN 5820-00-223-7417), AN/VRC-45
(NSN 5820-00-223-7418), AN/VRC-46 (NSN 5820-00-223-7433), AN/VRC-47
(NSN 5820-00-223-7434), AN/VRC-48 (NSN 5820-00-223-7435),
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RECEIVER-TRANSMITTERS, RADIO
RT-246/VRC (NSN 5820-00-892-0623) AND RT-246/VRC (NSN 5820-01-140-9071)
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FO-3 .......................... FO-3
FO-24 .......................... FO-24

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5 SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

1 DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL

2 IF POSSIBLE, TURN OFF THE ELECTRICAL POWER

3 IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH, OR LIFT THE PERSON TO SAFETY USING A WOODEN POLE OR A ROPE OR SOME OTHER INSULATING MATERIAL

4 SEND FOR HELP AS SOON AS POSSIBLE

5 AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION
HIGH VOLTAGE
IS USED IN THE OPERATION OF THIS EQUIPMENT
DEATH ON CONTACT

MAY RESULT IF PERSONNEL FAIL TO OBSERVE SAFETY PRECAUTIONS

Never work on electronic equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid. When the technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, the power supply to the equipment must be shut off before beginning work on the equipment. Take particular care to ground every capacitor likely to hold a dangerous potential. When working inside the equipment, after the power has been turned off, always ground every part before touching it.

Be careful not to contact high-voltage connections of 115 volt ac input connections when installing or operating this equipment.

Whenever the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body.

**WARNING** Do not be misled by the term “low voltage”. Potentials as low as 50 volts may cause death under adverse conditions.

For Artificial Respiration, refer to FM 21-11.
WARNING

HIGH VOLTAGE

is used in this equipment.

DEATH ON CONTACT

MAY RESULT IF SAFETY PRECAUTIONS

ARE NOT OBSERVED.

Remove all rings, watches and jewelry before turning power on.

Make certain you are not grounded when working inside the equipment with power turned on. Do not attempt internal service or adjustment unless another person is present who is capable of rendering first aid and resuscitation. A periodic review of safety precautions in TB 385-4, Safety Precautions for Maintenance of Electrical/Electronic Equipment, is recommended.

WARNING

Never attempt to lift a radio receiver-transmitter (RT) alone. Serious injury could result.

WARNING

TRICHLOROTRIFLUOROETHANE

Fumes of TRICHLOROTRIFLUOROETHANE are poisonous. Provide adequate ventilation whenever you use TRICHLOROTRIFLUOROETHANE. Do not use solvent near heat or open flame. TRICHLOROTRIFLUOROETHANE will not burn, but heat changes the gas into poisonous, irritating fumes. DO NOT breathe the fumes or vapors. TRICHLOROTRIFLUOROETHANE dissolves natural skin oils. DO NOT get the solvent on your skin. Use gloves, sleeves, and an apron which the solvent cannot penetrate. If the solvent is taken internally, consult a physician immediately.
Direct Support and General Support
Maintenance Manual

RADIO SETS: AN/VRC-12 (NSN 5820-00-223-7412), AN/VRC-43
(NSN 5820-00-223-7415), AN/VRC-44 (NSN 5820-00-223-7417), AN/VRC-45
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AND
RT-524/VRC AND RT-524A/VRC (NSN 5820-00-892-0622)

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CHAPTER 4

DIRECT SUPPORT PERFORMANCE AND TROUBLESHOOTING
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*.This manual, together with, TM 11-5820-401-34-2-l/NAVELEX 0967-LP-432-3030, 16 April 1984
and TM 11-5820-401-34-3/NAVELEX 096-LP-432-3030, 16 April 1984 supersedes TB 11-5820-401-34-1/
9 April 1976.
HOW TO USE THIS MANUAL

This manual is designed to help you maintain receiver-transmitters used in the AN/VRC-12 series radio sets.

The table of contents on the front cover is provided for quick reference to important information. There is also an alphabetical index to help locate specific information.

Measurements in this manual are given in both US standard and metric units.

Read all preliminary information found at the beginning of each procedure. It contains important directions which must be followed to perform the task correctly.

Warning pages are located in the front of this manual. You should learn the warnings before doing maintenance on the equipment.

Paragraphs in this manual are numbered by chapter and order of appearance within a chapter. A subject index appears at the beginning of each chapter, breaking the chapter into sections. A more specific subject index is located at the beginning of each section to help you find the exact paragraph you are looking for.

There are three chapters covering direct support performance tests, troubleshooting, and alignment procedures. Each chapter shows how to perform these tasks using a different set of test equipment; that is:

2. Chapter 4 contains performance and troubleshooting procedures, using Test Set AN/GRM-114A.
3. Chapter 5 contains performance and troubleshooting procedures, using Test Cable No. 1 and discrete test equipment (TMDE).

The procedures you follow will depend upon the test equipment at your disposal.

For repair parts and tools required for direct support and general support maintenance, refer to TM 11-5820-401-34P-2-1 (RT-246(*)/VRC) and TM 11-5820-401-34P-2-2 (RT-524(*)/VRC).
CHAPTER 4
DIRECT SUPPORT PERFORMANCE AND TROUBLESHOOTING PROCEDURES USING TEST SET AN/GRM-114A

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OVERVIEW

This chapter contains performance tests, troubleshooting, and alinement procedures at the direct support level using Test Set AN/GRM-114A.

The performance tests are diagnostic in purpose. They should be used to verify that an RT is operating properly or to point out the existence of faults.

If failure to meet a performance test standard confirms that a fault is present in the unit under test, the test procedure will refer you to a specific chart in the troubleshooting section. The troubleshooting charts are designed to isolate the faults noted in the performance tests. They will guide you to the source of defects and/or misalignments.

Once it has identified the source of a fault, a troubleshooting chart will refer you to the appropriate repair/replacement instructions or alinement procedures. Because each stage of the RT's receiver or transmitter sections depends upon its other stages for overall operating efficiency, the replacement, repair, or realignment of even one component could alter the RT's signals enough to create the need for other realignments. Therefore, after making any alterations in the RT, do all the performance tests, even those you have done already.
Section I PERFORMANCE TESTS

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4-1. GENERAL.

This section contains performance test procedures for use with Test Set AN/GRM-114A. They will enable you to determine whether or not an RT is operating acceptably. Each test procedure checks specific functions of the receiver or transmitter sections to help you find and isolate faults.

Each test is complete and maybe performed individually. Therefore, you may choose an appropriate test to verify gross equipment failure or performance degradation of specific stages. However, this maintenance approach is not recommended, it is best to perform all the tests in sequence. This systematic maintenance approach will ensure that all faults are found and corrected.

Faults in the RT are evidenced by failure of the unit to meet the performance standards found within the test procedures in **bold type**. When an RT fails to meet a performance standard, discontinue the test and turn to the troubleshooting chart referred to in the procedure.
4-1.1. +25 VOLT DC COMMON OUTPUT.

PURPOSE: This test checks the RT’s +25 Vdc output used to power the Vinson Systems.

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<td></td>
<td>KEY</td>
<td>RCVE</td>
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<td></td>
<td>ALL OTHER SWITCHES</td>
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<td></td>
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<td>LOW</td>
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<tr>
<td>MM-100E</td>
<td>30V</td>
<td>+DC</td>
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STANDARD. MM-100E should indicate 22-30V. If voltage is lower or higher than 22-30V check power supply.

2. If MM-100E indicates 0V see Troubleshooting Chart (paragraph 4-23).

492. VOLUME CONTROL TEST.

PURPOSE. This test checks the VOLUME control of the RT for proper operation. When a 1-kHz tone is injected into the RT ANTENNA port, the speaker should output a clear tone with no scratchy sound or sudden drop in volume. The absence of a tone means that the signal is not passing completely through the RT circuitry and could even indicate total equipment failure; therefore, perform this test before the others in this section.
4-2 VOLUME CONTROL TEST. (CONT)

TEST EQUIPMENT AND MATERIALS

Power Supply PP-1104(*)/G
Maintenance Kit MK-1978/VRC

Test Set AN/GRM-114A
Rf Cable RG-58/U

TEST SETUP. Connect equipment as shown in test setup diagram.

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK-1978/VRC</td>
<td>POWER</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>AUDIO</td>
<td>MUTED</td>
</tr>
<tr>
<td></td>
<td>KEY</td>
<td>RCVE</td>
</tr>
<tr>
<td></td>
<td>X-MODE (RT)</td>
<td>NORMAL</td>
</tr>
<tr>
<td></td>
<td>AUX RCVR</td>
<td>NORMAL</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>ON</td>
</tr>
</tbody>
</table>
4-2. VOLUME CONTROL TEST. (CONT)

CONTROL AND SWITCH SETTINGS (CONT)

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>BAND</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>OLD OFF</td>
</tr>
<tr>
<td></td>
<td>LIGHT</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td>OFF</td>
</tr>
<tr>
<td>AN/GRM-114A; MM-100E</td>
<td>See test setup diagram B</td>
<td></td>
</tr>
</tbody>
</table>

TEST PROCEDURE

1. Connect MM-100E attenuated probe A to MK-1978/VRC SPKR jack; connect probe B to GND jack. (See test setup diagram A, page 4-3.)
2. Turn RT VOLUME control fully clockwise, then fully counterclockwise.

STANDARD. Tone from ME-100E speaker should be clear with no scratchiness or sudden changes in volume at any point in the rotation of the VOLUME control.
4-2. VOLUME CONTROL TEST. (CONT)

3. If volume changes suddenly, if tone is scratchy, or if no tone at all is heard, see troubleshooting chart 4-1.

4-3. RECEIVER SENSITIVITY TEST.

PURPOSE. This test checks the ability of the RT to detect low level rf signals by measuring its SINAD at several frequencies. SINAD gives receiver sensitivity in terms of the following ratio:

\[
\text{SINAD} = \frac{\text{Signal + noise + distortion}}{\text{noise + distortion}}.
\]

SINAD is expressed in decibels. The better a receiver’s SINAD, the better signals, even weak ones, can be heard over unwanted internal noise. The SINAD for the RT should be at least -10 db (from a zero-db reference) when the rf level is 0.5 µv.

TEST EQUIPMENT AND MATERIALS

- Power Supply PP-1104(*)/G
- Maintenance Kit MK-1978/VRC
- Test Set AN/GRM-114A
- Rf Cable RG-58/U

TEST SETUP. Connect equipment as shown in test setup diagram A.
4-3. RECEIVER SENSITIVITY TEST. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

### CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK-1978/VRC</td>
<td>POWER</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>AUDIO</td>
<td>MUTED</td>
</tr>
<tr>
<td></td>
<td>KEY</td>
<td>RCVE</td>
</tr>
<tr>
<td></td>
<td>X-MODE (RT)</td>
<td>NORMAL</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>ON</td>
</tr>
<tr>
<td>RT</td>
<td>BAND</td>
<td>(A) 30.00</td>
</tr>
<tr>
<td></td>
<td>MG-TUNE-KC</td>
<td>OLD OFF</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>LIGHT</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td></td>
</tr>
<tr>
<td>AN/GRM-114A; MM-100E</td>
<td>See test setup diagram</td>
<td></td>
</tr>
</tbody>
</table>

![Image of receiver](image-url)
4-3. RECEIVER SENSITIVITY TEST. (CONT)

Sensitivity Test at 30.00 MHz

1. Connect MM-100E attenuated probe A to MK-1978/VRC SPKR jack; connect probe B to GND.
   (See test setup diagram A, page 4-5.)
2. Adjust RT VOLUME control for 17-volt indication on MM-100E meter.
3. If 17-volt indication cannot be obtained on MM-100E, see troubleshooting chart 4-6.
4. Change MM-100E RANGE switch to SINAD.

STANDARD. MM-100E blue SINAD scale should indicate 10 or greater.

5. If MM-100E scale indicates below 10, see troubleshooting chart 4-2.

Sensitivity Test at Other Frequencies

6. Set AN/GRM-114A RF FREQUENCY MHz thumbwheels (1), test setup diagram C) and
   RT MC-TUNE-KC switch to frequency control settings listed below. After each frequency
   change note MM-100E blue SINAD scale indication.

<table>
<thead>
<tr>
<th>RT SWITCH SETTINGS</th>
<th>EQUIVALENT AN/GRM-114A THUMBWHEEL SETTINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>41.00 MHz (BAND A)</td>
<td>041 000.0</td>
</tr>
<tr>
<td>52.00 MHz (BAND A)</td>
<td>052 000.0</td>
</tr>
<tr>
<td>53.00 MHz (BAND B)</td>
<td>053 000.0</td>
</tr>
<tr>
<td>64.00 MHz (BAND B)</td>
<td>064 000.0</td>
</tr>
<tr>
<td>75.00 MHz (BAND B)</td>
<td>075 000.0</td>
</tr>
</tbody>
</table>
4-3. RECEIVER SENSITIVITY TEST. (CONT)

STANDARD. MM-100E blue SINAD scale should indicate 10 or greater at each frequency.

7. If MM-100E indication falls below 10 at any frequency, see troubleshooting chart 4-2.

4-4. NEW SQUELCH TEST.

PURPOSE. This test checks the sensitivity of the RT squelch modules (A5200, A5300) to the NEW SQUELCH signal (150 Hz) at several carrier frequencies. The 150-Hz signal is injected into the RT ANTENNA port, energizing Squelch Module Relay K5002, which unsquelches the receiver. Proper operation of the squelch modules is verified by CALL lamp response to carrier signal strength of 0.1 to 0.5 µV, not to exceed 0.5 µV rf level.

TEST EQUIPMENT AND MATERIALS

- Power Supply PP-1104(*)G
- Maintenance Kit MK-1978/VRC
- Test Set AN/GRM-114A
- Rf Cable RG-58/U

TEST SETUP. Connect equipment as shown in test setup diagram A

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.
4-4. NEW SQUELCH TEST. (CONT)

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK-1978/VRC</td>
<td>POWER</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>AUDIO</td>
<td>MUTED</td>
</tr>
<tr>
<td></td>
<td>KEY</td>
<td>RCVE</td>
</tr>
<tr>
<td></td>
<td>X-MODE (RT)</td>
<td>NORMAL</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>OFF</td>
</tr>
<tr>
<td>RT</td>
<td>BAND</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>NEW ON</td>
</tr>
<tr>
<td></td>
<td>LIGHT</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td>OFF</td>
</tr>
<tr>
<td>AN/GRM-114A</td>
<td>See test setup diagram</td>
<td>B</td>
</tr>
</tbody>
</table>

![Image of control panel](image)

- **B**: See test setup diagram

**Notes:**
- Adjust for 3 kHz deviation on meter.
- FM
- Fully counter-clockwise
- RCVR
- Just past detent
- GEN 0.05 μV

**Diagram:**
- **FM/AM-1100S**
- **NORM**
- **AUTO**
- **OFF**
- **ADJUST FOR 3 kHz DEVIATION ON METER**
- **FULLY COUNTER-CLOCKWISE**
- **RCVR**
- **JUST PAST DETENT**
- **GEN 0.05 μV**
- **EL4GP375**
NEW SQUELCH Test at 30.00 MHz

1. Turn AN/GRM-114A RF LEVEL control (1) slowly clockwise until RT lamp lights. (See test setup diagram.)
2. If CALL lamp does not light, set AN/GRM-114A MODULATION FREQ Hz thumbwheels (2) to 00 151.0 Hz, return RF LEVEL control (1) to minimum setting, and repeat step 1. If CALL lamp still does not light, set MODULATION FREQ Hz thumbwheels (2) to 00 149.0, return RF LEVEL control (1) to minimum setting, and repeat step 1.

STANDARD. RT CALL lamp should light while AN/GRM-114A RF LEVEL is at or below 0.5 μV.

3. If RF LEVEL (1) is more than 0.1 μV, not to exceed 0.5 μV, when RT CALL lamp lights or if CALL lamp will not light, see troubleshooting chart 4-5.
4. Remove cable from RT ANTENNA port.

STANDARD. RT CALL lamp should go out. Remember, without the 150-Hz tone, Relay K5002 will not be energized to supply the 16 volts necessary to turn on the audio amplifiers; therefore, the receiver is squelched.

5. If CALL lamp does not go out, see troubleshooting chart 4-5.
6. Reconnect cable to RT ANTENNA port.
4-4. NEW SQUELCH TEST. (CONT)

STANDARD. RT CALL lamp should light,

7. If CALL lamp does not light, see troubleshooting chart 4-5.

NEW SQUELCH Test at Other Frequencies

8. Return AN/GRM-114A RF LEVEL control (1) to minimum setting.
9. Set AN/GRM-114A RF FREQUENCY MHz thumbwheels (3) and RT MC-TUNE-KC switch to frequency control settings listed below. Repeat steps 1 through 7 at each frequency.

NOTE

<table>
<thead>
<tr>
<th>RT SWITCH SETTING</th>
<th>EQUIVALENT AN/GRM-114A THUMBWHEEL SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>41.00 MHz</td>
<td>041 000.0 Hz</td>
</tr>
<tr>
<td>52.00 MHz</td>
<td>052 000.0 Hz</td>
</tr>
<tr>
<td>53.00 MHz</td>
<td>053 000.0 Hz</td>
</tr>
<tr>
<td>65.00 MHz</td>
<td>065 000.0 Hz</td>
</tr>
<tr>
<td>75.00 MHz</td>
<td>075 000.0 Hz</td>
</tr>
</tbody>
</table>

Change RT to BAND \( \text{\textcircled{B}} \) at 53, 65, and 75 MHz.
4-5. OLD SQUELCH TEST.

PURPOSE. This test checks the sensitivity of the RT squelch modules (A5200, A5300) to OLD SQUELCH noise components (7300 Hz) at several carrier frequencies. Proper operation of the squelch modules is verified by the CALL lamp response to signal strength at or below a 0.1 to 0.7-µv rf carrier level.

TEST EQUIPMENT AND MATERIALS

- Power Supply PP-1104(*)/G
- Maintenance Kit MK-1978/VRC
- Test Set AN/GRM-114A
- Rf Cable RG-58/U

TEST SETUP. Connect equipment as shown in test setup diagram A.
4-5. OLD SQUELCH TEST. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK-1978/VRC</td>
<td>SQUELCH</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>AUDIO</td>
<td>MUTED</td>
</tr>
<tr>
<td></td>
<td>KEY</td>
<td>RCVE</td>
</tr>
<tr>
<td></td>
<td>X-MODE (RT)</td>
<td>NORMAL</td>
</tr>
<tr>
<td>RT</td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully counterclockwise A</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>OLD ON</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>LIGHT</td>
<td>OFF</td>
</tr>
<tr>
<td>AN/GRM-114A; MM-100E</td>
<td>See test setup diagram B</td>
<td></td>
</tr>
</tbody>
</table>

![Diagram of equipment control settings](image-url)
4-5. OLD SQUELCH TEST. (CONT)

TEST PROCEDURE

OLD SQUELCH Test at 30.00 MHz

1. Turn AN/GRM-114A RF LEVEL control (1) slowly clockwise until RT CALL lamp lights. (See test setup diagram ©.)

STANDARD. RT CALL lamp should light while AN/GRM-114A RF LEVEL control is at 0.1 to 0.7 µv.

2. If RF LEVEL control (1) is more than 0.7 µv, see troubleshooting chart 4-5.
3. Remove cable from RT ANTENNA port.

STANDARD. RT CALL lamp should go out.

4. If RT CALL lamp does not go out, see troubleshooting chart 4-5.
5. Reconnect cable to RT ANTENNA port.

STANDARD. RT CALL lamp should light.

6. If CALL lamp does not light, see troubleshooting chart 4-5.

OLD SQUELCH Test at Other Frequencies

7. Return AN/GRM-114A RF LEVEL control (1) to minimum setting.
8. Set AN/GRM-114A RF FREQUENCY MHz thumbwheels (2) and RT MC-TUNE-KC switch to frequency control settings listed below. Repeat steps 1 through 7 at each frequency.
4-5. OLD SQUELCH TEST. (CONT)

**NOTE**
Change RT to BAND (B) at 53, 65, and 75 MHz.

<table>
<thead>
<tr>
<th>RT SWITCH SETTING</th>
<th>EQUIVALENT AN/GRM-114A THUMBWHEEL SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>41.00 MHz</td>
<td>041 000.0 Hz</td>
</tr>
<tr>
<td>52.00 MHz</td>
<td>052 000.0 Hz</td>
</tr>
<tr>
<td>53.00 MHz</td>
<td>053 000.0 Hz</td>
</tr>
<tr>
<td>65.00 MHz</td>
<td>065 000.0 Hz</td>
</tr>
<tr>
<td>75.00 MHz</td>
<td>075 000.0 Hz</td>
</tr>
</tbody>
</table>

4-6. RECEIVER AUDIO POWER TEST.

PURPOSE. This test checks the ability of the RT to drive its three audio outputs, namely:

1. The MUTED audio output, which supplies power to the speaker.
2. The UNMUTED audio output, which supplies power to the headphones.
3. The FIXED LEVEL audio output, which supplies power to the interphone system.

An rf level strong enough to drive the A4200 module into limiting (20 µv) is injected into the RT ANTENNA port. The audio output voltages are then measured at the SPKR and INTERCOM jacks of the MK-1978/VRC.

**TEST EQUIPMENT AND MATERIALS**

- Power Supply PP-1104(*)/G
- Test Set AN/GRM-114A
- Maintenance Kit MK-1978/VRC
- Rf Cable RG-58/U

**TEST EQUIPMENT SETUP.** Connect equipment as shown in test setup diagram (A), page 4-16.
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK-1978/VRC</td>
<td>POWER</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>AUDIO</td>
<td>MUTED</td>
</tr>
<tr>
<td></td>
<td>KEY</td>
<td>RCVR</td>
</tr>
<tr>
<td></td>
<td>X-MODE (RT)</td>
<td>NORMAL</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>ON</td>
</tr>
<tr>
<td>RT</td>
<td>BAND</td>
<td>60.00</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>OLD OFF</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>LIGHT</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td></td>
</tr>
<tr>
<td>AN/GRM-114A; MM-100E</td>
<td>See test setup diagram page 4-17</td>
<td></td>
</tr>
</tbody>
</table>

4-16
4-8. RECEIVER AUDIO POWER TEST. (CONT)

TEST PROCEDURE

Muted Audio Power Test

1. Connect MM-100E attenuated probe A to MK-1978/VRC SPKR jack; connect probe B to GND jack. (See test setup diagram A, page 4-16.)
2. Turn RT VOLUME control fully clockwise.

STANDARD. MM-100E meter should indicate at least 20 volts.

3. If MM-100E meter indicates less than 20 volts, see troubleshooting chart 4-6.

Unmuted Audio Power Test

5. Change MM-100E RANGE switch 10 volts.

STANDARD. MM-100E should indicate at least 7.75 volts.

6. If MM-100E meter indicates less than 7.75 volts, see troubleshooting chart 4-6.

Fixed Audio Power Test

7. Connect MM-100E attenuated probe A to MK-1978/VRC INTERCOM jack. (See test setup diagram A.)
8. Change MM-100E RANGE switch to 0.3 volts.
4-6. RECEIVER AUDIO POWER TEST. (CONT)

STANDARD. MM-100E should indicate at least 0.16 volt.

9. If MM-100E meter indicates less than 0.16 volt, see troubleshooting chart 4-6.

4-7. RECEIVER AUDIO DISTORTION TEST.

PURPOSE. This test checks the ability of the RT to minimize distortion. It is similar to the Receiver Sensitivity Test [paragraph 4-3], except that now a strong (20-µv) rf level is used instead of a weak (0.5µv) one. The 20-µv rf level is injected into the RT ANTENNA port. The audio distortion, measured at the MUTED AUDIO output jack of the MK-1978/VRC, should be less than 8 percent.

TEST EQUIPMENT AND MATERIALS

<table>
<thead>
<tr>
<th>Power Supply PP-1104(*)/G</th>
<th>Test Set AN/GRM-114A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance Kit MK-1978/VRC</td>
<td>Rf Cable RG-58/U</td>
</tr>
</tbody>
</table>

TEST EQUIPMENT SETUP. Connect test equipment as shown in test setup diagram A.

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.
4-7. RECEIVER AUDIO DISTORTION TEST. (CONT)

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK-1978/VRC</td>
<td>POWER</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>AUDIO</td>
<td>MUTED</td>
</tr>
<tr>
<td></td>
<td>KEY</td>
<td>RCVE</td>
</tr>
<tr>
<td></td>
<td>AUX RCVR</td>
<td>NORMAL</td>
</tr>
<tr>
<td></td>
<td>X-MODE (RT)</td>
<td>NORMAL</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>ON</td>
</tr>
<tr>
<td>RT</td>
<td>BAND</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>64.00</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>OLD OFF</td>
</tr>
<tr>
<td></td>
<td>LIGHT</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td>OFF</td>
</tr>
</tbody>
</table>

AN/GRM-114A; MM-100E

See test setup diagram B

TEST PROCEDURE

---

![Diagram](image-url)
4-7. RECEIVER AUDIO DISTORTION TEST. (CONT)

1. Connect MM-100E attenuated probe A to MK-1978/VRC SPKR jack; connect probe B to GND jack. (See test setup diagram A, page 4-18.)
2. Adjust RT VOLUME control for 17-volt indication on MM-100E meter.
3. Change MM-100E RANGE switch to DIST 0-30%. If meter indicates less than 10 percent, set RANGE switch to 0-10%.

STANDARD. MM-100E (distortion) meter should indicate less than 8 percent.

4. If MM-100E meter indicates 8 percent or above, see troubleshooting chart 4-7.

4-8. RECEIVER AUDIO RESPONSE TEST (NORMAL MODE).

PURPOSE. This test checks the RT A5000 tray for a flat response to modulating frequencies at and below 3 kHz. Receiver circuits are said to have a flat response if their gain remains nearly constant over a specified bandwidth. Frequencies not falling within this limited range receive little or no gain.

The ability of the RT to detect and respond flatly to the desired voice frequencies is verified by injecting 1 kHz, 500 Hz, and 3 kHz into its ANTENNA port and insuring that the power measured at the SPKR jack of the MK-1978/VRC, falls within the required db range.

TEST EQUIPMENT AND MATERIALS

- Power Supply PP-1104(*)/G
- Maintenance Kit MK-1978/VRC
- Test Set AN/GRM-114A
- Rf Cable RG-58/U

TEST EQUIPMENT SETUP. Connect equipment as shown in test setup diagram A.
4-8. RECEIVER AUDIO RESPONSE TEST (NORMAL MODE). (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

**CONTROL AND SWITCH SETTINGS**

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
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<td>AUDIO</td>
<td>MUTED</td>
</tr>
<tr>
<td></td>
<td>X-MODE (RT)</td>
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<td>AUX RCVR</td>
<td>NORMAL</td>
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<td>SQUELCH</td>
<td>ON</td>
</tr>
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<td>RT</td>
<td>BAND</td>
<td>OLD OFF</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
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<td>SQUELCH</td>
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</tr>
<tr>
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<td>LOW</td>
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<td>NORMAL</td>
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<tr>
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<td>X-MODE-NORMAL</td>
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</tr>
</tbody>
</table>

**NOTE**

The X-MODE-NORMAL switch is located on the A4000 assembly.

AN/GRM-114A; MM-100E | See test setup diagram page 4-22
4-8. RECEIVER AUDIO RESPONSE TEST (NORMAL MODE). (CONT)

TEST PROCEDURE
4-8. RECEIVER AUDIO RESPONSE TEST (NORMAL MODE). (CONT)

1. Connect MM-100E attenuated probe A to MK-1978/VRC SPKR jack; connect probe B to GND.
   (See test setup diagram [A], page 4-20.)
2. Adjust RT VOLUME control until MM-100E red db scale indicates zero db.
3. Turn AN/GRM 114A 1 kHz/OFF control (1) to OFF. (See test setup diagram [C].)
4. Adjust AN/GRM-114A VAR/OFF control (2) for zero-db indication on red db scale of MM-100E (3).

STANDARD. The AN/GRM-114A DEVIATION meter (4) should indicate 8 kHz.

5. If DEVIATION meter does not indicate 8 kHz, see troubleshooting chart 4-8.

Audio Response Test (Normal Mode) Modulating Frequencies

6. Set AN/GRM-114A MODULATION FREQ Hz thumbwheels (4) to modulating frequencies listed below. Note MM-100E and AN/GRM-114A DEVIATION meter indications.
   a. 2000 Hz
   b. 3000 Hz
   c. 500 Hz
   d. 1000 Hz

STANDARD. MM-100E should indicate 0 ±2 db and AN/GRM-114A DEVIATION meter should indicate 8 kHz at each frequency.

7. If, at any frequency, MM-100E indicates more than 2 db above or below zero db, or if AN/GRM-114A DEVIATION meter does not indicate 8 kHz, see troubleshooting chart 4-8.
8. Reset X-MODE-NORMAL switch to X-MODE position.

4-9. RECEIVER AUDIO RESPONSE TEST (X-MODE).

PURPOSE. This test is similar to the Receiver Audio Response Test (Normal Mode). When setup for X-mode, however, the receiver responds to a wider band of frequencies because the A5000 tray is not used. The ability of the RT to detect and respond flatly to the desired intelligence is verified by:

1. Injecting 1-kHz modulation into the RT ANTENNA port while measuring the voltage at the MK-1978/VRC X-MODE AUX RCVR jack.
2. Changing the modulation rate to 500 Hz, 3 kHz, 5 kHz, and 10 kHz, while taking db readings at the MK-1978/VRC X-MODE AUX RCVR jack.
3. Comparing the db readings taken in step 2 to the reference voltage taken in step 1 to see if the standard is met.

TEST EQUIPMENT AND MATERIALS

<table>
<thead>
<tr>
<th>Power Supply PP-1104(*)/G</th>
<th>Test Set AN/GRM-114A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance Kit MK-1978/VRC</td>
<td>Rf Cable RG-58/U</td>
</tr>
</tbody>
</table>

TEST SETUP. Connect test equipment as shown in test setup diagram [A].
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

### CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK-1978/VRC</td>
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</tr>
<tr>
<td></td>
<td>AUDIO</td>
<td>MUTED</td>
</tr>
<tr>
<td></td>
<td>KEY</td>
<td>RCVE</td>
</tr>
<tr>
<td></td>
<td>X-MODE (RT)</td>
<td>CIPHER</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>ON</td>
</tr>
<tr>
<td>RT</td>
<td>BAND</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>OLD OFF</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
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<td>LIGHT</td>
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<td>POWER</td>
<td>OFF</td>
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<td>SPEAKER (RT-524/VRC)</td>
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<td>FL4002</td>
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<td>AN/GRM-114A; MM-100E</td>
<td>See test setup diagram**, page 4-25**</td>
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---

**Page 4-25**

**Change 1**
4-9. RECEIVER AUDIO RESPONSE TEST (X-MODE). (CONT)

TEST PROCEDURE
4-9. RECEIVER AUDIO RESPONSE TEST (X-MODE). (CONT)

Audio Response Test (X-Mode) at 1000 Hz

1. Connect MM-100E probe A to MK-1978/VRC RCVR jack (inside X-MODE square); connect probe B to GND jack. (See test setup diagram, page 4-24.) Note meter indication.

STANDARD. MM-100E meter should indicate at least 0.78 volts.

2. If MM-100E does not indicate at least 0.78 volts, see troubleshooting chart 4-9.

Audio Response Test (X-Mode) at other modulating frequencies

3. Set AN/GRM-114A MODULATION FREQ Hz thumbwheels (1) to modulating frequencies listed below. Note MM-100E meter and AN/GRM-114A DEVIATION meter (2) indications. (See test setup diagram, page 4-25.)

   a. 03000.0 Hz
   b. 05000.0 Hz
   c. 10000.0 Hz
   d. 00500.0 Hz

STANDARD. MM-100E meter should indicate between +2 db and -3 db of reading noted in step 1, and AN/GRM-114A DEVIATION meter should indicate 8 kHz at each frequency.

4. If MM-100E meter does not indicate between +2 db and -3 db of reading noted in step 1, or if AN/GRM-114A DEVIATION meter does not indicate 8 kHz at each frequency, see troubleshooting chart 4-9.

4-10. RECEIVER SELECTIVITY TEST.

NOTE

This check cannot be accomplished if the FL4002 is set at 50 kHz. The X-MODE switch must be in the WIDEBAND position for checking the FL4002 filter.

PURPOSE. This test checks the ability of the RT A4000 tray IF Filters FL4001 and FL4002 to reject unwanted signals and, thus, determine bandwidth. The receiver should have a minimum bandwidth of 32 kHz at the filters' 6-db attenuation point and a maximum bandwidth of 60 kHz at their 60-db attenuation point. This is verified by:

   1. Finding the minimum rf level which must be injected into the RT ANTENNA port to cause the CALL lamp to light.
   2. Injecting twice the rf level found in step 1, while observing that the RT CALL lamp is lit when the frequency is offset ±16 kHz from the carrier.
   3. Injecting 1000 the rf level found in step 1, while observing that the RT CALL lamp is off when the frequency is offset more than ±40 kHz from the carrier.

TEST EQUIPMENT AND MATERIALS

   Power Supply PP-1104(*)/G
   Maintenance Kit MK-1978/VRC
   Test Set AN/GRM-114A
   Rf Cable RG-58/U

TEST SETUP. Connect equipment as shown in test setup diagram, page 4-27.
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
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</thead>
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<td>RCVCE</td>
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<td>RT</td>
<td>BAND</td>
<td>A</td>
</tr>
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<td>MC-TUNE-KC</td>
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<td>SQUELCH</td>
<td>OLD ON</td>
</tr>
<tr>
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<td>LIGHT</td>
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</tr>
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<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
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</tr>
</tbody>
</table>

AN/GRM-114A; MM-100E: See test setup diagram, page 4-28.
4-10. RECEIVER SELECTIVITY TEST. (CONT)

TEST PROCEDURE
4-10. RECEIVER SELECTIVITY TEST. (CONT)

1. Turn AN/GRM-114A RF LEVEL control (1) slowly clockwise until RT CALL lamp lights. (See test setup diagram © page 4-28) Note RF LEVEL setting.

2. Increase RF LEVEL to twice indication noted in step 1.

STANDARD. RT CALL lamp should stay lit.

3. If RT CALL lamp goes off, see troubleshooting chart 4-10.

4. Set AN/GRM-114A RF FREQUENCY MHZ thumbwheels (2) to 030 019.0(30.019 MHz).

STANDARD. RT CALL lamp should go off.

5. If RT CALL lamp stays lit, see troubleshooting chart 4-10.

6. Decrease AN/GRM-114A RF FREQUENCY MHZ thumbwheel setting (2) in 1-kHz steps until RT CALL lamp lights. Note FREQUENCY MHZ setting (2).

7. Set AN/GRM-114A RF FREQUENCY MHZ thumbwheels (2) to 029961.0(29.981 MHz).

STANDARD. RT CALL lamp should go off.

8. If RT CALL lamp stays lit, see troubleshooting chart 4-10.

9. Increase AN/GRM-114A RF FREQUENCY MHZ thumbwheel setting (2) in 1-kHz steps until RT CALL lamp lights, Note FREQUENCY MHZ setting (2).

10. Subtract frequency noted in step 9 from frequency noted in step 6.

STANDARD. The difference between the two frequencies should beat least 32 kHz.

11. If difference between frequencies noted in step 9 and step 6 is less than 32 kHz, but not more than 38 kHz with ±16 kHz minimum and ±19 kHz maximum, see troubleshooting chart 4-10.

12. Set AN/GRM-114A HI LVL/µv x100/NORM switch (3) to µv x100.

13. Increase AN/GRM-114A RF LEVEL control (1) to ten times indication noted in step 1.

14. Set AN/GRM-114A RF FREQUENCY MHZ thumbwheels (2) to 030 041.0(30.041 MHz).

STANDARD. RT CALL lamp should go off.

15. If RT CALL lamp stays lit, see troubleshooting chart 4-10.

16. Decrease AN/GRM-114A RF FREQUENCY MHZ thumbwheel setting (2) in 1-kHz steps until RT CALL lamp lights, Note RF FREQUENCY MHZ setting (2).

17. Set AN/GRM-114A RF FREQUENCY MHZ thumbwheels (2) to 029959.0(29.959 MHz).

STANDARD. RT CALL lamp should go off.

18. If RT CALL lamp stays lit, see troubleshooting chart 4-10.

19. Increase AN/GRM-114A RF FREQUENCY MHZ thumbwheel setting (2) in 1-kHz steps until RT CALL lamp lights, Note RF FREQUENCY MHZ setting (2).

20. Subtract RF FREQUENCY MHZ setting (2) noted in step 19 from setting noted in step 16.

STANDARD. The difference between the two frequencies should be 80 kHz or less.

21. If difference between frequencies noted in step 19 and step 16 is more than 80 kHz, see troubleshooting chart 4-10.
4-11. TRANSMITTER FREQUENCY ACCURACY TEST.

PURPOSE. This test verifies proper operation of the frequency crystals and antenna control circuits in the transmitter. The RT is keyed, and its output is measured (in kHz) on the AN/GRM-114A FREQ ERROR meter. Frequency accuracy must be within ±3.5 of the RT MC-TUNE-KC switch setting to meet the standard.

TEST EQUIPMENT AND MATERIALS

Power Supply PP-1104(∗)/G
Maintenance Kit MK-1978/VRC
Test Set AN/GRM-114A
Rf Cable RG-58/U

TEST SETUP. Connect equipment as shown in test setup diagram A.

CAUTION

Do not set MK-1978/VRC KEY switch to XMIT unless RT ANTENNA Port and AN/GRM-114A TRANS-RCVR connector are connected.
4-11. TRANSMITTER FREQUENCY ACCURACY TEST. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
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<td>MK-1978/VRC</td>
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<tr>
<td></td>
<td>BAND</td>
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<td>MC-TUNE-KC</td>
<td>LOW</td>
</tr>
<tr>
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<td>POWER</td>
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<td>See test setup diagram</td>
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</tr>
</tbody>
</table>

[B] See test setup diagram
4-11. TRANSMITTER FREQUENCY ACCURACY TEST. (CONT)

TEST PROCEDURE

1. Key transmitter by setting MK-1978/VRC KEY switch to XMIT. Observe AN/GRM-114A FREQ ERROR meter(l). (See test setup diagram ©.)

STANDARD. AN/GRM-114A FREQ ERROR meter should indicate between +3.5 kHz and -3.5 kHz.

2. If AN/GRM-114A FREQ ERROR meter indicates above +3.5 kHz or below -3.5 kHz, see troubleshooting chart 4-11.

3. Unkey transmitter by setting MK-1978/VRC KEY switch to RCVE.

4. Set the AN/GRM-114A RF FREQUENCY MHz thumbwheels and RT MC-TUNE-KC switch to frequencies listed below. At each frequency, repeat steps 1,2, and 3. Turn BAND switch to at frequencies 53.00 and above. Test the following frequencies:

   A. 30.05 MHz
   B. 30.10 MHz
   C. 30.20 MHz
   D. 30.30 MHz
   E. 30.40 MHz
   F. 30.50 MHz
   G. 30.60 MHz
   H. 30.70 MHz
   I. 30.80 MHz
   J. 30.90 MHz
   K. 41.00 MHz
   L. 52.00 MHz
   M. 53.00 MHz
   N. 64.00 MHz
   O. 75.00 MHz
   P. 86.00 MHz
   Q. 97.00 MHz
   R. 108.00 MHz
   S. 119.00 MHz
   T. 130.00 MHz
   U. 141.00 MHz
   V. 152.00 MHz
   W. 163.00 MHz
   X. 174.00 MHz
   Y. 185.00 MHz
   Z. 196.00 MHz

   1. 30.60 MHz
   J. 30.90 MHz
   K. 41.00 MHz
   L. 52.00 MHz
   M. 53.00 MHz
   N. 64.00 MHz
   O. 75.00 MHz
   P. 86.00 MHz
   Q. 97.00 MHz
   R. 108.00 MHz
   S. 119.00 MHz
   T. 130.00 MHz
   U. 141.00 MHz
   V. 152.00 MHz
   W. 163.00 MHz
   X. 174.00 MHz
   Y. 185.00 MHz
   Z. 196.00 MHz
4-12. TRANSMITTER LOW AND HIGH POWER OUTPUT TEST.

PURPOSE. This test checks the RT's ability to transmit a modulated rf carrier with sufficient power. The radio is keyed, and the power output is measured with the AN/GRM-114AWAIT meter. Low output power should be between 0.5 and 10 watts; high power between 30 and 65 watts.

TEST EQUIPMENT AND MATERIALS

- Power Supply PP-1104(*)/G
- Test Set AN/GRM-114A
- Maintenance Kit MK-1978/VRC
- Rf Cable RG-58/U

TEST SETUP. Connect test equipment as shown in test setup diagram.

CAUTION

Do not set MK-1978/VRC KEY switch to XMIT unless RT ANTENNA port and AN/GRM-114A TRANS-RCVR connector are connected.

Do not connect transmitter to antenna connector. Connect only external antenna to antenna connector.

Maximum continuous input to antenna connector must not exceed 0.25 watts.

Maximum input to antenna connector is -30 dbm for proper spectrum analyzer operation. (Signals above -30 dbm may cause spurious signals to be generated and displayed by AN/GRM-114A.)

If a signal is to be monitored through the UUT via a direct cable connection to TRANS-RCVR connector, do not apply more than 20 watts of continuous input to TRANS-RCVR connector. Maximum operating "on" time for measurement of a transmitter output using TRANS-RCVR connector is:

- 10 seconds at 100 watts, 15% duty cycle,
- 20 seconds at 50 watts 30% duty cycle, or
- 2 minutes at 30 watts 50% duty cycle.
4-12. TRANSMITTER LOW AND HIGH POWER OUTPUT TEST. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

### CONTROL AND SWITCH SETTINGS

<table>
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<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
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<td>X-MODE (RT)</td>
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<td>AUX RCVR</td>
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<td>BAND</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
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<tr>
<td></td>
<td>SQUELCH</td>
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<tr>
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<td>See test setup diagram</td>
</tr>
</tbody>
</table>

![Test Setup Diagram](image)
4-12. TRANSMITTER LOW AND HIGH POWER OUTPUT TEST. (CONT)

TEST PROCEDURE

1. Key transmitter by setting MK-1978/VRC KEY switch to XMIT and vary PP-1104(*)/E output between 22 and 30 Vdc. Observe AN/GRM-114A WATTS meter (1). (See test setup diagram C.)

STANDARD. AN/GRM-114A WATTS meter should indicate between 0.30 and 0.65.

NOTE

For actual power in watts, multiply meter indication by 100. The true RT HIGH POWER output should be between 30 and 65 watts.

2. If AN/GRM-114A WATTS meter indicates less than 0.30 or more than 0.65, see troubleshooting chart 4-12.

3. Unkey transmitter by setting MK-1978/VRC KEY switch to RCVE.

4. Repeat steps 1, 2, and 3 with RT MC-TUNE-KC switch set at 41.00, 52.00, 53.00, 64.00, and 75.00 MHz. Turn BAND switch to A for frequencies 53.00 MHz and above.

5. Turn RT POWER switch to LOW.

6. Set AN/GRM-114A DEV/PWR switch (2) to x10.

7. Turn RT MC-TUNE-KC switch to 30.00 MHz, BAND A.

8. Key transmitter. Observe AN/GRM-114A WATTS meter (1).
4-12. TRANSMITTER LOW AND HIGH POWER OUTPUT TEST. (CONT)

STANDARD. AN/GRM-114A WATTS meter should indicate between 0.05 and 1.0.

NOTE

That is, the RT’s LOW POWER output should be between 0.5 and 10.0 watts.

9. If AN/GRM-114A WATTS meter indicates less than 0.05 or more than 1.0, see troubleshooting chart 4-12.
10. Unkey transmitter.
11. Repeat steps 7, 8, and 9 with RT MC-TUNE-KC switch set at 41.00, 52.00, 84.00, and 75.00 MHz. Turn BAND switch to B for frequencies 53.00 MHz and above.
13. TRANSMITTER DEVIATION TEST(NORMAL MODE).

PURPOSE. Carrier wave variation, or deviation, is directly proportional to the amplitude variations of the modulating signal. This test checks both (1) Transmitter Speech Amplifier A8500 Assembly gain control circuits, which develop proper signal strength before modulation, and (2) Modulators A8100 and A6300. An audio signal is injected into the MK-1978/VRC MIC/PIN N jack, the transmitter is keyed, and the output is measured on the AN/GRM-114A DEVIATION (kHz) meter.

TEST EQUIPMENT AND MATERIALS

Power Supply PP-1104(*)/G
Maintenance Kit MK-1978/VRC
Test Set AN/GRM-114A
Rf Cables (two) RG-58/U
Adapter (T-Connector) UG-274/U

TEST SETUP. Connect test equipment as shown in test setup diagram A.

CAUTION

Do not set MK-1978/VRC KEY switch to XMIT unless RT ANTENNA port and AN/GRM-114A TRANS-RCVR connector are connected.
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
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<td>MK-1978/VRC</td>
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</tr>
<tr>
<td></td>
<td>AUDIO</td>
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</tr>
<tr>
<td></td>
<td>KEY</td>
<td>RCVE</td>
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<tr>
<td></td>
<td>X-MODE (RT)</td>
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<tr>
<td></td>
<td>AUX RCVR</td>
<td>NORMAL</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
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</tr>
<tr>
<td>RT</td>
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</tr>
<tr>
<td></td>
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<td>30.00</td>
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<td>MC-TUNE-KC</td>
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<td>POWER</td>
<td>OLD ON</td>
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<td>SQUELCH</td>
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<td>VOLUME</td>
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<tr>
<td>AN/GRM-114A;</td>
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<td>MM-100E</td>
<td>See test setup diagram</td>
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</table>

See test setup diagram B, page 4-38.
4-13 TRANSMITTER DEVIATION TEST (NORMAL MODE) (CONT)

TEST PROCEDURE
4-13. TRANSMITTER DEVIATION TEST (NORMAL MODE). (CONT)

Deviations Test (Normal Mode) at 1kHz.

1. Connect attenuated probe A to MK-1978/VRC MIC/PIN N jack (inside KEY square); connect probe B to GND. (See test setup diagram, page 4-37)
2. Adjust AN/GRM-114A VAR knob (1) (see test setup diagram, page 4-38) for 0.22-volt indication on MM-100E meter.
3. Key transmitter by setting MK-1978/VRC KEY switch to XMIT. Observe AN/GRM-114A DEVIATION (kHz) meter (2) indication.

STANDARD. AN/GRM-114A DEVIATION (kHz) meter (2) should indicate between 6 kHz and 10 kHz.

4. If DEVIATION meter indicates more than 10 kHz, see troubleshooting chart 4-13.
5. If DEVIATION meter indicates less than 6 kHz.
   a. Unkey transmitter.
   b. Set RT POWER to HIGH.
   c. Key transmitter.

NOTE

If DEVIATION meter still indicates below 6 kHz, see troubleshooting chart 4-13.

6. Unkey transmitter.

Deviations Test (Normal Mode) at 500 Hz.

7. Set AN/GRM-114A MODULATION FREQ Hz thumbwheels (3) to 00500.0 (Hz).
8. Reconnect attenuated probe A to MK-1978/VRC MIC/PIN N jack and probe B to GND.
9. Adjust AN/GRM-114A VAR/OFF knob (1) for 0.22-volt indication on MM-100E meter.
10. Repeat steps 3 through 6.

Deviations Test (Normal Mode) at 3 kHz.

11. Set AN/GRM-114A MODULATION FREQ Hz thumbwheels (3) to 03000.0 (Hz).
12. Reconnect attenuated probe A to MK-1978/VRC MIC 1 PIN N jack and probe B to GND.
13. Adjust AN/GRM-114A VAR/OFF knob (1) for 0.22-volt indication on MM-100E meter.
14. Repeat steps 3 through 6.
4-14. TRANSMITTER LIMITING TEST.

PURPOSE. Limiting circuits eliminate those portions of a signal that exceed a specific amplitude. This test verifies that higher than acceptable audio frequency input levels will not force the RT to overdeviate. As in the Transmitter Deviation Test (Normal Mode) (paragraph 4-13), an audio signal is injected into the MK-1978/VRC MIC/PIN N jack, the transmitter is keyed, and the output is measured on the AN/GRM-114A DEVIATION (kHz) meter.

TEST EQUIPMENT AND MATERIALS

<table>
<thead>
<tr>
<th>Equipment/Part</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply</td>
<td>PP-1104(*)/G</td>
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<tr>
<td>Maintenance Kit</td>
<td>MK-1978/VRC</td>
</tr>
<tr>
<td>Test Set</td>
<td>AN/GRM-114A</td>
</tr>
</tbody>
</table>

ADAPTER (T-CONNECTOR) UG-274/U

Rf Cables (two) RG-58/U

TEST SETUP. Connect test equipment as shown in test setup diagram A.

CAUTION

Do not set MK-1978/VRC KEYSwitch to XMIT unless RT ANTENNA port and AN/GRM-114A TRANS-RCVR connector are connected.
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

### CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK-1978/VRC</td>
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<td>KEY</td>
<td>RCVE</td>
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<tr>
<td></td>
<td>X-MODE (RT)</td>
<td>NORMAL</td>
</tr>
<tr>
<td></td>
<td>AUX RCVR</td>
<td>NORMAL</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>ON</td>
</tr>
<tr>
<td>RT</td>
<td>LIGHT</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
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<td>MC-TUNE-KC</td>
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<td>POWER</td>
<td>OLD ON</td>
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<td></td>
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<td></td>
<td>VOLUME</td>
<td>OFF</td>
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<td></td>
<td>SPEAKER (RT-524/VRC)</td>
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<tr>
<td>MM-100E</td>
<td>See test setup diagram</td>
<td>B</td>
</tr>
</tbody>
</table>

![Test Setup Diagram]

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**Diagram Notes:**

- **5 kHz:**
  - 030 000.0
  - 20 kHz DEV

- **3V:**
  - HI-Z
  - SEE PROCEDURE OFF
  - FM RCVR MID ON AUTO

- **Offset:**
  - INPUT LEVEL
  - DISTORTION
  - HI-Z
4-14. TRANSMITTER LIMITING TEST. (CONT)

TEST PROCEDURE

Limiting Test at 1 kHz

1. Connect attenuated probe A to MK-1978/VRC MIC/PIN N jack (inside KEY square); connect probe B to GND. (See test setup diagram A, page 4-40.)
2. Adjust AN/GRM-114A VAR knob (1) (see test setup diagram C) for 1.1-volt indication on MM-100E meter.
3. Key transmitter by setting MK-1978/VRC KEY switch to XMIT. Observe AN/GRM-114A DEVIATION (kHz) meter (2) indication.

STANDARD. AN/GRC-114A DEVIATION (kHz) meter (2) should indicate between 8 kHz and 12 kHz.

4. If DEVIATION meter indicates more than 12 kHz, see troubleshooting chart 4-11.
5. If DEVIATION meter indicates less than 8 kHz,
   a. Unkey transmitter.
   b. Set RT POWER to HIGH.
   c. Key transmitter.

NOTE

If DEVIATION meter still indicates below 8 kHz, see troubleshooting chart 4-11.

6. Unkey transmitter.
4-14 TRANSMITTER LIMITING TEST. (CONT)

Limiting Test at 500 Hz

7. Set AN/GRM-114A MODULATION FREQ Hz thumbwheels (3) to 00 500.0 (Hz).
8. Reconnect attenuated probe A to MK-1978/VRC MIC/PIN N Jack and probe B to GND.
9. Adjust AN/GRM-114A VAR knob(1) for 1.1-volt Indication on MM-100E meter.
10. Repeat steps 3 through 6.

Limiting Test at 3 kHz

11. Set AN/GRM.114A MODULATION FREQ Hz thumbwheels (3) to 03000.0 (Hz).
12. Reconnect attenuated probe A to MK-1978/VRC MIC/PIN N jack and probe B to GND.
13. Adjust AN/GRM-114A VAR (1) knob for 1.1-volt indication on MM-100E meter.
14. Repeat steps 3 through 8.

4-15. TRANSMITTER DISTORTION TEST (NORMAL MODE).

PURPOSE. Distortion will ruin the quality of an audio signal and must, therefore, be kept at the lowest possible level. This test measures the percentage of distortion in the signal transmitted by the RT. An audio signal is injected into the MK-1978/VRC MIC/PIN N jack. The transmitter is keyed, the output is demodulated, and the distortion is measured on the MM-100E distortion scale.

TEST EQUIPMENT AND MATERIALS

Power Supply PP-1104(*)/G
Maintenance Kit MK-1978/VRC
Test Set AN/GRM-114A
Rf Cable RG-58/U
Adapter (T-Connector) UG-274/U

TEST SETUP. Connect equipment as shown in test setup diagram A.

CAUTION

Do not set MK-1978/VRC KEY switch to XMIT unless RT ANTENNA port and AN/GRM-114A TRANS-RCVR connector are connected.
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

### CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK-1978/VRC</td>
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<td></td>
<td>AUDIO</td>
<td>MUTED</td>
</tr>
<tr>
<td></td>
<td>X-MODE (RT)</td>
<td>RCVE</td>
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<tr>
<td></td>
<td>AUX RCVR</td>
<td>NORMAL</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>ON</td>
</tr>
<tr>
<td>RT</td>
<td>LIGHT</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>30.00</td>
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<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>OLD ON</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
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<td></td>
<td>VOLUME</td>
<td></td>
</tr>
<tr>
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<td>SPEAKER (RT-524/VRC)</td>
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<tr>
<td>AN/GRM-114A; MM-100E</td>
<td>See test setup diagram <a href="#">B</a>, page 4-45</td>
<td></td>
</tr>
</tbody>
</table>
4-15. TRANSMITTER DISTORTION TEST (NORMAL MODE). (CONT)

TEST PROCEDURE

(A) DISCONNECT RF CABLE FROM THIS SIDE OF T CONNECTOR

(B) CONNECT RF CABLE HERE

TO MK-1978/VRC

T CONNECTOR
4-15. TRANSMITTER DISTORTION TEST (NORMAL MODE). (CONT)

1. Connect attenuated probe A to MK-1978/VRC MIC/PIN N jack (inside KEY square); connect B to GND. (See test setup diagram A, page 4-44).
2. Adjust AN/GRM-114A VAR knob for 0.22-volt indication on MM-100E meter.
3. Disconnect rf cable from MM-100E side of T-connector. Connect rf cable to MM-100E DEMOD port. (See test setup diagram C).

4. Turn MM-100E RANGE switch (1) to DIST 0 - 30%. (See test setup diagram D).
5. Key transmitter by setting MK-1978/VRC KEY switch to XMIT. Observe MM-100E black distortion scale (2).

STANDARD. MM-100E black distortion scale (2) should indicate less than 10% distortion.

6. If MM-100E black distortion scale (2) indicates 10% or greater, see troubleshooting chart 4-14.
7. Unkey transmitter by setting MK-1978/VRC switch to RCVE.
4-16 TRANSMITTER DEVIATION TEST (X-MODE)

PURPOSE. This test checks much of the same circuitry as the Transmitter Deviation Test (Normal Mode) (paragraph 4-13). When setup for X-mode, however, the RT does not utilize Speech Amplifier A8500 Assembly. An audio signal is injected into the MK-1978/VRC XMTR jack, the transmitter is keyed, and the output is measured on the AN/GRM-114A DEVIATION (kHz) meter and oscilloscope.

TEST EQUIPMENT AND MATERIALS

- Power Supply PP-1104(*)/G
- Maintenance Kit MK-1978/VRC
- Test Set AN/GRM-114A
- Rf cables (two) RG-58/U
- Adapter UG-274/U

TEST SETUP. Connect equipment as shown in test setup diagram A.

CAUTION

Do not set MK-1978/VRC KEY switch to XMIT unless RT ANTENNA port and AN/GRM-114A TRANS-RCVR connector are connected.
4-16. TRANSMITTER DEVIATION TEST (X-MODE). (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

### CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
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<td>KEY</td>
<td>RCVE</td>
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<td>AUX RCVR</td>
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<td>X-MODE (RT)</td>
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<td>SQUELCH</td>
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<td>BAND</td>
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<td>VOLUME</td>
<td>OFF</td>
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<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td>See test setup diagram B</td>
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</tbody>
</table>

AN/GRM-114A; MM-100E

---

**Diagram:**

[Diagram showing control and switch settings for the equipment.]
4-16 TRANSMITTER DEVIATION TEST (X-MODE). (CONT)

TEST procedure

1. Connect attenuated probe A to MK-1978/VRC XMTR jack (inside X-MODE square); connect probe B to GND. (See test setup diagram A, page 4-47.)

2. Adjust AN/GRM-114A VERT control (1) and DEV-VERT (small knob) control (2) until oscilloscope (3) waveform spans four divisions peak-to-peak. (See test setup diagram C.)

NOTE

Calibrate oscilloscope for 9 kHz per division.

3. Adjust AN/GRM-114A VAR control (4) for 0.8-volt indication on MM-100E meter.

4. Set AN/GRM-114A GEN/RCVR switch (5) to RCVR.

5. Key transmitter by turning MK-1978/VRC KEY switch to XMIT. Observe AN/GRM-114A DEVIATION (kHz) meter (6).

STANDARD. AN/GRM-114A DEVIATION (kHz) meter (6) should indicate between 6 and 10 kHz.

6. If DEVIATION meter indicates more than 10 kHz, see troubleshooting chart 4-15.
4-16. TRANSMITTER DEVIATION TEST (X-MODE). (CONT)

7. If DEVIATION meter indicates less than 6 kHz:
   a. Unkey transmitter.
   b. Set RT POWER to HIGH.
   c. Key transmitter.

   **NOTE**

   If DEVIATION meter still indicates less than 6 kHz, see troubleshooting chart 4-15.

8. Unkey transmitter by turning MK-1978/VRC KEY switch to RCVE.
9. Turn AN/GRM-114A DEV/PWR switch (7) to x 1.
10. Turn MM-100E RANGE switch (8) to 3 volts.
11. Adjust AN/GRM-114A VAR/OFF control (4) for 2.5-volt indication on MM-100E meter.

   **STANDARD.** Waveform should be between 36 and 72 kHz peak-to-peak (That is, the wave spans between four and eight vertical divisions.)

13. If AN/GRM-114A oscilloscope waveform is less than 36 kHz or more than 72 kHz peak-to-peak, see troubleshooting chart 4-15.
14. Unkey transmitter.

4-17. TRANSMITTER DISTORTION TEST (X-MODE).

**PURPOSE.** This test measures the percentage of distortion in the X-mode signal transmitted by the RT. It is the same as the Transmitter Distortion Test (Normal Mode) [paragraph 4-15], except for a change in the signal injection point.

**TEST EQUIPMENT AND MATERIALS**

- Power supply PP-1104(*)/G
- Test Set AN/GRM-114A
- Maintenance Kit MK-1978/VRC
- Rf Cables (two) RG-58/U
4-17. TRANSMITTER DISTORTION TEST (X-MODE). (CONT)

TEST SETUP. Connect equipment as shown in test setup diagram A.

CAUTION

Do not set MK-1978/VRC KEY switch to XMIT unless RT ANTENNA port and AN/GRM-114A TRANS-RCVR connector are connected.

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

<table>
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<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
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<td>AUX RCVR</td>
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<td>X-MODE (RT)</td>
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<td>SQUELCH</td>
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</table>
4-17. TRANSMITTER DISTORTION TEST (X-MODE). (CONT)

**CONTROL AND SWITCH SETTINGS (CONT)**

<table>
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<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
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<tbody>
<tr>
<td>RT</td>
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<tr>
<td></td>
<td>BAND</td>
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<tr>
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<td>MC-TUNE-KC</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
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<td></td>
<td>SQUELCH</td>
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<tr>
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<td>VOLUME</td>
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<tr>
<td>AN/GRM-114A; MM-100E</td>
<td>See test setup diagram</td>
<td>B</td>
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---

![Diagram of equipment controls and settings](image)

ELAGP287

Change 4  4-52
4-17. TRANSMITTER DISTORTION TEST (X-MODE). (CONT)

TEST PROCEDURE

1. Connect attenuated probe A to MK-1978/VRC XMTR jack (inside X-MODE square); connect probe B to GND. (See test setup diagram A, page 4-51).
2. Connect MM-100E INPUT connector (3) to its DEMOD connector (4) with RG-58/U cable.
3. Turn MM-100E RANGE switch (5) to DIST 0-30%.
4. Key transmitter by setting MK-1978/VRC KEY switch to XMIT. Observe MM-100E black distortion scale (6).
5. Adjust AN/GRM-114A VAR control (1) for 20-kHz indication on DEVIATION meter (2). (See test setup diagram C).

STANDARD. MM-100E black distortion scale (6) should indicate less than 7 percent distortion.

6. If MM-100E black distortion scale (6) indicates more than 7 percent distortion, see troubleshooting chart 4-11.
7. Unkey transmitter by setting MK-1978/VRC KEY switch to RCVE.
4-18. TRANSMITTER SQUELCH TONE STABILITY TEST.

PURPOSE. Transmitter squelch tone must be accurate if a distant radio is to receive the desired signals. This test checks the Speech Amplifier A8500 and Squelch Amplifier A5200 modules for proper squelch tone development. The RT is keyed with the SQUELCH switch set to NEW ON, NEW OFF, and OLD OFF. Frequency accuracy and deviation measurements are then taken on the AN/GRM-114A.

TEST EQUIPMENT AND MATERIALS

- Power Supply PP-1104(*)/G
- Maintenance Kit MK-1978/VRC
- Test Set AN/GRM-114A
- Rf Cable

TEST SETUP. Connect equipment as shown in test setup diagram A.

CAUTION

Do not set MK-1978/VRC KEY switch to XMIT unless RT ANTENNA port and AN/GRM-114A TRANS-RCVR connector are connected.
4-18. TRANSMITTER SQUELCH TONE STABILITY TEST. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

### CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
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<td>MK-1978/VRC</td>
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<td>KEY</td>
<td>RCVE</td>
</tr>
<tr>
<td></td>
<td>X-MODE (RT)</td>
<td>NORMAL</td>
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<tr>
<td></td>
<td>AUX RCVR</td>
<td>NORMAL</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>ON</td>
</tr>
<tr>
<td>RT</td>
<td>LIGHT</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>A</td>
</tr>
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<td>MC-TUNE-KC</td>
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<tr>
<td>AN/GRM-114A</td>
<td>See test setup diagram</td>
<td>B</td>
</tr>
</tbody>
</table>
4-18. TRANSMITTER SQUELCH TONE Stability TEST. (CONT)

TEST PROCEDURE

1. Key transmitter by setting MK-1978/VRC KEY switch to XMIT. Note AN/GRM-114A DEVIATION (kHz) meter (1) indication. (See test setup diagram ©.)

STANDARD. AN/GRM-114A DEVIATION (kHz) meter (1) should indicate 3 kHz ±0.5 kHz.

2. If DEVIATION meter indicates below 2.5 kHz or above 3.5 kHz, aline A8500 module (paragraph 4-42). (If unable to aline, replace A8500 module.)

3. Adjust AN/GRM-114A VAR/OFF control (2) to obtain lissajous ellipse pattern on oscilloscope.
4-18. TRANSMITTER SQUELCH TONE STABILITY TEST. (CONT)

NOTE

The lissajous pattern may be rotating.

4. Adjust AN/GRM-114A MODULATION FREQ Hz thumbwheels (3) until lissajous pattern is stationary.

STANDARD. Lissajous pattern should be stationary when the AN/GRM-114A Modulation FREQ Hz thumbwheels (3) are between 00149.0 and 00151.0 Hz.

5. If lissajous pattern is not stationary when the AN/GRM-114A MODULATION FREQ Hz thumbwheels are between 00149.0 and 00151.0 Hz, check wiring between A8500 and A5300 modules. If wiring is ok align A5300 module (paragraph 4-33) or A5300A (paragraph 4-34).

6. Turn RT SQUELCH switch to NEW OFF.
7. Repeat steps 1 through 5.
8. Turn RT SQUELCH switch to OLD OFF.
9. Repeat steps 1 through 5.

4-19. TRANSMITTER SIGNAL-TO-NOISE RATIO TEST.

PURPOSE. Some noise is always present in electronic signals and can never be completely eliminated. However, if the signal is much stronger than the noise, the signal intelligence will remain nearly free of interference. So, a high signal-to-noise ratio is desirable. This test checks the transmitter for an acceptable signal-to-noise ratio. An audio signal is injected into the MK-1978/VRC MIC/PIN N jack, the transmitter is keyed, and the signal-to-noise ratio is measured with a db meter at the MK-1978/VRC SPKR jack.

TEST EQUIPMENT AND MATERIALS

- Power Supply PP-1104(*)/G
- Test Set AN/GRM-114A (two probes needed)
- Maintenance Kit MK-1978/VRC
- Rf Cable RG-58/U

TEST SETUP. Connect equipment as shown in test setup diagram page 4-58.

CAUTION

Do not set MK-1978/VRC KEY switch to XMIT unless RT ANT port and AN/GRM-114A connector are connected.
4-19. TRANSMITTER SIGNAL-TO-NOISE RATIO TEST. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK-1978/VRC</td>
<td>POWER</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>AUDIO</td>
<td>MUTED</td>
</tr>
<tr>
<td></td>
<td>KEY</td>
<td>RCVE</td>
</tr>
<tr>
<td></td>
<td>X-MODE (RT)</td>
<td>NORMAL</td>
</tr>
<tr>
<td></td>
<td>AUX RCVR</td>
<td>NORMAL</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>ON</td>
</tr>
<tr>
<td>RT</td>
<td>LIGHT</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>a</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>OLD ON</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td>OFF</td>
</tr>
<tr>
<td>AN/GRM-114A</td>
<td>See test setup diagram</td>
<td>B, page 4-59</td>
</tr>
<tr>
<td>MM-100E</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[Diagram of equipment controls and connections]
4-19. TRANSMITTER SIGNAL-TO-NOISE RATIO TEST. (CONT)

TEST PROCEDURE
4-19. TRANSMITTER SIGNAL-TO-NOISE RATIO TEST. (CONT)

1. Connect MM-100E attenuated probe A to MK-1978/VRC SPKR jack (inside AUDIO square); connect probe B to GND. (See test setup diagram A, page 4-58.)
2. Connect AN/GRM-114A attenuated probe A to MK-1978/VRC MIC/PIN N jack (inside KEY square); connect probe B to GND.
3. Key transmitter by setting MK-1978/VRC KEY switch to XMIT.
4. If necessary, readjust AN/GRM-114A VAR/OFF control (1) for 8-kHz indication on DEVIATION (kHz) meter(2). (See test setup diagram ©, page 4-59.)
5. Adjust RT VOLUME control for zero-db indication on MM-100E red db scale (3).

NOTE

MM-100E speaker (4) will emit 1-kHz tone.

7. Set MM-100E RANGE switch (5) to 0.3 volts.

STANDARD. MM-100E red db scale (3) should indicate -5 db or greater (from zero-db reference).

NOTE

After setting the reference at 0 db, you removed the signal and measured the noise. Remember, the MM-100E RANGE switch has been reset to 0.3 volts. Therefore, the actual value of a -5 db meter indication is -35 db.

8. If MM-100E red db scale (3) does not indicate -5 db or greater, see troubleshooting chart 4-16.
9. Unkey transmitter by setting MK-1978/VRC KEY switch to RCVE.

4-29. ANTENNA INFORMATION (SWITCHING) TEST.

PURPOSE. This test checks the performance of the RT ANTENNA CONTROL switches and ANT CONT jack connectors. The transmitter is keyed and the MK-1978/VRC indicator lights are observed for proper response to band and frequency selections.

TEST EQUIPMENT AND MATERIALS

<table>
<thead>
<tr>
<th>Power Supply PP-1104(*)/G</th>
<th>Test Set AN/GRM-114A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance Kit MK-1978/VRC</td>
<td>Rf Cable RG-58/U</td>
</tr>
</tbody>
</table>

4-60 Change 1
4-20. ANTENNA INFORMATION (SWITCHING) TEST. (CONT)

TEST SETUP. Connect equipment as shown in test setup diagram A.

CAUTION

Do not set MK-1978/VRC KEY switch to XMIT unless RT ANTENNA port and AN/G RM-114A TRANS-RCVR connector are connected.

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK-1978/VRC</td>
<td>POWER</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>AUDIO</td>
<td>Muted</td>
</tr>
<tr>
<td></td>
<td>KEY</td>
<td>RCVE</td>
</tr>
<tr>
<td></td>
<td>AUX RCVR</td>
<td>NORMAL</td>
</tr>
<tr>
<td></td>
<td>X-MODE (RT)</td>
<td>NORMAL</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>ON</td>
</tr>
</tbody>
</table>
### 4-20. ANTENNA INFORMATION (SWITCHING) TEST. (CONT)

#### CONTROL AND SWITCH SETTINGS (CONT)

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>LIGHT</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>(A)</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>OLD ON</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td>OFF</td>
</tr>
<tr>
<td>AN/GRM-114A</td>
<td>See test setup diagram B</td>
<td></td>
</tr>
</tbody>
</table>

---

![Diagram of equipment controls and settings](image-url)
4-20. ANTENNA INFORMATION (SWITCHING) TEST. (CONT)

TEST PROCEDURE


**STANDARD. MK-1978/VRC A BAND (1) and 33-33 (2) indicator lamps should be lit. (See test setup diagram C .

2. If proper lamps are not lit, see troubleshooting chart 4-17.
3. Turn RT MC-TUNE-KC switches and AN/GRM-114A RF FREQUENCY MHz thumbwheels to frequencies listed in the following table. At each frequency, observe MK-1978/VRC lamps for proper response. (See standard.)

**NOTE**

Turn RT BAND switch to B for frequencies 53.00 MHz and above.

<table>
<thead>
<tr>
<th>RT MC-TUNE-KC FREQUENCY MHZ</th>
<th>AN/GRM-114A RF FREQUENCY MHZ</th>
<th>MK-1978/VRC INDICATOR LAMPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>35.05</td>
<td>035 050 0</td>
<td>A 33-37</td>
</tr>
<tr>
<td>38.10</td>
<td>038 100 0</td>
<td>A 37-42</td>
</tr>
<tr>
<td>41.20</td>
<td>041 200 0</td>
<td>A 37-42</td>
</tr>
<tr>
<td>45.30</td>
<td>045 300 0</td>
<td>A 42-45</td>
</tr>
<tr>
<td>52.80</td>
<td>052 800 0</td>
<td>A 47.5-52</td>
</tr>
<tr>
<td>53.00</td>
<td>053 000 0</td>
<td>B 53-56</td>
</tr>
<tr>
<td>54.40</td>
<td>054 400 0</td>
<td>B 53-56</td>
</tr>
<tr>
<td>56.50</td>
<td>056 500 0</td>
<td>B 56-60</td>
</tr>
<tr>
<td>61.60</td>
<td>061 600 0</td>
<td>B 60-65</td>
</tr>
<tr>
<td>69.70</td>
<td>069 700 0</td>
<td>B 65-70.5</td>
</tr>
<tr>
<td>75.95</td>
<td>075 950 0</td>
<td>B 70.5-75</td>
</tr>
</tbody>
</table>
4-20. ANTENNA Information (SWITCHING) TEST. (CONT)

STANDARD. Proper MK-1978/VRC frequency range and BAND lamps should light at each tuned frequency.

4. If proper lamps do not light at each tuned frequency, see troubleshooting chart 4-17.

4-21. AUTOMATIC FREQUENCY SELECTION TEST.

NOTE

This test can be conducted on the RT-246/VRC only. The RT-524/VRC does not feature automatic frequency control.

PURPOSE. This test checks the RT-246/VRC servosystem, which allows the operator to pretune the radio to any 10 of the 920 available channels. Each channel is preset, then pressed in turn. The selected frequency should appear in the dial window within 5 seconds.

TEST EQUIPMENT AND MATERIALS

- Power Supply PP-1104(*)/G
- Wristwatch or Stopwatch
- Maintenance Kit MK-1978/VRC

NOTE

Since the radio will neither transmit nor receive signals during this test, the AN/GRM-114A will not be needed.

TEST SETUP. Connect equipment as shown in test setup diagram A.

Turn on test equipment. Allow at least 15 to 30 minutes for warmup.
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

**CONTROL AND SWITCH SETTINGS**

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK-1978/VRC</td>
<td>POWER</td>
<td>ON</td>
</tr>
<tr>
<td>RT-246/VRC</td>
<td>LIGHT</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>AUTO</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>75.95</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>OLD OFF</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td>Channel Buttons (preset)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>30.00 MHz</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>39.15</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>42.20</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>43.30</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>54.40</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>56.50</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>67.60</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>66.70</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>71.0</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>75.95</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE**

Directions for presetting channel buttons are in paragraph 4-46.

**TEST PROCEDURE**

1. Press RT-24/VRC channel button (see test setup diagram on page 4-64).
   Note time required for frequency to appear in dial window.

   STANDARD. 30.00-MHz display should appear in RT-246/VRC dial window within 5 seconds.

2. If 30.00-MHz display does not appear in RT-246/VRC dial window within 5 seconds, see paragraph 4-46.

3. Press each channel button (in any order). Note time required for each frequency to appear in dial window.

   STANDARD. Each preset frequency should appear in dial window within 5 seconds of selection.

4. If correct display does not appear within 5 seconds of each new frequency selection, see paragraph 4-46.
Section II TROUBLESHOOTING

442. GENERAL.

This section contains troubleshooting charts which will help you diagnose failures in the RT. The troubleshooting charts are designed to isolate faults in response to specific performance problems noted during performance testing in section I of this chapter.

There are two basic kinds of troubleshooting charts provided: gross failure troubleshooting and performance degradation troubleshooting. Both kinds of troubleshooting in this section are based on the use of Test Set AN/GRM-114A and Maintenance Kit MK-1978/VRC.

GROSS FAILURE TROUBLESHOOTING

Gross failure troubleshooting is generated by failure of the VOLUME control test, the first of the performance tests in section I of this chapter. Failure of the VOLUME control test indicates that no audio at all is available at the receiver’s loudspeaker jack. This implies a total failure of some module or component resulting in complete loss of signal. Therefore, the gross troubleshooting charts are designed to help you locate the failed module or component, with the assumption that the failed part does not operate at all.

This assumption differs from the approach taken in performance degradation troubleshooting, which assumes that a module or component may be responsible for slight defect symptoms because the part may be only partially operational.
4-22. GENERAL. (CONT)

PERFORMANCE DEGRADATION TROUBLESHOOTING

When its signals fail to meet certain standards, the RT's performance is considered degraded. Degraded performance can result in weak audio, limited reception range, distortion, and many other problems.

The troubleshooting charts are designed to locate the cause of the performance degradation by using procedures more complex than those utilized for gross troubleshooting. Added complexity is due to the fact that the troubleshooting tests must evaluate the quality of the signals at various test points, instead of merely confirming the presence of signals as is usually the case in gross troubleshooting.

OVERALL TROUBLESHOOTING APPROACH

Both kinds of troubleshooting charts contained in this section are intended for use based on the following assumptions in connection with the RT:

1. Only one malfunction exists which is causing the defect symptom.
2. The troubleshooting charts do not isolate every possible defect.
3. Failure to locate a defect using the charts suggests a wiring-related problem which can be isolated using the schematics located in the back of this manual.
4. Troubleshooting procedures for germanium and silicon versions of the RT are the same.

4-23. GROSS TROUBLESHOOTING PRELIMINARY INSTRUCTIONS.

The gross troubleshooting charts in this section are based on the assumption that the receiver fails the VOLUME control test at any frequency setting of the MG-TUNE-KC control. However, certain defects in the crystal reference system can result in loss of audio at some frequencies while the receiver can function normally at other frequency settings.

Before proceeding with the steps given in the gross troubleshooting charts, determine whether or not the failure of the VOLUME control test conforms to any of the following failure modes.

<table>
<thead>
<tr>
<th>FAILURE MODE</th>
<th>CAUSE</th>
<th>CORRECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>No audio on all channels ending in &quot;O&quot;, (eg, 30.00, 30.10, 30.20, etc).</td>
<td>Crystal Y2012 (5.65 MHz) in A2000 assembly.</td>
<td>Replace A2000 assembly.</td>
</tr>
<tr>
<td>No audio on all channels ending in &quot;5&quot;, (eg, 30.05, 30.15, 30.25, etc).</td>
<td>Crystal Y2011 (5.60 MHz) in A2000 assembly.</td>
<td>Replace A2000 assembly.</td>
</tr>
<tr>
<td>No audio on the same 100-kHz segment for each MHz of tuning.</td>
<td>Defective interpolation oscillator crystal.</td>
<td>Replace A2000 assembly. See Interpolation oscillator crystal chart.</td>
</tr>
</tbody>
</table>
4-23. GROSS TROUBLESHOOTING PRELIMINARY INSTRUCTIONS. (CONT)

INTERPOLATION OSCILLATOR CRYSTAL CHART

The following chart is used to isolate the particular crystal responsible for audio failure in the same 100-kHz segment for each MHz of tuning. In this failure mode, if audio is absent at 30.05 and 30.10, it will be absent at 40.05 and 40.10; 50.05 and 50.10, etc.

<table>
<thead>
<tr>
<th>SEGMENT OF KC CONTROL WHERE AUDIO IS ABSENT</th>
<th>CAUSE</th>
<th>CORRECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>05 and 10</td>
<td>Crystal Y2007</td>
<td>Replace A2000 assembly.</td>
</tr>
<tr>
<td>35 and 40</td>
<td>Crystal Y2010</td>
<td>Replace A2000 assembly.</td>
</tr>
<tr>
<td>45 and 50</td>
<td>Crystal Y2005</td>
<td>Replace A2000 assembly.</td>
</tr>
<tr>
<td>55 and 60</td>
<td>Crystal Y2004</td>
<td>Replace A2000 assembly.</td>
</tr>
<tr>
<td>65 and 70</td>
<td>Crystal Y2003</td>
<td>Replace A2000 assembly.</td>
</tr>
<tr>
<td>75 and 80</td>
<td>Crystal Y2002</td>
<td>Replace A2000 assembly.</td>
</tr>
<tr>
<td>85 and 90</td>
<td>Crystal Y2001</td>
<td>Replace A2000 assembly.</td>
</tr>
<tr>
<td>95 and 100</td>
<td>Crystal Y2006</td>
<td>Replace A2000 assembly.</td>
</tr>
</tbody>
</table>

+25 VOLT DC COMMON OUTPUT TROUBLESHOOTING CHART

NOTE

1. If the problem still exists, check the +25.5 Vdc output wiring.
4-24. TROUBLESHOOTING FLOW CHARTS.

CHART 4-1
No Audio Troubleshooting
(Sheet 1 of 25)

NOTES

1. Do not confuse audio tone with noise. Audio
tone is 1-kHz signal.

2. The assumption here is that audio is scratchy
or fades in and out one or more times as
VOLUME control is turned. A very weak
audio tone is diagnosed in Audio Power
Troubleshooting (chart 4-6).

3. If 0.16 vac is present, A5100 monitor ampli-
ifier is working, indicating a valid received
audio from A4300. Therefore, 25.5 vdc
power supply to prior stages and to lamp
can be assumed ok.

START

CONNECT EQUIPMENT AS
SHOWN ON SH 21 AND TURN
POWER ON. SET MK-1978/
VRC AUDIO TO MUTED.

TURN VOLUME CONTROL
ON RT FULLY CLOCKWISE.
SET RT TO 30 MHZ. MK-1978/
VRC AUX POWER ON.

ANY
AUDIO TONE
HEARD?
NOTE 1

REPLACE VOLUME
CONTROL R101. REPEAT
PERFORMANCE TEST.
SEE NOTE 2

PARA
4-2

IS
DIAL
LAMP LIT?

MM-100E PROBE A TO
MK-1978/VRC PIN K, FIXED
AUDIO. PROBE B TO GND.

AT
LEAST
0.16 VAC
?

1A
SH 2

REPLACE DIAL LAMP
SEE NOTE 3

TROUBLESHOOT
POWER
SUPPLY

AT
LEAST
0.16 VAC
?

1B
SH 6

18
SH 6

NO

YES

NO

YES

TROUBLESHOOT
POWER
SUPPLY

4-69
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-1
No Audio Troubleshooting
(Sheet 2 of 25)

NOTES

4. Presence of unmuted audio indicates good Audio Transformer T5001 and probable bad Resistor R5117 in A5100.

5. Be sure that volume control is fully clockwise.

6. Signal at TP5003 is assumed because fixed audio is ok, indicating that FL5001 is good. The 0.78 vac value is approximate and can be as high as 1.1 volts.
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-1
No AudioTroubleshooting
(Sheet 3 of 25)

1C

SET MM-100E RANGE TO 30 V.

MM-100E PROBE A TO TP500
PROBE B TO GND.

16 TO 20 VAC
?  NO
NOTE 7A
YES

SET MM-100E FUNCTION
TO DC+. SET RANGE TO
30 V.

MM-100E PROBE A TO TP5003
PROBE B TO GND.

25.5 VDC
PRESENT?
NOTE 7

REPLACE T5001 AUDIO
OUTPUT TRANSFORMER.
RETURN TO PERFORMANCE
TESTS.

PARA 4-2

REPAIR WIRING TO PLUG
P5001 OR AT JS001. RETURN
TO PERFORMANCE TESTS.

PARA 4-2

1D
SH 4

NOTE
7. See note 3, Sh 1. Possibility of failure of
25.5 vdc supply localized to A5000 stages is
small. However, check is easy to do; therefore
it is covered in this procedure.

7A. If 16 to 20VAC is present at TP then TP5001
can be considered good.
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-1
No Audio Troubleshooting
(Sheet 4 of 25)

NOTE
8. Due to limited number of test points, component substitution is sometimes necessary. Absence of signal at TP5001 could be due to failed Power Transistor Q401 or Resistor R402. These components are difficult to test directly and much more difficult to substitute than the A5100 assembly.
4-24. TROUBLESHOOTING FLOWCHARTS. (CONT)

CHART 4-1
No Audio Troubleshooting
(Sheet 5 of 25)

1E

SET MM-100E FUNCTION TO OHMS

JUMP ACROSS R402 WITH JUMPER WIRE

TONE HEARD ?

YES

NO

REPLACE POWER TRANSISTOR Q401

RETURN TO PERFORMANCE TESTS. DO ALL TESTS IN SEQUENCE.

PARA 4-2

REPLACE R402

RETURN TO PERFORMANCE TESTS. DO ALL TESTS IN SEQUENCE.

PARA 4-2
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-1
No Audio Troubleshooting
(sheet 6 of 25)

1. CRS CHECK

SLOWLY INCREASE AN/GRM-114A RF OUTPUT TO 31.00 MHZ. MM-100E SET AS PER NOTE 9.

TONE OR MOTOR-BOATING SOUND HEARD?

YES

SH 9
SEE NOTE 10

NO
SEE NOTE 4

SET AN/GRM-114A TO 30.00 MHZ. SLOWLY DECREASE RF OUTPUT TO 29.00 MHZ.

TONE OR MOTOR-BOATING SOUND HEARD?

YES

SET MM-100E FUNCTION TO DC+. RANGE TO 30 V. PROBE A TO TP4006. PROBE B TO GND.

16 VDC PRESENT?

NO
TROUBLESHOOT POWER SUPPLY

YES

SH 7

9. MM-100E FUNCTION to HI-Z, RANGE to 30 V. Probe A to MK-1978/VRC SPKR, Probe B to Ground.

10. Keep in mind that this entire troubleshooting procedure assumes one total component failure, causing absence of an audio signal. This simple check can quickly isolate a bad CRS.

11. An alternate method of checking for a bad CRS is to ground TP3001 in the A3000 assembly while the sig generator is varied ± 1 MHz. If the audio tone is heard when TP3001 is grounded, it means that the CRS is bad. If so, go to SH 9.
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-1
No Audio Troubleshooting
(Sheet 7 of 25)

1. IF A4000 CHECK

2. TURN OFF POWER TO AN/GRM-114A

3. REMOVE AN/GRM-114A RF CABLE FROM RT ANTENNA PORT

4. CONNECT FREE END TO SMC #222. REMOVE P1005 FROM A1000 TRAY. CONVERT P1005 TO SMC #222.

5. SET AN/GRM-114A FREQUENCY MHZ THUMBWHEELS TO 011 500.0 (11.5 MHZ)

6. SEE NOTE 12

7. TURN ON POWER TO AN/GRM-114A

8. SET AN/GRM-114A RF OUTPUT TO 50 MV. SET MM-100E AS PER NOTE 13.

9. AUDIO TONE HEARD?

10. MM-100E FUNCTION TO HI-Z. RANGE TO 1 V. PROBE A TO TPS013. PROBE B TO GND.

11. 0.78 VAC PRESENT? NOTE 14

12. MODULATION FREQ Hz remains at 1000.0. Keep deviation at 8-kHz.

13. MM-100E RANGE to 30 V. FUNCTION to HI-Z. Probe A to MK-1978/VRC SPKR. Probe B to GND.

14. Voltage can vary from 0.78 to 1.1 vac.

NOTES

1. SMC NO. 222

2. ORIENT BLUE COAX AWAY FROM A1000 TRAY

3. P1005

4. TO AN/GRM-114A

5. B1012

6. BLACK - SMD

7. WHITE - INPUT SIGNAL FROM CIR 240V DC

8. YELLOW - ORANGE

9. VIOLET - RED - BROWN

10. EL4GP488

4-75
4-24. TROUBLESHOOTING FLOWCHARTS (CONT)

CHART 4-1
No Audio Troubleshooting
(Sheet 8 of 25)

NOTE
15. Actual voltage will be slightly lower due to some attenuation of signal by the filter.
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-1
No Audio Troubleshooting
(sheet 9 of 25)

NOTES

16. With RT set at 30.00 MHz and 41.5 MHz injected into FL3002, there should be no error signal from the CRS. The meter will remain centered.

17. This setting should force the CRS to output a dc error voltage. The MM-100E will indicate this voltage.

18. If Time Delay Relay K3001 fails to momentarily short the dc error signal, the CRS can shift the local oscillator 1 MHz.

19. Since previous steps confirmed presence of audio tone when CRS was isolated from other stages, the local oscillator can be considered aligned. Therefore, CRS must be outputting incorrect error signal driving the local oscillator off frequency.

SEE NOTE 2

11 SH 11

16. Check

A3000

TURN OFF POWER TO AN/GRM-114A. REMOVE RF CABLE FROM RT ANTENNA PORT.

CONNECT FREE END TO SMC #222. REMOVE P1004 (GREEN WIRE) FROM A1000 TRAY.

CONNECT P1004 TO SMC #222. SET AN/GRM-114A FREQUENCY MHZ TO 041 500.0.

TURN RT KC CONTROL TO DIAL READING OF 30.00 MHZ

MM-100E PROBE A TO TP3001. PROBE B TO GND.

MM-100E RANGE TO 3 V. FUNCTION TO DC+. ADJUST DC ZERO OFFSET TO CENTER METER ON SCALE.

SET AN/GRM-114A HLV/LV X 100/NORM SWITCH TO HI LVL. TURN ON POWER. TURN RF LEVEL KNOB CLOCKWISE UNTIL 0 DBM LAMP LIGHTS.

0 VDC READING ON MM-100E? NOTE 18

YES

SET AN/GRM-114A FREQUENCY MHZ TO 041 750.0. MM-100E WILL MOVE OFF CENTER.

TURN RT KC CONTROL SLOWLY TO 31.00 MHZ WHILE OBSERVING MM-100E FOR RETURN TO CENTER

MOMENTARY 0 VDC READING? NOTE 18

YES

SET MM-100E RANGE SWITCH TO 30 V

NO

SEE NOTE 19

1J SH 10

4-77
4-24. TROUBLESHOOTING Flowcharts (CONT)

CHART 4-1
No Audio Troubleshooting
(Sheet 10 of 25)

NOTE
20. Do not discard A2100.

1J

MM-100E PROBE A TO TP3002. ADJUST DC ZERO OFFSET TO SET METER AT TRUE ZERO.

TURN RT KC CONTROL TO 30.00 MHZ WHILE OBSERVING MM-100E

MOMENTARY 13.5 VDC READING?
YES

REPLACE K3001 AND RETURN TO PERFORMANCE TESTS.

NO

REPLACE A2100
SEE NOTE 20

TURN RT KC CONTROL TO 31.00 MHZ WHILE OBSERVING MM-100E

MOMENTARY 13.5 VDC READING?
YES

PROBLEM CORRECTED, RETURN TO PERFORMANCE TESTS.

NO

PUT BACK ORIGINAL A2100

REPLACE S103 MOMENTARY CONTACT SWITCH

RETURN TO PERFORMANCE TESTS

PARA 4-2
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-1
No Audio Troubleshooting
(Sheet 11 of 26)

TURN OFF POWER TO AN/GRM-114A. REMOVE P1004 FROM SMC #222. CONNECT P1004 TO J1004.

REMOVE P3701 FROM J3701 ON A3700. CONNECT P3701 TO SMC #222. REMOVE RF CABLE FROM AN/GRM-114A TRANS-RCVR PORT AND CONNECT TO ANTENNA PORT.

SET RT TO 30.00 MHZ. SET AN/GRM-114A FREQ ERROR KNOB TO 1.5 KHZ.

SET AN/GRM-114A FREQUENCY MHZ TO 005 650.0. SET RCVR GEN SWITCH TO RCVR. TURN ON POWER.

FREQ ERROR METER <500 HZ?

YES

REPLACE Y2012 CRYSTAL. RETURN TO PERFORMANCE TESTS.

NO

REPLACE Y2200 REFERENCE OSCILLATOR

FREQ ERROR METER <500 HZ?

YES

PROBLEM CORRECTED. RETURN TO PERFORMANCE TESTS.

NO

PARA 4-2

REMOVE P3301 FROM J3301 ON A3300. CONNECT P3301 TO SMC #222.

SET AN/GRM-114A FREQUENCY MHZ TO 046 850.0. SET AN/GRM-114A FREQ ERROR KNOB TO 5 KHZ.

FREQ ERROR METER <2.3 KHZ?

YES

2T SH 20

NO

1K SH 12
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-1
No Audio Troubleshooting
(Sheet 12 of 25)

---

21. The test point voltages given for the A3000 assembly are approximately rms values. Peak-to-peak values viewed on scopes will be somewhat higher. If no signals are present, try a replacement module.

22. CRS modules are prelined.
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-1
No Audio Troubleshooting
(Sheet 13 of 25)

1L

CONNECT PROBE TO TP3016

0.2 VAC READING?

NO

CONNECT PROBE TO TP3009

YES

0.8 VAC READING?

NO

REPLACE A3300 AND RETURN TO PERFORMANCE TESTS

REPLACE A3400 AND RETURN TO PERFORMANCE TESTS

NO

REPLACE A3500 AND RETURN TO PERFORMANCE TESTS

PARA 4-2

CONNECT PROBE TO TP3006

YES

1.0 VAC READING?

NO

REPLACE FL3005 AND RETURN TO PERFORMANCE TESTS

PARA 4-2

1M SH 14

YES

REPLACE FL3004 AND RETURN TO PERFORMANCE TESTS

CONNECT PROBE TO TP3008

0.3 VAC READING?

NO

YES

1.5 VAC READING?

NO

YES
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-1
No Audio Troubleshooting
(Sheet 14 of 25)

1M

SET SCOPE TO DC

CONNECT PROBE TO TP3003. CHANGE RT FREQUENCY SEVERAL TIMES WHILE OBSERVING SCOPE.

MOMENTARY PLUS OR MINUS DC READING?

YES

SET RT TO 30.00 MHZ. SET SCOPE TO AC. CONNECT PROBE TO TP3004.

0.3 VAC READING?

YES

REPLACE A3700 AND RETURN TO PERFORMANCE TESTS

NO

REPLACE A3500 AND RETURN TO PERFORMANCE TESTS

NO

REPLACE A3800 AND RETURN TO PERFORMANCE TESTS

NO

PARA 4-2

PARA 4-2

PARA 4-2
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-1
No Audio Troubleshooting
(Sheet 15 of 25)

1N
A1000 CHECK

CONNECT P1005 TO J1005.
CONNECT AN/GRM-114A TO J1004 AS SHOWN ON SH 22.

SET UP AN/GRM-114A CONTROLS AS SHOWN ON SH 22.
SET RT TO 30.00 MHZ.

FREQ ERROR METER INDICATES < 3.5 KHz?

YES

IS ANALYZER WAVEFORM PEAK ABOVE -80 DBM LINE?

YES

REPLACE AND ALINE A1500 LOCAL OSCILLATOR. RETURN TO PERFORMANCE TESTS.

NO

REPLACE AND ALINE A1500 LOCAL OSCILLATOR. REPLACE A1500 IF ALINEMENT DOES NOT CORRECT PROBLEM.

PARA 4-2

CONNECT SPEAKER TO RT AND TURN RT VOLUME CONTROL CLOCKWISE ONE-HALF TURN

TONE FROM SPEAKER?

YES

NO

ALINE A1400. REPLACE A1400 IF ALINEMENT DOES NOT CORRECT PROBLEM.

RETURN TO PERFORMANCE TESTS

PARA 4-2

10 SH 16
CHART 4-1
No Audio Troubleshooting
(Sheet 17 of 25)

1P

ALIGN A1200(*) REPLACE A1200(*) IF ALIGNMENT DOES NOT CORRECT PROBLEM.
SEE CAUTION

RETURN TO PERFORMANCE TESTS

PARA 4-2

CAUTION
MODULE A1200B CONTAINS PARTS SENSITIVE TO ELECTROSTATIC DISCHARGE (ESD).
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

**CHART 4-1**
No Audio Troubleshooting
(Sheet 18 of 25)

- **A4000 ISOLATION**
  - **REMOVE MM-100E PROBE A FROM TP5013. PROBE A TO TP4003 ON A4000 TRAY. PROBE B TO GND.**
  - SET MM-100E RANGE SWITCH TO 0.3 V
  - **0.15 VAC READING?**
    - **YES**
      - **REPLACE A4300 AUDIO AND SQUELCH PREAMP**
    - **NO**
      - **SET MM-100E FUNCTION SWITCH TO DC+. SET RANGE SWITCH TO 30 V.**
      - **MM-100E PROBE A TO TP4006**
      - **16 VDC PRESENT?**
        - **YES**
          - **TROUBLESHOOT POWER SUPPLY OR WIRING**
        - **NO**
          - **TRoubleshooting POWER SUPPLY OR WIRING**
  - **16 VDC PRESENT?**
    - **YES**
    - **NO**
      - **CONNECT MM-100E PROBE A TO TP4008**
      - **16 VDC PRESENT?**
        - **YES**
          - **REPLACE A4200 MODULE**
        - **NO**
          - **REPLACE A4200 MODULE**
      - **ALINE A4200. RETURN TO PERFORMANCE TESTS.**
      - **ALINE A4200. RETURN TO PERFORMANCE TESTS.**
      - **PARA 4-2**
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-1
No Audio Troubleshooting
(Sheet 19 of 25)

1R

SET UP EQUIPMENT AS SHOWN ON SH 25.
TURN RT VOLUME CONTROL CLOCKWISE ONE-HALF TURN.

ATTENUATED PROBE A TO TP4004. PROBE B TO GND.

LOUDSPEAKER QUIET?

YES

ATTENUATED PROBE A TO TP4005

LOUDSPEAKER QUIET?

NO

YES

SET AN/GRM-114A HI LVL/µVX180/NORM SWITCH TO NORM. SET RF LEVEL TO 50.

NO

PARA 4-2

REPLACE FL4002. RETURN TO PERFORMANCE TESTS.

PARA 4-2

REPLACE FL4001. RETURN TO PERFORMANCE TESTS.

LOUDSPEAKER QUIET?

NO

PARA 4-2

1S SH 20

YES

REPLACE A4200 MODULE

ALINE A4200 MODULE. RETURN TO PERFORMANCE TESTS.

CONNECT ATTENUATED PROBE A TO TP4009
4-24. TROUBLESHOOTING FLOW CHARTS (CONT)

CHART 4-1
No Audio Troubleshooting
(Sheet 20 of 25)

1S

REPLACE A4100 MODULE.
RETURN TO
PERFORMANCE TESTS.

PARA
4-2

2T

REPLACE Y2100
INTERPOLATION
OSCILLATOR

FREQ.
ERROR METER
< 2.3 KHZ?

YES

PROBLEM CORRECTED.
RETURN TO
PERFORMANCE TESTS.

PARA
4-2

NO

REPLACE Y2006 CRYSTAL.
RETURN TO PERFORMANCE
TESTS.

PARA
4-2
4-24. TROUBLESHOOTING FLOW CHARTS (CONT)

CHART 4-1
No Audio Troubleshooting
(Sheet 21 of 25)
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-1
No Audio Troubleshooting
(Sheet 22 of 25)
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-1
No Audio Troubleshooting
(Sheet 23 of 25)
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-1
No Audio Troubleshooting
(Sheet 24 of 25)
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-1
No Audio Troubleshooting
(Sheet 25 of 25)
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-2
A4000 Assembly Troubleshooting
(Sheet 1 of 10)

START

USE SAME EQUIPMENT SETUP AS IN PERFORMANCE TEST. SET MM-100E FUNCTION SWITCH TO DC+.

MM-100E PROBE A TO TP4006. (SEE SH 8). GND PROBE B. OBSERVE MM-100E METER.

16 VDC PRESENT ?

16 VDC PRESENT ?

CHECK A4000 AND A5000 TRAYS

SET RT SQUELCH SWITCH TO OLD OFF.

CONNECT EQUIPMENT AND SET CONTROLS AS INDICATED ON SH 8.

SET AN/GRM-114A BFO - RF_LVL TO 50μV AND HI_LVL/LV_LVL X 100/ NORMAL - SWITCH TO NORMAL, 8 KHZ DEVIATION.

REPAIR WIRING TO A4000 TRAY. RETURN TO PERFORMANCE TESTS.

PARA 4-2

PARA 4-2

TROUBLESHOOT A1000(*) ASSEMBLY.

SEE CAUTION

CHART 4-3

CHART 4-3

OBserve MM-100E SINAD METER INDICATION.

SINAD 10 DB OR GREATER ?

SINAD 10 DB OR GREATER ?

NO

YES

RETURN TO PERFORMANCE TESTS. RECONNECT AND RESET EQUIPMENT AS REQUIRED.

PARA 4-2

PARA 4-2

2A SH 2

CAUTION

MODULE A1200B CONTAINS PARTS SENSITIVE TO ELECTROSTATIC DISCHARGE (ESD).

4-94 Change 4
2A

DISCONNECT P1005 CABLE FROM SMC #222 AND RF CABLE. LEAVE DISCONNECTED.

SET MM-100E RANGE SWITCH TO 1.0 V

DISCONNECT MK-1978/VRC TEST PROBE FROM MM-100E INPUT JACK

FREE END OF BNC TO BNC CABLE TO MM-100E INPUT JACK

ATTENUATED PROBE A (FROM BNC TEE) TO TP5013. GROUND PROBE B.

ADJUST AN/GRM-114A 1 KHZ/OFF CONTROL FOR 0.78-V MM-100E INDICATION

SET MM-100E RANGE SWITCH TO 30 V

DISCONNECT BNC TO BNC CABLE FROM MM-100E INPUT JACK. LEAVE DISCONNECTED.

RECONNECT MK-1978/VRC TEST PROBE TO MM-100E INPUT JACK

SEE NOTE 1

MK-1978/VRC TEST PROBE (FROM MM-100E) INPUT JACK TO MK-1978/VRC SPEAKER JACK

SET RT VOLUME CONTROL FULLY CLOCKWISE. OBSERVE MM-100E METER INDICATION.

17 V OR GREATER?

NO

YES

PERFORM AUDIO POWER TEST FAILURE TROUBLESHOOTING

CHART 4-6

28 SH 3

NOTE

1. Attenuated probe must remain in contact with TP5013 to achieve 17-volt indication.
4-24. TROUBLESHOOTING FLOW CHARTS (CONT)

CHART 4-2
A4000 Assembly Troubleshooting
(Sheet 3 of 10)

28

ADJUST RT FOR 17-V MM-100E INDICATION

SET MM-100E RANGE SWITCH TO DIST 0-10%. OBSERVE DISTORTION SCALE.

2% DISTORTION OR LESS?

YES

A4300 CHECK

DISCONNECT MK-1978/VRC TEST PROBE FROM MM-100E INPUT JACK. SET RANGE TO 0.3 V.

RECONNECT FREE END OF BNC TO BNC CABLE TO MM-100E INPUT JACK

ATTENUATED PROBE A TO TP4003. (SEE SH 8.) PROBE B TO GND.

NO

280

PERFORM AUDIO DISTORTION TEST FAILURE TROUBLESHOOTING

CHART 4-7

OBSERVE MM-100E METER INDICATION

0.78 V OR GREATER?

YES

ADJUST AN/GRM-114A 1 KHZ/OFF CONTROL FOR 0.13-V MM-100E INDICATION

2H SH 6

NO

DISCONNECT BNC TO BNC CABLE FROM MM-100E. LEAVE DISCONNECTED.

SET MM-100E RANGE SWITCH TO 1 V. RECONNECT MK-1978/VRC TEST PROBE TO MM-100E INPUT JACK.

MK-1978/VRC TEST PROBE A TO MK-1978/VRC RCVR JACK (INSIDE X-MODE SQUARE)
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-2
A4000 Assembly Troubleshooting
(Sheet 4 of 10)

---

2C

SET MM-100E RANGE SWITCH TO DIST 0-10%. OBSERVE DISTORTION SCALE.

2% DISTORTION OR LESS?

YES

2D

- SET MM-100E RANGE Switch TO 1V.
- DISCONNECT ATTENUATED PROBE FROM BNC TEE ON AN/GRM-114A INT MOD AND CONNECT TO AN/GRM-114A TRANS-RCVR.
- ATTENUATED PROBE A TO TP4005. (SEE SH 8). GROUND PROBE B.
- SET AN/GRM-114A BFO-RF LVL TO 2.0 AND HI LVL / μV X 100/ NORM SWITCH TO μV X 100.

INCREASE AN/GRM-114A BFO-RF LEVEL CONTROL TO 0.0 (1000-V INPUT). OBSERVE MM-100E METER INDICATION.

0.78V OR GREATER?

YES

ALIGN A4200/A4300 MODULES.

0.78V OR GREATER?

NO

RETURN TO PERFORMANCE TESTS. RECONNECT AND RESET EQUIPMENT AS REQUIRED.

PARA 4-2
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-2
A4000 Assembly Troubleshooting
(Sheet 4 of 10)

NOTE
2. AN/GRM-114A 1-kHz/OFF control must be adjusted for 8-kHz deviation.

2E

SET MM-100E RANGE SWITCH TO DIST 0-10%. OBSERVE MM-100E METER INDICATION.

6% DISTORTION OR LESS?

YES

REPLACE AND ALIGN A4100 MODULE.

NO

2F

RECONNECT EQUIPMENT AND SET CONTROLS AS ILLUS ON SH 8, EXCEPT....

SET MM-100E RANGE SWITCH TO SINAD, MM-100E INPUT PROBE A TO MK-1978/VRC SPKR JACK.

REPAIR W201/W401 (BLUE COAX).

SET AN/GRM-114A BFO-RF LVL CONTROL TO 0.5 µV AND HI LVL / µV X100/NORM SWITCH TO NORM.

GROUND P1005 CASING TO GROUNDING POST. (SEE SH 8). OBSERVE MM-100E BLUE SINAD SCALE.

SINAD 10 DB OR GREATER?

YES

RETURN TO PERFORMANCE TESTS. RECONNECT AND RESET EQUIP AS REQUIRED.

PARA 4-2

REPLACE AND ALIGN FL4001 MODULE.

SINAD 10 DB OR GREATER?

YES

RECONNECT EQUIPMENT AND SET CONTROLS AS ILLUS ON SH 8, EXCEPT....

SET MM-100E RANGE SWITCH TO DIST 0-10%. OBSERVE MM-100E METER INDICATION.

NO

SH 4.

5% DISTORTION OR LESS?

YES

REPLACE AND ALIGN A4100 MODULE.

NO

2G

REPAIR W201/W401 (BLUE COAX).

4-98 Change 4
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-2
A4000 Assembly Troubleshooting
(Sheet 6 of 10)

FREE END OF BNC TO BNC CABLE TO MM-100E INPUT JACK.

ATTENUATED PROBE A (FROM BNC TEE) TO TP4003. PROBE B TO GND.

DISCONNECT BNC TO BNC CABLE FROM MM-100E. LEAVE DISCONNECTED.

SET MM-100E RANGE SWITCH TO 1 V. MK-1978/VRC TEST PROBE TO MM-100E INPUT JACK.

MK-1978/VRC TEST PROBE A TO MK-1978/VRC RCVR JACK (INSIDE X-MODE SQUARE). PROBE B TO GND.

DISCONNECT P1005 FROM J1005. DO NOT CONNECT P1005 TO SMC TO BNC CABLE.

DISCONNECT MK-1978/VRC TEST PROBE MM-100E INPUT JACK. SET RANGE TO 0.3 V.

RECONNECT P1005 BLUE COAX TO J1005. (SEE SH 8).

ALIGN A4200/A4300 MODULES

RECONNECT EQUIPMENT AND SET CONTROLS AS INDICATED ON SH 8, EXCEPT...

DISCONNECT MK-1978/VRC TEST PROBE MM-100E INPUT JACK. SET RANGE TO 0.3 V.

RETURN TO PERFORMANCE TESTS. RECONNECT AND RESET EQUIPMENT AS REQ'D.

OBSERVE MM-100E METER INDICATION.

0.78 V OR GREATER?

YES

REPLACE AND ALIGN A4300 MODULE.

NO

PARA 4-2

SH 7

Change 4 4-99
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-2
A4000 Assembly Troubleshooting
(Sheet 7 of 10)

NOTE
3. AN/GRM-114A 1-kHz/OFF control must be adjusted for 8-kHz deviation.

- RECONNECT EQUIPMENT AND SET CONTROLS AS ILLUS ON SH 8.
- SET AN/GRM-114A RF SWITCH TO SINAD. INPUT PROBE A TO MK-1978/VRC SPKR.
- SET AN/GRM-114A BFO-RF LVL CONTROL TO 0.5 \( \mu \) V AND HI LVU/\( \mu \) V X 100/NORM SWITCH TO NORM.
- SET AN/GRM-114A RF FREQ MHZ THUMBWHEELS TO 011 500.0.
- GROUND P1005 CASING TO GROUNDING POST. (SEE SH 8). OBSERVE MM-100E BLUE SINAD SCALE.

- SINAD 10 OR GREATER?
  - NO
    - 2D SH 4
  - YES
    - RETURN TO PERFORMANCE TESTS. RECONNECT AND RESET EQUIP AS REQUIRED.
    - PARA 4-2
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-2
A4000 Assembly Troubleshooting
(Sheet 9 of 10)

RECEIVER SIMPLIFIED

ANT
K301
J1001
BROWN
W301

A1000
UHF TUNER

P1006
BLUE
W201

A4000
IF AMP

TP4007
TP6013

A5000
AUDIO/SQUELCH

CRS
A3000

A2000
CRYSTAL
SWITCH

RECEIVER SIMPLIFIED

ELAGPM42
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-2
A4000 Assembly Troubleshooting
(Sheet 10 of 10)

RECEIVER IF AMPLIFIER ASSY A4000

-XTAL FILTER FL4001
-1ST
-2ND
+16V DC

A4100

40 DB OR X 100 GAIN

XTAL FILTER FL4002

TP4005 TP4004

B
GND

A4200

60 DB OR X 1000 GAIN

3RD
4TH
6TH
LIM
DISCR
TP4003

A4300 AUDIO SQUELCH PREAMP

178 DB OR +796 GAIN

S4001

X-MODE AUDIO TO P201

X-MODE

NORMAL

AUDIO TO A5000

TP4007

TP4006

+16V DC

EL4GP443

4-103
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

START

SET MM-100E FUNCTION SWITCH TO DC+

USE MM-100E INPUT PROBE A TO MEASURE VOLTAGES INDICATED ON SH 8.

PROPER VOLTAGE LEVELS OBTAINED?

YES

CONNECT EQUIP AS ILLUS ON SH 8. SET AN/GRM-114A BFO-RF LEVEL CONTROL TO 0.35µV. SET MM-100E FUNCTION SWITCH TO AC-HI-Z.

DISCONNECT SMC TO BNC CABLE FROM J1001 AND RECONNECT COAX P1001.

CONNECT 10-DB, 20-DB, AND 30-DB ATTENUATORS (OR EQUIVALENT) IN SERIES TO AN/GRM-114A ANTENNA INPUT.

3A

SH 2

REPAIR WIRING TO A1000(*) TRAY. RETURN TO PERFORMANCE TESTS.

SEENOTE 2

17V OR GREATER?

YES

SET MM-100E RANGE SWITCH TO SINAD. OBSERVE BLUE SINAD SCALE.

10-DB OR GREATER?

YES

NO

NO

SET MM-100E RANGE SWITCH TO DC+

PROPER VOLTAGE LEVELS OBTAINED?

NO

CONNECT EQUIP AS ILLUS ON SH 8. SET AN/GRM-114A BFO-RF LEVEL CONTROL TO 0.35µV. SET MM-100E FUNCTION SWITCH TO AC-HI-Z.

SEENOTE 3

MM-100E INPUT PROBE A TO MK-1978/VRC SPKR JACK. PROBE B TO GND. OBSERVE METER.

CAUTION

MODULE A1200B CONTAINS PARTS SENSITIVE TO ELECTROSTATIC DISCHARGE (ESD).

NOTES

1. Ground probe B. Adjust MM-100E RANGE switch as needed.
2. Power supply and battery input voltage should already have been checked.
3. Make sure that P1005 is connected to J1005 and that the AN/GRM-114A 1-kHz/OFF control is adjusted for 8-kHz deviation on the DEV meter before taking the following readings.

4-104 Change 4
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-3
A1000 Assembly Troubleshooting
(Sheet 2 of 8)

4. Make sure SMC tee is connected to BNC cable.

3A

CHECK L.O. A1500

DISCONNECT SMC TO BNC CABLE FROM AN/GRM-114A TRANS-RCVR. CONNECT TO ATTENUATORS.

DISCONNECT CONNECTOR FROM J1004. CONNECT TO SMC TEE.

SEE NOTE 4

SET AN/GRM-114A AC/DC SWITCH TO AC. TURN ANALYZER DSPR CONTROL FULLY CLOCKWISE (1 MHZ/DIV).

SET AN/GRM-114A GEN/RCVR SWITCH TO RCVR. SET RF FREQUENCY MHZ THUMBWHEELS TO 041 500.0.

OBSERVE WAVEFORM ON AN/GRM-114A SPECTRUM ANALYZER

PEAK IS ABOVE -60 DBM LINE?

YES

TROUBLESHOOT CRYSTAL REFERENCE SYSTEM

CHART 4-4

NO

DISCONNECT SMC TEE FROM J1004. OBSERVE WAVEFORM ON AN/GRM-114A SPECTRUM ANALYZER.

PEAK IS ABOVE -60 DBM LINE?

YES

NO

REPLACE AND ALIGN A1500 MODULE

3C SH 3

3C SH 3

4-105
4-24. TROUBLESHOOTING FLOW CHARTS (CONT)

CHART 4-3
A1000 Assembly Troubleshooting
(Sheet 3 of 8)

38
REPAIR OR
REPLACE P1001
OR W102

RETURN TO
PERFORMANCE TESTS

PARA 4-2

3C
FREQ ERROR
METER INDICATES
WITHIN ± 3.5 KHZ

YES
REPEAT LAST THREE
DECISIONS WITH AN/GRM-
114A AND RT FREQ'S SET
PER TABLE A.

NO
TROUBLESHOOT
CRYSTAL REFERENCE
SYSTEM

CHART 4-4

SET RT TO 30.00, SET
AN/GRM-114A RF
FREQUENCY MHZ
THUMBWHEELS TO
041 500.0.

CHECK A1000
OUTPUT

REMOVE SMC TEE FROM
J1004 AND RECONNECT
P1004 TO J1004

DISCONNECT P1005 BLUE
COAX FROM J1005.
(SEE SH 8)

CONNECT END OF SMC
TO BNC CABLE TO J1005.
OBSERVE SPECTRUM
ANALYZER.

3D
SH 4

TABLE A

<table>
<thead>
<tr>
<th>RT FREQUENCY</th>
<th>AN/GRM-114A FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.00 MHz</td>
<td>041 500.0 MHz</td>
</tr>
<tr>
<td>41.00 MHz</td>
<td>052 500.0 MHz</td>
</tr>
<tr>
<td>52.00 MHz</td>
<td>063 500.0 MHz</td>
</tr>
<tr>
<td>75.00 MHz</td>
<td>083 500.0 MHz</td>
</tr>
<tr>
<td>64.00 MHz</td>
<td>052 500.0 MHz</td>
</tr>
<tr>
<td>53.00 MHz</td>
<td>041 500.0 MHz</td>
</tr>
</tbody>
</table>
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

A1000 Assembly Troubleshooting
(Sheet 4 of 8)

3D

PEAK IS ABOVE 80-DB LINE?

DISCONNECT SMC TO BNC CABLE FROM ATTENUATORS ON AN/GRM-114A ANTENNA INPUT

CONNECT SAME SMC TO BNC CABLE END TO AN/GRM-114A TRANS-RCVR CONNECTOR

DISCONNECT OTHER END OF SMC TO BNC CABLE FROM J1005; CONNECT TO J1002. LEAVE P1002 YELLOW COAX DISCONNECTED.

RECONNECT P1005 TO J1005

SET AN/GRM-114A BFO-RF LEVEL TO 50 μV. SET RF FREQUENCY MHz THUMBHEWHEELS TO 03 000.0.

3F

SH 5

+17 V OR GREATER?

YES

SET MM-100E RANGE SWITCH TO 30 V AND FUNCTION SWITCH TO AC-HI-Z. OBSERVE METER INDICATION.

SET AN/GRM-114A GEN/RCVR SWITCH TO GEN. ADJUST 1 KHZ/OFF CONTROL FOR 8-KHZ DEVIATION.

3E

SH 5

NO

CONNECT SAME SMC TO BNC CABLE END TO AN/GRM-114A TRANS-RCVR PORT

DISCONNECT OTHER END OF SMC TO BNC CABLE FROM J1005; CONNECT TO J1002. LEAVE P1002 YELLOW COAX DISCONNECTED.

RECONNECT P1005 TO J1005

SET AN/GRM-114A RF LEVEL TO 10 μV. SET RF FREQUENCY MHZ THUMBHEWHEELS TO 011 500.0.

SET AN/GRM-114A GEN/RCVR SWITCH TO GEN. ADJUST 1 KHZ/OFF CONTROL FOR 8-KHZ DEVIATION.

3H

SH 6

3E

SH 5
5. The following steps check modules A1100, A1200, and A1300 by measuring SNR and voltage at the six capacitors listed in Table B.

6. Adjust 1-kHz/Off control for 8-kHz deviation on Dev meter.

<table>
<thead>
<tr>
<th>TABLE B</th>
<th>AN/GRM-114A RF LEVEL</th>
<th>AN/GRM-114A AND RT FREQ SETTINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 µV</td>
<td>C1305</td>
<td>30.00 MHz (BAND A)</td>
</tr>
<tr>
<td>20 µV</td>
<td>C1205</td>
<td></td>
</tr>
<tr>
<td>3 µV</td>
<td>C1104</td>
<td></td>
</tr>
<tr>
<td>64.00 MHz (BAND B)</td>
<td>C1301</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C1201</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C1101</td>
<td></td>
</tr>
</tbody>
</table>
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-3
A1000(*) Assembly Troubleshooting
(Sheet 6 of 8)

3G

17V OR GREATER?

YES

10-DB OR GREATER?

YES

RETURN TO PERFORMANCE TESTS.

PARA 4-2

NO

REPLACE AND ALIGN A1100, A1200(*) AND A1300
SEE CAUTION/SEE NOTE 7

SET MM-100E RANGE SWITCH TO SINAD, OBSERVE BLUE SINAD SCALE.

3H

SET MM-100E RANGE SWITCH TO 30V AND FUNCTION SWITCH TO AC-HI-Z.
OBSERVE METER

17V OR GREATER?

YES

NOTE
Depending upon which caps fail to meet requirements.

CAUTION
MODULE A1200B CONTAINS PARTS SENSITIVE TO ELECTROSTATIC DISCHARGE (ESD).

PARA 4-2

NO

10-DB OR GREATER?

NO

RETURN TO PERFORMANCE TESTS.

PARA 4-2

YES

3I

SH 5

3I

SH 5

YES

3J

SH 7

3J

SH 7

NO

10-DB OR GREATER?

SET MM-100E RANGE SWITCH TO SINAD, OBSERVE BLUE SINAD SCALE.

NO

SWITCH TO AC-HI-Z.
OBSERVE METER

SWITCH TO SINAD.
OBSERVE BLUE SINAD SCALE.
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-3
A1000 Assembly Troubleshooting
(Sheet 7 of 8)

NOTE

8. Other end of BNC to SMC cable is connected to AN/GRM-114A TRANS-RCVR port.

SET RT MC-TUNE-KC SWITCH TO 84.00 MHZ. TURN VOLUME CONTROL FULLY CLOCKWISE.

SET AN/GRM-114A RF FREQUENCY MHZ THUMBWHEELS TO 064 000.0

DISCONNECT YELLOW COAX P1002 FROM J1002. LEAVE DISCONNECTED. CONNECT BNC TO SMC CABLE TO J1002. SEE NOTE 8

ADJUST AN/GRM-114A 1-KHZ/OFF CONTROL FOR 8-KHZ DEVIATION. SET RF LEVEL TO 73 DBM.

ADJUST CAPACITOR C1404 (SEE VIEW A) FOR PEAK SINAD

SINAD 10 DB OR GREATER?

YES

REPLACE AND ALIGN A1400 MODULE

NO

SET MM-100E RANGE SWITCH TO 30 V. OBSERVE METER INDICATION.

17 V OR GREATER?

YES

RETURN TO PERFORMANCE TESTS

NO

PARA 4-2

ADJUST CAPACITOR C1404 (SEE VIEW A) FOR PEAK SINAD

SET MM-100E RANGE SWITCH TO 30 V. OBSERVE METER INDICATION.

17 V OR GREATER?

YES

RETURN TO PERFORMANCE TESTS

NO

PARA 4-2

SET MM-100E RANGE SWITCH TO SINAD AND FUNCTION SWITCH TO AC-HI-Z

MM-100E INPUT PROBE A TO MK-1978/VRC SPKR JACK. PROBE B TO GND.

SET MM-100E RANGE SWITCH TO SINAD AND FUNCTION SWITCH TO AC-HI-Z

MM-100E INPUT PROBE A TO MK-1978/VRC SPKR JACK. PROBE B TO GND.
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-3
A1000 Assembly Troubleshooting
(Sheet 8 of 8)

POWER SUPPLY
PP-1104(*)/G

MUST SUPPLY
MK-1978/VRC

RCVR
XMTR

TO P401

RT-524

RAISE
A4000 TRAY

TEST PROBE
MK-1978/VRC

AC-HI-Z

0.36 µV

GRM-114A TEST SET

SMC TO BNC CABLE

A1000 ASSEMBLY TOP

GREEN COAX

VIOLET COAX

BROWN P1001
(LEAVE DISCONNECTED)

A1000 ASSEMBLY BOTTOM

GROUND (BLACK)

INPUT SIGNAL
FROM CRS; BETWEEN
± 0.5 V DC

+16 V DC

+10 V DC

25.5 V DC

EL67448
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-4
A2000, A3000 Assemblies Troubleshooting
(Sheet 1 of 9)

START

SET MM-100E FUNCTION SWITCH TO DC+

MM-100E INPUT PROBE A TO TP3012, PROBE B TO GND. (SEE VIEW A.)

16-VDC METER INDICATION?

YES

NO

16-VDC METER INDICATION?

YES

NO

DISCONNECT WHITE WIRE FROM A1000 ASSEMBLY

CONNECT EQUIPMENT AS INDICATED ON SH 9

OBSERVE WAVEFORM ON AN/GRM-114A SPECTRUM ANALYZER AND NOTE FREQ ERROR METER INDICATION

WAVEPEAK ABOVE -60 DB LINE?

YES

4B
SH 2

NO

4A
SH 2
Module A1200B contains parts sensitive to electrostatic discharge (ESD).

**CAUTION**

**TABLE A**

<table>
<thead>
<tr>
<th>RT FREQUENCY</th>
<th>AN/GRM-114A FREQUENCY</th>
</tr>
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<tbody>
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<tr>
<td>64.00 MHz</td>
<td>052 500.0 MHz</td>
</tr>
<tr>
<td>53.00 MHz</td>
<td>041 500.0 MHz</td>
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</table>

**CHANGE 4 4-113**
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-4
A2000, A3000 Assemblies Troubleshooting
(Sheet 3 of 9)

4D

WAVE PEAK ABOVE -60 DB LINE?

NO

REPLACE A2000 CRYSTAL SWITCH MODULE

YES

RETURN TO PERFORMANCE TESTS

REPLACE A2000 CRYSTAL SWITCH MODULE

YES

NO

WAVE PEAK ABOVE -60 DB LINE?

YES

NO

FREQ ERROR METER INDICATES WITHIN ±500 HZ?

YES

NO

SET RT MC-TUNE-KC SWITCH TO 30.05 MHZ.
SET AN/GRM-114A RF FREQUENCY MHZ
THUMBWHEELS TO 005 600.0.

REPEAT LAST TWO DECISIONS

DISCONNECT P3701 FROM SMC TEE AND RECONNECT TO J3701. DISCONNECT P3301 FROM J3301. (SEE SH 9.)

P3301 (BLACK COAX) TO SMC TEE

DISCONNECT P3701 FROM SMC TEE AND RECONNECT TO J3701. DISCONNECT P3301 FROM J3301. (SEE SH 9.)

OBSERVE WAVEFORM ON AN/GRM-114A SPECTRUM ANALYZER. NOTE FREQ ERROR METER INDICATION.

SET RT MC-TUNE-KC SWITCH TO 30.05 MHZ. SET AN/GRM-114A RF FREQUENCY MHZ
THUMBWHEELS TO 046 950.0.

SET RT MC-TUNE-KC SWITCH TO 30.05 MHZ. SET AN/GRM-114A RF FREQUENCY MHZ
THUMBWHEELS TO 046 950.0.

REPLACE A2000 (CRYSTAL SWITCH) MODULE

PARA 4-2

REPLACE M00 (CRYSTAL SWITCH) MODULE

P3301 (BLACK COAX) TO SMC TEE

FREQ ERROR WITHIN ±2.3 KHZ?

YES

NO

4E SH 4

4-114
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-4
A2000, A3000 Assemblies Troubleshooting
(Sheet 4 of 9)

NOTES
1. Leave 10-db attenuator attached to AN/GRM-114A ANTENNA input but do not reconnect BNC cable.
2. See Sh 9.
3. At 14 MHz center frequency, wave peaks at 10 MHz, 11 MHz and 12 MHz should be at least -40 db. By 16 MHz or 17 MHz they should be approx -60 db.

<table>
<thead>
<tr>
<th>RT FREQUENCY</th>
<th>AN/GRM-114A FREQUENCY</th>
<th>CRYSTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>XX.05 OR XX.10</td>
<td>046 950.0</td>
<td>Y2007</td>
</tr>
<tr>
<td>XX.15 OR XX.20</td>
<td>047 050.0</td>
<td>Y2008</td>
</tr>
<tr>
<td>XX.25 OR XX.30</td>
<td>047 150.0</td>
<td>Y2009</td>
</tr>
<tr>
<td>XX.35 OR XX.40</td>
<td>047 250.0</td>
<td>Y2010</td>
</tr>
<tr>
<td>XX.45 OR XX.50</td>
<td>047 350.0</td>
<td>Y2005</td>
</tr>
<tr>
<td>XX.55 OR XX.60</td>
<td>047 450.0</td>
<td>Y2004</td>
</tr>
<tr>
<td>XX.65 OR XX.70</td>
<td>047 550.0</td>
<td>Y2003</td>
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<tr>
<td>XX.75 OR XX.80</td>
<td>047 650.0</td>
<td>Y2002</td>
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<tr>
<td>XX.85 OR XX.90</td>
<td>047 750.0</td>
<td>Y2001</td>
</tr>
<tr>
<td>XX.95 OR XX.00</td>
<td>046 850.0</td>
<td>Y2006</td>
</tr>
</tbody>
</table>

Table A

TEST PROBE A TO TP3015.
(SEE SH 9). OBSERVE SPECTRUM ANALYZER.

SIGNALS ARE PRESENT?

NO

REPLACE A3100
(HARMONIC GENERATOR)

YES

MEETS SPECS IN NOTE 3?

NO

4F SH 5

YES

REPLACE FL3001
(Low Pass Filter)

X = ANY SETTING

CONNECT MK-1978/VRC TEST PROBE TO 10-DB ATTENUATOR. PROBE A TO TP3013. PROBE B TO GND.

SEE NOTE 2

TURN AN/GRM-114A ANALY DISPR FULLY CLOCKWISE (1 MHZ/DIV). SET RF FREQ. MHZ THUMBWHEELS TO 014 000.0.

CHECK A3100 OUTPUT

RECONNECT P3301 TO J3301. DISCONNECT CABLE AND 20-DB AND 30-DB ATTENUATORS FROM AN/GRM-114A ANTENNA.

SEE NOTE 1

REPEAT LAST TWO DECISIONS WITH RT AND AN/GRM-114A FREQUENCIES SET AS PER TABLE A.

4E
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-4
A2000, A3000 Assemblies Troubleshooting
(Sheet 5 of 9)

Q

SET AN/GRM-114A RF FREQUENCY MHZ THUMBWHEELS TO 052 500.0

TEST PROBE A TO TP3010. (SEE SH 9.) OBSERVE SPECTRUM ANALYZER.

MEETS SPECS IN NOTE 3, SH 4 ?

YES CHECK A3300 OUTPUT

NO

SET AN/GRM-114A RF FREQUENCY MHZ THUMBWHEELS TO 005 650.0

SEE NOTE 4

SET AN/GRM-114A ANAL DISPR FULLY COUNTER-CLOCKWISE (SHORT OF DETENT)

CONNECT TEST PROBE A TO TP3016. (SEE SH 9.)

4F

TEST PROBE A TO TP3011. (SEE SH 9.)

SIGNALS ARE PRESENT ?

YES REPLACE A3200 (BALANCED MIXER MODULE)

NO

REPLACE FL3003 (53-MHZ BANDPASS FILTER)

OBSERVE WAVEFORM ON SPECTRUM ANALYZER

MEETS SPECS IN NOTE 3, SH 4 ?

YES REPLACE A3300 (CRS 2ND MIXER MODULE)

NO

4G SH 8

NOTE

4. RT frequency must end in zero; eg, 30.00, not 30.05.
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-4  
A2000, A3000 Assemblies Troubleshooting  
(Sheet 8 of 9)

NOTE
5. 10-db attenuator and MK-1978_VRC test probe connect to attenuators.

#6

- Reconnect 20-db and 30-db attenuators to AN/GRM-114A antenna input.  
  See Note 5

- Check 1st and 2nd amplifier output

- Connect test probe A to TP3009. (See SH 9.) Observe waveform on spectrum analyzer.

- Wave peak above -80 db line?
  - No
  - Yes
    - Set RT MCTUNE-KC switch to 30.05. Set AN/GRM-114A RF frequency MHz thumbwheels to 005 600.0 MHz.
    - Observe AN/GRM-114A spectrum analyzer
    - Wave peak above -80 db line?
      - No
      - Yes
        - Check 3rd amp and limiter
      - No
      - Yes
        - Connect test probe A to TP3004. (See SH 8.) Observe waveform on spectrum analyzer.
        - Wave peak above -80 db line?
          - No
          - Yes
            - Replace A3600 module
          - No

- Replace A3400 (CRS 1st and 2nd IF amps)

- Check FL3004 output

- Set RT MCTUNE-KC switch to 30.00 MHz. Set AN/GRM-114A RF frequency MHz thumbwheels to 005 600.0 MHz.

- Connect test probe A to TP3008. (See SH 8.) Observe waveform on spectrum analyzer.

- Wave peak above -60 db line?
  - Yes
  - No
    - Replace FL3004 (5.625-MHz bandpass filter)
    - Replace A3500 module

4H  
SH 7

4-117
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-4
A2000, A3000 Assemblies Troubleshooting
(Sheet 7 of 9)

4H

SET RT MC-TUNE-KC SWITCH TO 30.05. SET AN/GRM-114A RF FREQUENCY MHz THUMBWHEELS TO 005 600.0 MHZ.

OBSERVE WAVEFORM ON AN/GRM-114A SPECTRUM ANALYZER

WAVE PEAK ABOVE -60 DB LINE ?

YES

REPLACE A3500 (CRS 3RD AMP AND LIMITER)

NO

CHECK CRS PHASE DISCRIMINATOR OUTPUT

CONNECT ATTENUATED PROBE A TO AN/GRM-114A SCOPE INPUT. (PROBE SET AT X1.)

TURN AN/GRM-114A ANALY DISPR OFF (FULLY COUNTERCLOCKWISE, PAST DETENT)

SET AN/GRM-114A EXT V/DIV CONTROL TO 0.1. SET SWEEP TO 10 MS.

4I

CHECK FILTER FL3005 OUTPUT

REPLACE FL3005 (5.85 MHZ BANDPASS FILTER)

REPLACE A3500 (CRS 3RD AMP AND LIMITER)

4J

SH 8

TURN AN/GRM-114A ANALY DISPR FULLY COUNTERCLOCKWISE JUST PAST DETENT, 100 KHZ/DIV)

SET RT MC-TUNE-KC SWITCH TO 30.00 MHZ. SET AN/GRM-114A RF FREQUENCY MHz THUMBWHEELS TO 005 650.2.

CONNECT TEST PROBE A TO TP3006. (SEE SH 8.) OBSERVE WAVEFORM ON AN/GRM-114A SPECTRUM ANALYZER.
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-4
A2000, A3000 Assemblies Troubleshooting
(Sheet 8 of 9)

NOTE

6. If wave is sinusoidal, the A3600 module is hunting and must be replaced.

SET AN/GRM-114A AC/OFF/DC SWITCH TO DC. ADJUST VERT AND HORIZ CONTROLS TO CENTER TRACE ON SCREEN.

PROBE A TO TP3001. (SEE SH 9.) OBSERVE WAVEFORM ON AN/GRM-114A OSCILLOSCOPE.

IS WAVE ON SCOPE SINUSOIDAL?

YES

REPLACE A3600 (CRS HUNT DISCRIMINATOR)

SEE NOTE 6

NO

REPLACE A3700 (CRS PHASE DISCRIMINATOR)

WITHIN ±0.5 VDC?

YES

RETURN TO PERFORMANCE TESTS

NO

PARA 4-2

VIEW A

SINE WAVE

EL4GP447
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-4
A2000, A3000 Assemblies Troubleshooting
(Sheet 9 of 9)
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-5
Squelch Test Failure Troubleshooting
(Sheet 1 of 2)

NOTES
1. Use same equipment setup as in Performance Test.
2. That is, repeat the Performance Test (NEW SQUELCH or OLD SQUELCH) that referred you to this section to see if fault has been corrected.
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-5
Squelch Test Failure Troubleshooting
(Sheet 2 of 2)

<table>
<thead>
<tr>
<th>REPLACEMENT AND ALINE AS900 MODULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQUELCH TEST OK? YES NO</td>
</tr>
<tr>
<td>REPLACE SQUELCH SWITCH ON FRONT PANEL</td>
</tr>
<tr>
<td>RETURN TO PERFORMANCE TESTS</td>
</tr>
<tr>
<td>PARA 4-2</td>
</tr>
</tbody>
</table>
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-6
Audio Power Test Failure Troubleshooting
(Sheet 1 of 5)

START

USE SAME EQUIPMENT SETUP AS IN PERFORMANCE TEST

NOTE 1 ?

YES

NOTE 2 VOLTAGE LOW AT . . . ?

NO

6A SH 2

SPEAKER

TURN RT VOLUME CONTROL FULLY CLOCKWISE

SET MM-100E RANGE SWITCH TO 1.0 V

BNC TEE TO AN/GRM-114A INT AND OUT JACK

MM-100E INPUT PROBE A TO TP5006. (SEE SH 5.) PROBE B TO GND.

SET MM-100E RANGE SWITCH TO 0.3 V. OBSERVE METER INDICATION.

0.16 V OR GREATER ?

YES

REPAIR WIRING BETWEEN A5000 ASSEMBLY AND SPEAKER OUTPUT

RF CABLE FROM FREE END OF BNC TEE TO MM-100E INPUT JACK

6A SH 2

NO

REPLACE AND ALINE A5100 MODULE

RETURN TO PERFORMANCE TESTS

NOTES

1. Performance voltage measurements LOW at both FIXED AUDIO and MUTED AUDIO (SPEAKER) test points.

2. Performance test voltage measurements low at either FIXED AUDIO or MUTED AUDIO (SPEAKER) test points.
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-6
Audio Power Test Failure Troubleshooting
(Sheet 2 of 5)

6A

ATTENUATED PROBE A (FROM BNC TEE) TO TP5013. (SEE SH 5.) PROBE B TO GROUND.

ADJUST AN/GRM-114A 1-KHZ/OFF CONTROL FOR 0.52 ± 0.16-V INDICATION ON MM-100E METER

SET MM-100E RANGE SWITCH TO 30 V

DISCONNECT BNC TO BNC CABLE FROM THE MM-100E INPUT JACK. LEAVE DISCONNECTED.

MK-1978/VRC TEST PROBE TO MM-100E INPUT JACK

MK-1978/VRC TEST PROBE (FROM MM-100E INPUT JACK) TO MK-1978/VRC SPKR JACK

TURN RT VOLUME CONTROL FULLY CLOCKWISE. OBSERVE MM-100E METER INDICATION.

AUDIO POWER 17 V OR GREATER?

NO

YES

6C SH 4

SET THE MK-1978/VRC AUDIO SWITCH TO UNMUTED. SET MM-100E RANGE SWITCH TO 10 V.

AUDIO POWER 7.75 V OR GREATER?

NO

YES

DISCONNECT MK-1978/VRC PROBE FROM MM-100E INPUT JACK AND RECONNECT FREE END OF BNC TO BNC CABLE

6B SH 3

REPAIR WIRING BETWEEN A5000 TRAY AND UNMUTED AUDIO OUTPUT

REPLACE T5001 (AUDIO OUTPUT TRANSFORMER)

RETURN TO PERFORMANCE TESTS

PARA 4-2
4-24 TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-6
Audio Power Test Failure Troubleshooting
(Sheet 3 of 5)

68

ATTENUATED PROBE A (FROM BNC TEE) TO TP4003. (SEE SH 5.) PROBE B TO GND.

SET MM-100E RANGE SWITCH TO 0.3 V

ADJUST AN/GRM-114A 1-KHZ/OFF CONTROL FOR 0.13-V INDICATION ON MM-100E METER

SET MM-100E RANGE SWITCH TO 1 V

DISCONNECT BNC TO BNC CABLE FROM THE MM-100E INPUT JACK. LEAVE DISCONNECTED.

RECONNECT MK-1978/VRC TEST PROBE TO MM-100E INPUT JACK

MK-1978/VRC TEST PROBE A (FROM MM-100E INPUT JACK), AND PROBE B TO GND

0.78 V OR GREATER?

SET MM-100E RANGE SWITCH TO DIST 0-10%. OBSERVE METER INDICATION.

LESS THAN 2% DISTORTION?

REPAIR WIRING BETWEEN A4000 AND A5000 ASSEMBLIES AND SPEAKER OUTPUT

PARA 4-2

ALINE A4300 (AUDIO SQUELCH AND PREAMP)

0.78 V OR GREATER?

REPLACE AND ALINE A4300 MODULE

RETURN TO PERFORMANCE TESTS
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-8
Audio Power Test Failure Troubleshooting
(Sheet 4 of 5)

- Set MM-100E range switch to 30 V
- Replace and align AE5100 (Audio AMP) Module
- Replace T5001 (Audio output transformer)
- MK-1872/VRM test probe A (from MM-100E Input jack) to TP5001. (See SH 5) Probe B to GND.
- MK-1872/VRM test probe A to TP5005. (See SH 5) Observe MM-100E meter indication.
- Replace relay K5001

RETURN TO PERFORMANCE TESTS

11 V OR GREATER?

YES

NO

REPEAT LAST TWO STEPS AFTER REPLACING Q402, R402, OR T5001 BY SUBSTITUTION

RETAKE VOLTAGE READING AT TP5001

11 V OR GREATER?

YES

NO

RETURN TO PERFORMANCE TESTS

PARA 4-2

PARA 4-2

4-126
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-6
Audio Power Test Failure Troubleshooting
(Sheet 5 of 5)
4-24. TROUBLESHOOTING FLOWCHARTS. (CONT)

START

CHECK A1000 AND A4200 DISTORTION

USE SAME EQUIPMENT SETUP AS IN PERFORMANCE TEST

CHECK A1000 AND A4000 DISTORTION

SET AN/GRM-114A BFO-RF LEVEL TO 10 AND HI LVL/μV X 100/NORM SWITCH TO μV X 100

MM-100E INPUT PROBE A TO TP4003. (SEE SH 5.) PROBE B TO GND. OBSERVE MM-100E METER INDICATION

4.5% DISTORTION OR LESS?

NO

YES

CHECK A4300 DISTORTION

MM-100E INPUT PROBE A TO TP4007. (SEE SH 5.) OBSERVE MM-100E METER INDICATION.

5% DISTORTION OR LESS?

NO

YES

ALINE A4200 DISCRIMINATOR AND A4300 AUDIO SQUELCH PREAMP

5% DISTORTION OR LESS?

NO

YES

7A SH 2

REPLACE AND ALINE A4300. RETURN TO PERFORMANCE TESTS.

78 SH 3

TROUBLESHOOT A1000 ASSEMBLY

4.5% DISTORTION OR LESS?

YES

CHART 4-3

DISCONNECT P1005 BLUE COAX FROM J1005

SET AN/GRM-114A RF FREQUENCY MHZ THUMBWHEELS TO 011 500.0 AND BFO-RF LEVEL TO 20

4-24.
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-7
Audio Distortion Test Failure Troubleshooting
(Sheet 2 of 5)

NOTE
The following decisions refer to distortion readings obtained in the Receiver Audio Distortion Performance Test at the FIXED AUDIO and MUTED AUDIO (SPEAKER) test points.

7A

SEE NOTE 1

CHECK A5000 DISTORTION

MM-100E INPUT PROBE A TO TP5006. (SEE SH 5.) PROBE B TO GND.

SET MM-100E FUNCTION SWITCH TO AC-HI-Z. OBSERVE METER INDICATION.

DISTORTION HIGH AT BOTH POINTS?

YES

7C

SH 3

DISTORTION HIGH AT...

? FIXED AUDIO

SPEAKER

NO

SET MM-100E RANGE SWITCH TO 30 V

MM-100E INPUT PROBE A TO TP5001. (SEE NOTE 5.) PROBE B TO GND. OBSERVE METER INDICATION.

2% DISTORTION OR LESS?

YES

REPLACE AND ALIGN A5100 (AUDIO AMP)

REPAIR WIRING BETWEEN A5000 ASSEMBLY AND SPEAKER OUTPUT

NO

REPLACE Q402 (TRANSISTOR)

RETURN TO PERFORMANCE TESTS

11 V OR GREATER?

NO

YES

REPLACE T5001 (AUDIO OUTPUT TRANSFORMER)

PARA 4-2
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-7
Audio Distortion Test Failure Troubleshooting
(Sheet 3 of 5)

7B
ALINE A4200 MODULE AND A4300 MODULE

4.5% DISTORTION OR LESS?

YES
ATTENUATED PROBE TO FREE END OF BNC TEE. SET MM-100E RANGE SWITCH TO 1 V.

NO
PERFORM SELECTIVITY TEST FAILURE TROUBLESHOOTING

CHART 4-10

7C
CHECK A5000 DISTORTION

TURN RT VOLUME CONTROL FULLY CLOCKWISE

BNC TEE TO AN/GRM-114A INT MOD OUT JACK. BNC TO BNC CABLE TO BNC TEE.

FREE END OF BNC TO BNC CABLE TO MM-100E INPUT JACK

ATTENUATED PROBE A TO TP5013. (SEE SH 6.) GROUND PROBE B.

ADJUST AN/GRM-114A VAR/OFF CONTROL FOR 0.52 ± 0.16 V INDICATION ON MM-100E METER

DISCONNECT BNC TO BNC CABLE FROM MM-100E INPUT JACK. LEAVE DISCONNECTED.

MK-1978/VRC TEST PROBE TO MM-100E INPUT JACK

SET MM-100E RANGE SWITCH TO DIST 10%

7D
SH 4

PARA 4-2

RETURN TO PERFORMANCE TESTS
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-7
Audio Distortion Test Failure Troubleshooting
(Sheet 4 of 5)

NOTES

2. Connect probe B to GND jack.

3. That is, 2% distortion or less at both FIXED AUDIO and SPKR jacks.

END
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-7
Audio Distortion Test Failure Troubleshooting
(Sheet 5 of 5)
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-8
Audio Response Test Failure (Normal Mode) Troubleshooting
(Sheet 1 of 2)

NOTES

1. The 1000-Hz (modulation) reading is used as a reference, as it was in the performance test.

2. Additionally, AN/GRM-114A DEVIATION meter should indicate 8 kHz.

3. Repeat last two steps with AN/GRM-114A MODULATION FREQ Hz thumbwheels set to:
   a. 03 000.0;
   b. 00 500.0.

START

USE SAME EQUIPMENT SETUP AS IN PERFORMANCE TEST

MM-100E INPUT PROBE A TO TP5009. (SEE SH 2.) PROBE B TO GND.

ADJUST RT VOLUME CONTROL FOR 0-DB INDICATION ON MM-100E RED DB SCALE

SET AN/GRM-114A MODULATION FREQ Hz THUMBWHEELS TO 02 000.0. OBSERVE RED DB SCALE.

REPLACE AND ALINE FL5001 (AUDIO FILTER)

WITHIN ±2 DB OF 1000-HZ INDICATION?

SEE NOTE 3. IF DECISION IS YES AT ALL FREQUENCIES, . . .

REPLACE AND ALINE A5100 (AUDIO AMP)

RETURN TO PERFORMANCE TESTS

PARA 4-2

WITHIN ±2 DB OF 1000-HZ INDICATION?  

SEE NOTE 1

NO

YES

NOTE 1

NOTE 2
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-8
Audio Response Test Failure (Normal Mode) Troubleshooting
(Sheet 2 of 2)
4–24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-9
Audio Response Test Failure (X-Mode) Troubleshooting
(Sheet 1 of 4)

NOTES
1. The 1000-Hz (modulation) reading is used as a reference, as it was in the performance test.

2. Repeat the previous two steps with AN/GRM-114A MODULATION FREQ Hz thumbwheels set to:
   a. 05 000.0;
   b. 10 000.0;
   c. 00 500.0.

SET MM-100E RANGE SWITCH TO 0.3 V

CHECK A4100 AND A4200 MODULES

ALINE A4200 AND A4300 MODULES. RETURN TO START.

WITHIN +2 AND -3 DB OF 1000-HZ INDICATION?

MM-100E INPUT PROBE A TO TP4003. (SEE SH 4.) PROBE B TO GND.

NOTE INDICATION ON MM-100E RED DB SCALE

SEE NOTE 1

SET AN/GRM-114A MODULATION FREQ Hz THUMBWHEELS TO 03 000.0

REPLACE AND ALINE A4200 MODULE, IF FAULT STILL EXISTS . . . .

WITHIN +2 AND -3 DB OF 1000-HZ INDICATION?

OBSERVE MM-100E RED DB SCALE. COMPARE TO 1000-HZ (MODULATION) READING.

START

SEE NOTE 2. IF DECISION IS YES AT ALL FREQUENCIES, REPLACE AND ALINE A4300.

RETURN TO PERFORMANCE TESTS

BA SH 2

PARA 4-2
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-9
Audio Response Test Failure (X-Mode) Troubleshooting
(Sheet 2 of 4)

**CHART 4-9**
Audio Response Test Failure (X-Mode) Troubleshooting
(Sheet 2 of 4)
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-9
Audio Response Test Failure (X-Mode) Troubleshooting
(Sheet 3 of 4)

SEE NOTE 2, SH 1. IF DECISION IS YES AT ALL FREQUENCIES RECONNECT P1005 TO J1005.

TROUBLESHOOT A1000(*) AND/OR A3000 ASSEMBLIES. SEE CAUTION

NOTE
3. A1000(*) assembly troubleshooting is on chart 4-3; A3000 troubleshooting, Chart 4-4.

CAUTION
MODULE A1200B CONTAINS PARTS SENSITIVE TO ELECTROSTATIC DISCHARGE (ESD).

Change 4 4-137
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-9
Audio Response Test Failure (X-Mode) Troubleshooting
(Sheet 4 of 4)

RECEIVER IF AMPLIFIER ASSY A4000

P1005 BLUE

XTAL FILTER FL4001
TP4010
TP4009

1ST

A4100

2ND

40 DB OR X 100 GAIN

XTAL FILTER FL4002
TP4005
TP4004

+16V DC

TP4002

+16V DC

DISCR

TP4003

A4200

60 DB OR X 1000 GAIN

3RD

4TH

5TH

LIM

A4300

AUDIO SQUELCH PREAMP

178 DB OR +795 GAIN

S4001

X MODE

X-MODE AUDIO TO P201

NORMAL

TP4007

AUDIO TO A5000

TP4006

+16V DC

EL4GP443

4-138
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-10
Selectively Test Failure Troubleshooting
(Sheet 1 of 1)

START
SEE NOTE

REPLACE AND ALINE FL4001 (11.5-MHZ CRYSTAL FILTER)

REPEAT SELECTIVITY TEST

RT MEETS SELECTIVITY SPEC?

NO

REPLACE AND ALINE FL4002 (11.5 MHZ CRYSTAL FILTER)

YES

RETURN TO PERFORMANCE TESTS

PARA 4-2

NOTE
Use same equipment setup as in performance test.
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-11
A8000 and A6000 Assemblies Troubleshooting
(Sheet 1 of 12)

START

USE SAME EQUIPMENT SETUP AS IN PERFORMANCE TEST

SET AN/GRM-114A AC/OFF/DC SWITCH TO DC

SET AN/GRM-114A ANALYZER DISPLAY TO JUST PAST DETENT (100 KHZ/DIVISION)

SET MK-1978/VRC KEY SWITCH TO XMIT

AN/GRM-114A INPUT LEVEL LAMP ON?

IS THERE A SINGLE LINE?

YES

8A SH 2

NO

ARE THERE MULTIPLE FREQUENCY LINES?

YES

SEE VIEW A

NO

8D SH 4

VIEW A

WHEN THE A8400 MODULE IS "HUNTING" SEVERAL PEAKS THAT SEEM TO BE MOVING, APPEAR ON THE SPECTRUM ANALYZER SCREEN.
4-24. TROUBLESHOOTING FLOW CHARTS (CONT)

CHART 4-11
A8000 AND A6000 Assemblies Troubleshooting
(Sheet 2 of 12)

9A

IS POWER LEVEL OK?

YES

RETURN TO PERFORMANCE TESTS

NO

IS FREQUENCY ACCURACY OK?

YES

TROUBLESHOOT A8000 ASSEMBLY

NO

CHART 4-12

CHECK A1000 ASSEMBLY, PIN 4 (ORANGE TERMINAL) FOR 16 VDC.

16 VDC?

YES

REPLACE RELAY K403, RETURN TO PERFORMANCE TESTS.

NO

CONNECT EQUIPMENT AS SHOWN ON SH 9

SET MK-1978/VRC KEY SWITCH TO XMIT

MM-100E PROBE A TO TP8001. (SEE SH 11.) GROUND PROBE B.

16 ± 0.5 VDC?

NO

YES

9B SH 3

PARA 4-2

PARA 4-2

CHECK A2100 POWER SUPPLY. IF OK, REPLACE WIRING TO A2100. RETURN TO PERFORMANCE TESTS.
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-11
A8000 and A6000 Assemblies Troubleshooting
(Sheet 3 of 12)

NOTES
1. Speech amplifier module.
2. After taking measurement, set MK-1978/VRC KEY switch to RCVE.

8B

MM-100E PROBE A TO TP8006. (SEE SH 11.)

12 VDC?

NO

YES

REPLACE AND ALINE A8500 MODULE
SEE NOTE 1

RETURN TO PERFORMANCE TESTS

PARA 4-2

TROUBLESHOOT A2000 (CRYSTAL SWITCH) MODULE (CHART 4-4)

IF A2000 OK, DISCONNECT P6001 (GRAY COAX) FROM J8001 ON A6000 ASSEMBLY. (SEE SH 12.)

CONNECT EQUIPMENT AS SHOWN ON SH 10

CHECK A8100 MODULE

MK-1878/VRC PROBE A TO TP8005. (SEE SH 11.) GROUND PROBE B.

SET AN/GRM-114A FREQ FREQUENCY MHZ THUMBWHEELS TO 011 500.0

SET AN/GRM-114A FREQ ERROR SWITCH TO 1.5 KHZ

FREQ ERROR IS ± 200 HZ?

YES

NO

SET MK-1978/VRC KEY SWITCH TO XMIT. OBSERVE AN/GRM-114A FREQ ERROR METER.

ALINE A8100 (TRANS MODULATOR) MODULE. RETURN TO PERFORMANCE TESTS.

SEQ SH 4

PARA 4-2
4-24. TROUBLESHOOTING FLOW CHARTS (CONT)

CHART 4-11
A8000 and A6000 Assemblies Troubleshooting
(Sheet 4 of 12)

NOTE
3. This frequency accuracy reading is taken at 10 MHz to allow for a large tolerance (± 500 Hz).

4-143
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-11
A8000 and A6000 Assemblies Troubleshooting
(Sheet 5 of 12)

NOTES

4. After taking measurements, set MK-1978/VRC KEY switch to RCVE.
5. P8301 at violet coax.

9E

SET AN/GRM-114A RF FREQUENCY MHZ THUMBWHEELS TO 011 500.0

SET MK-1978/VRC KEY SWITCH TO XMIT. OBSERVE WAVEFORM ON AN/GRM-114A SPECTRUM ANALYZER.

WAVE PEAK IS ABOVE -60 DBM LINE?

YES

NO

9F

FREQ ERROR IS \(\pm\) 200 HZ?

YES

NO

9G

SH 8

REMOVE P6002 (BROWN COAX) FROM A6000 ASSEMBLY. (SEE SH 12.)

9I

SH 8

ALINE OR REPLACE A8100 (TRANSMITTER MODULATOR)

RETURN TO PERFORMANCE TESTS

Para 4-2

MK-1978/VRC PROBE A TO TP8003. (SEE SH 1.) PROBE B TO GND. OBSERVE SPECTRUM ANALYZER.

WAVE PEAK IS ABOVE -54 DBM LINE?

YES

NOTE 4

NO

NOTES

4. After taking measurements, set MK-1978/VRC KEY switch to RCVE.
5. P8301 at violet coax.

DISCONNECT MK-1978/VRC TEST PROBE FROM AN/GRM-114A ANTENNA CONNECTOR. CONNECT SMC TO BNC CABLE TO AN/GRM-114A ANT CONNECTOR AND P8301.

WAVE PEAK ABOVE -69 DBM LINE?

YES

REPLACE A8300 (TRANSMITTER 1ST AND 2ND IF AMPS)
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-11
A8000 and A6000 Assemblies Troubleshooting
(Sheet 6 of 12)

8G

SET AN/GRM-114A
AC/OFF/DC SWITCH TO DC.
TURN ANALYZER DISPLAY SWITCH OFF.

CONNECT A PROBE TO
AN/GRM-114 SCOPE IN
JACK. GROUND PROBE END.

ADJUST OSCILLOSCOPE
VERT AND HORIZ
CONTROLS FOR A 0-V
LINE AS IN VIEW B

RECONNECT BROWN
COAX P6002 TO J6002
ON THE A6000 ASSY

DISCONNECT SCOPE
PROBE END FROM
GROUND AND CONNECT
TO TP8008. (SEE SH 11.)

OBSERVE WHETHER
WAVEFORM ON
OSCILLOSCOPE IS ABOVE
ZERO LINE (VIEW C)
OR BELOW (VIEW D)

9H
SH 7

VIEW B
OSCILLOSCOPE CALIBRATION
(0V AT 1 DIVISION FROM BOTTOM)

VERT 1 V/DIVSN DC
HORIZ 10 ms/DIVSN

VIEW C
A4200 O.K.

VERT 1 V/DIVSN
HORIZ 10 ms/DIVSN
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-11
A8000 and A6000 Assemblies Troubleshooting
(Sheet 7 of 12)

--- Diagram Content ---

4. Waveform above or below 0?
   - Above: Replace A8200. Recheck phase lock using spectrum analyzer as above.
   - Below: Replace A4200 (discriminator) module. Return to performance tests.

5. One single peak on frequency?
   - No: Replace A8400 (damping network). Return to performance tests.
   - Yes: Reconnect gray coax to J6101. Return to performance tests.

--- View D Image ---
A4200 bad
Vert 1 V/DivSN DC
Horiz 10 ms/DivSN
CHART 4-11
A8000 and A6000 Assemblies Troubleshooting
(Sheet 8 of 12)

4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

**NOTE**
6. A1400 module output.

---

**CHART 4-11**
A8000 and A6000 Assemblies Troubleshooting
(Sheet 8 of 12)

---
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-11
A8000 and A6000 Assemblies Troubleshooting
(Sheet 9 of 12)
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-11
A8000 and A6000 Assemblies Troubleshooting
(Sheet 10 of 12)
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-11
A8000 and A6000 Assemblies Troubleshooting
(Sheet 11 of 12)
4-24. TROUBLESHOOTING FLOW CHARTS (CONT)

CHART 4-11
A8000 AND A6000 Assemblies Troubleshooting
(Sheet 12 of 12)
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-12
A6000 Assembly Troubleshooting
(Sheet 1 of 7)

NOTES
1. Make sure probe is on x1 setting.
2. After taking measurements, set MK-197B/VRC to RCVE.

TABLE A

<table>
<thead>
<tr>
<th>WIRE COLOR</th>
<th>RT HIGH POWER</th>
<th>RT LOW POWER</th>
</tr>
</thead>
<tbody>
<tr>
<td>GREEN</td>
<td>205 ± 40 vdc</td>
<td>65 ± 13 vdc</td>
</tr>
<tr>
<td>YELLOW</td>
<td>220 ± 44 vdc</td>
<td>0 vdc</td>
</tr>
<tr>
<td>CLEAR</td>
<td>220 ± 44 vdc</td>
<td>0 vdc</td>
</tr>
</tbody>
</table>
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-12
A6000 Assembly Troubleshooting
(Sheet 2 of 7)

NOTES
3. After taking measurement, set MK-1978/VRC KEY switch to RCVE.

10A

CHECK A6000 POWER SUPPLY VOLTAGES

REPAIR POWER SUPPLY. RETURN TO PERFORMANCE TESTS.

PROPER VOLTAGE LEVELS OBTAINED?

YES

CHECK A6400 OUTPUT

DISCONNECT P6101 (GRAY COAX) FROM J6101. (SEE SH 7.)

AN/GRM-114A ANTENNA CONNECTOR TO P6101 (GRAY COAX)

SET RT MC-TUNE-KC SWITCH TO 30.00 MHZ. SET AN/GRM-114A FREQUENCY MHZ THUMBWHEELS TO 030 000.0.

WAVER PEAK IS ABOVE -40 DB LINE?

NOTE 3

YES

10B SH 3

NO

PARA 4-2

SET AN/GRM-114A ANALY DISPR TO JUST PAST DETENT (100 KHZ/DIV). SET AC/OFF/DC SWITCH TO AC.

SET MK-1978/VRC KEY SWITCH TO XMIT. OBSERVE WAVEFORM ON SPECTRUM ANALYZER.

ALINE AND, IF NECESSARY, REPLACE A8300 (MASTER OSC) AND A8400 (BUFFER AMP) MODULES

RETURN TO PERFORMANCE TESTS

PARA 4-2
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-12
A6000 Assembly Troubleshooting
(Sheet 3 of 7)

**NOTES**

4. Set both AN/GRM-114A RF FREQUENCY MHz thumbwheels and RT MC-TUNE-KC switch to frequencies listed in the following table. At each frequency,
   a. Set MK-1978/VRC KEY switch to XMIT.
   b. Observe wave form on spectrum analyzer.
   c. Set MK-1978/VRC KEY switch to RCVE.

**CAUTION**

Do not change frequencies while MK-1978/VRC KEY switch is in XMIT position.

<table>
<thead>
<tr>
<th>RT MC-TUNE-KC SWITCH</th>
<th>AN/GRM-114A RF FREQUENCY MHz THUMBWHEELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.00 MHz</td>
<td>030 000.0 MHz</td>
</tr>
<tr>
<td>40.00 MHz</td>
<td>040 000.0 MHz</td>
</tr>
<tr>
<td>52.00 MHz</td>
<td>052 000.0 MHz</td>
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<tr>
<td>76.00 MHz</td>
<td>076 000.0 MHz</td>
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<tr>
<td>63.00 MHz</td>
<td>063 000.0 MHz</td>
</tr>
<tr>
<td>53.00 MHz</td>
<td>053 000.0 MHz</td>
</tr>
</tbody>
</table>

(Set RT BAND to 0 at frequencies above 52.00 MHz.)
4-24. TROUBLESHOOTING FLOW CHARTS (CONT)

CHART 4-12
A6000 Assembly Troubleshooting
(Sheet 5 of 7)

10E

DISCONNECT SMC TO BNC CABLE END FROM J6201. RECONNECT P6201 TO J6201.

CHECK A6100 AND A6200 OUTPUT

DISCONNECT P6202 (VIOLET COAX) FROM J6202 ON A6200 ASSEMBLY. (SEE SH 7.)

SMC TO BNC CABLE END TO J6202

SET RT MC-TUNE-KC SWITCH TO 75.000 MHZ AND AN/GRM-114A RF FREQUENCY MHZ THUMBWHEELS TO 075 000.0 MHZ

SET MK-1978/VRC KEY SWITCH TO XMIT. OBSERVE AN/GRM-114A WATT METER INDICATION.

3.5 TO 5.0 WATTS?

YES

NO

LOW POWER OR NO POWER NOTES 9 AND 10?

NO POWER

REPLACE TUBES IN A6100 (DRIVER) AND A6200 (POWER AMP) MODULES

POWER?

YES

ALINE A6300 AND A6400 MODULES

RETURN TO PERFORMANCE TESTS

SEE NOTE 11

REPLACE A6100 AND/OR A6200

SEE NOTE 12

RETURN TO PERFORMANCE TESTS

PARA 4-2

10F

SH 6

NOTES
9. For actual power, multiply meter indication by 10.
10. After taking measurement, set MK-1978/VRC KEY switch to RCVE.
11. Isolate by substitution.
12. Repeat last two steps with RT MC-TUNE-KC switch set at 63.00 MHZ and 53.00 MHZ and AN/GRM-114A RF FREQUENCY MHZ thumbwheels set 063 000.0 MHZ and 053 000.0 MHZ respectively.

CAUTION
LOW POWER Do not change frequency while MK-1978/VRC KEY switch is in XMIT position.
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-12
A6000 Assembly Troubleshooting
(Sheet 6 of 7)

13. Low power or no power across BAND A or across BANDS A and B.

---

NOTE 13

BAND A ONLY

CHECK COAX CABLES. IF PROBLEM REMAINS . . .
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-12
A6000 Assembly Troubleshooting
(Sheet 7 of 7)
CHART 4-13
Transmitter Deviation (Normal Mode) Troubleshooting
(Sheet 1 of 1)
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-14
Transmitter Distortion (Normal Mode) Troubleshooting
(Sheet 1 of 6)

NOTE
1. After taking measurement, set MK-1978/VRC KEY switch to RCV.

NOTE 1
7% DISTORTION OR LESS?

11A SH 2

YES
REPLACE AND ALIGN A8500
(XMTR SPEECH AMP) MODULE
RETURN TO PERFORMANCE TESTS

PARA 4-2
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-14
Transmitter Distortion (Normal Mode) Troubleshooting
(Sheet 2 of 6)

NOTE

2. Probe from BNC TEE must still be connected to TP8004 for signal injection.

11A

DISCONNECT BNC CABLE FROM MM-100E DEMOD JACK. LEAVE OTHER END CONNECTED TO INPUT JACK.

FREE END OF BNC CABLE TO TEE CONNECTOR ON AN/GRM-114A INT MOD OUT PORT

SET MM-100E RANGE SWITCH TO 0.1 V.

ADJUST AN/GRM-114A VAR/OFF CONTROL FOR 0.035-V INDICATION ON MM-100E METER

DISCONNECT BNC CABLE FROM TEE AND RECONNECT TO MM-100E DEMOD JACK

SET MM-100E RANGE SWITCH TO DISTR 0 – 10%

ATTENUATED PROBE A TO TP8004. (SEE SH 6.) GROUND PROBE B.

SET MK-1978/VRC RT AND AUX RCVR SWITCHES TO NORMAL

20 DB AND 30 DB ATTENUATORS (IN SERIES) TO AN/GRM-114A ANTENNA INPUT

ATTENUATED PROBE TO ATTENUATORS

ATTENUATED PROBE A TO TP8005. (SEE SH 6.) GROUND PROBE B.

REPLACE AND ALINE A8500 (XMTR SPEECH AMP) MODULE

RETURN TO PERFORMANCE TESTS

DISCONNECT P6101 (GREY COAX) FROM J6101 ON A6100 AND A6200 ASSEMBLIES. (SEE SH 5.)

NOTE 2

PARA 4-2

11B

SH 3
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-14
Transmitter Distortion (Normal Mode) Troubleshooting
(Sheet 3 of 6)

SET AN/GRM-114A RF FREQUENCY MHZ THUMBWHEELS TO 011 500.0 MHZ

SET MK-1978/VRC KEY SWITCH TO XMIT. OBSERVE MM-100E METER INDICATION.

7% DISTORTION OR LESS?

NO

YES

OBSERVE AN/GRM-114A DEVIATION METER

REPLACE AND ALINE A8100 (11.5-MHZ MODULATOR) MODULE

RETURN TO PERFORMANCE TESTS

FREE END OF BNC CABLE TO TEE CONNECTOR ON AN/GRM-114A INTO MOD OUT PORT

SET MM-100E RANGE SWITCH TO 0.1

ADJUST AN/GRM-114A VAR/OFF CONTROL FOR 0.017-V INDICATION ON MM-100E METER

DISCONNECT BNC CABLE FROM TEE AND RECONNECT TO MM-100E DEMOD JACK

DISCONNECT PROBE FROM TEE ON AN/GRM-114A INTO MOD JACK

SMC TO BNC CABLE TO TEE

CHECK A9000

RECONNECT P6101 (GREY COAX) TO J6101 ON A6100 AND A8200 ASSEMBLIES

DISCONNECT BNC CABLE FROM MM-100E DEMOD JACK. (LEAVE OTHER END CONNECTED TO INPUT.)

SET MK-1978/VRC KEY SWITCH TO RCVE

8-KHZ DEVIATION?

NO

YES

PARA 4-2

119

11C

SH 4
4-24 TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-14
Transmitter Distortion (Normal Mode) Troubleshooting
(Sheet 4 of 6)

11C

DISCONNECT P6002 (BROWN COAX) FROM J6002 ON A6000 ASSEMBLY. (SEE SH 5.)

FREE END OF SMC TO BNC CABLE TO J6002

SET MM-100E RANGE SWITCH TO DISTR 0 - 10%

SET AN/GRM-114A AC/OFF/DC SWITCH TO AC

SET AN/GRM-114A ANALY DISPR TO JUST PAST DETENT (100 KHZ/DIV)

SET MK-1978/VRC KEY SWITCH TO XMIT

ADJUST RF FREQUENCY MHZ THUMBWHEELS UNTIL WAVEFORM IS CENTERED ON SPECTRUM ANALYZER

OBSERVE MM-100E DISTORTION METER INDICATION

7% DISTORTION OR LESS?

YES

ALINE AND, IF NECESSARY, REPLACE A8400 MODULES

RETURN TO PERFORMANCE TESTS

NO

REPLACE AND ALINE A6300 (MASTER OSCILLATOR) MODULE

NOTE

3. After taking measurement, set MK-1978/VRC KEY switch to RCVE.
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-14
Transmitter Distortion (Normal Mode) Troubleshooting
(Sheet 5 of 6)
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-14
Transmitter Distortion (Normal Mode) Troubleshooting
(Sheet 6 of 6)
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-15
Transmitter Deviation (X-Mode) Troubleshooting
(Sheet 1 of 4)

NOTES

1. After taking a reading, set MK-1878/VRC KEY switch to RCVE.

2. The desired waveform corresponds to between 30 and 72 kHz (8 kHz per division).

3. If this is a recheck after A8500 alignment or A8100 replacement, recheck XMTR deviation with AN/GRM-114A RF FREQUENCY MHz thumbwheels set at 030 000.0 MHz.

START

USE SAME EQUIPMENT SETUP AS IN PERFORMANCE TESTS

DISCONNECT A8101 (GRAY COAX) FROM J6101 ON A8000 ASSEMBLY. (SEE SH 3.)

PROBE A TO TP80005. (SEE SH 4) PROBE B TO GND.

SET AN/GRM-114A RF FREQUENCY MHz THUMBWHEELS TO 011 500.0

SET MK-1878/VRC KEY SWITCH TO XMIT. OBSERVE WAVEFORM ON AN/GRM-114A OSCILLOSCOPE.

BETWEEN 4 AND 8 DIVISIONS IN HEIGHT?

YES

ALINE A8500 MODULE. IF PROBLEM STILL EXISTS, REPLACE AND ALINE A8100 MODULE.

NO

SEE NOTE 3

RECONNECT P6101 (GRAY COAX) TO J6101

BETWEEN 4 AND 8 DIVISIONS IN HEIGHT?

YES

12A SH 2

NO

RETURN TO PERFORMANCE TESTS

PARA 4-2

12A SH 2
4-24. TROUBLESHOOTING FLOW CHARTS. (CONTR)

CHART 4-16
Transmitter Deviation (X-Mode) Troubleshooting
(Sheet 2 of 4)

12A

REPLACE AND ALINE A6300 (MASTER OSCILLATOR) MODULE

RECHECK DEVIATION AT P6101 WITH AN/GRM-114A RF FREQUENCY MHZ SET AT 030 000.0

DEVIAITON BETWEEN 4 AND 8 DIVISIONS IN HEIGHT?

YES

RECONNECT P6101 (GRAY COAX) TO J6101, RETURN TO PERFORMANCE TESTS.

NO

REPLACE GRAY COAX BETWEEN A6400 AND A6100. (SEE SH 3.)

RETURN TO PERFORMANCE TESTS

PARA 4-2
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-15
Transmitter Deviation (X-Mode) Troubleshooting
(Sheet 3 of 4)
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-16
Transmitter Deviation (X-Mode) Troubleshooting
(Sheet 4 of 4)
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-16
Transmitter Signal-to-Noise Ratio Troubleshooting
(Sheet 1 of 2)

START

CHECK NOISE ON +16-VOLT LINE

USE SAME EQUIPMENT SETUP AS IN PERFORMANCE TESTS

SET AN/GRM-114A AC/OFF/DC SWITCH TO AC. SET DEV-VERT TO 0.01 AND SWEEP TO 0.1 MSEC.

ATTENUATED PROBE (ON X1 SETTING) TO AN/GRM-114A SCOPE IN JACK

ATTENUATED PROBE A TO TP0001. (SEE SH 2.) PROBE B TO GND.

SET MK-1978/VRC KEY SWITCH TO XMIT. OBSERVE WAVEFORM ON AN/GRM-114A OSCILLOSCOPE.

20 MV PEAK-TO-PEAK OR LESS?

YES

NO

TROUBLESHOOT A8000 ASSEMBLY

NO

LOW SIGNAL-TO-NOISE RATIO DUE TO EXCESSIVE NOISE IN POWER SUPPLY. NO FURTHER ACTION NEED BE TAKEN.

RETURN TO PERFORMANCE TESTS

YES

1 V PEAK-TO-PEAK OR LESS?

YES

ATTENUATED PROBE A TO MK-1978/VRC PIN 8 (25 V). PROBE B TO GND.

SET MK-1978/VRC KEY SWITCH TO XMIT. OBSERVE WAVEFORM ON AN/GRM-114A OSCILLOSCOPE.

SET AN/GRM-114A SWEEP TO 1 MSEC

CHECK POWER SUPPLY NOISE

NOTE

After taking measurement, set MK-1978/VRC KEY switch to RCVE.

REPLACE A8000/A8400 (POWER SUPPLY) MODULES

 PARA

2-43

 PARA

4-11

 PARA

4-2
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-16
Transmitter Signal-to-Noise Ratio Troubleshooting
(Sheet 2 of 2)
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-17
Antenna Information (Switching) Troubleshooting
(Sheet 1 of 1)

START

USE SAME EQUIPMENT SETUP AS IN PERFORMANCE TEST

REMOVE CABLE FROM RT ANT CONT CONNECTOR

REFER TO TABLE A. FIND ANT CONT PIN WHICH MATCHES UNLIT MK-1978/VRC INDICATOR LAMP.

ME-26/U LEAD TO MATCHING PIN. OBSERVE VOLTAGE METER INDICATION.

25.5 VDC?

CHECK AND, IF NECESSARY, REPLACE WIRING AND SWITCHES 3065 AND 3069

FAULTY ANT CONT CONNECTION TO MK-1978/VRC. RETURN TO PERFORMANCE TESTS.

IF PROBLEM STILL EXISTS, GO TO NEXT STEP. IF FAULT HAS BEEN CORRECTED, RETURN TO PERFORMANCE TESTS.

REFER TO TABLE A. REPLACE CAPACITOR WHICH MATCHES UNLIT MK-1978/VRC INDICATOR LAMP.

RETURN TO PERFORMANCE TESTS

PARA 4-2

TABLE A

<table>
<thead>
<tr>
<th>MK-1978/VRC INDICATOR LAMP</th>
<th>MATCHING RT ANT CONT PIN</th>
<th>MATCHING CAPACITOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) BAND</td>
<td>A</td>
<td>C321</td>
</tr>
<tr>
<td>(B) BAND</td>
<td>B</td>
<td>C320</td>
</tr>
<tr>
<td>30-33/53-66</td>
<td>D</td>
<td>C319</td>
</tr>
<tr>
<td>33-37/56-60</td>
<td>E</td>
<td>C315</td>
</tr>
<tr>
<td>37-42/60-65</td>
<td>F</td>
<td>C318</td>
</tr>
<tr>
<td>42-47.5/65-70.5</td>
<td>H</td>
<td>C314</td>
</tr>
<tr>
<td>47.5-52/70.5-75</td>
<td>J</td>
<td>C317</td>
</tr>
</tbody>
</table>

PARA 4-2

4-172
Section III ALINEMENT AND ADJUSTMENT PROCEDURES

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4-25. GENERAL.

This section contains alinement instructions for use with Test Set AN/GRM-114A and Maintenance Kit MK-1978/VRC. The instructions are presented in individual procedures which apply to a specific stage of the RT receiver or transmitter section.

Except for the local oscillator alinements, each procedure is self-contained; that is, all necessary instructions are provided without reference to any previously performed alinement. Therefore, it is possible to use the procedures in this section to aline an individual module without doing any work on other stages in the radio.

However, this maintenance approach is not recommended. It is best to perform a complete realinement of all modules after replacing an individual module. This should be done even if the radio has undergone its annual realinement less than one year prior to the repair.
4-25. GENERAL. (CONT)

Careful performance of all the instructions contained in the receiver and transmitter section alinement procedures ensures that the radio will meet all performance standards outlined in section 1 of this chapter. Although the radio may seem to work satisfactorily if other quick-fix methods are used, there is no guarantee that such methods will result in proper performance when the radio is used along with secure equipment, or for other than voice communication.

4-26. CRYSTAL REFERENCE SYSTEM (CRS) TEST.

PURPOSE. This test is performed to make sure that the local oscillator will not be pulled off frequency by a malfunctioning CRS. Steps 1 through 8 involve a quick check to determine whether the CRS is putting out an incorrect error signal causing improper local oscillator frequency and loss of audio tone. The remaining steps are done with the local oscillator disconnected from the CRS in order to check CRS performance in response to a nonfluctuating 42.00-MHz signal generator output. If the CRS passes the second part of the test, it will be able to correct normal fluctuation in local oscillator frequency.

TEST EQUIPMENT AND MATERIALS

<table>
<thead>
<tr>
<th>Test Set AN/GRM-114A</th>
<th>T-Connector UG-274/U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply PP-1104(*)/G</td>
<td>Amphenol Adapter M-39012/16</td>
</tr>
<tr>
<td>Maintenance Kit MK-1978/VRC</td>
<td></td>
</tr>
</tbody>
</table>

TEST SETUP. Connect the equipment as shown in test setup diagram A. Set A4000 X-MODE/ NORMAL switch to X-MODE.
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. Inject 100-µv rf at 30 MHz, 1-kHz modulation; 8-kHz deviation.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>MC-TUN-E-KC</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully clockwise</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>NEW OFF</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td>OFF</td>
</tr>
<tr>
<td>MK-1978/VRC</td>
<td>All switches</td>
<td>Down, except POWER up</td>
</tr>
<tr>
<td>AN/GRM-114A;</td>
<td>See test setup diagram</td>
<td></td>
</tr>
<tr>
<td>MM-100E</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4-26. CRYSTAL REFERENCE SYSTEM (CRS) TEST. (CONT)

TEST PROCEDURE

2. Adjust RT VOLUME control for comfortable level.
3. Raise A3000 tray.
4. Remove A1000 cover and install alignment cover with at least one screw to ensure good ground.
5. Ground TP3001 with screwdriver.
6. Adjust L1502 (1) to get clearest possible 1000-HZ tone from speaker. See test setup diagram (C).
7. Remove ground from TP3001. Tone must not change.

NOTE

If the tone changes to a rushing noise when step 7 is completed, the CRS is defective. See the troubleshooting section.

8. Set RT MC-TUNE-KC control to 40.00 MHz; then adjust back to 30.00 MHz. Tone must not change.

NOTE

If the tone changes after step 8 is completed, the CRS may be defective. See the troubleshooting section.

9. Set RT MC-TUNE-KC control to 30.50 MHz.
10. Disconnect rf cable from AN/GRM-114A TRANS-RCVR jack (1). (See test setup diagram D.)

11. Connect amphenol adapter to TRANS-RCVR jack, or end of RF Cable (RT-524).

12. Disconnect P1004 from J1004 on A1000 tray. (See test setup diagram C, page 4-176.)

13. Connect P1004 to amphenol adapter at cable at AN/GRM-114A TRANS-RCVR jack.

14. Set AN/GRM-114A HI LVL/µv x100/NORM switch (2) to HI LVL. (See test setup diagram D.)

15. Set AN/GRM-114A RF FREQUENCY MHz thumbwheels (3) to 042 000 0. (See test setup diagram D.)

16. Adjust AN/GRM-114A VERT control (4) and HORIZ control (5) to center scope trace on screen. (See test setup diagram D.)

17. Turn AN/GRM-114A RF LEVEL control (6) fully counterclockwise; then slowly clockwise and stop when 0 dBm lamp (7) comes on. (See test setup diagram D.)

18. Set AN/GRM-114A VAR control (8) to OFF. (See test setup diagram D.)

19. Connect AN/GRM-114A SCOPE probe A to TP3001 and probe B to ground. Set attenuated probe to x10.
4-28. CRYSTAL REFERENCE SYSTEM (CRS) TEST. (CONT)

NOTE

Scope trace should be centered on screen. A slight ac component superimposed on the horizontal trace is normal. If dc level varies higher than +0.32 vdc or lower than -0.32 vdc, the CRS is defective. See troubleshooting section.

In steps 20 and 21, scope trace should vary up to at least +0.5 vdc and then down to at least -0.5 vdc. If this does not happen, the CRS is defective. See the troubleshooting section.

20. Slowly adjust AN/GRM-114A RF FREQUENCY MHz thumb wheels to 042 250 0. Note scope trace.
21. Slowly adjust AN/GRM-114A RF FREQUENCY MHz thumb wheels to 041 750 0. Note scope trace.

4-27. LOCAL OSCILLATOR A1500 ALIGNMENT.

PURPOSE. If the local oscillator is operating at the correct frequency, the CRS will not output a dc error signal. This procedure aligns the oscillator by tuning its circuits to bring the CRS error signal as close to zero as possible. The Crystal Reference System Test (paragraph 4-26) must be done prior to performing this alignment.

TEST EQUIPMENT AND MATERIALS

Test Set AN/GRM-114A Maintenance Kit MK-1978/VRC
Power Supply PP-1104(*)/G

TEST SETUP. Connect the equipment as shown in test setup diagram , page 4-179. Connect P1004 to J1004 on the A1000 tray.
LOCAL OSCILLATOR A1500 ALIGNMENT. (CONT)

EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. Inject at 30, 52 and 42 MHz, with 1000-HZ modulation; 8-kHz deviation. Short out TP 3001, adjust for clear test beat for 42 and 52 MHz). Once tone is established, go back to zero-scope and trace.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>IPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER</td>
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<td>LOW</td>
</tr>
<tr>
<td>BAND</td>
<td></td>
<td>42.00</td>
</tr>
<tr>
<td>MC-TUNE-KC</td>
<td></td>
<td>Fully clockwise</td>
</tr>
<tr>
<td>VOLUME</td>
<td></td>
<td>NEW OFF</td>
</tr>
<tr>
<td>SQUELCH</td>
<td></td>
<td>OFF</td>
</tr>
<tr>
<td>SPEAKER (RT-524/VRC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/VRC</td>
<td>All switches</td>
<td>Down, except POWER up</td>
</tr>
<tr>
<td>-114A, 30E</td>
<td>See test setup diagram</td>
<td></td>
</tr>
<tr>
<td></td>
<td>page 4-180</td>
<td></td>
</tr>
</tbody>
</table>

![Diagram](image-url)
4-27. LOCAL OSCILLATOR A1500 ALIGNMENT. (CONT)

ALINEMENT PROCEDURE

1. Adjust AN/GRM-114A VERT control to zero scope trace.
2. Connect AN/GRM-114A test probe (see test setup diagram A, page 4-179) to TP3001 and alligator clip to ground.

NOTE

Probe must be on x10 setting for correct scope reading. Without probe set AN/GRM-114A DEV-VERT to XI V/DIV.

Due to a 3.5-kHz local oscillator tolerance with the CRS operating, it may not be possible to achieve a zero-vdc scope trace in the following steps. The dc voltage should not exceed ±0.5 volts.
4-27. **LOCAL OSCILLATOR A1500 ALIGNMENT. (CONT)**

3. Adjust C1501 (1) for zero-vdc scope reading. (See test setup diagram page 4-180.)
4. Set RT MC-TUNE-KC control to 30.00 MHz.
5. Set AN/GRM-114A RF FREQUENCY MHz thumb wheels to 030 000 0.
6. Adjust L1502 (2) for zero-vdc scope reading.
7. Set RT MC-TUNE-KC control to 52.00 MHz.
   a. Set AN/GRM-114A RF FREQUENCY MHz thumb wheels to 052 000 0.
9. Adjust L1501 (3) for zero-vdc scope reading.
10. Repeat steps 3 through 9 until scope reads as close to zero vdc as possible for all three frequencies, with clear audio.

4-28. **TUNER A1000 ALIGNMENT**

**PURPOSE.** This procedure tunes the A1000 assembly to produce maximum amplification of low-level signals and maximum attenuation of noise.

**TEST EQUIPMENT AND MATERIALS**

Test Set AN/GRM-114A
Power Supply PP-1104(*)/G

Maintenance Kit MK-1978/VRC

**TEST SETUP.** Connect the equipment as shown in test setup diagram.
4-28. TUNER A1000 ALIGNMENT. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>Fully clockwise</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>NEW OFF</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td></td>
</tr>
<tr>
<td>AN/GRM-114A; MM-100E</td>
<td>See test setup diagram</td>
<td><img src="image-url" alt="Diagram of equipment controls" /></td>
</tr>
<tr>
<td>MK-1978/VRC</td>
<td>All switches</td>
<td>Down, except POWER up</td>
</tr>
</tbody>
</table>

4-182
4-28. TUNER A1000 ALINEMENT. (CONT)

ALIGNMENT PROCEDURE

1. Connect MM-100E attenuated probe A (see test setup diagram, page 4-181) to SPKR jack in MK-1978/VRC AUDIO square. Connect alligator clip to GND.

2. Install A1000 alinement cover, securing it with one screw.

NOTE

In the following steps, a 1000-HZ audio tone will be heard on the loudspeaker. During alinement of A1000 circuits, a reading of at least 10 db SINAD on the MM-100E blue scale at 0.5-ÌV rf indicates correct receiver sensitivity. However, problems in the A4000 or A5000 can result in a lower SINAD even through the A1000 is properly alined. Therefore, adjust all A1000 inductors and capacitors for best possible SINAD reading. Adjust RF LEVEL for SINAD meter indication.

3. Adjust C1 104 (1), C1205 (2), and C1305 (3) for highest SINAD reading. (See test setup diagram, page 4-181.)

4. Set AN/GRM-114A RF FREQUENCY MHz thumbwheels to 052 000 0.

5. Set RT MC-TUNE-KC control to 52.00 MHz.

6. Adjust L1102 (4), L1202 (5), and L1302 (6) for highest SINAD reading.

7. Set AN/GRM-114A RF FREQUENCY MHz thumbwheels to 053 000 0.

8. Set RT BAND switch to.

9. Set RT MC-TUNE-KC control to 53.00 MHz.

10. Adjust L1103 (7), L1203 (8), and L1303 (9) for highest SINAD reading.

11. Set AN/GRM-114A RF FREQUENCY MHz thumbwheels to 065 000 0.

12. Set RT MC-TUNE-KC control to 65.00 MHz.
4-28. TUNER A1000 ALIGNMENT. (CONT)

13. Adjust C1101 (10), C1201 (11), and C1301 (12) for highest SINAD reading.
14. Set AN/GRM-114A RF FREQUENCY MHz thumbwheels to 075 000 0.
15. Set RT MC-TUNE-KC control to 75.00 MHz.
16. Adjust L1101 (13), L1201 (14), and L1301 (15) for highest SINAD reading.

Mixer Adjustment

17. Set RT MC-TUNE-KC control to 52.00 MHz.
18. Set AN/GRM-114A RF FREQUENCY MHz thumbwheels to 052 000 0.
19. Adjust C1404 (16) for highest SINAD reading.

4-29. IF DISCRIMINATOR A4200 ALIGNMENT.

PURPOSE. This procedure enables the discriminator to provide maximum separation of the audio signal from the rf carrier. Adjusting for zero vdc at TP4003 ensures that T4206 and T4207 are conducting equally around the carrier frequency. Adjusting for maximum ac at TP4007 ensures that the discriminator is tuned exactly to the 11.5-MHz center frequency.

TEST EQUIPMENT AND MATERIALS

Test Set AN/GRM-114A
Power Supply PP-1104(*)/G
Maintenance Kit MK-1978/VRC
T-Connector UG-274/U

TEST SETUP. Connect the equipment as shown in test setup diagram A.
4-29. IF DISCRIMINATOR A4200 ALIGNMENT (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. Inject 20-µV rf at 30 MHz, 1-kHz modulation; 8-kHz deviation.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>A 30.00</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>Fully clockwise</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>NEW OFF</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td>Down, except POWER up</td>
</tr>
<tr>
<td></td>
<td>All switches</td>
<td></td>
</tr>
<tr>
<td>MK-1978/VRC</td>
<td>See test setup diagram</td>
<td></td>
</tr>
<tr>
<td>AN/GRM-114A; MM-100E</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![Test setup diagram](EL4GP340)
4-29. IF DISCRIMINATOR A4200 ALINEMENT. (CONT)

ALINEMENT PROCEDURE

1. Lift A4000 tray (1). (See test setup diagram ©.)
2. Adjust AN/GRM-114A VERT and HORIZ controls to center scope trace at zero line.
3. Connect AN/GRM-114A test probe A to TP4003 (2). Connect lead B to ground.
4. Adjust T4206 (4) to center scope trace on zero line.
5. Set attenuated probe to xl.
6. Connect probe A to TP4007 (3).
7. Adjust T4207 (5) for maximum voltage reading on MM-100E.
8. Repeat steps 3 through 7 until maximum MM-100E reading and zero-vdc scope trace are present at the same time.
9. Adjust RT volume control for a 17 VAC indication on the MM-100E meter connected to Speaker output on the MK-1978VRC, and repeat SINAD test.
10. Connect probe A to TP4003 (2). Probe must remain on xl setting.
11. Set MM-100E to 0-10% DIST.
12. Set AN/GRM-114A HI LVLµ x100 NORM switch to µv x 100.
13. Set AN/GRM-114 RF LEVEL control to 2.
14. Adjust T4207 (5) for distortion reading on MM-100E slightly less than 5 percent.
15. If adjustment of T4207 is required in step 13, repeat steps 2 through 7 after first restoring MM-100E and AN/GRM-114A controls to the initial settings given in test setup diagram.

4-30. SILICON VERSION IF DISCRIMINATOR A4200A ALINEMENT.

PURPOSE. This procedure enables the integrated circuit discriminator to provide maximum separation of the audio signal from the rf carrier. Coil L4202 is adjusted to tune the fm detector portion of the integrated circuit exactly to the 11.5-MHz center frequency.
4-20. SILICON VERSION IF DISCRIMINATOR A4209A ALIGNMENT. (CONT)

TEST EQUIPMENT AND MATERIALS

Test Set AN/GRM-114A
Power Supply PP-1104(*)/G

Maintenance Kit MK-1978/VRC

TEST SETUP. Connect the equipment as shown in test setup diagram A.

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. Inject 20-µV rf at 30 MHz, 1-kHz modulation; 8-kHz deviation.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/GRM-114A; MM-100E</td>
<td>See test setup diagram page 4-188</td>
<td>B, LOW</td>
</tr>
<tr>
<td>RT</td>
<td>POWER</td>
<td>A, 30.00</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>Fully clockwise</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>NEW OFF</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td></td>
</tr>
<tr>
<td>MK-1978/VRC</td>
<td>All switches</td>
<td>Down, except POWER up</td>
</tr>
</tbody>
</table>
4-20. SILICON VERSION IF DISCRIMINATOR A4200A ALIGNEMENT. (CONT)

ALIGNEMENT PROCEDURE
4-39. SILICON VERSION IF DISCRIMINATOR A4209A ALIGNMENT. (CONT)

1. Lift A4000 tray (1). (See test setup diagram C, page 4-188.)
2. Connect MM-100E attenuated probe A (test setup diagram A, page 4-187) to TP4007 (2); connect alligator clip to ground.
3. Adjust L4202 (3) for maximum indication on MM-100E.

4-31. AUDIO AND SQUELCH PREAMPLIFIER A4300 ALIGNMENT.

PURPOSE. This procedure adjusts the gain of the A4300 assembly.

TEST EQUIPMENT AND MATERIALS

Test Set AN/GRM-114A
Maintenance Kit MK-1978/VRC

Power Supply PP-1104(*)/G
Attenuated Probe

TEST SETUP. Connect the equipment as shown in test setup diagram A.
4-31. AUDIO AND SQUELCH PREAMPLIFIER A4300 ALIGNMENT. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>Fully clockwise</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>NEW OFF</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td>Down, except POWER up</td>
</tr>
<tr>
<td>MK-1978/VRC</td>
<td>All switches</td>
<td></td>
</tr>
<tr>
<td>AN/GRM-114A; MM-100E</td>
<td>See test setup diagram</td>
<td></td>
</tr>
</tbody>
</table>

![Test setup diagram](image_url)
4-31. AUDIO AND SQUELCH PREAMPLIFIER A4300 ALIGNMENT (CONT)

ALIGNMENT PROCEDURE

1. Lift RT A4000 tray (1). (See test setup diagram C.)
2. Remove A4300 cover (2).
3. Connect attenuated probe A to TP4007 (3). Connect alligator clip B to ground.
4. Adjust R4304 (4) for 0.8-volt reading on MM-100E.
4-32 SILICON VERSION AUDIO AND SQUELCH PREAMPLIFIER A4300A ALIGNMENT.

PURPOSE. This procedure adjusts the gain of the A4300A assembly.

TEST EQUIPMENT AND MATERIALS

Test Set AN/GRM-114A
Maintenance Kit MK-1978/VRC

Power Supply PP-1104(*)/G
Attenuated Probe

TEST SETUP. Connect the equipment as shown in test setup diagram A.
4-32. SILICON VERSION AUDIO AND SQUELCH PREAMPLIFIER A4300A ALINEMENT. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as illustrated in the following table.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
<th>RT</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER</td>
<td>LOW</td>
<td></td>
</tr>
<tr>
<td>BAND</td>
<td>64.00</td>
<td></td>
</tr>
<tr>
<td>MC-TUNE-KC</td>
<td>Fully clockwise</td>
<td></td>
</tr>
<tr>
<td>VOLUME</td>
<td>NEW OFF</td>
<td></td>
</tr>
<tr>
<td>SQUELCH</td>
<td>Down, except POWER up</td>
<td></td>
</tr>
</tbody>
</table>

MK-1978/VRC

All switches

AN/GRM-114A; MM-100E

See test setup diagram

---

![Diagram of equipment controls and settings](image-url)
4-32. SILICON VERSION AUDIO AND SQUELCH PREAMPLIFIER A4300A ALIGNMENT. (CONT)

ALIGNMENT PROCEDURE

1. Lift RT A4000 tray (1).
2. Remove A4300A cover (2).
3. Connect attenuated probe A to TP4007 (3). Connect alligator clip B to ground.
4. Adjust R4304 (4) for 0.8-volt reading on MM-100E.

4-33 ALIGNMENT OF AS300 SQUELCH FILTER FOR CORRECT TRANSMITTED SQUELCH TONE

PURPOSE. This procedure adjusts Resistor R5301 in the squelch filter to ensure transmission of a 150-Hz NEW SQUELCH tone. Adjustment of R5301 during transmission also properly tunes the squelch filter for 150-Hz NEW SQUELCH tone reception.

TEST EQUIPMENT AND MATERIALS

Power Supply PP-1104(*)/G
Maintenance Kit MK-1978/VRC

Test Set AN/GRM-114A
4-33 ALINEMENT OF A5300 SQUELCH FILTER FOR CORRECT TRANSMITTED SQUELCH TONE (CONT)

TEST SETUP. Connect the equipment as shown in test setup diagram A.
4-23. ALIGNMENT OF AS300 SQUELCH FILTER FOR CORRECT TRANSMITTED SQUELCH TONE. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment as indicated in the following table.

**CONTROL AND SWITCH SETTINGS**

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>64.00</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>Counterclockwise</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>NEW ON</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td></td>
</tr>
<tr>
<td>MK-1978/VRC</td>
<td>All switches</td>
<td>Down, except POWER up</td>
</tr>
<tr>
<td>AN/GRM-114A; MM-100E</td>
<td>See test setup</td>
<td></td>
</tr>
</tbody>
</table>

See test setup diagram B

![Control Panel Diagram](image-url)
ALINEMENT OF A5300 SQUELCH FILTER FOR CORRECT TRANSMITTED SQUELCH TONE (CONT)

ALINEMENT PROCEDURE

1. Set MK-1978/VRC KEY switch to XMIT.
2. Check lissajous pattern on AN/GRM-114A scope. Pattern should not rotate, and should appear as indicated in test setup diagram ©. If pattern is rotating, go to step 3.

3. Adjust R5301 (test setup diagram D) until lissajous pattern stops rotating.
4. Unkey transmitter.
4-34. ALINEMENT OF SILICON A5300A SQUELCH FILTER FOR CORRECT TRANSMITTED SQUELCH TONE.

PURPOSE. This procedure adjusts Resistor R5303 in the squelch filter to ensure transmission of a 150-HZ NEW SQUELCH tone. Adjustment of R5303 during transmission also properly tunes the squelch filter for 150-HZ NEW SQUELCH tone reception.

TEST EQUIPMENT AND MATERIALS

Power Supply PP-1104(*)/G
Maintenance Kit MK-1978/VRC
Test Set AN/GRM-114A

TEST SETUP. Connect the equipment as shown in test setup diagram A.
4-34 ALIGNMENT OF SILICON A5300A SQUELCH FILTER FOR CORRECT TRANSMITTED SQUELCH TONE. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment as indicated in the following table.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>POWER</td>
<td>LOW</td>
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<tr>
<td></td>
<td>BAND</td>
<td>64.00</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>Counterclockwise</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>NEW ON</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>Down, except POWER up</td>
</tr>
<tr>
<td>MK-1978/VRC</td>
<td>All switches</td>
<td></td>
</tr>
<tr>
<td>AN/GRM-I14A; MM-100E</td>
<td>See test setup diagram</td>
<td></td>
</tr>
</tbody>
</table>

Diagram of the equipment with control and switch settings indicated.
4-34. ALINEMENT OF SILICON A5300A SQUELCH FILTER FOR CORRECT TRANSMITTED SQUELCH TONE. (CONT)

ALINEMENT PROCEDURE

1. Set MK-1978/VRC KEY switch to XMIT.
2. Check lissajous pattern on AN/GRM-114A scope. Pattern should not rotate, and should appear as indicated in test setup diagram ©. If pattern is rotating, go to step 3.
3. Adjust R5303 (test setup diagram D) until lissajous pattern stops rotating.
4. Unkey transmitter.

4-35. A5200 SQUELCH AMPLIFIED? ALINEMENT, NEW SQUELCH LEVEL.

PURPOSE. This procedure adjusts the receiver sensitivity to the 150-Hz NEW SQUELCH tone.
4-35. A5200 SQUELCH AMPLIFIER ALIGNMENT, NEW SQUELCH LEVEL. (CONT)

TEST EQUIPMENT AND MATERIALS

Test Set AN/GRM-114A
Power Supply PP-1104(*)/G

Maintenance Kit MK-1978/VRC

TEST SETUP. Connect the equipment as shown in test setup diagram A.

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment as indicated in the following table.

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully clockwise</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>NEW ON</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td>OFF</td>
</tr>
<tr>
<td>AN/GRM-114A; MM-100E</td>
<td>See test setup diagram B, page 4-202</td>
<td></td>
</tr>
<tr>
<td>MK-1978/VRC</td>
<td>All switches</td>
<td>Down, except POWER up</td>
</tr>
</tbody>
</table>

TM 11-5820-401-34-2-2/0967-LP-432-3030
4-35. A5290 SQUELCH AMPLIFIER ALIGNMENT, NEW SQUELCH LEVEL. (CONT)

ALINEMENT PROCEDURE

A5000 MODULE
4-35. **A5200 SQUELCH AMPLIFIER ALIGNMENT, NEW SQUELCH LEVEL. (CONT)**

1. Lift RT A3000 tray.
2. Connect MM-10OE attenuated probe A to TP5012 (1). Connect alligator clip B to ground. (See test setup diagram © page 4-202).
3. Adjust AN/GRM-114A VAR control (deviation control) for 4-vac reading on MM-10OE.
4. Adjust NEW Squelch Resistor R5217 (2) until RT CALL light just comes on. (See test setup diagram ©).

4-36. **SILICON VERSION A5200A SQUELCH AMPLIFIER ALIGNMENT, NEW SQUELCH LEVEL.**

**PURPOSE.** This procedure adjusts the receiver sensitivity to the 150-Hz NEW SQUELCH tone.

**TEST EQUIPMENT AND MATERIALS**

- Test Set AN/GRM-114A
- Power Supply PP-1104(*)/G
- Maintenance Kit MK-1978/VRC

**TEST SETUP.** Connect the equipment as shown in test setup diagram A.
4-46. SILICON VERSION A5200A SQUELCH AMPLIFIER ALIGNMENT, NEW SQUELCH LEVEL. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment as indicated in the following table.

**CONTROL AND SWITCH SETTINGS**

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>64.00</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Fully clockwise</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>NEW ON</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>OFF</td>
</tr>
<tr>
<td>AN/GRM-114A; MM-100E</td>
<td>See test setup diagram B</td>
<td></td>
</tr>
<tr>
<td>MK.1978/VRC</td>
<td>All switches</td>
<td>Down, except POWER up</td>
</tr>
</tbody>
</table>
4-36. SILICON VERSION A5200A SQUELCH AMPLIFIER ALIGNMENT, NEW SQUELCH LEVEL. (CONT)

ALIGNMENT PROCEDURE

1. Lift RT A3000 tray.
2. Connect MM-100E attenuated probe A to TP5012 (1). Connect alligator clip B to ground.
3. Adjust AN/GRM-114A VAR control (deviation control) for O.20 ± 0.01 vac reading on MM-100E.
4. Adjust NEW Squelch Resistor R5217 (2) until RT CALL light just comes on.

4-37. A5200 SQUELCH AMPLIFIER ALIGNMENT, OLD SQUELCH LEVEL.

PURPOSE. This procedure adjusts the receiver sensitivity to the OLD SQUELCH signals which include internal noise and the received carrier.

TEST EQUIPMENT AND MATERIALS

Test Set AN/GRM-114A
Power Supply PP-1104(*)/G

TEST SETUP. Connect the equipment as shown in test setup diagram page 4-206.
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment as indicated in the following table.

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td><strong>A</strong></td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>42.00</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully clockwise</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>OLD ON</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td>OFF</td>
</tr>
<tr>
<td>AN/GRM-114A; MM-100E</td>
<td>See test setup diagram [page 4-207]</td>
<td></td>
</tr>
<tr>
<td>MK-1978/VRC</td>
<td>All switches</td>
<td>Down, except POWER up</td>
</tr>
</tbody>
</table>

See test setup diagram [page 4-207]
4-37. A5200 SQUELCH AMPLIFIER ALIGNMENT, OLD SQUELCH LEVEL. (CONT)

ALIGNMENT PROCEDURE

A5000 MODULE

TP5008

1

2

OFF ADJUST FOR 3 KHZ DEVIATION ON METER

OFF FM RCVR OFF GEN MID ON 20 μV AUTO

FULLY COUNTER-CLOCKWISE 6 KHz 3 KHz NORM

10 VOLTS HI-Z

OFF 07 300.0 OFF 042 000.0

EL4GP358

EL4GP357
4-37. A5200 SQUELCH AMPLIFIER ALIGNMENT, OLD SQUELCH LEVEL. (CONT)

1. Disconnect rf cable from RT ANTENNA port.
2. Lift RT A3000 tray.
3. Connect attenuated probe A to TP5008 (1). Connect alligator clip B to ground. (See test setup diagram ©, page 4-207.)
4. Notedb reading on MM-100E red db scale.
5. Reconnect rf cable to RT ANTENNA port.
6. Reset AN/GRM-114A Modulation FREQ Hz thumbwheels to vary modulation frequency ±2 KHz in 100 Hz steps while observing MM-100E for voltage peak. Stop at frequency that produces peak voltage within the ± 2 KHz limits.

**NOTE**

If a voltage peak is not seen, it is possible that the modulating signal strength is too high. Try reducing the deviation by adjusting the VAR control, then repeat step 6. If a peak is still not clearly observed, leave the MODULATION FREQ Hz set at 07 300 0, and go on to step 7.

7. Adjust VAR (deviation) control for an MM-100E reading 4 db less than that noted in step 4.
8. Check RT CALL light. If light is out, go to step 9. If light is on, go to step 10.
9. CALL LIGHT OUT. Turn R5216 (2) counter clockwise slowly and stop at point where light just comes on.
10. CALL LIGHT ON. Turn R51216 (2) clockwise until light goes out, then perform step 9.

4-38. SILICON VERSION A5200A SQUELCH AMPLIFIER ALIGNMENT, OLD SQUELCH LEVEL.

PURPOSE. This procedure adjusts the receiver sensitivity to the OLD SQUELCH signals which include internal noise and the received carrier.

**TEST EQUIPMENT AND MATERIALS**

<table>
<thead>
<tr>
<th>Test Set AN/GRM-114A</th>
<th>Maintenance Kit MK-1978/VRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply PP-1104(*)/G</td>
<td></td>
</tr>
</tbody>
</table>

**TEST SETUP.** Connect the equipment as shown in test setup diagram ©, page 4-209.
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment as indicated in the following table.

### CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>POWER, BAND, MC-TUNE-KC, VOLUME, SQUELCH, SPEAKER (RT-524/VRC)</td>
<td>LOW, 64.00, Fully clockwise, OLD ON, OFF</td>
</tr>
<tr>
<td>AN/GRM-114A; MM-100E</td>
<td>Sea test setup diagram</td>
<td>Down, except POWER up</td>
</tr>
<tr>
<td>MK-1978/VRC</td>
<td>All switches</td>
<td></td>
</tr>
</tbody>
</table>
4-36. SILICON VERSION A5200a SQUELCH AMPLIFIER ALINEMENT. OLD SQUELCH LEVEL (CONT...
4-38 SILICON VERSION A5200A SQUELCH AMPLIFIER ALIGNMENT, OLD SQUELCH LEVEL. (CONT)

1. Lift RT A3000 tray.
2. Connect attenuated probe A to TP5008 (1). Connect alligator clip B to ground. (See test setup diagram ©, page 4-210)
3. Adjust AN/GRM-114A VAR (deviation) control to obtain 1.5-vac reading on MM-100E.
4. Check RT CALL light. If light is out, go to step 5. If light is on, go to step 6.
5. CALL LIGHT OUT. Turn R5216 (2) counterclockwise slowly and stop at point where light just comes on.
6. CALL LIGHT ON. Turn R5216 (2) clockwise until light goes out, then perform step 5.

4-39 POWER SUPPLY A9000/A9400A (A9000AIA9400B) TESTS.

PURPOSE. This test verifies the availability of adequate power before the transmitter is aligned.

TEST EQUIPMENT AND MATERIALS

Power Supply PP-1104 (*)/G
Test Set AN/GRM-114A

TEST SETUP. Connect the equipment as shown in test setup diagram A.
4-29. POWER SUPPLY A9000A/A9400A (A9000A/A9400B) TESTS (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

**CONTROL AND SWITCH SETTINGS**

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>BAND</td>
<td>A 30.00</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>HIGH</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>NEW ON</td>
</tr>
<tr>
<td>MM-100E</td>
<td>See test setup diagram</td>
<td>B</td>
</tr>
<tr>
<td>MK-1978/VRC</td>
<td>All switches</td>
<td>Down, except POWER up</td>
</tr>
</tbody>
</table>

**TEST PROCEDURE**

**NOTE**

The power supply voltage measured at TP9005 should not drop significantly below 25 vdc when the RT is keyed. If the voltage at TP9005 is much less than 25 volts, the driver and power amplifier are probably out of alignment, causing excessive current draw. If TP9005 voltage is satisfactory, but other test points given in the following table are not up to normal readings, troubleshoot the power supply.

Check power supply voltages at test points given in following table. Change MM-100E RANGE setting as indicated in table.

**NOTE**

Key the transmitter before performing voltage checks.
4-39. POWER SUPPLY A9000/A9000B) TESTS. (CONT)

<table>
<thead>
<tr>
<th>A9000 TEST POINT</th>
<th>MM-100E RANGE</th>
<th>ATTENUATED PROBE</th>
<th>VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP9005</td>
<td>30 volts (dc +)</td>
<td>x1</td>
<td>25 vdc minimum</td>
</tr>
<tr>
<td>TP9001</td>
<td>100 volts (dc +)</td>
<td>x10</td>
<td>640 to 760 vdc</td>
</tr>
<tr>
<td>TP9002</td>
<td>300 volts (dc +)</td>
<td>x1</td>
<td>250 to 300 vdc</td>
</tr>
<tr>
<td>TP9003</td>
<td>100 volts (AC-H1-Z)</td>
<td>x1</td>
<td>90 vac minimum</td>
</tr>
<tr>
<td>TP9004</td>
<td>30 volts (dc-)</td>
<td>x1</td>
<td>-20 vdc minimum (-14 vdc min, older units)</td>
</tr>
</tbody>
</table>

4-40. MASTER OSCILLATOR A6300 AND BUFFER AMPLIFIER A6400 ALIGNMENT.

PURPOSE. The master oscillator is one of the most critical sections of the radio set. It must generate an rf frequency within ±3.5 kHz of the selected transmit frequency. The following procedure ensures that the master oscillator operates within the correct frequency range.

TEST EQUIPMENT AND MATERIALS

Power Supply PP-1104(*)/G  
10-, 20-, and 30-db Attenuators  
Test Set AN/GRM-114A  
SMC-To-BNC Cable

TEST SETUP. Connect the equipment as shown in test setup diagram A.

```
A
```

![Test setup diagram](image-url)
4-49. MASTER OSCILLATOR A6300 AND BUFFER AMPLIFIER ALINEMENT. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

**CONTROL AND SWITCH SETTINGS**

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td></td>
</tr>
<tr>
<td>AN/GRM-114A;</td>
<td></td>
<td>30.00</td>
</tr>
<tr>
<td>MM-100E</td>
<td>See test setup diagram</td>
<td></td>
</tr>
</tbody>
</table>

**ALIGNMENT PROCEDURE**

A **BAND**

1. Remove cover from A6000 assembly.
2. Install alinement cover using at least one screw.
3. Do not reconnect plugs to J6001, J6002, and J6003.
4. Connect rf cable to J6003. (See test setup diagram, page 4-213.)
5. Set MK-1978/VRC KEY switch to XMIT.
6. Adjust L6305 (1) for 30 MHz ±100 kHz reading on AN/GRM-114A spectrum analyzer. The signal trace should be within one major graticule division on either side of center line. (See test setup diagram ©.)

7. Unkey transmitter.
8. Set RT to 40.00 MHz.
9. Set AN/GRM-114A RF FREQUENCY MHz to 0400000.
10. Set MK-1978/VRC KEY switch to XMIT.
11. Adjust 05314 (2) for 40 MHz ±100 kHz reading on spectrum analyzer.
12. Unkey transmitter.
13. Set RT to 52.00 MHz.
14. Set AN/GRM-114A RF FREQUENCY MHz to 0520000.
15. Set MK-1978/VRC KEY switch to XMIT.
16. Adjust L6303 (3) for 52 MHz ±100 kHz reading on spectrum analyzer.

NOTE

Adjustments should be repeated at 30, 40, and 52 MHz.

17. Unkey transmitter.
18. Remove rf cable from J6003 and connect to J6001. (See test setup diagram ©.)
19. Set RT to 30.00 MHz.
20. Set AN/GRM-114A RF FREQUENCY MHz to 0300000; set RCVR to MID.
21. Set MK-1978/VRC KEY switch to XMIT.

NOTE

In the following step, it may be necessary to remove the 10-db pad from the AN/GRM-114A in order to obtain a signal of sufficient strength to perform the adjustment.

22. Adjust L6405 (4) for peak reading on AN/GRM-114A DEViATiON/WATTS meter. (See test setup diagram ©.)

NOTE

A sharply defined peak may be difficult to obtain. Perform adjustments very slowly to obtain maximum meter indication.
23. Unkey transmitter.
24. Set RT to 40.00 MHz.
25. Set AN/GRM-114A RF FREQUENCY MHz to 040 000 0.
26. Set MK-1978/VRC KEY switch to XMIT.
27. Adjust C6409 (5), test setup diagram (C) for peak reading on AN/GRM-114A DEVIATION/WATTS meter.
28. Unkey transmitter.
29. Set RT to 52.00 MHz.
30. Set AN/GRM-114A RF FREQUENCY MHz to 052 000 0.
31. Set MK-1978/VRC KEY switch to XMIT.
32. Adjust L6403 (6), test setup diagram (C) for peak reading on AN/GRM-114A DEVIATION/WATTS meter.
33. Unkey transmitter.

**BAND**

34. Remove rf cable from J6001 and reconnect to J6003. (See test setup diagram (A).)
35. Set RT BAND switch to (B).
36. Set RT to 53.00 MHz.
37. Set AN/GRM-114A RF FREQUENCY MHz to 053 000 0.
38. Set MK-1978/VRC KEY switch to XMIT.

39. Adjust L6302 (1), test setup diagram (D) for 53 MHz ± 100 kHz reading on AN/GRM-114A spectrum analyzer.
40. Unkey transmitter.
41. Set RT to 63.00 MHz.
42. Set AN/GRM-114A RF FREQUENCY MHz to 063 000 0.
43. Set MK-1978/VRC KEY switch to XMIT.
44. Adjust C6313 (2) for 63 MHz ± 100 kHz reading on spectrum analyzer. (See test setup diagram (D).)
45. Unkey transmitter.
46. Set RT to 75.00 MHz.
47. Set AN/GRM-114A RF FREQUENCY MHz to 075 000 0.
48. Set MK-1978/VRC KEY switch to XMIT.
49. Adjust L6304 (3) for 75 MHz ± 100 kHz reading on spectrum analyzer. (See test setup diagram (D).)
50. Unkey transmitter.
51. Set RT to 53.00 MHz.
52. Set AN/GRM-114A RF FREQUENCY MHz to 053 000 0.
4-40. MASTER OSCILLATOR A6300 AND BUFFER AMPLIFIER A6400 ALIGNMENT. (CONT)

53. Remove rf cable from J6003 and connect to J6001. (See test setup diagram A.)
54. Set MK-1978/VRC KEY switch to XMIT.
55. Adjust L6402 ((4), test setup diagram D) for peak reading on AN/GRM-114A DEVIATION/WATTS meter.
56. Unkey transmitter.
57. Set RT to 63.00 MHz.
58. Set AN/GRM-114A RF FREQUENCY MHz to 063 000 0.
59. Set MK-1978/VRC KEY switch to XMIT.
60. Adjust C6406 ((5), test setup diagram D) for peak reading on AN/GRM-114A DEVIATION/WATTS meter.
61. Unkey transmitter.
62. Set RT to 75.00 MHz.
63. Set AN/GRM-114A RF FREQUENCY MHz to 075 000 0.
64. Set MK-1978/VRC KEY switch to XMIT.
65. Adjust L6404 ((6), test setup diagram D) for peak reading on AN/GRM-114A DEVIATION/WATTS meter.
66. Unkey transmitter.

4-41. MASTER OSCILLATOR TEST

PURPOSE. This test checks the amount of dc correction voltage required to keep the transmitter master oscillator on frequency. If the correction voltage is greater than 0.45 vdc, the A6300 and A6400 must be replaced. The master oscillator and buffer amplifier must be aligned before performing this test.

TEST EQUIPMENT AND MATERIALS

| Power Supply PP-1104(*)/G | Test Set AN/GRM-114A |
| Maintenance Kit MK-1978/VRC | Cable SMC-To-BNC |

TEST SETUP. Connect the equipment as shown in test setup diagram A, page 4-218.
### INITIAL EQUIPMENT CONTROL SETTINGS

Set equipment controls as indicated in the following table.

#### CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>BAND</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td></td>
</tr>
<tr>
<td>AN/GRM-114A</td>
<td>See test setup diagram</td>
<td></td>
</tr>
<tr>
<td></td>
<td>page 4-219</td>
<td></td>
</tr>
<tr>
<td>MK-1978/VRC</td>
<td>All switches</td>
<td>Down, except POWER up</td>
</tr>
</tbody>
</table>
4-41. MASTER OSCILLATOR TEST. (CONT)

TEST PROCEDURE

1. Check that P6001 is connected to J6001, and P6003 is connected to J6003.
2. Adjust AN/GRM-114A HORIZ and VERT controls to center trace on oscilloscope screen.
3. Set MK-19768/VRC KEY switch to XMIT.
4. Check that oscilloscope trace does not shift more than ±0.45 vdc when transmitter is keyed.
5. Unkey transmitter.
6. Repeat steps 3, 4, and 5 with RT and AN/GRM-114A both set at the following frequencies: 40, 52, 53, 63, and 75 MHz.

NOTE

If the oscilloscope trace shifts more than ±0.45 vdc at any test frequency, replace the A6300 and A6400 modules.

4-42. ADJUSTMENT OF A8500 RESISTOR R8515 FOR TRANSMITTED NEW SQUELCH TONE DEVIATION.

PURPOSE. Resistor R8515 is used to control the overall gain of the squelch amplifier. When the resistor is properly adjusted, the 150-Hz NEW SQUELCH tone causes a carrier deviation of 3.0 kHz. The alignment is performed at 3.0 kHz and the tolerance for the test is ±0.5 kHz.

TEST EQUIPMENT AND MATERIALS

Power Supply PP-1104(*)/G
Maintenance Kit MK-1978/VRC

Test Set AN/GRM-114A

Change 2 4-219
4-42. ADJUSTMENT OF \textbf{R8500} RESISTOR \textbf{R8515} FOR TRANSMITTED NEW SQUELCH TONE DEVIATION. (CONT)

TEST SETUP. Connect the equipment as shown in test setup diagram \textbf{A}, page 4-220.

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment as indicated in the following table.

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>BAND</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>64.00</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>NEW ON</td>
</tr>
<tr>
<td>MK-1978/VRC</td>
<td>All switches</td>
<td>Down, except POWER up</td>
</tr>
<tr>
<td>AN/GRM-114A</td>
<td>See test setup diagram</td>
<td></td>
</tr>
<tr>
<td></td>
<td>page 4-221</td>
<td></td>
</tr>
</tbody>
</table>
442 ADJUSTMENT OF A8500 RESISTOR R8515 FOR TRANSMITTED NEW SQUELCH TONE
DEVIAITION. (CONT)

ADJUSTMENT PROCEDURE

ADJUST LOWER SCREW
4-42. ADJUSTMENT OF A8500 RESISTOR R8515 FOR TRANSMITTED NEW SQUELCH TONE DEVIATION. (CONT)

2. Check indication of AN/GRM-114A DEVIATION (kHz) meter. Meter should indicate 3.0 kHz. If reading is incorrect, go to step 3.
3. Unkey transmitter.
4. Remove cover from A8500.
5. Key transmitter.
6. Adjust R8515 (test setup diagram© page 4-221) for 3.0-kHz deviation.
7. Unkey transmitter.

4-43. ALIGNMENT OF A8500 RESISTOR R8516 FOR CORRECT TRANSMITTER NARROWBAND DEVIATION.

PURPOSE. This procedure adjusts the gain of the transmitter speech amplifier. Resistor R8516 must be adjusted so that a 0.78-vac audio signal injected into the A8100 11.5-MHz modulator through the resistor results in 8.0 ±0.5 kHz deviation of the transmitted rf carrier.

TEST EQUIPMENT AND MATERIALS

- Power Supply PP-1104(*)/G
- Maintenance Kit MK-1978/VRC
- Test Set AN/GRM-114A

TEST SETUP. Connect the equipment as shown in test setup diagram A.
4-42. ALIGNMENT OF A8500 RESISTOR R8516 FOR CORRECT TRANSMITTER NARROWBAND DEVIATION. CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>BAND</td>
<td>64.00</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>OLD ON</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td></td>
</tr>
<tr>
<td>MK-1978/VRC</td>
<td>POWER</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>X-MODE (RT and AUX RCVR)</td>
<td>CIPHER</td>
</tr>
<tr>
<td></td>
<td>AUDIO</td>
<td>MUTED</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>KEY</td>
<td>RCVE</td>
</tr>
<tr>
<td>AN/GRM-114A; MM-100E</td>
<td>See test setup diagram</td>
<td></td>
</tr>
</tbody>
</table>

[Diagram showing equipment controls and settings]
4-43. ALIGNMENT OF A8500 RESISTOR R8516 FOR CORRECT TRANSMITTER NARROWBAND DEVIATION. (CONT)

ALIGNMENT PROCEDURE

1. Connect attenuated probe A to MK-1978/VRC XMTR jack inside X-MODE square. Connect probe B to GND.
2. Adjust AN/GRM-114A VAR knob for 0.78-vac reading on MM-100E.
3. Set MK-1978/VRC KEY switch to XMIT.
4. Check AN/GRM-114A DEVIATION (kHz) meter. Meter should indicate 8 ±0.5 kHz. If reading is not correct, go to step 5.
5. Unkey transmitter.
6. Remove cover from A8500 module.
7. Set MK-1978/VRC KEY switch to XMIT.
8. Adjust R8516 (test setup diagram ©) for 8 ±0.5 kHz deviation reading. (R8516 is the upper screw adjustment.)
9. Unkey transmitter.
10. Set AN/GRM-114A Modulation FREQ Hz to 00500.0.
11. Adjust AN/GRM-114A VAR knob for 0.78-vac reading on MM-100E.
12. Set MK-1978/VRC KEY switch to XMIT.
13. Check AN/GRM-114A DEVIATION (kHz) meter. Meter should indicate 8 ±2 kHz. Do not readjust R8516.

CAUTION

Make sure that RT POWER switch is set on LOW.

1. Connect attenuated probe A to MK-1978/VRC XMTR jack inside X-MODE square. Connect probe B to GND.
2. Adjust AN/GRM-114A VAR knob for 0.78-vac reading on MM-100E.
3. Set MK-1978/VRC KEY switch to XMIT.
4. Check AN/GRM-114A DEVIATION (kHz) meter. Meter should indicate 8 ±0.5 kHz. If reading is not correct, go to step 5.
5. Unkey transmitter.
6. Remove cover from A8500 module.
7. Set MK-1978/VRC KEY switch to XMIT.
8. Adjust R8516 (test setup diagram ©) for 8 ±0.5 kHz deviation reading. (R8516 is the upper screw adjustment.)
9. Unkey transmitter.
10. Set AN/GRM-114A Modulation FREQ Hz to 00500.0.
11. Adjust AN/GRM-114A VAR knob for 0.78-vac reading on MM-100E.
12. Set MK-1978/VRC KEY switch to XMIT.
13. Check AN/GRM-114A DEVIATION (kHz) meter. Meter should indicate 8 ±2 kHz. Do not readjust R8516.
4-48. ALINEMENT OF A8500 RESISTOR R8516 FOR CORRECT TRANSMITTER NARROWBAND DEVIATION. (CONT)

NOTE

SET AN/GRM-114A WIDE/MID/NARROW switch to WDE for modulation frequencies above 6 kHz.

14. Unkey transmitter.
15. Repeat steps 12, 13, and 14 with MODULATION FREQ Hz settings of 03 000.0, 05000.0, and 09999.9.

4-44. A8190 MODULATOR ALINEMENT.

PURPOSE. This procedure ensures that the A8100 oscillator runs at 11.5 MHz ±3.5 kHz with no dc correction from the crystal discriminator.

TEST EQUIPMENT AND MATERIALS

Power Supply PP-1104(*)/G
Test Set AN/GRM-114A
Maintenance Kit MK-1978/VRC

TEST SETUP. Connect the equipment as shown in test setup diagram
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>BAND</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>OLD OFF</td>
</tr>
<tr>
<td>MK-1978/VRC</td>
<td>All switches</td>
<td>Down, except POWER up</td>
</tr>
<tr>
<td>AN/GRM-114A</td>
<td>See test setup diagram</td>
<td></td>
</tr>
</tbody>
</table>

![Diagram of equipment controls and settings]
4-44. A8100 MODULATOR ALIGNMENT. (CONT)

ALIGNMENT PROCEDURE

1. Disconnect P6001 from J6001.
2. Remove A8100 cover.
3. Wrap grounding wire around exposed terminal of R8114. (See test setup diagram ©, page 4-226).*
4. Reinstall A8100 cover. Wrap grounding wire around holddown screw.
5. Connect AN/GRM-114A attenuated probe A to TP8005 and probe B to ground.
6. Set MK-1978/VRC KEY switch to XMIT.
7. Check AN/GRM-114A FREQ ERROR meter. If frequency error is greater than 3.5 kHz, go to step 8.
8. Unkey transmitter.
9. Remove A8100 cover.
10. Install A8100 alinement cover.
11. Secure grounding wire to alinement cover screw.
12. Remove A8400 HUNT GENERATOR module.
13. Set MK-1978/VRC KEY switch to XMIT.
14. Adjust C8104 for frequency error reading of 3.5 kHz or less. (See test setup diagram ©.)
15. Unkey transmitter. Remove alinement cover.
16. Remove grounding wire from R8114. Install alinement cover.
17. Set AN/GRM-114A FREQ ERROR knob to 1.5 kHz.
18. Set MK-1978/VRC KEY switch to XMIT.

NOTE

The AN/GRM-114A cannot provide an accurate reading of the A8100 output to a ±150 Hz tolerance using the attenuated probe. To avoid misadjustment of the A8100, a sniffer must be used. See appendix C, paragraph C-4, for details concerning fabrication of the sniffer coil. Use of the sniffer coil may require removal of one of the input attenuators to ensure adequate signal strength.

19. Insert sniffer coil into oblong opening in alinement cover. Check AN/GRM-114A FREQ ERROR meter. Reading should be no greater than ±150 Hz. If reading is incorrect, go to step 20.
20. With transmitted keyed, adjust C8116 (test setup diagram ©) for frequency error reading of 150 Hz or less. Use sniffer to obtain frequency reading.
21. Unkey transmitter.
22. Install A8400 HUNT GENERATOR module.
23. Connect P6001 to J6001.
4-45. DRIVER A6100 AND POWER AMPLIFIER A6200 ALIGNEMENT.

PURPOSE. This procedure enables the transmitter to generate maximum rf power without overdriving the power stages. Correct alignment prolongs the life of Power Tube V6201 and Power Supply A9000/A9400.

TEST EQUIPMENT AND MATERIALS

Power Supply PP-1104(*)/G
Maintenance Kit MK-1978/VRC

Test Set AN/G RM-114A

TEST SETUP. Connect the equipment as shown in test setup diagram.
4-45 DRIVER A6100 AND POWER AMPLIFIER A6200 ALIGNMENT. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment as indicated in the following table,

### CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>MC-TUNE-KC POWER</td>
<td>30.00 HIGH</td>
</tr>
<tr>
<td>MK-1978/VRC</td>
<td>All switches</td>
<td>Down, except POWER up</td>
</tr>
<tr>
<td>AN/GRM-114 A; MM-100E</td>
<td>See test setup diagram (8)</td>
<td></td>
</tr>
</tbody>
</table>

[Diagram of equipment controls and switches]
4-45 DRIVER A6100 AND POWER AMPLIFIER A8200 ALIGNMENT. (CONT)

ALIGNMENT PROCEDURE

Tuning Coil Adjustment

CAUTION

Do not use pliers B or any metal tool to adjust Tuning Coils L6206 and L6203.

1. Remove A6100I/A6200 assembly after marking gear couplers B to ensure installation in original position. (See paragraph 2-46 and 2-48.)
2. Remove burrs from tuning coils using crocus cloth.
3. Adjust spacing of Coil L6203 (1) to 0.078 inch using nonmetallic tool.
4. Adjust spacing of Coil L6206 (2) to 0.073 inch using nonmetallic tool.
5. Turn L6204 screw (3) fully clockwise.
6. Turn L6205 screw (4) fully counterclockwise.
7. Adjust screw (3) to bring coil (5) as close as possible to coil (1) without touching.
8. Adjust screw (4) to bring coil (6) as close as possible to Coil (2) without touching.
9. Install A6100/A6200 assembly. (See paragraphs 2-46 and 2-48.)
Air Capacitor Adjustment

10. Remove RT bottom cover.
11. Using 3/32-Inch allen wrench, loosen gear looking clamp screw (1). (See test setup diagram)
12. Set MK-1978/VRC KEY switch to XMIT.
13. Move C6217 gear (2) back and forth to obtain peak wattmeter indication.
14. Tighten clamp screw (1). Wattmeter indication should not change.
15. Unkey transmitter.
16. Connect MM-100E attenuated probe A to TP9008 and probe B to ground.
17. Set MK-1978/VRC KEY switch to XMIT.
18. Adjust A-BAND Capacitors C6103 (1) and C6114 (2) for maximum negative voltage reading on MM-100E. (See test setup diagram)
19. Unkey transmitter.
20. Set RT to 53.00 MHz.

NOTE
Replace Tube V6201 if 35-watt minimum power output cannot be obtained.
4-45. DRIVER A6100 AND POWER AMPLIFIER A6200 ALIGNMENT. (CONT)

A6200 Tuning Procedure

21. Set MK-1978/VRC KEY switch to XMIT.
22. Adjust B-BAND Capacitors C6105 (3) and C6115 (4) for maximum negative voltage reading on MM-100E. (See test setup diagram.)
23. Connect equipment as shown in test setup diagram.

NOTE

See chapter 1, section iii, Principles of Operation, for details covering use of TP9007.
24. Connect MM-100E probe A to TP9007 and probe B to ground.
25. Set RT to 52.00 MHz POWER to HIGH.
26. Set MK-1978/VRC KEY switch to XMIT.
27. Adjust Capacitor C6219 (1) for minimum negative MM-100E reading. (See test setup diagram (G).)
28. Readjust C6219 to increase AN/GRM-114A wattmeter indication by 1 watt.
29. Adjust Coil L6205 (2) for maximum wattmeter indication but not more than 5.5 watts. (See test setup diagram (G).
30. Unkey transmitter.

**CAUTION**

In the following steps, always unkey the transmitter before changing RT frequency.

31. Tune RT to 30.00, 41.00, and 52.00 MHz, keying transmitter at each frequency. Readjust C6219 (l), test setup diagram (G), until output powers at all frequencies fall within 3 to 4 watts of each other. Record final output at each frequency.
32. Unkey transmitter.
33. Set RT POWER switch to LOW.
34. Set MK-1978/VRC KEY switch to XMIT.
35. Check wattmeter indication at 30, 41, and 52 MHz. Wattmeter should Indicate at least one-half watt. If power is too low, go to step 36.
36. Unkey transmitter.
37. Set RT to 52.00 MHz.
38. Key transmitter.
39. Adjust C6103 (1), test setup diagram (G), page 4-232) for minimum one-half watt indication.
40. Unkey transmitter.
41. Reconnect P6201 to J6201.
42. Connect AN/GRM-114A TRANS-RCVR port directly to RT ANTENNA port.
43. Set RT POWER switch to HIGH.
44. Set RT to 30.00 MHz.
45. Key transmitter.
46. Check wattmeter indication and compare with reading obtained at 30 MHz in step 31. Replace FL401 if wattmeter indication is not within ± 0.1 to 0.7 watts of step 31 reading.
47. Unkey transmitter.
48. Tune RT to 41.00 MHz.
4-45. DRIVER A6100 AND POWER AMPLIFIER A6200 ALINEMENT. (CONT)

49. Key transmitter.
50. Repeat step 48.
51. Unkey transmitter.
52. Tune RT to 52.00 MHz.
53. Key transmitter.
54. Check wattmeter indication and compare with reading obtained at 52 MHz in step 31. Replace FL401 if wattmeter indication is not within 1 to 9 watts of step 31 reading.
55. Unkey transmitter.
56. Tune RT to 75.00 MHz.
57. Connect MM-100E to TP9007.
58. Key transmitter.
59. Adjust Capacitor C8218 (3), test setup diagram(G) for minimum negative MM-100E indication.
60. Readjust L6204 ((4), test setup diagram(G)) for maximum wattmeter indication, but not more than 55 watts.
61. Unkey transmitter.

CAUTION

In the following steps always unkey the transmitter before changing RT frequency.

62. Tune RT to 53.00, 64.00, and 75.00 MHz, keying transmitter at each frequency. Adjust C6218 (3), test setup diagram(6) until output powers at all frequencies fan within 3 to 4 watts of each other.
63. Unkey transmitter.
64. Set RT POWER switch to LOW.
65. Key transmitter.
66. Check wattmeter indication at 53, 64, and 75 MHz. Wattmeter should indicate at least one-half watt. If power is too low, go to step 86.
67. Unkey transmitter.
68. Tune RT to 75.00 MHz.
69. Key transmitter.
70. Adjust C6105 (3 test setup diagram(5), page 4-232) for at least one-half watt indication on wattmeter.
71. Unkey transmitter.

4-46. ALINEMENT OF RT-2046(*)VRC SERVOSYSTEM.

PURPOSE. This procedure adjusts the sensitivity of the servoamplifier to ensure correct frequency tuning in response to the preset pushbuttons.

TEST EQUIPMENT AND MATERIALS

Power Supply PP-1104(*)/G

TEST SETUP. Connect the equipment as shown in test setup diagram(A)
4-46. ALIGNMENT OF RT-248(*)/VRC SERVOSYSTEM. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>BAND POWER</td>
<td>AUTO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LOW</td>
</tr>
</tbody>
</table>

ALIGNMENT PROCEDURE
4-46. ALINEMENT OF RT-246(*)/VRC SERVOSYSTEM. (CONT)

1. Remove RT top cover.
2. Loosen locknut on R304. (See test setup diagram, page 4-236.)
3. Turn R304 shaft fully clockwise.
4. Back off R304 shaft one-eighth turn.
5. Tune pushbutton 1 to 30.00 MHz and pushbutton 2 to 48.00 MHz. Follow Instructions on back of pushbutton cover.
6. Press pushbutton 2 and wait for servomotor to stop.
9. Turn R304 shaft clockwise and stop at point where servomotor just stops hunting.
11. Press pushbutton 1. RT should tune to exactly 30.00 MHz after a slight overshoot.

NOTE

Overshoot means that when pushbutton 1 is pressed, the numbers in the RT viewing window move from 00 to 95 and then back to 00 (30.00) when the servomotor stops. If overshoot is excessive, turn R304 very slightly clockwise and recheck.

12. Repeat steps 10 and 11 with power supply set at 20 vdc.

NOTE

if tuning is unsatisfactory at 20 vdc, repeat steps 5 through 11.
CHAPTER 5

DIRECT SUPPORT PERFORMANCE AND TROUBLESHOOTING PROCEDURES USING TEST CABLE NO. 1 AND DISCRETE TEST EQUIPMENT (TMDE)

OVERVIEW

This chapter contains performance tests, troubleshooting, and alignment procedures at the direct support level using Test Cable No. 1 and discrete test equipment (TMDE).

The performance tests are diagnostic in purpose. They should be used to verify that an RT is operating properly or to point out the existence of faults.

If failure to meet a performance test standard confirms that a fault is present in the unit under test, the test procedure will refer you to a specific chart in the troubleshooting section. The troubleshooting charts are designed to isolate the faults noted in the performance tests. They will guide you to the source of defects and/or misalignments.

Once it has identified the source of a fault, a troubleshooting chart will refer you to the appropriate repair/replacement instructions or alignment procedures. Because each stage of the RT’s receiver or transmitter sections depends upon its other stages for overall operating efficiency, the replacement, repair, or realignment of even one component could alter the RT’s signals enough to create the need for other realignments. Therefore, after making any alterations in the RT, do all the performance tests, even those you have done already.
Section I PERFORMANCE TESTS

<table>
<thead>
<tr>
<th>Subject</th>
<th>Para</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>5-1</td>
<td>5-2</td>
</tr>
<tr>
<td>Receiver Tests:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME Control Test</td>
<td>5-2</td>
<td>5-3</td>
</tr>
<tr>
<td>Receiver Sensitivity Test</td>
<td>5-3</td>
<td>5-5</td>
</tr>
<tr>
<td>NEW SQUELCH Test</td>
<td>5-4</td>
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</tr>
<tr>
<td>OLD SQUELCH Test</td>
<td>5-5</td>
<td>5-13</td>
</tr>
<tr>
<td>Receiver Audio Power Test</td>
<td>5-8</td>
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</tr>
<tr>
<td>Receiver Audio Distortion Test</td>
<td>5-7</td>
<td>5-19</td>
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<tr>
<td>Receiver Audio Response Test (Normal Mode)</td>
<td>5-8</td>
<td>5-22</td>
</tr>
<tr>
<td>Receiver Audio Response Test (X-Mode)</td>
<td>5-9</td>
<td>5-28</td>
</tr>
<tr>
<td>Receiver Selectivity Test</td>
<td>5-10</td>
<td>5-31</td>
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<tr>
<td>Transmitter Tests:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transmitter Frequency Accuracy Test</td>
<td>5-11</td>
<td>5-34</td>
</tr>
<tr>
<td>Transmitter Low and High Power Output Test</td>
<td>5-12</td>
<td>5-36</td>
</tr>
<tr>
<td>Transmitter Deviation Test (Normal Mode)</td>
<td>5-13</td>
<td>5-38</td>
</tr>
<tr>
<td>Transmitter Limiting Test</td>
<td>5-14</td>
<td>5-42</td>
</tr>
<tr>
<td>Transmitter Distortion Test (Normal Mode)</td>
<td>5-15</td>
<td>5-45</td>
</tr>
<tr>
<td>Transmitter Deviation Test (X-Mode)</td>
<td>5-16</td>
<td>5-47</td>
</tr>
<tr>
<td>Transmitter Distortion Test (X-Mode)</td>
<td>5-17</td>
<td>5-52</td>
</tr>
<tr>
<td>Transmitter Squelch Tone Stability Test</td>
<td>5-18</td>
<td>5-56</td>
</tr>
<tr>
<td>Antenna Information (Switching) Test</td>
<td>5-19</td>
<td>5-58</td>
</tr>
<tr>
<td>Automatic Frequency Selection Test</td>
<td>5-20</td>
<td>5-60</td>
</tr>
</tbody>
</table>

5-1. GENERAL.

This section contains performance test procedures for use with Test Cable No. 1 and discrete test equipment (TMDE). They will enable you to determine whether or not an RT is operating acceptably. Each test procedure checks specific functions of the receiver or transmitter sections to help you find and isolate faults.

Each test is complete and may be performed individually. Therefore, you may choose an appropriate test to verify gross equipment failure or performance degradation of specific stages. However, this maintenance approach is not recommended. It is best to perform all the tests in sequence. This systematic maintenance approach will insure that all faults are found and corrected.

Faults in the RT are evidenced by failure of the unit to meet the performance standards found within the test procedures in bold type. When an RT fails to meet a performance standard, discontinue the test and turn to the troubleshooting chart referred to in the procedure.
5-2. VOLUME CONTROL TEST.

PURPOSE. This test checks the VOLUME control of the RT for proper operation. When a 1-kHz tone is injected into the RT ANTENNA port, the speaker should output a clear tone with no scratchy sound or sudden drop in volume. The absence of a tone means that the signal is not passing completely through the RT circuitry and could even indicate total equipment failure; therefore, perform this test before the others in this section.

TEST EQUIPMENT AND MATERIALS

- Power Supply PP-1104(*)/G
- Frequency Counter AN/USM-207
- Signal Generator AN/URM-103
- Adapter (T-Connector) UG-274 B/U
- Matching Unit CN-901/U
- Loudspeaker LS-454/U (RT-246/VRC)
- RF Cables (two) RG-58/U
- Test Cable No. 1

TEST SETUP. Connect equipment as shown in test setup diagram.

Turn on test equipment. Allow at least 15 to 30 minutes for warmup.
5-2. VOLUME CONTROL TEST. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. If using alternate test equipment, adjust for 30.00 MHz, 20-µv rf input level, 1-kHz modulation, and 8-kHz frequency deviation.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSTION/SEIiING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/USM-207</td>
<td>FREQUENCY TUNING-MC POWER DISPLAY</td>
<td>100 TRACK</td>
</tr>
<tr>
<td></td>
<td>INPUT GATE TIME SENSITIVELY</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td></td>
<td>FUNCTION DIRECT/HETERODYNE</td>
<td>0.3 V MAX (both switches to left)</td>
</tr>
<tr>
<td></td>
<td>RF TUNING DEVIATION RANGE KHZ</td>
<td>10^6 (black knob)</td>
</tr>
<tr>
<td></td>
<td>RF SET TO LINE DEVIATION</td>
<td>PLUG IN</td>
</tr>
<tr>
<td></td>
<td>RF OUTPUT SQUELCH LIGHT VOLUME</td>
<td>FREQ DIRECT</td>
</tr>
<tr>
<td></td>
<td>POWER SPEAKER (RT-524/VRC)</td>
<td></td>
</tr>
</tbody>
</table>

AN/URM-103 OPERATE/OFF/STAND BY BAND SWITCH RF TUNING DEVIATION RANGE KHZ FUNCTION DEVIATION RF SET TO LINE RF OUTPUT LO RF UV OPERATE

<table>
<thead>
<tr>
<th>B</th>
<th>30.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>1000 Hz</td>
<td></td>
</tr>
<tr>
<td>Adjust for 8-kHz meter indication</td>
<td></td>
</tr>
<tr>
<td>To red line</td>
<td></td>
</tr>
<tr>
<td>LO, 0-10 KUV</td>
<td></td>
</tr>
<tr>
<td>20µV</td>
<td></td>
</tr>
</tbody>
</table>

RT BAND MC-TUNE-KC SQUELCH LIGHT VOLUME POWER SPEAKER (RT-524/VRC)

A 30.00

OLD OFF ON Fully counterclockwise LOW ON

TEST PROCEDURE

1. Adjust AN/URM-103 RF TUNING control for 30.00-MHz display on AN/USM-207.

NOTE

To produce a display on the AN/USM-207, the AN/URM-103 rf level must be increased by turning the LO RF UV control clockwise. When the display appears, readjust the AN/URM-103 RF TUNING control until the AN/USM-207 indicates 30.00 MHz, and reset the LO RF UV control to 20µv.
5-2. VOLUME CONTROL TEST. (CONT)

2. Disconnect T-connector from AN/USM-207.
3. Turn RT VOLUME control fully clockwise, then fully counterclockwise.

STANDARD. Tone from Speaker should be clear with no scratchiness or sudden changes in volume at any point in the rotation of the VOLUME control.

4. If volume changes suddenly, if tone is scratchy, or if no tone at all is heard, see troubleshooting chart 5-1.

5-3. RECEIVER SENSITIVITY TEST.

PURPOSE. This test checks the ability of the RT to detect low-level rf signals by measuring its SINAD at several frequencies. SINAD gives receiver sensitivity in terms of the following ratio:

\[
\text{Signal + noise + distortion} / \text{noise + distortion}.
\]

SINAD is expressed in decibels. The better a receiver's SINAD, the better signals, even weak ones, can be heard over unwanted internal noise. The SINAD for the RT should be at least -10 db (from a zero-db reference) when the rf level is 0.5 µv.

TEST EQUIPMENT AND MATERIALS

<table>
<thead>
<tr>
<th>Power Supply PP-1104(*)/G</th>
<th>Matching Unit CN-901/U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distortion Analyzer TS-723(*)/U</td>
<td>Resistor, 600-ohm ±5%, 2 watt</td>
</tr>
<tr>
<td>Frequency Counter AN/USM-207</td>
<td>(RT-246/VRC)</td>
</tr>
<tr>
<td>Signal Generator AN/URM-103</td>
<td>Rf Cables (two) RG-58/U</td>
</tr>
<tr>
<td>Adapter (T-Connector) UG-274 B/U</td>
<td>Test Cable No. 1</td>
</tr>
</tbody>
</table>

NOTE

The 600-ohm resistor provides an impedance matching load for the audio transformer. The resistor is used in place of Loudspeaker LS-454/U, which would issue a loud, distracting tone when the RT-246/RC VOLUME control is adjusted during the test. If no 600-ohm resistor available, however, the loudspeaker must be connected. (See test setup diagram [A], page 5-6.)
5-3. RECEIVER SENSITIVITY TEST. (CONT)

TEST SETUP. Connect equipment as shown in test setup diagram.

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment control, as indicated in the following table. If using alternate test equipment, adjust for 30 MHz 0.5-µv rf input level, 1-kHz modulation, and 8-kHz frequency deviation.

**CONTROL AND SWITCH SETTINGS**

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/USM-207</td>
<td>FREQUENCY TUNING - MC</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>TRACK</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td></td>
<td>INPUT</td>
<td>0.3 V MAX (both switches to left)</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>10³ (black knob)</td>
</tr>
<tr>
<td></td>
<td>Sensitivity</td>
<td>PLUG IN</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>FREQ</td>
</tr>
<tr>
<td></td>
<td>DIRECT/HETERODYNE</td>
<td>DIRECT</td>
</tr>
</tbody>
</table>

TM 11-5820-401-34-2-2/0967-LP-432-3030

5-6
53. RECEIVER SENSITIVITY TEST. (CONT)

CONTROL AND SWITCH SETTINGS (CONT)

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/URM-103</td>
<td>OPERATE/OFF/STAND BY</td>
<td>OPERATE</td>
</tr>
<tr>
<td></td>
<td>BAND SWITCH</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>RF TUNING</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>DEVIATION RANGE KHZ</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>1000 Hz</td>
</tr>
<tr>
<td></td>
<td>DEVIATION</td>
<td>Adjust for 8-kHz meter indication</td>
</tr>
<tr>
<td></td>
<td>RF SET TO LINE</td>
<td>To red line</td>
</tr>
<tr>
<td></td>
<td>RF OUTPUT</td>
<td>LO, 0-10 KUV</td>
</tr>
<tr>
<td></td>
<td>LO RF UV</td>
<td>0.5 µv</td>
</tr>
<tr>
<td>TS-723(*)/U</td>
<td>RANGE</td>
<td>x10</td>
</tr>
<tr>
<td></td>
<td>AF INPUT</td>
<td>MIN</td>
</tr>
<tr>
<td></td>
<td>AF-RF</td>
<td>AF</td>
</tr>
<tr>
<td></td>
<td>FREQUENCY</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>METER</td>
</tr>
<tr>
<td></td>
<td>R.M.S. VOLTS/DB</td>
<td>30 v</td>
</tr>
<tr>
<td>RT</td>
<td>BAND</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>OLD OFF</td>
</tr>
<tr>
<td></td>
<td>LIGHT</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td>OFF</td>
</tr>
</tbody>
</table>

TEST PROCEDURE

Sensitivity Test at 30.00 MHz

1. Connect TS-723(*)/U METER lead C to Test Cable No. 1 terminal F; connect lead D to terminal A. (See test setup diagram A page 5-6)
2. Adjust AN/URM-103 RF TUNING control for 30.00-MHz display on AN/USM-207.

NOTE

To produce a display on the AN/USM-207, the AN/URM-103 rf level must be increased by turning the LO RF UV control clockwise. When the display appears, readjust the AN/URM-103 RF TUNING control until the AN/USM-207 indicates 30.00 MHz, and reset the LO RF UV control to 0.5 µv.

3. Disconnect T-connector from AN/USM-207.
5. If 17-volt indication cannot be obtained, see troubleshooting chart 5-10.
6. Disconnect TS-723(*)/U METER leads from Test Cable No. 1 terminals.
5-3 RECEIVER SENSITIVITY TEST (CONT)

7. Connect TS-723(“)U AF INPUT lead B to Test Cable No. 1 terminal F; connect lead A to terminal A. (See test setup diagram (A).)
8. Turn TS-723(“)U FUNCTION switch to SET LEVEL.
10. Change TS-723(“)U FUNCTION switch to DISTORTION.
11. Adjust TS-723(“)U FREQUENCY and BALANCE controls for minimum meter indication.

STANDARD. The new TS-723(“)U meter indication (step 11) should be at least -10 dB from the previous zero-db indication (step 8).

12. If TS-723(“)U meter indication is not at least -10 dB from previous indication, see troubleshooting chart 5-2.

Sensitivity Test at 53.00 MHz

13. Change RT MC-TUNE-KC switch to 53.00 MHz and BAND to B.
14. Turn AN/URM-103 BAND SWITCH to C and RF TUNING control for 53.00-MHz meter indication.
15. Reconnect TS-723(“)U METER lead C to Test Cable No. 1 terminal F; reconnect lead D to terminal A.
16. Adjust AN/URM-103 RF TUNING control for 53.00-MHz display on AN/USM-207. To produce display, see note under step 2 and readjust RF TUNING control until AN/USM-207 indicates 53.00 MHz.
17. Repeat steps 3 through 12.

Sensitivity Test at 41.00 MHz

18. Change RT MC-TUNE-KC switch to 41.00 MHz and BAND to A.
19. Turn AN/URM-103 BAND SWITCH to C and RF TUNING control for 41.00-MHz meter indication.
20. Reconnect TS-723(“)U METER lead C to Test Cable No. 1 terminal F; reconnect lead D to terminal A.
21. Adjust AN/URM-103 RF TUNING control for 41.00-MHz display on AN/USM-207. To produce display, see note under step 2 and readjust RF TUNING control until AN/USM-207 indicates 41.00 MHz.
22. Repeat steps 3 through 12.

Sensitivity Test at 64.00 MHz

23. Change RT MC-TUNE-KC switch to 64.00 MHz and BAND to A.
24. Turn AN/URM-103 BAND SWITCH to D and RF TUNING control for 64.00-MHz meter indication.
25. Reconnect TS-723(“)U METER lead C to Test Cable No. 1 terminal F; reconnect lead D to terminal A.
26. Adjust AN/URM-103 RF TUNING control for 64.00-MHz display on AN/USM-207. To produce display, see note under step 2 and readjust RF TUNING control until AN/USM-207 indicates 64.00 MHz.
27. Repeat steps 3 through 12.

Sensitivity Test at 52.00 MHz

28. Change RT MC-TUNE-KC switch to 52.00 MHz and BAND to A.
5-3. RECEIVER SENSITIVITY TEST. (CONT)

29. Turn AN/URM-103 BAND SWITCH to C and RF TUNING control for 52.00-MHz meter indication.

30. Reconnect TS-723(*)/U METER lead C to Test Cable No. 1 terminal F; reconnect lead D to terminal A.

31. Adjust AN/URM-103 RF TUNING control for 52.00-MHz display on AN/USM-207. To produce display, see note under step 2, and readjust RF TUNING control until AN/USM-207 indicates 52.00 MHz.

32. Repeat steps 3 through 12.

Sensitivity Test at 75.00 MHz

33. Change RT MC-TUNE-KC switch to 75.00 MHz and BAND to B

34. Turn AN/URM-103 BAND SWITCH to D and RF TUNING control for 75.00-MHz meter indication.

35. Reconnect TS-723(*)/U METER lead C to Test Cable No. 1 terminal F; reconnect lead D to terminal A.

36. Adjust AN/URM-103 RF TUNING control for 75.00-MHz display on AN/USM-207. To produce display, see note under step 2 and readjust RF TUNING control until AN/USM-207 indicates 75.00 MHz.

37. Repeat steps 3 through 12.

5-4. NEW SQUELCH TEST.

PURPOSE. This test checks the sensitivity of the RT squelch modules (A5200, A5300) to the NEW SQUELCH signal (150 Hz) at several carrier frequencies. The 150-Hz signal is injected into the RT ANTENNA port, energizing Squelch Module Relay K5002, which unsquelches the receiver. Proper operation of the squelch modules is verified by CALL lamp response to carrier signal strength at or below a 0.5-μV rf level.

TEST EQUIPMENT AND MATERIALS

<table>
<thead>
<tr>
<th>Power Supply PP-1104(*)/G</th>
<th>Matching Unit CN-901/U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Counter AN/USM-207</td>
<td>Loudspeaker LS-454/U (RT-246/VRC)</td>
</tr>
<tr>
<td>Signal Generator AN/URM-103</td>
<td>Rf Cables (two) RG-58/U</td>
</tr>
<tr>
<td>Adapter (T-Connector) UG-274 B/U</td>
<td>Test Cable No. 1</td>
</tr>
</tbody>
</table>
5-4. NEW SQUELCH TEST. (CONT)

TEST SETUP. Connect equipment as shown in test setup diagram A.

Turn on test equipment. Allow at least 15 to 30 minutes for warmup.

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. If using alternate test equipment, adjust for 30.00 MHz, minimum rf input level, 150-Hz tone rate, and 3-kHz frequency deviation.

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/USM-207</td>
<td>FREQUENCY TUNING-MC</td>
<td>100 TRACK MIN (fully counterclockwise)</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>0.3 V MAX (both switches to left)</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>10⁰ (black knob)</td>
</tr>
<tr>
<td></td>
<td>INPUT</td>
<td>PLUG IN</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>FREQ</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY</td>
<td>DIRECT</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>HETEROODYNE</td>
</tr>
<tr>
<td></td>
<td>DIRECT/HETERODYNE</td>
<td></td>
</tr>
</tbody>
</table>
5-4 NEW SQUELCH TEST. (CONT)

CONTROL AND SWITCH SETTINGS (CONT)

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>BAND</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>NEW ON</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>LIGHT</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td>OFF</td>
</tr>
<tr>
<td>AN/URM-103</td>
<td>OPERATE/OFF/STAND BY</td>
<td>OPERATE</td>
</tr>
<tr>
<td></td>
<td>BAND SWITCH</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>RF TUNING</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>DEVIATION RANGE KHZ</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>150 Hz</td>
</tr>
<tr>
<td></td>
<td>DEVIATION</td>
<td>Adjust for 3-kHz meter indication</td>
</tr>
<tr>
<td></td>
<td>RF SET TO LINE</td>
<td>To red line</td>
</tr>
<tr>
<td></td>
<td>RF OUTPUT</td>
<td>LO, 0-10 KUV</td>
</tr>
<tr>
<td></td>
<td>LO RF UV</td>
<td>Minimum setting</td>
</tr>
</tbody>
</table>

TEST PROCEDURE

NEW SQUELCH Test at 30.00 MHz

1. Adjust AN/URM-103 RF TUNING control for 30.00-MHz display on AN/USM-207.

   **NOTE**

   To produce a display on the AN/USM-207, the AN/URM-103 rf level must be increased by turning the LO RF UV control clockwise. When the display appears, readjust the AN/URM-103 RF TUNING control until the AN/USM-207 indicates 30.00 MHz, and reset the LO RF UV control to minimum setting.

2. Disconnect T-connector from AN/USM-207.
3. If necessary, readjust AN/URM-103 DEVIATION control for 3-kHz meter indication.
4. Turn AN/URM-103 LO RF UV control slowly clockwise until RT CALL lamp lights.

   **STANDARD.** RT CALL lamp should light while the AN/URM-103 LO RF UV control setting is at or below 0.5µv.

   5. If LO RF UV control setting is more than 0.5µv when RT CALL lamp lights or if CALL lamp will not light, see troubleshooting chart 5-3.
6. Remove cable from RT ANTENNA port.

   **STANDARD.** RT CALL lamp should go out. Remember, without the 150-Hz tone, Relay K5002 will not be energized to supply the 16 volts necessary to turn on the audio amplifiers; therefore, the receiver is squelched.
5-4. NEW SQUELCH TEST. (CONT)

7. If CALL lamp does not go out, see troubleshooting chart 5-3.
8. Reconnect cable to RT ANTENNA port.

STANDARD. RT CALL lamp should light.

9. If RT CALL lamp does not light, see troubleshooting chart 5-3.

NEW SQUELCH Test at 41.00 MHz

10. Change RT MC-TUNE-KC switch to 41.00 MHz and BAND to A.
11. Turn AN/URM-103 BAND SWITCH to C and RF TUNING control for 41.00-MHz meter indication.
12. Adjust AN/URM-103 RF TUNING control for 41.00-MHz display on AN/USM-207. To produce display, see note under step 1 and readjust RF TUNING control until AN/USM-207 indicates 41.00 MHz.
13. Repeat steps 2 through 9.

NEW SQUELCH Test at 52.00 MHz

14. Change RT MC-TUNE-KC switch to 52.00 MHz.
15. Turn AN/URM-103 RF TUNING control for 52.00-MHz meter indication.
16. Adjust AN/URM-103 RF TUNING control for 52.00-MHz display on AN/USM-207. To produce display, see note under step 1 and readjust RF TUNING control until AN/USM-207 indicates 52.00 MHz.
17. Repeat steps 2 through 9.

NEW SQUELCH TEST at 53.00 MHz

18. Change RT MC-TUNE-KC switch to 53.00 MHz and BAND to B.
19. Turn AN/URM-103 RF TUNING control for 53.00-MHz meter indication.
20. Adjust AN/URM-103 RF TUNING control for 53.00-MHz display on AN/USM-207. To produce display, see note under step 1 and readjust RF TUNING control until AN/USM-207 indicates 53.00 MHz.
21. Repeat steps 2 through 9.

NEW SQUELCH Test at 65.00 MHz

22. Change RT MC-TUNE-KC switch to 65.00 MHz.
23. Turn AN/URM-103 BAND SWITCH to D and RF TUNING control for 65.00-MHz meter indication.
24. Adjust AN/URM-103 RF TUNING control for 65.00-MHz display on AN/USM-207. To produce display, see note under step 1 and readjust RF TUNING control until AN/USM-207 indicates 65.00 MHz.
25. Repeat steps 2 through 9.

NEW SQUELCH Test at 75.00 MHz

26. Change RT MC-TUNE-KC switch to 75.00 MHz.
27. Turn AN/URM-103 RF TUNING control for 75.00-MHz meter indication.
28. Adjust AN/URM-103 RF TUNING control for 75.00-MHz display on AN/USM-207. To produce display, see note under step 1 and readjust RF TUNING control until AN/USM-207 indicates 75.00 MHz.
5-4  NEW SQUELCH TEST. (CONT)

29. Repeat steps 2 through 9.

5-6  OLD SQUELCH TEST.

PURPOSE. This test checks the sensitivity of the RT squelch modules (A5200, A5300) to OLD SQUELCH noise components (7300 Hz) at several carrier frequencies. Proper operation of the squelch modules is verified by CALL lamp response to signal strength at or below a 0.7-µv rf carrier level.

TEST EQUIPMENT AND MATERIALS

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply PP-1104(*)/G</td>
<td></td>
</tr>
<tr>
<td>Frequency Counter AN/USM-207</td>
<td></td>
</tr>
<tr>
<td>Signal Generator AN/URM-103</td>
<td></td>
</tr>
<tr>
<td>Adapter (T-Connector) UG-274 B/U</td>
<td></td>
</tr>
<tr>
<td>Matching Unit CN-901/U</td>
<td></td>
</tr>
<tr>
<td>Loudspeaker (RT-246/VRC) LS-454/U</td>
<td></td>
</tr>
<tr>
<td>Rf Cables (two) RG-58/U</td>
<td></td>
</tr>
<tr>
<td>Test Cable No. 1</td>
<td></td>
</tr>
</tbody>
</table>

TEST SETUP. Connect equipment as shown in test setup diagram A.

Turn on test equipment. Allow at least 15 to 30 minutes for warmup.
5-5. OLD SQUELCH TEST. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. If using alternate test equipment, adjust for 30.00 MHz, minimum rf Input level, 1-kHz modulation, and 3-kHz frequency deviation.

![CONTROL AND SWITCH SETTINGS](image)

**TEST PROCEDURE**

OLD SQUELCH Test at 30.00 MHz

1. Adjust AN/URM-103 RF TUNING control for 30.00-MHz display on AN/USM-207.

**NOTE**

To produce a display on the AN/USM-207, the AN/URM-103 rf level must be increased by turning the LO RF UV control clockwise. When the display appears, readjust the AN/URM-103 RF TUNING control until the AN/USM-207 indicates 30.00 MHz and reset the LO RF UV control to minimum setting.

2. Disconnect T-connector from AN/USM-207.
3. Turn AN/URM-103 LO RF UV control clockwise until RT CALL lamp lights.

5-14
5. OLD SQUELCH TEST. (CONT)

STANDARD. RT CALL lamp should light while AN/URM-103 LO RF UV control setting is at or below 0.7 µv.

4. If LO RF UV control setting is more than 0.7 µv, see troubleshooting chart 5-3.
5. Remove cable from RT ANTENNA port.

STANDARD. RT CALL lamp should go out.

6. If CALL lamp stays lit, see troubleshooting chart 5-3,
7. Reconnect cable to RT ANTENNA port.

STANDARD. RT CALL lamp should light.

8. If RT CALL lamp does not light, see troubleshooting chart 5-3.

OLD SQUELCH Test at 41.00 MHz

9. Change RT MC-TUNE-KC switch to 41.00 MHz and BAND to A.
10. Turn AN/URM-103 BAND SWITCH to B and RF TUNING control for 41.00-MHz meter indication.
11. Adjust AN/URM-103 RF TUNING control for 41.00-MHz display on AN/USM-207. To produce display, see note under step 1 and readjust RF TUNING control until AN/USM-207 Indicates 41.00 MHz.
12. Repeat steps 2 through 8.

OLD SQUELCH Test at 52.00 MHz

13. Change RT MC-TUNE-KC switch to 52.00 MHz.
14. Turn AN/URM-103 RF TUNING control for 52.00 MHz meter indication.
15. Adjust AN/URM-103 RF TUNING control for 52.00-MHz display on AN/USM-207. To produce display, see note under step 1 and readjust RF TUNING control until AN/USM-207 Indicates 52.00 MHz.
16. Repeat steps 2 through 8.

OLD SQUELCH Test at 53.00 MHz

17. Change RT MC-TUNE-KC switch to 53.00 MHz and BAND to B.
18. Turn AN/URM-103 RF TUNING control for 53.00-MHz meter indication.
19. Adjust AN/URM-103 RF TUNING control for 53.00 MHz display on AN/USM-207. To produce display, see note under step 1 and readjust RF TUNING control until AN/USM-207 indicates 53.00 MHz.
20. Repeat steps 2 through 8.

OLD SQUELCH Test at 65.00 MHz

21. Change RT MC-TUNE-KC switch to 65.00 MHz.
22. Turn AN/URM-103 BAND SWITCH to D and RF TUNING control for 65.00-MHz meter indication.
23. Adjust AN/URM-103 RF TUNING control for 65.00 MHz display on AN/USM-207. To produce display, see note under step 1 and readjust RF TUNING control until AN/USM-207 indicates 65.00 MHz.
24. Repeat steps 2 through 8.
5-5. OLD SQUELCH TEST. (CONT)

OLD SQUELCH Test at 75.00 MHz

25. Change RT MC-TUNE-KC switch to 75.00 MHz.
26. Turn AN/URM-103 RF TUNING control for 75.00-MHz meter indication.
27. Adjust AN/URM-103 RF TUNING control for 75.00-MHz display on AN/USM-207. To produce display, see note under step 1 and readjust RF TUNING control until AN/USM-207 indicates 75.00 MHz.
28. Repeat steps 2 through 8.

5-6. RECEIVER AUDIO POWER TEST.

PURPOSE. This test checks the ability of the RT to drive its three audio outputs, namely:

1. The MUTED audio output, which supplies power to the speaker.
2. The UNMUTED audio output, which supplies power to the headphones.
3. The FIXED LEVEL audio output, which supplies power to the interphone system.

An rf level strong enough to drive the A4200 module into limiting (20 µV) is injected into the RT ANTENNA port. The audio output voltages are then measured at Test Cable No. 1 terminals F, S, and K to make sure minimum standards are met.

TEST EQUIPMENT AND MATERIALS

- Power Supply PP-1104(*)/G
- Ac Voltmeter ME-30(*)/U
- Frequency Counter AN/USM-207
- Signal Generator AN/URM-103
- Adapter (T-Connector) UG-274 B/U
- Matching Unit CN-901/U
- Resistor, 600-ohm ± 5%, 2 watt
  (RT-246/VRC)
- Resistor, 150-ohm ± 5%, 2 watt
  (RT-246/VRC)
- Rf Cables (two) RG-58/U
- Test Cable No. 1

NOTE

The 600- and 150-ohm resistors provide impedance matching loads for the audio transformer. The 600-ohm resistor is used in place of Loudspeaker LS-454/U, which would issue a loud, distracting tone when the RT-246/VRC VOLUME control is adjusted during the test. If no 600-ohm resistor is available, however, the loudspeaker must be connected. (See test setup diagram A.)
5-6. RECEIVER AUDIO POWER TEST. (CONT)

TEST SETUP. Connect test equipment as shown in test setup diagram A.

Turn on test equipment. Allow at least 15 to 30 minutes for warmup.

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. If using alternate test equipment, adjust for 60.00 MHz, 20-μv rf input level, 1-kHz modulation, and 8-kHz frequency deviation.

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/USM-207</td>
<td>FREQUENCY TUNING-MC</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>TRACK</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td></td>
<td>INPUT</td>
<td>0.3 V MAX (both switches to left)</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>10Ω (black knob)</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY</td>
<td>PLUG IN</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>FREQ</td>
</tr>
<tr>
<td></td>
<td>DIRECT/HETERODYNE</td>
<td>DIRECT</td>
</tr>
</tbody>
</table>
5-6. RECEIVER AUDIO POWER TEST. (CONT)

CONTROL AND SWITCH SETTINGS (CONT)

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/URM-103</td>
<td>OPERATE/OFF/STAND BY</td>
<td>OPERATE</td>
</tr>
<tr>
<td></td>
<td>BAND SWITCH</td>
<td>(D)</td>
</tr>
<tr>
<td></td>
<td>RF TUNING</td>
<td>60.00</td>
</tr>
<tr>
<td></td>
<td>DEVIAITON RANGE KHZ</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>1000 Hz</td>
</tr>
<tr>
<td></td>
<td>DEVIATION</td>
<td>Adjust for 8-kHz meter indication</td>
</tr>
<tr>
<td></td>
<td>RF SET TO LINE</td>
<td>To red line</td>
</tr>
<tr>
<td></td>
<td>RF OUTPUT</td>
<td>LO, 0-10 KUV</td>
</tr>
<tr>
<td></td>
<td>LO RF UV</td>
<td>20 µv</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td>OFF</td>
</tr>
<tr>
<td>RT</td>
<td>BAND</td>
<td>(B)</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>60.00</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>OLD OFF</td>
</tr>
<tr>
<td></td>
<td>LIGHT</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td>ME-30(*)/U</td>
<td>RANGE selector switch</td>
<td>30 v</td>
</tr>
</tbody>
</table>

TEST PROCEDURE

Muted Audio Power Test

1. Connect free lead of 800-ohm resistor to Test Cable No. 1 terminal F. (See test setup A, page 5-17.)

2. Connect ME-30(*)/U INPUT lead A to Test Cable No. 1 terminal F; connect lead B to terminal A.

3. Adjust AN/URM-103 RF TUNING control for 60.00-MHz display on AN/USM-207.

NOTE

To produce a display on the AN/USM-207, the AN/URM-103 rf level must be increased by turning the LO RF UV control clockwise. When the display appears, readjust the AN/URM-103 RF TUNING control until the AN/USM-207 indicates 60.00 MHz, and reset the LO RF UV control to 20 µv.

4. Disconnect T-connector from AN/USM-207.

5. Turn RT VOLUME control fully clockwise.

STANDARD. ME-30(*)/U meter should indicate at least 17 volts.

6. If ME-30(*)/U meter indicates less than 17 volts, see troubleshooting chart 5-10.
5-6 RECEIVER AUDIO POWER TEST. (CONT)

Unmuted Audio Power Test

7. Disconnect 600-ohm resistor lead from Test Cable No. 1 terminal F and connect it to terminal S (RT-246/VRC only).
8. Connect ME-30(*)/U INPUT lead A to Test Cable No. 1 terminal S; connect lead B to terminal A. (See test setup diagram A.)
9. Set ME-30(*)/U RANGE selector switch to lower settings until reaching most exact on-scale reading.

STANDARD. ME-30(*)/U meter should indicate at least 7.75 volts.

10. If ME-30(*)/U meter indicates less than 7.75 volts, see troubleshooting chart 5-10.

Fixed Audio Power Test

11. Connect ME-30(*)/U INPUT lead A to Test Cable No. 1 terminal K; connect lead B to terminal A. (See test setup diagram A.)
12. Set ME-30(*)/U RANGE selector switch to lower settings until reaching most exact on-scale reading.

STANDARD. ME-30(*)/U meter should indicate at least 0.16 volt.

13. If ME-30(*)/U meter indicates less than 0.16 volt, see troubleshooting chart 5-10.

5-7. RECEIVER AUDIO DISTORTION TEST.

PURPOSE. This test checks the ability of the RT to minimize distortion. It is similar to the Receiver Sensitivity Test (paragraph 5-3), except that now a strong (20-μv) rf level is used instead of a weak (0.5-μv) one. The 20-μv level is injected into the RT ANTENNA port. The audio distortion, measured at the MUTED AUDIO output terminal (pin F) of Test Cable No. 1 should be less than 8 percent.

TEST EQUIPMENT AND MATERIALS

<table>
<thead>
<tr>
<th>Power Supply PP-1104(*)/G</th>
<th>Matching Unit CN-901/U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distortion Analyzer TS-723(*)/U</td>
<td>Resistor, 600-ohm ± 5%, 2 watt</td>
</tr>
<tr>
<td>Frequency Counter AN/USM-207</td>
<td>(RT-246/VRC)</td>
</tr>
<tr>
<td>Signal Generator AN/URM-103</td>
<td>Rf Cables (two) RG-58/U</td>
</tr>
<tr>
<td>Adapter (T-Connector) UG-274 B/U</td>
<td>Test Cable No. 1</td>
</tr>
</tbody>
</table>

NOTE

The 600-ohm resistor provides an impedance matching load for the audio transformer. The resistor is used in place of Loudspeaker LS-454/U, which would issue a loud, distracting tone when the RT-246/VRC VOLUME control is adjusted during the test. If no 600-ohm resistor is available, however, the loudspeaker must be connected. (See test setup diagram A, page 5-20.)
5-7. RECEIVER AUDIO DISTORTION TEST. (CONT)

TEST SETUP. Connect test equipment as shown in test setup diagram A.

Turn on test equipment. Allow at least 15 to 30 minutes for warmup.

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. If using alternate test equipment, adjust for 84.00 MHz, 20-μV rf input level, 1-kHz modulation, and 8-kHz frequency deviation.

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/USM-207</td>
<td>FREQUENCY TUNING – MC</td>
<td>100 TRACK</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>0.3 V MAX (both switches to left)</td>
</tr>
<tr>
<td></td>
<td>INPUT</td>
<td>10^3 (black knob)</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>PLUG IN</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY</td>
<td>FREQ</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>DIRECT</td>
</tr>
<tr>
<td></td>
<td>DIRECT/HETERODYNE</td>
<td></td>
</tr>
</tbody>
</table>

5-20
### 5-7. RECEIVER AUDIO DISTORTION TEST. (CONT)

#### CONTROL AND SWITCH SETTINGS (CONT)

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/URM-103</td>
<td>OPERATE/OFF/STAND BY</td>
<td>OPERATE</td>
</tr>
<tr>
<td></td>
<td>BAND SWITCH</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>RF TUNING</td>
<td>64.00</td>
</tr>
<tr>
<td></td>
<td>DEVIATION RANGE KHZ</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>1000 Hz</td>
</tr>
<tr>
<td></td>
<td>DEVIATION</td>
<td>Adjust for 8-kHz meter indication</td>
</tr>
<tr>
<td></td>
<td>RF SET TO LINE</td>
<td>To red line</td>
</tr>
<tr>
<td></td>
<td>RF OUTPUT</td>
<td>LO, 0-10 KUV</td>
</tr>
<tr>
<td></td>
<td>LO RF UV</td>
<td>20 μv</td>
</tr>
<tr>
<td>RT</td>
<td>BAND</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>64.00</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>OLD OFF</td>
</tr>
<tr>
<td></td>
<td>LIGHT</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td>OFF</td>
</tr>
<tr>
<td>TS-723(*)/U</td>
<td>RANGE</td>
<td>x10</td>
</tr>
<tr>
<td></td>
<td>AF INPUT</td>
<td>MIN</td>
</tr>
<tr>
<td></td>
<td>AF – RF</td>
<td>AF</td>
</tr>
<tr>
<td></td>
<td>FREQUENCY</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>METER</td>
</tr>
<tr>
<td></td>
<td>R.M.S. VOLTS/DB</td>
<td>30 v</td>
</tr>
</tbody>
</table>

#### TEST PROCEDURE

1. Connect TS-723(*)/U METER lead C to Test Cable No. 1 terminal F; connect lead D to terminal A. (See test setup diagram A, page 5-20.)
2. Adjust AN/URM-103 RF TUNING control for 64.00-MHz display on AN/USM-207.

#### NOTE

To produce a display on the AN/USM-207, the AN/URM-103 rf level must be increased by turning the LO RF UV control clockwise. When the display appears, readjust the AN/URM-103 RF TUNING control until the AN/USM-207 indicates 64.00 MHz, and reset the LO RF UV control to 20 μv.

3. Disconnect T-connector from AN/USM-207.
5. Disconnect TS-723(*)/U METER leads from Test Cable No. 1 terminals.
6. Connect TS-723(*)/U AF INPUT lead B to Test Cable No. 1 terminal F; connect lead A to terminal A. (See test setup diagram A.)
7. Turn TS-723(*)/U FUNCTION switch to SET LEVEL.
8. Set TS-723(*)/U METER RANGE to 100 percent.
57. RECEIVER AUDIO DISTORTION TEST. (CONT)

9. Adjust TS-723(*)/U signal INPUT control for full scale meter deflection.
10. Turn TS-723(*)/U FUNCTION switch to DISTORTION.
11. Adjust TS-723(*)/U FREQUENCY and BALANCE controls for minimum meter indication.

STANDARD. TS-723(*)/U meter should indicate less than 8 percent (distortion).

12. If TS-723(*)/U meter indicates 8 percent or above, see troubleshooting chart 5-4.

58. RECEIVER AUDIO RESPONSE TEST (NORMAL MODE)

PURPOSE. This test checks the RT A5000 tray circuits for a flat response to modulating frequencies at and below 3 kHz. Receiver circuits are said to have a flat response if their gain remains nearly constant over a specified bandwidth. Frequencies not failing within this limited range receive little or no gain. The ability of the RT to detect and respond flatly to the desired voice frequencies is verified by injecting 1 kHz, 500 Hz, and 3 kHz into its ANTENNA port and insuring that the power measured at the MUTED audio output (pin F) of Test Cable No. 1 falls within the required range.

TEST EQUIPMENT AND MATERIALS

<table>
<thead>
<tr>
<th>Power Supply PP-1104(*)/G</th>
<th>Adapters (two) UG-274 S/U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Counter AN/USM-207</td>
<td>(T-Connector) and UG-514</td>
</tr>
<tr>
<td>Signal Generator AN/URM-127</td>
<td>Matching Unit CN-901/U</td>
</tr>
<tr>
<td>Signal Generator AN/URM-103</td>
<td>Rf Cables (two) RG-58/U</td>
</tr>
<tr>
<td>Ac Voltmeter ME-30(*)/U</td>
<td>Resistor, 600-ohm ±5%, 2 watt</td>
</tr>
<tr>
<td></td>
<td>(RT-246/VRC)</td>
</tr>
<tr>
<td></td>
<td>Test Cable No. 1</td>
</tr>
</tbody>
</table>

NOTE

The 600-ohm resistor provides an impedance matching load for the audio transformer. The resistor is used in place of Loudspeaker LS-454/U, which would issue a loud, distracting tone when the RT-246/VRC VOLUME control is adjusted during the test. If no 600-ohm resistor is available, however, the loudspeaker must be connected. (See test setup diagram(A).)
5-8. RECEIVER AUDIO RESPONSE TEST (NORMAL MODE) (CONT)

TEST SETUP. Connect test equipment as shown in test setup diagram A.

Turn on test equipment. Allow at least 15 to 30 minutes for warmup.

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. If using alternate test equipment, adjust for 64.00 MHz, 20-μV rf input level, 1-kHz modulation, and 8-kHz frequency deviation.

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/USM-207</td>
<td>FREQUENCY TUNING – MC</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>TRACK</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td></td>
<td>INPUT</td>
<td>0.3 V MAX (both switches to left)</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>10° (black knob)</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY</td>
<td>PLUG IN</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>FREQ</td>
</tr>
<tr>
<td></td>
<td>DIRECT/HETERODYNE</td>
<td>DIRECT</td>
</tr>
<tr>
<td>ME-30(“)*/U</td>
<td>RANGE selector switch</td>
<td>30 v</td>
</tr>
</tbody>
</table>
### 5-8. RECEIVER AUDIO RESPONSE TEST (NORMAL MODE) (CONT)

#### CONTROL AND SWITCH SETTINGS (CONT)

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/URM-103</td>
<td>OPERATE/OFF/STAND BY</td>
<td>OPERATE</td>
</tr>
<tr>
<td></td>
<td>BAND SWITCH</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>RF TUNING</td>
<td>64.00</td>
</tr>
<tr>
<td></td>
<td>DEVIATION RANGE KHZ</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>EXT MOD</td>
</tr>
<tr>
<td></td>
<td>DEVIATION</td>
<td>Adjust for 8-kHz meter indication</td>
</tr>
<tr>
<td></td>
<td>RF SET TO LINE</td>
<td>To red line</td>
</tr>
<tr>
<td></td>
<td>RF OUTPUT</td>
<td>LO, 0-10 KUV</td>
</tr>
<tr>
<td></td>
<td>LO RF UV</td>
<td>20 μV</td>
</tr>
<tr>
<td>RT</td>
<td>BAND</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>64.00</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>OLD OFF</td>
</tr>
<tr>
<td></td>
<td>LIGHT</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>X-MODE-NORMAL</td>
<td>NORMAL</td>
</tr>
</tbody>
</table>

#### NOTE

The X-MODE-NORMAL switch is located on the A4000 assembly.

<table>
<thead>
<tr>
<th>AN/URM-127</th>
<th>FREQ RANGE MULTIPLIER</th>
<th>x10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FREQ RANGE DIAL</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>ATTENUATOR</td>
<td>x1</td>
</tr>
<tr>
<td></td>
<td>OUTPUT CONTROL</td>
<td>Fully clockwise (maximum)</td>
</tr>
</tbody>
</table>

#### TEST PROCEDURE

1. Adjust AN/URM-103 RF TUNING control for 64.00-MHz display on AN/USM-207.

#### NOTE

To produce a display on the AN/USM-207, the AN/URM-103 rf level must be increased by turning the LO RF UV control clockwise. When the display appears, readjust the AN/URM-103 RF TUNING control until the AN/USM-207 indicates 64.00 MHz, and reset the LO RF UV control to 20 μV.

2. Disconnect T-connector from AN/USM-207.

5-24
5-8. RECEIVER AUDIO RESPONSE TEST (NORMAL MODE). (CONT)

Audio Response Test (Normal Mode) at 1 kHz

3. Set AN/USM-207 controls to the following positions:

<table>
<thead>
<tr>
<th>CONTROL/SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER</td>
<td>TRACK</td>
</tr>
<tr>
<td>DISPLAY</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td>SENSITIVITY</td>
<td>0.1 v</td>
</tr>
<tr>
<td>GATE TIME</td>
<td>1 (black knob)</td>
</tr>
<tr>
<td>FUNCTION</td>
<td>FREQ</td>
</tr>
</tbody>
</table>

4. Disconnect rf cable from Adapter UG-514. (See test setup diagram A, page 5-23.)
5. Connect rf cable to AN/USM-207 FREQ A connector.
6. Adjust AN/URM-127 FREQ RANGE DIAL for 1-kHz display on AN/USM-207.
7. Disconnect rf cable from AN/USM-207 FREQ A connector.
8. Reconnect rf cable to Adapter UG-514.
9. Connect ME-30(*)/U INPUT lead A to Test Cable No. 1 terminal F; connect lead B to terminal A.
10. Adjust RT VOLUME control for 17-volt indication on ME-30(*)/U. Do not change VOLUME control position during rest of test.

STANDARD. A 1-kHz modulating tone injected into the RT should produce 17 volts at the output.

11. If RT VOLUME control adjustment cannot produce 17-volt indication on ME-30(*)/U, see troubleshooting chart 5-10.

Audio Response Test (Normal Mode) at 500 Hz

12. Turn AN/URM-127 FREQ RANGE DIAL to 50.
13. Disconnect rf cable from Adapter UG-514. (See test setup diagram A.)
14. Connect rf cable to AN/USM-207 FREQ A connector.
15. Adjust AN/URM-127 FREQ RANGE DIAL for 500-Hz display on AN/USM-207.
16. Disconnect rf cable from AN/USM-207 from FREQ A connector.
17. Reconnect rf cable to Adapter UG-514.

STANDARD. ME-30(*)/U should indicate between 14 and 22 volts.

18. If ME-30(*)/U indicates below 14 volts or above 22 volts, see troubleshooting chart 5-5.

Audio Response Test (Normal Mode) at 3 kHz

19. Turn AN/URM-127 FREQ RANGE MULTIPLIER to x100.
20. Turn FREQ RANGE DIAL to 30.
21. Disconnect rf cable from Adapter UG-514. (See test setup diagram A.)
22. Connect rf cable to AN/USM-207 FREQ A connector.
23. Adjust AN/URM-127 FREQ RANGE DIAL for 3-kHz display on AN/USM-207.
24. Disconnect rf cable from AN/USM-207 FREQ A connector.
25. Reconnect rf cable to Adapter UG-514.
5-8. RECEIVER AUDIO RESPONSE TEST (NORMAL MODE). (CONT)

STANDARD. ME-30(*)/U should indicate between 14 and 22 volts.

26. If ME-30(*)/U indicates below 14 volts or above 22 volts, see troubleshooting chart 5-5.
27. Reset RT X-MODE-NORMAL switch (on A4000 assembly) to X-MODE position.

5-9. RECEIVER AUDIO RESPONSE TEST (X-MODE).

PURPOSE. This test is similar to the RT Receiver Audio Response Test (Normal Mode). When setup for X-mode, however, the receiver responds to a wider band of frequencies because the A5000 tray is not used. The ability of the RT to detect and respond flatly to the desired intelligence is verified by:

1. Injecting 1-kHz modulation into the RT ANTENNA port while measuring the voltage at the RT X-MODE port (pin A),
2. Changing the modulation rate to 500 Hz, 3 kHz, 5 kHz, and 10 kHz while taking db readings at the RT X-MODE port (pin A).
3. Comparing the db readings taken in step 2 to the reference voltage taken in step 1 to see if the standard is met.

TEST EQUIPMENT AND MATERIALS

<table>
<thead>
<tr>
<th>Power Supply PP-1104(*)/G</th>
<th>Loudspeaker LS-454/U (RT-246/VRC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Counter AN/USM-207</td>
<td>Adapter (two) UG-274 B/U and UG-514</td>
</tr>
<tr>
<td>Signal Generator AN/URM-103</td>
<td>Matching Unit CN-901/U</td>
</tr>
<tr>
<td>Signal Generator AN/URM-127</td>
<td>Rf Cables (three) RG-58/U</td>
</tr>
<tr>
<td>Ac Voltmeter ME-30(*)/U</td>
<td>Test Cable No. 1</td>
</tr>
</tbody>
</table>
5-9. RECEIVER AUDIO RESPONSE TEST (X-MODE). (CONT)

TEST SETUP. Connect test equipment as shown in test setup diagram A.

Turn on test equipment. Allow at least 15 to 30 minutes for warmup.

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. If using alternate test equipment, adjust for 64.00 MHz, 20-μv rf input level, 1-kHz modulation, and 8-kHz frequency deviation.
## 5-9. RECEIVER AUDIO RESPONSE TEST (X-MODE). (CONT)

### CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/USM-207</td>
<td>FREQUENCY TUNING-MC</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>TRACK</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td></td>
<td>INPUT</td>
<td>0.3 V MAX (both switches to left)</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>10Ω (black knob)</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY</td>
<td>PLUG IN</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>FREQ</td>
</tr>
<tr>
<td></td>
<td>DIRECT/HETERODYNE</td>
<td>DIRECT</td>
</tr>
<tr>
<td>AN/URM-103</td>
<td>OPERATE/OFF/STAND BY</td>
<td>OPERATE</td>
</tr>
<tr>
<td></td>
<td>BAND SWITCH</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>RF TUNING</td>
<td>64.00</td>
</tr>
<tr>
<td></td>
<td>DEVIATION RANGE KHZ</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>EXT MOD</td>
</tr>
<tr>
<td></td>
<td>DEVIATION</td>
<td>Adjust for 8-kHz meter reading</td>
</tr>
<tr>
<td></td>
<td>RF SET TO LINE</td>
<td>To red line</td>
</tr>
<tr>
<td></td>
<td>RF OUTPUT</td>
<td>LO, 0-10 KUV</td>
</tr>
<tr>
<td></td>
<td>LO RF UV</td>
<td>20 µV</td>
</tr>
<tr>
<td>AN/URM-127</td>
<td>FREQ RANGE MULTIPLIER</td>
<td>x10</td>
</tr>
<tr>
<td></td>
<td>FREQ RANGE DIAL</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>ATTENUATOR</td>
<td>x1</td>
</tr>
<tr>
<td></td>
<td>OUTPUT CONTROL</td>
<td>Fully clockwise (maximum)</td>
</tr>
<tr>
<td>ME-30(*)/U</td>
<td>RANGE selector switch</td>
<td>3 v</td>
</tr>
<tr>
<td>RT</td>
<td>BAND</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>64.00</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>OLD OFF</td>
</tr>
<tr>
<td></td>
<td>LIGHT</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td>OFF</td>
</tr>
</tbody>
</table>

### TEST PROCEDURE

1. Adjust AN/URM-103 RF TUNING control for 64.00-MHz display on AN/USM-207.

### NOTE

To produce a display on the AN/USM-207, the AN/URM-103 rf level must be increased by turning the LO RF UV control clockwise. When the display appears, readjust the AN/URM-103 RF TUNING control until the AN/USM-207 indicates 64.00 MHz, and reset the LO RF UV control to 20 µV.

2. Disconnect T-connector from AN/USM-207.
5-0. RECEIVER AUDIO RESPONSE TEST (X-MODE). (CONT)

Audio Response (X-Mode) at 1 kHz (For Reference)

3. Set AN/USM-207 controls to the following positions:

<table>
<thead>
<tr>
<th>CONROL/SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER</td>
<td>TRACK</td>
</tr>
<tr>
<td>DISPLAY</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>0.1 v</td>
</tr>
<tr>
<td>GATE TIME</td>
<td>1 (black knob)</td>
</tr>
<tr>
<td>FUNCTION</td>
<td>FREQ</td>
</tr>
</tbody>
</table>

4. Disconnect rf cable from Adapter UG-514. (See test setup diagram, page 5-27.)
5. Connect rf cable to AN/USM-207 FREQ A connector.
6. Adjust AN/URM-127 FREQ RANGE DIAL for 1-kHz display on AN/USM-207.
7. Disconnect rf cable from AN/USM-207 FREQ A connector.
8. Reconnect rf cable to Adapter UG-514.

10. Connect ME-30(\(^*\))/U INPUT lead A to X-MODE jack pin A; connect lead B on pin F. Record ME-30(\(^*\))/U meter indication.

Audio Response Test (X-Mode) at 500 Hz

11. Turn AN/URM-127 FREQ RANGE DIAL to 50.
12. Disconnect rf cable from Adapter UG-514. (See test setup diagram, page 5-27.)
13. Connect rf cable to AN/USM-207 FREQ A connector.
15. Disconnect rf cable from AN/USM-207 FREQ A connector.
16. Reconnect rf cable to Adapter UG-514.

STANDARD. ME-30(\(^*\))/U meter should indicate between +2 db and −3 db of reading noted in step 10.
5-9. RECEIVER AUDIO RESPONSE TEST (X-MODE). (CONT)

17. If ME-30(*)/U meter does not indicate between +2 db and −3 db of reading taken in step 10, see troubleshooting chart 5-9.

Audio Response Test (X-Mode) at 3 kHz

18. Turn AN/URM-127 FREQ RANGE MULTIPLIER to x100.
19. Turn FREQ RANGE DIAL to 30.
20. Disconnect rf cable from Adapter UG-514. (See test setup diagram A.)
21. Connect rf cable to AN/USM-207 FREQ A connector.
22. Adjust AN/URM-127 FREQ RANGE DIAL for 3-kHz display on AN/USM-207.
23. Disconnect rf cable from AN/USM-207 FREQ A connector.
24. Reconnect rf cable to Adapter UG-514.

STANDARD. ME-30(*)/U meter should indicate between +2 db and −3 db of reading noted in step 10.

25. If ME-30(*)/U meter does not indicate between +2 db and −3 db of reading noted in step 10, see troubleshooting chart 5-9.

Audio Response Test (X-Mode) at 5 kHz

26. Turn AN/URM-127 FREQ RANGE DIAL to 50.
27. Disconnect rf cable from Adapter UG-514. (See test setup diagram A.)
28. Connect rf cable to AN/USM-207 FREQ A connector.
29. Adjust AN/URM-127 FREQ RANGE DIAL for 5-kHz display on AN/USM-207.
30. Disconnect rf cable from AN/USM-207 FREQ A connector.
31. Reconnect rf cable to Adapter UG-514.

STANDARD. ME-30(*)/U meter should indicate between +2 db and −3 db of reading noted in step 10.

32. If ME-30(*)/U meter does not indicate between +2 db and −3 db of reading noted in step 10, see troubleshooting chart 5-9.

Audio Response Test (X-Mode) at 10 kHz

33. Turn FREQ RANGE DIAL to 100.
34. Disconnect rf cable from Adapter UG-514. (See test setup diagram A.)
35. Connect rf cable to AN/USM-207 FREQ A connector.
36. Adjust AN/URM-127 FREQ RANGE DIAL for 10-kHz display on AN/USM-207.
37. Disconnect rf cable from AN/USM-207 FREQ A connector.
38. Reconnect rf cable to Adapter UG-514.

STANDARD. ME-30(*)/U meter should indicate between +2 db and −3 db of reading noted in step 10.

39. If ME-30(*)/U meter does not indicate between +2 db and −3 db of reading noted in step 10, see troubleshooting chart 5-9.
5-10. RECEIVER SELECTIVITY TEST.

PURPOSE. This test checks the ability of the RT A4000 tray IF Filters FL4001 and FL4002 to reject unwanted signals and, thus, determine bandwidth. The RT should have a minimum bandwidth of 32 kHz at the filters' 6-db attenuation point and a maximum bandwidth of 80 kHz at their 60-db attenuation point. This is verified by:

1. Finding the minimum rf level which must be injected into the RT ANTENNA port to cause the CALL lamp to light.
2. Injecting twice the rf level found in step 1, while observing that the RT CALL lamp is lit when the frequency is offset ± 16 kHz from the carrier.
3. Injecting 1000 times the rf level found in step 1, while observing that the RT CALL lamp is off when the frequency is offset more than ± 40 kHz from the carrier.

TEST EQUIPMENT AND MATERIALS

| Power Supply PP-1104(*)/G                      | Adapter (T-Connector) UG-274 B/U                  |
| Frequency Counter AN/USM-207                   | Matching Unit CN-901/U                            |
| Signal Generator AN/URM-103                    | Rf Cables (two) RG-58/U                           |
| Loudspeaker LS-454/U (RT-246/VRC)             | Test Cable No. 1                                  |

TEST SETUP. Connect equipment as shown in test setup diagram A.

Turn on test equipment. Allow at least 15 to 30 minutes for warmup.
5-10. RECEIVER SELECTIVITY TEST. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. If alternate test equipment is used, adjust for 30 MHz, minimum rf input level, no modulation.

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/USM-207</td>
<td>FREQUENCY TUNING-MC</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>TRACK</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td></td>
<td>INPUT</td>
<td>0.3 V MAX (both switches to left)</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>10Ω (black knob)</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY</td>
<td>PLUG IN</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>FREQ</td>
</tr>
<tr>
<td></td>
<td>DIRECT/HETERODYNE</td>
<td>DIRECT</td>
</tr>
<tr>
<td>AN/URM-103</td>
<td>OPERATE/OFF/STAND BY</td>
<td>OPERATE</td>
</tr>
<tr>
<td></td>
<td>BAND SWITCH</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>RF TUNING</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>DEVIATION RANGE KHZ</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>MOD OFF</td>
</tr>
<tr>
<td></td>
<td>RF SET TO LINE</td>
<td>To red line</td>
</tr>
<tr>
<td></td>
<td>RF OUTPUT</td>
<td>LO, 0-10 KUV</td>
</tr>
<tr>
<td></td>
<td>LO RF UV</td>
<td>Minimum setting</td>
</tr>
<tr>
<td>RT</td>
<td>BAND</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>OLD ON</td>
</tr>
<tr>
<td></td>
<td>LIGHT</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td>OFF</td>
</tr>
</tbody>
</table>

TEST PROCEDURE

1. Adjust AN/URM-103 RF TUNING control for 30.00-MHz display on AN/USM-207.

NOTE

To produce a display on the AN/USM-207, the AN/URM-103 rf level must be increased by turning the LO RF UV control clockwise. When the display appears, readjust the AN/URM-103 RF TUNING control until the AN/USM-207 indicates 30.00 MHz, and reset the LO RF UV control to minimum setting.

2. Disconnect T-connector from AN/USM-207.
3. Turn AN/URM-103 LO RF UV control slowly clockwise until RT CALL lamp lights. Note control setting.
4. Increase AN/URM-103 LO RF UV level to twice the reading noted in step 3.

STANDARD. RT CALL lamp should remain lit.
5-10. RECEIVER SELECTIVITY TEST. (CONT)

5. If RT CALL lamp goes off, see troubleshooting chart 5-6.
7. Reattach T-connector to AN/USM-207.
8. Adjust AN/URM-103 RF TUNING control for 30.019-MHz (30019.0-kHz) display on AN/USM-207. To produce display, follow instructions in note under step 1, but reset AN/URM-103 LO RF UV control to level arrived at in step 4.
9. Disconnect T-connector from AN/USM-207.

STANDARD. RT CALL lamp should be off.

10. If RT CALL lamp is lit, see troubleshooting chart 5-6.
11. Turn AN/URM-103 RF TUNING control slowly counterclockwise until RT CALL lamp lights.
12. Reattach T-connector to AN/USM-207.
13. Turn AN/URM-103 LO RF UV control clockwise until display appears on AN/USM-207. Note frequency displayed.
14. Adjust AN/URM-103 RF TUNING control for 29.981-MHz (29981.0-kHz) display on AN/USM-207.
15. Disconnect T-connector from AN/USM-207.
16. Reset AN/URM-103 LO RF UV control to level arrived at in step 4.

STANDARD. RT CALL lamp should be off.

17. If RT CALL lamp is lit, see troubleshooting chart 5-6.
18. Turn AN/URM-103 RF TUNING control slowly clockwise until RT CALL lamp lights.
20. Turn AN/URM-103 LO RF UV control clockwise until display appears on AN/USM-207. Note frequency displayed.
21. Subtract frequency noted in step 20 from frequency noted in step 13.

STANDARD. The difference between the two frequencies should be at least 32 kHz.

22. If difference between frequencies noted in steps 13 and 20 is less than 32 kHz, see troubleshooting chart 5-6.
23. Increase LO RF UV level to 1000 times reading noted in step 3.
25. Reattach T-connector to AN/USM-207.
26. Adjust AN/URM-103 RF TUNING control for 30.041-MHz display on AN/USM-207. To produce display, follow instructions in note under step 1, but reset AN/URM-103 LO RF UV control to level arrived at in step 23.
27. Disconnect T-connector from AN/USM-207.

STANDARD. RT CALL lamp should be off.

28. If RT CALL lamp is lit, see troubleshooting chart 5-6.
29. Turn AN/URM-103 RF TUNING control slowly counterclockwise until RT CALL lamp lights.
30. Reattach T-connector to AN/USM-207.
31. Turn AN/URM-103 LO RF UV control clockwise until display appears on AN/USM-207. Note frequency displayed.
32. Adjust AN/URM-103 RF TUNING control for 29.959-MHz display on AN/USM-207.
33. Disconnect T-connector from AN/USM-207.
34. Reset AN/URM-103 LO RF UV control to level arrived at in step 23.
5-10.  RECEIVER SELECTIVITY TEST.  (CONT)

STANDARD.  RT CALL lamp should be off.

35.  If RT CALL lamp is lit, see troubleshooting chart 5-6.
36.  Turn AN/URM-103 RF TUNING control slowly clockwise until RT CALL lamp lights.
37.  Reattach T-connector to AN/USM-207.
38.  Turn AN/URM-103 LO RF UV control clockwise until display appears on AN/USM-207.  Note
frequency displayed.
39.  Subtract frequency noted in step 38 from frequency noted in step 31.

STANDARD.  The difference between the two frequencies should be 80 kHz or less.

40.  If difference between frequencies noted in steps 31 and 38 is more than 80 kHz, see
troubleshooting chart 5-6.

5-11.  TRANSMITTER FREQUENCY ACCURACY TEST.

PURPOSE.  This test verifies proper operation of the frequency crystals in the transmitter.  The RT is
keyed, and the frequency error is measured at the ANTENNA output port with a frequency counter.
Frequency accuracy must be within ±3.5 kHz of the RT MC-TUNE-KC switch settings to meet the
standard:

TEST EQUIPMENT AND MATERIALS

<table>
<thead>
<tr>
<th>Power Supply PP-1104(*)/G</th>
<th>Handset H-250/U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Counter AN/USM-207</td>
<td>Rf Cables (two) RG-58/U</td>
</tr>
<tr>
<td>Dummy Load DA-75/U</td>
<td>Test Cable No. 1</td>
</tr>
<tr>
<td>Adapters (two) UG-274/U (T-Connector), UG-201/U</td>
<td></td>
</tr>
</tbody>
</table>

TEST SETUP.  Connect equipment as shown in test setup diagram  A

CAUTION

Do not key transmitter unless DA-75/U is connected to ANT jack.
5-11. TRANSMITTER FREQUENCY ACCURACY TEST. (CONT)

Turn on test equipment. Allow at least 15 to 30 minutes for warmup.

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/USM-207</td>
<td>FREQUENCY TUNING-MC</td>
<td>100 TRACK</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>0.3 V MAX (both switches to left)</td>
</tr>
<tr>
<td></td>
<td>INPUT</td>
<td>10^2 (black knob)</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>PLUG IN</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY</td>
<td>FREQ</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>DIRECT</td>
</tr>
<tr>
<td></td>
<td>DIRECT/HETERODYNE</td>
<td></td>
</tr>
<tr>
<td>RT</td>
<td>LIGHT</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>OLD ON</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td>OFF</td>
</tr>
</tbody>
</table>

5-35
5-11. **TRANSMITTER FREQUENCY ACCURACY TEST. (CONT)**

**TEST PROCEDURE**

1. Key transmitter. Note AN/USM-207 frequency display.

**STANDARD.** AN/USM-207 should display 30 000.0 kHz (30.00 MHz) ± 3.5 kHz.

2. If AN/USM-207 displays less than 29996.5 kHz or more than 30 003.5 kHz, see troubleshooting chart 5-11.

3. Unkey microphone.

4. Set RT MC-TUNE-KC switch to frequency listed below. At each frequency key transmitter and note AN/USM-207 frequency display. Then unkey transmitter. (Turn RT BAND switch to \(B\) for frequencies above 52.95 MHz.) Test frequencies: 30.05, 35.10, 41.20, 46.30, 50.40, 52.85, 54.50, 56.60, 60.70, 62.80, 63.90, 66.95, 70.95, 75.85, and 75.95 MHz.

**STANDARD.** AN/USM-207 display should be within ±3.5 kHz of MC-TUNE-KC switch setting.

5. If AN/USM-207 display is not within ±3.5 kHz of MC-TUNE-KC switch setting, see troubleshooting chart 5-11.

5-12. **TRANSMITTER LOW AND HIGH POWER OUTPUT TEST.**

**PURPOSE.** This test checks the RT's ability to transmit a modulated rf carrier with sufficient power. The radio is keyed, and power is measured at the ANTENNA output port with a wattmeter. Low output power should be between 0.5 and 10 watts; high power between 30 and 65 watts.

**TEST EQUIPMENT AND MATERIALS**

- Power Supply PP-1104(\(^*)/G
- Wattmeter AN/URM-120
- Dummy Load DA-75/G
- Handset H-250/U
- RF Cable RG-58/U
- Test Cable No. 1

**TEST SETUP.** Connect equipment as shown in test setup diagram \(A\)

**CAUTION**

Do not key transmitter unless AN/URM-120 and DA-75/U are connected to ANT jack.

**NOTE**

To measure transmitter deviation loosely couple the output of the transmitter to the input jack of the ME-57/U with a pick-up coil of a few turns.
5-12. TRANSMITTER LOW AND HIGH POWER OUTPUT TEST. (CONT)

![Diagram of transmitter power supply and connections]

Turn on test equipment. Allow at least 15 to 30 minutes for warmup.

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/URM-120</td>
<td>10 W – 500 W</td>
<td>10 W</td>
</tr>
<tr>
<td>RT</td>
<td>LIGHT</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>(A)</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>OLD OFF</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td>OFF</td>
</tr>
</tbody>
</table>
5-12. TRANSMITTER LOW AND HIGH POWER OUTPUT TEST. (CONT)

TEST PROCEDURE

1. Key transmitter. Note AN/URM-120 meter indication.

STANDARD. AN/URM-120 should indicate between 0.5 and 10.0 watts.

2. If AN/URM-120 indicates less than 0.5 or more than 10.0 watts, see troubleshooting chart 5-12.
3. Unkey transmitter.
4. Turn AN/URM-120 10 W - 500 W switch to 100 W.
5. Turn RT POWER switch to HIGH.
6. Key transmitter. Note AN/URM-120 meter indication.

STANDARD. AN/URM-120 should indicate between 30 and 65 watts.

7. If AN/URM-120 indicates less than 30 or more than 65 watts, see troubleshooting chart 5-12.
8. Unkey transmitter.
9. Turn RT POWER switch to LOW.
10. Turn AN/URM-120 10 W - 500 W switch to 10 W.
11. Repeat steps 1 through 10 with RT MC-TUNE-KC switch set at 41.00, 52.00, 53.00, 64.00, and 75.00 MHz. (Turn BAND switch to 8 for frequencies 53.00 MHz and above.)

5-13. TRANSMITTER DEVIATION TEST (NORMAL MODE).

PURPOSE. Carrier wave variation, or deviation, is directly proportional to the amplitude variations of the modulating signal. This test checks both (1) Transmitter Speech Amplifier A8500 Assembly gain control circuits, which develop proper signal strength before modulation, and (2) Modulators A8100 and A8300. An audio signal is injected into the MIC AUDIO Terminal (pin N) of Test Cable No. 1, the transmitter is keyed, and the output is measured with a deviation meter at the ANTENNA port.

TEST EQUIPMENT AND MATERIALS

Power Supply PP-1104(*)/G
Signal Generator AN/URM-127
Voltmeter ME-30(*)/U
Wattmeter AN/URM-120
Dummy Load DA-75/U
Frequency Counter AN/USM-207
Adapters UG-274 (three), UG-1441/U, UG-201/U

Modulation Meter ME-57/U
Handset H-250/U
Test Cable No. 1
RF Cables (three) RG-58/U
Loudspeaker LS-454/U (RT-248/VRC)
RF Probe

TEST SETUP. Connect equipment as shown in test setup diagram A.

CAUTION

Do not key transmitter unless AN/URM-120 and DA-75/U are connected to ANTENNA jack.

ME-57/U DEVIATION RANGE-KC switch must be in 1000 TUNE position.
5-13. TRANSMITTER DEVIATION TEST (NORMAL MODE). (CONT)
5-13. TRANSMITTER DEVIATION TEST (NORMAL MODE) (CONT)

Turn on test equipment. Allow at least 15 to 30 minutes for warmup.

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. If using alternate test equipment, adjust for 30.00 MHz, 0.22-volt rf level, and 1-kHz modulation.

### CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/URM-127</td>
<td>FREQ RANGE MULTIPLIER</td>
<td>x10</td>
</tr>
<tr>
<td></td>
<td>FREQ RANGE DIAL</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>ATTENUATOR</td>
<td>x1</td>
</tr>
<tr>
<td></td>
<td>OUTPUT CONTROL</td>
<td>Fully counterclockwise (maximum)</td>
</tr>
<tr>
<td>ME-30(*)/U</td>
<td>RANGE selector switch</td>
<td>0.3 v</td>
</tr>
<tr>
<td>AN/URM-120</td>
<td>10 W – 500 W</td>
<td>10 W</td>
</tr>
<tr>
<td>ME-57/U</td>
<td>TUNE-FINE TUNE</td>
<td>TUNE</td>
</tr>
<tr>
<td></td>
<td>DEVIATION RANGE-KC</td>
<td>1000 TUNE</td>
</tr>
<tr>
<td></td>
<td>FREQUENCY RANGE-MC</td>
<td>20-55</td>
</tr>
<tr>
<td></td>
<td>TUNING</td>
<td>30-MHz indication on FREQUENCY-MC meter with transmitter keyed</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>ON</td>
</tr>
<tr>
<td>AN/USM-207</td>
<td>POWER</td>
<td>TRACK</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY</td>
<td>0.1 v</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>1 (black knob)</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>FREQ</td>
</tr>
<tr>
<td>RT</td>
<td>LIGHT</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>[A]</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>OLD ON</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td>OFF</td>
</tr>
</tbody>
</table>

### TEST PROCEDURE

Deviation Test (Normal Mode) at 1 kHz

1. Key transmitter.
2. Rotate ME-57/U TUNING knob until CARRIER SHIFT meter indicates 0 KC.
3. Change ME-57/U TUNE-FINE TUNE switch to FINE TUNE.
4. Readjust ME-57/U TUNING knob until CARRIER SHIFT meter again indicates 0 KC.
5-13. TRANSMITTER DEVIATION TEST (NORMAL MODE). (CONT)

NOTE

ME-57/U LIMITING meter pin must be in BLACK area.

5. Unkey transmitter.
6. Turn AN/URM-127 OUTPUT CONTROL clockwise until display appears on AN/USM-207.
7. Adjust AN/URM-127 FREQ RANGE DIAL for 1-kHz display on AN/USM-207.
8. Disconnect T-connector from AN/USM-207.
9. Turn AN/URM-127 OUTPUT CONTROL fully counterclockwise.
10. Connect both AN/URM-127 lead A to Test Cable No. 1 pin N (MIC AUDIO); connect
    AN/URM-127 lead B to pin A (ground). (See test setup diagram A, page 5-39.)
11. Adjust AN/URM-127 OUTPUT CONTROL for 0.22-volt indication on ME-30(*)/U meter.
12. Key transmitter.
13. Set ME-57/U DEVIATION RANGE-KC switch to lower settings until obtaining highest on-
    scale reading (without pinning needle) on DEVIATION meter.

STANDARD. ME-57/U DEVIATION meter should indicate between 6 kHz and 10 kHz.

14. If DEVIATION meter indicates more than 10 kHz, see troubleshooting chart 5-14.
15. If DEVIATION meter indicates less than 6 kHz:
   a. unkey transmitter;
   b. set AN/URM-120 to 100 W;
   c. set RT POWER to HIGH;
   d. key transmitter.

NOTE

If DEVIATION meter still indicates below 6 kHz, see troubleshooting chart 5-14.

18. Unkey transmitter.

Deviation Test (Normal Mode) at 500 Hz

17. Connect T-connector to AN/USM-207.
18. If necessary, turn AN/URM-127 OUTPUT CONTROL clockwise until display appears on
    AN/USM-207.
19. Turn AN/URM-127 FREQ RANGE DIAL to 50, then adjust for 500-Hz indication on AN/USM-207.
20. Repeat steps 8 through 16.

Deviation Test (Normal Mode) at 3 kHz

22. If necessary, turn AN/URM-127 OUTPUT CONTROL clockwise until display appears on
    AN/USM-207.
23. Turn AN/URM-127 FREQ RANGE MULTIPLIER to x100.
24. Turn AN/URM-127 FREQ RANGE DIAL to 30, then adjust for 3-kHz indication on AN/USM-207.
25. Repeat steps 8 through 16.
5-14. TRANSMITTER LIMITING TEST.

PURPOSE. Limiting circuits eliminate those portions of a signal that exceed a specific amplitude. This test verifies that higher than acceptable audio frequency input levels will not force the RT to overdeviate. As in the Transmitter Deviation Test (Normal Mode) (paragraph 5-13), an audio signal is injected into the MIC AUDIO Terminal (pin N) of Test Cable No. 1, the transmitter is keyed and the output is measured with a deviation meter at the ANTENNA port.

TEST EQUIPMENT AND MATERIALS

- Power Supply PP-1104(*)/G
- Signal Generator AN/URM-127
- Voltmeter ME-30(*)/U
- Wattmeter AN/URM-120
- Dummy Load DA-75/U
- Frequency Counter AN/USM-207
- Adapters UG-274/U(three), UG-1441/U, UG-201/U
- Modulation Meter ME-57/U
- Handset H-250/U
- Test Cable No. 1
- RF Cables (three) RG-58/U
- Loudspeaker LS-454/U (RT-248/VRC)
- RF Probe

TEST SETUP. Connect equipment as shown in test setup diagram A .

CAUTION

Do not key transmitter unless AN/URM-120 and DA-75/U are connected to ANTENNA jack.

ME-57/U DEVIATION RANGE-KC switch must be in 1000 TUNE position.
5-14. TRANSMITTER LIMITING TEST. (CONT)

Turn on test equipment. Allow at least 15 to 30 minutes for warmup.

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. If using alternate test equipment, adjust for 30.00 MHz, 1.1-volt rf level, and 1-kHz modulation.

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/URM-127</td>
<td>FREQ RANGE MULTIPLER</td>
<td>x10</td>
</tr>
<tr>
<td></td>
<td>FREQ RANGE DIAL</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>ATTENUATOR</td>
<td>x1</td>
</tr>
<tr>
<td></td>
<td>OUTPUT CONTROL</td>
<td>Fully counterclockwise (maximum)</td>
</tr>
<tr>
<td>ME-30(*)/U</td>
<td>RANGE selector switch</td>
<td>3 v</td>
</tr>
<tr>
<td>AN/URM-120</td>
<td>10 W – 500 W</td>
<td>10 W</td>
</tr>
<tr>
<td>ME-57/U</td>
<td>TUNE-FINE TUNE</td>
<td>TUNE</td>
</tr>
<tr>
<td></td>
<td>DEVIATION RANGE-KC</td>
<td>1000 TUNE</td>
</tr>
<tr>
<td></td>
<td>FREQUENCY RANGE-MC</td>
<td>20-55</td>
</tr>
<tr>
<td></td>
<td>TUNING</td>
<td>30-MHz indication on FREQUENCY-MC meter with transmitter keyed ON</td>
</tr>
<tr>
<td>AN/USM-207</td>
<td>POWER</td>
<td>TRACK</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY</td>
<td>0.1 v</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>1 (black knob)</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>FREQ</td>
</tr>
<tr>
<td>RT</td>
<td>LIGHT</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>OLD ON</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td></td>
</tr>
</tbody>
</table>

TEST PROCEDURE

Limiting Test at 1 kHz

1. Key transmitter.
2. Rotate ME-57/U TUNING knob until CARRIER SHIFT meter indicates 0 KC.
3. Change ME-57/U TUNE-FINE TUNE switch to FINE TUNE.
4. Readjust ME-57/U TUNING knob until CARRIER SHIFT meter again indicates 0 KC.
5-14. TRANSMITTER LIMITING TEST. (CONT)

NOTE

ME-57/U LIMITING meter pin must be in BLACK area.

5. Unkey transmitter.
6. Turn AN/URM-127 OUTPUT CONTROL clockwise until display appears on AN/USM-207.
7. Adjust AN/URM-127 FREQ RANGE DIAL for 1-kHz display on AN/USM-207.
8. Disconnect T-connector from AN/USM-207.
9. Turn AN/URM-127 OUTPUT CONTROL fully counterclockwise.
10. Connect AN/URM-127 lead A to Test Cable No. 1 pin N (MIC AUDIO); connect AN/URM-127 lead B to pin A (ground). (See test setup diagram A, page 5-42.)
11. Adjust AN/URM-127 OUTPUT CONTROL for 1.1-volt indication on ME-30(*)/U meter.
12. Key transmitter.
13. Set ME-57/U DEVIATION RANGE-KC switch to lower settings until obtaining highest on-scale reading (without pinning needle) on DEVIATION meter.

STANDARD: ME-57/U DEVIATION meter should indicate between 8 kHz and 12 kHz.

14. If DEVIATION meter indicates more than 12 kHz, see troubleshooting chart 5-18.
15. If DEVIATION meter indicates less than 8 kHz;
   a. unkey transmitter;
   b. set AN/URM-120 to 100 W;
   c. set RT POWER to HIGH;
   d. key transmitter.

NOTE

If DEVIATION meter indication is still below 8 kHz, see troubleshooting chart 5-18.

16. Unkey transmitter.

Limiting Test at 500 Hz

17. Connect T-connector to AN/USM-207.
18. If necessary, turn AN/URM-127 OUTPUT CONTROL clockwise until display appears on AN/USM-207.
19. Turn AN/URM-127 FREQ RANGE DIAL to 50, then adjust for 500-Hz indication on AN/USM-207.
20. Repeat steps 8 through 16.

Limiting Test at 3 kHz

22. If necessary, turn AN/URM-127 OUTPUT CONTROL clockwise until display appears on AN/USM-207.
23. Turn AN/URM-127 FREQ RANGE MULTIPLIER to x100.
24. Turn AN/URM-127 FREQ RANGE DIAL to 30, then adjust for 3-kHz indication on AN/USM-207.
25. Repeat steps 8 through 16.
5-15. TRANSMITTER DISTORTION TEST (NORMAL MODE).

PURPOSE. Distortion will ruin the quality of an audio signal and must, therefore, be kept at the lowest possible level. This test measures the percentage of distortion in the signal transmitted by the RT. An audio signal is injected into the MIC AUDIO Terminal (pin N) of Test Cable No. 1. The transmitter is keyed, the output is demodulated at the ANTENNA port with a modulation meter, and the distortion is measured at the modulating meter’s AUDIO OUTPUT port with a distortion analyzer.

TEST EQUIPMENT AND MATERIALS

- Power Supply PP-1104(*)/G
- Signal Generator AN/URM-127
- Voltmeter ME-30(*)/U
- Wattmeter AN/URM-120
- Dummy Load DA-75/U
- Frequency Counter AN/USM-207
- Adapters UG-274 (three), UG-1441/U, UG-201/U
- Modulation Meter ME-57/U
- Distortion Analyzer TS-723(*)/U
- Loudspeaker LS-454/U(RT-246/VRC)
- RF Cables (three) RG-58/U
- Test Cable No.1
- Handset H-250
- RF Probe
- Wattmeter AN/URM-120
- Handset H-250
- Rf Probe

TEST SETUP. Connect equipment as shown in test setup diagram A.

CAUTION

Do not key transmitter unless AN/URM-120 and DA-75/U are connected to ANTENNA port.

ME-57/U DEVIATION RANGE-KC switch must be in 1000 TUNE position.
5-15. TRANSMITTER DISTORTION TEST (NORMAL MODE). (CONT)

Turn on test equipment. Allow at least 30 minutes for warmup.

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. If using alternate test equipment, adjust for 30.00 MHz, 0.22-volt rf level, and 1-kHz modulation.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
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<tbody>
<tr>
<td>AN/URM-127</td>
<td>FREQ RANGE MULTIPLIER</td>
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<td>FREQ RANGE DIAL</td>
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<td></td>
<td>ATTENUATOR</td>
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<td></td>
<td>OUTPUT CONTROL</td>
<td>Fully counterclockwise (maximum)</td>
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<tr>
<td>ME-30(*)/U</td>
<td>RANGE selector switch</td>
<td>0.3 v</td>
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<tr>
<td>AN/URM-120</td>
<td>10 w -500 w</td>
<td>10 w</td>
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<tr>
<td>ME-57/U</td>
<td>TUNE-FINE TUNE</td>
<td>TUNE</td>
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<td>DEVIATION RANGE-KC</td>
<td>1000 TUNE</td>
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<td>FREQUENCY RANGE-MC</td>
<td>20-55</td>
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<td></td>
<td>TUNING</td>
<td>30-MHz indication on FREQUENCY-MC meter with transmitter keyed</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>ON</td>
</tr>
<tr>
<td>AN/USM-207</td>
<td>POWER</td>
<td>TRACK</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY</td>
<td>0.1 v</td>
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<tr>
<td></td>
<td>GATE TIME</td>
<td>1 (black knob)</td>
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<td></td>
<td>FUNCTION</td>
<td>FREQ</td>
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<td>TS-723(*)/U</td>
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<td>AF INPUT</td>
<td>MIN</td>
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<td>AF-RF</td>
<td>AF</td>
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<td>FREQUENCY</td>
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<td></td>
<td>FUNCTION</td>
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<td>R.M.S. VOLTS/DB</td>
<td>100%</td>
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<td>RT</td>
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<td>ON</td>
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<tr>
<td></td>
<td>BAND</td>
<td>A</td>
</tr>
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<td></td>
<td>MC-TUNE-KC</td>
<td>30.00</td>
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<tr>
<td></td>
<td>POWER</td>
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<td></td>
<td>SQUELCH</td>
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<td>VOLUME</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
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<td>SPEAKER (RT-524/VRC)</td>
<td>OFF</td>
</tr>
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</table>
5-15. TRANSMITTER DISTORTION TEST (NORMAL MODE). (CONT)

TEST PROCEDURE

1. Key transmitter.
2. Rotate ME-57/U TUNING knob until CARRIER SHIFT meter indicates 0 KC.
3. Change ME-57/U TUNE-FINE TUNE switch to FINE TUNE.
4. Readjust ME-57/U TUNING knob until CARRIER SHIFT again indicates 0 KC.

NOTE

ME-57/U LIMITING meter pin must be in BLACK area.

5. Unkey transmitter.
6. Turn AN/URM-127 OUTPUT CONTROL clockwise until display appears on AN/USM-207.
7. Adjust AN/URM-127 FREQ RANGE DIAL for 1-kHz display on AN/USM-207.
8. Disconnect T-connector from AN/USM-207.
9. Turn AN/URM-127 OUTPUT CONTROL fully counterclockwise.
10. Connect AN/URM-127 lead A to Test Cable No. 1 pin N (MIC AUDIO); connect AN/URM-127 lead B to pin A (ground). (See test setup diagram , page 5-45.)
11. Adjust AN/URM-127 OUTPUT CONTROL for 0.22-volt indication on ME-30(*)/U meter.
12. Key transmitter.
13. Step ME-57/U DEVIATION RANGE-KC switch to lower settings until obtaining highest on-scale reading (without pinning needle) on DEVIATION meter.
14. Set TS-723(*)/U signal AF INPUT control for full scale meter deflection.
15. Turn TS-723(*)/U FUNCTION switch to DISTORTION.
16. Adjust TS-723(*)/U FREQUENCY and BALANCE controls for minimum meter indication.

STANDARD. TS-723(*)/U meter should indicate less than 10 percent (distortion).

17. If TS-723(*)/U meter indicates 10 percent (distortion) or greater, see troubleshooting chart 5-18.
18. Unkey transmitter.

5-16. TRANSMITTER DEVIATION TEST (X-MODE).

PURPOSE. This test checks much of the same circuitry as the Transmitter Deviation Test (Normal Mode). When setup for X-mode, however, the RT does not utilize the Speech Amplifier Assembly A8500. An audio signal is injected directly into the X-MODE receptacle, the transmitter is keyed, and the output is measured at the ANTENNA port with a deviation meter.

TEST EQUIPMENT AND MATERIALS

- Power Supply PP-1104(*)/G
- Signal Generator AN/URM-127
- Voltmeter ME-30(*)/U
- Wattmeter AN/URM-120
- Dummy Load DA-75
- Frequency Counter AN/USM-207
- Adapters UG-274/U (three), UG-1441/U, UG-201/U
- Modulation Meter ME-57/U
- Handset H-250/U
- Test Cable No. 1
- Rf Cables (three) RG-58/U
- Loudspeaker LS-454/U (RT-246/VRC)
- Rf Probe
5-16. TRANSMITTER DEVIATION TEST (X-MODE). (CONT)

TEST SETUP. Connect equipment as shown in test setup diagram A

**CAUTION**

Do not key transmitter unless AN/URM-120 and DA-75/U are connected to ANTENNA jack.

ME-57/U DEVIATION RANGE-KC switch must be in 1000 TUNE position.

Turn on test equipment. Allow at least 30 minutes for warmup.

**INITIAL EQUIPMENT CONTROL SETTINGS.** Set equipment controls as indicated in the following table. If using alternate test equipment, adjust for 30.00 MHz, 0.8-volt rf level, and 1-kHz modulation.
5-16. TRANSMITTER DEVIATION TEST (X-MODE). (CONT)

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
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<tr>
<td>AN/URM-127</td>
<td>FREQ RANGE MULTIPLIER</td>
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<tr>
<td></td>
<td>FREQ RANGE DIAL</td>
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<tr>
<td></td>
<td>ATTENUATOR</td>
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</tr>
<tr>
<td></td>
<td>OUTPUT CONTROL</td>
<td>Fully counterclockwise</td>
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<tr>
<td>ME-30(*)/U</td>
<td>RANGE selector switch</td>
<td>1v</td>
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<td>AN/URM-120</td>
<td>10 W-500 w</td>
<td>10 w</td>
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<tr>
<td>ME-57/U</td>
<td>TUNE-FINE TUNE</td>
<td>TUNE</td>
</tr>
<tr>
<td></td>
<td>DEVIATION RANGE-KC</td>
<td>1000 TUNE</td>
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<tr>
<td></td>
<td>FREQUENCY RANGE-MC</td>
<td>20-55</td>
</tr>
<tr>
<td></td>
<td>TUNING</td>
<td>30-MHz indication on FREQUENCY-MC meter with transmitter keyed ON</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td></td>
</tr>
<tr>
<td>AN/USM-207</td>
<td>POWER</td>
<td>TRACK</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>MIN (fully counterclockwise)</td>
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<tr>
<td></td>
<td>SENSITIVITY</td>
<td>0.1 v</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>1 (black knob)</td>
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<td></td>
<td>FUNCTION</td>
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<tr>
<td></td>
<td>BAND</td>
<td>30.00</td>
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<td></td>
<td>MC-TUNE-KC</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>OLD ON</td>
</tr>
<tr>
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<td>SQUELCH</td>
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<tr>
<td></td>
<td>VOLUME</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td></td>
</tr>
</tbody>
</table>

TEST PROCEDURE

Deviation Test (X-Mode) at 1 kHz

1. Key transmitter.
2. Rotate ME-57/U TUNING knob until CARRIER SHIFT meter indicates 0 KC.
3. Change ME-57/U TUNE-FINE TUNE switch to FINE TUNE.
4. Readjust ME-57/U TUNING knob until CARRIER SHIFT meter again indicates 0 KC.
5. Unkey transmitter.

NOTE

ME-57/U LIMITING meter pin must be in BLACK area.
5-16. TRANSMITTER DEVIATION TEST (X-MODE). (CONT)

6. Turn AN/URM-127 OUTPUT CONTROL clockwise until display appears on AN/USM-207.
7. Adjust AN/URM-127 FREQ RANGE DIAL for 1-kHz display on AN/USM-207.
8. Disconnect T-connector from AN/USM-207.
9. Turn AN/URM-127 OUTPUT CONTROL fully counterclockwise.

10. Unscrew X-MODE cap and collar from X-MODE port (on RT front panel).
11. Pull out X-MODE plug.
12. Place tip of AN/URM-127 lead A on X-MODE jack pin E; place lead B on pin A (ground).
13. Adjust AN/URM-127 OUTPUT CONTROL for 0.8-volt indication on ME-30(*)/U meter.
14. Key transmitter.
15. Set ME-57/U DEVIATION RANGE-KC switch to lower settings until obtaining highest on-scale reading (without pinning needle) on DEVIATION meter.

STANDARD. ME-57/U DEVIATION meter should indicate between 6 and 10 kHz.

16. If DEVIATION meter indicates more than 10 kHz, see troubleshooting chart 5-18.
17. If DEVIATION meter indicates less than 6 kHz:
   a. unkey transmitter;
   b. set AN/URM-120 to 100 W;
   c. set RT POWER to HIGH;
   d. key transmitter.

   NOTE

   IF DEVIATION meter still indicates less than 6 kHz, see troubleshooting chart 3-18.

18. Unkey transmitter.
19. Turn ME-30(*)/U RANGE selector switch to 3 v.
20. Turn ME-57/U DEVIATION RANGE-KC switch to 50.
5-16. TRANSMITTER DEVIATION TEST (X-MODE). (CONT)

21. Hold tip of AN/URM-127 lead A on X-MODE jack receptacle E; ground lead B to radio chassis.
22. Adjust AN/URM-127 OUTPUT CONTROL for 2.5-volt indication on ME-30(*)/U meter.
23. Key transmitter.

STANDARD. ME-57/U DEVIATION meter should indicate between 17 and 36 kHz.

24. If ME-57/U DEVIATION meter indicates below 17 kHz or above 36 kHz, see troubleshooting chart 5-18.
25. Unkey transmitter.

Deviation Test (X-Mode) at 500 Hz

27. If necessary, turn AN/URM-127 OUTPUT CONTROL clockwise until display appears on AN/USM-207.
28. Turn AN/URM-127 FREQ RANGE DIAL to 50, then adjust for 500-Hz indication on AN/USM-207.
29. Disconnect T-connector from AN/USM-207.
30. Repeat steps 21 through 25.

Deviation Test (X-Mode) at 3 kHz

31. Connect T-connector to AN/USM-207.
32. If necessary, turn AN/URM-127 OUTPUT CONTROL clockwise until display appears on AN/USM-207.
33. Turn AN/URM-127 FREQ RANGE MULTIPLIER to x100.
34. Turn AN/URM-127 FREQ RANGE DIAL to 30, then adjust for 3-kHz indication on AN/USM-207.
35. Disconnect T-connector from AN/USM-207.
36. Repeat steps 21 through 25.

Deviation Test (X-Mode) at 5 kHz

37. Connect T-connector to AN/USM-207.
38. If necessary, turn AN/URM-127 OUTPUT CONTROL clockwise until display appears on AN/USM-207.
39. Turn AN/URM-127 FREQ RANGE DIAL to 50, then adjust for 5-kHz indication on AN/USM-207.
40. Disconnect T-connector from AN/USM-207.
41. Repeat steps 21 through 25.

Deviation Test (X-Mode) at 10 kHz

42. Connect T-connector to AN/USM-207.
43. If necessary, turn AN/URM-127 OUTPUT CONTROL clockwise until display appears on AN/USM-207.
44. Turn AN/URM-127 FREQ RANGE DIAL to 100, then adjust for 10-kHz indication on AN/USM-207.
45. Disconnect T-connector from AN/USM-207.
46. Repeat steps 21 through 25.
5-17. TRANSMITTER DISTORTION TEST (X-MODE).

PURPOSE. This test is the same as the Transmitter Distortion Test (Normal Mode) (para 5-15), except for a change in signal injection point and the use of a wider band of test frequencies.

TEST EQUIPMENT AND MATERIALS

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Model/Type</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>Power Supply</td>
<td>PP-1104(*)/G</td>
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<tr>
<td>Signal Generator</td>
<td>AN/URM-127</td>
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</tr>
<tr>
<td>Voltmeter</td>
<td>ME-30(*)/U</td>
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<tr>
<td>Wattmeter</td>
<td>AN/URM-120</td>
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</tr>
<tr>
<td>Dummy Load</td>
<td>DA-75/U</td>
<td></td>
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<tr>
<td>Frequency Counter</td>
<td>AN/USM-207</td>
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<tr>
<td>Adapters</td>
<td>UG-274B/U, UG-1441/U, UG-201/U</td>
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<tr>
<td>Distortion Analyzer</td>
<td>TS-723(*)/U</td>
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<tr>
<td>Modulation Meter</td>
<td>ME-57/U</td>
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<tr>
<td>Loudspeaker</td>
<td>LS-454/U (RT-246/VRC)</td>
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<td>RF Cables (three)</td>
<td>RG-58/U</td>
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<td>Handset</td>
<td>H-250/U</td>
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TEST SETUP. Connect equipment as shown in test setup diagram @.

**CAUTION**

Do not key transmitter unless AN/URM-120 and DA-75/U are connected to ANTENNA port.

ME-57/U DEVIATION RANGE-KC switch must be in 1000 TUNE position.

Turn on test equipment. Allow at least 30 minutes for warmup.
5-17. TRANSMITTER DISTORTION TEST (X-MODE). (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. If using alternate test equipment, adjust for 30.00 MHz, 2.5-volt rf level, and 1-kHz modulation.

<table>
<thead>
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<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
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<tr>
<td>AN/URM-127</td>
<td>FREQ RANGE MULTIPLIER</td>
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<td>FREQ RANGE DIAL</td>
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</tr>
<tr>
<td></td>
<td>ATTENUATOR</td>
<td>x1</td>
</tr>
<tr>
<td></td>
<td>OUTPUT CONTROL</td>
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</tr>
<tr>
<td>ME-30(*)/U</td>
<td>RANGE selector switch</td>
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</tr>
<tr>
<td>AN/URM-120</td>
<td>10 W-500 w</td>
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<td>ME-57/U</td>
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<td>DEVIATION RANGE-KC</td>
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<td>30-MHz indication on FREQUENCY-MC meter with transmitter keyed</td>
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<td>POWER</td>
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<td>AN/USM-207</td>
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<td>TRACK</td>
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<td>DISPLAY</td>
<td>MIN (fully counterclockwise)</td>
</tr>
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<td></td>
<td>SENSITIVITY</td>
<td>0.1 v</td>
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<td>GATE TIME</td>
<td>1 (black knob)</td>
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<td>SPEAKER (RT-524/VRC)</td>
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<td>TS-723(*)/U</td>
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<td>R.M.S. VOLTS/DB</td>
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5-17. TRANSMITTER DISTORTION TEST (X-MODE). (CONT)

TEST PROCEDURE

Distortion Test (X-Mode) at 1 kHz

1. Key transmitter.
2. Rotate ME-57/U TUNING knob until CARRIER SHIFT meter indicates 0 KC.
3. Change ME-57/U TUNE-FINE TUNE switch to FINE TUNE.
4. Readjust ME-57/U TUNING knob until CARRIER SHIFT again indicates 0 KC.

NOTE

ME-57/U LIMITING meter pin must be in BLACK area.

5. Unkey transmitter.
6. Turn AN/URM-127 OUTPUT CONTROL clockwise until display appears on AN/USM-207.
7. Adjust AN/URM-127 FREQ RANGE DIAL for 1-kHz display on AN/USM-207.
8. Disconnect T-connector from AN/USM-207.
9. Turn AN/URM-127 OUTPUT CONTROL fully counterclockwise.

10. Unscrew X-MODE cap and collar from X-MODE port (on RT front panel).
11. Pull out X-MODE plug.
12. Place tip of AN/URM-127 lead A on X-MODE jack pin E; ground lead B on pin A (ground).
13. Adjust AN/URM-127 OUTPUT CONTROL for 2.5-volt indication on ME-30(*)/U meter.
14. Key transmitter.
15. Set ME-57/U DEVIATION RANGE-KC switch to lower settings until obtaining highest on-scale reading (without pinning needle) on DEVIATION meter.
16. Adjust TS-723(*)/U signal AF INPUT control for full-scale meter deflection.
17. Turn TS-723(*)/U FUNCTION switch to DISTORTION.
5-17. TRANSMITTER DISTORTION TEST (X. MODE). (CONT)

18. Adjust TS-723(*)/U FREQUENCY and BALANCE controls for minimum meter indication.

STANDARD. TS-723(*)/U meter should indicate less than 7 percent (distortion).

19. If TS-723(*)/U indicates 7 percent (distortion) or greater, see troubleshooting chart 5-18.

20. Unkey transmitter.

Distortion Test (X-Mode) at 500 Hz

22. If necessary, turn AN/URM-127 OUTPUT CONTROL clockwise until display appears on AN/USM-207.
23. Turn AN/URM-127 FREQ RANGE DIAL to 50, then adjust for 500-Hz indication on AN/USM-207.
24. Disconnect T-connector from AN/USM-207.
25. Set TS-723(*)/U FUNCTION switch to SET LEVEL.
26. Repeat steps 12 through 20.

Distortion Test (X-Mode) at 3 kHz

27. Connect T-connector to AN/USM-207.
28. If necessary, turn AN/URM-127 OUTPUT CONTROL clockwise until display appears on AN/USM-207.
29. Turn AN/URM-127 FREQ RANGE MULTIPLIER to x100.
30. Turn FREQ RANGE DIAL to 30, then adjust for 3-kHz indication on AN/USM-207.
31. Disconnect T-connector from AN/USM-207.
32. Set TS-723(*)/U FUNCTION switch to SET LEVEL.
33. Repeat steps 12 through 20.

Distortion Test (X-Mode) at 5 kHz

34. Connect T-connector to AN/USM-207.
35. If necessary, turn AN/URM-127 OUTPUT CONTROL clockwise until display appears on AN/USM-207.
36. Turn FREQ RANGE DIAL to 50, then adjust for 5-kHz indication or AN/USM-207.
37. Disconnect T-connector from AN/USM-207.
38. Set TS-723(*)/U FUNCTION switch to SET LEVEL.
39. Repeat steps 12 through 20.

Distortion Test (X-Mode) at 10 kHz

40. Connect T-connector to AN/USM-207.
41. If necessary, turn AN/URM-127 OUTPUT CONTROL clockwise until display appears on AN/USM-207.
42. Turn FREQ RANGE DIAL to 100, then adjust for 10-kHz indication on AN/USM-207.
43. Disconnect T-connector from AN/USM-207.
44. Set TS-723(*)/U FUNCTION switch to SET LEVEL.
45. Repeat steps 12 through 20.
TRANSMITTER SQUELCH TONE STABILITY TEST.

PURPOSE. Transmitter squelch tone must be accurate if a distant radio is to receive the desired signals. This test checks the Speech Amplifier A8500 and Squelch Amplifier A5200 modules for proper squelch tone development. The RT is keyed with the SQUELCH switch set to NEW ON. Frequency accuracy and deviation are then measured at the ANTENNA output with a frequency counter and a deviation meter.

TEST EQUIPMENT AND MATERIALS

- Power Supply PP-1104(*)/G
- Frequency Counter AN/USM-207
- Modulation Meter ME-57/U
- Wattmeter AN/URM-120
- Dummy Load DA-75/U
- Adapters UG-274/U, UG-201/U
- Test Cable No. 1
- RF Cables (three) RG-58/U
- Handset H-250

TEST SETUP. Connect equipment as shown in test setup diagram.

**CAUTION**

Do not key transmitter unless AN/URM-120 and DA-75 are connected to ANTENNA jack.

ME-57/U DEVIATION RANGE-KC switch must be in 1000 TUNE position.

Turn on test equipment. Allow at least 30 minutes for warmup.
5-18. TRANSMITTER SQUELCH TONE STABILITY TEST. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

<table>
<thead>
<tr>
<th>CONTROL AND SWITCH SETTINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EQUIPMENT</strong></td>
</tr>
<tr>
<td>ANA/URM-120</td>
</tr>
<tr>
<td>ME-57/U</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>AN/USM-207</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>RT</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

TEST PROCEDURE

1. Key transmitter.
2. Rotate ME-57/U TUNING knob until CARRIER SHIFT meter indicates 0 KC.
3. Change ME-57/U TUNE-FINE TUNE switch to FINE TUNE.
4. Readjust ME-57/U TUNING knob until CARRIER SHIFT meter again indicates 0 KC.

**NOTE**

ME-57/U LIMITING meter pin must be in BLACK area.

5. Turn RT SQUELCH switch to NEW ON.
6. Set ME-57/U DEVIATION RANGE-KC switch to lower settings until obtaining highest on-scale reading (without pinning needle) on DEVIATION meter.

STANDARD. ME-57/U DEVIATION meter should indicate 3 kHz ± 0.5 kHz. AN/USM-207 should display 150 Hz ± 1 Hz (0.150 KC ± 0.001 KC).
5-18. TRANSMITTER SQUELCH TONE STABILITY TEST. (CONT)

7. If ME-57/U DEVIATION meter indicates below 2.5 kHz or above 3.5 kHz; or if AN/USM-207 displays below 149 Hz or above 151 Hz, see troubleshooting chart 5-13.

8. Unkey transmitter.

5-19. ANTENNA INFORMATION (SWITCHING) TEST.

PURPOSE. This test checks the performance of the RT ANTENNA CONTROL switches and ANT CONT jack connectors. The transmitter is keyed, and voltage measurements are taken at the ANT CONT jack pins as the MC-TUNE-KC switches are taken through the full frequency range in both bands.

TEST EQUIPMENT AND MATERIALS

- Power Supply PP-1104(*)/G
- Wattmeter AN/URM-120
- Dummy Load DA-75/U
- Multi meter ME-26(*)/U
- Handset H-250
- Test Cable No. 1
- Rf Cable RG-58/U

TEST SETUP. Connect equipment as shown in test setup diagram A.

CAUTION

Do not key transmitter unless AN/URM-120 and DA-75/U are connected to ANT jack.

Turn on test equipment. Allow at least 15 to 30 minutes for warmup.

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.
5-19. **ANTENNA INFORMATION (SWITCHING) TEST. (CONT)**

### CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME-26(*)/U</td>
<td>RANGE selector switch</td>
<td>30 v</td>
</tr>
<tr>
<td>AN/URM-120</td>
<td>10 W-500 W</td>
<td>10 W</td>
</tr>
<tr>
<td>RT</td>
<td>LIGHT</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>OLD ON</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>SPEAKER (RT-524/VRC)</td>
<td>OFF</td>
</tr>
</tbody>
</table>

### TEST PROCEDURE

1. Twist off cap from ANT CONT port.
2. Ground ME-26(*)/U COMMON lead to radio chassis or ANT CONT pin C. Touch tip of ME-26(*)/U DC lead to ANT CONT pin A. Note meter indication.

**STANDARD.** ME-26(*)/U meter should indicate 25.5 vdc.

3. If ME-26(*)/U does not indicate 25.5 vdc, see troubleshooting chart 5-15.
4. Rotate RT MC-TUNE-KC switch through frequencies listed below while touching ME-26(*)/U DC lead to matching ANT CONT pin. Note meter indication at each frequency setting.

<table>
<thead>
<tr>
<th>MC-TUNE-KC FREQUENCY SETTING</th>
<th>MATCHING ANT CONT PIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.00-32.95</td>
<td>D</td>
</tr>
<tr>
<td>33.00-36.95</td>
<td>E</td>
</tr>
<tr>
<td>37.00-41.95</td>
<td>F</td>
</tr>
<tr>
<td>42.00-47.45</td>
<td>H</td>
</tr>
<tr>
<td>47.50-52.55</td>
<td>J</td>
</tr>
</tbody>
</table>
5-19. **ANTENNA INFORMATION (SWITCHING) TEST. (CONT)**

**STANDARD.** ME-26(*)/U meter should indicate 25.5 vdc.

5. If any measurement falls below 25.5 vdc, see troubleshooting chart 5-15,
6. Turn RT BAND switch to B.
7. Touch tip of ME-26(*)/U DC lead to ANT CONT pin B. Note meter indication.

**STANDARD.** ME-26(*)/U meter should indicate 25.5 vdc.

8. If ME-26(*)/U meter does not indicate 25.5 vdc, see troubleshooting chart 5-15.
9. Rotate RT MC-TUNE-KC switch through frequencies listed below while touching ME-26(*)/U DC lead to matching ANT CONT pin. Note meter indication at each frequency setting.

<table>
<thead>
<tr>
<th>MC-TUNE-KC FREQUENCY SETTING</th>
<th>MATCHING ANT CONT PIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>53.00-55.95</td>
<td>D</td>
</tr>
<tr>
<td>56.00-59.95</td>
<td>E</td>
</tr>
<tr>
<td>60.00-64.95</td>
<td>F</td>
</tr>
<tr>
<td>65.00-70.45</td>
<td>H</td>
</tr>
<tr>
<td>70.50-75.95</td>
<td>J</td>
</tr>
</tbody>
</table>

**STANDARD.** ME-26(*)/U should indicate 25.5 vdc.

10. If any measurement falls below 25.5 vdc, see troubleshooting chart 5-15.

5-20. **AUTOMATIC FREQUENCY SELECTION TEST,**

**NOTE**

This test can be conducted on the RT-246/VRC only.

The RT-524/VRC does not feature automatic frequency selection.

**PURPOSE.** This test checks the RT-246/VRC servosystem which allows the operator to pretune the radio to any 10 of the 920 available channels. Each channel button is preset, then pressed in turn. The selected frequency should appear in the dial window within 5 seconds.

**TEST EQUIPMENT AND MATERIALS**

- Power Supply PP-1104(*)/G
- Test Cable No.1
- Wristwatch or Stopwatch
5-20.  AUTOMATIC FREQUENCY SELECTION TEST. (CONT)

TEST SETUP. Connect equipment as shown in test setup diagram A.

![Test Setup Diagram]

Turn on test equipment. Allow at least 15 to 30 minutes for warmup.

INITIAL EQUIPMENT CONTROL SETTINGS. Set RT-246/VRC controls as indicated in the following table.

<table>
<thead>
<tr>
<th>CONTROL/SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIGHT</td>
<td>ON</td>
</tr>
<tr>
<td>BAND</td>
<td>AUTO</td>
</tr>
<tr>
<td>MC-TUNE-KC</td>
<td>75.95</td>
</tr>
<tr>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td>SQUELCH</td>
<td>OLD OFF</td>
</tr>
<tr>
<td>VOLUME</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td>Channel Buttons</td>
<td></td>
</tr>
<tr>
<td>(preset)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>30.00 MHz</td>
</tr>
<tr>
<td>2</td>
<td>39.15</td>
</tr>
<tr>
<td>3</td>
<td>42.20</td>
</tr>
<tr>
<td>4</td>
<td>43.30</td>
</tr>
<tr>
<td>5</td>
<td>54.40</td>
</tr>
<tr>
<td>6</td>
<td>56.55</td>
</tr>
<tr>
<td>7</td>
<td>67.60</td>
</tr>
<tr>
<td>8</td>
<td>68.70</td>
</tr>
<tr>
<td>9</td>
<td>71.80</td>
</tr>
<tr>
<td>10</td>
<td>75.95</td>
</tr>
</tbody>
</table>

**NOTE**

Directions for presetting channel buttons are given in paragraph 5-46.
5-20. AUTOMATIC FREQUENCY SELECTION TEST. (CONT)

TEST PROCEDURE

1. Press RT-246/VRC channel button. (See test setup diagram, page 5-61.) Note time required for frequency to appear in dial window.

   **STANDARD.** 30.00-MHz display should appear in RT dial window within 5 seconds.

2. If 30.00-MHz display does not appear in RT-246/VRC dial window within 5 seconds, see paragraph 4-46.

3. Press each channel button (in any order). Note time required for each frequency to appear in dial window.

   **STANDARD.** Each preset frequency should appear in display window within 5 seconds of selection.

4. If correct display does not appear within 5 seconds of each new frequency selection, see paragraph 4-46.
Section II TROUBLESHOOTING

5-21. GENERAL.

This section contains troubleshooting charts which will help you diagnose failures in the RT. The troubleshooting charts are designed to isolate faults in response to specific performance problems noted during performance testing in section I of this chapter.

There are two basic kinds of troubleshooting charts provided: gross failure troubleshooting, and performance degradation troubleshooting. Both kinds of troubleshooting are based on the use of Test Cable No. 1 and TMDE.

GROSS FAILURE TROUBLESHOOTING

Gross failure troubleshooting is generated by failure of the VOLUME control test, the first of the performance tests in section I of this chapter. Failure of the VOLUME control test indicates that no audio at all is available at the receiver’s loudspeaker jack. This implies a total failure of some module or component resulting in complete loss of signal. Therefore, the gross troubleshooting charts are designed to help you locate the failed module or component, with the assumption that the failed part does not operate at all.
5-21. GENERAL. (CONT)

This assumption differs from the approach taken in performance degradation troubleshooting, which assumes that a module or component may be responsible for slight defect symptoms because the part may be only partially operational.

PERFORMANCE DEGRADATION TROUBLESHOOTING

When its signals fail to meet certain standards, the RT’s performance is considered degraded. Degraded performance can result in weak audio, limited reception range, distortion, and many other problems.

The troubleshooting charts are designed to locate the cause of the performance degradation by using procedures more complex than those utilized for gross troubleshooting. Added complexity is due to the fact that the troubleshooting tests must evaluate the quality of the signals at various test points, instead of merely confirming the presence of signals as is usually the case in gross troubleshooting.

OVERALL TROUBLESHOOTING APPROACH

Both kinds of troubleshooting charts contained in this section are intended for use based on the following assumptions in connection with the RT.

1. Only one malfunction exists which is causing the defect symptom.
2. The troubleshooting charts do not isolate every possible defect.
3. Failure to locate a defect using the charts suggests a wiring-related problem which can be isolated using the schematics located in the back of this manual.
4. Troubleshooting procedures for germanium and silicon versions of the RT are the same.

5-22. GROSS TROUBLESHOOTING PRELIMINARY INSTRUCTIONS.

The gross troubleshooting charts in this section are based on the assumption that the receiver fails the VOLUME control test at any frequency setting of the MC-TUNE-KC control. However, certain defects in the crystal reference system can result in loss of audio at some frequencies while the receiver can function normally at other frequency settings.

Before proceeding with the steps given in the gross troubleshooting charts, determine whether or not the failure of the VOLUME control test conforms to any of the following failure modes.

<table>
<thead>
<tr>
<th>FAILURE MODE</th>
<th>CAUSE</th>
<th>CORRECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>No audio on all channels ending in 0, eg, 30.00, 30.10, 30.20, etc.</td>
<td>Crystal Y2012 (5.65 MHz) in A2000 assembly</td>
<td>Replace A2000 assembly.</td>
</tr>
<tr>
<td>No audio on all channels ending in 5, eg, 30.05, 30.15, 30.25, etc.</td>
<td>Crystal Y2011 (5.60 MHz) in A2000 assembly</td>
<td>Replace A2000 assembly.</td>
</tr>
<tr>
<td>No audio on the same 100-kHz segment for each megahertz of tuning.</td>
<td>Defective interpolation oscillator crystal</td>
<td>Replace A2000 assembly. See interpolation oscillator crystal chart.</td>
</tr>
</tbody>
</table>
5-22. GROSS TROUBLESHOOTING PRELIMINARY INSTRUCTIONS. (CONT)

INTERPOLATION OSCILLATOR CRYSTAL CHART

The following chart is used to isolate the particular crystal responsible for audio failure in the same 100-kHz segment for each MHz of tuning. In this failure mode, if audio is absent at 30.05 and 30.10, it will be absent at 40.05 and 40.10; 50.05 and 50.10, etc.

<table>
<thead>
<tr>
<th>SEGMENT OF KC CONTROL WHERE AUDIO IS ABSENT</th>
<th>CAUSE</th>
<th>CORRECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>05 and 10</td>
<td>Crystal Y2007</td>
<td>Replace A2000 assembly.</td>
</tr>
<tr>
<td>35 and 40</td>
<td>Crystal Y2010</td>
<td>Replace A2000 assembly.</td>
</tr>
<tr>
<td>45 and 50</td>
<td>Crystal Y2005</td>
<td>Replace A2000 assembly.</td>
</tr>
<tr>
<td>55 and 60</td>
<td>Crystal Y2004</td>
<td>Replace A2000 assembly.</td>
</tr>
<tr>
<td>65 and 70</td>
<td>Crystal Y2003</td>
<td>Replace A2000 assembly.</td>
</tr>
<tr>
<td>75 and 80</td>
<td>Crystal Y2002</td>
<td>Replace A2000 assembly.</td>
</tr>
<tr>
<td>85 and 90</td>
<td>Crystal Y2001</td>
<td>Replace A2000 assembly.</td>
</tr>
<tr>
<td>95 and 100</td>
<td>Crystal Y2006</td>
<td>Replace A2000 assembly.</td>
</tr>
</tbody>
</table>
5-23. TROUBLESHOOTING FLOW CHARTS.

CHART 5-1
No Audio Troubleshooting
(Sheet 1 of 18)

NOTES

1. Do not confuse audio tone with noise. Audio tone is 1-kHz signal.

2. The assumption here is that audio is scratchy or fades in and out one or more times as VOLUME control is turned.

3. If 0.16 vac is present, Monitor Amplifier A5100 is working, indicating a valid received audio from A4300. Therefore, 25.5 vdc power supply to prior stages and to lamp can be assumed OK.
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 2 of 18)

NOTES

4. Presence of unmuted audio indicates good Audio Transformer T5001 and probable bad Resistor R5117 in the A5100.

5. A signal at TP5009 is assumed because FIXED AUDIO is OK, indicating that FL5001 is good. The 0.78 vac value is approximate and can be as high as 1.1 v.
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 3 of 18)

NOTE

6. Due to limited number of test points, component substitution is sometimes necessary. Absence of signal at TP5001 could be due to failed Power Transistor Q401 or Resistor R402. These components are difficult to test directly and much more difficult to substitute than the A5100 assembly.

1B

SET ME-26/U TO READ VDC, ME-26/U TO TP5003.

25.5 VDC PRESENT?

NO

REPAIR WIRING TO PLUG P5001 OR AT J5001. REPEAT PERFORMANCE TEST.

YES

REPLACE AUDIO AMPLIFIER A5100. REPEAT PERFORMANCE TEST.

SEE NOTE 6

PARA 5-2

PARA 5-2

PROBLEM CORRECTED, RETURN TO PERFORMANCE TESTS. DO ALL TESTS IN SEQUENCE.

AUDIO TONE HEARD?

YES

INSTALL ORIGINAL A5100. SET ME-26/U TO READ OHMS.

NO

1C SH 4

5-68
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 4 of 18)

1C

JUMP ACROSS R402 WITH JUMPER WIRE

TONE HEARD?

YES

REPLACE POWER TRANSISTOR Q401

RETURN TO PERFORMANCE TESTS. DO ALL TESTS IN SEQUENCE.

NO

REPLACE R402

RETURN TO PERFORMANCE TESTS. DO ALL TESTS IN SEQUENCE.

PARA 5-2

PARA 5-2
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 5 of 18)

7. An alternate method of checking for a bad CRS is to ground TP3001 in the A3000 assembly while the sig generator is varied ±1 MHz. If the audio tone is heard when TP3001 is grounded, it means that the CRS is bad.

8. Keep in mind that this entire troubleshooting procedure assumes one total component failure causing absence of an audio signal. This simple check can quickly isolate a bad CRS.
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 6 of 18)

NOTES
9. With RT set at 30.00 MHz and 41.5 MHz injected into FL3002, there should be no error signal from the CRS. The meter will remain centered.

10. This setting should force the CRS to output dc error voltage. The voltmeter will indicate this voltage.

11. If the Time Delay Relay K3001 fails to momentarily short the dc error signal, the CRS can shift the local oscillator 1 MHz.

12. Since previous steps confirmed presence of audio tone when CRS was isolated from other stages, the local oscillator can be considered aligned. Therefore, CRS must be generating incorrect error signal, driving local oscillator off frequency.

1E

ZERO-VDC READING ON ME-26/U?
SEE NOTE 9

YES

NO

SET SIG GENERATOR TO 41.75 MHZ. ME-26/U WILL MOVE OFF CENTER.
SEE NOTE 10

TURN RT KC CONTROL SLOWLY TO 30.05 MHZ WHILE OBSERVING ME-26/U FOR RETURN TO CENTER

MOMENTARY ZERO-VDC READING?
NOTE 11

YES

NO

SET ME-26/U BACK TO TRUE ZERO REFERENCE. ME-26/U TO TP3002.

TURN RT KC CONTROL TO 30.00 MHZ WHILE OBSERVING ME-26/U

1E

SH 7

1G

SH 7

1G

SH 13

1M

SH 17

IM

13.5-VDC READING?

MOMENTARY ZERO-VDC READING ON ME-26/U?

YES

NO

REMOVE P1004 FROM RF CABLE AND CONNECT P1004 TO J1004. REMOVE P3701 FROM J3701 ON THE A3700.

P3701 TO FREQUENCY COUNTER. SET RT TO 30.00 MHZ.

FREQUENCY COUNTER READS 5.65 MHZ ± 500 HZ?

YES

NO
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 7 of 18)

NOTE
13. Do not discard A2100.
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 8 of 18)

NOTES
14. Voltage may vary from 0.78 to 1.1 vac.
15. Actual voltage will be slightly lower due to some attenuation of signal by the filter.

SET RT TO 30.00 MHZ. REMOVE RF CABLE FROM RT ANT PORT. REMOVE P1005 FROM J1005 ON A1000.

SIG GENERATOR RF CABLE TO P1005. SET SIG GENERATOR TO 11.5 MHZ, 1-KHZ MODULATION, 8-KHZ DEVIATION, 50-mV RF.

AUDI0 TONE HEARD?

0.78 VAC PRESENT? NOTE 14

0.78 VAC PRESENT? NOTE 15

REPLACE A5100. RETURN TO PERFORMANCE TESTS.

REPLACE FL5001. RETURN TO PERFORMANCE TESTS.

ME-30/U TO TP5013. SET ME-30/U TO READ 1 V.

ME-30/U TO TP5009

NOTES
14. Voltage may vary from 0.78 to 1.1 vac.
15. Actual voltage will be slightly lower due to some attenuation of signal by the filter.
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 9 of 18)

NOTES
16. No signal is injected into receiver during this step. RT is set at 30.00 MHz.
17. The tolerance of the local oscillator with the CRS connected is +/- 3.5 kHz.

CAUTION
MODULE A1200B CONTAINS PARTS SENSITIVE TO ELECTROSTATIC DISCHARGE (ESD).
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 10 of 18)

INJECT SIGNAL AT CI 305 AS PER ILLUSTRATION.

TONE HEARD?

YES

CHANGE SIG GENERATOR RF LEVEL TO 20 μV.
INJECT SIGNAL AT CI 1205.

TONE HEARD?

NO

ALIGN A1300, REPLACE A1300 IF ALIGNMENT DOES NOT CORRECT PROBLEM.

RETURN TO PERFORMANCE TESTS.

ALIGN A1200*, REPLACE A1200* IF ALIGNMENT DOES NOT CORRECT PROBLEM.

RETURN TO PERFORMANCE TESTS.

MODULE A1200B CONTAINS PARTS SENSITIVE TO ELECTROSTATIC DISCHARGE (ESD).

CAUTION

PARA 5-2

PARA 5-2

INJECT SIGNAL AT CI 1205 AS PER ILLUSTRATION.

/*

PARA 5-2

DISCHARGE (ESD).

PARA 5-2

INJECT SIGNAL AT CI 1205.

TONE HEARD?

NO

ALIGN A1300. REPLACE A1300 IF ALIGNMENT DOES NOT CORRECT PROBLEM.

RETURN TO PERFORMANCE TESTS.

ALIGN A1200*, REPLACE A1200* IF ALIGNMENT DOES NOT CORRECT PROBLEM.

RETURN TO PERFORMANCE TESTS.

PARA 5-2

PARA 5-2

DISCHARGE (ESD).
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 11 of 18)

1K
A4000 ISOLATION

ME-30/U TO TP4003 ON THE A4000 TRAY

0.15-VAC READING ?

NO
SET ME-26/U TO READ VDC, 30-V SCALE

ME-26/U TO TP4006

16 VDC PRESENT ?

NO
TROUBLESHOOT POWER SUPPLY OR WIRING

YES
ME-26/U TO TP4008

REPLACE AUDIO AND SQUELCH PREAMP A4300

ALINE A4300. RETURN TO PERFORMANCE TESTS.

16 VDC PRESENT ?

NO
REPLACE A4200 MODULE

ALINE A4200. RETURN TO PERFORMANCE TESTS.

YES
PARA 5-2

PARA 5-2

1L SH 12
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 12 of 18)

1. SET SIG GENERATOR TO INJECT 11.5 MHZ RF AT 3000 μV WITH NO MODULATION. INJECT SIGNAL INTO TP4004.

LOUDSPEAKER QUIET?

YES

INJECT SIGNAL INTO TP4005

NO

LOUDSPEAKER QUIET?

YES

SET RF LEVEL TO 50 μV. INJECT SIGNAL INTO TP4009.

NO

REPLACE A4200 MODULE

ALINE A4200. RETURN TO PERFORMANCE TESTS.

REPLACE A4100 MODULE

ALINE A4100. RETURN TO PERFORMANCE TESTS.

REPLACE FL4002. RETURN TO PERFORMANCE TESTS.

PARA 5-2

PARA 5-2

PARA 5-2

REPLACE FL4001. RETURN TO PERFORMANCE TESTS.

PARA 5-2
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 13 of 18)

NOTES
18. The test point voltages given for the A3000 assembly are approximate. If no reading is obtained, try a replacement module.
19. CRS modules are prealined.

1M

REMOVE P3701 FROM COUNTER. P3701 TO J3701. REMOVE P3301 FROM J3301.

P3301 TO COUNTER

COUNTER READS 46.850 MHZ ± 2.3 KHZ?

CHECK A3000

YES

REMOVE P3301 FROM COUNTER. P3301 TO J3301.

SET SIG GENERATOR TO INJECT 41.5 MHZ, 10 KU V, WITH NO MODULATION. SET RT TO 30.00 MHZ.

REMOVE P3002 FROM J3002. SIG GENERATOR TO J3002.

ME-30/U TO TP3014

ME-30/U TO TP3015

0.4 VAC READING?

NOTE 18

NO

REPLACE FL3002 AND RETURN TO PERFORMANCE TESTS

SEE NOTE 19

PARA 5-2

YES

PARA 5-2

REPLACE Y2006 CRYSTAL. RETURN TO PERFORMANCE TESTS.

REPLACE Y2100 INTERPOLATION OSCILLATOR. RETURN TO PERFORMANCE TESTS.
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 14 of 18)

NOTE

20. CRS modules are prealined.

1. IN

2. 0.5-VAC READING?
   - NO: REPLACE A3100 AND RETURN TO PERFORMANCE TESTS
   - YES: ME-30/U TO TP3013

3. ME-30/U TO TP3013

4. 0.3-VAC READING?
   - NO: REPLACE FL3001 AND RETURN TO PERFORMANCE TESTS
   - YES: ME-30/U TO TP3011

5. ME-30/U TO TP3011

6. METER SHOWS SLIGHT INDICATION?
   - NO: REPLACE A3200 AND RETURN TO PERFORMANCE TESTS
   - YES: ME-30/U TO TP3016

7. ME-30/U TO TP3016

8. 0.2-VAC READING?
   - YES: PARA 5-2
   - NO: REPLACE A3300 AND RETURN TO PERFORMANCE TESTS

9. REPLACE A3300 AND RETURN TO PERFORMANCE TESTS

10. PARA 5-2

11. PARA 5-2

12. PARA 5-2

13. PARA 5-2

14. SH 15
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 16 of 18)

1P

SET ME-26/U TO READ VDC WITH POINTER AT CENTER SCALE ZERO REFERENCE

ME-26/U TO TP3003. CHANGE RT FREQUENCY SEVERAL TIMES WHILE OBSERVING VOLTOMETER.

MOMENTARY ± DC READING?

NO

REPLACE A3600 AND RETURN TO PERFORMANCE TESTS

YES

SET RT TO 30.00 MHZ. ME-30/U TO TP3004.

0.3 VAC READING?

NO

REPLACE A3500 AND RETURN TO PERFORMANCE TESTS

YES

REPLACE A3700 AND RETURN TO PERFORMANCE TESTS

PARA 5-2

PARA 5-2
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

**Chart 5-1**

No Audio Troubleshooting
(Sheet 17 of 18)

1. Any frequency reading at all?
   - Yes: Replace crystal Y2012
   - No: Replace reference oscillator Y2200

2. Return to performance tests

3. Para 5-2
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 18 of 18)

EQUIPMENT SETUP USING TEST CABLE NO. 1
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-2
SINAD Test Failure Troubleshooting
(Sheet 1 of 7)

START

CONNECT EQUIPMENT AS ILLUSTRATED ON SH 5.

SET AN/URM-103 TO 11.5 MHz, 1-KHZ MODULATION, 8-KHZ DEVIATION, 2.0-µV RF LEVEL.
SEE NOTE 1

RECONNECT TS-723/U AF INPUT LEADS FROM TEST CABLE NO 1. TS-723/U METER LEAD C TO TP4007. (SEE SH 4.)
SEE NOTE 2

CHANGE AN/URM-103 RF LEVEL TO 1 KµV.

TP4007 0.78 V RMS +/- 5% ?

NO

YES 2A
SH 2

2B
SH 2

SINAD -10 DB OR GREATER ?

NO

TROUBLESHOOT A1000(*) ASSEMBLY.
SEE NOTE 3

YES

REPLACE WIRE W102. RETURN TO PERFORMANCE TESTS.

PARA 5-2

SINAD -10 DB OR GREATER ?

NO

REPEAT SINAD TEST, STEPS 7 THRU 11.

CONNECT EQUIPMENT AS ILLUSTRATED ON SH 6. RECONNECT P1005 TO J1005.

REPEAT SINAD TEST, STEPS 7 THRU 11.

NOTES
1. Other equipment control settings same as in SINAD Test.
2. Ground lead D. Set FUNCTION switch to METER.
3. If unable to find fault in A1000(*) Assembly repair gear train.

CAUTION
MODULE A1200B CONTAINS PARTS SENSITIVE TO ELECTROSTATIC DISCHARGE (ESD).

OTHER EQUIPMENT CONTROL SETTINGS SAME AS IN SINAD TEST.
GROUND LEAD D. SET FUNCTION SWITCH TO METER.
IF UNABLE TO FIND FAULT IN A1000(*) ASSEMBLY REPAIR GEAR TRAIN.

MODULE A1200B CONTAINS PARTS SENSITIVE TO ELECTROSTATIC DISCHARGE (ESD).
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-2
SINAD Test Failure Troubleshooting
(Sheet 2 of 7)

2A

DC LEAD OF ME-26/U TO TP4006. (SEE SH 4.) GROUND COMMON LEAD.

TP4006 16 ± 0.1 VDC ?

YES

TROUBLESHOOT A4000 ASSEMBLY

NO

2B

CONNECT EQUIPMENT AS INDICATED ON SH 7

SET A4000 TRAY X-MODE NORMAL SWITCH (S4001) BETWEEN POSITIONS. (SEE SH 4.)

TS-723/U METER LEAD C TO TP5002. (SEE SH 4.)

TP5002 0 DB ± 0.75 DB ?

YES

REPLACE R101. RETURN TO PERFORMANCE TESTS.

NO

TS-723/U METER LEAD C TO TP5009. (SEE SH 4.) LEAD D TO GND.

TP5009 0 DB ± 0.75 DB ?

YES

2C SH 3

NO

TROUBLESHOOT A5000 ASSEMBLY

PARA 5-10

PARA 5-2

REPAIR CHASSIS WIRING RETURN TO PERFORMANCE TESTS.

PARA 5-2

PARA 5-2
CHART 5-2
SINAD Test Failure Troubleshooting
(Sheet 3 of 7)

**2C**

TS-723/U METER LEAD C TO TP5001. (SEE SH 4.) LEAD D TO GND.

- **TP5001 15 V RMS MINIMUM?**
  - **NO**
    - REPLACE Q401 AND IF NECESSARY R402 RETURN TO SINAD TEST.
  - **YES**
    - **TS-723/U METER LEAD C TO TP5007. (SEE SH 4.)**

- **TP5007 22.5 V RMS MINIMUM?**
  - **NO**
    - TROUBLESHOOT A5000 ASSEMBLY
  - **YES**
    - REPAIR CHASSIS WIRING. RETURN TO PERFORMANCE TESTS.

- **SINAD -10 DB OR GREATER?**
  - **YES**
    - RETURN TO PERFORMANCE TESTS
  - **NO**
    - **PARA 5-10**
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-2
SINAD Test Failure Troubleshooting
(Sheet 4 of 7)

RT-524
RAISE A4000 TRAY

+16V DC

A4000 ASSEMBLY
BOTTOM VIEW

A5000 ASSEMBLY
5-23. TROUBLESHOOTING FLOW CHARTS. (CONTI)

CHART 5-2
SINAD Test Failure Troubleshooting
(Sheet 5 of 7)
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-2
SINAD Test Failure Troubleshooting
(Sheet 6 of 7)
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-2
SINAD Test Failure Troubleshooting
(Sheet 7 of 7)
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-3
Squelch Test Failure Troubleshooting
(Sheet 1 of 2)

NOTES
1. Use same equipment setup as in Performance Test.
2. That is, repeat Performance Test (NEW SQUELCH or OLD SQUELCH) that referred you to this section to see if fault has been corrected.

START
SEE NOTE 1

TEST CABLE NO. 1 PIN P (SQUELCH DISABLE) TO PIN A (GND)

AUDIO NOISE PRESENT?

YES

RT CALL LAMP LIGHTS?

YES

ALINE A5200 MODULE

SQUELCH TEST OK? NOTE 2

YES

RETURN TO PERFORMANCE TESTS

NO

3A SH 2

NO

REPLACE K5002 (SQUELCH RELAY). RETURN TO PERFORMANCE TESTS.

PARA 5-2

PARA 5-2

PARA 5-2

PARA 5-2
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-3
Squelch Test Failure Troubleshooting
(Sheet 2 of 2)
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-4
Audio Distortion Test Failure Troubleshooting
(Sheet 1 of 1)

NOTES
1. Other equipment control settings same as in Distortion Test.
2. Set TS-723/U FUNCTION switch to DISTORTION.

START

USE SAME EQUIPMENT SETUP AS IN PERFORMANCE TEST

SET AN/URM-103 RF LEVEL CONTROL TO 100 μV
SEE NOTE 1

TS-723/U METER LEAD C TO TP5013. SEE CHART 5-2, SHE 4. LEAD D TO GND.
SEE NOTE 2

TP5013 DISTORTION 3.3% OR LESS ?
YES
TROUBLESHOOT A5000 ASSEMBLY

NO
TROUBLESHOOT A4000 ASSEMBLY

PARA 5-9

PARA 5-10
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-5
Audio Response Test Failure (Normal Mode) Troubleshooting
(Sheet 1 of 1)

NOTES

1. Control settings same as at start of Performance Test.
2. The 1000-Hz (modulation) reading is used as a reference.
3. Additionally, AN/URM-103 DEVIATION KHZ meter should indicate 8 kHz.
4. Repeat last two steps with AN/URM-127 controls adjusted for 3 kHz.
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-6
Selectivity Test Failure Troubleshooting
(Sheet 1 of 1)

NOTE

Use same equipment setup as in Performance Test.

START
SEE NOTE

REPLACE AND ALINE FL4001 (11.5-MHZ CRYSTAL FILTER)

REPEAT SELECTIVITY TEST

YES

RETURN TO PERFORMANCE TESTS

NO

REPLACE AND ALINE FL4002 (11.5-MHZ CRYSTAL FILTER)

RT MEETS SELECTIVITY SPEC?

PARA 5-2
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-7
A1000(*) Assembly Troubleshooting
(Sheet 1 of 5)

NOTES
1. Do not connect AN/USM-207.
2. After replacing, align modules.

CAUTION
MODULE A1200B CONTAINS PARTS SENSITIVE TO ELECTROSTATIC DISCHARGE (ESD).

1. Connect equipment as shown on SH 4.
   SEE NOTE 1

2. Use ME-26/U DC probe to measure voltages on SH 4. Ground common lead.

3. Proper voltage levels obtained?
   YES
   TURN OFF POWER. ME-26/U OHMS probe to blue wire. (see SH 4).

   NO
   ME-26/U DC probe to yellow wire. (see SH 4).
   25.5 VDC +/- 5%?
   NO
   Repair wiring to A1000(*) tray. Return to performance tests.
   YES
   Replace and align FL1001. Return to performance tests.

   PAR A 5-2

4. Replace and align parent board.

5. Substitute A1200(*), A1300 and A1400 replacements until 200-ohm reading obtained.
   SEE CAUTION
   200 OHMS +/- 10%?
   NO
   "SH 2"
   YES
   200-ohm reading obtained?
   NO
   "SH 2"
   YES
   "SH 2"
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-7
A1000 Assembly Troubleshooting
(Sheet 2 of 5)

NOTE
3. Turn power back on.

|-- 4A
|   |-- TEE TO AN/USM-207 AS INDICATED ON SH 4
|       |-- SEE NOTE 3
|       |-- SET RT MC-TUNE-KC SWITCH TO FREQUENCIES LISTED IN TABLE A
|       |       |-- VERIFY LOCAL OSCILLATOR FREQUENCIES AS PER TABLE A
|       |       |       |-- LO FREQUENCIES WITHIN ±2 KHz?
|       |       |       |       |-- YES
|       |       |       |       |       |-- CONNECT EQUIPMENT AS SHOWN ON SH 5
|       |       |       |       |       |       |-- SET RT MC-TUNE-KC SWITCH FOR 60.00 MHz (BAND@)
|       |       |       |       |       |       |       |-- ME-30/U INPUT LEAD A TO MK-1978/VRC SPKR JACK. LEAD B TO GND.
|       |       |       |       |       |       |       |       |-- 4B
|       |       |       |       |       |       |       |       |       |-- SH 3
|       |       |       |       |       |       |       |       |       |       |-- 4A
|       |       |       |       |       |       |       |       |       |       |       |-- GROUND TP3001 AND RECHECK LO FREQUENCIES
|       |       |       |       |       |       |       |       |       |       |       |       |-- LO FREQUENCIES WITHIN 150 KHz?
|       |       |       |       |       |       |       |       |       |       |       |       |       |-- YES
|       |       |       |       |       |       |       |       |       |       |       |       |       |       |-- TROUBLESHOOT CRYSTAL REFERENCE SYSTEM
|       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |-- PARA 5-8
|       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |-- PARA 5-2
|       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |-- RETURN TO PERFORMANCE TESTS
|       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |-- TABLE A

<table>
<thead>
<tr>
<th>DIAL</th>
<th>LOCAL OSCILLATOR (MHz ± 2 KHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.00</td>
<td>41.50</td>
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<tr>
<td>41.50</td>
<td>53.00</td>
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<td>53.50</td>
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<tr>
<td>55.50</td>
<td>54.40</td>
</tr>
<tr>
<td>57.00</td>
<td>56.30</td>
</tr>
<tr>
<td>75.85</td>
<td>84.35</td>
</tr>
</tbody>
</table>
ADJUST RT VOLUME CONTROL FOR 17-V INDICATION ON ME-30/U METER.

CHECK SINAD

17 V AND SINAD OK?

YES

RETURN TO PERFORMANCE TESTS.

NO

ALIGN A1100, A1200(*), A1300 AND A1400 MODULES.

SEE CAUTION

17 V AND SINAD OK?

YES

NO

REPLACE AND ALIGN IN TURN A1100, A1200(*), A1300, A1400 AND A1500(*) MODULES UNTIL ME-30/U INDICATES 17 V.

SEE CAUTION

CAUTION

MODULE A1200B CONTAINS PARTS SENSITIVE TO ELECTROSTATIC DISCHARGE (ESD).

PARA 5-2

5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-7
A1000(*) Assembly Troubleshooting
(Sheet 3 of 5)
NOTE:
The loudspeaker will issue a tone when the R-442 volume control is adjusted during the procedure. If you wish to disconnect the loudspeaker, you must add an impedance matching load for the audio transformer. This may be accomplished by connecting a 800 ohm resistor between test cable no.1 pin F (muted audio) and pin A (ground).

CHART 5-7
A1000 Assembly Troubleshooting
(Sheet 5 of 5)
CHART 5-8
A2000, A3000 Assemblies Troubleshooting
(Sheet 1 of 5)

NOTES
1. (a) P-to-P = Peak-to-Peak
(b) Locations of TP3001 and test points listed in the following steps are illustrated on Sh 6.
2. Readjust AN/URM-103 RF TUNING control for steady waveform.

START

CONNECT EQUIPMENT AS SHOWN ON SH 5

SET RT MC-TUNE-KC SWITCH TO 30.00 MHZ (BAND A)

SET AN/URM-103 TO 41.50 MHZ AND RF OUTPUT TO 250 µV

ADJUST OSCILLOSCOPE TO DISPLAY P-TO-P VOLTAGE OF SIGNAL AT TP3001

TP3001 0 ± 0.1 VDC (FREQ. CENTERED)?

OSCILLOSCOPE PROBE AND AN/USM-207 TO TP3003. ADJUST FOR P-TO-P DISPLAY.

SEE NOTE 2

TP3003 300 MV P-TO-P MIN AT 5.65 MHZ?

YES

5A SH 2

NO

OSCILLOSCOPE AND AN/USM-207 TO TP3006

TP3006 710 MV P-TO-P MIN AT 5.65 MHZ?

YES

REPLACE A3009A MODULE

NO

RETURN TO PERFORMANCE TESTS

RETURN TO PERFORMANCE TESTS

PARA 5-2

PARA 5-2
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-8
A2000, A3000 Assemblies Troubleshooting
(Sheet 2 of 5)

5A

OSCILLOSCOPE PROBE
AND AN/USM-207 TO
TP3004. ADJUST FOR
P-TO-P DISPLAY.

TP3004
210 MV P-TO-P
MIN AT 5.65
MHZ?

YES

OSCILLOSCOPE LEAD A
AND AN/USM-207 TO J3701.
(SEE SH 6.) GROUND LEAD
B. SET OSCILLOSCOPE
RANGE SWITCH TO 1V.

J3701
300 MV P-TO-P
MIN AT 5.65
MHZ?

NO

YES

REPLACE A3700A MODULE.
RETURN TO PERFORMANCE
TESTS.

NO

5C

SH 3

REPLACE A2000A MODULE.
RETURN TO PERFORMANCE
TESTS.

5B

OSCILLOSCOPE AND
AN/USM-207 TO TP3008.
ADJUST FOR P-TO-P
DISPLAY.

TP3008
176 MV P-TO-P
MIN AT 5.65
MHZ?

NO

YES

REPLACE A3500A MODULE.
RETURN TO PERFORMANCE
TESTS.

5-2

PARA

5-2

REPLACE FL3004. RETURN TO PERFORMANCE TESTS.
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-8
A2000, A3000 Assemblies Troubleshooting
(sheet 3 of 5)

--- Diagram Contents ---

1. Oscilloscope and AN/USM-207 to TP3018. Adjust for P-TO-P display.

   TP3018
   [1.8 MV P-TO-P MIN AT 5.65 MHZ]
   YES
   REPLACE A3400A MODULE
   RETURN TO PERFORMANCE TESTS

   NO
   DISCONNECT P3301 FROM J3301. USING T-CONNECTOR, CONNECT VOLTOMETER PROBE AND AN/USM-207 TO P3301. (SEE SH 5.) GROUND PROBE B.

   P3301
   [400 MV MIN AT 46.35 MHZ ?]
   YES
   RECONNECT P3301 TO J3301. VOLTOMETER PROBE A TO TP3010.
   NO
   REPLACE A2000A MODULE

   TP3011
   [27 MV MIN ?]
   NO
   YES
   REPLACE A3300A MODULE
   REPLACE FL3003. RETURN TO PERFORMANCE TESTS.

   VOLTMETER PROBE A TO TP3011

   TP3010
   [19 MV MIN ?]
   YES
   NO

--- Additional Notes ---

5C

Change 3  5-103
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-8
A2000, A3000 Assemblies Troubleshooting
(Sheet 4 of 5)

NOTE

3. The following steps require a spectrum analyzer. If none is available, go to Chart 5-1; sh 14 and follow instructions for use of ME-30/U at TP3013.

- CONNECT VOLTOMETER PROBE A TO TP3014
  - TP3014 220 MV MIN?
    - YES
      - CONNECT SPECTRUM ANALYZER TO TP3013
        - TP3013 1 MHZ THRU 12 MHZ IN 1-MHZ STEPS?
          - YES
            - REPLACE A3200 MODULE
          - NO
            - CONNECT VOLTOMETER PROBE A TO J3002.
  - NO
    - CONNECT SPECTRUM ANALYZER TO TP3015
      - SEE NOTE 3
      - TP3015 1 MHZ THRU 12 MHZ IN 1-MHZ STEPS?
        - YES
          - REPLACE FL3001
        - NO
          - REPLACE A3100A MODULE
            - REPLACE FL3002
              - PARA 5-2
    - PARA 5-2

- REPAIR CABLE W202/W402 (GREEN). RETURN TO PERFORMANCE TESTS.

5-104 Change 3
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-8
A2000, A3000 Assemblies Troubleshooting
(Sheet 5 of 5)

- POWER SUPPLY PP-1104(*)/G
- FREQUENCY COUNTER AN/USM-207
- OSCILLOSCOPE
- 25.5V DC
- VOLTMETER
- TEST CABLE NO. 1
- INPUT O
- SIGNAL GENERATOR AN/URM-103 LO-RF
- A
- B
- TO P401
- RAISE A3000 TRAY
- SMC TEE (LEAVE DISCONNECTED)

RT-524

A3000 ASSEMBLY

+16V DC

EL4GP455

Change 3 5-105
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-9
A4000 Assembly Troubleshooting
(Sheet 1 of 3)

START

CONNECT EQUIPMENT AS SHOWN ON SH 3

ME-26/U DC PROBE TO TP4006. (SEE SH 3.) GROUND COMMON LEAD.

TP4006 16 VDC ± 5% ?

YES

REPLACE AND ALIGN A2100 MODULE

NO

REPAIR CHASSIS WIRING

RETURN TO PERFORMANCE TESTS

TP4006 16 VDC ± 5% ?

YES

NO

ADJUST R4304 FOR 1.0-V INDICATION ON ME-30/U METER

DISCONNECT VOLTOMETER ME-26/U DC LEAD TO TP4002. (SEE SH 3.) GROUND COMMON LEAD.

TP4007 VOLTAGE ADJUSTS TO 1.0 V ± 100 mV?

YES

NO

TP4002 14 ± 2 VDC, WITHOUT RF 2 VDC MAX?

YES

NO

REPLACE AND ALIGN A4200A MODULE

PARA 5-2

S6A SH 2
5-23 TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-9
A4000 Assembly Troubleshooting
(Sheet 2 of 3)

6A

VOLTMETER A TO TP4003. (SEE SH 3.) LEAD B TO GND.

TP4003 50 MV MIN ?

YES

RETURN TO PERFORMANCE TESTS

NO

VOLTMETER LEAD A TO TP4004 (SEE SH 3.)

TP4004 2.8 MV MIN AT 11.5 MHZ?

YES

ALINE A4200A. IF UNABLE TO ALINE, REPLACE A4200A.

NO

VOLTMETER LEAD A TO TP4005. (SEE SH 3.)

TP4005 4.0 MV MIN AT 11.5 MHZ?

YES

REPLACE AND ALINE FL4002

NO

6B

8B

TURN VOLTMETER RANGE SWITCH TO 0.001. LEAD A TO TP4009. (SEE SH 3.)

TP4009 67 µV MIN AT 11.5 MHZ?

YES

REPLACE FL4001

NO

REPLACE AND ALINE A4100A MODULE

RETURN TO PERFORMANCE TESTS

PARA 5-2
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-9
A4000 Assembly Troubleshooting
(Sheet 3 of 3)
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-10
A5000 Assembly Troubleshooting
(Sheet 1 of 8)

NOTES
1. Use A5000 signal flow diagram (FD-13) for reference during troubleshooting.

2. Germanium Assemblies A5200 and A5300 must be replaced with Silicon Assemblies A5200A and A5300A.

CAUTION
Do not mix Germanium Assemblies A5200 or A5300 with Silicon Assemblies A5200A or A5300A.

3. Set RT MC-TUNE-KC SWITCH to 60.05 MHz, BAND ③.

START
SEE NOTES 1 AND 2

25.5-V POWER SUPPLY TO RT. POWER ON ME-26/U TO TP5003. (SEE SH 7.) GROUND COMMON LEAD.

TP5003 +25.5 VDC ?

YES

ME-26/U DC LEAD TO TP5010. (SEE SH 7.)

NO

REPAIR CHASSIS WIRING

RETURN TO PERFORMANCE TESTS

PARA 5-2

TP5010 +16 VDC ± 5% ?

YES

EQUIPMENT AS SHOWN ON SH 7
SEE NOTE 3

NO

REPLACE AND ALINE A2100 ASSEMBLY

TP5010 +16 VDC ± 5% ?

YES

USING AN/URM-127, INJECT 3-V, 1-KHZ SIGNAL INTO TP5013. (SEE SH 7.)

NO

SET A4000A X-MODE NORMAL SWITCH TO MIDPOSITION

ME-30/U LEAD A TO TP5009. (SEE SH 7.) GROUND LEAD B. NOTE DB VALUE.

7A
SH 2
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-10
A5000 Assembly Troubleshooting
(Sheet 2 of 8)

NOTES
4. After replacing A5100 module, aline.
5. FUNCTION: EXT MOD set AN/URM-127
for 1 kHz at 10 μV.

<table>
<thead>
<tr>
<th>X-MODE RCVR (HZ)</th>
<th>TP 5008 (DB CHANGE FROM 1-KHZ VALUE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>± 1.0</td>
</tr>
<tr>
<td>3000</td>
<td>± 1.0</td>
</tr>
<tr>
<td>6000</td>
<td>-21 MIN</td>
</tr>
</tbody>
</table>

POWER OFF. CONNECT EQUIPMENT AS SHOWN ON SH 8. POWER ON.

ADJUST AN/URM-103 RF TUNING CONTROL FOR 60.05 MHZ AND DEVIATION
CONTROL FOR 8 KHZ

SEE NOTE 5

ME-30/U LEAD A TO TP5004. (SEE SH 7.) GROUND LEAD B. NOTE VOLTAGE.

78 SH 3

5-110 Change 2
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-10
A5000 Assembly Troubleshooting
(Sheet 3 of 8)

NOTES
6. Repeat Distortion Test steps 6 thru 11, but take measurements at TP5005 instead of Test Cable No. 1.
7. After replacing A5100 module, align.

REPLACE K5001

TP5005 1.7% DISTORTION MAX?

YES

CHECK A5100A, R402 AND Q402. REPLACE, IF NECESSARY. (SEE NOTE 7.) RETURN TO PERFORMANCE TESTS

NO

TP5005 17 V MIN?

YES

ME-30/U LEAD A TO TP5007. (SEE SH 7.)

TP5007 17 V MIN?

NO

RESET AN/USM-127 FOR 1000-HZ MODULATING FREQ

CHECK DISTORTION AT TP5005.

SEE NOTE 6

REPLACE T5001. RETURN TO PERFORMANCE TESTS.

PARA 5-2

TP5004 7.75 MIN AT ALL FREQ?

7C YES

NO

ME-30/U TO TP5005. (SEE SH 7.)

TP5005 17 V MIN?

NO

YES

REPEAT MEASUREMENT WITH AN/URM-127 SET AT 500 HZ AND 3 KHZ
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 6-10
A5000 Assembly Troubleshooting
(Sheet 4 of 8)

NOTE
8. Repeat Distortion Test steps 8 thru 11, but take measurements at TP5006 instead of Test Cable No. 1.

1. Replace and aline A5100A module. Return to performance tests.

2. Adjust AN/URM-127 for 150 Hz at 2 V. Adjust AN/URM-103 deviation control for 3-KHz meter indication.

3. Set RT SQUELCH switch to NEW ON.

4. Replace and aline A5100A. Return to performance tests.
CHART 5-10
A5000 Assembly Troubleshooting
(Sheet 5 of 8)

NOTES

9. Set TS-723/U FUNCTION SWITCH to METER.
10. That is, limiting occurs.

5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)
5-23 TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-10
A5000 Assembly Troubleshooting
(Sheet 6 of 8)

1. **7F**
   - **RT CALL LAMP OFF?**
     - **YES**
       - Change RT call lamp switch to old on. Set audio oscillator freq to 7300 Hz.
     - **NO**
       - Adjust new squelch pot. (See Sh 7.)

2. **RT CALL LAMP OFF?**
   - **YES**
     - **RETURN TO PERFORMANCE TESTS**
   - **NO**
     - **RETURN TO PERFORMANCE TESTS**

3. **TS-723/U METER LEAD C TO TP5006. SET AUDIO OSCILLATOR FOR 1.5 ± 0.1 V AT TP5006.**

4. **CHECK AND IF NECESSARY REPLACE A5200A, A5300A, K5002 AND S102**

5. **RETURN TO PERFORMANCE TESTS**

6. **ADJUST OLD SQUELCH POT. (SEE SH 7.)**

7. **RT CALL LAMP OFF?**
   - **YES**
     - **RETURN TO PERFORMANCE TESTS**
   - **NO**
     - **RETURN TO PERFORMANCE TESTS**

8. **PARA 5-2**
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 6-10
A6000 Assembly Troubleshooting
(Sheet 8 of 8)

DISTORTION ANALYZER TS-723(*)/U

AF INPUT METER

POWER SUPPLY PP-1104(*)/G

+ -

25.5V DC

FO J

NO A

SIGNAL GENERATOR AN/URM-103

EXT MOD LO RF

MATCHING UNIT CN-901/U

ADAPTER UG-514
(observe polarity)

SIGNAL GENERATOR AN/URM-127

OUTPUT

FREQUENCY COUNTER AN/USM-207

FREQ A

INPUT RG-58/U

T CONNECTOR UG-274/U

TEST CABLE NO. 1

EL4GP458
5-23 TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-11
Transmitter Frequency Accuracy Troubleshooting
(Sheet 1 of 4)

NOTES
1. Set RT MC-TUNE-KC switch to the following frequencies. At each frequency,
   a) Key handset.
   b) Note ME-30/U meter indication.
   c) Unkey handset.

CAUTION
Do not change frequencies when transmitter is keyed.

Test frequencies: 30.00, 42.00, 52.00, 53.00, 65.00, and 75.00 MHZ. (Turn BAND switch to 8 at frequencies above 52.00 MHZ.)
5-118

CHART 5-11
Transmitter Frequency Accuracy Troubleshooting
(Sheet 2 of 4)

NOTE
2. See Sh 4.

BA

RECONNECT P6003 TO J6003

ME-26/U LEAD A TO TP8008. (SEE SH 5.) LEAD B TO GND.

SET MK-1978/VRC KEY SWITCH TO XMIT. NOTE ME-26/U METER INDICATION.

+15 ± 1.0 VDC?

YES

NO

TROUBLESHOOT A8000 ASSEMBLY

CHART 5-18

TROUBLESHOOT A4000 ASSEMBLY

CHART 5-18

IF FAULT IS STILL NOT CORRECTED, DISCONNECT J9301. CONNECT 50-OHM RESISTOR BETWEEN P9301 AND GND.

SEE NOTE 2

ME-30/U LEAD A TO P9301. GROUND LEAD B. SET MK-1978/VRC KEY SWITCH TO XMIT.

10 MV RMS?

YES

NO

REPLACE AND ALIGN A1400 (MIXER) MODULE. RETURN TO PERFORMANCE TESTS.

PARA 5-2

TROUBLESHOOT A8000 ASSEMBLY

CHART 5-18

CHART 5-18
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 511
Transmitter Frequency Accuracy Troubleshooting
(Sheet 3 of 4)
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-12
Transmitter Low and High Power Troubleshooting
(Sheet 1 of 4)

START

USE SAME EQUIPMENT SETUP AS IN PERFORMANCE TESTS
SEE NOTE 1

DISCONNECT J6101 FROM P6101. (SEE SH 4.)

ME-26/U AND AN/USM-207 TO P6101

KEY HANDSET

1.5 V RMS AT 30.00 MHZ ± 3.5 KHZ ?
SEE NOTE 2
YES
9A SH 2

RECONNECT P6001 TO J6001. CONNECT ME-26/U TO PIN 2 OF A6000 ASSEMBLY. (SEE SH 4.) KEY HANDSET.

16 ± VDC ?
NOTE 2
NO
ME-26/U DC LEAD TO K403. SET MK-1978/VRC KEY SWITCH TO XMIT.

YES

CHART 5-16

TROUBLESHOOT A6000 ASSEMBLY

25.5 ± 0.1 VDC ?
NOTE 2
NO
CHECK K401, A7100, CB301 (RT-246/VRC), AND CB351 (RT-524/VRC)

YES
REPLACE K403. RETURN TO PERFORMANCE TESTS.

REPLACE FAULTY COMPONENTS. RETURN TO PERFORMANCE TESTS.

NOTES
1. You will also need a frequency counter (AN/USM-207) and a voltmeter (ME-30/U).
2. After taking measurements, unkey handset.
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-12
Transmitter Low and High Power Troubleshooting
(Sheet 2 of 4)

NOTES
3. J6201 checks BAND A, and J6202 checks BAND B.
4. After taking measurements, unkey handset.
5. P3 checks BAND A, and P2 checks BAND B.
6. TEST POINT | MINIMUM VALUE
               |                  
TP9003 | 95 V RMS         
TP9004 | -10 V            
TP9002 | +250 V           
TP9001 | +650 V

Low Power Tests OK ? NOTE 4

ME-26/U LEAD A TO JUNCTION BETWEEN R401 AND K406. KEY HANDSET.

225 VDC MINIMUM ? NOTE 4

CHECK AND IF NECESSARY REPLACE K401, R401 AND K406. SEE RETURN TO PERFORMANCE TESTS

PERFORM LOW POWER TEST WITH ME-26/U DC LEAD CONNECTED TO P3. (SEE SH 4.)


PERFORM LOW POWER TEST WITH ME-26/U LEAD A CONNECTED TO J6201. (SEE SH 4.)

REPEAT LOW POWER TEST WITH ME-26/U DC LEAD CONNECTED TO J6202. (SEE SH 4.)

SEE NOTE 3

LOW POWER TESTS OK ? NOTE 4

YES

REPEAT LOW POWER TEST WITH ME-26/U DC LEAD CONNECTED TO P2. (SEE SH 4.)

SEE NOTE 5

98 SH 3

PARA 5-2


VOLTAGES OK ? NOTE 4

YES

TRoubleshoot A9000 and A9400 assemblies

CHART 5-19

CHECK AND IF NECESSARY REPLACE K301, K401, S307 (RT-246/VRC), AND S356 (RT-524/VRC). RETURN TO PERFORMANCE TESTS.
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-12
Transmitter Low and High Power Troubleshooting
(Sheet 3 of 4)

Low Power Test OK?

Yes

Check and if necessary replace S307 (RT-246/VRC), S366 (RT-524/VRC), K301 and K401

No

Check and if necessary replace FL4001 and cables W412, W411, and W410

Return to performance tests

Para 5-2
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-13
Transmitter Squelch Tone Stability Troubleshooting
(Sheet 2 of 3)

NOTE
2. In all positions except OLD ON.

10A

ME-30/U LEAD A TO J8001, PIN 3. (SEE SH 3.)

ROTATE RT SQUELCH SWITCH THRU ALL POSITIONS. OBSERVE ME-30/U METER INDICATION.

J8001, PIN 3 1.4 V RMS MIN? NOTE 2

YES

NO

UNKEY HANDSET. CHECK AND IF NECESSARY REPLACE K401, X-MODE CONNECTOR, CHASSIS WIRING.

RETURN TO PERFORMANCE TESTS

PARA 5-2

AN/USM-207 TO TP9009. (SEE SH 3.)

ROTATE RT SQUELCH SWITCH THRU ALL POSITIONS. OBSERVE AN/USM-207 DISPLAY.

150 HZ? NOTE 2

YES

NO

UNKEY HANDSET. TROUBLESHOOT A8000 ASSEMBLY.

UNKEY HANDSET. TROUBLESHOOT A8000 ASSEMBLY.

CHART 5-18

CHART 5-18
5-23 TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 6-13
Transmitter Squelch Tone Stability Troubleshooting
(sheet 3 of 3)
5-23 TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-14
Transmitter Deviation (Normal Mode) Troubleshooting
(sheet 1 of 2)

START

USE SAME EQUIPMENT SETUP AS IN PERFORMANCE TESTS

RF PROBE A TO TEST CABLE NO. 1 PIN N. PROBE B TO PIN A.

SEE NOTE 1

DISCONNECT ME-30/U FROM AN/URM-127, AND CONNECT LEAD A TO J8001-9. (SEE SH 2.) LEAD B TO GND. KEY HANDSET.

IS SIGNAL PRESENT?

NO

15 MV RMS MINIMUM?

NO

UNKEY HANDSET. TROUBLESHOOT A8000 ASSEMBLY. (CHART 5-18).

YES

UNKEY HANDSET. CHECK AND IF NECESSARY REPLACE Z401.

SEE NOTE 2

ME-30/U LEAD A TO TP8009. (SEE SH 3.) KEY HANDSET.

YES

UNKEY HANDSET. TROUBLESHOOT A8000 ASSEMBLY.

NOTES

1. Make sure the signal generator is still outputting a 0.22-v signal.

2. If problem still exists after replacing Z401, go to next step. If fault has been corrected, return to Performance Tests, paragraph 5-2.

CHART 5-16
5-23 TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-14
Transmitter Deviation (Normal Mode) Troubleshooting
(sheet 2 of 2)
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-15
Antenna Information (Switching) Troubleshooting
(sheet 1 of 1)

START

CHECK AND IF NECESSARY, REPLACE WIRING AND SWITCHES S305 AND S309

25.5 VDC AT FAULTY PIN?

YES

FAULT CORRECTED. RETURN TO PERFORMANCE TESTS.

NO

SEE TABLE A. REPLACE CAPACITOR WHICH MATCHES FAULTY RT ANT CONT PIN.

RETURN TO PERFORMANCE TESTS

TABLE A

<table>
<thead>
<tr>
<th>FAULTY RT ANT CONT PIN</th>
<th>MATCHING CAPACITOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>C321</td>
</tr>
<tr>
<td>B</td>
<td>C320</td>
</tr>
<tr>
<td>D</td>
<td>C319</td>
</tr>
<tr>
<td>E</td>
<td>C315</td>
</tr>
<tr>
<td>F</td>
<td>C318</td>
</tr>
<tr>
<td>H</td>
<td>C314</td>
</tr>
<tr>
<td>J</td>
<td>C317</td>
</tr>
</tbody>
</table>

Para 5-2
5-23 TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-16
Main Circuit Board Assembly A6000A, and Modules A6300A and A6400A Troubleshooting
(sheet 1 of 5)

START

CONNECT EQUIPMENT AS SHOWN ON SHEET 3

DISCONNECT P6002 FROM J6002. CONNECT 50-OHM RESISTOR BETWEEN J6002 AND GND.

SEE NOTE 1

REMOVE COVER FROM OSC-BUFFER ASSEMBLY AND INSTALL ALIGNMENT COVER

DISCONNECT P6001 FROM J6001. CONNECT RF CABLE LEAD A TO J6001. (SEE SHEET 3) LEAD B TO GND.

KEY HANDSET. NOTE AN/USM-207 FREQUENCY DISPLAY.

UNKEY HANDSET. TURN RT POWER SWITCH TO OFF.

REMOVE OSC-BUFFER COVER AND REMOVE A6300A AND A6400A ASSEMBLIES

SET RT POWER SWITCH TO ON. KEY HANDSET.

RF CABLE LEAD A TO TERMINALS LISTED IN TABLE A. (SEE NOTE 2) LEAD B TO GND.

VOLTAGE INDICATIONS AS PER TABLE A?

YES

11A
SH 2

NO

30 MHZ ± 150 HZ?

YES

11B
SH 2

REPLACE AND ALIGN A6000A BOARD. RETURN TO PERFORMANCE TESTS.

PARA 5-2

NOTES
1. See sheet 5.
2. Connector terminal diagrams.

TABLE A

<table>
<thead>
<tr>
<th>CONNECTOR/PIN</th>
<th>VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>J6004-2</td>
<td>10.3 ± 3%</td>
</tr>
<tr>
<td>J6004-3</td>
<td>6.3 ± 0.2 VDC</td>
</tr>
<tr>
<td>J6005-2</td>
<td>10.3 ± 3%</td>
</tr>
<tr>
<td>J6005-3</td>
<td>16.0 ± 0.2 VDC</td>
</tr>
</tbody>
</table>
CHART 5-16
Main Circuit Board Assembly A6000A, and Modules
A6300A and A6400A Troubleshooting
(sheet 2 of 5)

5-23 TROUBLESHOOTING FLOW CHARTS.(CONT)

NOTE
3. If a problem still exists, go to the next step. If the fault has been corrected, return to Performance Tests, paragraph 5-2.
5-23. TROUBLESHOOTING FLOWCHARTS. (CONT)

CHART 5-16
Main Circuit Board Assembly A6000A, and Modules
A6300A and A6400A Troubleshooting
(Sheet 3 of 5)
5-23 TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-16
Main Circuit Board Assembly A6000A, and Modules A6300A and A6400A Troubleshooting (sheet 4 of 5)
5-23. TROUBLESHOOTING FLOW CHARTS (CONT)

CHART 5-16
Main Circuit Board Assembly A6000A, and Modules
A6300A and A6400A Troubleshooting
(Sheet 6 of 5)
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-17
A6100 and A6200 Assemblies Troubleshooting
(Sheet 1 of 2)

NOTES
1. After taking measurement, unkey handset.
2. If a problem still exists, go to the next step. If the fault has been corrected, return to Performance Tests, paragraph 5-2.
6-29. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-18
A8000A Assembly Troubleshooting
(Sheet 1 of 9)

1. Set RT SQUELCH switch to OLD ON.
2. That is, set signal generator signal amplitude for 5 V RMS. Verify output with ME-30/U meter.
3. After taking measurements, unkey handset.

START

CONNECT EQUIPMENT AS SHOWN ON SH 7

SEE NOTE 1

DISCONNECT P6301 FROM J6301. (SEE SH 5.)

SET AN/URM-127 FREQ RANGE DIAL TO 150.
SET FREQ RANGE MULTIPLIER TO X1.

SET AN/URM-127 OUTPUT CONTROL FOR 0.5 METER INDICATION. SET ATTENUATOR SWITCH TO X10.

SEE NOTE 2

AN/URM-127 LEAD A TO TP8007. (SEE SH 6.) LEAD B TO GND.

ME-30/U LEAD A TO TP8004. (SEE SH 5.) LEAD B TO GND. KEY HANDSET.

ME-30/U INDICATES 18 ± 5 MV RMS?

SEE NOTE 3

YES

DISCONNECT P4001.

KEY HANDSET

ADJUST FABRICATED TEST CABLE POT FOR 1.0 VDC ME-30/U METER INDICATION. OBSERVE SAWTOOTH WAVEFORM ON SCOPE.

TP8009 7 - 12 V PEAK-TO-PEAK, 100 TO 200 Hz?

YES

NO

REPLACE AND ALINE A8500 MODULE. RETURN TO PERFORMANCE TESTS.

PARA 5-2

SEE NOTE 3

REPLACE AND ALINE A8400A MODULE. RETURN TO PERFORMANCE TESTS.

PARA 5-2

12A SH 2
INCREASE TEST CABLE POT VOLTAGE UNTIL SAWTOOTH OUTPUT AT TP8009 IS CUT OFF. OBSERVE ME-38/U METER INDICATION.

IF TP8009 2.2 TO 5.5 VDC?

NO

SEE NOTE 4

YES

CONNECT EQUIPMENT AS SHOWN ON SH 9

SET AN/URM-127 FREQ RANGE DIAL TO 100. SET FREQ RANGE MULTIPLIER TO X10.

SET AN/URM-127 OUTPUT CONTROL FOR 400 MV RMS. KEY HANDSET.

REPLACE AND ALINE A8400A MODULE. RETURN TO PERFORMANCE TESTS.

MEASURE OUTPUT LEVEL WITH TS-723/U

SEE NOTE 5

500 MV RMS MIN 1100 MV RMS MAX 4% MAX DISTORTION?

NO

YES

DISCONNECT TS-723/U FROM RT X-MODE PORT AND AN/URM-127 CABLE FROM TEST CABLE NO. 1

DISCONNECT P8301 FROM J8301. CONNECT AN/USM-127 LEAD A TO J8301. LEAD B TO GND. (SEE SH 5.)

ME-30/U LEAD A TO TP8003. (SEE SH 6.) LEAD B TO GND.

12B SH 3

NOTES

4. Unkey handset.

5. For TS-723/U control settings, and distortion test procedure, see Transmitter Distortion Test.

SET AN/URM-127 FREQ RANGE DIAL TO 115. SET FREQ RANGE MULT TO X100. SET OUTPUT TO 10 MV RMS.
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 518
A8000A Assembly Troubleshooting
(sheet 3 of 9)

6. That is, set signal generator for 1 kHz.
7. For ME-57/U control settings and deviation test procedure, see Transmitter Deviation Test.
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-18
A8000A Assembly Troubleshooting
(Sheet 4 of 9)

NOTE
8. When the signal generator is adjusted to exactly 11.5 MHz, it will be equal to the receiver mixer frequency (via A8300A) and the scope display will be 0. If, however, the signal generator is adjusted even slightly above or below the mixer frequency, the scope will display a combination of the ac beat signal sine wave and the dc component. Dc polarity will be positive or negative, depending on which way the signal generator frequency varies from the mixer frequency. The dc signal should be between 5 and 7 vdc, while the ac signal should be 6.0 v peak-to-peak.

KEY HANDSET.
OBSERVE SCOPE DISPLAY.

SEE NOTE 8

SCOPE DISPLAY AS PER NOTE 8?

NO
REPLACE AND ALINE 8200A MODULE

YES
RETURN TO PERFORMANCE TESTS

PARA 5-2
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-18
A8000A Assembly Troubleshooting
(sheet 5 of 9)
523. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-18
A8000A Assembly Troubleshooting
(Sheet 6 of 9)
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-18
A8000A Assembly Troubleshooting
(Sheet 7 of 9)
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-18
A8000A Assembly Troubleshooting
(Sheet 8 of 9)
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-19
A9000A and A9400B Assemblies Troubleshooting
(Sheet 1 of 3)

<table>
<thead>
<tr>
<th>TEST POINT</th>
<th>VOLTAGE</th>
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<tbody>
<tr>
<td>TP9001</td>
<td>+650 VDC MIN</td>
</tr>
<tr>
<td>TP9002</td>
<td>+250 VDC MIN</td>
</tr>
<tr>
<td>TP9003</td>
<td>95 VAC MIN</td>
</tr>
<tr>
<td>TP9004</td>
<td>-10 VDC MIN</td>
</tr>
</tbody>
</table>

NOTE
Germanium Assemblies A9000 and A9400 or A9400A must be replaced with Silicon Assemblies A9000A and A9400B. Do not mix Germanium Assemblies A9000 and A9400 or A9400A with Silicon Assemblies A9000A and A9400B.

START

CORRECT EQUIPMENT AS SHOWN ON SH 2

ME-26/U DC LEAD A TO TEST POINTS LISTED IN TABLE A. COMMON TO GND.

AT EACH TEST POINT, KEY HANDSET. NOTE ME-26/U METER INDICATION, THEN UNKEY HANDSET.

VOLTAGES AS LISTED IN TABLE A?

REPLACE A9400B MODULE

IF PROBLEM STILL EXISTS, GO TO NEXT STEP. IF FAULT HAS BEEN CORRECTED, RETURN TO PERFORMANCE TESTS.
523. TROUBLESHOOTING FLOW CHARTS. (CONT)
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-19
A9000A and A9400B Assemblies Troubleshooting
(Sheet 3 of 3)
Section III ALINEMENT AND ADJUSTMENT PROCEDURES

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<td>Adjustment of A6500 Resistor R8516 for Correct Transmitter Narrowband Deviation</td>
<td>5-42</td>
<td>5-195</td>
</tr>
<tr>
<td>A8100 Modulator Alinement</td>
<td>5-43</td>
<td>5-198</td>
</tr>
<tr>
<td>Driver A6100 and Power Amplifier A6200 Alinement</td>
<td>5-44</td>
<td>5-200</td>
</tr>
<tr>
<td>Alinement of RT-246(*)/VRC Servosystem</td>
<td>5-45</td>
<td>5-205</td>
</tr>
</tbody>
</table>

5-24. GENERAL.

This section contains alinement instructions for use with Test Cable No. 1 and TMDE (discrete test equipment). The instructions are presented in individual procedures which apply to a specific stage of the RT receiver or transmitter section.

Except for the local oscillator alineiments, each procedure is self-contained; that is, all necessary instructions are provided without reference to any previously performed alinement. Therefore, it is possible to use the procedures in this section to aline an individual module without doing any work on other stages in the radio.

However, this maintenance approach is not recommended. It is best to perform a complete realinement of all modules after replacing an individual module. This should be done even if the radio has undergone its annual realinement less than one year prior to the repair.

5-150
5-24. GENERAL. (CONT)

Careful performance of all the instructions contained in the receiver and transmitter section alinement procedures ensures that the radio will meet all performance standards outlined in section I of this chapter. Although the radio may seem to work satisfactorily if other quick-fix methods are used, there is no guarantee that such methods will result in proper performance when the radio is used along with secure equipment, or for other than voice communication.

5-25. CRYSTAL REFERENCE SYSTEM (CRS) TEST

PURPOSE. This test is performed to make sure that the local oscillator will not be pulled off frequency by a malfunctioning CRS. Steps 1 through 8 involve a quick check to determine whether the CRS is putting out an incorrect error signal causing improper local oscillator frequency and loss of audio tone. The remaining steps are done with the local oscillator disconnected from the CRS in order to check CRS performance in response to a nonfluctuating 42.00-MHz signal generator output. If the CRS passes the second part of the test, it will be able to correct normal fluctuation in local oscillator frequency.

TEST EQUIPMENT AND MATERIALS

Signal Generator AN/URM-103
Frequency Counter AN/USM-207
Power Supply PP-1104(*)/G
Test Cable No. 1
Rf Cable RG-58/U

Matching Unit CN-901/U
T-Connector UG-274/U
Loudspeaker LS-454/U
Multimeter ME-26(*)/U
Amphenol Adapter M-39012/16

TEST SETUP. Connect the equipment as shown in test setup diagram A. Set A4000 X-MODE/NORMAL switch to X-MODE.
5-25. CRYSTAL REFERENCE SYSTEM (CRS) TEST. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. If using alternate equipment, inject 100-µv rf at 30 MHz; 1-kHz modulation; 8-kHz deviation.

### CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>Clockwise one-third turn</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>NEW OFF</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td></td>
</tr>
<tr>
<td>AN/URM-103</td>
<td>OPERATE/OFF/STAND BY</td>
<td>OPERATE (allow 15-minute warmup)</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>1000 Hz</td>
</tr>
<tr>
<td></td>
<td>BAND SWITCH</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>RF TUNING</td>
<td>LO, 0-10 KUV</td>
</tr>
<tr>
<td></td>
<td>DEVIATION RANGE KHZ</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>RF OUTPUT</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>DEVIATION</td>
<td>Adjust until needle on IF UV RF SET TO LINE meter Is over red line</td>
</tr>
<tr>
<td></td>
<td>RF SET TO LINE</td>
<td>100 µv</td>
</tr>
<tr>
<td></td>
<td>LO RF UV</td>
<td></td>
</tr>
<tr>
<td>AN/USM-207</td>
<td>POWER</td>
<td>Track (allow 5-minute warmup)</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY</td>
<td>PLUG IN</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>FREQ</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>10 (black knob)</td>
</tr>
<tr>
<td></td>
<td>DIRECT/HETERODYNE</td>
<td>DIRECT</td>
</tr>
<tr>
<td></td>
<td>INPUT</td>
<td>0.3 V MAX (both switches to left)</td>
</tr>
<tr>
<td></td>
<td>FREQUENCY TUNING-MC</td>
<td>100</td>
</tr>
</tbody>
</table>

### TEST PROCEDURE

**NOTE**

Check the frequency counter to make sure that the signal generator is outputting exactly 30 MHz. The rf level must be increased temporarily to enable the frequency counter to display. Adjust the AN/URM-103 RF TUNING control as necessary, reset to 100-µv rf level; then disconnect the T-connector from the counter.
5-25. CRYSTAL REFERENCE SYSTEM (CRS) TEST. (CONT)

1. Turn AN/URM-103 DEVIATION control clockwise until DEVIATION KHZ meter reads 8 kHz. The 1000-Hz tone will be heard on speaker. If no tone is heard, CRS may be defective. Make sure the T-connector is disconnected from the coupler.

2. Adjust RT VOLUME control to a comfortable level.

3. Raise A3000 tray.

4. Remove A1000 cover and install alinement cover with at least one screw to ensure good ground.

5. Ground TP3001 with screwdriver.

6. Adjust L1502 (1) to get clearest possible 1000-Hz tone from speaker.

7. Remove ground from TP30001. Tone must not change.

NOTE

If the tone heard changes to a rushing noise when step 7 is completed, the CRS is defective. See the troubleshooting section.

8. Set RT MC-TUNE-KC control to 40.00 MHz; then back to 30.00 MHz. Tone must not change.

NOTE

If the tone changes after step 8 is completed, the CRS may be defective. See the troubleshooting section.

9. Set RT MC-TUNE-KC control to 30.50 MHz.

10. Remove rf cable and matching unit from AN/URM-103 LO-RF jack and input in HI-RF jack.

11. Remove P1004 from J1004 on A1000 tray.

12. Remove rf cable from ANT jack on RT.

13. Using Amphenol Adapter M-39012/16, connect rf cable to P1004.

14. Connect T-connector to frequency counter.

15. Set AN/URM-103 RF OUTPUT control to 125 KUV.

16. Adjust AN/URM-103 RF TUNING control for 42.00-MHz output. Verify frequency on frequency counter.

17. Set ME-26(*)/U to 3-vdc scale and turn ZERO ADJ for midscale reading.

18. Connect ME-26(*)/U positive lead to TP3001, and negative lead to ground.

19. Check reading on ME-26(*)/U. Meter should read zero vdc (midscale), with slight fluctuation.
5-25. **CRYSTAL REFERENCE SYSTEM (CRS) TEST. (CONT)**

**NOTE**

If ME-26(*)/U reads greater than +0.32 vdc or less than -0.32 vdc, the CRS is defective. See the troubleshooting section.

In steps 20 and 21, ME-26(*)/U should vary smoothly at least to +0.5 vdc and then at least -0.5 vdc. If not, the CRS is defective. See the troubleshooting section.

20. Slowly turn AN/URM-103 RF TUNING control to increase output frequency to 42.25 MHz. Note change in reading on ME-26(*)/U.

21. Slowly turn AN/URM-103 RF TUNING control to decrease output frequency to 41.75 MHz. Note change in reading on ME-26(*)/U.

22. Proceed to paragraph 5-27 Local Oscillator A1500 Alinement.

5-26. **LOCAL OSCILLATOR A1500 ALINEMENT.**

**PURPOSE.** If the local oscillator is operating at the correct frequency, the CRS will not output a dc error signal. This procedure alines the oscillator by tuning its circuits to bring the CRS error signal as close to zero as possible. The Crystal Reference System Test (paragraph 5-25) must be done prior to performing this alinement.

**TEST EQUIPMENT AND MATERIALS**

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal Generator AN/URM-103</td>
<td>Matching Unit CN-901/U</td>
</tr>
<tr>
<td>Frequency Counter AN/USM-207</td>
<td>T-Connector UG-274/U</td>
</tr>
<tr>
<td>Power Supply PP-1104(*)/G</td>
<td>Loudspeaker LS-454/U</td>
</tr>
<tr>
<td>Test Cable No. 1</td>
<td>Multimeter ME-26(*)/U</td>
</tr>
</tbody>
</table>

**TEST SETUP.** Connect the equipment as shown in test setup diagram (page 5-155). Connect P1004 to J1004 on the A3000 tray.
5-26. LOCAL OSCILLATOR A1500 ALINEMENT (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Change the final settings used in the CRS Test as follows:

1. Set AN/URM-103 RF OUTPUT switch to 0-10 KUV.
2. Adjust AN/URM-103 RF TUNING control for 42.00-MHz output.

**NOTE**

Check the frequency counter to make sure that the signal generator is outputting exactly 42 MHz. The rf level must be increased temporarily to enable the frequency counter to display. Adjust the AN/URM-103 RF TUNING Control as necessary, reset to 100-µv rf level, then disconnect the T-connector from the counter.

3. Set RT MC-TUNE-KC control to 42.00 MHz.
4. Adjust AN/URM-103 DEVIATION control for 8-kHz reading on DEVIATION KHZ meter.
5-26. LOCAL OSCILLATOR A1500 ALIGNMENT. (CONT)

ALIGNMENT PROCEDURE

1. Connect ME-26(*)/U positive lead to TP3001 and negative lead to ground.
2. Adjust C1501 (1) for clear audio tone and zero-volt reading on ME-26(*)/U. Zero-volt reading means zero deflection from 1.5 v center of scale. (See test setup diagram B.)
3. Set RT MC-TUNE-KC control to 30.00 MHz.
4. Connect AN/USM-207 frequency counter to T-connector.
5. Adjust AN/URM-103 RF TUNING control for 30.00-MHz output.

NOTE

Check the frequency counter to make sure that the signal generator is outputting exactly 30 MHz. The rf level must be increased temporarily to enable the frequency counter to display. Adjust the AN/URM-103 RF TUNING control as necessary, reset to 100-µv rf level; then disconnect the T-connector from the counter.

6. Adjust L1502 (2) for clear audio tone and zero-volt reading on ME-26(*)/U.
7. Set RT MC-TUNE-KC control to 52.00 MHz.
8. Connect frequency counter to T-connector.
9. Adjust AN/URM-103 RF TUNING control for 52.00-MHz output.
10. Adjust L1501 (3) for clear audio tone and zero-volt reading on ME-26(*)/U. Set RT to 42.00 MHz and AN/URM-103 to 42.00 MHz.
11. Repeat steps 2 through 10 to make sure that local oscillator tracks with no more than 0.5-vdc error signal required in any of the three test frequencies.

NOTE

If the ME-26(*)/U indicates more than +0.5 vdc or less than -0.5 vdc in any frequency, and repetition of steps 2 through 10 does not correct the problem, replace the A1500 assembly.
5-27. LOCAL OSCILLATOR A1500 ALTERNATE ALIGNMENT PROCEDURE

PURPOSE. This procedure permits alignment of the local oscillator without the use of a signal generator. The frequency of the local oscillator is checked directly with a counter; therefore, the presence of an audible audio tone is not important. Thus, alignment does not depend on the performance of the A4000 or A5000 sections of the receiver. The CRS Test must be done prior to performing this alignment (paragraph 5-25).

TEST EQUIPMENT AND MATERIALS

- Frequency Counter AN/USM-207
- Multimeter ME-26(*)/U
- Two Amphenol Adapters M-39012/16
- One extra SMC rf cable
- T-Connectors (two) UG-274/U

TEST SETUP. Connect equipment as shown in test setup diagram A.

INITIAL EQUIPMENT CONTROL SETTINGS. Change the final settings used in the CRS Test as follows:

1. Set RT MC-TUNE-KC control to 30.00 MHz.
2. Set AN/USM-207 Sensitivity switch as necessary to trigger frequency counter.

ALIGNMENT PROCEDURE
5-27. LOCAL OSCILLATOR A1500 ALTERNATE ALIGNMENT PROCEDURE (CONT)

1. Connect ME-26(*)/U positive lead to TP3001.

**NOTE**

In the following adjustment, it may not be possible to achieve zero frequency error and zero-vdc indication on the ME-26(*)/U. Local oscillator tolerance with the CRS connected is ±3.5 kHz. The ME-26(*)/U should not exceed ±0.5 vdc.

2. Adjust L1502 (1) for 41.5-MHz reading in counter and zero vdc (midscale) on ME-26(*)/U. (See test setup diagram page 5-157.)
3. Set RT MC-TUNE-KC control to 52.00 MHz.
4. Adjust L1501 (2) for 63.5-MHz reading on counter and zero vdc (midscale) on ME-26(*)/U.
5. Set RT to 42.00 MHz.
6. Adjust C1501 (3) for 53.5-MHz reading on counter and zero vdc (midscale) on ME-26(*)/U.
7. Set RT to 30.00 MHz.
8. Repeat steps 2 through 6 until ME-26(*)/U reads zero vdc for all three frequencies.
9. Reconnect P1004 to J1004.

5-26. TUNER A1000 ALIGNMENT.

**PURPOSE.** This procedure tunes the A1000 assembly to produce maximum amplification of low-level signals and maximum attenuation of noise.

**TEST EQUIPMENT AND MATERIALS**

- Signal Generator AN/URM-103
- Frequency Counter AN/USM-207
- Power Supply PP-1104(*)/G
- Test Cable No. 1
- Matching Unit CN-901/U
- T-Connector UG-274/U
- Loudspeaker LS-454/U
- Voltmeter ME-30(*)/U

**TEST SETUP.** Connect equipment as shown in test setup diagram page 5-159.
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. When using alternate equipment, inject unmodulated rf carrier at 30, 52, 53, 75, 65, and 52 MHz, in that order. Rf output level will vary according to alignment requirements.

**CONTROL AND SWITCH SETTINGS**

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>NEW OFF</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>Fully clockwise</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td></td>
</tr>
<tr>
<td>AN/URM-103</td>
<td>FUNCTION</td>
<td>MOD OFF</td>
</tr>
<tr>
<td></td>
<td>RF OUTPUT</td>
<td>LO, 0-10 KUV</td>
</tr>
<tr>
<td></td>
<td>LO RF UV</td>
<td>Set to zero output</td>
</tr>
<tr>
<td></td>
<td>BAND SWITCH</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RF TUNING</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OPERATE/OFF/STAND BY</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
### 5-28. TUNER A1000 ALIGNMENT. (CONT)

## CONTROL AND SWITCH SETTINGS (CONT)

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/USM-207</td>
<td>POWER</td>
<td>TRACK</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY</td>
<td>PLUG IN</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>FREQ</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>10(^\circ) (black knob)</td>
</tr>
<tr>
<td></td>
<td>DIRECT/HETERODYNE</td>
<td>DIRECT</td>
</tr>
<tr>
<td></td>
<td>INPUT</td>
<td>0.3 V MAX (both switches to left)</td>
</tr>
<tr>
<td></td>
<td>FREQUENCY TUNING-MC</td>
<td>100</td>
</tr>
</tbody>
</table>

### ALIGNMENT PROCEDURE

**30-MHz Test**

1. Check AN/URM-103 frequency output on frequency counter, then disconnect from counter.
2. Set ME-30\(^(*)\)/U to 3-volt scale.
3. Connect ME-30\(^(*)\)/U positive lead to TP5012(1), and negative lead to ground. (See test setup diagram B.)
4. Note reading on ME-30\(^(*)\)/U.
5-28. TUNER A1000 ALIGNMENT. (CONT)

5. While observing ME-300(*)/U, increase rf output level of AN/URM-103 by turning LO RF UV control until ME-30(*)/U drops to one-half of step 4 reading.
6. Adjust C1104(2), C1205(3), and C1305(4) for lowest possible ME-30(*)/U reading and minimum noise from speaker.

52-MHz Test

7. Set RT MC-TUNE-KC control to 52.00 MHz.
   Adjust AN/URM-103 RF TUNING control to 52.00 MHz. Check on frequency counter.
8. Set AN/URM-103 LO RF UV control for zero-rf output.
10. Note reading on ME-30(*)/U.
11. While observing ME-30(*)/U, increase rf output level of AN/URM-103 by turning LO RF UV control until ME-30(*)/U drops to one-half of step 10 reading.
12. Adjust L1102(5), L1202(6), and L1302(7) for lowest possible ME-30(*)/U reading and minimum noise from speaker. (See test setup diagram  B, page 5-160.)

53-MHz Test

13. Set RT MC-TUNE-KC control to 53.00 MHz.
14. Adjust AN/URM-103 RF TUNING control to 53.00 MHz. Check on frequency counter.
15. Set AN/URM-103 LO RF UV control for zero-rf output.
16. Note reading on ME-30(*)/U.
17. While observing ME-30(*)/U, increase rf output level of AN/URM-103 by turning LO RF UV control until ME-30(*)/U drops to one-half of step 16 reading.
18. Adjust L1103(8), L1203(9), and L1303(10) for lowest possible ME-30(*)/U reading and minimum noise from speaker. (See test setup diagram  B.)

75-MHz Test

19. Set RT MC-TUNE-KC control to 75.00 MHz.
20. Adjust AN/URM-103 RF TUNING control to 75.00 MHz. Check on frequency counter.
21. Set AN/URM-103 LO RF UV control for zero-rf output.
22. Note reading on ME-30(*)/U.
23. While observing ME-30(*)/U, increase rf output level of AN/URM-103 by turning LO RF UV control until ME-30(*)/U drops to one-half of step 22 reading.
24. Adjust L1101(11), L1201(12) and L1301(13) for lowest possible ME-30(*)/U reading and minimum noise from speaker. (See test setup diagram  B.)

65-MHz Test

25. Set RT MC-TUNE-KC control to 65.00 MHz.
28. Adjust AN/URM-103 RF TUNING control to 65.00 MHz. Check on frequency counter.
27. Set AN/URM-103 LO RF UV control for zero-rf output.
28. Note reading on ME-30(*)/U.
29. While observing ME-30(*)/U, increase rf output level of AN/URM-103 by turning LO RF UV control until ME-30(*)/U drops to one-half of step 28 reading.
30. Adjust C1101(14), C1201(15), and C1301(16) for lowest possible ME-30(*)/U reading and minimum noise from speaker. (See test setup diagram  B.)
5-28. TUNER A1000 ALINEMENT. (CONT)

Mixer Adjustment

31. Set RT MC-TUNE-KC control to 52.00 MHz.
32. Adjust AN/URM-103 RF TUNING control to 52.00 MHz. Check on frequency counter.
33. Set AN/URM-103 LO RF UV control for zero-rf output.
34. Note reading on ME-30(*)/U.
35. While observing ME-30(*)/U, increase rf output level of AN/URM-103 by turning LO RF UV control until ME-30(*)/U drops to one-half of step 34 reading.
36. Set ME-30(*)/U to 1-volt scale.
37. Adjust C1404(17) for lowest possible ME-30(*)/U reading. (See test setup diagram B.)

NOTE

The ME-30(*)/U reading can also decrease if C1404 is turned in or out too far. The first sharp decrease in the ME-30(*)/U reading will indicate the correct C1404 adjustment.

5-29. IF DISCRIMINATOR A4200 ALINEMENT.

PURPOSE. This procedure enables the discriminator to provide maximum separation of the audio signal from the rf carrier. Adjusting for zero vdc at TP4003 ensures that TA206 and T4207 are conducting equally around the carrier frequency. Adjusting for maximum ac at TP4007 ensures that the discriminator is tuned exactly to the 11.5-MHz center frequency.

TEST EQUIPMENT AND MATERIALS

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal Generator</td>
<td>AN/URM-103</td>
</tr>
<tr>
<td>Frequency Counter</td>
<td>AN/USM-207</td>
</tr>
<tr>
<td>Power Supply</td>
<td>PP-1104(*)/G</td>
</tr>
<tr>
<td>Test Cable No. 1</td>
<td></td>
</tr>
<tr>
<td>Multimeter</td>
<td>ME-26(*)/U</td>
</tr>
<tr>
<td>Matching Unit</td>
<td>CN-901/U</td>
</tr>
<tr>
<td>T-Connector</td>
<td>UG-274/U</td>
</tr>
<tr>
<td>Loudspeaker</td>
<td>LS-454/U</td>
</tr>
<tr>
<td>Voltmeter</td>
<td>ME-30(*)/U</td>
</tr>
</tbody>
</table>

TEST SETUP. Connect the equipment as shown in test setup diagram A, page 5-163.
5-29. IF DISCRIMINATOR A4200 ALIGNMENT. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. If using alternate equipment, inject 20-µv rf at 30 MHz, 1-kHz modulation; 8-kHz deviation.

<table>
<thead>
<tr>
<th>CONTROL AND SWITCH SETTINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EQUIPMENT</strong></td>
</tr>
<tr>
<td>RT</td>
</tr>
<tr>
<td>RT</td>
</tr>
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<td>RT</td>
</tr>
<tr>
<td>RT</td>
</tr>
<tr>
<td>RT</td>
</tr>
<tr>
<td>RT</td>
</tr>
<tr>
<td>AN/URM-103</td>
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<td>AN/URM-103</td>
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<tr>
<td>AN/URM-103</td>
</tr>
<tr>
<td>RT</td>
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</table>

5-163
5-29. IF DISCRIMINATOR A4200 ALINEMENT. (CONT)

CONTROL AND SWITCH SETTINGS (CONT)

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/USM-207</td>
<td>POWER</td>
<td>TRACK</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY</td>
<td>PLUG IN</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>FREQ</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>10° (black knob)</td>
</tr>
<tr>
<td></td>
<td>DIRECT/HETEROODYNE</td>
<td>DIRECT</td>
</tr>
<tr>
<td></td>
<td>INPUT</td>
<td>0.3 V MAX (both switches to left)</td>
</tr>
<tr>
<td></td>
<td>FREQUENCY TUNING-MC</td>
<td>100</td>
</tr>
</tbody>
</table>

ALINEMENT PROCEDURE

NOTE

Check the frequency counter to make sure that the signal generator is outputting exactly 30 MHz. The rf level must be increased temporarily to enable the frequency counter to display. Adjust the AN/URM-103 RF TUNING control as necessary, reset to 20-µv rf level; then disconnect the T-connector from the counter.
5-29. **IF DISCRIMINATOR A4200 ALIGNMENT. (CONT)**

1. Turn AN/URM-103 DEVIATION control clockwise until DEVIATION KHZ meter reads 8 kHz.
2. Set ME-30(*)/U to 1-vdc scale and turn ZERO ADJ for midscale reading.
3. Set ME-30(*)/U to 3-volt scale.
4. Lift A4000 tray (1). (See test setup diagram B, page 5-164.)
5. Connect ME-26(*)/U positive lead to TP4003 (2) and negative lead to ground.
6. Connect ME-30(*)/U positive lead to TP4007 (3) and negative lead to ground.
7. Adjust T4206 (4) for zero-vdc reading (center of scale; no deflections) on ME-26(*)/U.
   Adjust T4207 (5) for peak reading ME-30(*)/U.
8. Repeat steps 7 and 8 until maximum ME-30(*)/U reading and zero-vdc ME-26(*)/U reading occur at the same time.

5-30. **SILICON VERSION IF DISCRIMINATOR A4200A ALIGNMENT.**

**PURPOSE.** This procedure enables the integrated circuit discriminator to provide maximum separation of the audio signal from the rf carrier. Coil L4202 is adjusted to tune the fm detector portion of the Integrated circuit exactly to the 11.5-MHz center frequency.

**TEST EQUIPMENT AND MATERIALS**

- Signal Generator AN/URM-103
- Frequency Counter AN/USM-207
- Power Supply PP-1104(*)/G
- Test Cable No. 1
- Matching Unit CN-901/U
- T-Connector UG-274/U
- Loudspeaker LS-454/U
- Voltmeter ME-30(*)/U

**TEST SETUP.** Connect the equipment as shown in test setup diagram A.
5-30. SILICON VERSION IF DISCRIMINATOR A4200A ALIGNMENT. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. If using alternate equipment, inject 20-µv rf at 30 MHz 1-kHz modulation; 8-kHz deviation.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully clockwise</td>
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<tr>
<td></td>
<td>SQUELCH</td>
<td>NEW OFF</td>
</tr>
<tr>
<td>AN/URM-103</td>
<td>OPERATE/OFF/STAND BY FUNCTION</td>
<td>OPERATE</td>
</tr>
<tr>
<td></td>
<td>BAND SWITCH</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>RF TUNING</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>DEVIATION RANGE KHZ</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>RF OUTPUT</td>
<td>LO, 0-10 KUV</td>
</tr>
<tr>
<td></td>
<td>DEVIATION</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>RF SET TO LINE</td>
<td>Adjust until needle on IF UV RF SET TO LINE meter is over red line</td>
</tr>
<tr>
<td></td>
<td>LO RF UV</td>
<td>20 µv</td>
</tr>
<tr>
<td>AN/USM-207</td>
<td>POWER</td>
<td>TRACK</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY</td>
<td>PLUG IN</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>FREQ</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>10° (black knob)</td>
</tr>
<tr>
<td></td>
<td>DIRECT/HETEROODYNE</td>
<td>DIRECT</td>
</tr>
<tr>
<td></td>
<td>INPUT</td>
<td>0.3 V MAX (both switches to left)</td>
</tr>
<tr>
<td></td>
<td>FREQUENCY TUNING-MC</td>
<td>100</td>
</tr>
</tbody>
</table>
5-30. SILICON VERSION IF DISCRIMINATOR A4200A ALINEMENT. (CONT)

ALIGNMENT PROCEDURE

NOTE

Check the frequency counter to make sure that the signal generator is outputting exactly 30 MHz. The rf level must be increased temporarily to enable the frequency counter to display. Adjust the AN/URM-103 RF TUNING control as necessary, reset to 20-µv rf level; then disconnect the T-connector from the counter.

1. Turn AN/URM-103 DEVIATION control clockwise until DEVIATION KHZ meter reads 8 kHz.
2. Set ME-30(*)/U to 1-volt scale.
3. Lift A4000 tray (1). (See test setup diagram.)
   Connect ME-30(*)/U positive lead to TP4007 (2), and negative lead to ground.
4. Adjust L4202 (3) for maximum indication on ME-30(*)/U.

5-31. AUDIO AND SQUELCH PREAMPLIFIER A4300 ALINEMENT.

PURPOSE. This procedure adjusts the gain of the A4300 assembly.

TEST EQUIPMENT AND MATERIALS

- Signal Generator AN/URM-103
- Frequency Counter AN/USM-207
- Power Supply PP-1104(*)/G
- Test Cable No. 1
- Matching Unit CN-901/U
- T-Connector UG-274/U
- Loudspeaker LS-454/U
- Voltmeter ME-30(*)/U
5-31. AUDIO AND SQUELCH PREAMPLIFIER ALIGNMENT. (CONT)

TEST SETUP. Connect the equipment as shown in test setup diagram A.
5-31. AUDIO AND SQUELCH PREAMPLIFIER A4300 ALIGNMENT. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. When using alternate equipment, inject 20-µv rf at 30 MHz, 1-kHz modulation; 8-kHz deviation.

### CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
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<tbody>
<tr>
<td>RT</td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fully clockwise</td>
</tr>
<tr>
<td>AN/URM-103</td>
<td>OPERATE/OFF/STAND BY</td>
<td>OPERATE (allow 15-minute warmup)</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>1000 Hz</td>
</tr>
<tr>
<td></td>
<td>BAND SWITCH</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>RF TUNING</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>DEVIATION RANGE KHZ</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>RF OUTPUT</td>
<td>LO, 0-10 KUV</td>
</tr>
<tr>
<td></td>
<td>DEVIATION</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>RF SET TO LINE</td>
<td>Adjust until needle on IF UV RF SET TO LINE</td>
</tr>
<tr>
<td></td>
<td>LO RF UV</td>
<td>meter is over red line</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20 µv</td>
</tr>
<tr>
<td>AN/USM-207</td>
<td>POWER</td>
<td>TRACK</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td></td>
<td><strong>Sensitivity</strong></td>
<td>PLUG IN</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>FREQ</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>10³ (black knob)</td>
</tr>
<tr>
<td></td>
<td>DIRECT/HETERODYNE</td>
<td>DIRECT</td>
</tr>
<tr>
<td></td>
<td>INPUT</td>
<td>0.3 V MAX (both switches to left)</td>
</tr>
<tr>
<td></td>
<td>FREQUENCY TUNING-MC</td>
<td>1000</td>
</tr>
</tbody>
</table>
5-31. AUDIO AND SQUELCH PREAMPLIFIER A4300 ALIGNMENT. (CONT)

ALIGNMENT PROCEDURE

NOTE

Check the frequency counter to make sure that the signal generator is outputting exactly 30 MHz. The rf level must be increased temporarily to enable the frequency counter to display. Adjust the AN/URM-103 RF TUNING CONTROL as necessary, reset to 100-µv rf level; then disconnect the T-connector from the counter.

1. Turn AN/URM-103 DEVIATION control clockwise until DEVIATION KHZ meter reads 8 kHz.
2. Set ME-30(*)/U to 1-volt scale.
3. Lift A4000 tray (1). (See test setup diagram B.)
4. Remove A4300 cover (2).
5. Connect ME-30(*)/U positive lead to TP4007 (3) and negative lead to ground.
6. Adjust R4304 (4) for 0.8-vac reading on ME-30(*)/U.

5-32. SILICON VERSION AUDIO AND SQUELCH PREAMPLIFIER A4300A ALIGNMENT.

PURPOSE. This procedure adjusts the gain of the A4300A assembly.

TEST EQUIPMENT AND MATERIALS

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal Generator AN/URM-103</td>
<td></td>
</tr>
<tr>
<td>Frequency Counter AN/USM-207</td>
<td></td>
</tr>
<tr>
<td>Power Supply PP-1104(*)/G</td>
<td></td>
</tr>
<tr>
<td>Test Cable No. 1</td>
<td></td>
</tr>
<tr>
<td>Matching Unit CN-901/U</td>
<td></td>
</tr>
<tr>
<td>T-Connector UG-274/U</td>
<td></td>
</tr>
<tr>
<td>Loudspeaker LS-454/U</td>
<td></td>
</tr>
<tr>
<td>Voltmeter ME-30 (*)/U</td>
<td></td>
</tr>
</tbody>
</table>

5-170
5-32. SILICON VERSION AUDIO AND SQUELCH PREAMPLIFIER A4300A ALINEMENT. (CONT)

TEST SETUP. Connect the equipment as shown in test setup diagram A.

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. When using alternate equipment, inject 10-µv rf at 64 MHZ 1-kHz modulation, 8-kHz deviation.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
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<tr>
<td></td>
<td>BAND</td>
<td>64.00</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>Fully clockwise</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>NEW OFF</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>TRACK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PLUG IN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FREQ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10&quot; (black knob)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DIRECT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.3 V MAX (both switches to left)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

AN/USM-207

POWER
DISPLAY
Sensitivity
FUNCTION
GATE TIME
DIRECT/HETERODYNE
INPUT
FREQUENCY TUNING-MC
5-32. SILICON VERSION AUDIO AND SQUELCH PREAMPLIFIER A4300A ALINEMENT (CONT)

CONTROL AND SWITCH SETTINGS (CONT)

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/URM-103</td>
<td>OPERATE/OFF/STAND BY FUNCTION</td>
<td>OPERATE (allow 15-minute warmup)</td>
</tr>
<tr>
<td></td>
<td>BAND SWITCH</td>
<td>1000 Hz</td>
</tr>
<tr>
<td></td>
<td>RF TUNING</td>
<td>64.00</td>
</tr>
<tr>
<td></td>
<td>DEVIATION RANGE KHZ</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>RF OUTPUT</td>
<td>LO, 0-10 KUV</td>
</tr>
<tr>
<td></td>
<td>DEVIATION</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>RF SET TO LINE</td>
<td>Adjust until needle on IF UV RF</td>
</tr>
<tr>
<td></td>
<td>LO RF UV</td>
<td>SET TO LINE meter is over red line</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 µV</td>
</tr>
</tbody>
</table>

ALIGNMENT PROCEDURE

NOTE

Check the frequency counter to make sure that the signal generator is outputting exactly 64 MHz. The rf level must be increased temporarily to enable the frequency counter to display. Adjust the AN/URM-103 RF TUNING control as necessary, reset to 10-µv rf level; then disconnect the T-connector from the counter.
5-32. SILICON VERSION AUDIO AND SQUELCH PREAMPLIFIER A4300A ALIGNMENT. (CONT)

1. Turn AN/URM-103 DEVIATION control clockwise until DEVIATION KHZ meter reads 8 kHz.
2. Set ME-30(*)/U to 1-volt scale.
3. Lift A4000 tray (1). (See test setup diagram B, page 5-172.)
4. Remove A4300A cover (2).
5. Connect ME-30(*)/U positive lead to TP4007(3) and negative lead to ground.
6. Adjust R4304(4) for 0.8-vac reading on ME-30(*)/U.

5-33. ALIGNMENT OF A5300 SQUELCH FILTER FOR CORRECT TRANSMITTED SQUELCH TONE.

PURPOSE. This procedure adjusts Resistor R5301 in the squelch filter to ensure transmission of a 150-Hz NEW SQUELCH tone. Adjustment of R5301 during transmission also properly tunes the squelch filter for 150-Hz NEW SQUELCH tone reception.

TEST EQUIPMENT AND MATERIALS

Power Supply PP-1104(*)/G
Frequency Counter AN/USM-207
Dummy Load DA-75/U
T-Connector UG-274/U
Test Cable No. 1

TEST SETUP. Connect the equipment as shown in test setup diagram A.

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>NEW ON</td>
</tr>
</tbody>
</table>
5-33. ALIGNMENT OF A5300 SQUELCH FILTER FOR CORRECT TRANSMITTED SQUELCH TONE. (CONT)

CONTROL AND SWITCH SETTINGS (CONT)

<table>
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<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/USM-207</td>
<td>POWER</td>
<td>TRACK</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY</td>
<td>0.1 V</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>1 (black knob)</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>FREQ</td>
</tr>
</tbody>
</table>

ALIGNMENT PROCEDURE

1. Connect frequency counter to TP5008 (1). (See test setup diagram B.)
2. Key transmitter.
3. Check frequency counter. Indication should be 150 ±1 Hz. If frequency is not correct, go to step 4.
4. Adjust R5301(2) until frequency counter indicates 150 Hz. (See test setup diagram B.)
5. Unkey transmitter.
5-34. ALINEMENT OF SILICON A5300A SQUELCH FILTER FOR CORRECT TRANSMITTED SQUELCH TONE

PURPOSE. This procedure adjusts Resistor R5303 in the squelch filter to ensure transmission of a 150-Hz NEW SQUELCH tone. Adjustment of R5303 during transmission also properly tunes the squelch filter for 150-Hz NEW SQUELCH tone reception.

TEST EQUIPMENT AND MATERIALS

Power Supply PP-1104(*)/G
Frequency Counter AN/USM-207
Test Cable No. 1

Dummy Load DA-75/U
T-Connector UG-274/U

TEST SETUP. Connect the equipment as shown in test setup diagram A.

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

<table>
<thead>
<tr>
<th>CONTROL AND SWITCH SETTINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQUIPMENT</td>
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</tr>
<tr>
<td></td>
</tr>
<tr>
<td>AN/USM-207</td>
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</tr>
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</tr>
</tbody>
</table>

5-175
5-34. ALINEMENT OF SILICON A5300A SQUELCH FILTER FOR CORRECT TRANSMITTED SQUELCH TONE. (CONT)

ALINEMENT PROCEDURE

1. Connect frequency counter to TP5008 (1). (See test setup diagram B.)
2. Key transmitter.
3. Check frequency counter indication should be 150 ±1 Hz. If frequency is not correct, go to step 4.
4. Adjust R5303 (2) until frequency counter indicates 150 Hz. (See test setup diagram B.)
5. Unkey transmitter.

5-35. A5200 SQUELCH AMPLIFIER ALINEMENT, NEW SQUELCH LEVEL.

PURPOSE. This procedure adjusts the receiver sensitivity to the 150-Hz NEW SQUELCH tone.

TEST EQUIPMENT AND MATERIALS

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal Generator AN/URM-103</td>
<td></td>
</tr>
<tr>
<td>Frequency Counter AN/USM-207</td>
<td></td>
</tr>
<tr>
<td>Power Supply PP-1104(*)/G</td>
<td></td>
</tr>
<tr>
<td>Test Cable No. 1</td>
<td></td>
</tr>
<tr>
<td>Matching Unit CN-901/U</td>
<td></td>
</tr>
<tr>
<td>T-Connector UG-274/U</td>
<td></td>
</tr>
<tr>
<td>Loudspeaker LS-454/U</td>
<td></td>
</tr>
<tr>
<td>Voltmeter ME-30(*~U)</td>
<td></td>
</tr>
</tbody>
</table>

TEST SETUP. Connect the equipment as shown in test setup diagram A. (Page 5-177)
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. When using alternate equipment, inject 20-µv at 30 MHz, with 150-Hz modulation; deviation as per alinement requirements.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
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<td>RT</td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully clockwise</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>NEW ON</td>
</tr>
<tr>
<td></td>
<td>OPERATE/OFF/STAND BY FUNCTION</td>
<td>OPERATE</td>
</tr>
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<td>AN/URM-103</td>
<td>BAND SWITCH</td>
<td>150 Hz</td>
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<td>RF TUNING</td>
<td>30.00</td>
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<td></td>
<td>DEVIATION RANGE KHZ</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>RF OUTPUT</td>
<td>LO, 0-10 KUV</td>
</tr>
<tr>
<td></td>
<td>DEVIATION</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>RF SET TO LINE</td>
<td>Adjust until needle on IF UV RF SET TO LINE meter is over red line</td>
</tr>
<tr>
<td></td>
<td>LO RF UV</td>
<td>20 µv</td>
</tr>
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</table>
### A5200 SQUELCH AMPLIFIER ALIGNMENT, NEW SQUELCH LEVEL (CONT)

#### CONTROL AND SWITCH SETTINGS (CONT)

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
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<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/USM-207</td>
<td>POWER</td>
<td>TRACK</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY</td>
<td>PLUG IN</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>FREQ</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>10¹² (black knob)</td>
</tr>
<tr>
<td></td>
<td>DIRECT/HETERODYNE</td>
<td>DIRECT</td>
</tr>
<tr>
<td></td>
<td>INPUT</td>
<td>0.3 V MAX (both switches to left)</td>
</tr>
<tr>
<td></td>
<td>FREQUENCY TUNING-MC</td>
<td>100</td>
</tr>
</tbody>
</table>

#### ALIGNMENT PROCEDURE

**NOTE**

Check the frequency counter to make sure that the signal generator is outputting exactly 30 MHz. The rf level must be increased temporarily to enable the frequency counter to display. Adjust the AN/URM-103 RF TUNING control as necessary, reset to 20-µv rf level; then disconnect the T-connector from the counter.

![Diagram of A5000 Module](image)
5-35. **A5200 SQUELCH AMPLIFIER ALIGNMENT, NEW SQUELCH LEVEL (CONT)**

1. Lift RT A3000 tray.
2. Set ME-30(*)/U to 10-volt scale.
3. Connect ME-30(*)/U positive lead to TP5008 (1) and negative lead to ground. (See test setup diagram B.)
4. Turn AN/URM-103 DEVIATION control clockwise until ME-30(*)/U reads 4 vac.
5. Remove ME-30(*)/U positive lead.
6. Adjust NEW Squelch Resistor R5217 (2) until RT CALL light just comes on.

**5-36. SILICON VERSION A5200A SQUELCH AMPLIFIER ALIGNMENT, NEW SQUELCH LEVEL.**

PURPOSE. This procedure adjusts the receiver sensitivity to the 150-Hz NEW SQUELCH tone.

**TEST EQUIPMENT AND MATERIALS**

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal Generator</td>
<td>AN/URM-103</td>
</tr>
<tr>
<td>Frequency Counter</td>
<td>AN/USM-207</td>
</tr>
<tr>
<td>Power Supply</td>
<td>PP-1104(*)/G</td>
</tr>
<tr>
<td>Test Cable No. 1</td>
<td></td>
</tr>
<tr>
<td>Matching Unit</td>
<td>CN-901/U</td>
</tr>
<tr>
<td>T-Connector</td>
<td>UG-274/U</td>
</tr>
<tr>
<td>Loudspeaker</td>
<td>LS-454/U</td>
</tr>
<tr>
<td>Voltmeter</td>
<td>ME-30(*)/U</td>
</tr>
</tbody>
</table>

**TEST SETUP.** Connect the equipment as shown in test setup diagram A.
5-36. SILICON VERSION A5200A SQUELCH AMPLIFIER ALIGNMENT, NEW SQUELCH LEVEL (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. When using alternate equipment, inject 2000-µv rf at 64 MHz, 150-Hz modulation; deviation as per alignment requirements.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>64.00</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>Fully clockwise</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>NEW ON</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td></td>
</tr>
<tr>
<td>AN/URM-103</td>
<td>OPERATE/OFF/STAND BY FUNCTION</td>
<td>OPERATE</td>
</tr>
<tr>
<td></td>
<td>BAND SWITCH</td>
<td>150 Hz</td>
</tr>
<tr>
<td></td>
<td>RF TUNING</td>
<td>64.00</td>
</tr>
<tr>
<td></td>
<td>DEVIATION RANGE KHZ</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>RF OUTPUT</td>
<td>LO, 0-10 KUV</td>
</tr>
<tr>
<td></td>
<td>DEVIATION</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>RF SET TO LINE</td>
<td>Adjust until needle on IF UV RF SET TO LINE meter is over red line</td>
</tr>
<tr>
<td></td>
<td>LO RF UV</td>
<td>2000 µv</td>
</tr>
<tr>
<td>AN/USM-207</td>
<td>POWER</td>
<td>TRACK</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>MIN</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY</td>
<td>PLUG IN</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>FREQ</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>10° (black knob)</td>
</tr>
<tr>
<td></td>
<td>DIRECT/HETERODYNE</td>
<td>DIRECT</td>
</tr>
<tr>
<td></td>
<td>INPUT</td>
<td>0.3 V MAX (both switches to left)</td>
</tr>
<tr>
<td></td>
<td>FREQUENCY TUNING-MC</td>
<td>100</td>
</tr>
</tbody>
</table>
ALINEMENT PROCEDURE

NOTE

Check the frequency counter to make sure that the signal generator is outputting exactly 64 MHz. The rf level must be increased temporarily to enable the frequency counter to display. Adjust the AN/URM-103 RF TUNING control as necessary, reset to 2000-µv rf level; then disconnect the T-connector from the counter.

1. Lift RT A3000 tray.
2. Set ME-30(*)/U to 0.3-volt scale.
3. Connect ME-30(*)/U to TP5008 (1). (See test setup diagram B.)
4. Turn AN/URM-103 DEVIATION control clockwise until ME-30(*)/U reads 0.20 ± 0.01 vac.
5. Adjust NEW Squelch Resistor 5207 (2) until RT CALL light just comes on.
6. Turn AN/URM-103 DEVIATION control counterclockwise until ME-30(*)/U reads 0.15 ± 0.01 vac. RT CALL light should be off.

NOTE

If CALL light does not go off in step 6, repeat steps 4 and 5.
5-37. **A5200 SQUELCH AMPLIFIER ALIGNMENT, OLD SQUELCH LEVEL.**

**PURPOSE.** This procedure adjusts the receiver sensitivity to the OLD SQUELCH signals which include internal noise and the received carrier.

**TEST EQUIPMENT AND MATERIALS**

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal Generator</td>
<td>AN/URM-103</td>
</tr>
<tr>
<td>Frequency Counter</td>
<td>AN/USM-207</td>
</tr>
<tr>
<td>Power Supply</td>
<td>PP-1104(*)K3</td>
</tr>
<tr>
<td>Test Cable No. 1</td>
<td></td>
</tr>
<tr>
<td>Signal Generator</td>
<td>AN/URM-127</td>
</tr>
<tr>
<td>Matching Unit</td>
<td>CN-901/U</td>
</tr>
<tr>
<td>T-Connector</td>
<td>UG-274/U</td>
</tr>
<tr>
<td>Loudspeaker</td>
<td>LS-454/U</td>
</tr>
<tr>
<td>Voltmeter</td>
<td>ME-30(*)/U</td>
</tr>
</tbody>
</table>

**TEST SETUP.** Connect the equipment as shown in test setup diagram A.

![Test Setup Diagram](image)

**INITIAL EQUIPMENT CONTROL SETTINGS.** Set equipment controls as indicated in the following table. When using alternate equipment, inject 20-µv rf with 7.3-kHz modulation; deviation as per alinement requirements, carrier frequency determined by test requirements.
5-37. A5200 SQUELCH AMPLIFIER ALIGNMENT, OLD SQUELCH LEVEL. (CONT)

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>Follow instructions in alignment procedure</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>Follow instructions in alignment procedure</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>Fully clockwise</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>OLD ON</td>
</tr>
<tr>
<td>AN/URM-103</td>
<td>OPERATE/OFF/STAND BY FUNCTION</td>
<td>OPERATE</td>
</tr>
<tr>
<td></td>
<td>BAND SWITCH</td>
<td>EXT MOD</td>
</tr>
<tr>
<td></td>
<td>RF TUNING</td>
<td>Follow instructions in alignment procedure</td>
</tr>
<tr>
<td></td>
<td>DEVIATION RANGE KHZ</td>
<td>Follow instructions in alignment procedure</td>
</tr>
<tr>
<td></td>
<td>RF OUTPUT</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>DEVIATION</td>
<td>LO, 0-10 KUV</td>
</tr>
<tr>
<td></td>
<td>RF SET TO LINE</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>LO RF UV</td>
<td>Adjust until needle on IF UV RF SET TO LINE meter is over red line</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20 μV</td>
</tr>
<tr>
<td>AN/URM-127</td>
<td>POWER</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>FREQ RANGE MULTIPLIER</td>
<td>x100</td>
</tr>
<tr>
<td></td>
<td>FREQ RANGE DIAL</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td>ATTENUATOR</td>
<td>x10</td>
</tr>
<tr>
<td></td>
<td>OUTPUT CONTROL</td>
<td>Turn clockwise for 1.2-volt reading on panel voltmeter</td>
</tr>
<tr>
<td>AN/USM-207</td>
<td>POWER</td>
<td>TRACK</td>
</tr>
<tr>
<td>(to verify</td>
<td>DISPLAY</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td>AN/URM-127</td>
<td>SENSITIVITY</td>
<td>0.1 v</td>
</tr>
<tr>
<td>low-frequency</td>
<td>GATE TIME</td>
<td>1 (black knob)</td>
</tr>
<tr>
<td>output)</td>
<td>FUNCTION</td>
<td>FREQ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TRACK</td>
</tr>
<tr>
<td>AN/USM-207</td>
<td>POWER</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td>(to verify</td>
<td>DISPLAY</td>
<td>PLUG IN</td>
</tr>
<tr>
<td>AN/URM-103</td>
<td>SENSITIVITY</td>
<td>FREQ</td>
</tr>
<tr>
<td>high-frequency</td>
<td>GATE TIME</td>
<td>10^2 (black knob)</td>
</tr>
<tr>
<td>output)</td>
<td>FUNCTION</td>
<td>DIRECT</td>
</tr>
<tr>
<td></td>
<td>DIRECT/HETERODYNE</td>
<td>0.3 V MAX (both switches to left)</td>
</tr>
<tr>
<td></td>
<td>INPUT</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>FREQUENCY TUNING-MC</td>
<td></td>
</tr>
</tbody>
</table>
5-37. A5200 SQUELCH AMPLIFIER ALIGNMENT, OLD SQUELCH LEVEL (CONT)

ALIGNMENT PROCEDURE

1. Disconnect rf cable from RT ANTENNA port.
2. Lift RT A3000 tray.
4. Connect ME-30(*)/U to TP5008 (1). (See test setup diagram B.)
5. Set RT MC-TUNE-KC control to any frequency which results in at least a 4-vac reading on ME-30(*)/U. Record ME-30(*)/U reading.
6. Reconnect rf cable to RT ANTENNA port.
7. Set AN/URM-103 BAND switch to range that includes RT frequency setting.
8. Set AN/URM-103 RF TUNING control to same frequency selected in step 5.

NOTE

Check the frequency counter to make sure that the signal generator is outputting the correct frequency. The rf level must be increased temporarily to enable the frequency counter to display. Adjust the AN/URM-103 RF TUNING control as necessary, reset to 20-µV rf level; then disconnect the T-connector from the counter.

9. Adjust AN/URM-103 DEVIATION control for 3-kHz reading on DEVIATION KHZ meter.
10. Adjust AN/URM-127 FREQ RANGE DIAL to vary frequency above and below 7.3 kHz while observing ME-30(*)/U. Stop at frequency which gives highest possible ME-30(*)/U reading. At the same time, adjust AN/URM-103 DEVIATION control to keep ME-30(*)/U reading between 2 and 4 vac. If adjustment of DEVIATION control is required, readjust AN/URM-127 frequency for peak ME-30(*)/U reading.
5-37. A5200 SQUELCH AMPLIFIER ALIGNMENT, OLD SQUELCH LEVEL. (CONT)

11. Adjust AN/URM-103 DEVIATION control for ME-30(*)/U reading 4 db less than reading recorded in step 5.
12. Check RT CALL light. If light is out, go to step 13. If light is on, go to step 14.
13. CALL LIGHT OUT. Turn R5216 (2) counterclockwise slowly and stop at point where light just comes on.
14. CALL LIGHT ON. Turn R5216 (2) clockwise until light goes out, then perform step 13.

OLD SQUELCH Final Test

15. Adjust AN/URM-103 DEVIATION control for 8-kHz reading on DEVIATION KHZ meter.
16. Set AN/USM-127 FREQ RANGE MULTIPLIER to x 10.
17. Set AN/USM-127 FREQ RANGE DIAL to 35 (350 Hz). RT CALL light should be on.

NOTE
CALL light must stay on through range of 350 to 3500 Hz.

18. Rotate FREQ RANGE DIAL fully clockwise to 2000 Hz. CALL light should stay on.
20. Set FREQ RANGE MULTIPLIER to x100.
21. Rotate FREQ RANGE DIAL to 35 (3500 Hz). CALL light should stay on.

NOTE
If RT fails the OLD SQUELCH Final Test, replace the A5300 module and repeat the entire alignment procedure.

5-38. SILICON VERSION A5200A SQUELCH AMPLIFIER ALIGNMENT, OLD SQUELCH LEVEL.

PURPOSE. This procedure adjusts the receiver sensitivity to the OLD SQUELCH signals which include internal noise and the received carrier.

TEST EQUIPMENT AND MATERIALS

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Model/Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal Generator</td>
<td>AN/URM-103</td>
</tr>
<tr>
<td>Frequency Counter</td>
<td>AN/USM-207</td>
</tr>
<tr>
<td>Power Supply</td>
<td>PP-1104(*)/G</td>
</tr>
<tr>
<td>Test Cable</td>
<td>No. 1</td>
</tr>
<tr>
<td>Signal Generator</td>
<td>AN/URM-127</td>
</tr>
<tr>
<td>Matching Unit</td>
<td>CN-901/U</td>
</tr>
<tr>
<td>T-Connector</td>
<td>UG-274/U</td>
</tr>
<tr>
<td>Loudspeaker</td>
<td>LS-454/U</td>
</tr>
<tr>
<td>Voltmeter</td>
<td>ME-30(*)/U</td>
</tr>
</tbody>
</table>

TEST SETUP. Connect the equipment as shown in test setup diagram page 5-166.
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. When using alternate equipment, inject 20-µv rf at 64 MHz, 7.3-kHz modulation; deviation as per alignment requirements.

**CONTROL AND SWITCH SETTINGS**

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>POWER</td>
<td>LOW Follow instructions in alignment procedure</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>Follow instructions in alignment procedure</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>Fully clockwise</td>
</tr>
<tr>
<td></td>
<td>VOLUME</td>
<td>OLD ON</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td></td>
</tr>
<tr>
<td>AN/URM-103</td>
<td>OPERATE/OFF/STAND BY FUNCTION</td>
<td>OPERATE</td>
</tr>
<tr>
<td></td>
<td>BAND SWITCH</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RF TUNING</td>
<td>84.00</td>
</tr>
<tr>
<td></td>
<td>DEVIATION RANGE KHZ</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>RF OUTPUT</td>
<td>LO, 0-10 KUV</td>
</tr>
<tr>
<td></td>
<td>DEVIATION</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>RF SET TO LINE</td>
<td>Adjust until needle on IF UV RF SET TO LINE meter is over red line</td>
</tr>
<tr>
<td></td>
<td>LO RF UV</td>
<td>20 µv</td>
</tr>
</tbody>
</table>
## CONTROL AND SWITCH SETTINGS (CONT)

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN/URM-127</td>
<td>POWER</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>FREQ RANGE MULTIPLIER</td>
<td>x100</td>
</tr>
<tr>
<td></td>
<td>FREQ RANGE DIAL</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td>ATTENUATOR</td>
<td>x10</td>
</tr>
<tr>
<td></td>
<td>OUTPUT CONTROL</td>
<td>Turn clockwise for 2.2-volt reading on panel voltmeter</td>
</tr>
<tr>
<td></td>
<td>FREQ METER</td>
<td>ON</td>
</tr>
<tr>
<td>AN/USM-207 (to verify AN/URM-127 low-frequency output)</td>
<td>POWER</td>
<td>TRACK</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY</td>
<td>0.1 V</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>1 (black knob)</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>FREQ</td>
</tr>
<tr>
<td>AN/USM-207 (to verify AN/URM-103 high-frequency output)</td>
<td>POWER</td>
<td>TRACK</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>MIN (fully counterclockwise)</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY</td>
<td>PLUG IN</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>FREQ</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>10³ (black knob)</td>
</tr>
<tr>
<td></td>
<td>DIRECT/HETERODYNE</td>
<td>DIRECT</td>
</tr>
<tr>
<td></td>
<td>INPUT</td>
<td>0.3 V MAX (both switches to left)</td>
</tr>
<tr>
<td></td>
<td>FREQUENCY TUNING-MC</td>
<td>100</td>
</tr>
</tbody>
</table>
ALINEMENT  PROCEDURE

1. Lift RT A3000 tray.
2. Set ME-30(*)/U to 3-volt scale.
3. Connect ME-30(*)/U positive lead to TP5008 (1), and negative lead to ground. (See test setup diagram B.)
4. Turn AN/URM-103 DEVIATION control clockwise until ME-30(*)/U reads 1.5 vac. RT CALL light should be off. If necessary, adjust R5208 (2) until CALL light goes off.
5. Turn DEVIATION control counterclockwise until ME-30(*)/U reads 1.0 vac. Adjust R5208 (2) and stop at point where CALL light just comes on.
5-39. POWER SUPPLY A9000/A9400A (A9000A/A9400B) TESTS.

PURPOSE. This test verifies the availability of adequate power before the transmitter is aligned.

TEST EQUIPMENT AND MATERIALS

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Controls/Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dummy Load DA-75/U</td>
<td></td>
</tr>
<tr>
<td>Multimeter ME-26(*)/U</td>
<td></td>
</tr>
<tr>
<td>Power Supply PP-1104(*)/G</td>
<td></td>
</tr>
<tr>
<td>Test Cable No. 1</td>
<td></td>
</tr>
</tbody>
</table>

TEST EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>BAND</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>HIGH</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>NEW ON</td>
</tr>
</tbody>
</table>

TEST PROCEDURE

NOTE

The power supply voltage measured at TP9005 should not drop significantly below 25 vdc when the RT is keyed. If the voltage at TP9005 is much less than 25 volts, the driver and power amplifier are probably out of alignment, causing excessive current draw. If TP9005 voltage is satisfactory, but other test points given in the following table are not up to normal readings, troubleshoot the power supply.

Check power supply voltages attest points given in following table.

NOTE

Key the transmitter before performing voltage checks.
5-39. POWER SUPPLY A9000/A9400A (A9000A/A9400B) TESTS. (CONT)

<table>
<thead>
<tr>
<th>A9000 TEST POINT</th>
<th>REQUIRED VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP9005</td>
<td>25 vdc minimum</td>
</tr>
<tr>
<td>TP9001</td>
<td>640 to 700 vdc</td>
</tr>
<tr>
<td>TP9002</td>
<td>250 to 300 vdc</td>
</tr>
<tr>
<td>TP9003</td>
<td>90 vac minimum</td>
</tr>
<tr>
<td>TP9004</td>
<td>-20 vdc minimum</td>
</tr>
<tr>
<td></td>
<td>(-14 vdc minimum; older units)</td>
</tr>
</tbody>
</table>

5-40. MASTER OSCILLATOR A6300 AND BUFFER AMPLIFIER A6400 ALIGNMENT.

PURPOSE. The master oscillator is one of the most critical sections of the radio set. It must generate an rf frequency within ±3.5 kHz of the selected transmit frequency. The following procedure ensures that the master oscillator operates within the correct frequency range.

TEST EQUIPMENT AND MATERIALS

 Dummy Load DA-75/U
 Multimeter ME-28(*)/U
 Frequency Counter AN/USM-207

Test Cable No. 9 or substitute. (See test setup diagram A for substitute.)

TEST SETUP. Connect the equipment as shown in test setup diagram A.
5-40. MASTER OSCILLATOR A6300 AND BUFFER AMPLIFIER A6400 ALINEMENT. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>POWER</td>
<td>LOW (A)</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td></td>
</tr>
<tr>
<td>AN/USM -207</td>
<td>POWER</td>
<td>TRACK</td>
</tr>
<tr>
<td></td>
<td>DISPLAY</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY</td>
<td>PLUG IN</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>FREQ</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>$10^4$ (black knob)</td>
</tr>
<tr>
<td></td>
<td>DIRECT/HETERODYNE</td>
<td>DIRECT</td>
</tr>
<tr>
<td></td>
<td>INPUT</td>
<td>0.3 V MAX (both switches to left)</td>
</tr>
<tr>
<td></td>
<td>FREQUENCY TUNING-MC</td>
<td>100</td>
</tr>
</tbody>
</table>

ALINEMENT PROCEDURE

1. Remove cover from A6000 assembly.
2. Install alinment cover using at least one screw.
3. Do not reconnect plugs to J6001, J6002, and J6003.
4. Connect Test Cable No. 9 or substitute to J6003.
5. Connect frequency counter to test cable.
6. Key transmitter using Test Cable No. 1 switch.
7. Adjust L6305 (1) for 30 MHz ± 100 kHz, then unkey transmitter. (See test setup diagram B.)
8. Set RT to 40.00 MHz.
9. Key transmitter.
10. Adjust C6314 (2) for 40 MHz ± 100 kHz, then unkey transmitter.
5-40. MASTER OSCILLATOR A6300 AND BUFFER AMPLIFIER A6400 ALIGNMENT. (CONT)

11. Set RT to 52.00 MHz.
12. Key transmitter.
13. Adjust L6303(3) for 52.00 MHz ± 100 kHz, then unkey transmitter.
14. Repeat steps 6 through 13 until alignment is correct at all three frequencies.
15. Remove Test Cable No. 9 from J6003 and connect J6001.
16. Connect ME-26(*)/U to test cable as shown in test setup diagram A, page 5-190.
17. Set ME-26(*)/U to read vac, on 10-volt scale.
18. Set RT to 30.00 MHz.
19. Using switch on Test Cable No. 1, key transmitter.

\[ \text{Diagram image} \]

20. Adjust L6405 (1) for maximum reading on ME-26(*)/U. (See test setup diagram C.)
21. Unkey transmitter.
22. Set RT to 40.00 MHz.
23. Key transmitter.
24. Adjust C6409 (2) for maximum reading on ME-26(*)/U.
25. Unkey transmitter.
26. Set RT to 52.00 MHz.
27. Key transmitter.
28. Adjust L6403 (3) for maximum reading on ME-26(*)/U.
29. Unkey transmitter.
30. Remove Test Cable No. 9 from J6001 and connect to J6003.

B BAND

31. Set RT BAND switch to B and set frequency to 53.00 MHz.
32. Key transmitter.
33. Adjust L6302 (4) for 53 MHz ± 100 kHz.
34. Unkey transmitter.
35. Set RT to 63.00 MHz.
36. Key transmitter.
37. Adjust C6313(5) for 63 MHz ± 100 kHz.
38. Unkey transmitter.
39. Set RT to 75.00 MHz.
40. Key transmitter.
41. Adjust L6304(6) for 75 MHz ± 100 kHz.
42. Unkey transmitter.
5-40. MASTER OSCILLATOR A6300 AND BUFFER AMPLIFIER A6400 ALIGNMENT. (CONT)

43. Remove Test Cable No. 9 from J6003 and connect to J6001.
44. Connect ME-26(*)/U to test cable as shown in test setup diagram \( A \).
45. Set RT to 53.00 MHz.
46. Key transmitter.
47. Adjust L6402(7) for maximum reading on ME-26(*)/U. (See test setup diagram \( C \).)
48. Unkey transmitter.
49. Set RT to 63.00 MHz.
50. Key transmitter.
51. Adjust C6408 (8) for maximum reading on ME-26(*)/U.
52. Unkey transmitter.
53. Set RT to 75.00 MHz.
54. Key transmitter.
55. Adjust L6404 (9) for maximum reading on ME-26(*)/U.
56. Unkey transmitter.

5-41. ADJUSTMENT OF A8500 RESISTOR R8515 FOR TRANSMITTED NEW SQUELCH TONE DEVIATION.

PURPOSE. Resistor R8515 is used to control the overall gain of the squelch amplifier. When the resistor is properly adjusted, the 150-Hz NEW SQUELCH tone causes a carrier deviation of 3.5 kHz.

TEST EQUIPMENT AND MATERIALS

- Dummy Load DA-75/U
- Modulation Meter ME-57/U
- Test Cable No. 1
- Power Supply PP-1104(*)/G

TEST SETUP. Connect the equipment as shown in test setup diagram \( A \), page 5-194.

NOTE

To measure transmitter deviation loosely couple the output of the transmitter to the input jack of the ME-57/U with a pick-up coil of a few turns.
5-41. ADJUSTMENT OF A8500 RESISTOR R8515 FOR TRANSMITTED NEW SQUELCH TONE DEVIATION. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

**CONTROL AND SWITCH SETTINGS**

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>BAND</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>64.00</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td>NEW ON</td>
</tr>
<tr>
<td>ME-57/U</td>
<td>FREQUENCY RANGE-MC</td>
<td>55-120</td>
</tr>
<tr>
<td></td>
<td>DEVIATION RANGE-KC</td>
<td>1000 TUNE</td>
</tr>
<tr>
<td></td>
<td>TUNE-FINE TUNE</td>
<td>TUNE</td>
</tr>
<tr>
<td></td>
<td>TUNING KNOB</td>
<td>Adjust for 64.00 reading on FREQUENCY-MC</td>
</tr>
</tbody>
</table>

**ADJUSTMENT PROCEDURE**

1. Key transmitter.
2. ME-57/U LIMITING meter must be in BLACK area.
3. Tune ME-57/U slightly around 84 MHz with TUNING knob and stop when CARRIER SHIFT meter indicates zero kilocycles.
5-41. ADJUSTMENT OF A8500 RESISTOR R8515 FOR TRANSMITTED NEW SQUELCH TONE
DEVOTION. (CONT)

5. Check reading on ME-57/U. Deviation should be 3.5 kHz. If deviation is incorrect, go to
   step 6.
6. Unkey transmitter.
7. Remove cover from A8500.
8. Key transmitter.

9. Adjust R8515 for 3.5-kHz deviation (See test setup diagram, ).
10. Unkey transmitter.

5-42. ADJUSTMENT OF A8500 RESISTOR R8516 FOR CORRECT TRANSMITTER NARROWBAND
DEVOTION.

PURPOSE. This procedure adjusts the gain of the transmitter speech amplifier. Resistor R8516 must
be adjusted so that a 0.78-vac audio signal Injected into the A8100 11.5-MHz modulator through the
resistor results in 8.0 ± 0.5-kHz deviation of the transmitted rf carrier.

TEST EQUIPMENT AND MATERIALS

<table>
<thead>
<tr>
<th>Equipment/Component</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dummy Load DA-75/U</td>
<td></td>
</tr>
<tr>
<td>Multimeter ME-30(*)/U</td>
<td></td>
</tr>
<tr>
<td>Power Supply PP-1104(*)/IG</td>
<td></td>
</tr>
<tr>
<td>Modulation Meter ME-57/U</td>
<td></td>
</tr>
<tr>
<td>Signal Generator AN/URM-127</td>
<td></td>
</tr>
<tr>
<td>Test Cable No. 1</td>
<td></td>
</tr>
<tr>
<td>Adapter UG-1035/U</td>
<td></td>
</tr>
</tbody>
</table>

TEST SETUP. Connect the equipment as shown in test setup diagram page 5-196.
5-42. ADJUSTMENT OF A8500 RESISTOR R8516 FOR CORRECT TRANSMITTER NARROWBAND DEVIAION. (CONT)
5-42. ADJUSTMENT OF A8500 RESISTOR R8516 FOR CORRECT TRANSMITTER NARROWBAND DEVIATION. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>BAND</td>
<td>64.00</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>OLD ON</td>
</tr>
<tr>
<td></td>
<td>SQUELCH</td>
<td></td>
</tr>
<tr>
<td>ME-57/U</td>
<td>TUNE-FINE TUNE</td>
<td>TUNE</td>
</tr>
<tr>
<td></td>
<td>DEVIATION RANGE-KC</td>
<td>1000 TUNE</td>
</tr>
<tr>
<td></td>
<td>FREQUENCY RANGE-MC</td>
<td>55-120</td>
</tr>
<tr>
<td></td>
<td>TUNING</td>
<td>64-MHz Indication on FREQUENCY-MC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>meter with transmitter keyed</td>
</tr>
<tr>
<td>AN/URM-127</td>
<td>POWER</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>FREQ RANGE MULTIPLIER</td>
<td>x100</td>
</tr>
<tr>
<td></td>
<td>FREQ RANGE DIAL</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>ATTENUATOR</td>
<td>x10</td>
</tr>
<tr>
<td></td>
<td>OUTPUT CONTROL</td>
<td>Turn clockwise for 0.78-vac reading on multimeter</td>
</tr>
</tbody>
</table>

ADJUSTMENT PROCEDURE

[Diagram of equipment controls and components]
5-42. ADJUSTMENT OF A8500 RESISTOR R8516 FOR CORRECT TRANSMITTER NARROWBAND DEVIATION. (CONT)

1. Set ME-57(*)/U DEVIATION RANGE-KC knob to 1000 TUNE.
2. Key transmitter. ME-57(*)/U LIMITING meter must be in BLACK area.
3. Tune ME-57(*)/U slightly around 64 MHz with TUNING knob and stop when CARRIER SHIFT meter indicates zero kilocycles.
5. Check reading on ME-57(*)/U. Deviation should be 8.0 ±0.5 kHz. If reading is incorrect, go to step 6.
6. Unkey transmitter.
7. Remove cover from A8500.
8. Key transmitter.
9. Adjust R8516 for 8.0 ±0.5 kHz deviation. (See test setup diagram [B] page 5-197)
10. Unkey transmitter.
11. Repeat steps 2 and 5 with audio oscillator set at 500,3000, and 5000 Hz, and 10 kHz, keeping the signal amplitude at 0.78 volts in each case. Do not readjust R8516.

NOTE

Failure to achieve correct deviation reading at frequencies listed in step 8 indicates a defective A8100 module.

5-43. A8100 MODULATOR ALIGNMENT.

PURPOSE. This procedure ensures that the A8100 oscillator runs at 11.5 MHz ± 3.5 kHz with no dc correction from the crystal discriminator.

TEST EQUIPMENT AND MATERIALS

- Dummy Load DA-75/U
- Frequency Counter AN/USM-207
- Power Supply PP-1104(*)/G

No. 24 or No. 28 AWG wire (single strand) (7-inch length)
Test Cable No. 1

TEST SETUP. Connect the equipment as shown in test setup diagram [A].
5-43. A8100 MODULATOR ALIGNMENT. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>BAND</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>MC-TUNE-KC</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>OLD OFF</td>
</tr>
<tr>
<td>AN/USM-207</td>
<td>DISPLAY</td>
<td>TRACK</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY</td>
<td>Fully counterclockwise</td>
</tr>
<tr>
<td></td>
<td>FUNCTION</td>
<td>PLUG IN</td>
</tr>
<tr>
<td></td>
<td>GATE TIME</td>
<td>FREQ</td>
</tr>
<tr>
<td></td>
<td>DIRECT/HETERODYNE</td>
<td>10° (black knob)</td>
</tr>
<tr>
<td></td>
<td>INPUT</td>
<td>DIRECT</td>
</tr>
<tr>
<td></td>
<td>FREQUENCY TUNING-MC</td>
<td>0.3 V MAX (both switches to left)</td>
</tr>
</tbody>
</table>

ALIGNMENT PROCEDURE

1. Remove A8100 cover.
2. Wrap grounding wire around exposed terminal of R8114. (See test setup diagram B.*
3. Reinstall A8100 cover. Wrap grounding wire around holddown screw.
4. Key transmitter.
5. Check frequency counter. Frequency should be 11.5 MHz ±3.5 kHz. if not, go to step 6.
6. Unkey transmitter.
7. Remove A8100 cover.
8. Install A8100 alinement cover.
9. Secure grounding wire to alinement cover screw.
10. Remove A8400 HUNT GENERATOR module.
11. Key transmitter.
12. Adjust C8104 for 11.5 MHz ± 3.5 kHz reading on frequency counter.

*See page 5-201 for grounding wire hookup for A8100A module. The alinement is the same, except for this difference.
5-43. **A8100 MODULATOR ALIGNMENT. (CONT)**

13. Unkey transmitter.
14. Remove grounding wire from R8114.
15. Key transmitter.
16. Check frequency counter. Reading should be 11.5 MHz ± 150 Hz. If reading is incorrect, go to step 17.
17. With transmitter keyed, adjust C8116 for 11.5 MHz ± 150 Hz reading on counter. (See test setup diagram B.)
18. Unkey transmitter.
19. Install A8400 HUNT GENERATOR module.

5-44. **DRIVER A6100 AND POWER AMPLIFIER A6200 ALIGNMENT.**

**PURPOSE.** This procedure enables the transmitter to generate maximum rf power without over-driving the power stages. Correct alignment prolongs the life of Power Tube V6201 and Power Supply A9000/A9400.

**TEST EQUIPMENT AND MATERIALS**

<table>
<thead>
<tr>
<th>Dummy Load DA-75/U</th>
<th>Wattmeter AN/URM-120</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool Kit TK-105/G</td>
<td>Multi meter ME-26(*)/U</td>
</tr>
<tr>
<td>T-Connector UG-274/U</td>
<td>Amphenol Adapter M-39012/16</td>
</tr>
<tr>
<td>Nonmetallic feeler gages, 0.073 and 0.078 inch</td>
<td>Crocus cloth</td>
</tr>
</tbody>
</table>

**TEST SETUP.** Connect the equipment as shown in test setup diagram A.

**INITIAL EQUIPMENT CONTROL SETTINGS.** Set equipment controls as indicated in the following table.

<table>
<thead>
<tr>
<th>CONTROL AND SWITCH SETTINGS</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>MC-TUNE-KC</td>
<td>30.00</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>HIGH</td>
</tr>
</tbody>
</table>
5-44. DRIVER A6100 AND POWER AMPLIFIER A6200 ALIGNMENT. (CONT)

ALIGNMENT PROCEDURE

Tuning Coil Adjustment

Do not use pliers or any metal tool to adjust Tuning Coils L6206 and L6203.

1. Remove A6100/A6200 assembly after marking the gear couplers to ensure installation in original position. (See paragraphs 2-46 and 2-48.)
2. Remove burrs from tuning coils using crocus cloth.
3. Adjust spacing of Coil L6203 (1) to 0.078 inch using nonmetallic tool.
4. Adjust spacing of Coil L6206 (2) to 0.073 inch using nonmetallic tool.
5. Turn L6204 screw (3) fully clockwise.
6. Turn L6205 screw (4) fully counterclockwise.
7. Adjust screw (3) to bring coil (5) as close as possible to coil (1) without touching.
8. Adjust screw (4) to bring coil (6) as close as possible to coil (2) without touching.
9. Install A6100/A6200 assembly. (See paragraphs 2-46 and 2-48.)
5-44. DRIVER A6100 AND POWER AMPLIFIER A6200 ALINEMENT. (CONT)

Air Capacitor Adjustment

10. Remove RT bottom cover.
11. Using 3/32-inch allen wrench, loosen gear locking clamp screw (1). (See test setup diagram C.)
12. Key transmitter.
13. Move C6217 gear (2) back and forth to obtain peak wattmeter indication.
14. Tighten clamp screw (1). Wattmeter indication should not change.
15. Unkey transmitter.

A6100 Tuning Procedure
5-44. DRIVER A6100 AND POWER AMPLIFIER A6200 ALIGNMENT. (CONT)

NOTE

Replace Tube V6201 if 35-watt minimum power output cannot be obtained.

16. Set ME-26 (*)/U to measure -3 vdc and connect meter to TP9006 on A9000 tray.
17. Key transmitter.
18. Adjust BAND Capacitors C6103 (1) and C6114 (2) for maximum negative voltage reading on ME-26 (*)/U. (See test setup diagram D.)
19. Unkey transmitter.
20. Set RT to 53.00 MHz.
22. Adjust BAND Capacitors C6105 (3) and C6115 (4) for maximum negative voltage reading on ME-26(*)/U.

A6200 Tuning Procedure

23. Connect equipment as shown in test setup diagram E.

24. Set ME.26(*)/U to measure -3 vdc and connect meter to TP9007 on A9000 tray.
25. Set RT to 52.00 MHz; POWER to HIGH.
26. Key transmitter.

NOTE

See chapter 1, section III, Principles of Operation, for details covering use of Test Point TP9007.

Change 3 5-203
5-44. DRIVER A6100 AND POWER AMPLIFIER A6200 ALIGNMENT. (CONT)

27. Adjust Capacitor C6219 (1) for minimum negative ME-26(*)/U indication. (See test setup diagram F.)
28. Readjust C6219 to increase wattmeter indication by one watt.
29. Adjust Coil L6205 (2) for maximum reading on wattmeter, but not higher than 65 watts.
30. Unkey transmitter.

**CAUTION**

In the following steps, always unkey the transmitter before changing RT frequency.

31. Tune RT to 30.00, 41.00, and 52.00 MHz, keying transmitter at each frequency. Adjust C6219 (1), until output powers at all frequencies fall within 3 to 4 watts of each other. Record final output power at each frequency.
32. Unkey transmitter.
33. Set RT POWER switch to LOW.
34. Key transmitter.
35. Check wattmeter indication at 30, 41, and 52 MHz. Wattmeter should indicate at least one-half watt. If power is too low, go to step 36.
36. Unkey transmitter.
37. Set RT to 52.00 MHz.
38. Key transmitter.
39. Adjust C6103 (1), test setup diagram D, page 5-202) for minimum one-half watt indication.
40. Unkey transmitter.
41. Reconnect P6201 to J6201. (See test setup diagram E, page 5-203)
42. Connect rf cable from wattmeter to RT ANTENNA port.
43. Set RT POWER switch to HIGH.
44. Tune RT to 30.00 MHz.
45. Key transmitter.
46. Check wattmeter indication and compare with reading obtained at 30 MHz in step 31. Replace FL401 if wattmeter indication is not within ± 1 watt to -7 watts of step 31 reading.
47. Unkey transmitter.
48. Tune RT to 41.00 MHz.
49. Key transmitter.
50. Repeat step 46.
51. Unkey transmitter.
52. Tune RT to 52.00 MHz.
53. Key transmitter.
5-44. DRIVER A6100 AND POWER AMPLIFIER A6200 ALIGNMENT. (CONT)

54. Check wattmeter indication and compare with reading obtained at 52.00 MHz in step 31. Replace FL401 if wattmeter indication is not within +1 to -9 watts of step 31 reading.

55. Unkey transmitter.

56. Tune RT to 75.00 MHz

57. Set ME-26(*)W to read -3 vdc.

58. Connect ME-26(*)/U to TP9007 on A9000 tray.

59. Key transmitter.

60. Adjust Capacitor C6218 ((3) test setup diagram(F) , page5-204) for minimum ME-26(*)/U indication.

61. Readjust C6218 to increase wattmeter indication by one watt.

62. Adjust L6204 ((4) test setup diagram(D) ) for maximum wattmeter indication, but not more than 55 watts.

63. Unkey transmitter.

**CAUTION**

In the following steps, always unkey the transmitter before changing RT frequency.

64. Tune RT to 53.00, 64.00, and 75.00 MHz keying transmitter at each frequency. Adjust C6218 ((3), test setup diagram(F) ) until output powers at all frequencies fall within 3 to 4 watts of each other.

65. Unkey RT.

66. Set RT POWER switch to LOW.

67. Key transmitter.

68. Check wattmeter indication at 53, 64, and 75 MHz. Wattmeter should indicate at least one-half watt. If power is too low, go to step 69.

69. Unkey transmitter.

70. Tune RT to 75.00 MHz.

71. Key transmitter.

72. Adjust C6105 ((3), test setup diagram(D) ) for at least one-half watt indication on wattmeter.

73. Unkey transmitter.

5-45. ALIGNMENT OF RT-246(*)VRC SERVOSYSTEM.

PURPOSE. This procedure adjusts the sensitivity of the servoamplifier to ensure correct frequency tuning in response to the preset pushbuttons.

TEST EQUIPMENT AND MATERIALS

Power Supply PP-1104(*)/G

TEST SETUP. Connect the equipment as shown in test setup diagram(A) , page5-206.
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

### CONTROL AND SWITCH SETTINGS

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>CONTROL OR SWITCH</th>
<th>POSITION/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>BAND</td>
<td>AUTO</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>LOW</td>
</tr>
</tbody>
</table>

**ALIGNMENT PROCEDURE**
5-45. ALINEMENT OF RT-246(*)/VRC SERVOSYSTEM. (CONT)

1. Remove RT top cover.
2. Loosen locknut on R304. (See test setup diagram B, page 5-206.)
3. Turn R304 shaft fully clockwise.
4. Back off R304 shaft one-eighth turn.
5. Tune pushbutton 1 to 30.00 MHz and pushbutton 2 to 48 MHz. Follow instructions on back of pushbutton cover.
6. Press pushbutton 2 and wait for servomotor to stop.
9. Turn R304 shaft clockwise and stop at point where servomotor just stops hunting.
11. Press pushbutton 1. RT should tune to exactly 30.00 MHz, after a slight overshoot.

NOTE

Overshoot means that when pushbutton 1 is pressed, the numbers in the RT viewing window move from 00 to 95 and then back to 00 (30.00) when the servomotor stops. If overshoot is excessive, turn R304 very slightly clockwise and recheck.

12. Repeat steps 10 and 11 with power supply set at 20 vdc.

NOTE

If tuning is unsatisfactory at 20 vdc, repeat steps 5 through 11.
CHAPTER 6
GENERAL SUPPORT MAINTENANCE

OVERVIEW

This chapter contains general support troubleshooting and maintenance procedures for the RT-246(*)/VRC and RT-524(*)/VRC receiver-transmitters. References are made to those publications listing repair parts, tools and TMDE that support this level of maintenance.

Section I GENERAL SUPPORT REPAIR PARTS, TOOLS AND TMDE

6-1. GENERAL SUPPORT REPAIR PARTS AND TOOLS.

For repair parts and tools required to support general support maintenance, refer to TM 11-5820 401-34P-2-1 (RT-246(*)/VRC) or TM 11-5820-401-34P-2-2 (RT-524(*)/VRC).

6-2. SPECIAL TOOLS AND TMDE.

For special tools and TMDE, refer to the Maintenance Allocation Chart (MAC) in TM 11-5820-401-20-1 or TM 11-5820-401-20-2.
Section II GENERAL SUPPORT TROUBLESHOOTING

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6-3. GENERAL

This section contains troubleshooting charts which will help you locate the cause of various failures in RT-246(*)/VRC and RT-524(*)/VRC receiver-transmitters. The charts are intended for use based on the following assumptions:

1. Only one malfunction exists which is causing the defect symptom.
2. The troubleshooting charts do not isolate every possible defect.
3. Failure to isolate a defect using the charts suggests a wiring-related problem which can be isolated using the schematics located in the back of this manual.
4. Troubleshooting procedures for germanium and silicon versions of the RT are the same.

The troubleshooting charts assist you in determining which assemblies or parts in the RT require replacement to correct malfunctions. Replacement procedures corresponding to the replacement instructions in the charts can be found in the detailed maintenance procedures contained in section III. However, not all of the maintenance tasks are generated as a result of specific troubleshooting steps and replacement instruction boxes in the charts. The need to replace an assembly or part can be established by visual evidence of defects or damage. Therefore, a corresponding troubleshooting procedure may not exist.

6-4. TROUBLESHOOTING CHART SELECTION.

There are three charts in this section, all of which cover power supply troubleshooting. The correct chart to use depends on the kind of test equipment available. The charts and the kind of test equipment on which each chart is based is as follows:

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6-5. POWER SUPPLY TROUBLESHOOTING.

CHART 6-1
Power Supply Troubleshooting Using MK-1978/VRC and Discrete TMDE
(Sheet 1 of 3)
1. Common failure of the 700 vdc and 275 vdc power supplies could also be due to defective Transformer T9001. However, A9400(*) is a more likely cause of symptom. Also, more precise isolation of A9400(*) is mechanically difficult and time consuming. Visual evidence of overheating and a burning odor are indicators of a bad transformer.

2. Same logic as defined in note 1.

3. Loss of power at a module is assumed in this procedure.
6-5. POWER SUPPLY TROUBLESHOOTING. (CONT)

CHART 6-1
Power Supply Troubleshooting Using MK-1978/VRC and Discrete TMDE
(Sheet 3 of 3)
6-5. POWER SUPPLY TROUBLESHOOTING. (CONT)

CHART 6-2
Power Supply Troubleshooting Using MK-1978/VRC and AN/GRM-114A
(Sheet 1 of 3)

1. START

2. SET UP EQUIPMENT AS SHOWN ON SH 3. SET MK-1978/VRC POWER ON. SET MM-100E TO +30 VDC SCALE.

3. CONNECT MM-100E TO TP9005. KEY TRANSMITTER.

4. 25 VDC PRESENT?
   - YES: UNKEY TRANSMITTER. REMOVE MM-100E FROM TP9005.
   - NO: SET MM-100E TO +100 VDC SCALE. SET ATTENUATED PROBE TO X10.

5. VOLTOMETER READS 840 TO 760 VDC?
   - NO: SET MM-100E TO -30 VDC SCALE.
   - YES: UNKEY TRANSMITTER. REMOVE MM-100E FROM TP9001. SET ATTENUATED PROBE TO X1.

6. UNKEY TRANSMITTER. REMOVE MM-100E FROM TP9001. SET ATTENUATED PROBE TO X1.

7. CONNECT MM-100E TO TP9002. KEY TRANSMITTER.

8. 250 TO 300 VDC?
   - NO: REPLACE AS9000 POWER SUPPLY ASSEMBLY.
   - YES: 1B SH 2
6-5. POWER SUPPLY TROUBLESHOOTING. (CONT)

CHART 6-2
Power Supply Troubleshooting Using MK-1978/VRC and AN/GRM-114A
(Sheet 2 of 3)

NOTES
1. Common failure of the 700 vdc and 275 vdc power supplies could also be due to defective Transformer T9001. However, A9400 (*) is a more likely cause of symptom. Also, more precise isolation of A9400 (*) is mechanically difficult and time consuming. Visual evidence of overheating and a burning odor are indicators of a bad transformer.

2. Same logic as defined in Note 1.

3. Loss of power at a module is assumed in this procedure.
6-5. POWER SUPPLY TROUBLESHOOTING. (CONT)

CHART 6-2
Power Supply Troubleshooting Using MK-1978/VRC and AN/GRM-114A
(Sheet 3 of 3)
6-5. POWER SUPPLY TROUBLESHOOTING. (CONT)

CHART 6-3
Power Supply Troubleshooting Using Test Cable No. 1 and Discrete TMDE
(Sheet 1 of 3)
6-5. POWER SUPPLY TROUBLESHOOTING. (CONT)

CHART 6-3
Power Suply Troubleshooting Using Test Cable No. 1 and Discrete TMDE
(Sheet 2 of 3)

NOTES

1. Common failure of the 700 vdc and 275 vdc power supplies could also be due to defective Transformer T9001. However, A8400(*) is a more likely cause of symptom. Also, more precise isolation of A8400(*) is mechanically difficult and time consuming. Visual evidence of overheating and a burning odor are indicators of a bad transformer.

2. Same logic as defined in Note 1.

3. Loss of power at a module is assumed in this procedure.

---

1A

REPLACE A8400(*) TRANSISTOR ADAPTER ASSEMBLY
SEE NOTE 1

1B

UNKEY TRANSMITTER. REMOVE ME-28(*)/U FROM TP9002.

SET ME-28(*)/U TO –30 VDC SCALE

CONNECT ME-28(*)/U TO TP9004. KEY TRANSMITTER.

-14 TO –21 VDC?

NO

YES

108 TO 116 VAC?

NO

REPLACE A8400(*) TRANSISTOR ADAPTER ASSEMBLY

NOTE 2

YES

REPAIR WIRING HARNESS

NOTE 3

SET ME-28(*)/U TO 300 VAC SCALE

CONNECT ME-28(*)/U TO TP9003. KEY TRANSMITTER.

REPLACE A8000 POWER SUPPLY ASSEMBLY
6-5. POWER SUPPLY TROUBLESHOOTING. (CONT)

CHART 6-3
Power Supply Troubleshooting Using Test Cable No. 1 and Discrete TMDE
(Sheet 3 of 3)
Section III GENERAL SUPPORT MAINTENANCE PROCEDURES

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6-6. GENERAL.

This section contains instructions for general support maintenance of the RT-246(*)/VRC and RT-524(*)/VRC receiver-transmitters. The following initial setup information applies to all procedures.

All procedures apply to both the RT-246(*)/VRC and RT-524(*)/VRC receiver-transmitters unless otherwise specified.

These procedures can be performed using Tool Kit, Electronic Equipment TK-105/G. Tools will not be listed unless special tools are required.

The normal equipment rendition to start a maintenance task is power off. Equipment Condition is not listed unless some other condition is required.

NOTE

In order to determine the serviceability of the Front Panel Gear Train Assemblies for both the RT-246(*)/VRC and RT-524(*)/VRC receiver-transmitters conduct the following procedures:

To determine if there is a defective part, turn the selector mechanisms slowly through their entire range. Verify that each number is legible and appears centered in the window. While turning, check for excessive looseness, tightness, end-to-end or side-to-side movement. Also listen to the detents engage and disengage as the mechanism is rotated. Although these actions will identify an obvious problem, a more thorough examination may be required, if so then Remove Gear Train and return to Depot.
6-7. FRONT PANEL GEAR TRAIN ASSEMBLY REPLACEMENT (RT-524(*)/VRC ONLY).

MATERIALS/PARTS: Matched Helical Gear Set
PRELIMINARY PROCEDURE: Remove A1000 assembly. (See paragraph 2-9.)
Remove A2000 assembly. (See paragraph 2-12.)
Remove A6000 assembly. (See paragraph 2-14.)

REMOVAL

NOTE

Before performing next step, scribe a mark (1) across gears (2) and switch body to aid in installation.

1. Remove Switch S359. (See paragraph 2-32.)
2. Wrap rubberband around Switch S359 body and gear to prevent gear from turning.

CAUTION

Secure Switch S359 and Transformer T351 to panel to prevent hanging and breaking wires when panel is turned upside down.

3. Using screwdriver, remove two screws (3), two spacers (4) and move wire (5) out of way.
4. Using screwdriver, remove two screws (6) and move Connector P352 (7) out of way.
5. Using screwdriver, remove screw (1) and BAND switch knob (2).
6. Using screwdriver, remove screw (3) and MC-TUNE knob (4).
7. Using screwdriver, remove screw (5) and KC-TUNE knob (6).

**NOTE**

Before proceeding with next step, tag switches for Identification.

8. Remove Switches S356, S357 and S356. (See paragraph 2-29.)

**CAUTION**

Note three different length screws used to secure gear train assembly.

11. Using screwdriver, remove 13/16-inch-long screw (9).
6-7. FRONT PANEL GEAR TRAIN ASSEMBLY REPLACEMENT (RT-524(*)/VRC ONLY). (CONT)

NOTE

To gain access to 13/16-inch-long screw (10) under lever (11), do steps 12 and 13.

12. Move lever (11) to extreme left.
14. Reposition lever (11) in slot (12) and Install screw (13), lockwasher (14) and sleeve spacer (15).
15. Using screwdriver, tighten screw (13).

NOTE

Before proceeding to next step, see appendix C for construction of front panel holding fixture.

16. While holding gear train assembly (16) into front panel (17), turn panel face up and place on holding fixture (18).
17. While holding gear train assembly (16) from bottom, push down on three knob stems (19) and remove gear train assembly from front panel (17).
6-7. FRONT PANEL GEAR TRAIN ASSEMBLY REPLACEMENT (RT-524(*)/VRC ONLY. (CONT)

REMOVAL (CONT)

**CAUTION**

Do not turn gear train assembly upside down.

Note number of shims, if used, on inner knob stem seats.

Do not turn any gear train couplers or dials.

INSTALLATION

1. Position gear train assembly (1) under front panel (2) and align knob stems (3) with knob stem holes (4).

**NOTE**

Make sure gear train assembly (1) fits flush against seat (5) and that no wires are pinched.

2. Carefully push gear train assembly (1) into place making sure it engages with alignment pins (6) on front panel.
While holding gear train assembly into front panel, remove from holding fixture and place face down on workbench.

Note locations of different length screws.

3. Install 7/16-inch-long screw (7), 5/16-inch-long screw (8), and 16/16-inch-long screw (9).

To install 13/16-inch-long screw (10) under lever (11), do steps 4 and 5.

4. Using screwdriver, remove screw (12), flat washer (13) and sleeve spacer.
5. Lift lever (11) out of slot (15) and move away from screw hole (16).
6. Install 13/16-inch-long screw (10).
7. Using screwdriver, tighten screws (7), (8), (9), and (10).
8. Reposition lever (11) in slot (15) and install screw (12), flat washer, and sleeve spacer (14).
6-7. FRONT PANEL GEAR TRAIN ASSEMBLY REPLACEMENT (RT-524(*)/VRC ONLY. (CONT)

INSTALLATION (CONT)

10. Using screwdriver, install two screws (1), spacer (2), wire (3), and spacer (4).
11. Using screwdriver, install two screws (5) and Connector P352 (6).

NOTE

Before performing next step, remove rubberband and make sure scribe marks (7) on gears (8) are in alinement.

12. Install Switch S359. (See paragraph 2-32.)
13. Install Switches S356, S357 and S358. (See paragraph 2-29.)
6-7. FRONT PANEL GEAR TRAIN ASSEMBLY REPLACEMENT (RT-524 (*)/VRC ONLY). (CONT)

NOTE

Before performing next step, place front panel face up on workbench.

14. Using screwdriver, install screw (9) and KC-TUNE knob (10).
15. Using screwdriver, install screw (11) and MC-TUNE knob (12).
16. Using screwdriver, install screw (13) and BAND knob (14).

FOLLOW-ON MAINTENANCE: Install A6000 assembly. (See paragraph 2-14.)
Install A2000 assembly. (See paragraph 2-12.)
Install A1000 assembly. (See paragraph 2-9.)
6-8. FRONT PANEL GEAR TRAIN ASSEMBLY REPLACEMENT (RT-246(*)}/VRC ONLY

MATERIALS/PARTS: Matched Helical Gear Set
PRELIMINARY PROCEDURE: Remove A1000 assembly. (See paragraph 2-9.)
Remove A2000 assembly. (See paragraph 2-12.)
Remove A6000 assembly. (See paragraph 2-14.)
Remove Pushbutton Assembly A7100. (See paragraph 2-35.)
Remove A7200 assembly. (See paragraph 2-15.)
Remove Solenoid L301. (See paragraph 2-33.)
Remove Servomotor Generator MG301. (See paragraph 2-34.)

REMOVAL

1. Using screwdriver, remove two screws (1) and move Connector P301 (2) out of way.
2. Using screwdriver, remove two screws (3), two spacers (4) and move wire (5) out of way.
3. Using screwdriver, remove wide plug pin (8) and narrow plug pin (7), and move Connector J7201 (8) out of way.
4. Using screwdriver, remove short screw (9), long screw (10) and lockwasher (11), and move Switch S303 (12) and actuator (13) out of way.
5. Using screwdriver, loosen two screws (14) and remove Resistor R303 (15) from bracket (18).
6. Using screwdriver, remove two screws (17), Switch S307 (18), actuator (19) and plastic Insulator (20), and move Switch S307 out of way.
7. Using wrench, remove nut (21), nut (22), and lockwasher (23), and move Resistor R304 (24) out of way. Install nut (21), nut (22), and lockwasher (23) on Resistor R304 to keep Resistor R304 in adjustment.
NOTE

Before performing next step, scribe a mark (25) across gears (28) and switch body to aid in installation.

8. Remove Switch S309. (See paragraph 2-32.)
9. Wrap rubberband around Switch S309 body and gear to prevent gear from turning.

10. Using screwdriver, remove screw (27) and MC-TUNE knob (28).
11. Using screwdriver, remove screw (29) and KC-TUNE knob (30).
NOTE

There are three different length screws used to secure the gear train assembly.


NOTE

To gain access to 7/8-inch-long screw (4) under lever (5), do steps 15 and 16.

15. Using screwdriver, remove screw (8), lockwasher (7) and sleeve spacer (8).
16. Move lever (5) away from screw hole (9).

NOTE

To prevent loss of hardware, do step 18.

18. Reposition lever (5) and install screw (6), lockwasher (7) and sleeve spacer (8).
NOTE

Before proceeding with next step, see appendix C for construction of front panel holding fixture.

19. While holding gear train assembly (10) into front panel (11), turn panel face up and place on holding fixture (12).
20. While holding gear train assembly (10) from bottom, push down on two knob stems (13) and remove gear train assembly from front panel (11).

CAUTION

Do not turn gear train assembly upside down.

Note number of shims, if used, on inner knob stem seats.

Do not turn any gear train couplers or dials.
6-8. FRONT PANEL GEAR TRAIN ASSEMBLY REPLACEMENT(RT-246(*)/VRC ONLY. (CONT)

INSTALLATION

NOTE

Before proceeding to steps 1 and 2, place front panel faceup in holding fixture.

Make sure inner knob stem shims, if used, are in place.

1. Position gear train assembly (1) under front panel (2) and align knob stems (3) with knob stem holes (4).

NOTE

Make sure gear train assembly (1) fits flush against seat (5) and that no wires are pinched.

2. Carefully push gear train assembly (1) into place making sure it engages with alignment pins (6) on front panel.

NOTE

While holding gear train assembly into front panel, remove from holding fixture and place face down on workbench.
6-8. FRONT PANEL GEAR TRAIN ASSEMBLY REPLACEMENT (RT-246(*)/VRC ONLY). (CONT)

NOTE

There are three different length screws used to secure the gear train assembly.

Note locations of different length screws.

3. Install 7/16-inch-long screw (7), 3/8-inch-long screw (8) and two 7/8 inch-long screws (9).

NOTE

To Install 7/8-inch-long screw (10) under lever (11), do steps 4 and 5.

4. Using screwdriver, remove screw (12), flat washer (13) and sleeve spacer.
5. Move lever (11) away from screw hole (15).
6. Install 7/8-inch-long screw (10).
7. Using screwdriver, tighten screws (7), (8), (9), and (10).
8. Reposition lever (11) and Install screw (12), flat washer (13) and sleeve spacer.
Before performing next step, remove rubberband and make sure scribe marks (1) on gears (2) are in alignment.

10. Install Switch S309. (See paragraph 2-32.)
11. Using screwdriver, install two screws (3) and Connector P301 (4).
6-8. FRONT PANEL GEAR TRAIN ASSEMBLY REPLACEMENT (RT-246(”)/VRC ONLY). (CONT)

12. Using screwdriver, install two screws (5), two spacers (6) and wire (7).
13. Using screwdriver, install wide plug pin (8), narrow plug pin (9) and Connector J7201 (10).
14. Using screwdriver, install short screw (11), long screw (12) and lockwasher (13) through actuator (14) and Switch S303 (15).
15. Install Resistor R303 (16) in bracket (17) and tighten two screws (18).
16. Position Switch S307 (19) with actuator (20) in notch of lever (21), and install plastic Insulator (22) and two screws (23).
17. Using screwdriver, tighten two screws (23).
18. Remove nut (24), nut (25) and lockwasher (26) from Resistor R304 (27).
19. Position Resistor S304 (27) with locating tabs (28) in holes (29) and install lockwashers (26) and nut (25).

NOTE

Care must be taken when performing next step not to disturb Resistor R304 adjustment screw.

21. Install nut (24) and, using 5/16-inch wrench, tighten.

22. Install MC-TUNE knob (30), screw (31), KC-TUNE knob (32) and screw (33).
23. Using screwdriver, tighten screws (31) and (33).

FOLLOW-ON MAINTENANCE: Install Servomotor Generator MG301. (See paragraph 2-34.)
Install Solenoid L301. (See paragraph 2-33.)
Install A7200 assembly. (See paragraph 2-15.)
Install Pushbutton Assembly A7100. (See paragraph 2-35.)
Install A6000 assembly. (See paragraph 2-14.)
Install A2000 assembly. (See paragraph 2-12.)
Install A1000 assembly. (See paragraph 2-9.)
6-9. DIAL GLASS AND GASKET REPLACEMENT.

MATERIALS/PARTS: Dial Glass
Gasket
Cement, EC800

PRELIMINARY PROCEDURE: Remove front panel gear train assembly. (See paragraph 6-8.)

REMOVAL

1. Using screwdriver, remove screw (1) and lockwasher (2).
2. Using screwdriver and 1/4-inch wrench, remove screw (3) and nut (4).
3. Remove bracket (5) and reflector (6).
4. Using scraper, carefully remove cement from around mask mating surface (7).
5. Remove mask (6), gasket (9) and dial glass (10).

INSTALLATION

1. Using scraper, remove cement from dial glass mating surface (11).
2. Apply EC800 cement to dial glass mating surface (11).
3. Install dial glass (10), gasket (9) and mask (6).
4. Stake mask (6) to front panel.
5. Apply small bead of cement around mask mating surface (7).
6. Install reflector (6), bracket (5), nut (4), screw (3), lockwasher (2) and screw (1).
7. Using screwdriver and 1/4-inch wrench, tighten screw (3) and nut (4).
8. Using screwdriver, tighten screw (1).

FOLLOW-ON MAINTENANCE: Install front panel gear train assembly. (See paragraph 6-7 or 6-8.)
6-10. CONTROL ASSEMBLY REPLACEMENT (RT-246(*)/VRC ONLY).

MATERIALS/PARTS: Control Assembly
PRELIMINARY PROCEDURE: Remove Pushbutton Assembly A7100. (See paragraph 2-35.)

REMOVAL

1. Using screwdriver, remove four screws (1), lockwashers (2) and flat washers (3), and carefully pull assembly (4) out of connector (5) and move assembly out of way.
2. Using soldering iron, carefully unsolder GRA/WHT wire terminal (6), BRN/WHT wire terminal (7) and VIO/WHT wire terminal (8).
3. Carefully pull terminal ends (6), (7), and (8) off of assembly (9).
4. Using screwdriver, loosen six captive screws (10) and lift assembly (9) off of pushbutton assembly (11).

NOTE

Do not remove two cross-tip screws (12) from assembly.
Do not move plastic shafts (13).

INSTALLATION

1. Position assembly (9) with plastic shafts (13) mating with couplers (14).
2. Using screwdriver, tighten six captive screws (10).
3. Push terminal ends of VIO/WHT wire terminal (8), BRN/WHT wire terminal (7) and GRA/WHT wire terminal (8) on assembly (9).
4. Using soldering iron, carefully solder wire terminals (6), (7), and (8) to assembly (9).
5. Position assembly (4) with connector mating with connector (5).
6. Install four screws (1), lockwashers (2) and flat washers (3).
7. Using screwdriver, tighten four screws (1).

FOLLOW-ON MAINTENANCE: Install Pushbutton Assembly A7100. (See paragraph 2-35.)
6-11. CONTROL PLATE ASSEMBLY REPLACEMENT (RT-246)(*)/VRC ONLY).

MATERIALS/PARTS: Control Assembly Plate, P/N SMD414662
Two screws (no. 4 x 5/8 inch long), two flat washers.
PRELIMINARY PROCEDURE: Remove Pushbutton Assembly A7100. (See paragraph 2-35.)

REMOVAL

1. Using screwdriver, remove four screws(1), lockwashers (2) and flat washers (3) and carefully pull assembly (4) out of connector (5) and move out of way.
2. Using screwdriver, loosen six captive screws (6) and carefully move assembly (7) out of way.
3. Using screwdriver, remove two screws (10) on opposing corners and replace with two alignment screws (11) and flat washers (12). Tighten until they stop.
4. Using screwdriver, remove four screws (13).

NOTE

Do not remove two cross-tip screws (8) from assembly.

Do not move plastic shafts (9).
6-11. CONTROL PLATE ASSEMBLY REPLACEMENT (RT-246(*)/VRC ONLY). (CONT)

WARNING

Pushbutton springs are under pressure. Extreme care must be taken when performing next step to prevent pushbutton springs from popping out and injuring personnel when control plate assembly is removed.

5. Using screwdriver, carefully remove two alinement screws (11) and flat washers (12), alternating each one turn at a time while holding assembly against spring pressure.
6. Remove control plates assembly (14).

CAUTION

To prevent parts from falling out, do not turn assembly upside down.

INSTALLATION

NOTE

Make sure all spring seats (15) have raised portion facing up.

1. Position control plate assembly (14) on springs, and aline pushbutton shafts (16) with control plate assembly slots (17).
2. Install two alinement screws (11) and flat washers (12) through holes (18).

CAUTION

When performing steps 3, 4, and 5, care must be taken to make sure all ten pushbutton shafts (16) enter control plate assembly slots (17).

4. Install four screws (13).
5. Using screwdriver, alternate tightening of four screws (13) until they stop.
6. Using screwdriver, remove two alinement screws (11), flat washers (12) and replace with two screws (10).
7. Using screwdriver, tighten two screws (10).
8. Position assembly (7) with plastic shafts (9) mating with couplers (19).
10. Position assembly (4) with connector (20) mating with connector (5).
11. Install four screws (1), lockwashers (2) and flat washers (3).
12. Using screwdriver, tighten four screws (1).

FOLLOW-ON MAINTENANCE: Install Pushbutton Assembly A7100. (See paragraph 2-35.)
6-12. A7100 ASSEMBLY ADJUSTABLE RESISTOR REPLACEMENT (RT-246(*)/VRC ONLY).

MATERIALS/PARTS: Adjustable Resistor
PRELIMINARY PROCEDURE: Remove control plate assembly. (See paragraph 6-11)

NOTE

Steps given are typical for all ten resistors.

1. Using soldering iron, carefully unsolder one colored wire (1) and two clear jumper wires (2).
2. Using small screwdriver, remove two screws (3) and lockwashers (4).
3. Remove resistor (5) by pulling out of pushbutton assembly (6).
6-12. A7100 ASSEMBLY ADJUSTABLE RESISTOR REPLACEMENT (RT-246(*)/VRC ONLY). (CONT)

INSTALLATION

NOTE

When installing resistor (5), position red dot (7) toward top of pushbutton assembly (6).

1. Install resistor (5) and two screws (3) and lockwashers (4).
2. Using small screwdriver, tighten two screws (3).

NOTE

All resistors share common clear jumper wires, but individual resistor wiring is of different colors.

Resistor R7102 has two additional colored wires.

3. Using soldering iron, carefully solder two clear jumper wires (2).
4. Using soldering iron, carefully solder colored wires (1) as shown in table below.

<table>
<thead>
<tr>
<th>RESISTOR NO.</th>
<th>WIRE COLOR</th>
<th>INDEX NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>R7101</td>
<td>BRN</td>
<td>8</td>
</tr>
<tr>
<td>R7102</td>
<td>BLU</td>
<td>9</td>
</tr>
<tr>
<td>R7102</td>
<td>YEL</td>
<td>10</td>
</tr>
<tr>
<td>R7102</td>
<td>WHT</td>
<td>11</td>
</tr>
<tr>
<td>R7103</td>
<td>RED</td>
<td>12</td>
</tr>
<tr>
<td>R7104</td>
<td>VIO</td>
<td>13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RESISTOR NO.</th>
<th>WIRE COLOR</th>
<th>INDEX NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>R7105</td>
<td>ORG</td>
<td>14</td>
</tr>
<tr>
<td>R7108</td>
<td>GRA</td>
<td>15</td>
</tr>
<tr>
<td>R7107</td>
<td>YEL</td>
<td>16</td>
</tr>
<tr>
<td>R7108</td>
<td>WHT</td>
<td>17</td>
</tr>
<tr>
<td>R7109</td>
<td>GRN</td>
<td>18</td>
</tr>
<tr>
<td>R7110</td>
<td>BLK</td>
<td>19</td>
</tr>
</tbody>
</table>

FOLLOW-ON MAINTENANCE: Install control plate assembly. (See paragraph 6-11)
6-13. A1000 ASSEMBLY MAIN CIRCUIT BOARD VR1001 REPLACEMENT.

MATERIALS/PARTS: Regulator Assembly VR1001
PRELIMINARY PROCEDURE: Remove front panel. (See paragraph 2-8.)

REMOVAL

1. Using screwdriver, loosen four captive screws (1) and remove A1000 top cover (2).
2. Disconnect brown wire (W301) (3) from J1001.

CAUTION

To prevent damaging any modules, all modules should be removed from A1000 assembly.

3. Using module puller (4), carefully remove all five modules (5).
6-13. **A1000 ASSEMBLY MAIN CIRCUIT BOARD VR1001 REPLACEMENT. (CONT)**

4. Using screwdriver, remove two screws (6) and remove A1000 bottom cover (7).
5. Unplug ten color-coded wire plugs (1).
6. Unfasten retaining clip (2) by moving retaining clip to right.
7. Lift front of A1600 assembly (3) up and pull forward to remove from bracket (4).

**CAUTION**

Extreme care must be taken when performing next step to prevent damage to Circuit Board VR1001 and color-coded wire plugs.

**NOTE**

If color coding on unit varies from one shown, note corrected color coding before disassembly.

8. Using soldering iron, carefully unsolder wires from color-coded wire plugs. See table below.

<table>
<thead>
<tr>
<th>TOP OF A1000 ASSEMBLY</th>
<th>SIDE OF A1000 ASSEMBLY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PLUG COLOR</strong></td>
<td><strong>WIRE COLOR</strong></td>
</tr>
<tr>
<td>Brown Purple Black</td>
<td>Brown Purple Black</td>
</tr>
</tbody>
</table>
6-13. A1000 ASSEMBLY MAIN CIRCUIT BOARD VR1001 REPLACEMENT. (CONT)

CAUTION

Extreme care must be taken when performing next step to prevent damage to Circuit Board VR1001.

NOTE

Step 9 is for Circuit Board VR1001 with Voltage Regulator FL1001 which is used on A-models only. For plain models, proceed to step 10.

9. Using soldering iron, unsolder yellow wire (18) and blue wire (19) from Circuit Board VR1001 and ground wire (20) from ground lug (21).
10. Carefully push ten color-coded wire plugs (22) out of case (23).
11. Using small screwdriver, remove eight screws (24) and ground lug (21).

NOTE

Move ground wire (25) out of way before removing Circuit Board VR1001.

6-13. A1000 ASSEMBLY MAIN CIRCUIT BOARD VR1001 REPLACEMENT. (CONT)

INSTALLATION

NOTE

Step 1 is for A-models only. If plain model, proceed to step 2.

1. Put end of Voltage Regulator FL1001 wiring harness (l) through hole in Circuit Board VR1001 (2).

CAUTION

To prevent breaking ground wire (3), move out of way before installing Circuit Board VR1001 (2).

2. Position Circuit Board VR1001 (2) in case (4) and install five small screws (5) and one large screw (6).
3. Install ground lugs (7) and two small screws (8).

NOTE

Note positioning of ground lugs (7).

4. Using small screwdriver, carefully tighten eight screws (5), (6) and (8).
NOTE

If color coding on unit varies from one shown, note corrected color coding before disassembly.

5. Install color-coded wire plugs where indicated. See table below.

<table>
<thead>
<tr>
<th>PLUG TYPE: MALE/MALE</th>
<th>PLUG TYPE: MALE/MALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLUG COLOR</td>
<td>INDEX NO.</td>
</tr>
<tr>
<td>Brown</td>
<td>9</td>
</tr>
<tr>
<td>Purple</td>
<td>10</td>
</tr>
<tr>
<td>Black</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CAUTION

Extreme care must be taken when performing next step to prevent damage to Circuit Board VR1001.

NOTE

Step 6 is for Circuit Board VR1001 with Voltage Regulator FL1001 which is used on A-models only. For plain models, proceed to step 7.

6. Using soldering iron, carefully solder ground wire (19) to ground lug (20), and yellow wire (21) and blue wire (22) to Circuit Board VR1001.
6-13. A1000 ASSEMBLY MAIN CIRCUIT BOARD VR1001 REPLACEMENT. (CONT)

INSTALLATION (CONT)

CAUTION

Extreme care must be taken when performing next step to prevent damage to Circuit Board VR1001 and color-coded wire plugs.

NOTE

If color coding on unit varies from one shown, note corrected color coding before disassembly.

7. Using soldering iron, carefully solder wires to color-coated wire plugs. See table below.

<table>
<thead>
<tr>
<th>TOP OF A1000 ASSEMBLY</th>
<th>SIDE OF A1000 ASSEMBLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLUG COLOR</td>
<td>WIRE COLOR</td>
</tr>
<tr>
<td>Brown</td>
<td>Brown</td>
</tr>
<tr>
<td>Purple</td>
<td>Purple</td>
</tr>
<tr>
<td>Black</td>
<td>Black</td>
</tr>
<tr>
<td>Orange</td>
<td>Orange</td>
</tr>
<tr>
<td>Violet</td>
<td>Violet/White</td>
</tr>
<tr>
<td>Red</td>
<td>Violet</td>
</tr>
<tr>
<td>Brown</td>
<td>Red/White</td>
</tr>
</tbody>
</table>

8. Position A1600 assembly (14) in bracket (15) and push into place.
9. Fasten retaining clip (16) by moving retaining clip to left.
10. Connect ten color-coded wire plugs (17).
6 - 13 A1000 ASSEMBLY MAIN CIRCUIT BOARD VR1001 REPLACEMENT. (CONT)

CAUTION

Care must be taken when performing next step to prevent damage to modules.

Wound tabs on modules must make contact with partitions in assembly.

NOTE

Module number is stamped on modules.

Note locations of different numbered modules.

11. Carefully install all five modules in A1000 assembly.
12. Install A1000 top cover (18).
14. Connect brown wire (W301) (20) to J1001.
6-13. A1000( ) ASSEMBLY MAIN CIRCUIT BOARD VR1001 REPLACEMENT. (CONT)

INSTALLATION (CONT)

15. Install A1000( ) bottom cover (1) and three screws (2).

FOLLOW-ON MAINTENANCE: Install front panel. (See paragraph 2-8).

6-14. A2000 ASSEMBLY CIRCUIT BOARD Y2200 AND Y2100 REPLACEMENT

THIS CHAPTER IS DELETED. PROCEDURE IS NO LONGER AUTHORIZED BELOW DEPOT LEVEL. NEXT PRINTED PAGE IS: 6-47
6-14.  A2000 ASSEMBLY CIRCUIT BOARD Y2200 AND Y2100 REPLACEMENT. (CONT)

1. Using screwdriver, loosen two captive screws (1) and remove top cover (2) and bottom cover (3).
2. Using screwdriver, remove three screws (4) and U-shaped cover (5).

3. Using screwdriver, remove screw (6), lockwasher (7) and flat washer (8).
4. Using small screwdriver, remove screw(9) and lockwasher (10) from ground lug (11).
5. Lift circuit board (12) out of groove (13) and turn to gain access to rear of circuit board.

**NOTE**

Steps 3 through 6 are for the removal of Circuit Board Y2200.

6. Using soldering iron, carefully unsolder three wires (14) from circuit board (12) and remove circuit board.

**CAUTION**

When unsoldering a circuit board wire that leads to a crystal, clamp crystal terminal connection with heat sink pliers (see detail A) to prevent heat transfer during unsoldering operation.

Using soldering iron, carefully unsolder three wires (14) from circuit board (12) and remove circuit board.
6-14. A2000 ASSEMBLY CIRCUIT BOARD Y2200 AND Y2100 REPLACEMENT. (CONT)

REMOVAL (CONT)

NOTE

Steps 7 through 10 are for the removal of Circuit Board Y2100.

7. Using screwdriver, remove screw (1), lockwasher (2) and flat washer (3).
8. Using small screwdriver, remove screw (4) and lockwasher (5) from ground lug (6).
9. Lift circuit board (7) out of groove (8) and turn to gain access to rear of circuit board.

CAUTION

When unsoldering a circuit board wire that leads to a crystal, clamp crystal terminal connection with heat sink pliers (see detail A) to prevent heat transfer during unsoldering operation.

10. Using soldering iron, carefully unsolder one wire (9) from rear of circuit board and three wires (10) from front of circuit board.
6-14. A2000 ASSEMBLY CIRCUIT BOARD Y2200 AND Y2100 REPLACEMENT. (CONT)

INSTALLATION

NOTE

Steps 1 through 7 are for the Installation of Circuit Board Y2100.

1. Position circuit board (1) in groove (2) with notch (3) facing top.

CAUTION

Care must be taken when performing next step to prevent damage to circuit board.

2. Using soldering iron, carefully solder circuit board jumper wire (4) to circuit board (l).
3. Position ground lug (5) in recess and install screw (6) and lockwasher (7).
5. Install screw (8), lockwasher (9) and flat washer (10) through circuit board (l).
6. Using screwdriver, tighten screw (8).
6-14. A2000 ASSEMBLY CIRCUIT BOARD Y2200 ANDY2100 REPLACEMENT. (CONT)

INSTALLATION (CONT)

**CAUTION**

Care must be taken when performing next two steps to prevent damage to circuit board.

When soldering a circuit board wire that leads to a crystal, clamp crystal terminal connection with heat sink pliers (see detail A) to prevent heat transfer during soldering operation.

7. Using soldering Iron, carefully solder green wire (1) to pin (2), green wire (3) and clear wire (4) to pin (5).

**CAUTION**

Make sure all wires are routed as shown in illustration to prevent pinching when covers are installed.
6-15. A2000 CRS ASSEMBLY MECHANICAL ADJUSTMENT.

PRELIMINARY PROCEDURE: Remove A2000 assembly. (See paragraph 2-13).

DISASSEMBLY

1. Using screwdriver, loosen two captive screws (1) and remove top rover (2) and bottom cover (3).
2. Using screwdriver, remove three screws (4) and remove U-shaped cover (5).
6-15. A2000 CRS ASSEMBLY MECHANICAL ADJUSTMENT. (CONT)

NOTE

The OO/KC scribe mark (1) on assembly chassis is aligned with scribe mark on the A2000 coupler (2) to provide a starting point or reference during adjustment of point overlap. This represents the angular rotation of the A2000 coupler (2) in relation to contacts on Switch S2001 (3) that are closed by the S2001 cam (4).

CAUTION

When bending fixed contacts, the effect maybe reflected in the tuning of adjacent contacts.

NOTE

For a properly adjusted Switch S2001, there should be an overlap of 2 degrees minimum between any two successive switch closures.

3. Position template with two screws (5) through holes in template. (See FO-32.)
4. Aline scribe mark on A2000 coupler (6) and OO/KC mark (7) on template.
6-15. A2000 CRS ASSEMBLY MECHANICAL ADJUSTMENT. (CONT)

5. Rotate A2000 coupler (6) and note all switch closures on Switch S2001 (8).
6. If overlap is insufficient, carefully bend fixed contact (9) toward movable contact.
7. If overlap is excessive, carefully bend fixed contact (9) away from movable contact (10).
8. If switch closures do not agree with template, loosen adjustment screws (11) of effected switch section, and move Switch S2001 (6) up or down until proper overlap is reached. Tighten adjustment screws (11).

NOTE
Care must be taken when tightening adjustment screws (11) not to disturb adjustment. Switch closures must be tested clockwise and counterclockwise for proper function.

ASSEMBLY

1. Position U-shaped cover (12) over assembly and Install three screws (13)
2. Position top cover (14) and bottom cover (15) on assembly.
3. Using screwdriver, tighten three screws (13) and two captive screws (16) and (17).

FOLLOW-ON MAINTENANCE: Install A2000 assembly. (See paragraph 2-13.)
6-16. A6000 ASSEMBLY MAIN CIRCUIT BOARD TB6001 REPLACEMENT.

MATERIALS/PARTS: Circuit Board Assembly TB6001
PRELIMINARY PROCEDURE: Remove top and bottom covers. (See paragraph 2-7.)
For RT-246(*)/VRC only:
Remove front panel. (See paragraph 2-8.)
Remove Servomotor Generator MG301. (See paragraph 2-34.)
Remove Servoamplifier A7200. (See paragraph 2-15.)

REMOVAL

For RT-246(*)/VRC, after preliminary procedures have been performed, steps for replacement of A6000 Main Circuit Board TB6001 are the same as for RT-524(*)/VRC.

1. Set MC-TUNE-KC controls on front panel to 30.00 MHz.
2. Disconnect brown wire (W408)(1), grey wires (W407) (2) and yellow wire (W303) (3).
3. Using screwdriver, loosen two captive screws (4) and remove top cover (5).
CAUTION

To prevent damaging modules, both modules must be removed from assembly.

4. Using module puller (6), carefully remove both modules (7).

5. Using screwdriver, remove two screws (8) and remove bottom cover (9) from A6000 assembly.
6. Disconnect two color-coded wire plugs (10).

CAUTION

Care must be taken when performing next step to prevent damage to circuit board.

7. Using soldering Iron, carefully unsolder two wire leads (11) from color-coded wire plugs (12) and one ground tab (13) from center of circuit board (14).
8. Carefully push two color-coded wire plugs (12) out of case.
9. Using screwdriver, remove two screws (15).
10. Carefully remove circuit board (14).
6-16. A6000 ASSEMBLY MAIN CIRCUIT BOARD TB6001 REPLACEMENT. (CONT)

INSTALLATION

1. Install circuit board (1) in case (2) making sure ground tab (3) on case enters slot (4) on circuit board.
2. Install two screws (5) and, using flat-tip screwdriver, tighten two screws (5).
3. Push black color-coded wire plug (6) and orange color-coded wire plug (7) into case (2).

**CAUTION**

Care must be taken when performing next step to prevent damage to circuit board.

4. Using soldering iron, carefully solder two wire leads (8) to color-coded wire plugs (6) and (7), and ground tab (3) to circuit board (1).
5. Connect two color-coded wire plugs (9).
6. Install bottom cover (10) and two screws (11).
7. Using screwdriver, tighten two screws (11).
6-16. A6000 ASSEMBLY MAIN CIRCUIT BOARD TB6001 REPLACEMENT. (CONT)

**CAUTION**

Before installing modules, make sure BAND switch cam pin (12) on module (13) is positioned to mate with BAND switch activating pawl (14) on A6000 assembly (15). On some modules, spring (16) returns BAND switch to BAND **B** position. On these modules turn BAND switch control to BAND **B** for installation, then return to BAND **A** position.

![Diagram of A6000 assembly](image)

**NOTE**

Note locations of different numbered modules.

Make sure spring contacts on modules make contact with partitions between modules.

8. Carefully push modules (17) into place.
9. Install top cover (18).
10. Using screwdriver, tighten two captive screws.
11. Connect brown wire (W408) (20), grey wire (W407) (21) and yellow wire (W303) (22).

**FOLLOW-ON MAINTENANCE:** install top and bottom covers. (See paragraph 2-7.)

For RT-246(*)/VRC only:
install Servoamplifier A7200. (See paragraph 2-15.)
install Servomotor Generator MG301. (See paragraph 2-34.)
install front panel. (See paragraph 2-8.)
6-17. INTERMEDIATE GEAR TRAIN ASSEMBLY REPLACEMENT.

MATERIALS/PARTS: Helical Matched A6 Gear Set
PRELIMINARY PROCEDURE: Remove front panel. (See paragraph 2-8.)
Remove Power Amplifier Assembly A6200. (See paragraph 2-46.)
For RT-246(*)IVRC only:...
Remove Band Switch Motor B401. (See paragraph 2-45.)

REMOVAL

CAUTION

Secure assemblies A3000, A4000 and A8000 in place to prevent damage when turning unit upside down.

NOTE

Before starting removal procedure, scribe coupler alinement marks (1) as shown to aid in correct alinement for installation.

Using screwdriver, remove four screws (2) and carefully remove assembly (3) from case.

INSTALLATION

1. Carefully install assembly (3) into case and aline screw holes.
2. install four screws (2).
4. Aline couplers as shown.

FOLLOW-ON MAINTENANCE: Install Power Amplifier Assembly A6200. (See paragraph 2-46.)
install front panel. (See paragraph 2-6.)
8-18. POWER AMPLIFIER TUNING CAPACITOR C6217 REPLACEMENT.

MATERIALS/PARTS: Dielectric Air Variable Capacitor
PRELIMINARY PROCEDURE: Remove Tank Circuit Assembly Z6201. (See paragraph 6-21.)

REMOVAL

CAUTION

Extreme care must be taken when performing next step to prevent damage to nearby wiring.

1. Using screwdriver, remove screw (1) and lockwasher (2).
2. Using wrench, remove nut (3) and lockwasher (4).
3. Remove four-turn Coil L6206 (5).
4. Using wrench, remove nut (6) and lockwasher (7) on opposite side as shown.
5. Lift strap (8) high enough to clear standoff (9).
6-18. POWER AMPLIFIER TUNING CAPACITOR C6217 REPLACEMENT. (CONT)

REMOVAL (CONT)

6. Using screwdriver, remove two plastic screws (1) and carefully move Capacitor C6215 (2) out of way.

**CAUTION**

Extreme care must be taken when performing next step to prevent damage to nearby wiring.

7. Using screwdriver, remove screw (3) and lockwasher (4).
8. Using wrench, remove nut (5) and lockwasher (6).
9. Remove three-turn Coil L6203 (7).
10. Using wrench, remove nut (8) and lockwasher (9) on opposite side as shown.
6-18. POWER AMPLIFIER TUNING CAPACITOR C6217 REPLACEMENT. (CONT)

CAUTION

Position Rotary Switch S6202 as shown in detail A to prevent damage to switch during unsoldering operation.

Extreme care must be taken when performing next step.

11. Using soldering iron, carefully unsolder wire (10) from strap(n) and strap from rotary switch (12) as shown in detail B.

CAUTION

Standoffs (13) and (14) are made of porcelain. Do not use pliers to remove.

12. Using fingers, unscrew standoffs (13) and (14) while pulling Capacitor C6217 (15) away from and off mount (16).
13. Using hex wrench, loosen two setscrews (17) on gear (18) and slide gear off shaft as shown in detail C.
6-18. POWER AMPLIFIER TUNING CAPACITOR C6217 REPLACEMENT. (CONT)

INSTALLATION

1. Install gear (1) on gearshaft (2), lining up setscrews (3) with flats on gearshaft, and allow 1/16 Inch to stick out past gear hub (4) as shown in detail A.
2. Using hex wrench, tighten two setscrews (3).
3. Line up four studs (5) and one strap (6) on Capacitor C6217 (7) with holes In mount (8) and push into place.
4. Pull Capacitor C6217 (7) out slightly and Install 7/16-inch-long standoff (9) and 5/8-inch-long standoff (10).

**CAUTION**

Standoffs (9) and (10) are made of porcelain. Do not use pliers to tighten.

5. Using fingers, tighten standoffs (9) and (10) evenly to allow Capacitor C6217 (7) to be pulled into place flush with mount.

**CAUTION**

Position Rotary Switch S6202 as shown in detail B to prevent damage to switch during soldering operation.

6. Position strap (6) and wire (11) In rotary switch terminal (12) as shown In detail C.

**CAUTION**

Extreme care must be taken when performing next step to prevent damage to rotary switch.

7. Using soldering Iron, solder strap (6) to rotary switch terminal (12) and wire (11) to strap (6).
6-18. POWER AMPLIFIER TUNING CAPACITOR C6217 REPLACEMENT. (CONT)

8. Install nuts (13) and lockwashers (14) on two studs (15).
11. Position three-turn Coil L6203 (18) on stud (19) and 5/8-inch-long standoff (17).
12. Install nut (20), lockwasher (21), screw (22) and lockwasher (23).

CAUTION

Care must be taken when performing next step to prevent damage to nearby wiring.

15. Carefully position Capacitor 08215 (24) on mount and Install two plastic screws (25).

CAUTION

Care must be taken when performing next step to prevent damaging plastic screws. Do not overtighten.

17. Position strap (1) and strap (2) on 7/16-inch-long standoff (3).
18. Position four-turn Coil L6206 (4) on stud (5) and 7/16-inch long standoff (3).
19. Install nut (6), lockwasher (7), screw (8) and lockwasher (9).

CAUTION

Care must be taken when performing next step to prevent damage to nearby wiring.


FOLLOW-ON MAINTENANCE: Install Tank Circuit Assembly Z6201. (See paragraph 6-21.)
6-19. TUBE SOCKET XV6101 REPLACEMENT.

MATERIALS/PARTS: Tube Socket XV6101
PRELIMINARY PROCEDURE: Remove Driver Assembly A61OO. (See paragraph 2-48.)

REMOVAL

NOTE

Tube Socket XV6101 is located within the A61OO assembly.

1. Remove tube shield (1) by pushing in and turning counterclockwise. When tube shield is released, it will pop out.

CAUTION

When performing next step, do not twist or angle tube to side. This will prevent bending or breaking pins.

2. Using tube puller, carefully pull tube (2) straight out of socket (3).
3. Using screwdriver, loosen two captive screws (4) and remove cover (5).
6-19. TUBE SOCKET XV6101 REPLACEMENT. (CONT)

REMOVAL (CONT)

4. Using screwdriver, remove two screws (1) and remove cover (2).
5. Using screwdriver, remove four large screws (3) and two small screws (4).
6. Using screwdriver, carefully pry mounting plate (5) from housing (6) (see detail A) to remove pin (7) from hole (8).

CAUTION

Extreme care must be taken when performing next step to prevent damage to nearby components.

7. Using soldering iron, carefully unsolder center stem (9) of socket (10) on both sides of plate (11) (see arrows).
6-19. TUBE SOCKET XV6101 REPLACEMENT. (CONT)

CAUTION

Extreme care must be taken when performing next step to prevent damage to circuit board.

8. Using soldering Iron, carefully unsolder eight leads (12) from socket (13) to circuit board (14).

NOTE

Note placement of guide pin (15).

9. Remove socket (13).

INSTALLATION

NOTE

Note position of socket (13) in front view. Note placement of guide pin (15).

1. Carefully place socket (13) in position shown, alining leads (12) with solder points on circuit board (14).

CAUTION

Extreme care must be taken when performing next step to prevent damage to circuit board.

2. Using soldering Iron, carefully solder eight leads (12) from socket (13) to circuit board (14).
6-19. TUBE SOCKET XV61O1 REPLACEMENT. (CONT)

INSTALLATION (CONT)

CAUTION

Extreme care must be taken when performing next step to prevent damage to nearby components.

3. Using soldering iron, carefully solder center stem (1) of socket (2) on both sides of plate (3) (see arrows).

4. Install mounting plate (4) as shown and install two small screws (5) and four large screws (6).
5. Using screwdriver, tighten screws (5) and (6).
6. Install cover (7) and two screws (6).
7. Using screwdriver, tighten screws (8).
8. Install cover (9).

**CAUTION**

Check pins on tube for straightness before inserting into tube socket. If bent, straighten any bent pins.

When performing next step, note pin arrangement on tube and tube socket for correct installation (see view A).

10. Aline pins on tube (11) with holes in tube socket (12) and push into place.

**CAUTION**

Make sure metal shield coil is inside tube shield (13).

11. Install tube shield (13) by pushing in and turning clockwise to lock.

FOLLOW-ON MAINTENANCE: Install Driver Assembly A6100. (See paragraph 2-48.)
6-20. TUBE SOCKET XV6201 REPLACEMENT. (CONT)

MATERIALS/PARTS: Tube Socket XV6201
PRELIMINARY PROCEDURE: Remove Power Amplifier Tube V6201. (See paragraph 2-50 or 2-51.)
Remove Tank Circuit Assembly 26201. (See paragraph 5-21.)

REMOVAL

1. Using screwdriver, remove three screws (1) and two covers (2).
2. Using screwdriver, remove two screws (3) from standoff (4).

CAUTION

Extreme care must be taken when performing next step to prevent breaking ground wire (5).

3. Carefully move standoff (4) to gain access to screws (6) and (8).
4. Using screwdriver, remove one screw (8), lockwasher (9), two screws (10) and lockwashers (11).
5. Using screwdriver and nut driver with 1/4-inch socket, remove screw (6), lockwasher (7), ET lockwasher (12), ground lug (13) and nut (14).
6-20. TUBE SOCKET XV6201 REPLACEMENT. (CONT)

CAUTION

Care must be taken when performing steps 6, 7, and 8 to prevent damage to nearby components.

6. Using soldering iron, carefully unsolder two wires (15) from side terminal (16) and two white/red wires (17) from center terminal (18).
7. Push socket (19) out of socket base (20) to gain access to side terminal (21).
8. Using soldering iron, carefully unsolder one wire (22) from side terminal (21).
9. Remove socket (19) from socket base (20).

INSTALLATION

1. Place socket (19) in socket base (20). Note positioning of socket.

CAUTION

Care must be taken when performing steps 2, 3, and 4 to prevent damage to socket and nearby components.

2. Using soldering iron, carefully solder one wire (22) to side terminal (21).
3. Carefully push socket (19) into socket case (20).
4. Using soldering iron, carefully solder two white/red wires (17) to center terminal (18) and two wires (15) to side terminal (16).
5. Install three 5/16-inch-long screws (1) and lockwashers (2) through holes in socket mounting plate (3).
6. Install one 5/8-inch-long screw (4), lockwasher (5), ET lockwasher (6), groundlug (7) and nut (8).
7. Using screwdriver, tighten three screws (1).
8. Using screwdriver and nut driver with 1/4-inch socket, tighten one screw (4) and nut (8).

**CAUTION**

Care must be taken when performing next step to prevent breaking ground wire (9).

9. Carefully position standoff (10) and install two screws (11).
10. Using screwdriver, tighten two screws (11).
11. Install two covers (12) and three screws (13).
12. Using screwdriver, tighten three screws (13).

**FOLLOW-ON MAINTENANCE:** Install Power Amplifier Tube V6201. (See paragraph 2-50 or 2-51.)
install Tank Circuit Assembly Z6201. (See paragraph 6-21)
6-21. TANK CIRCUIT ASSEMBLY Z6201 REPLACEMENT.

MATERIALS/PARTS: Tank circuit assembly
PRELIMINARY PROCEDURE: Remove Power Amplifier Assembly A6200 (See paragraph 2-46.)

REMOVAL

NOTE

Cover configuration and number of screws will vary between plain and A-models. (A-model shown.)

Screws of different lengths are used to secure cover.

1. Using screwdriver, remove 19 screws(l).
2. Carefully remove cover (2) by lifting off of base.
3. Using small screwdriver, remove C-clip (1) from BAND switch actuator linkage (2).
4. Using screwdriver, remove screw (3) and lockwasher (4) from drive assembly coupler (5).
5. Remove BAND switch actuator linkage (2) and drive assembly coupler (5) as an assembly.
6. Inscription marks on tank circuit assembly coupler and body (6) and gear and body (7).
6-21. TANK CIRCUIT ASSEMBLY Z6201 REPLACEMENT. (CONT)

NOTE

Some tank circuit assembles may be assembled with shims to provide for correct gear meshing.

Disregard shims if not supplied.

7. Using screwdriver, remove three screws (8), ET lockwashers (9) and shims (10) (see note).

8. Using screwdriver, remove two screws (11), lockwashers (12) and flat washers.

CAUTION

Care must be taken when performing next step to prevent damage to nearby components.

9. Using screwdriver, remove screws (14) and (15).
6-21. TANK CIRCUIT ASSEMBLY Z6201 REPLACEMENT. (CONT)

REMOVAL (CONT)

10. Carefully move tank circuit assembly (1) to allow gear (2) to pass through hole in support (3).
11. Move tank circuit assembly (1) enough to reach ground wire (4).
12. Using screwdriver, remove screw (5), lockwasher (6), ground wire (4) and ET lockwasher (7).
13. Remove tank circuit assembly (1).

CAUTION

Extreme care must be taken when performing next step to prevent damage to gear (2) and ground wire (4).
6-21. TANK CIRCUIT ASSEMBLY Z6201 REPLACEMENT. (CONT)

INSTALLATION

1. Position tank circuit assembly (1) as shown and install screw (2), lockwasher (3), ground wire (4) and ET lockwasher (5).

CAUTION

Ground wire (4) must be in position shown for proper installation.

2. Using screwdriver, tighten screw (2).
6-21. TANK CIRCUIT ASSEMBLY Z6201 REPLACEMENT. (CONT)

INSTALLATION (CONT)

3. Carefully move tank circuit assembly to position shown allowing gear (1) to center hole in mount (2).
4. Turn gear (1) to aline second notch (3) on capacitor movable blade with edge of fixed blade (4).
5. Aline marks (5) on tank circuit assembly coupler and body, and marks (6) on gear and body.
6. Carefully push tank circuit assembly into hole in mount (2) allowing gear (1) to mesh with gear (7). Make sure alignment has not been disturbed.

CAUTION

Care must be taken when performing next step to prevent damage to ground wires.
6-21. TANK CIRCUIT ASSEMBLY Z6201 REPLACEMENT. (CONT)

NOTE

Some tank circuit assemblies may be assembled with shims to provide correct gear meshing. Disregard shims if not supplied.

7. Install three shims (8), screws (9) and ET lockwashers (10).
8. Using screwdriver, tighten three screws (9).

CAUTION

Extreme care must be taken performing steps 9 and 10 to prevent damage to nearby components.

9. Install screws (11) and (12).
10. Using screwdriver, tighten screws (11) and (12).
11. Install two screws (13), lockwasher (14) and flat washers (15).
12. Using screwdriver, tighten two screws (13).
13. Push BAND switch actuator linkage (1) through hole in mounting plate (2) and position it on pin (3). Position drive assembly coupler (4) on shaft as shown.

14. Install C-clip (5) on pin (3), and screw (6) and lockwasher (7) in drive assembly coupler (4).

15. Using screwdriver, tighten screw (6).
6-21. TANK CIRCUIT ASSEMBLY Z6201 REPLACEMENT. (CONT)

Cover configuration and number of screws will vary between plain and A-models. (A-model shown.)

Sea view A for locations of different length screws used to secure cover.

16. Install cover (8) and align screw holes.
17. Install 19 screws (9) (see note).
18. Using screwdriver, tighten 19 screws (9).

FOLLOW-ON MAINTENANCE: Install Power Amplifier Assembly A6200. (See paragraph 2-46.)
APPENDIX A

REFERENCES

A-1. SCOPE.

This appendix lists all pamphlets, forms, service catalogues, service bulletins, technical bulletins and technical manuals referenced in this manual. It also lists those technical manuals covering the operation of the test equipment needed to perform the test, troubleshooting, and alignment procedures in chapters 3, 4, and 5.

A-2. PAMPHLETS.

Consolidated index of Army Publications and Blank Forms

A-3. FORMS.

Recommended Changes to Publications and Blank Forms
Recommended Changes to Equipment Technical Manuals
Equipment Inspection and Maintenance Worksheet
Discrepancy in Shipment Report (DISREP)
Report of Discrepancy (ROD)
Quality Deficiency Report

A-4. SERVICE CATALOGUES.

Tool Kit, Electronic Equipment TK-105/G (NSN 5180-00-610-8177)
Tool Kit, Electronic Equipment TK-101/G (NSN 5180-00-064-5178)
Tool Kit, Electronic Equipment TK-100/G (NSN 5180-00-605-0079)

A-5. SERVICE BULLETINS.

Vehicular Radio Sets and Authorized installations
Painting and Preservation Supplies Available for Field Use for Electronic Equipment

A-6. TECHNICAL BULLETIN.

Field Instructions for Painting and Preserving Electronics Command Equipment including Camouflage Pattern Painting of Electrical Equipment Shelters

A-7. TECHNICAL MANUALS.

Power Supplies PP-1104(A)/G and PP-1104(B)/G (NSN 6130-00-542-6385)
Operator’s, Organizational, Direct Support, and General Support Maintenance Manual for installation Kits, Electronic Equipment TSEC/KY-38 and HYL3/TSEC

A-1
A-7. TECHNICAL MANUALS. (CONT)

Operator’s Manual: Radio Sets AN/VRC-12 (NSN 5820-00-223-7412), AN/VRC-43 (5820-00-223-7415), AN/VRC-44 (582000-223-7417), AN/VRC-45 (5820-00-223-7418), AN/VRC-46 (5820-00-223-7433), AN/VRC-47 (5820-00-223-7434), AN/VRC-48 (5820-00-223-7435), and AN/VRC-49 (5820-00-223-7437) (Used without intercom system) .......................................................... TM 11-5820-401-10-1

Hand Receipt Technical Manual Covering End item/Components of End item (CEOI), Basic issue items (BII), and Additional Authorization List (AAL) for Radio Sets AN/VRC-12 (NSN 5820-00-223-7412), AN/VRC-43 (5820-00223-7415), AN/VRC-44 (5820-00-223-7417), AN/VRC-45 (5820-00-223-7418), AN/VRC-46 (5820-00-223-7433), AN/VRC-47 (5820-00-223-7434), AN/VRC-48 (5820-00-223-7435), and AN/VRC-49 (5820-00-223-7437) (Used with intercom system) .......................................................... TM 11-5820-401-10-1-HR

Hand Receipt Technical Manual Covering End Item/Components of End item (COEI), Basic issue items, and Additional Authorization List (AAL) for Radio Sets AN/VRC-12 (NSN 5820-00-223-7412), AN/VRC-43 (5820-00-223-7415), AN/VRC-44 (5820-00-223-7417), AN/VRC-45 (5820-00-223-7418), AN/VRC-46 (5820-00-223-7433), AN/VRC-47 (5820-00-223-7434), AN/VRC-48 (5820-00-223-7435), and AN/VRC-49 (5820-00-223-7437) (Used with intercom System) .......................................................... TM 11-5820-401-10-2

Organizational Maintenance Manual: Radio Sets AN/VRC-12 (NSN 5820-00-223-7412), AN/VRC-43 (5820-00-223-7415), AN/VRC-44 (5820-00-223-7417), AN/VRC-45 (5820-00-223-7418), AN/VRC-46 (5820-00-223-7433), AN/VRC-47 (5820-00-223-7434), AN/VRC-48 (5820-00-223-7435), and AN/VRC-49 (5820-00-223-7437) (Used with intercom System) .......................................................... TM 11-5820-401-10-2-HR

Organizational Maintenance Manual: Radio Sets AN/VRC-12 (NSN 5820-00-223-7412), AN/VRC-43 (5820-00-223-7415), AN/VRC-44 (5820-00-223-7417), AN/VRC-45 (5820-00-223-7418), AN/VRC-46 (5820-00-223-7433), AN/VRC-47 (5820-00-223-7434), AN/VRC-48 (5820-00-223-7435), and AN/VRC-49 (5820-00-223-7437) (Used with intercom Set ANV/1 (V)) .................................................................................................................. TM 11-5820-401-20-1

Organizational Maintenance Manual: Radio Sets AN/VRC-12 (NSN 5820-00-223-7412), AN/VRC-43 (5820-00-223-7415), AN/VRC-44 (5820-00-223-7417), AN/VRC-45 (5820-00-223-7418), AN/VRC-46 (5820-00-223-7433), AN/VRC-47 (5820-00-223-7434), AN/VRC-48 (5820-00-223-7435), and AN/VRC-49 (5820-00-223-7437) (Used with intercom Set ANV/1 (V)) .................................................................................................................. TM 11-5820-401-20-2

Direct Support and General Support Maintenance Repair Parts and Special Tools for Receiver-Transmitters, Radio RT-248/ VRC and RT-246A/VRC (NSN 5820-00-892-0623) .................................................................................................................. TM 11-5820-401-34P-2-1

Direct Support and General Support Maintenance Repair Parts and Special Tools for Receiver-Transmitters, Radio RT-524/VRC and RT-524A/VRC (NSN 5820-00-892-0622) .................................................................................................................. TM 11-5820-401-34P-2-2
A-7. TECHNICAL MANUALS. (CONT)

Direct Support and General Support Maintenance Manual:
Radio Sets AN/VRC-12 (NSN 5820-00-223-7412), AN/VRC-43 (5820-00-223-7415), AN/VRC-44 (5820-00-223-7417), AN/VRC-45 (5820-00-223-7418), AN/VRC-46 (5820-00-223-7433), AN/VRC-47 (5820-00-223-7434), AN/VRC-48 (5820-00-223-7435), and AN/VRC-49 (5820-00 223-7437), Radio R-442/VRC and R-442A/VRC (NSN 5820-892-0624) .......................................................... TM 11-5820-401-34-3


Operator, Organizational, Direct Support, General Support, and Depot Maintenance Multimeter, ME-26(*)/U ................................................................. TM 11-6625-200-15

Operator’s, Organizational, Direct Support, and General Support Maintenance Manual Spectrum Analyzer TS-723 A/U (NSN 6625-00-833-2602), TS-723 B/U (NSN 6625-00-668-9418), and TS-723 C/U and TS-723 D/U (NSN 6625-00-668-9418) .......................................................................................................................... TM 11-6625-255-14

Operator and Organizational Maintenance Manual Meter, Modulation ME-57/U ........................................................................................................... TM 11-6625-400-12

Operator, Organizational, Field, and Depot Maintenance Manual Wattmeter AN/URM-120 ............................................................................................... TM 11-6625-446-15

Operator and Organizational Maintenance Manual Generator, Signal AN/URM-103 ........................................................................................................ TM 11-6625-586-12

Operator’s, Organizational, Direct Support, General Support, and Depot Maintenance Manual Signal Generator AN/URM-127 (NSN 6625-00-783-5965) ...................................................................................................................... TM 11-6625-683-15

Operator’s Manual: Digital Readout, Electronic Counter AN/USM-207 (NSN 6625-00-911-6368) .................................................................................. TM 11-6625-700-10

Operator, Organizational, Direct Support, and General Support Maintenance Manual Including Repair Parts and Special Tools, Digital Readout Electronic Counter AN/USM-207A .................................................................................................................. TM 11-6625-700-14-1

Organizational, Direct Support, General Support, and Depot Maintenance Manual Digital Readout Electronic Counter, AN/USM-207 (NSN 6625-00-911-6368) .................................................................................................................. TM 11-6625-700-25


Operator’s Manual, Radio Test Set AN/GRM-114A (NSN 8525-01-071-2817) .................................................................................................................. TM 11-6625-3016-10-1
A-7. TECHNICAL MANUALS (CONT)

Maintenance Management Update .................................................. DA Pam 738-750
Administrative Storage of Equipment .......................................... TM 740-90-1
Procedures for Destruction of Electronics Materials to
Prevent Enemy Use (Electronics Command) ................................. TM 750-244-2
APPENDIX B

EXPENDABLE SUPPLIES AND MATERIALS LIST

B-1. SCOPE.

This appendix lists expendable supplies and materials you will need to maintain the RT-246(*)/VRC and RT-524(*)/VRC. These items are authorized to you by CTA 50-970, Expendable items (except Medical, Class V, Repair Parts, and Heraldic items).

B-2. EXPLANATION OF COLUMNS.

a. Column (1), Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (for example, “Use cleaning compound, item 6,” appendix B).

b. Column (2), Level. This column identifies the lowest level of maintenance that requires the listed item.

F - Direct Support Maintenance
H - General Support Maintenance

c. Column (3), National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column (4), Description. indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

e. Column (5), Unit of Measure (U/M). indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (eg., ea, in., pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.
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<tr>
<th>ITEM NUMBER</th>
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<th>NATIONAL STOCK NUMBER</th>
<th>DESCRIPTION (FSCM)</th>
<th>U/M</th>
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<td>1</td>
<td>F</td>
<td>6850-00-880-7616</td>
<td>Silicone Insulating Compound (MIL-S-86660) (DC-4 or equal)</td>
<td>tube (8 OZ)</td>
</tr>
<tr>
<td>2</td>
<td>F</td>
<td>9505-00-293-4208</td>
<td>Wire, Nonelectrical (Safety Wire)</td>
<td>lb</td>
</tr>
<tr>
<td>3</td>
<td>F</td>
<td>5970-00-816-6056</td>
<td>Insulation Tape, Electrical, Plastic</td>
<td>ft</td>
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<td>4</td>
<td>F</td>
<td>7510-00-290-8036</td>
<td>Pressure Sensitive Tape, Filament Reinforced</td>
<td>yd (60)</td>
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<tr>
<td>5</td>
<td>F</td>
<td>6850-00-105-3084</td>
<td>Cleaning Compound, Freon TF (Trichlorotrifluoroethane)</td>
<td>oz (16)</td>
</tr>
<tr>
<td>6</td>
<td>F</td>
<td>6850-00-984-5853</td>
<td>Cleaning Compound, Freon PLA (Trichlorotrifluoroethane)</td>
<td>gal. (5)</td>
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<tr>
<td>7</td>
<td>H</td>
<td>8040-00-843-0802</td>
<td>Adhesive/Sealer Silicon</td>
<td>tube (3 oz)</td>
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APPENDIX C
MANUFACTURED/FABRICATED ITEMS

C-1. INTRODUCTION.

This appendix includes instructions for making items authorized to be manufactured or fabricated at the direct support level.

C-2. FABRICATED SMC TO BNC CABLE.

A fabricated SMC connector to BNC male connector is required to perform the troubleshooting in chapter 4. It is used to connect the AN/GRM-114A to various SMC jacks on the RT.

Parts Needed:

- BNC Connector UG-88C/U (NSN 5935-00-681-5685)
- Cable RG-174C/U (NSN 6145-00-606-8237)
- SMC Connector, Female, Slip-On

Connect parts as shown in the following diagram.

C-3. FABRICATED A8000A TEST CABLE.

A fabricated test cable is required to perform the A8000A assembly troubleshooting in chapters 3 and 5. It is used in conjunction with a voltmeter to isolate faults between test points in the A8000 assembly.

Parts needed:

- Alligator Clip
- P.C. Board
- Resistor, Linear, 5 k ohms, 1/4 watt
- Test Probe
C-3. FABRICATED A800A TEST CABLE. (CONT)

Connect parts as shown in the following diagram.

C-4. FABRICATED A8100 SNIFER COIL.

A fabricated sniffer coil is required to align the A8100 module as described in chapter 4. Fabricate the sniffer as shown in the following diagram.
C-5. CONSTRUCTION OF FRONT PANEL HOLDING FIXTURE

MATERIALS/PARTS: Wood, 30 3/4"x 2"x 4"
Nails, 3-inch-long, four required
Tape measure
T-square
Saw

PREPARATION

1. Using tape measure, measure 8 inches from end of wood and mark (1).
2. Measure 8 inches from mark (1) and mark (2).
3. Using T-square, draw line across wood at marks (1) and (2).
4. Using saw, cut wood at lines drawn to get two 8-inch-long pieces of wood.
5. Remainder of wood should be 14 1/2 inches long. If not, trim to size.

ASSEMBLY

1. Using tape measure, measure 2 inches up from bottom of each .8-inch piece of wood and mark (3).
2. Using T-square, draw line across wood at widest part.
3. Place bottom edge (4) of 14 1/2-inch-long piece of wood on line drawn and secure with two nails (5).
4. Do step 3 for remaining 5-inch-long piece of wood.
# APPENDIX D

## MAINTENANCE INFORMATION INDEX

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GLOSSARY

Section I ABBREVIATIONS

afc automatic frequency control
CRS Crystal Reference System
ant cont antenna control
demod demodulation
kHz (kc) kilohertz (kilocycles)
MHz (me) megahertz (megacycles)
Osc oscillator
pot potentiometer

Section II DEFINITION OF UNUSUAL TERMS

Attenuate. To reduce signal strength.

Automatic frequency control (afc). A system that produces an error voltage which is proportional to the amount of oscillator drift. The error voltage corrects this drift.

Limiting. Clipping those portions of a wave that exceed a specific amplitude.

Muting. Reducing speaker output to prevent acoustical feedback.

Sniffer. A small antenna used as a probe to detect radiated signals.

Squelch. To quiet a receiver by cutting off its output when no signal is being received.
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Stateside, N.J. 07703

**DATE SENT:** 10 July 1975

**PUBLICATION NUMBER**
TM 11-5840-340-12

**PUBLICATION DATE**
23 Jan 74

**PUBLICATION TITLE**
Radar Set AN/PRC-76

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**IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:**

Recommend that the installation antenna alignment procedure be changed throughout to specify a 2° IFF antenna lag rather than 1°.

**REASON:** Experience has shown that with only a 1° lag, the antenna servo system is too sensitive to wind gusting in excess of 25 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to 2° without degradation of operation.

Item 5, Function column. Change "2 db" to "3 db."

**REASON:** The adjustment procedure for the TRANS POWER FAULT indicator calls for a 3 db (500 watts) adjustment to light the TRANS POWER FAULT indicator.

Add new step f.1 to read, "Replace cover plate removed in step e.1, above."

**REASON:** To replace the cover plate.

Zone C 3. On J1-2, change "+24 VDC to +5 VDC."

**REASON:** This is the output line of the 5 VDC power supply. +24 VDC is the input voltage.

---

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