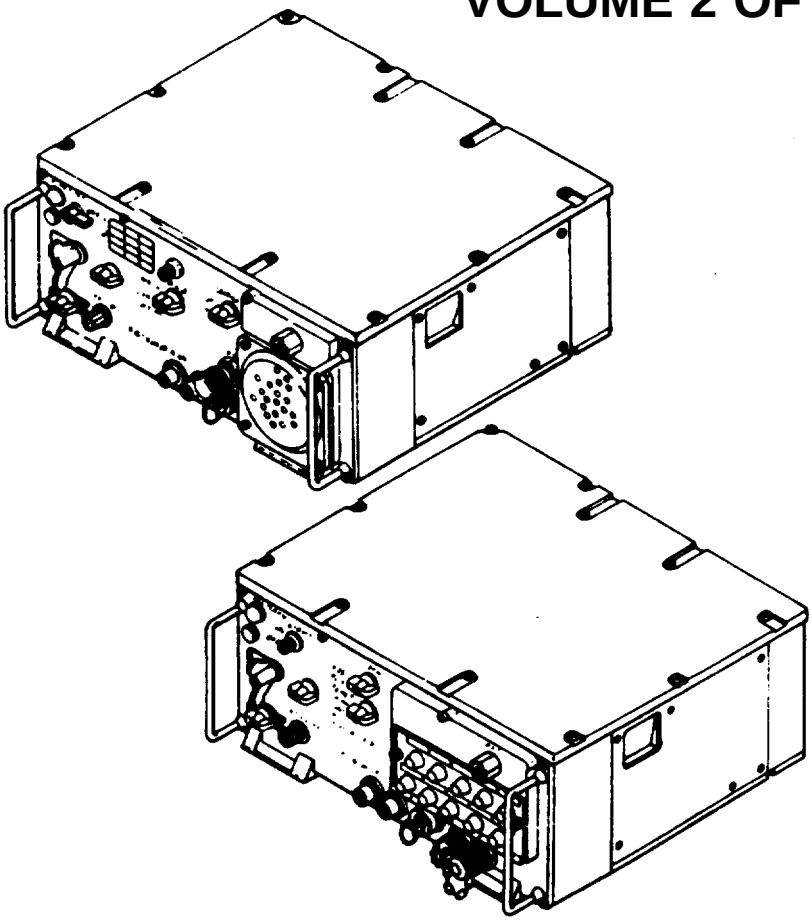
ARMY TM 11-5820-401-34-2-2
NAVY NAVELEX 0967-LP-432-3030

TECHNICAL MANUAL

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-48 (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 AND RT-246A/VRC
(NSN 5820-00-892-0623)
AND
RT-542/VRC AND RT-524A/VRC (NSN 5820-00-892-0622)

DEPARTMENT OF THE ARMY AND NAVY
16 APRIL 1984

TM 11-5820-401 -34-2-2
EE150-JA-MMM-020/E154 VRC 12
C 4

Change

No. 4

DEPARTMENTS OF THE ARMY
AND THE NAVY
Washington, DC, 1 September 1995

Direct Support and General Support Maintenance Manual (Volume 2 of 2)

RADIO SETS

AN/VRC-12 (NSN 5820-00-223-7412) (EIC: GCC)
AN/VRC-43 (NSN 5820-00-223-7415) (EIC: GCD)
AN/VRC-44 (NSN 5820-00-223-7412) (EIC: GCE)
AN/VRC-45 (NSN 5820-00-223-7418) (EIC: GCF)
AN/VRC-46 (NSN 5820-00-223-7433) (EIC: GCG)
AN/VRC47 (NSN 5820-00-223-7434) (EIC: GCH)
AN/VRC-48 (NSN 5820-00-223-7435) (EIC: GCJ)
AN/VRC-49 (NSN 5820-00-223-7437) (EIC: GCK)

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4-39 and 4-40	4-39 and 4-40
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4-51 through 4-54	4-51 through 4-54
4-71 and 4-72	4-71 and 4-72
4-85 and 4-86	4-85 and 4-86
4-93 and 4-94	4-93 and 4-94
4-97 through 4-100	4-97 through 4-100
4-103 and 4-104	4-103 and 4-104
4-109 and 4-110	4-109 and 4-110
4-113 through 4-116	4-113 through 4-1”16
4-137 and 4-138	4-137 and 4-138
5-73 through 5-76	5-73 through 5-76
5-83 and 5-84	5-83 and 5-84
5-95 through 5-98	5-95 through 5-98
6-11 and 6-12	6-11 and 6-12
6-41 and 6-42	6-41 and 6-42
6-47 and 6-48	6-47 and 6-49

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No. 3

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Washington, DC, 1 January 1990

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 5820-00-140-9071)
AND
RT-524/VRC AND RT-524A/VRC (NSN 5820-00-892-0622)

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4-1 and 4-2	4-1 through 4-2.1/(4.2.2 blank)
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4-29 and 4-30	4-29 and 4-30
4-31 and 4-32	4-31 and 4-32
4-35 and 4-36	4-35 and 4-36
4-39 and 4-40	4-39 and 4-40
4-67 and 4-68	4-67 and 4-68
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4-183 through 4-186	4-183 through 4-186
4-193 through 4-196	4-193 through 4-196
4-203 through 4-208	4-203 through 4-208
4-227 and 4-228	4-227 and 4-228

Remove pages	Insert pages
4-233 through 4-236	4-233 through 4-236
5-35 through 5-38	5-35 through 5-38
5-101 through 5-108	5-101 through 5-108
5-111 and 5-112	5-111 and 5-112
5-119 through 5-124	5-119 through 5-124
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5-191 through 5-196	5-191 through 5-196
5-199 through 5-204	5-199 through 5-204
6-61 and 6-62	6-61 and 6-62
Figure FO-2	Figure FO-2
Figure FO-3	Figure FO-3
Figure FO-8	Figure FO-8
Figure FO-12	Figure FO-12
Figure FO-15	Figure FO-15

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Official:

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The Adjutant General

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CHANGE

No. 2

DEPARTMENTS OF THE ARMY
AND THE NAVY
Washington, DC, 1 October 1987

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)

TM 1 l-5820-401-34-2-2/NAVELEX 0967-LP-432-3030, 16 April 1984, is changed as follows:

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4-219 through 4-222	4 -219 through 4-222
5-9 and 5-10	5-9 and 5-10
5-25 and 5-26	5-25 and 5-26
5-29 and 5-30	5-29 and 5-30
5-33 and 5-34	5-33 and 5-34
5-61 and 5-62	5-61 and 5-62
5-109 and 5-110	5-109 and 5-110
5-195 and 5-196	5-195 and 5-196
Figure FO-7 and Figure FO-8	Figure FO-7 and Figure FO-8
Figure FO-12 through Figure FO-14	Figure FO-12 through Figure FO-14
Figure FO-30	Figure FO-30

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No. 1

DEPARTMENTS OF THE ARMY
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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), AND AN/VRC-49 (NSN 5820-00-223-7437)

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Remove pages	*Insert pages*
i and ii	i and ii
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4-41 and 4-42	4-41 and 4-42
4-49and4-50	4-49 and 4-50
4-55 through 4-60	4-55 through 4-60
4-179 and 4-180	4-179 and 4-l80
5-43 and 5-44	5-43 and 5-44
B-1 and B-2	B-1 and B-2
C-1 and C-2	C-1 and C-2
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

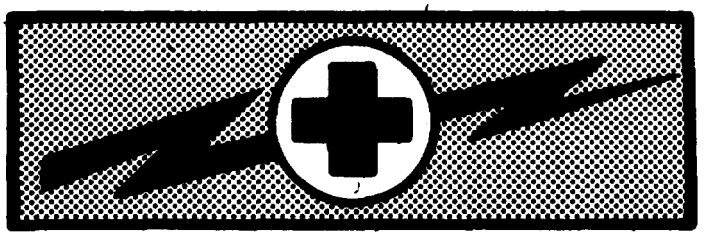
2 IF POSSIBLE, TURN OFF THE ELECTRICAL POWER

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

WARNING



WARNING

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 Artlficial 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.

Technical Manual
No. 11-5820-401-34-2-2
NAVELEX 0967-LP-432-3030

DEPARTMENTS OF THE ARMY
AND THE NAVY
Washington, DC, 16 April 1984

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 (NSN 5820-00-223-7418), AN/VRC-46 (NSN 5820-00-223-7433), AN/VRC-47 (NSN 5820-00-223-7424), 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)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2023-2 located in back of this manual direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-ME-MP, Fort Monmouth, New Jersey 07703-5007. For Navy, mail comments to the Commander, Space and Naval Warfare Systems Command, ATTN: SPAWAR 8122, Washington, DC 20363-5100. In either case a reply will be furnished direct to you.

VOLUME 2 OF 2

*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/EE150-JA-MMI-DID/E154RT246, 23 February 1984 and TM 11-5820-401-34-2/NAVELEX 0967-LP-432-3030, 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 alinement procedures. Each chapter shows how to perform these tasks using a different set of test equipment; that is:

1. Chapter 3 contains performance and troubleshooting procedures, using Maintenance Kit MK-1978/VRC and discrete test equipment (TMDE).
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

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 misalinements.

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 realinement of even one component could alter the RT's signals enough to create the need for other realinements. Therefore, after making any alterations in the RT, do all the performance tests, even those you have done already.

Section I PERFORMANCE TESTS

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

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
MK-1978/VRC	POWER	ON
	AUX POWER	OFF
	KEY	RCVE
	ALL OTHER SWITCHES	DOWN
RT	LIGHT	ON
	BAND	A
	MC TUNE KC	30.00
	POWER	LOW
MM-100E	30V	+DC

1. Connect MM-100E attenuated Probe A to MK-1978/VRC Pin C Jack (below Aux Power Switch). Connect Probe B to ground.

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.

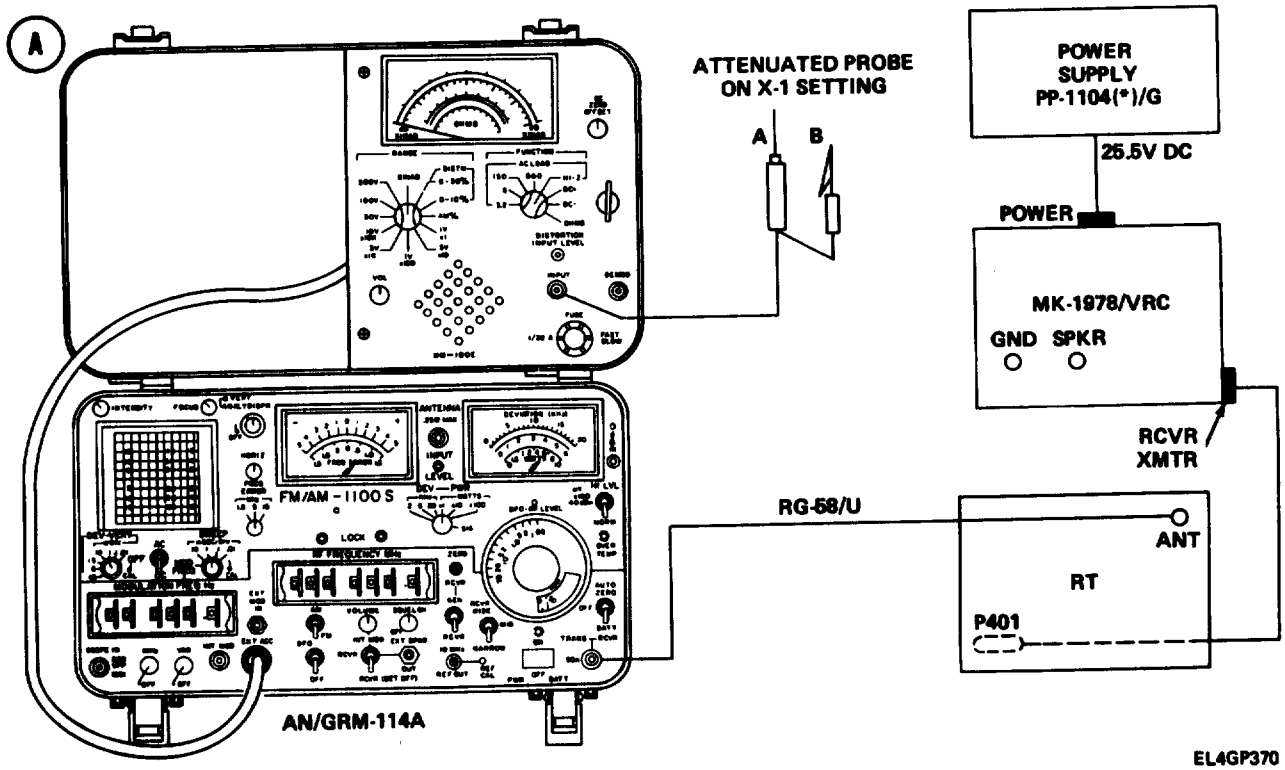
PURPOSE. This test checks the VOLUME control of the RT for proper operation. When a 1-kHz tone is injected into the RT ANTENNA port, the speaker should output a clear tone with no scratchy sound or sudden drop in volume. The absence of a tone means that the signal is not passing completely through the 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.

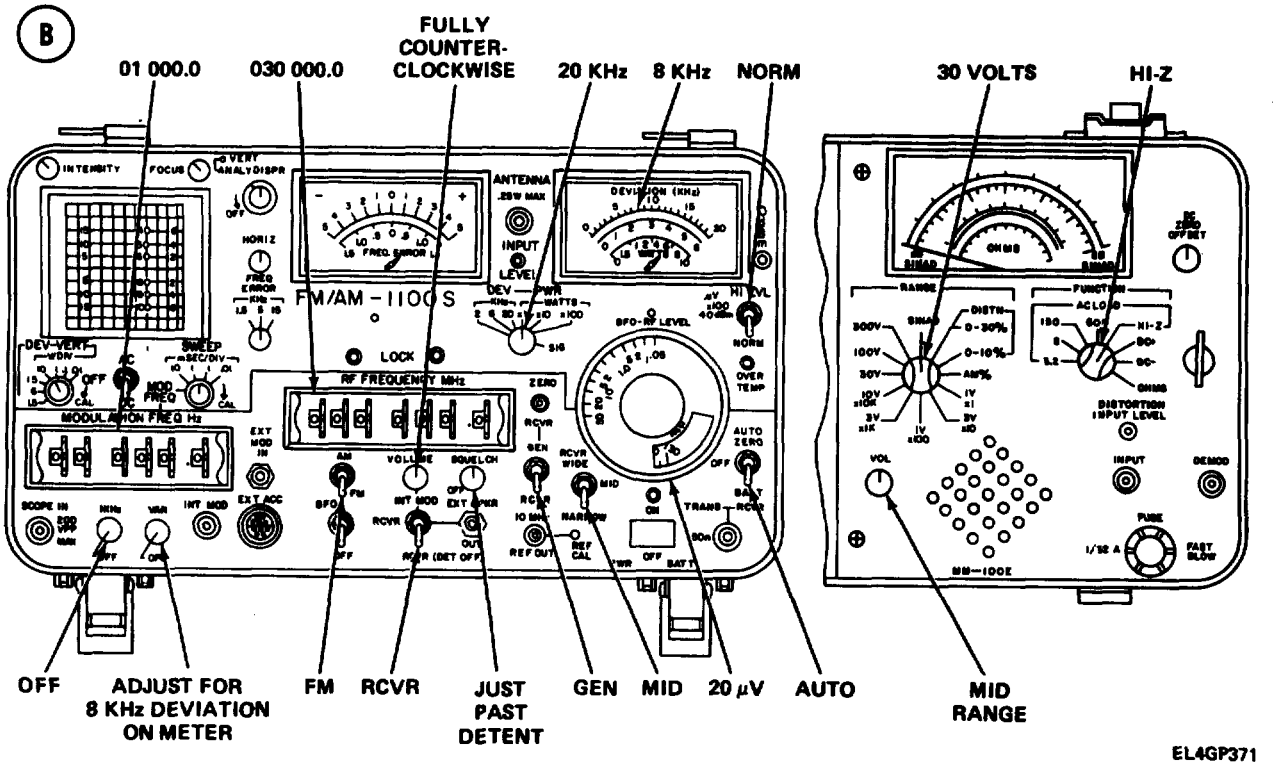
CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
MK-1978/VRC	POWER	ON
	AUDIO	MUTED
	KEY	RCVE
	X-MODE (RT)	NORMAL
	AUX RCVR	NORMAL
	SQUELCH	ON

4-2. VOLUME CONTROL TEST. (CONT)

CONTROL AND SWITCH SETTINGS (CONT)

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



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:

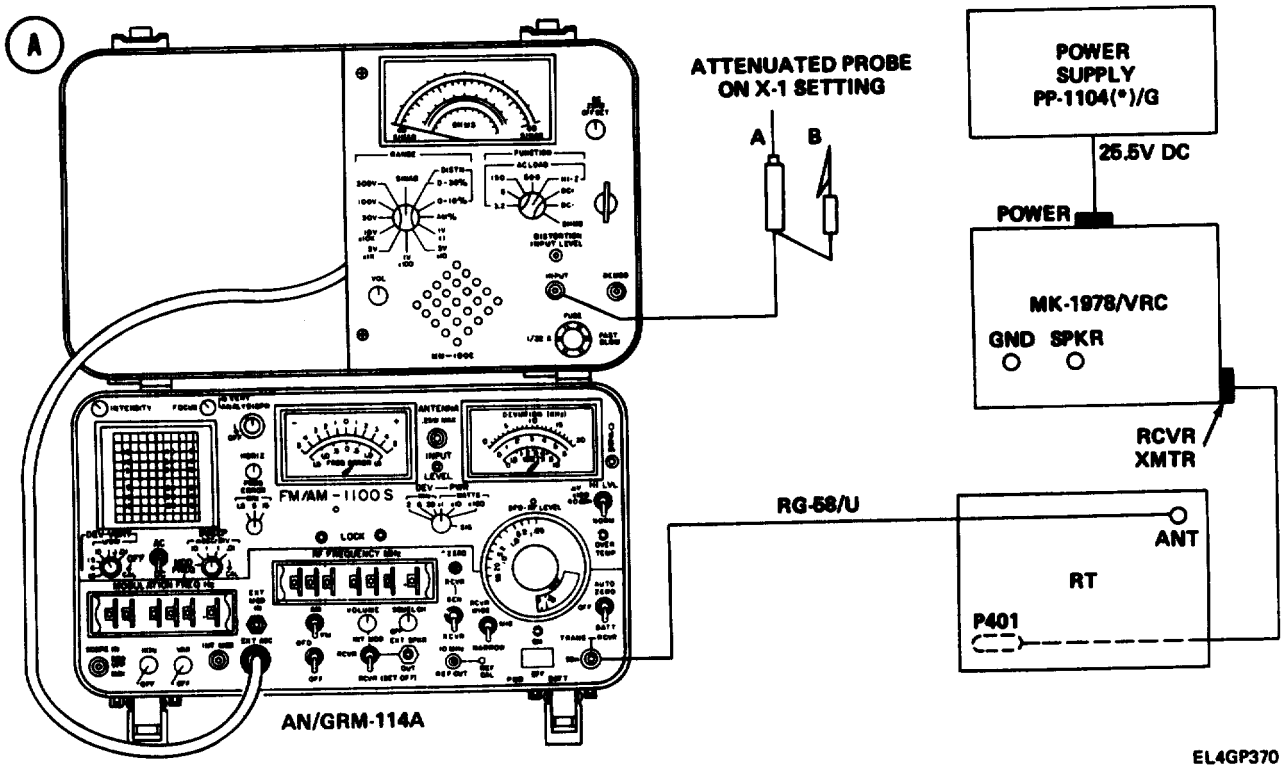
Signal + noise + distortion/noise + distortion.

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 Ⓐ .

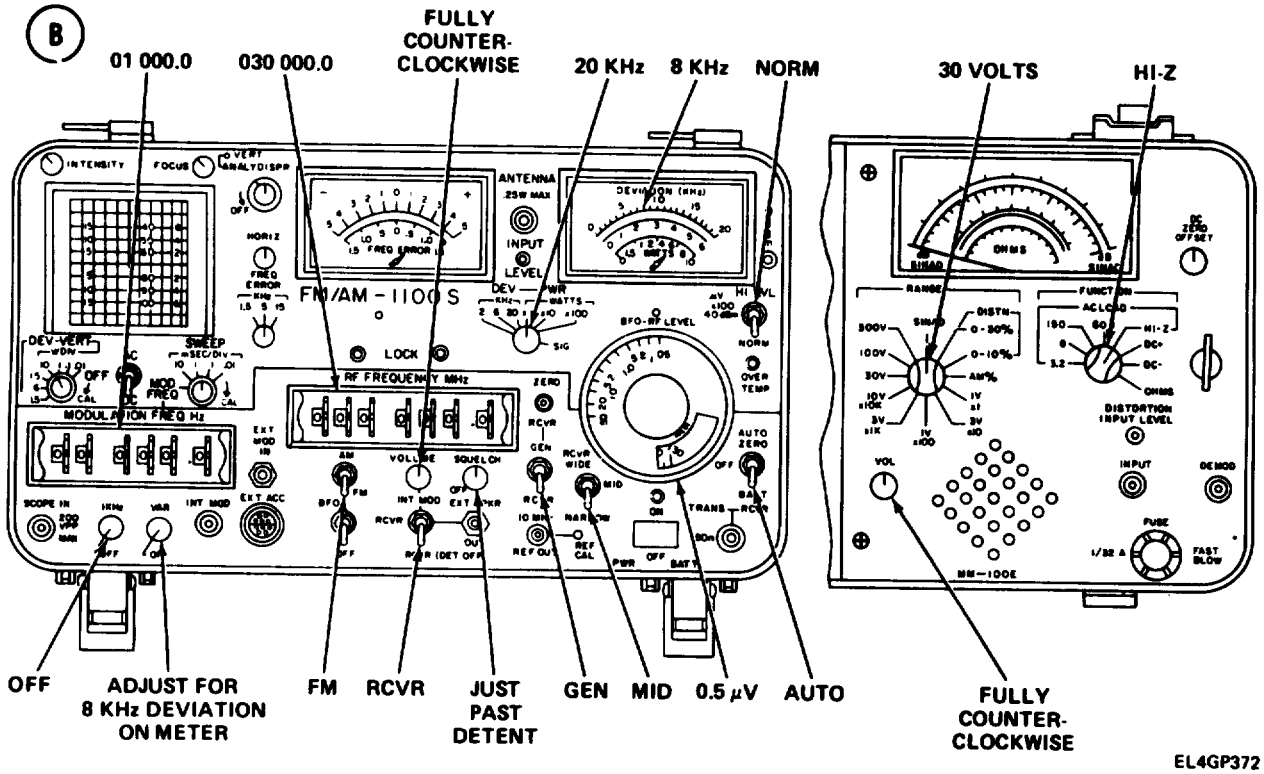


4-3. RECEIVER SENSITIVITY TEST. (CONT)

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

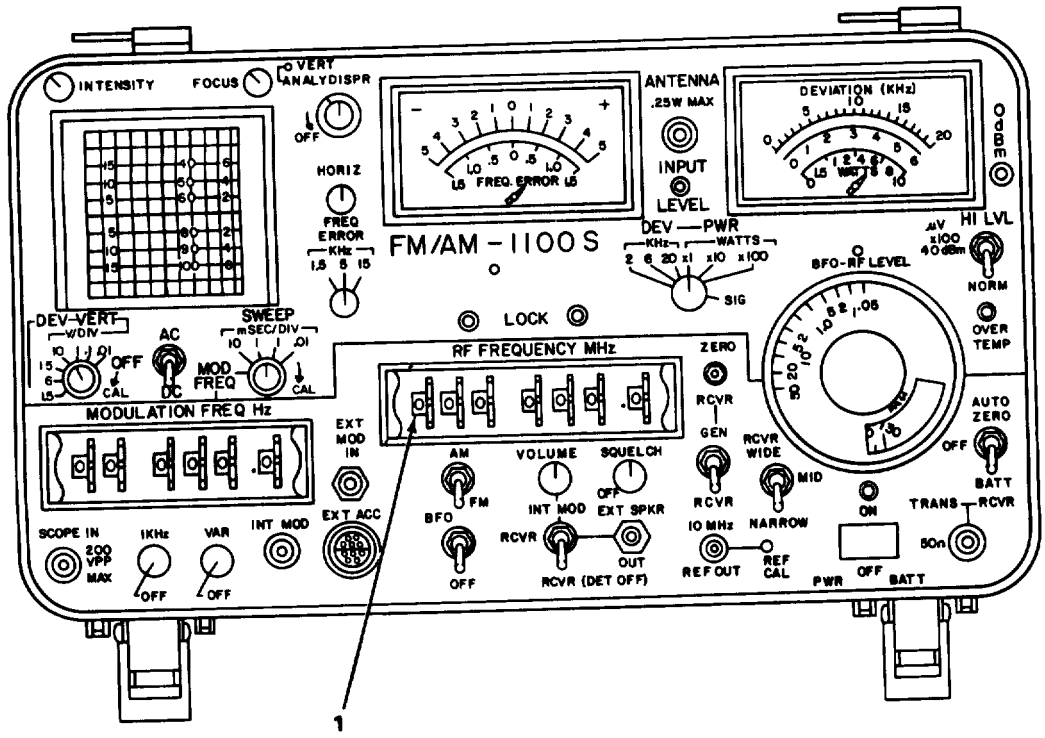
CONTROL AND SWITCH SETTINGS

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



4-3. RECEIVER SENSITIVITY TEST. (CONT)

C



EL4GP373

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 Ⓐ , 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.

RT SWITCH SETTINGS	EQUIVALENT AN/GRM-114A THUMBWHEEL SETTINGS
41.00 MHz (BAND Ⓐ)	041 000.0
52.00 MHz (BAND Ⓐ)	052 000.0
53.00 MHz (BAND Ⓑ)	053 000.0
64.00 MHz (BAND Ⓑ)	064 000.0
75.00 MHz (BAND Ⓑ)	075 000.0

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.

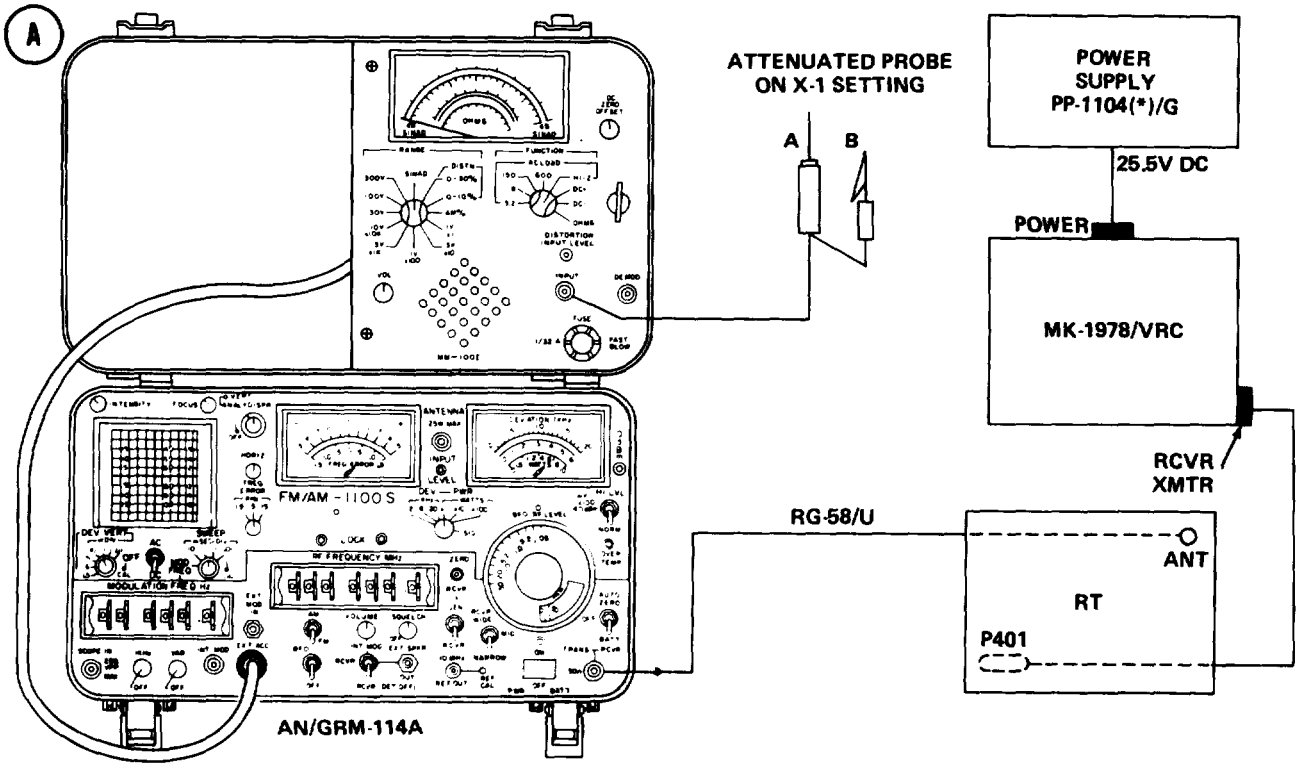
4-4. NEW SQUELCH TEST.

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	Test Set AN/GRM-114A
Maintenance Kit MK-1978/VRC	Rf Cable RG-58/U

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

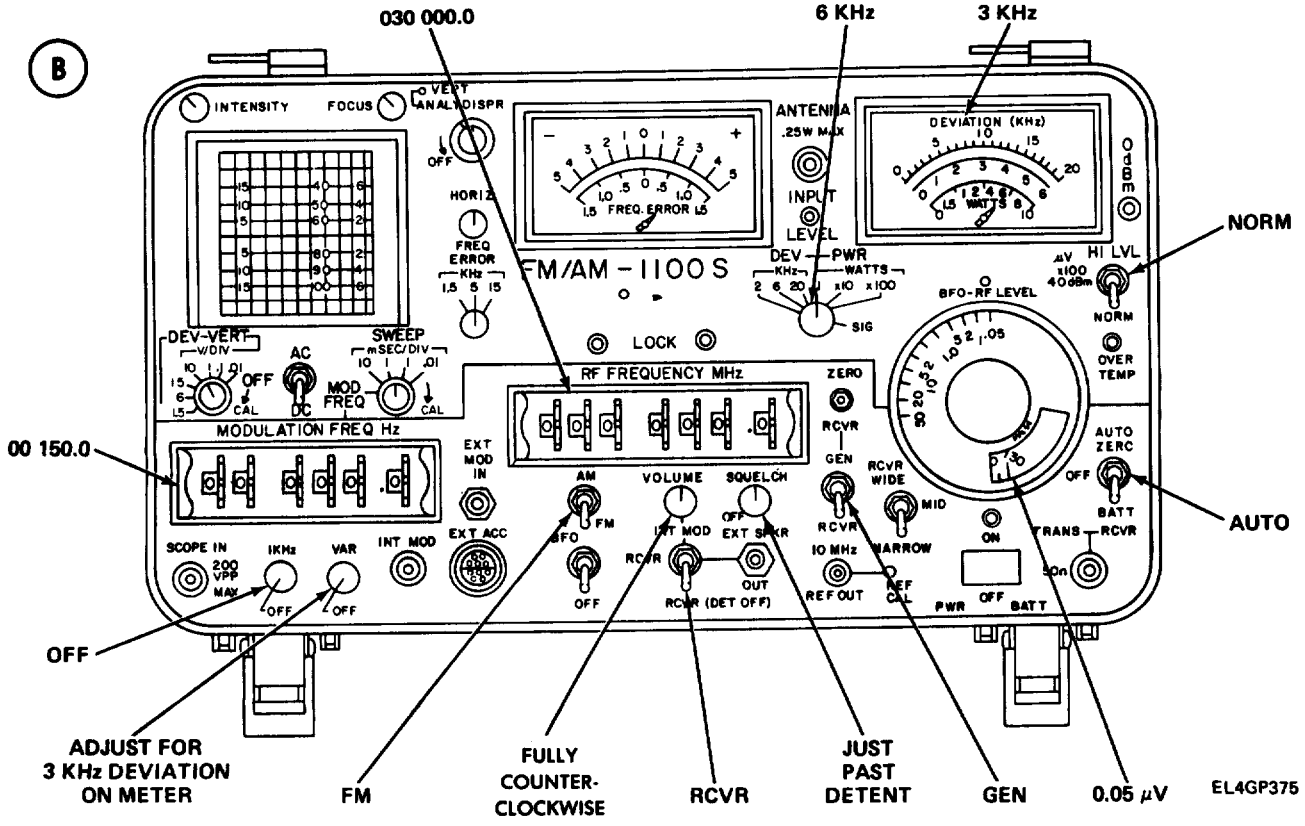


INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

4-4. NEW SQUELCH TEST. (CONT)

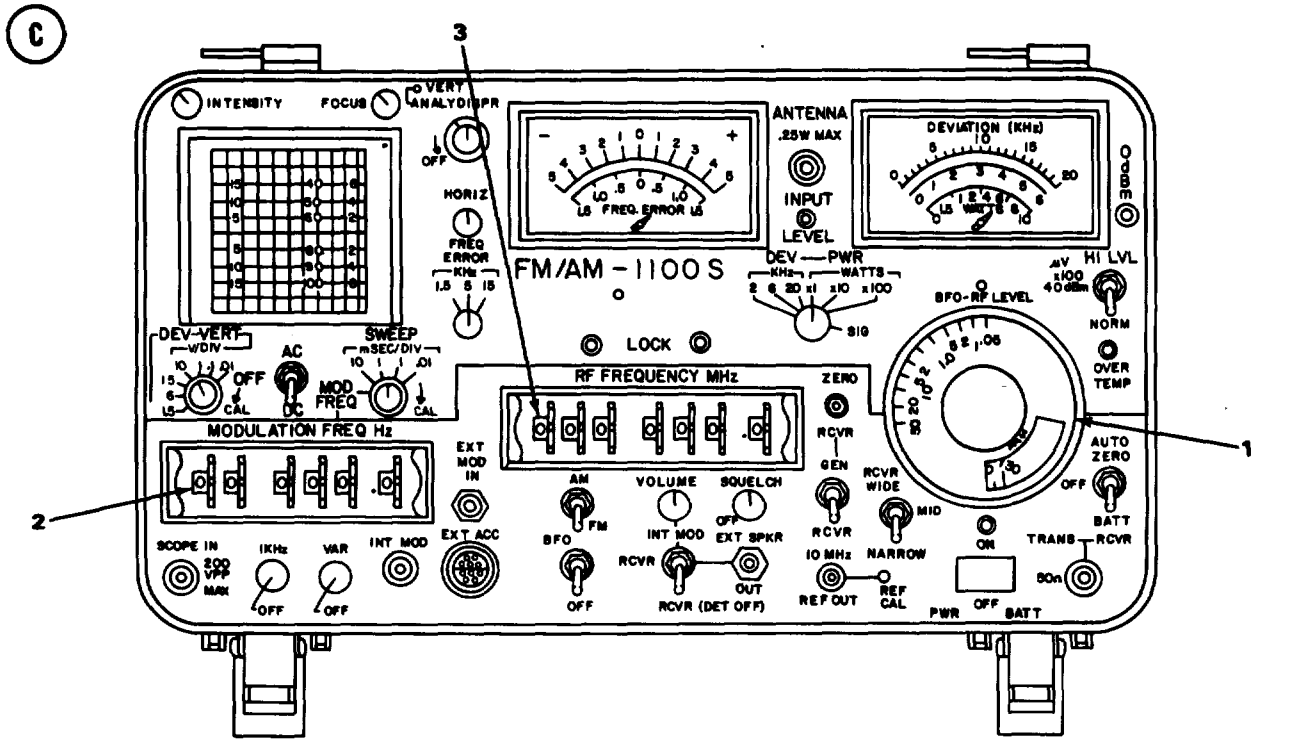
CONTROL AND SWITCH SETTINGS

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



4-4. NEW SQUELCH TEST. (CONT)

TEST PROCEDURE



EL4GP376

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

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

RT SWITCH SETTING	EQUIVALENT AN/GRM-114A THUMBWHEEL SETTING
41.00 MHz	041 000.0 Hz
52.00 MHz	052 000.0 Hz
53.00 MHz	053 000.0 Hz
65.00 MHz	065 000.0 Hz
75.00 MHz	075 000.0 Hz

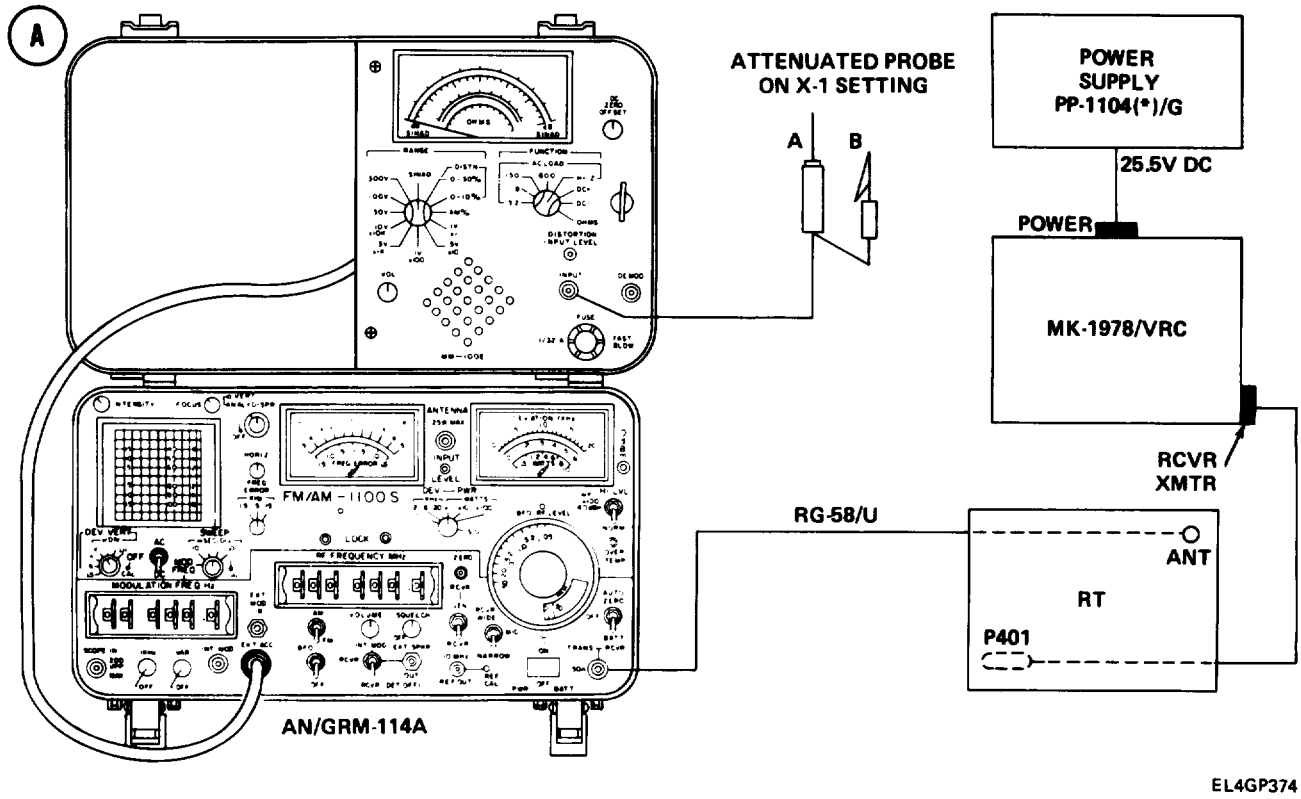
4-5. OLD SQUELCH TEST.

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	Test Set AN/GRM-114A
Maintenance Kit MK-1978/VRC	Rf Cable RG-58/U

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

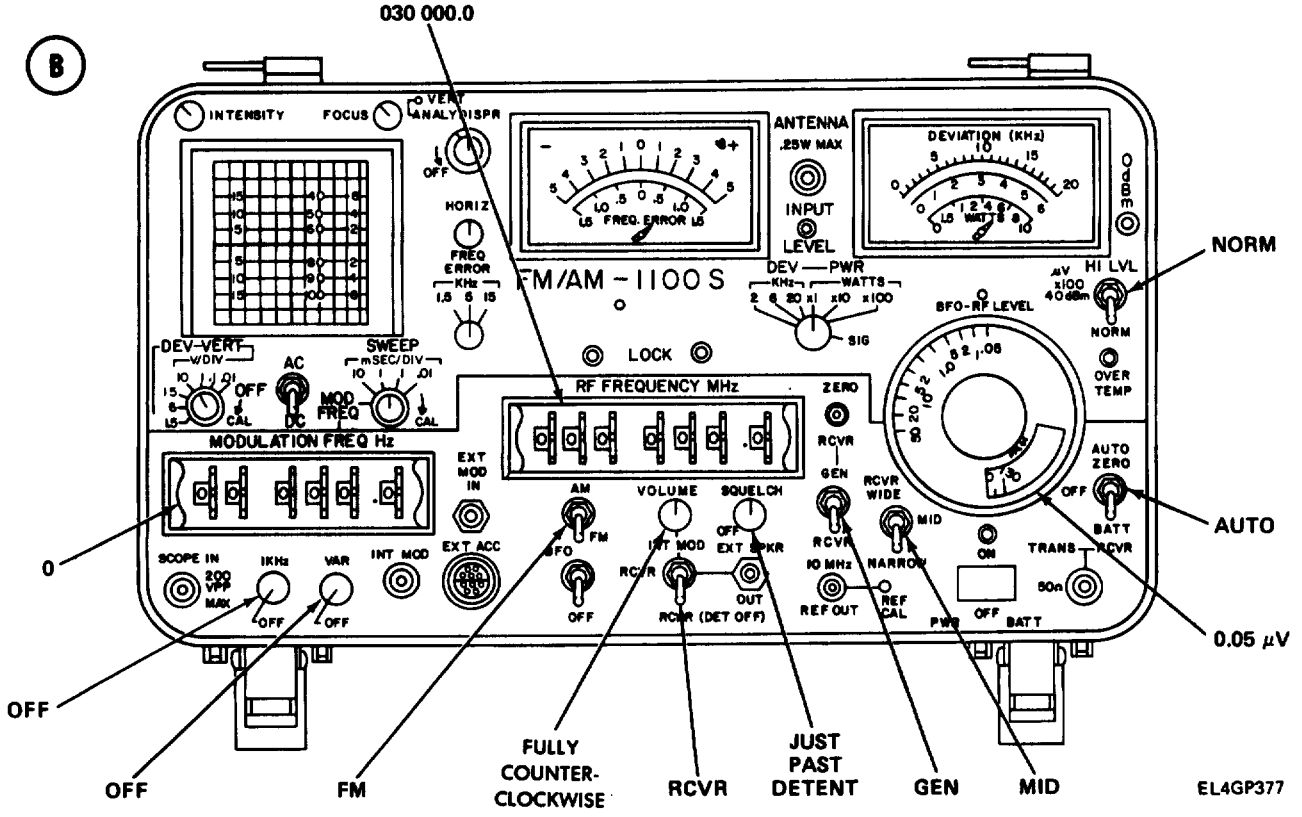


4-5. OLD SQUELCH TEST. (CONT)

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

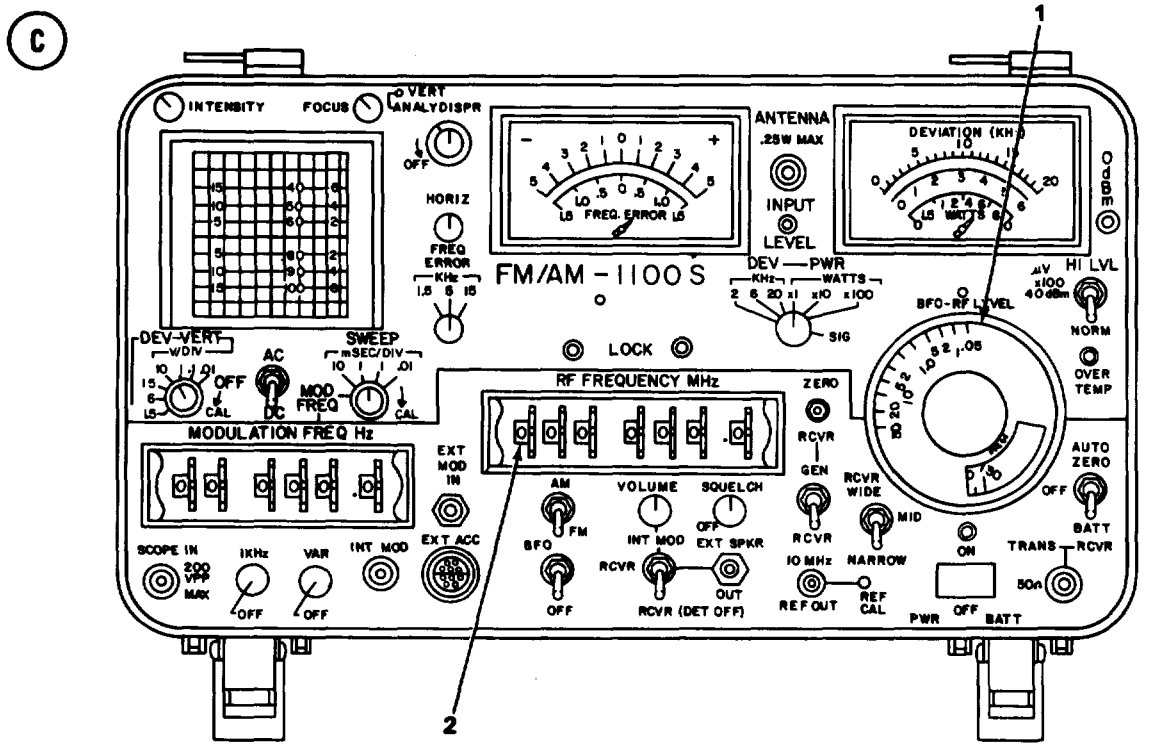
CONTROL AND SWITCH SETTTNGS

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



4-5. OLD SQUELCH TEST. (CONT)

TEST PROCEDURE



EL4GP378

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 0.7µv, 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 Ⓑ at 53, 65, and 75 MHz.

RT SWITCH SETTING	EQUIVALENT AN/GRM-114A THUMBWHEEL SETTING
41.00 MHz	041 000.0 Hz
52.00 MHz	052 000.0 Hz
53.00 MHz	053 000.0 Hz
65.00 MHz	065 000.0 Hz
75.00 MHz	075 000.0 Hz

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.

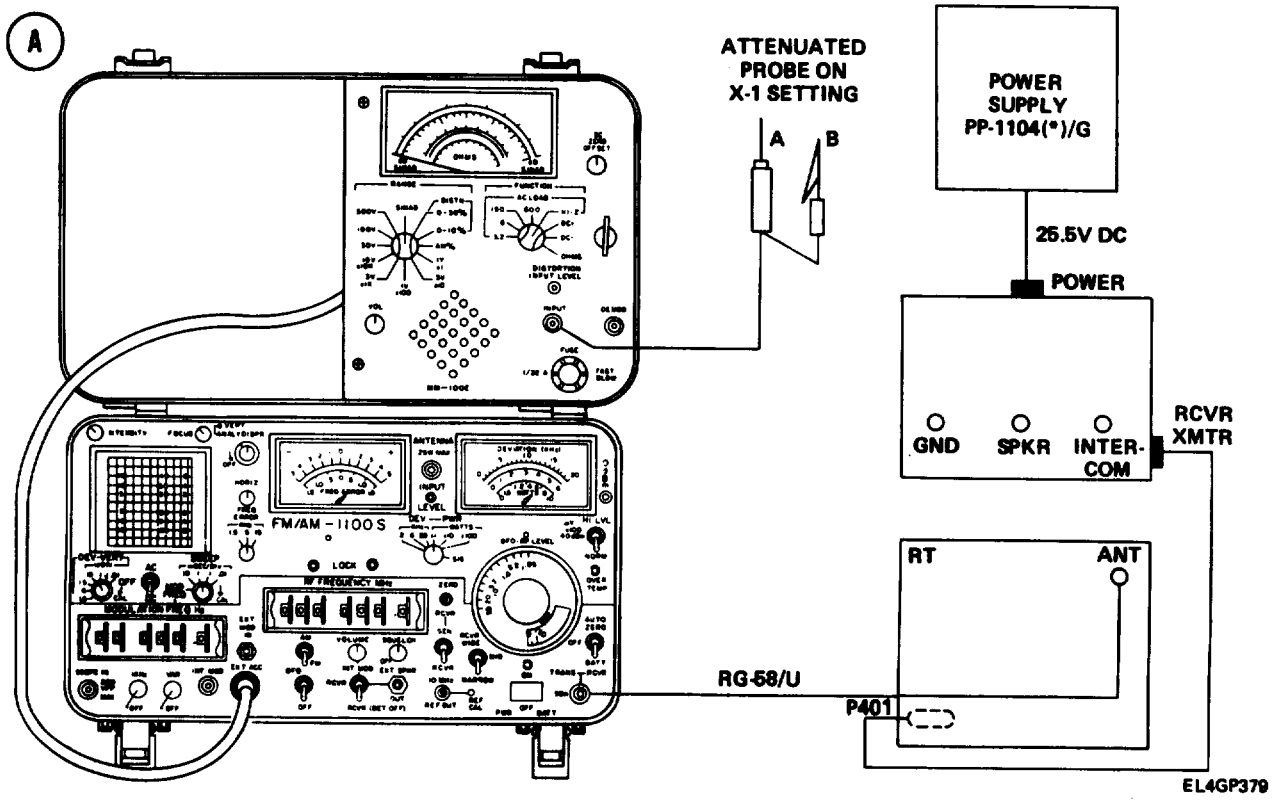
An rf level strong enough to drive the A4200 module into limiting (20 μv) is injected into the RT ANTENNA port. The audio output voltages are then measured at the SPKR and INTERCOM jacks of the MK-1978/VRC.

TEST EQUIPMENT AND MATERIALS

Power Supply PP-1104(*)/G
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 Ⓐ, page 4-16.

4-6. RECEIVER AUDIO POWER TEST. (CONT)



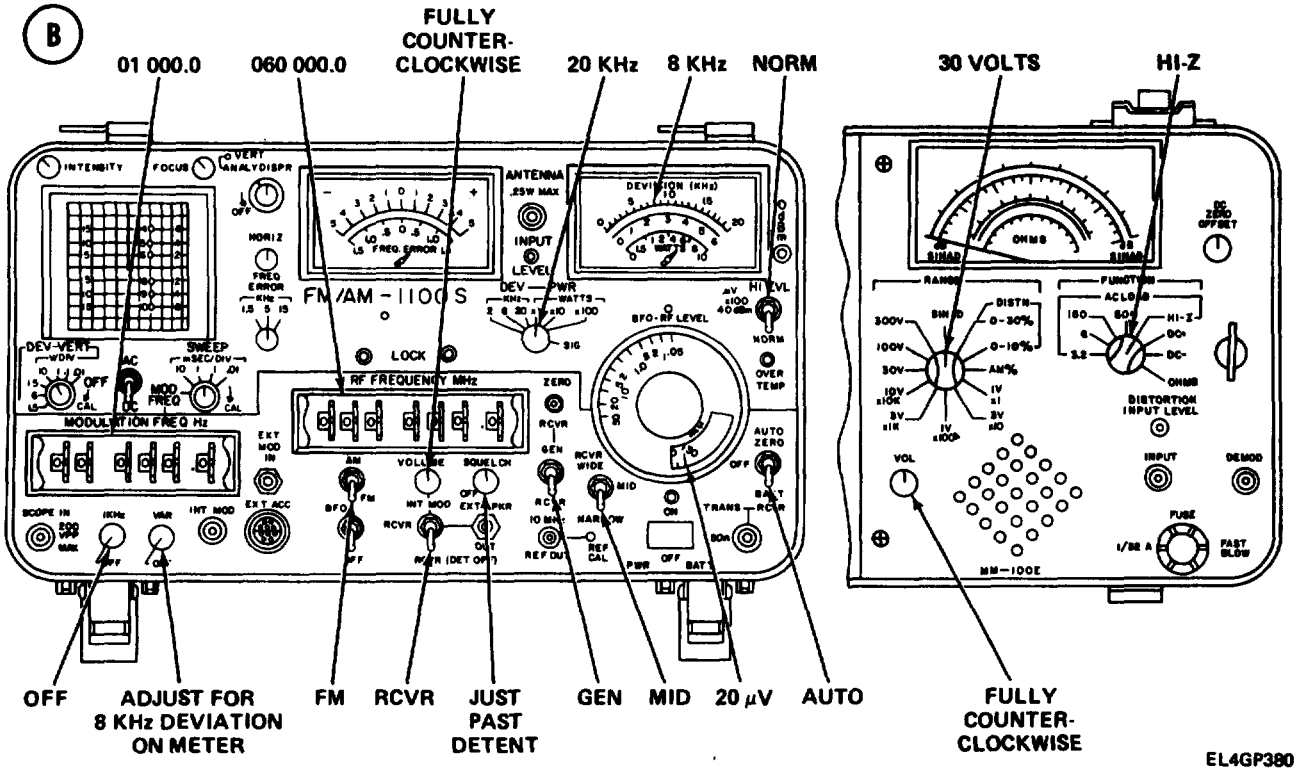
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

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

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 Ⓐ , 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

4. Change MK-1978/VRC AUDIO switch to UNMUTED setting.
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 Ⓐ .)
8. Change MM-100 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.

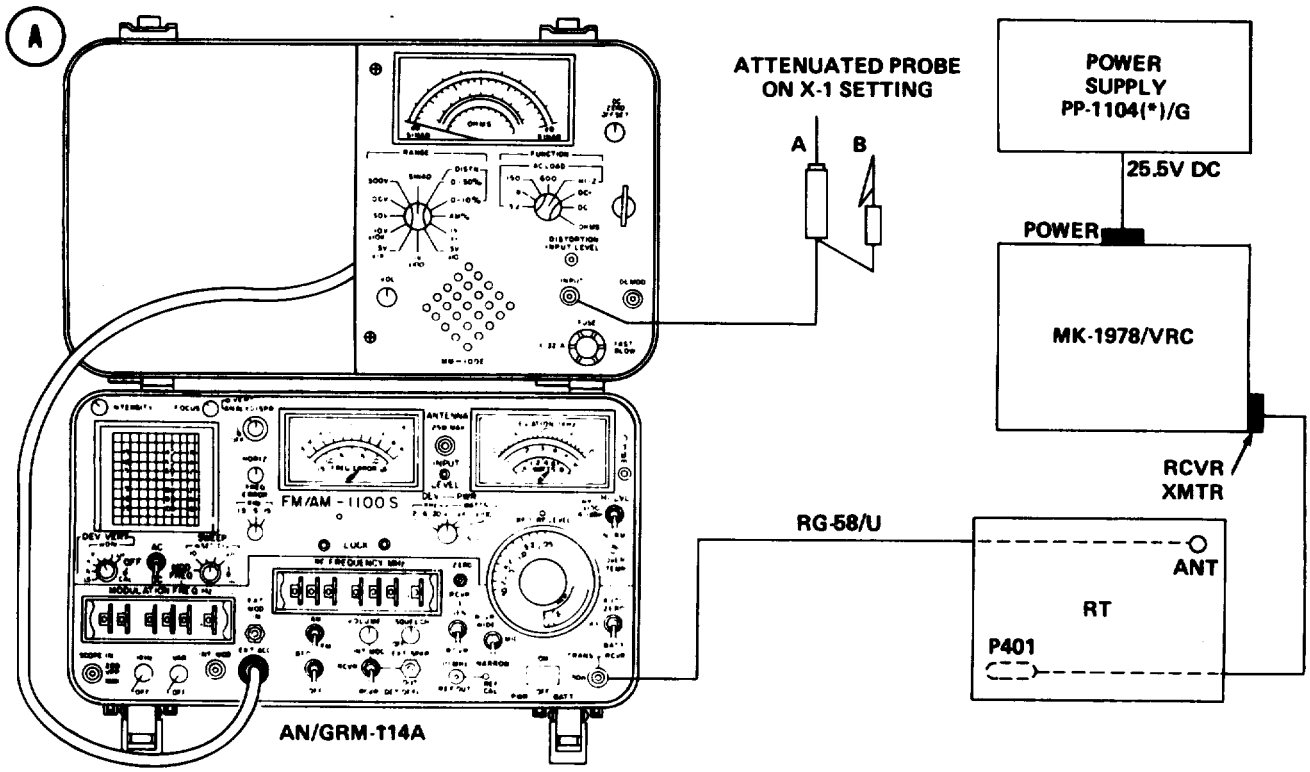
4-7. RECEIVER AUDIO DISTORTION TEST.

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

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

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



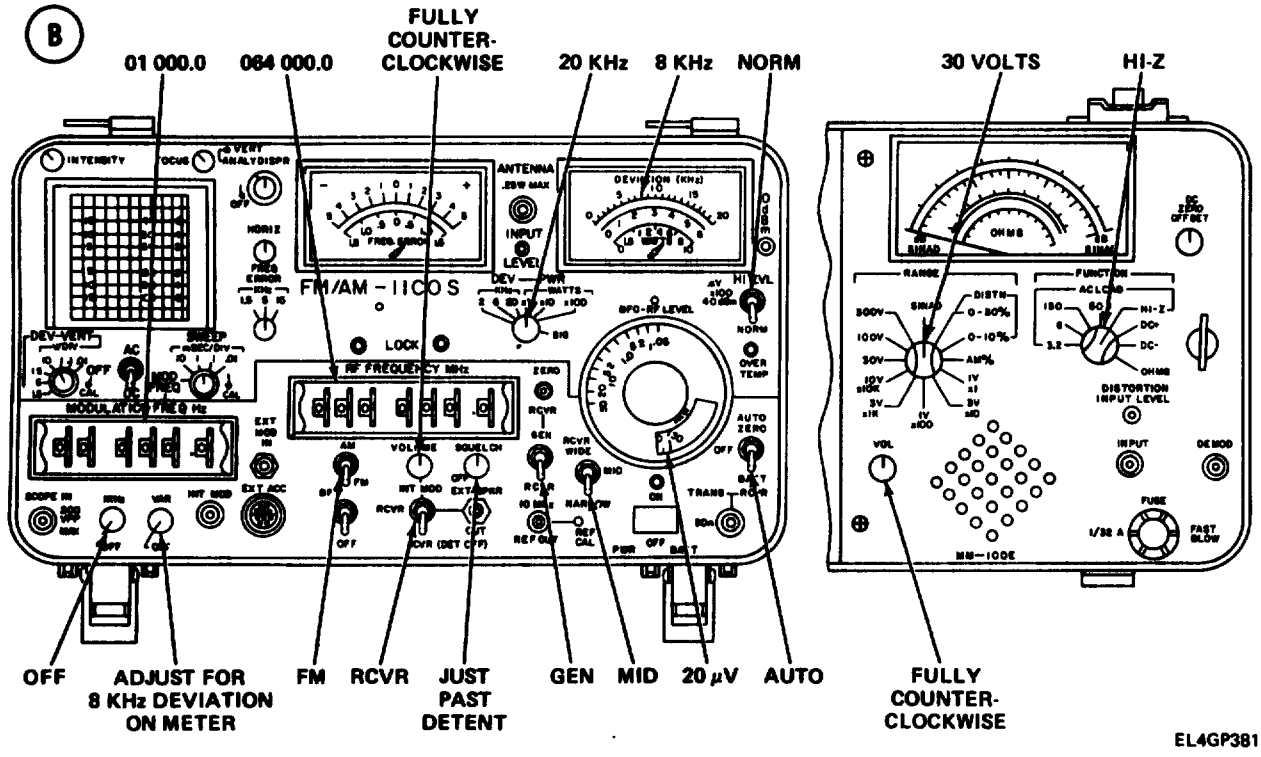
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

4-7. RECEIVER AUDIO DISTORTION TEST. (CONT)

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
MK-1978/VRC	POWER	ON
	AUDIO	MUTED
	KEY	RCVE
	AUX RCVR	NORMAL
	X-MODE (RT)	NORMAL
	SQUELCH	ON
RT	BAND	(B)
	MC-TUNE-KC	64.00
	SQUELCH	OLD OFF
	LIGHT	ON
	VOLUME	Fully counterclockwise
	POWER	LOW
	SPEAKER (RT-524/VRC)	OFF
AN/GRM-114A; MM-100E	See test setup diagram (B)	

TEST PROCEDURE



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.**

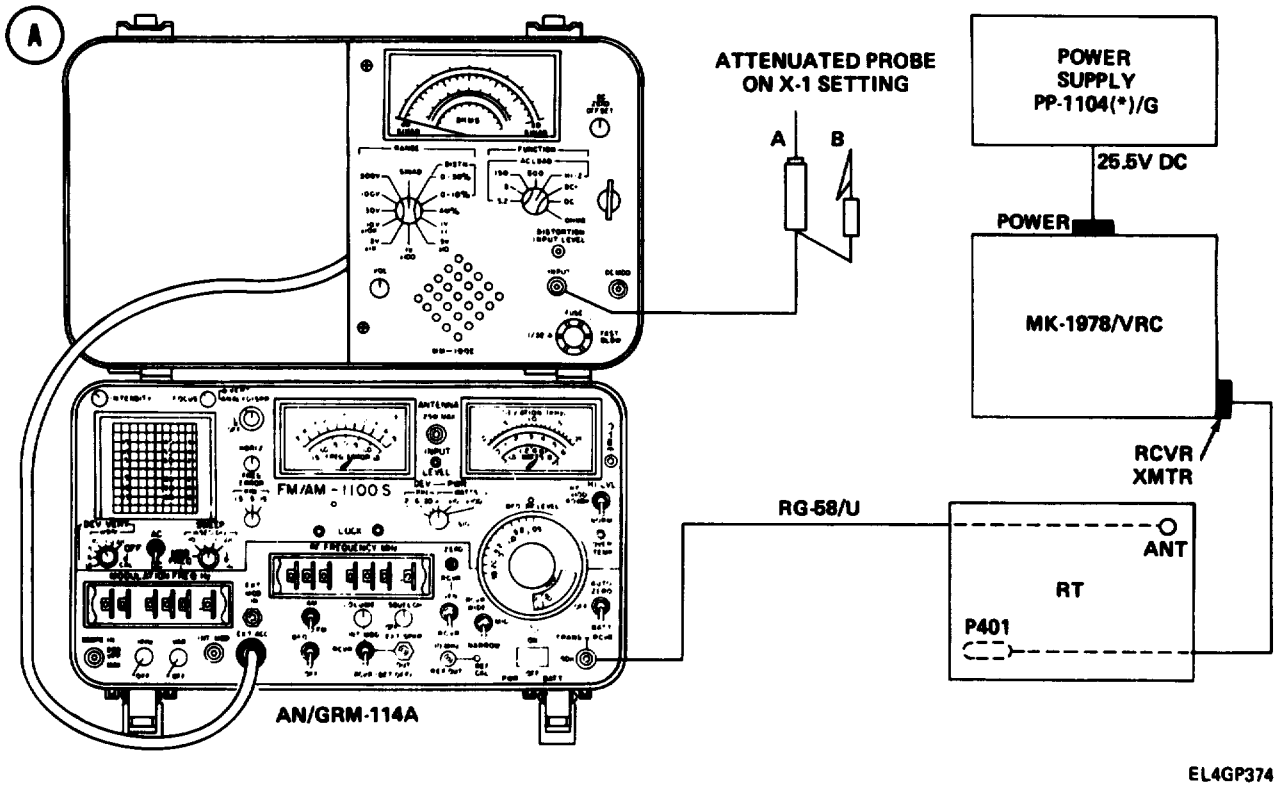
4-8. RECEIVER AUDIO RESPONSE TEST (NORMAL MODE).

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	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) .



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

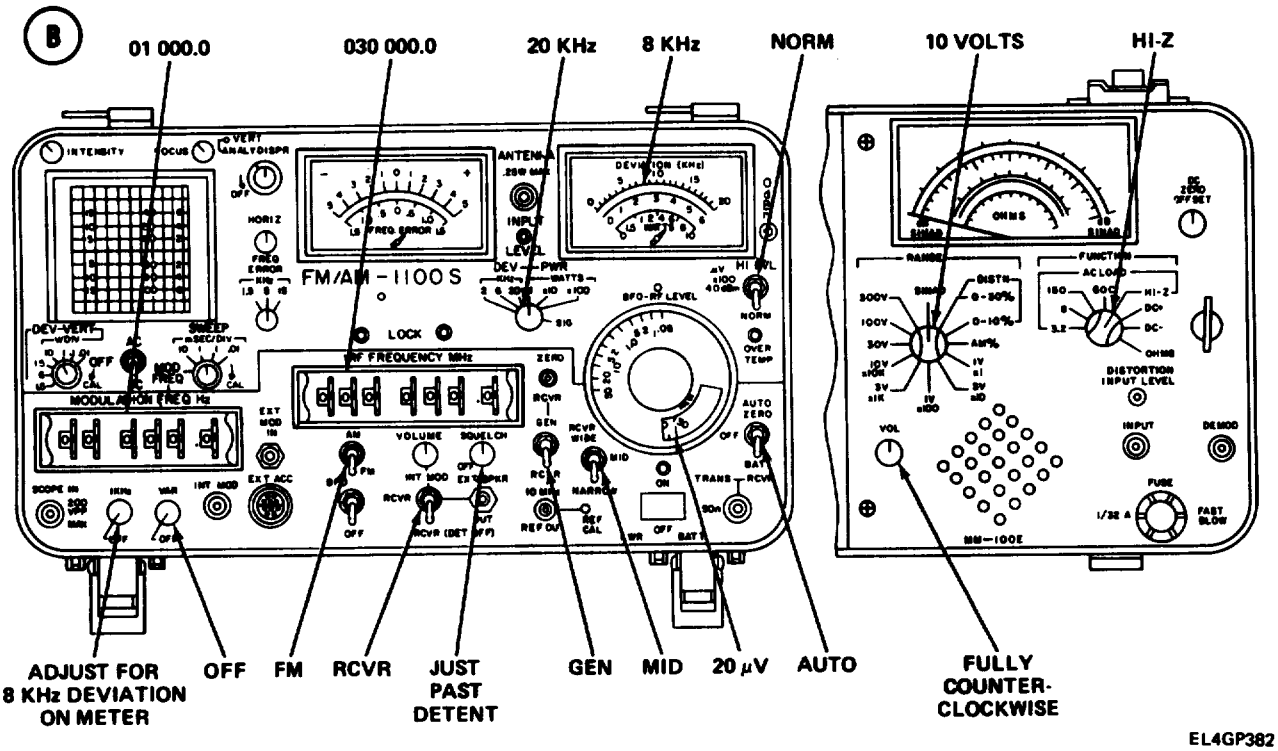
EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
MK-1978/VRC	POWER	ON
	AUDIO	MUTED RCVE
	X-MODE (RT)	NORMAL
	AUX RCVR	NORMAL
	SQUELCH	ON
RT	BAND	Ⓐ
	MC-TUNE-KC	**30.00**
	SQUELCH	OLD OFF
	LIGHT	ON
	VOLUME	Fully counterclockwise
	POWER	LOW
	SPEAKER (RT-524/VRC)	**OFF**
	X-MODE-NORMAL	**NORMAL**

NOTE

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

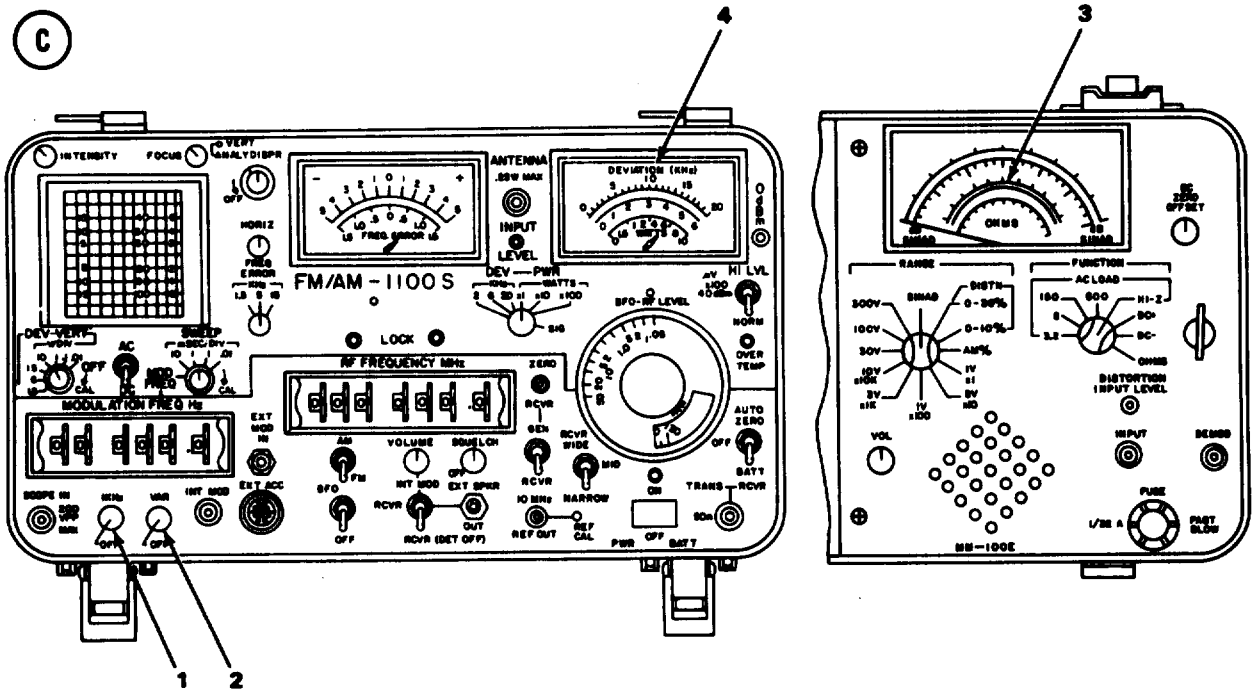
AN/GRM-114A; MM-100E	**See test setup diagram Ⓑ page 4-22**	

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



EL4GP382

TEST PROCEDURE



EL4GP383

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 Ⓐ , 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 Ⓒ .)**
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:

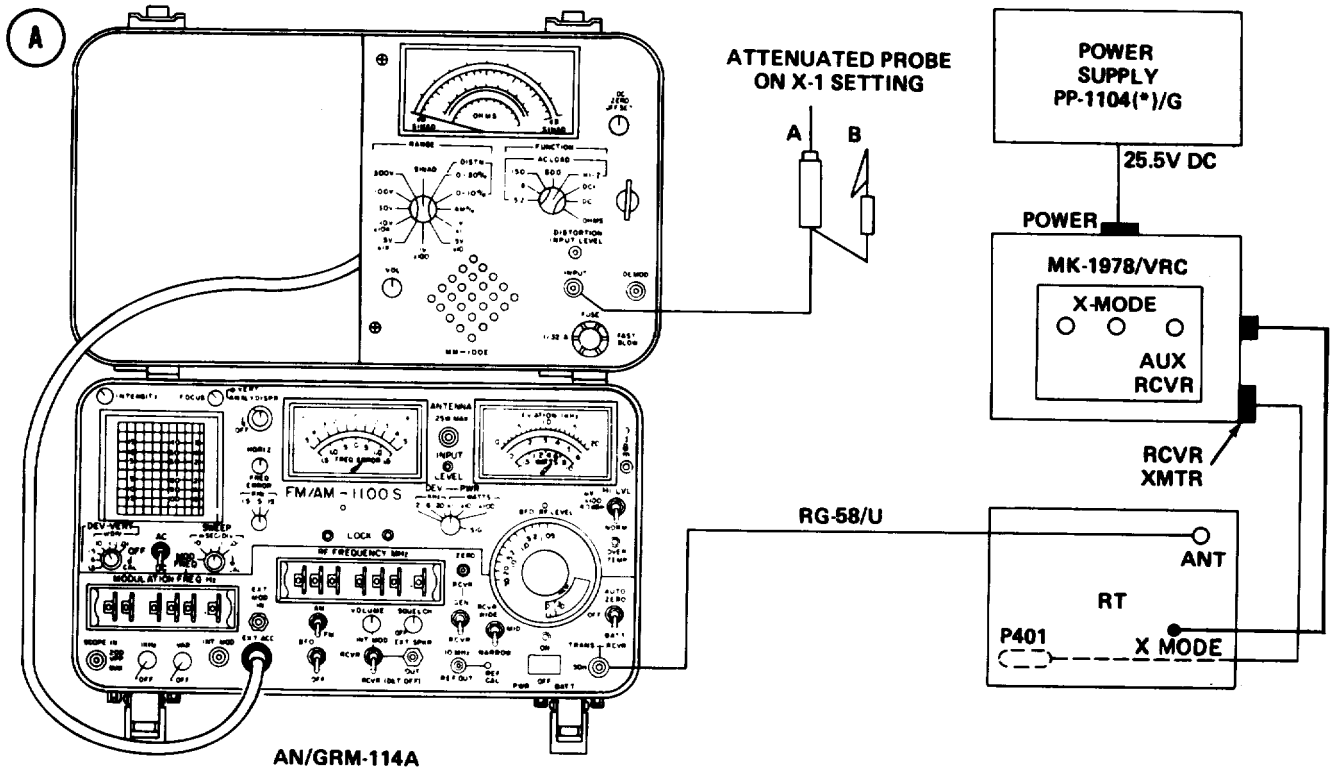
1. Injecting 1-kHz modulation into the RT ANTENNA port while measuring the voltage at the MK-1978/VRC X-MODE AUX RCVR jack.
2. Changing the modulation rate to 500 Hz, 3 kHz, 5 kHz, and 10 kHz, while taking db readings at the MK-1978/VRC X-MODE AUX RCVR jack.
3. Comparing the db readings taken in step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

TEST EQUIPMENT AND MATERIALS

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 Ⓐ .

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



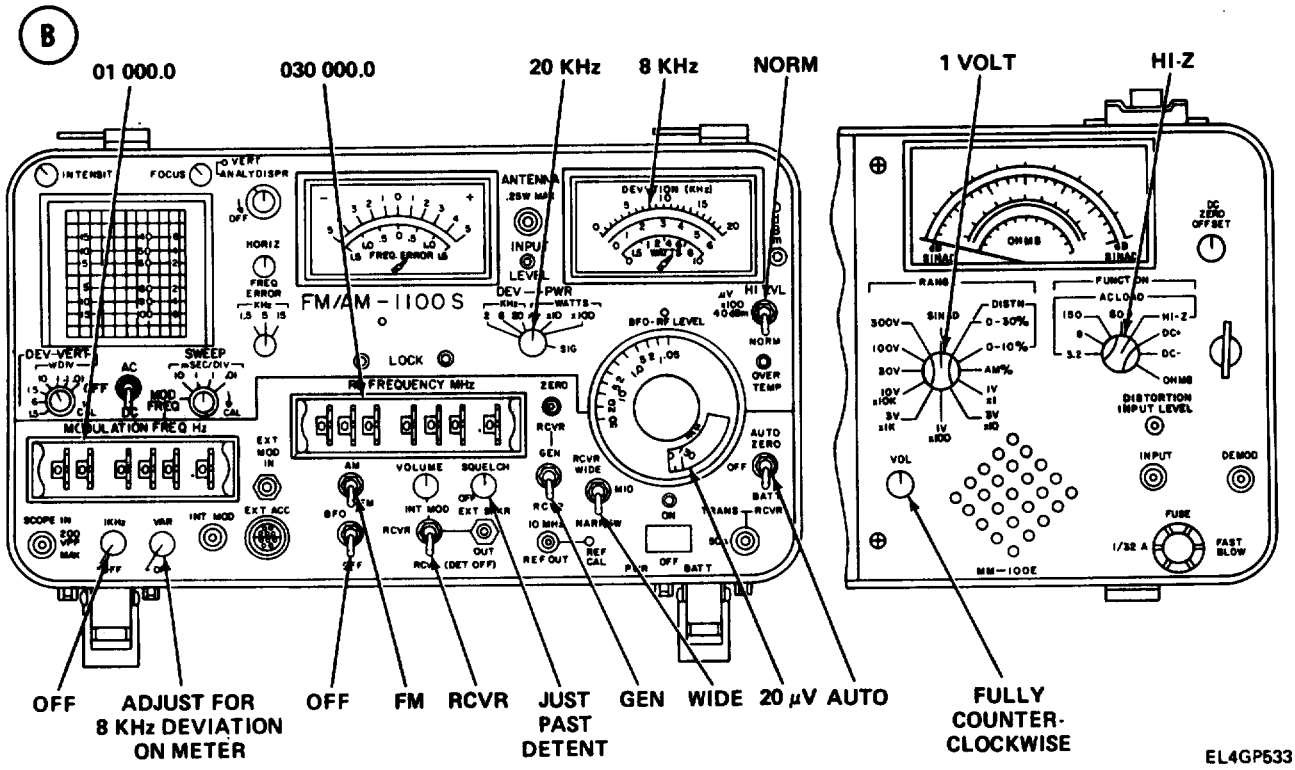
EL4GP384

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

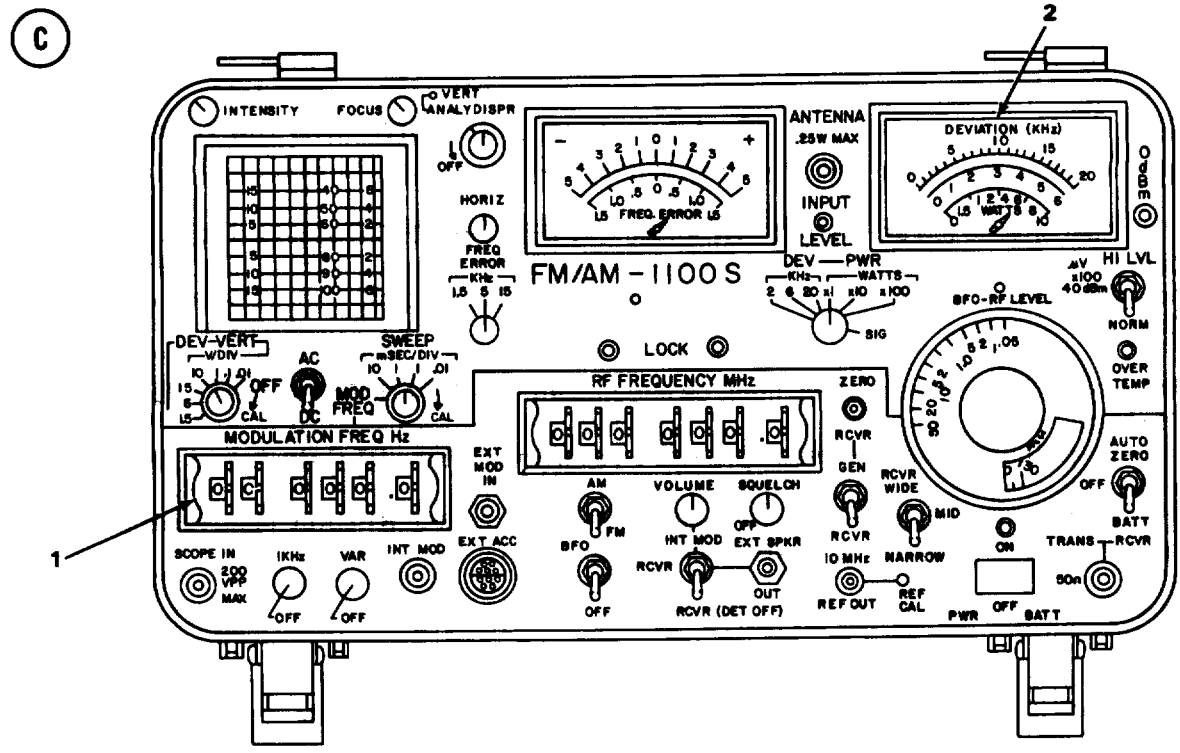
CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
MK-1978/VRC	POWER	ON
	AUDIO	MUTED
	KEY	RCVE
	X-MODE (RT)	CIPHER
	SQUELCH	ON
RT	BAND	(A)
	MC-TUNE-KC	30.00
	SQUELCH	OLD OFF
	LIGHT	ON
	VOLUME	Fully counterclockwise
	POWER	LOW
	SPEAKER (RT-524/VRC)	OFF
	FL4002	WIDEBAND
AN/GRM-114A; MM-100E	See test setup diagram (B), page 4-25	

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-1OOE meter should indicate between + 2 db and -3 db of reading noted in step 1, and AN/GRM-l14A 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 trouble-shooting 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:

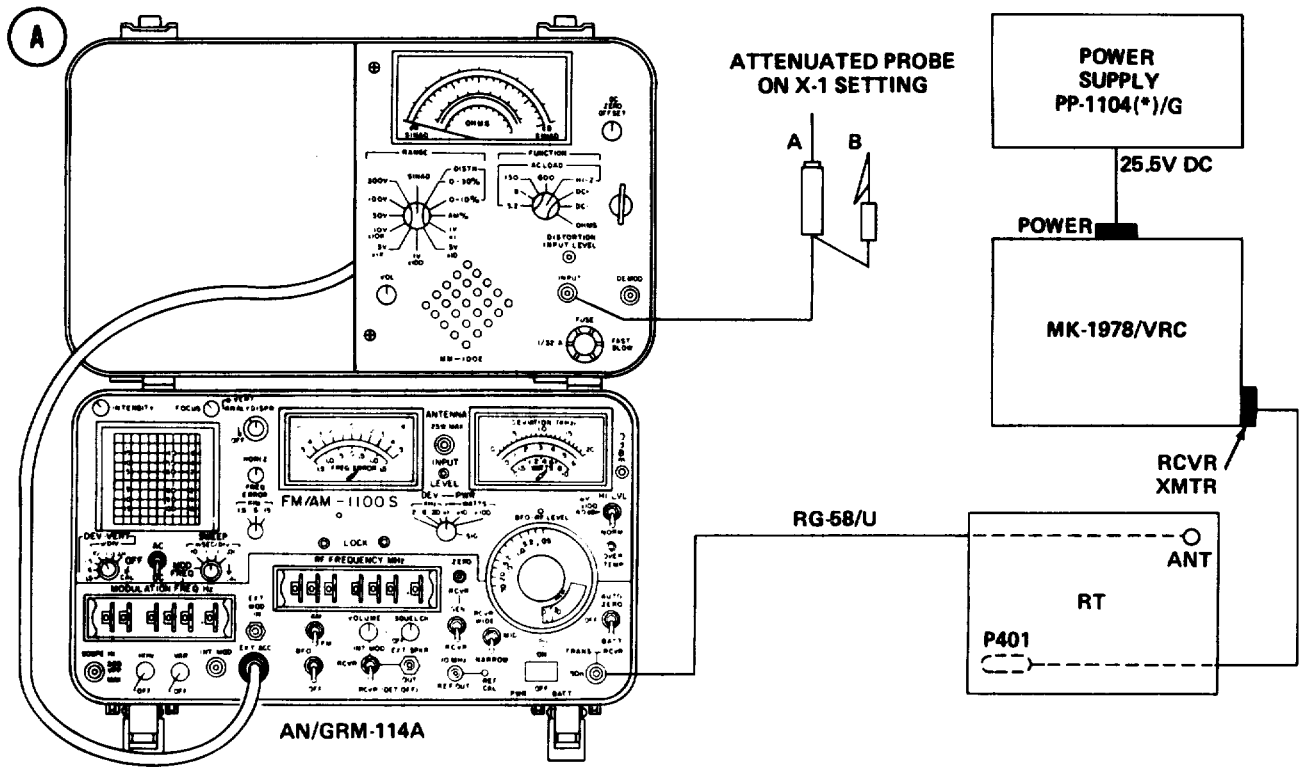
1. Finding the minimum rf level which must be injected into the RT ANTENNA port to cause the CALL lamp to light.
2. Injecting twice the rf level found in step 1, while observing that the RT CALL lamp is lit when the frequency is offset ±16 kHz from the carder.
3. Injecting 1000 the rf level found in 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	Test Set AN/GRM-114A
Maintenance Kit MK-1978/VRC	Rf Cable RG-58/U

TEST SETUP. Connect equipment as shown in test setup diagram Ⓐ, page 4-27.

4-10. RECEIVER SELECTIVITY TEST. (CONT)



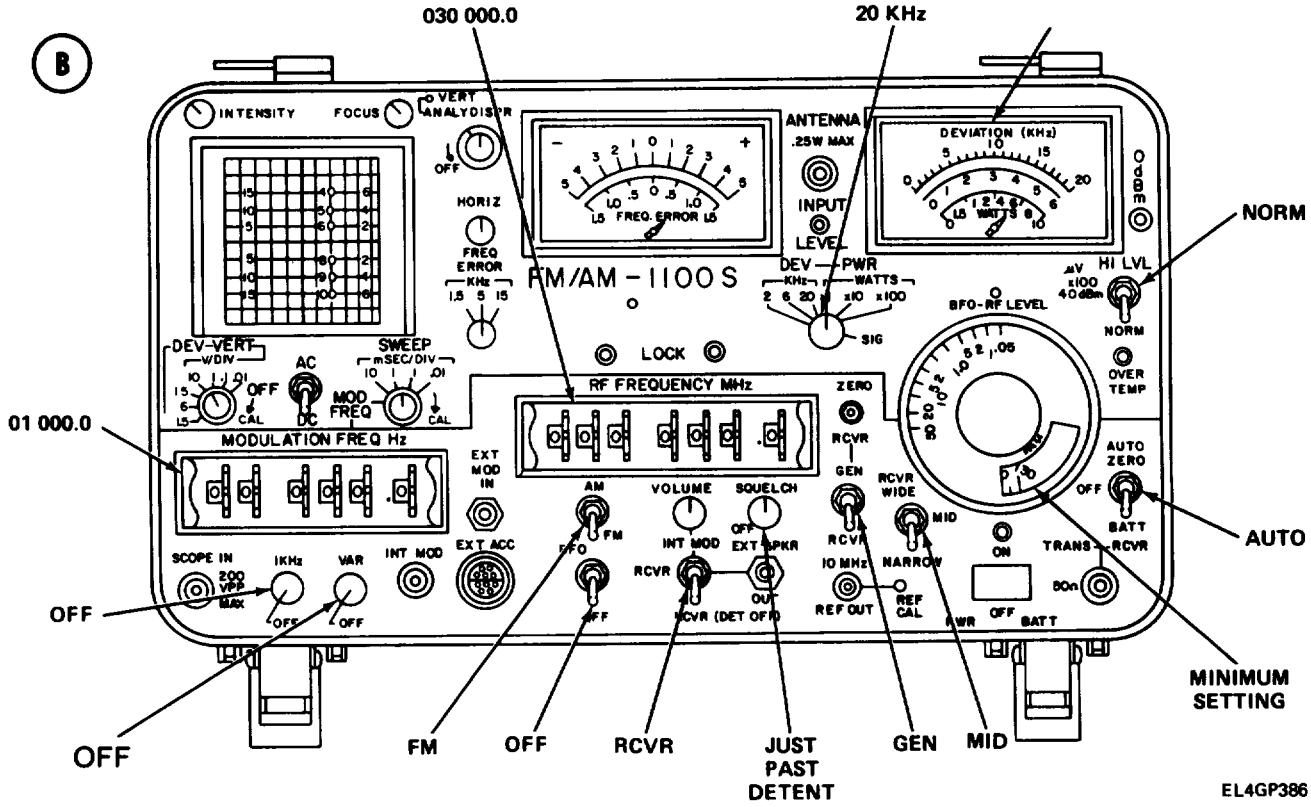
EL4GP374

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

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
MK-1978/VRC	POWER	ON
	SQUELCH	OFF
	AUDIO	MUTED
	KEY	RCVE
	X-MODE (RT)	CIPHER
RT	BAND	(A)
	MC-TUNE-KC	30.00
	SQUELCH	OLD ON
	LIGHT	ON
	VOLUME	Fully counterclockwise
	POWER	LOW
	SPEAKER (RT-524/VRC)	OFF
AN/GRM-114A; MM-1OOE	See test setup diagram (B), page 4-28	

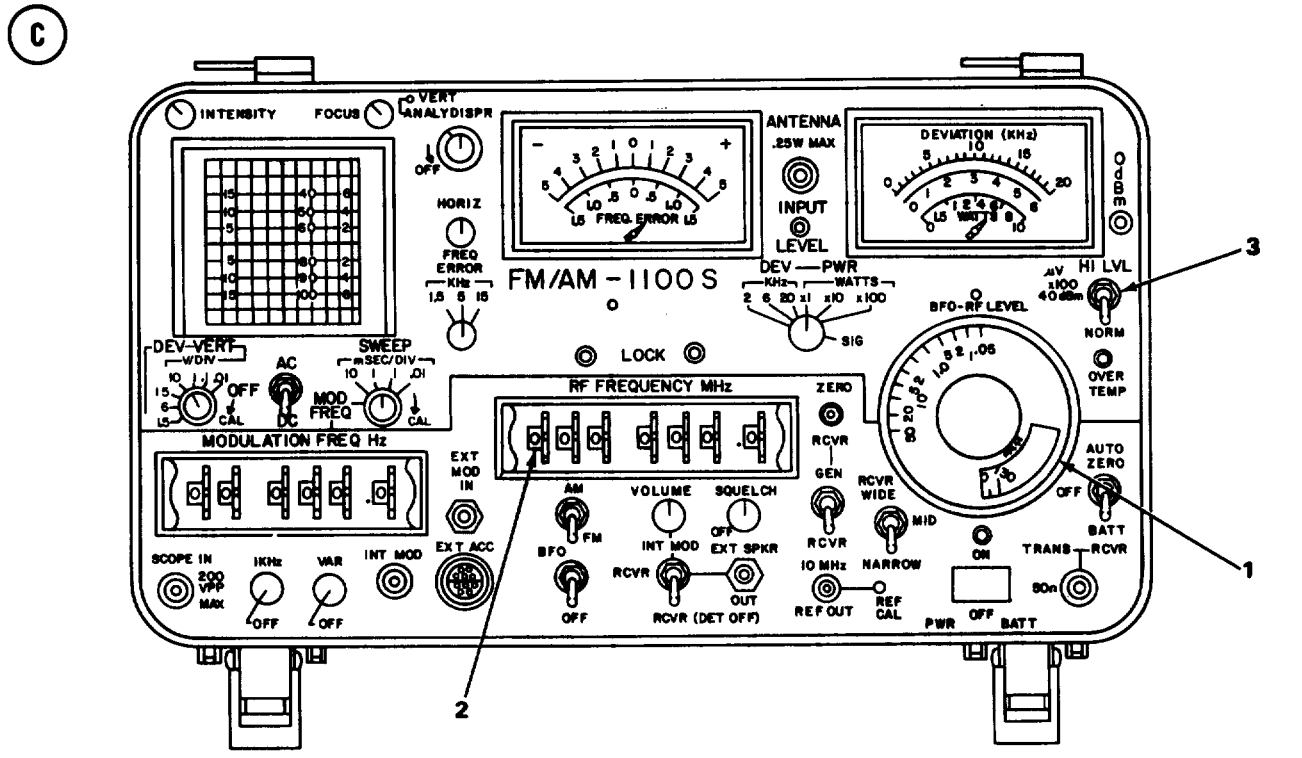
4-10. RECEIVER SELECTIVITY TEST. (CONT)



EL4GP386

TEST PROCEDURE

C



EL4GP387

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 maxinum, 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.

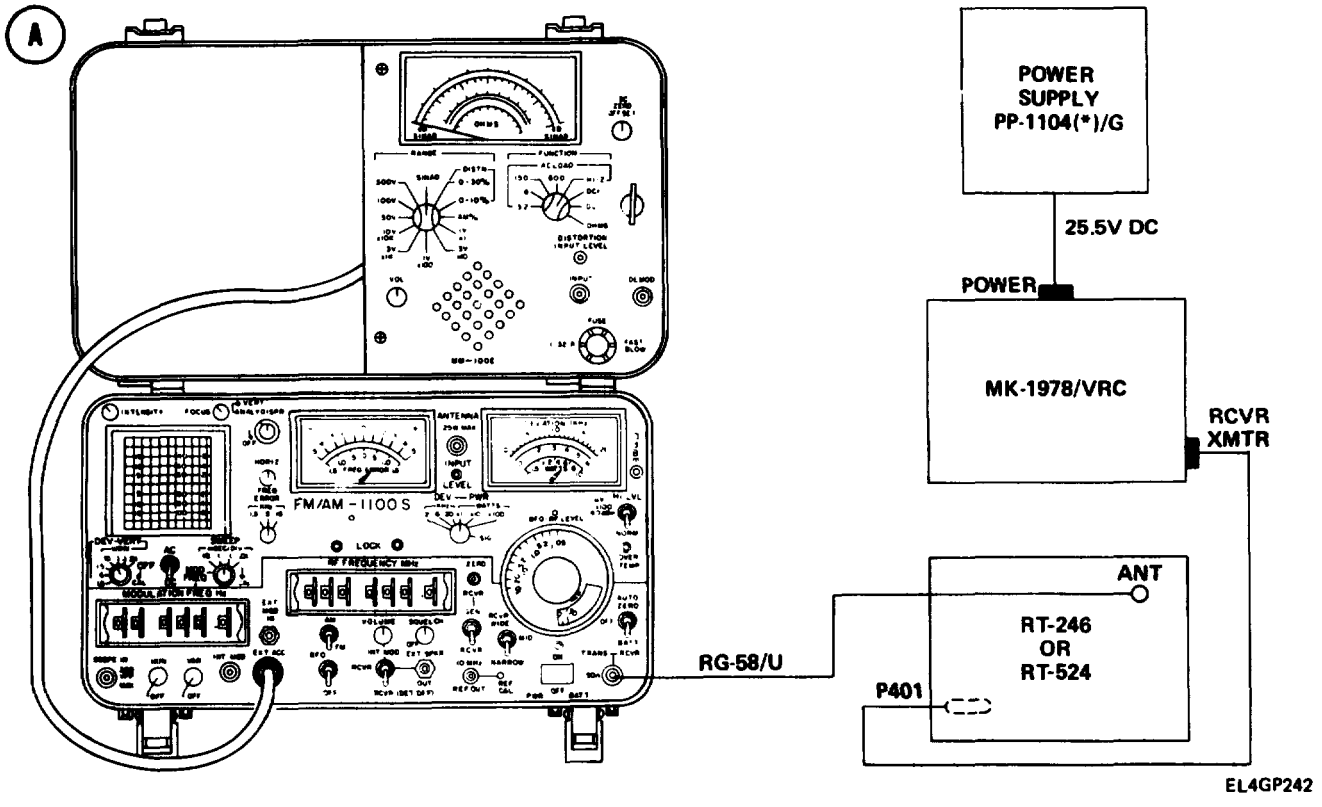
TEST EQUIPMENT AND MATERIALS

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

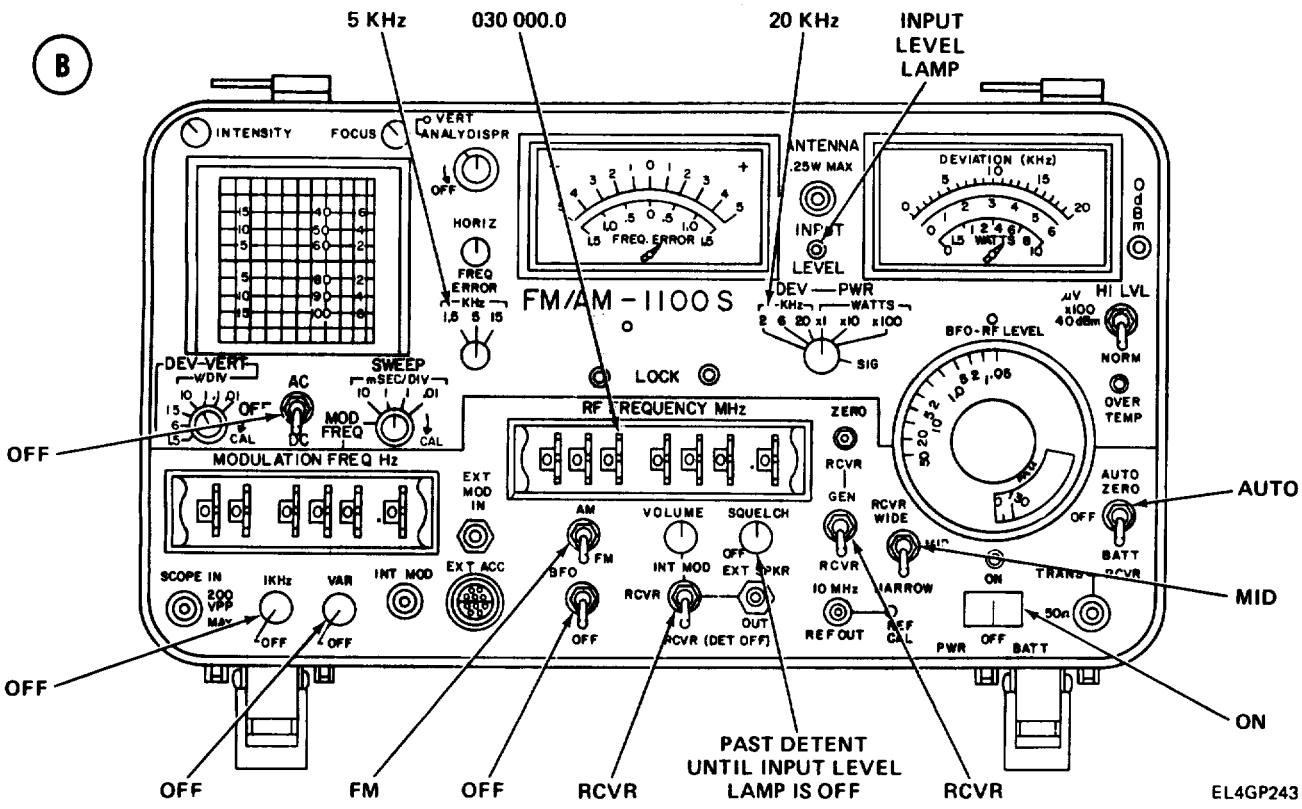


4-11. TRANSMITTER FREQUENCY ACCURACY TEST. (CONT)

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

CONTROL AND SWITCH SETTINGS

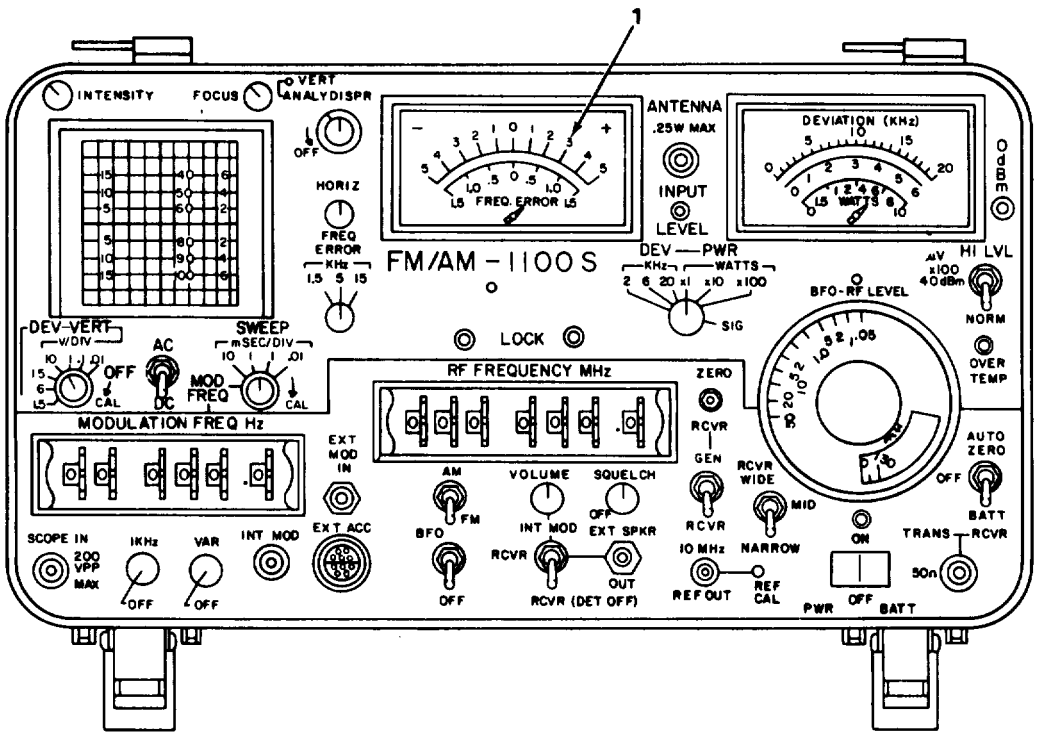
EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
MK-1978/VRC	POWER	ON
	AUDIO	MUTED
	KEY	RCVE
	X-MODE (RT)	NORMAL
	AUX RCVR	NORMAL
	SQUELCH	ON
RT	LIGHT	ON
	BAND	(A)
	MC-TUNE-KC	30.00
	POWER	LOW
	SQUELCH	OLD ON
	VOLUME	Fully counter clockwise
	SPEAKER (RT-524/VRC)	OFF
AN/GRM-114A	See test setup diagram (B)	



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
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

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-114AWAITS 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 (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.

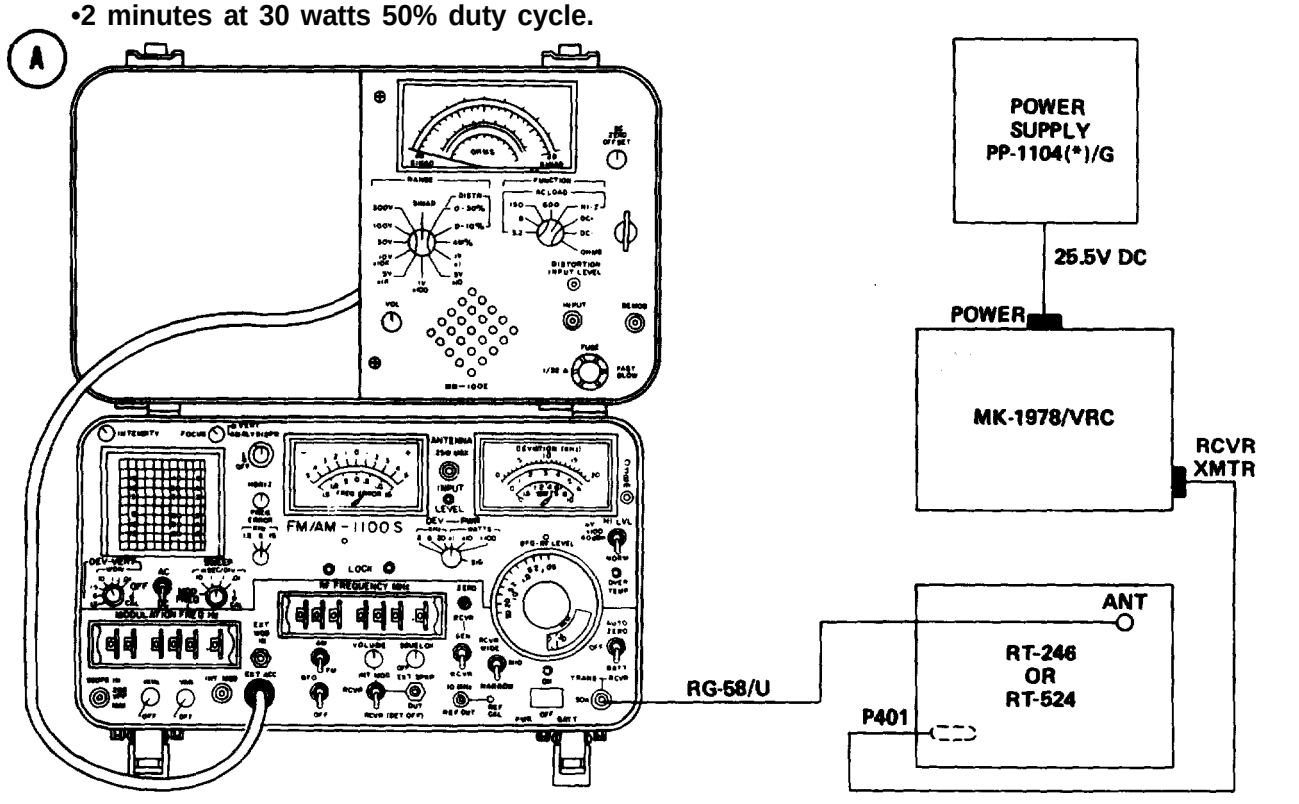
Do not connect transmitter to antenna connector. Connect only external antenna to antenna connector.

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.

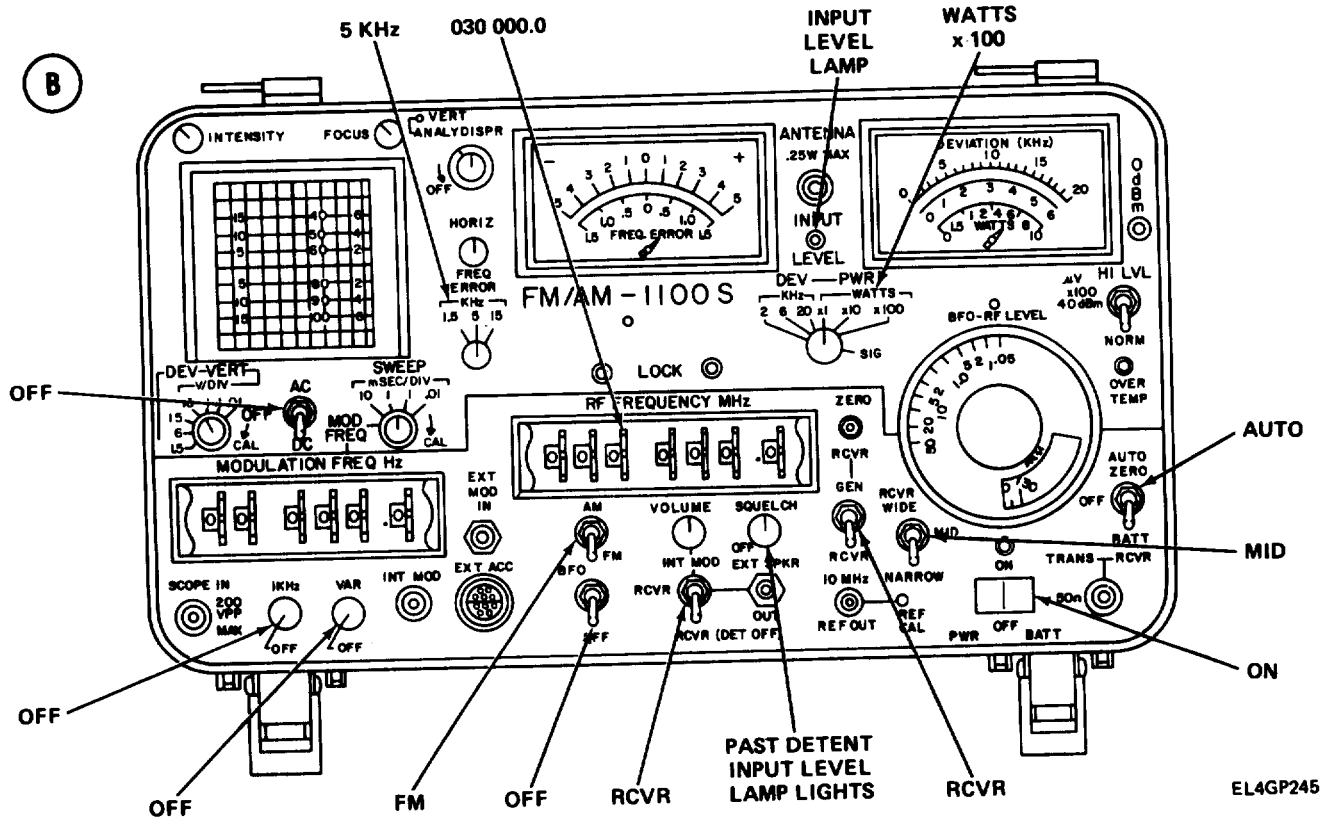


4-12. TRANSMITTER LOW AND HIGH POWER OUTPUT TEST. (CONT)

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

CONTROL AND SWITCH SETTINGS

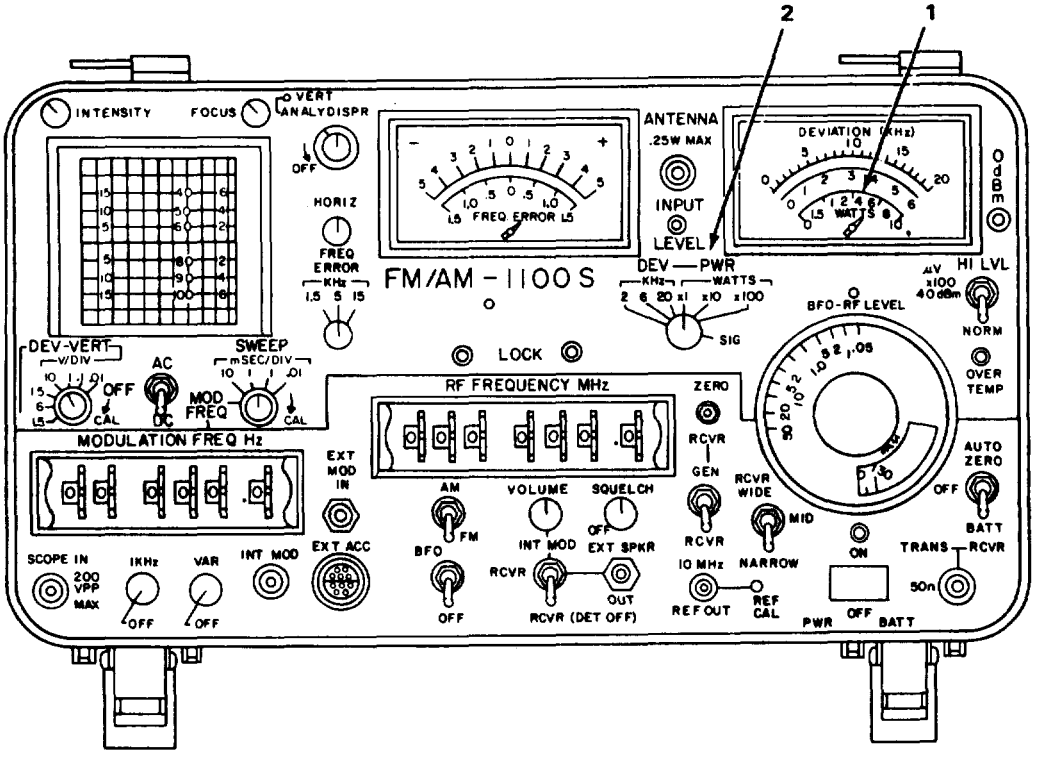
EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
MK-1978/VRC	POWER	ON
	AUDIO	MUTED
	KEY	RCVE
	X-MODE (RT)	NORMAL
	AUX RCVR	NORMAL
	SQUELCH	ON
RT	LIGHT	ON
	BAND	(A)
	MC-TUNE-KC	30.00
	POWER	HIGH
	SQUELCH	OLD ON
	VOLUME	Fully counterclockwise
	SPEAKER (RT-524/VRC)	OFF
AN/GRM-114A	See test setup diagram (B)	



4-12. TRANSMITTER LOW AND HIGH POWER OUTPUT TEST. (CONT)

TEST PROCEDURE

Ⓒ



EL4GP246

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 WAITS meter (1). (See test setup diagram Ⓒ .) ■

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 trouble-shooting 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 Ⓑ for frequencies 53.00 MHz and above.
5. Turn RT POWER switch to LOW.
6. Set AN/GRM-114A DEV/PWR switch (2) to x1O.
7. Turn RT MC-TUNE-KC switch to 30.00 MHz, BAND Ⓐ
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 trouble-shooting 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 Ⓑ for frequencies 53.00 MHz and above.
12. Return Power Supply, PP-1104(')/E output to 25.5 Vdc.
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 A81OO and A6300. An audio signal Isinjected 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

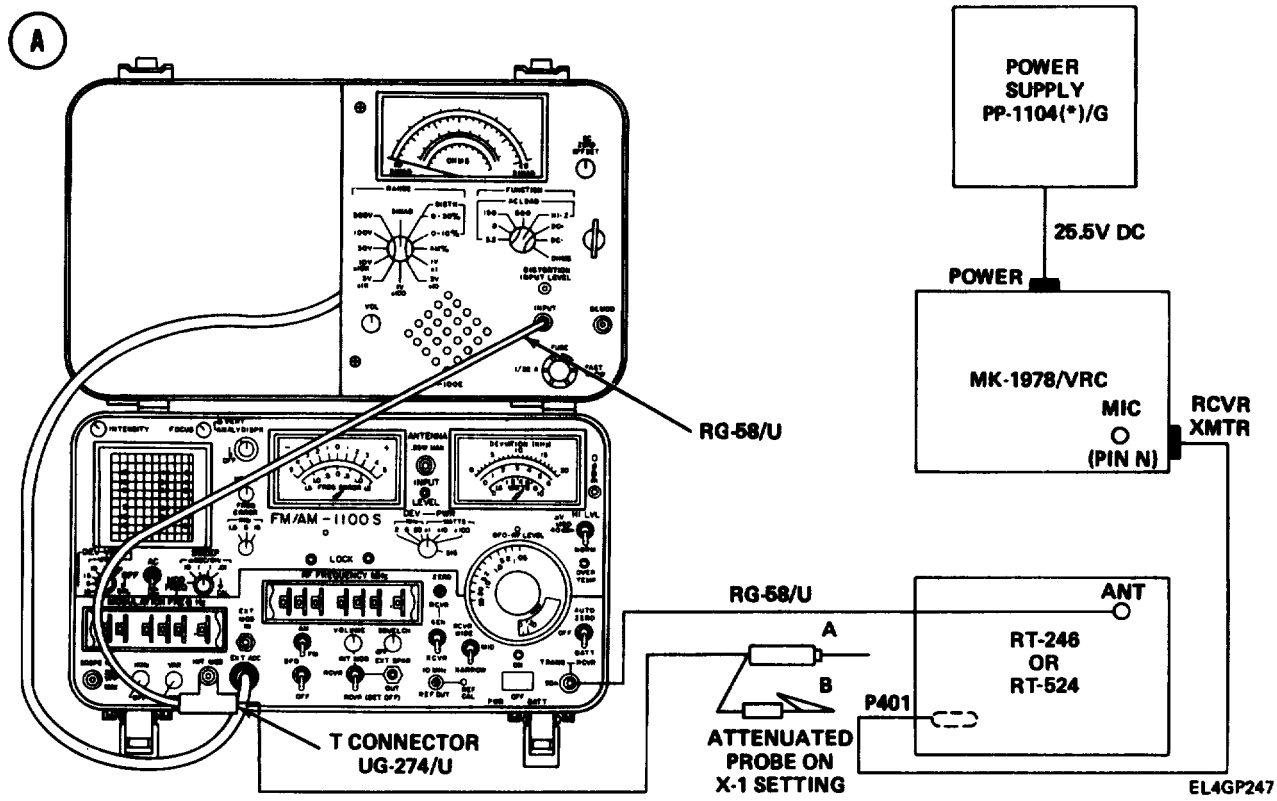
Power Supply PP-1104(*)/G	Rf Cables (two) RG-58/U
Maintenance Kit MK-1978/VRC	Adapter (T-Connector) UG-274/U
Test Set AN/GRM-114A	

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.

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

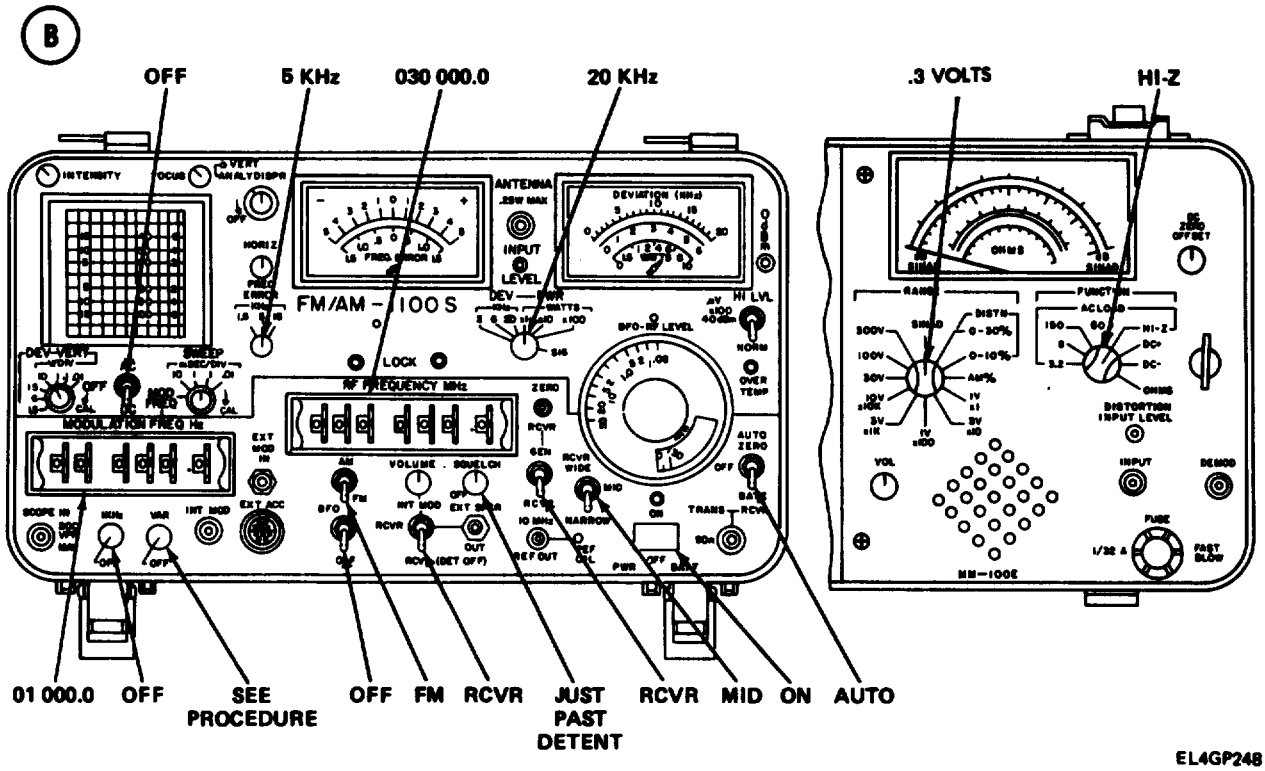


INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

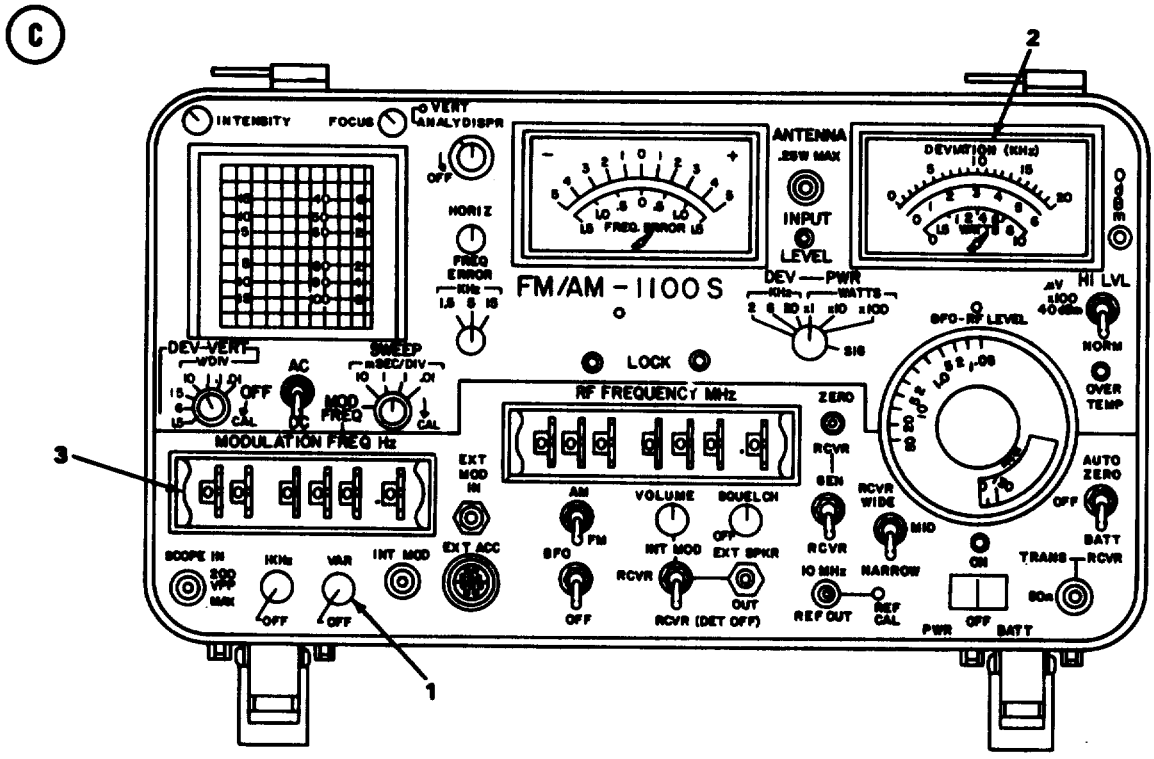
EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
MK-1978/VRC	POWER	ON
	AUDIO	MUTED
	KEY	RCVE
	X-MODE (RT)	NORMAL
	AUX RCVR	NORMAL
	SQUELCH	ON
RT	LIGHT	ON
	BAND	(A)
	MC-TUNE-KC	30.00
	POWER	LOW
	SQUELCH	OLD ON
	VOLUME	Fully counterclockwise
	SPEAKER (RT-524/VRC)	OFF
AN/GRM-114A; MM-100E	See test setup diagram (B), page 4-38	

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



EL4GP248

TEST PROCEDURE



EL4GP249

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

Deviation 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 (A), 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.

Deviation 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.

Deviation 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.**

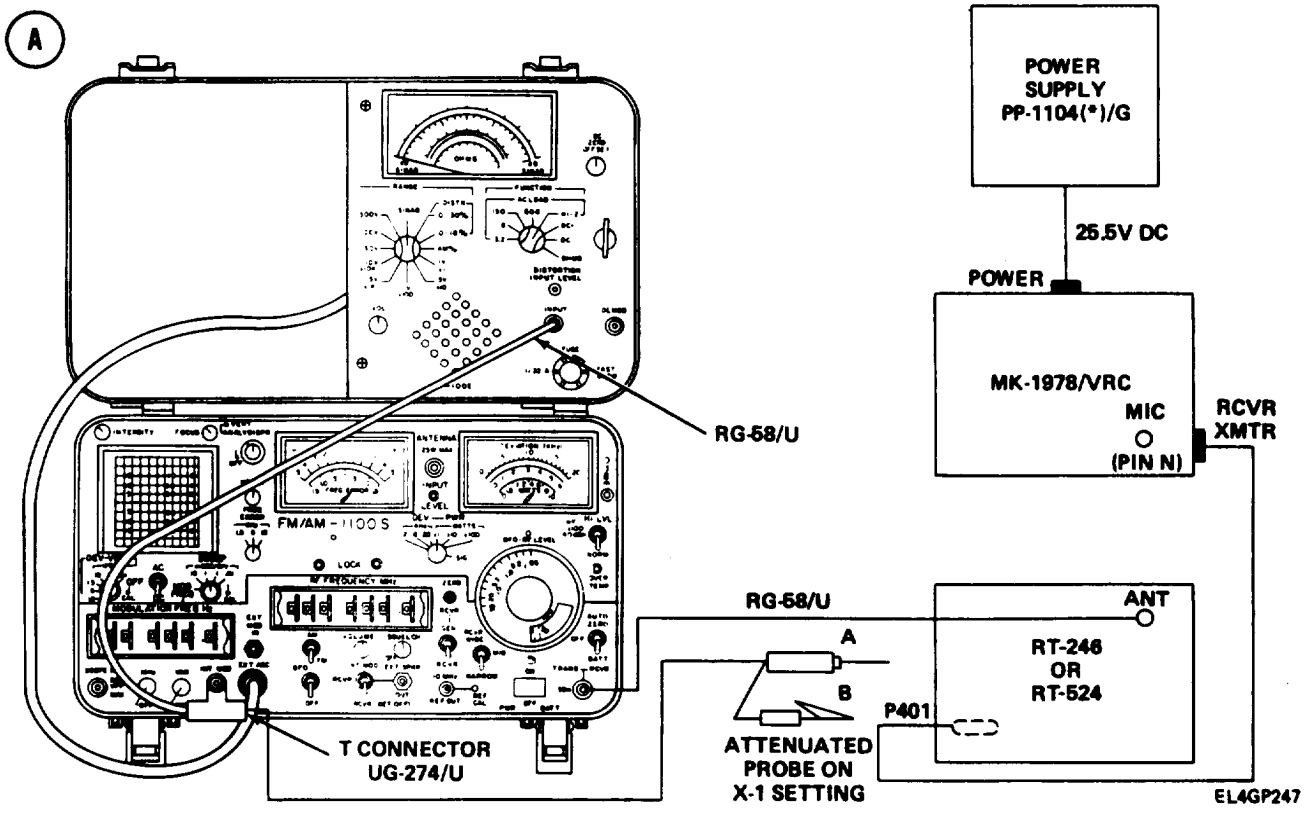
TEST EQUIPMENT AND MATERIALS

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.



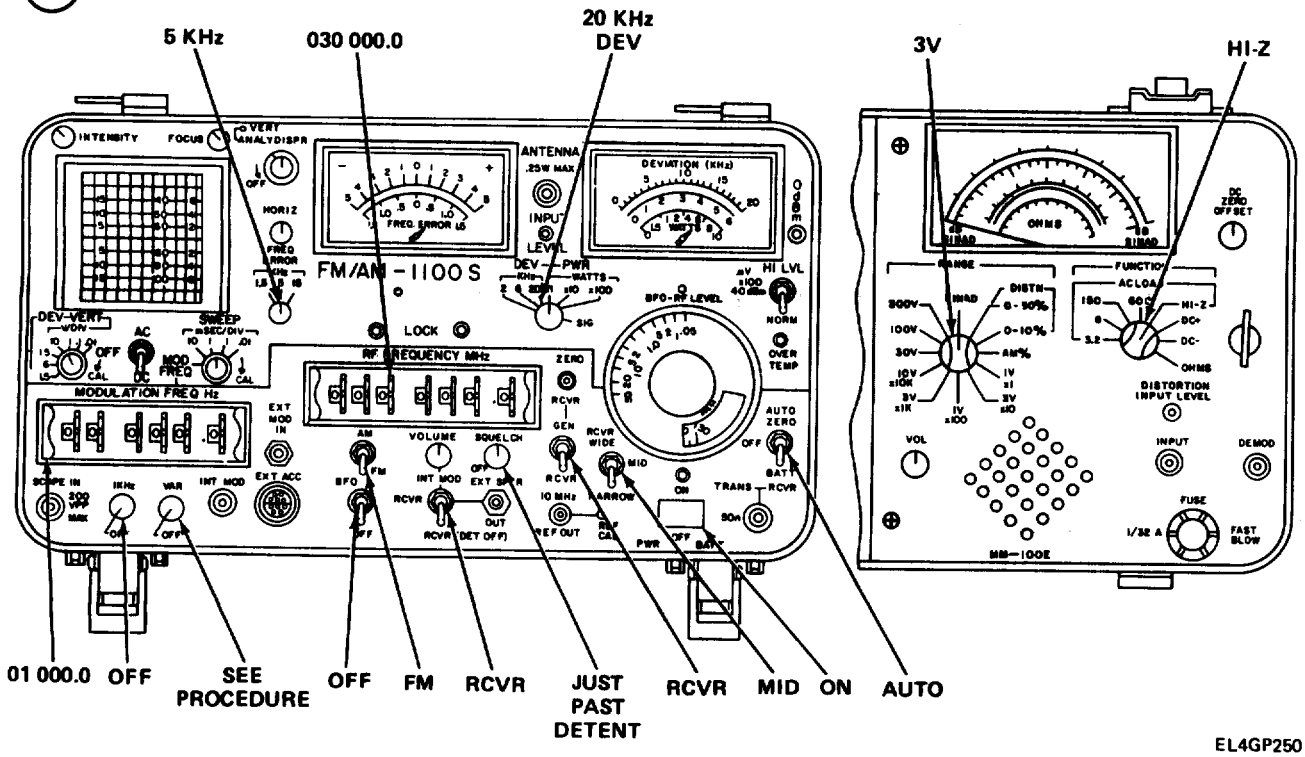
4-14. TRANSMITTER LIMITING TEST. (CONT)

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

CONTROL AND SWiTCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
MK-1978/VRC	POWER	ON
	AUDIO	MUTED
	KEY	RCVE
	X-MODE (RT)	NORMAL
	AUX RCVR	NORMAL
	SQUELCH	ON
RT	LIGHT	ON
	BAND	(A)
	MC-TUNE-KC	30.00
	POWER	LOW
	SQUELCH	OLD ON
	VOLUME	Fully counterclockwise
	SPEAKER (RT-524/VRC)	OFF
AN/GRM-114A; MM-1OOE	See test setup diagram (B)	

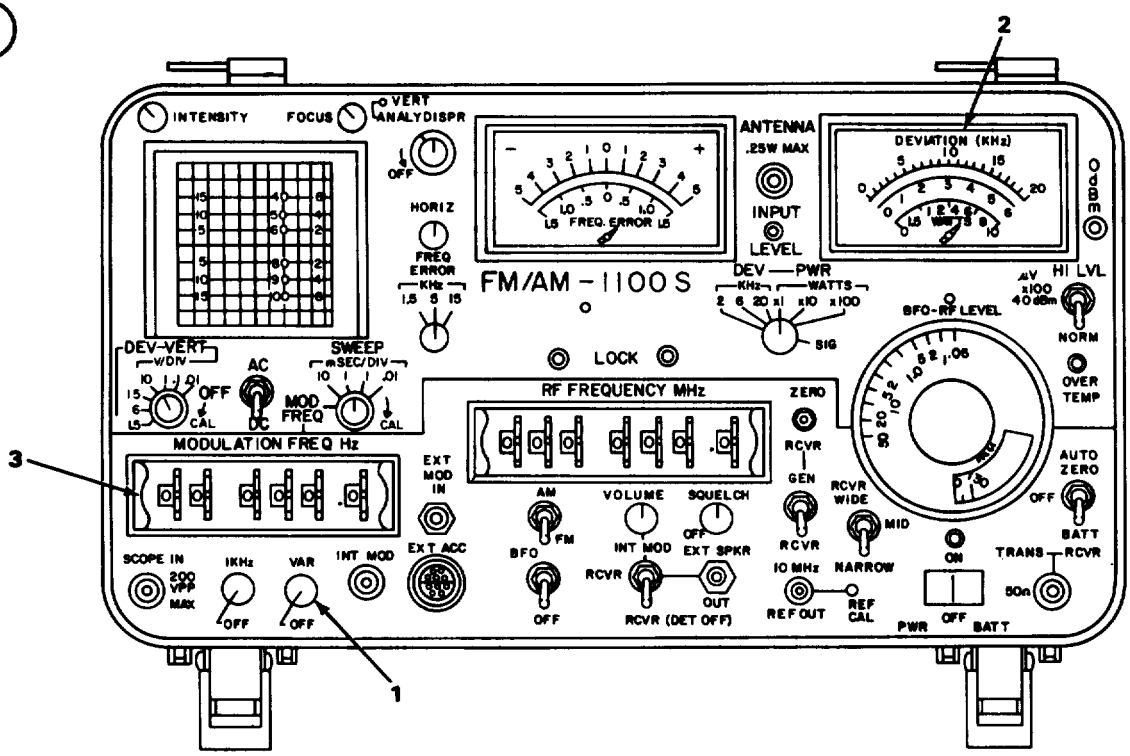
(B)



4-14. TRANSMITTER LIMITING TEST. (CONT)

TEST PROCEDURE

Ⓒ



EL4GP249

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 Ⓐ , page 4-40.)
2. Adjust AN/GRM-114A VAR knob (1) (see test setup diagram Ⓒ) 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-1OOE 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

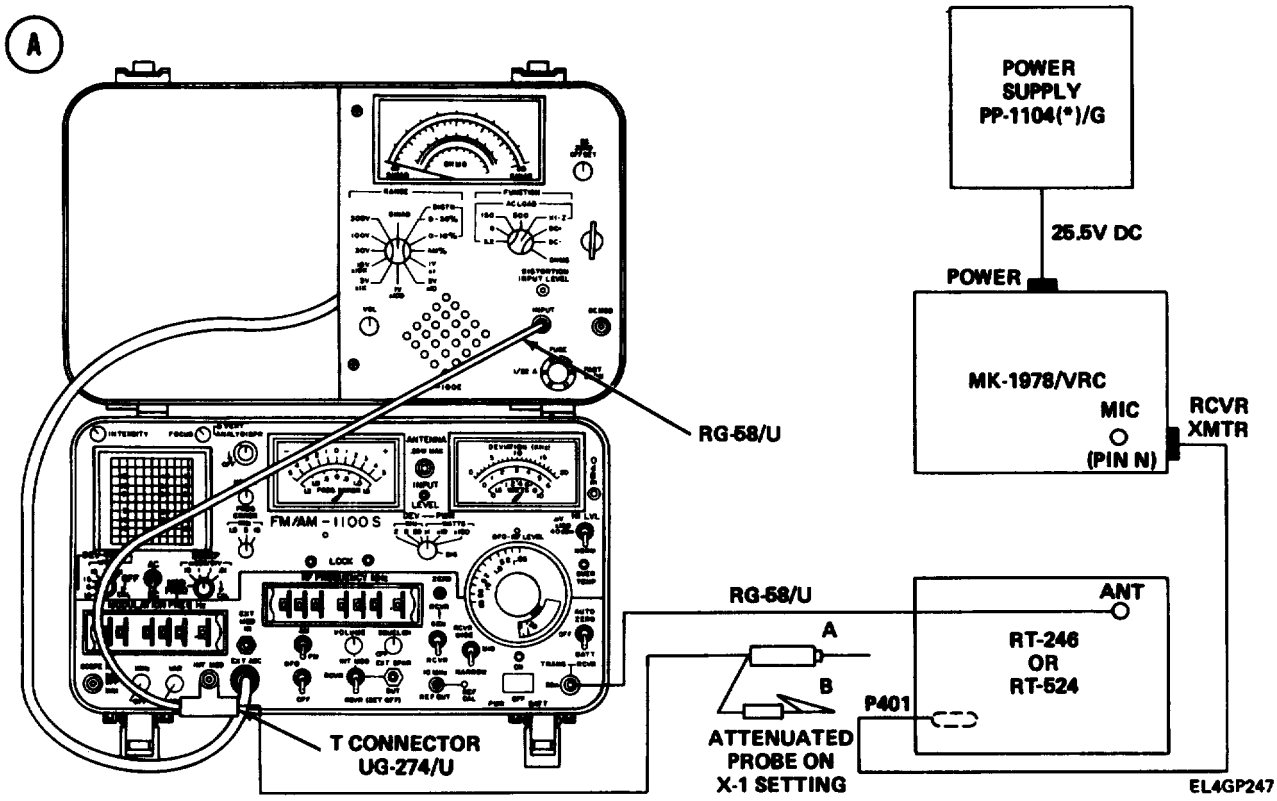
Power Supply PP-1104(*)/G	Rf Cable RG-58/U
Maintenance Kit MK-1978/VRC	Adapter (T-Connector) UG-274/U
Test Set AN/GRM-114A	

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.

4915. TRANSMITTER DISTORTION TEST (NORMAL MODE). (CONT)

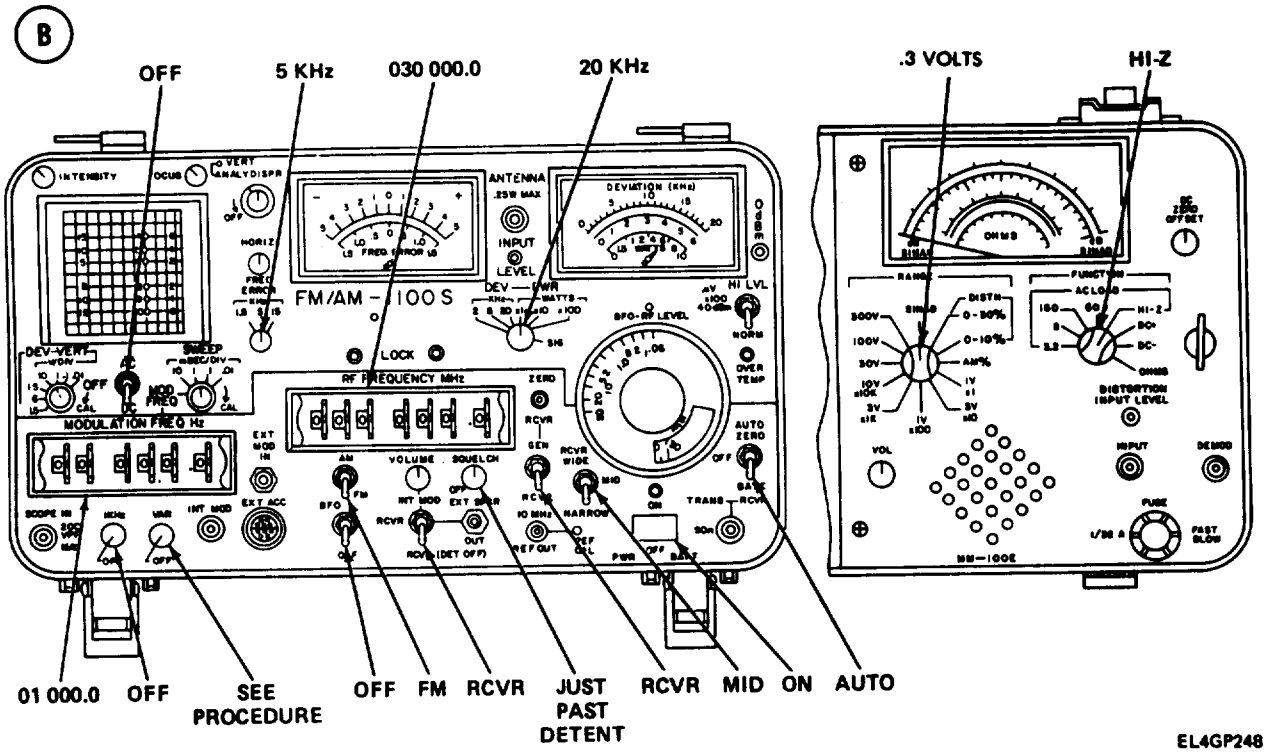


INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

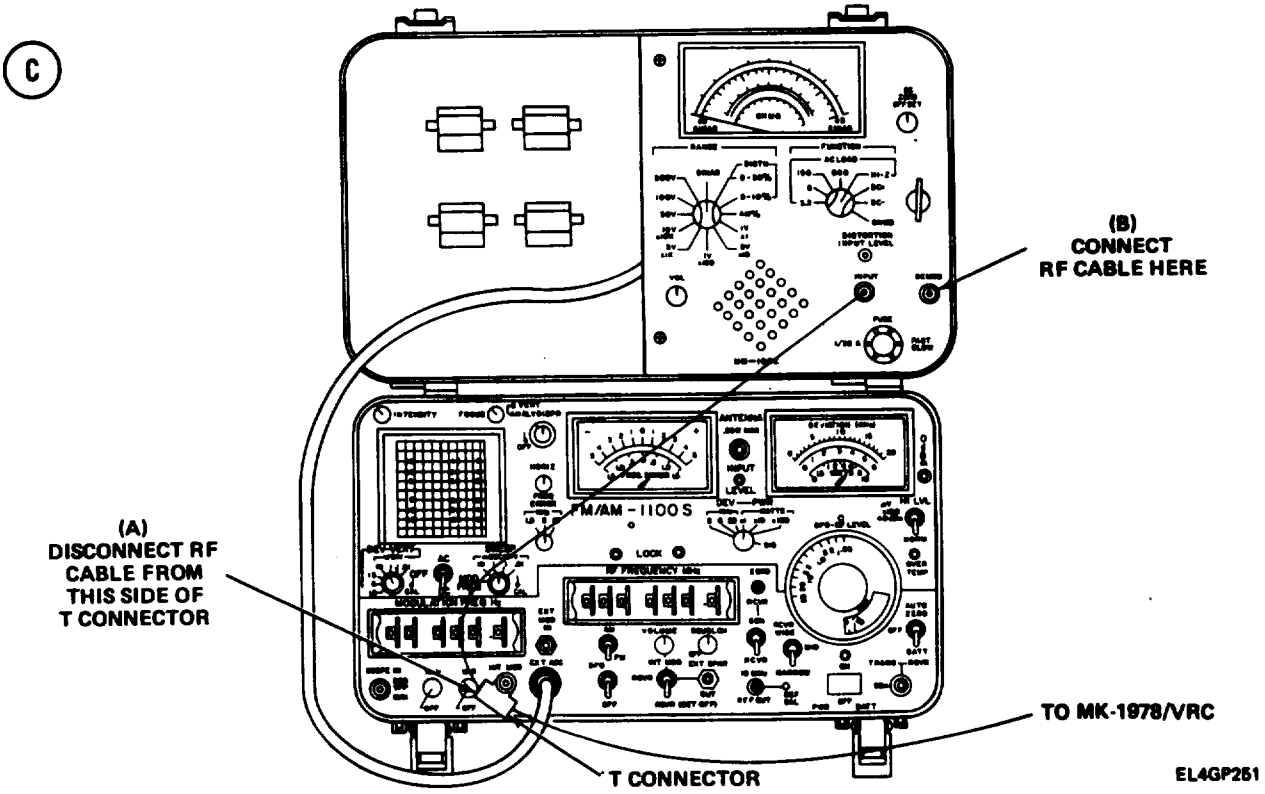
CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
MK-1978/VRC	POWER	ON
	AUDIO	MUTED
		RCVE
	X-MODE (RT	NORMAL
	AUX RCVR	NORMAL
	SQUELCH	ON
RT	LIGHT	ON
	BAND	A
	MC-TUNE-KC	30.00
	POWER	LOW
	SQUELCH	OLD ON
	VOLUME	Fully counterclockwise
	SPEAKER (RT-524/VRC)	OFF
AN/GRM-114A; MM-100E	See test setup diagram Ⓑ, page 4-45	

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

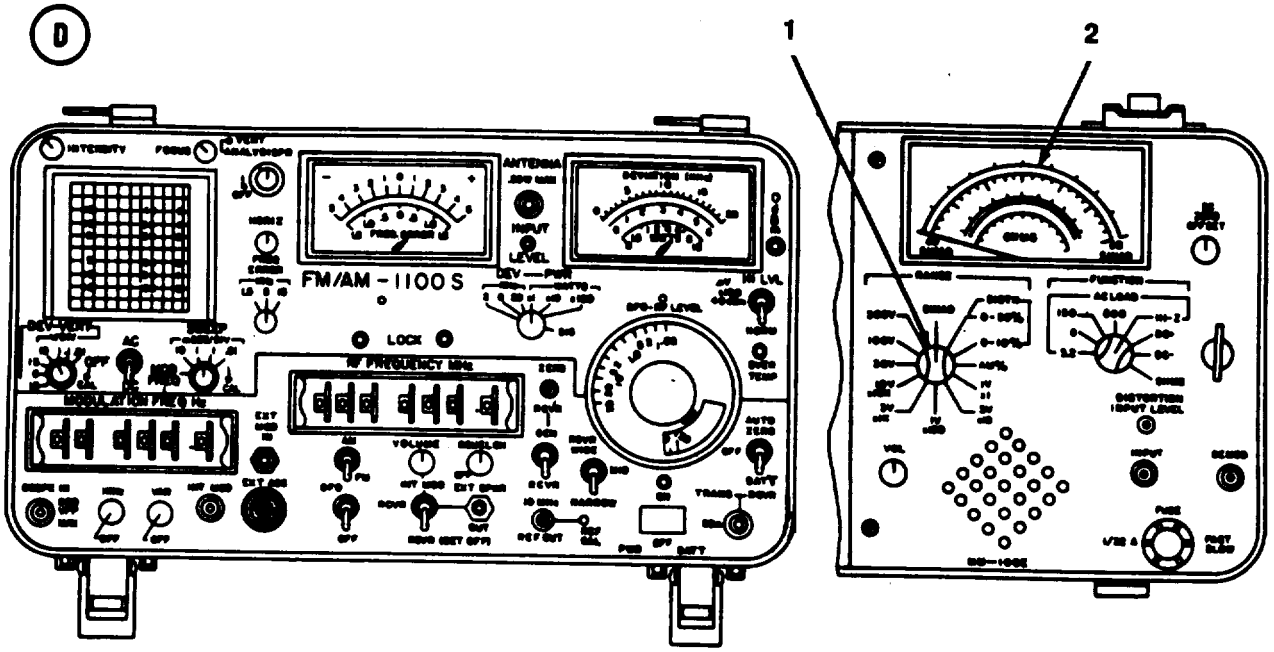


TEST PROCEDURE



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)).



EL4GP252

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 keyad, and the output is measured on the AN/GRM-114A DEVIATION (kHz) meter and oscilloscope.

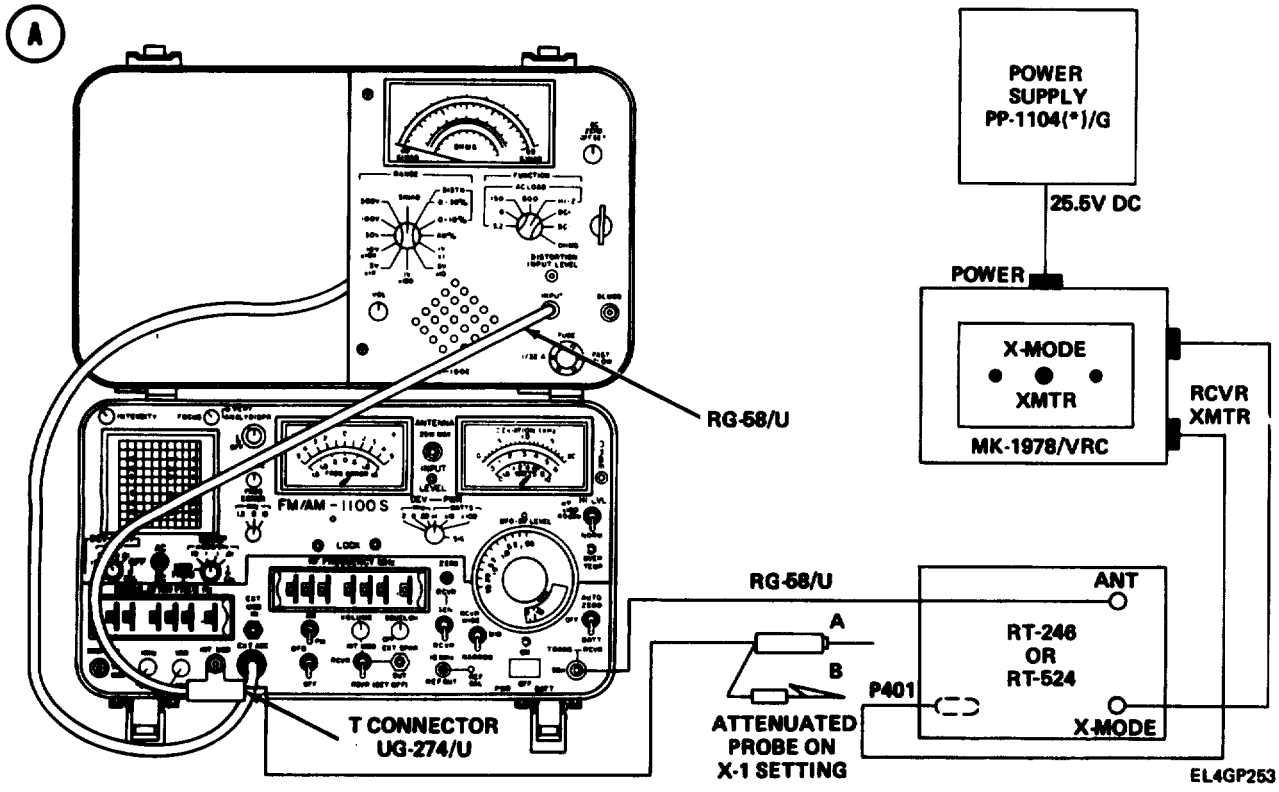
TEST EQUIPMENT AND MATERIALS

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.

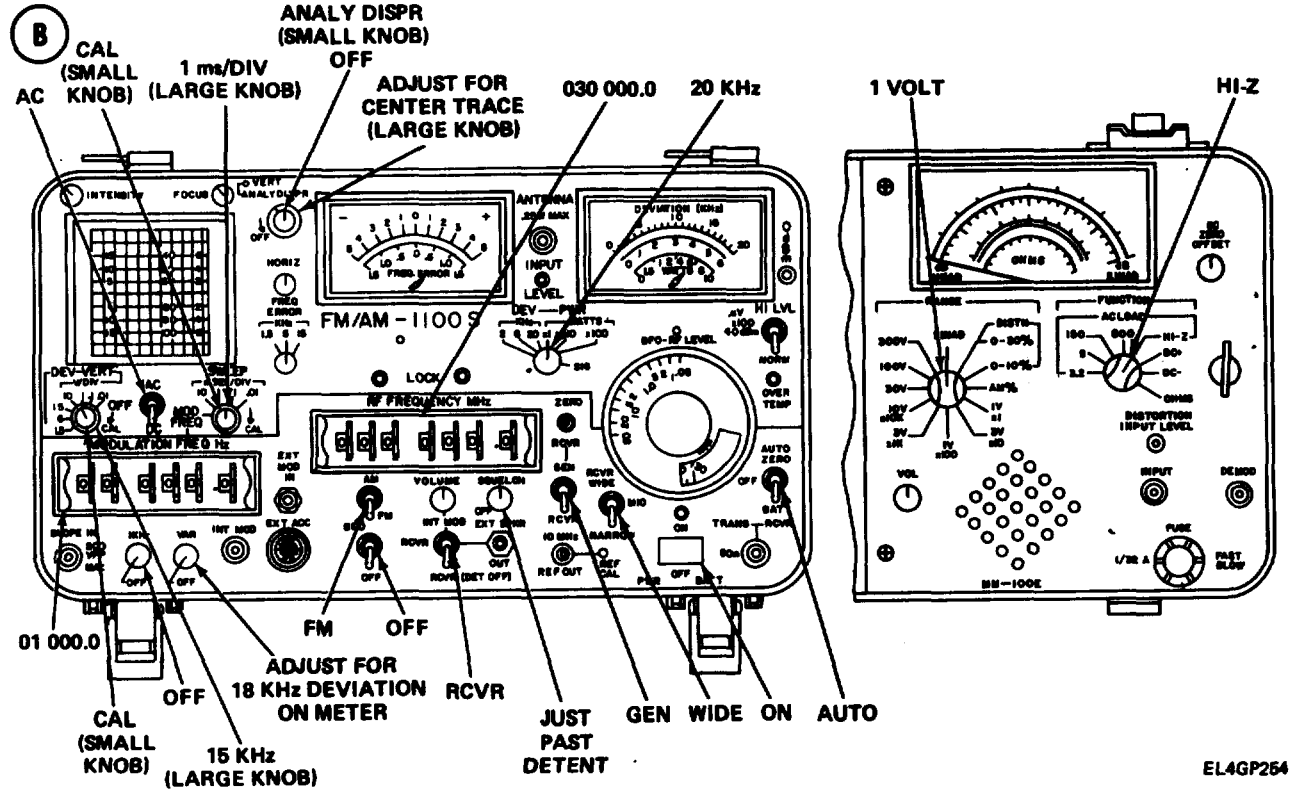


4-16. TRANSMITTER DEVIATION TEST(X-MODE). (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as Indicated In the following table.

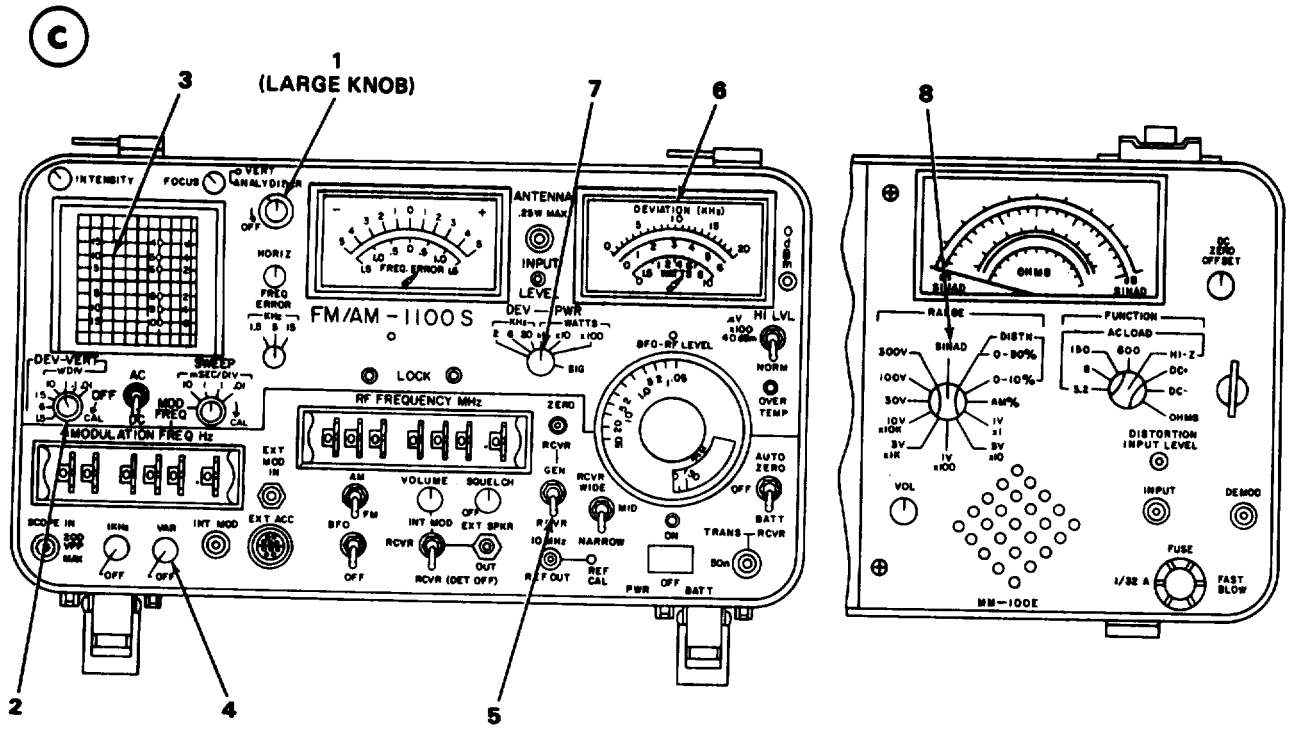
CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
MK-1978/VRC	POWER	ON
	AUDIO	MUTED
	KEY	RCVE
	AUX RCVR	CIPHER
	X-MODE (RT)	CIPHER
	SQUELCH	ON
RT	LIGHT	ON
	BAND	(A)
	MC-TUNE-KC	30.00
	POWER	LOW
	SQUELCH	OLD ON
	VOLUME	Fully counterclockwise
	SPEAKER (RT-524/VRC)	OFF
AN/GRM-114A; MM-100E	See test setup diagram (B)	



4-16 TRANSMITTER DEVIATION TEST(X-MODE). (CONT)

TEST procedure



EL4GP255

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

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.
12. Key transmitter. Observe AN/GRM-114A oscilloscope.

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

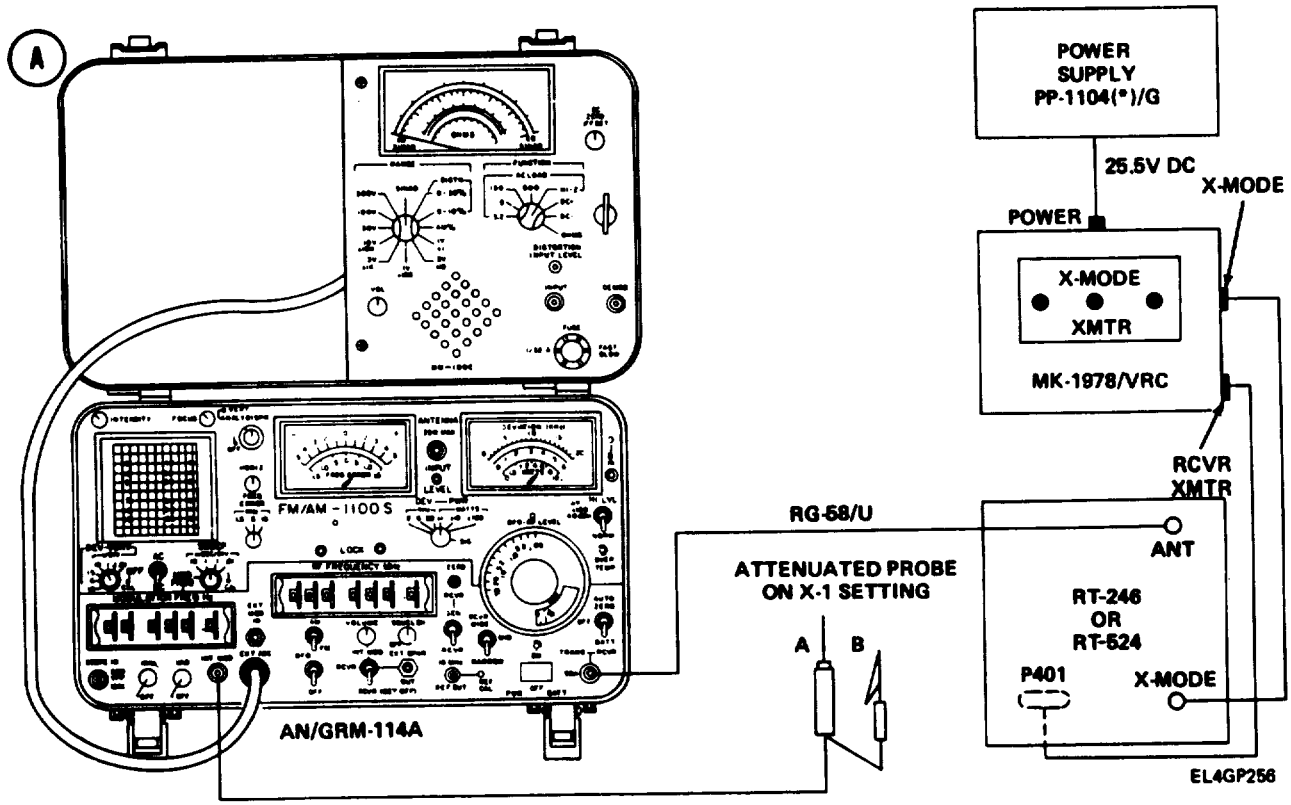
Power supply PP-1104(*)/G	Test Set AN/GRM-114A
Maintenance Kit MK-1978/VRC	Rf Cables (two) RG-58/U

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.

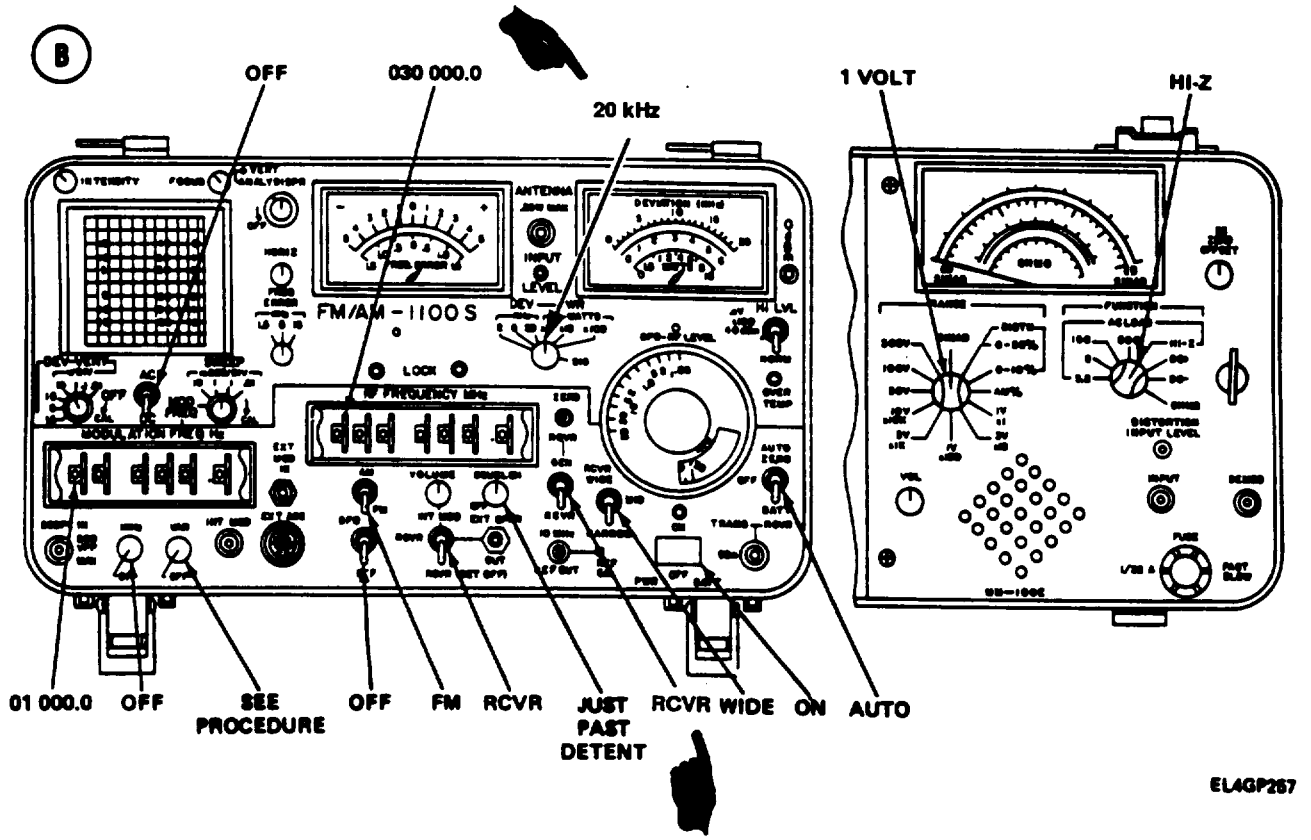
CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
MK-1978/VRC	POWER	ON
	AUDIO	MUTED
	KEY	RCVE
	AUX RCVR	CIPHER
	X-MODE (RT)	CIPHER
	SQUELCH	ON

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

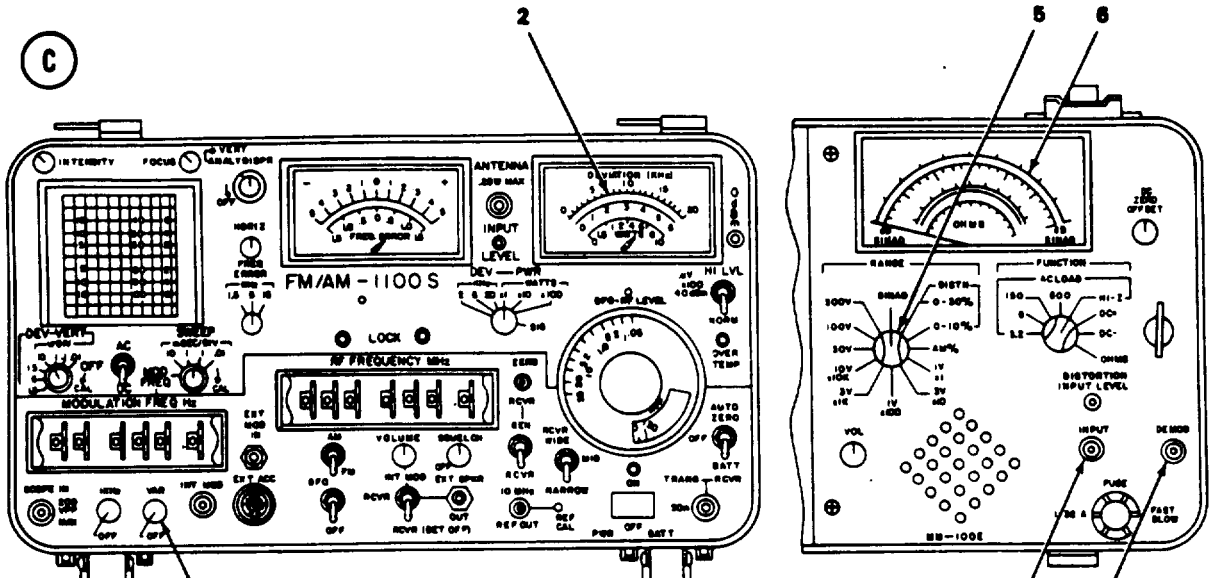
CONTROL AND SWITCH SETTINGS (CONT)

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



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), page4-51).
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-1OOE black distortion scale (6).
5. Adjust AN/GRM-114A VAR control (1) for 20-kHz indication on DEVIATION meter (2). (See test setup diagram Ⓒ).

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.

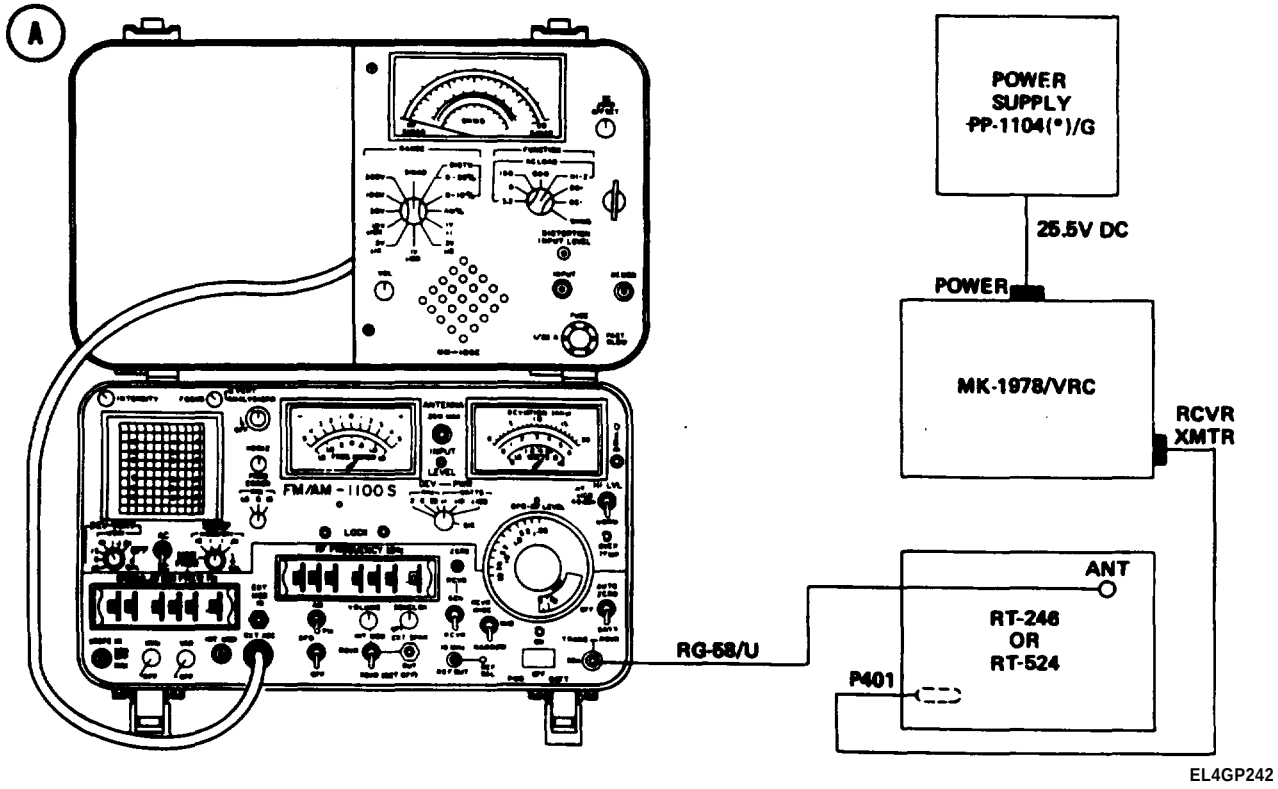
TEST EQUIPMENT AND MATERiALS

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

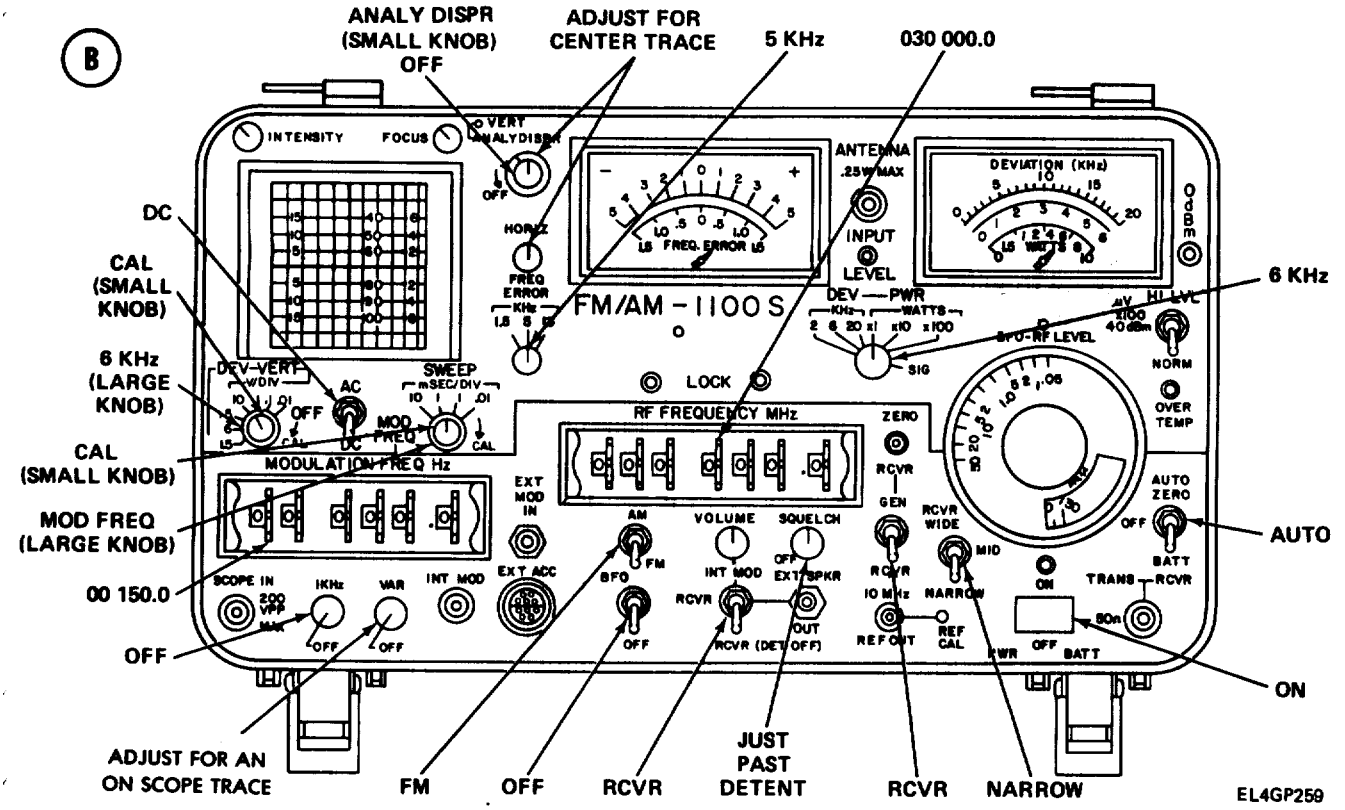


4-18. TRANSMITTER SQUELCH TONE STABILITYTEST. (CONT)

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

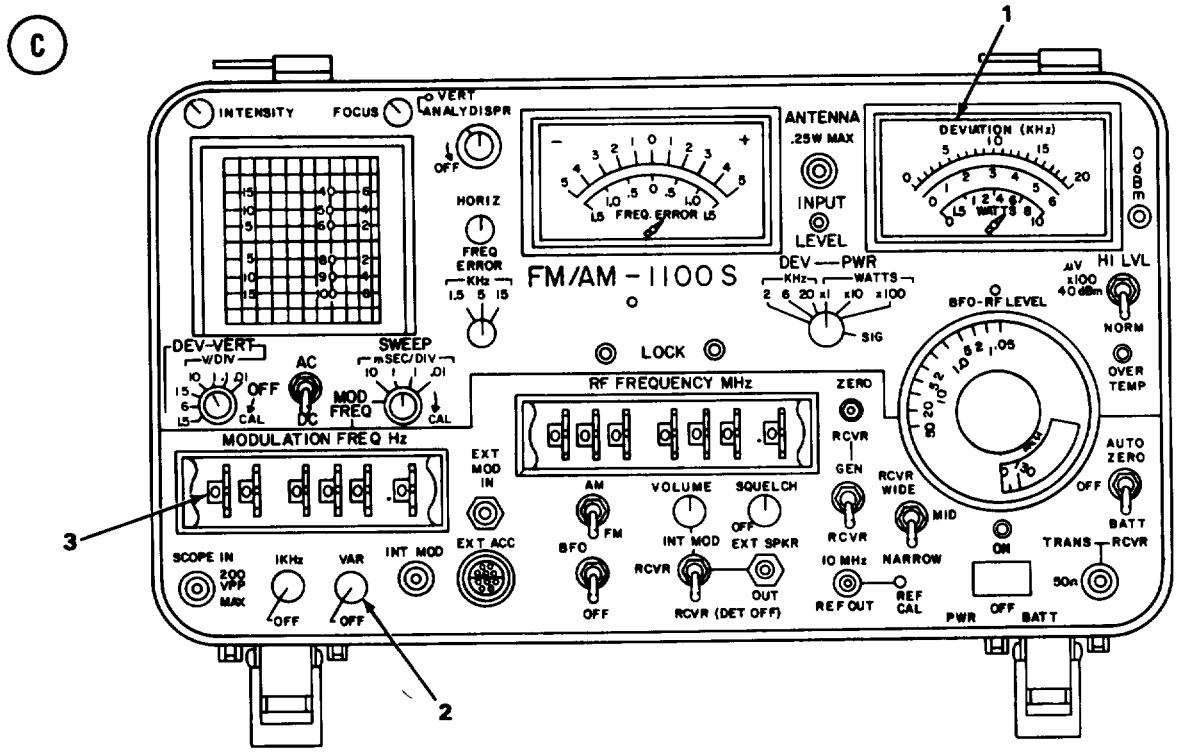
CONTROL AND SWITCH SETTINGS

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



4-18. TRANSMITTER SQUELCH TONE Stability TEST. (CONT)

TEST PROCEDURE

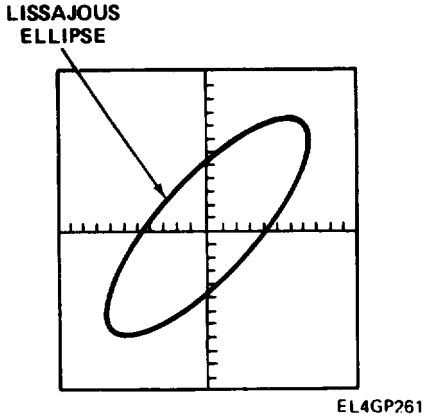


EL4GP260

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.



EL4GP261

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 aline 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

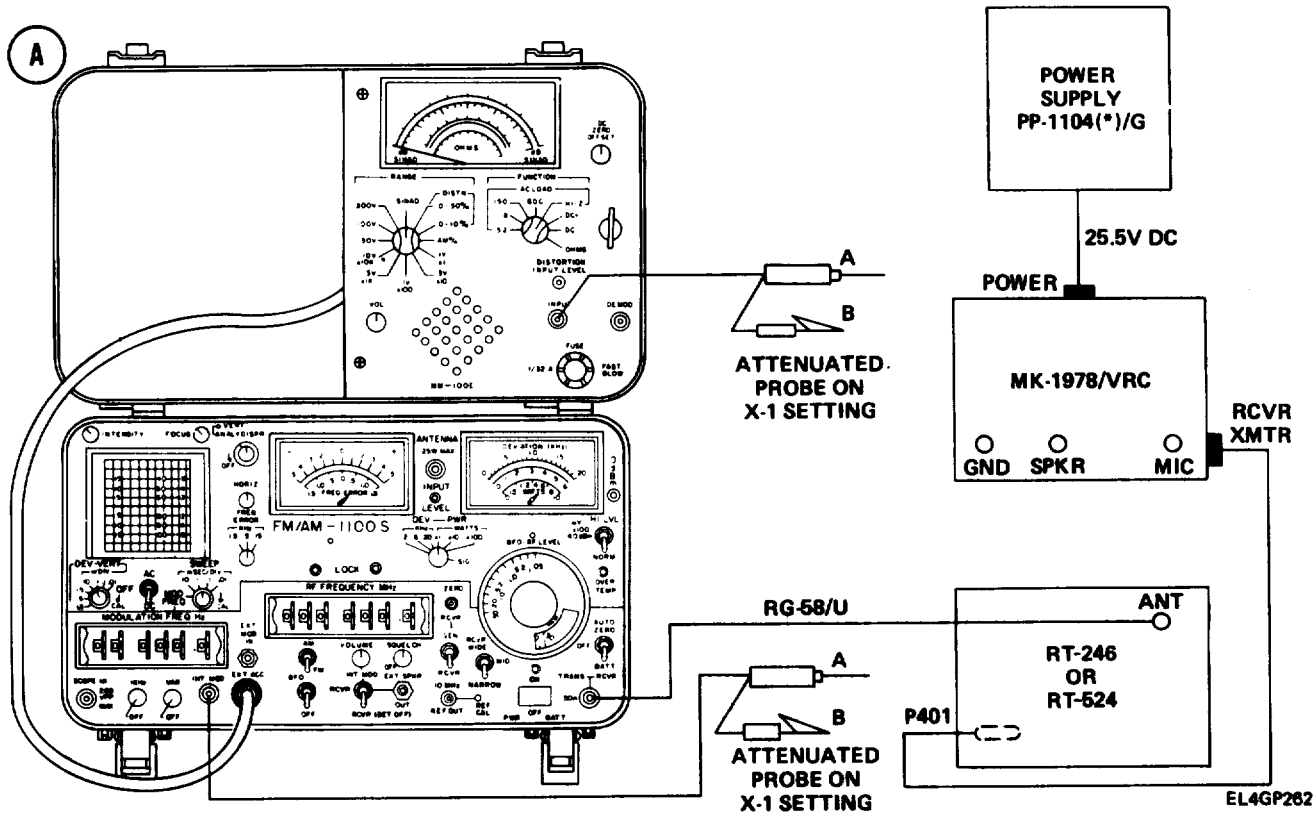
Power Supply PP-1104(*)/G
Maintenance Kit MK-1978/VRC
Test Set AN/GRM-114A (two probes needed)
Rf Cable RG-58/U

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

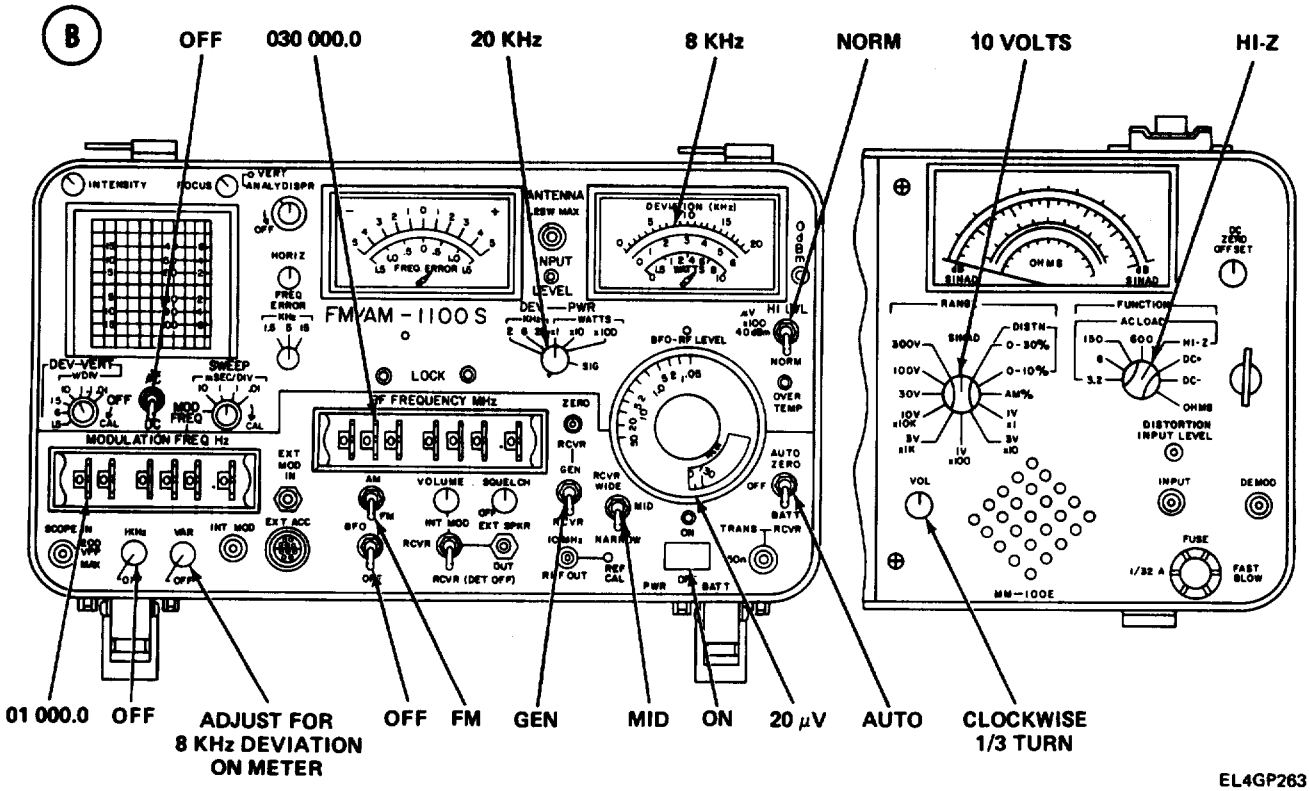


INITIAL EQUIPMENT CONTROL SEITTNGS. Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

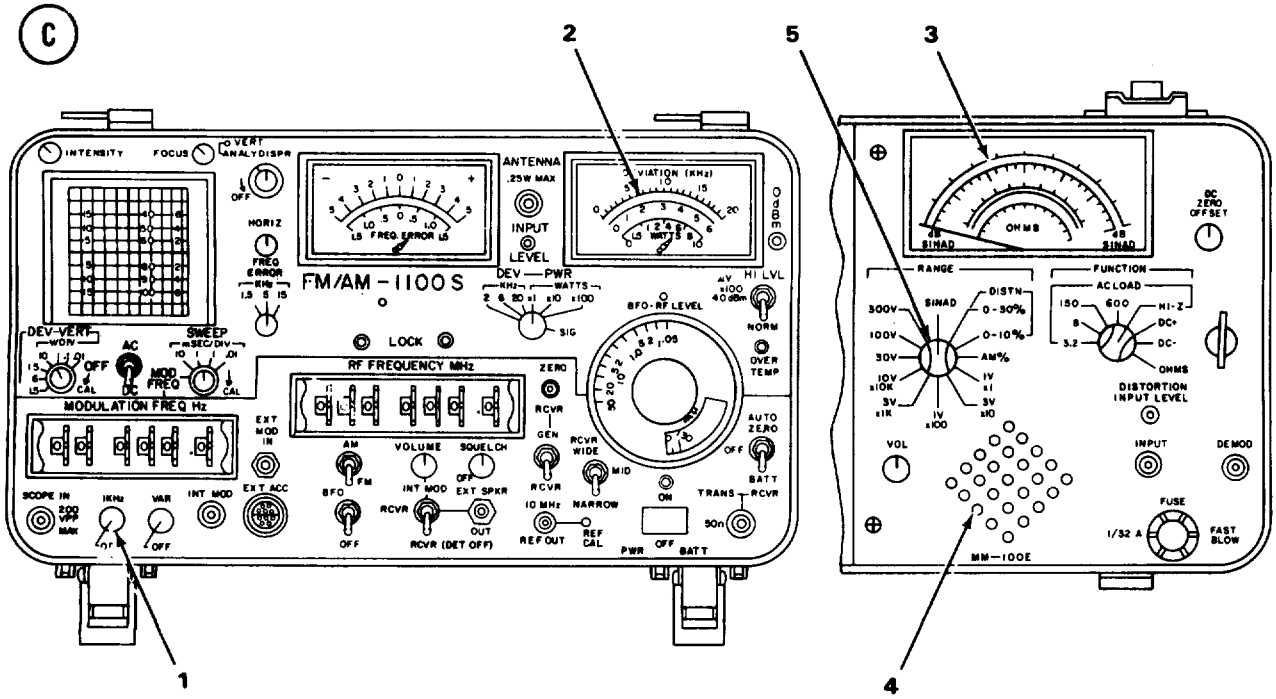
EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
MK-1978/VRC	POWER	ON
	AUDIO	MUTED
	KEY	RCVE
	X-MODE (RT)	NORMAL
	AUX RCVR	NORMAL
	SQUELCH	ON
RT	LIGHT	ON
	BAND	(A)
	MC-TUNE-KC	30.00
	POWER	LOW
	SQUELCH	OLD ON
	VOLUME	Fully counterclockwise
	SPEAKER (RT-524/VRC)	OFF
AN/GRM-114A, MM-100E	See test setup diagram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

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



EL4GP263

TEST PROCEDURE



EL4GP264

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 Ⓐ, 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 necessory, 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.

6. Remove AN/GRM-114A attenuated probe from MK-1978/VRC jack.
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

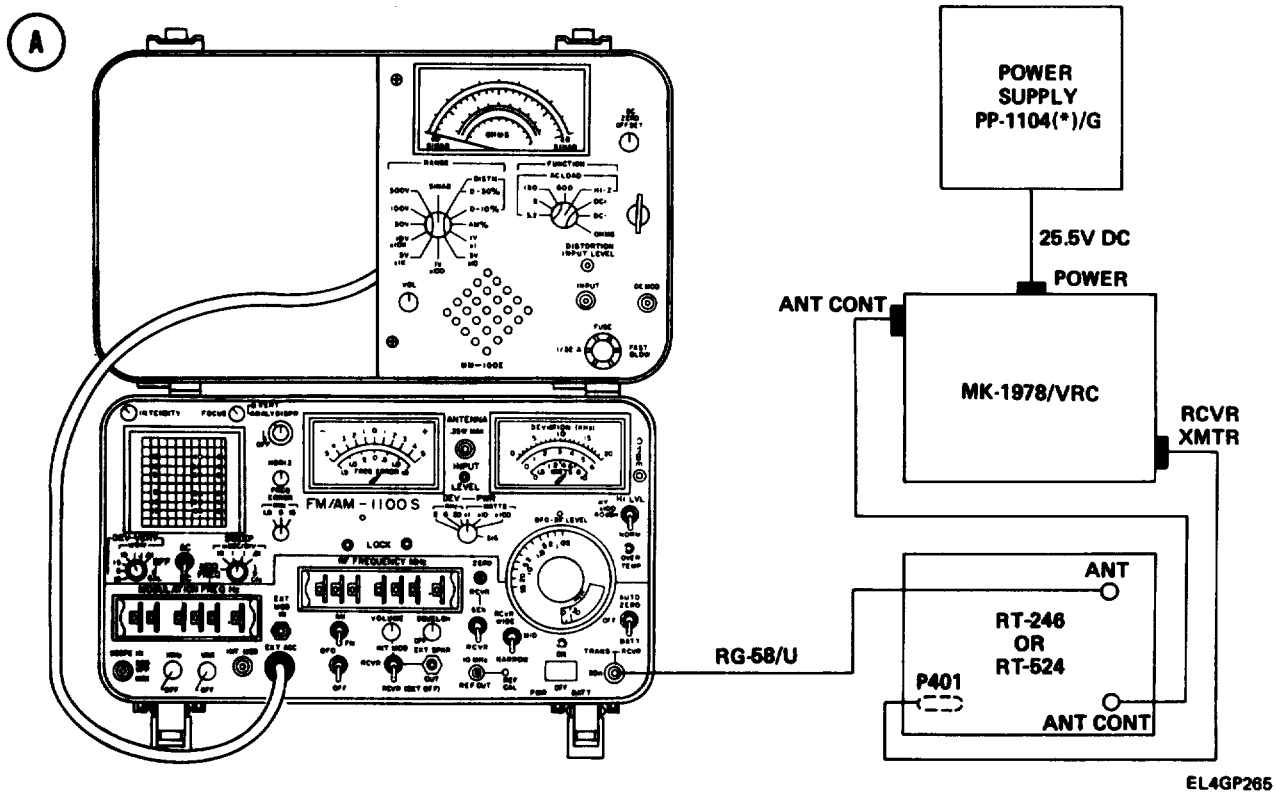
Power Supply PP-1104(*)/G
Maintenance Kit MK-1978/VRC
Test Set AN/GRM-114A
Rf Cable RG-58/U

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.

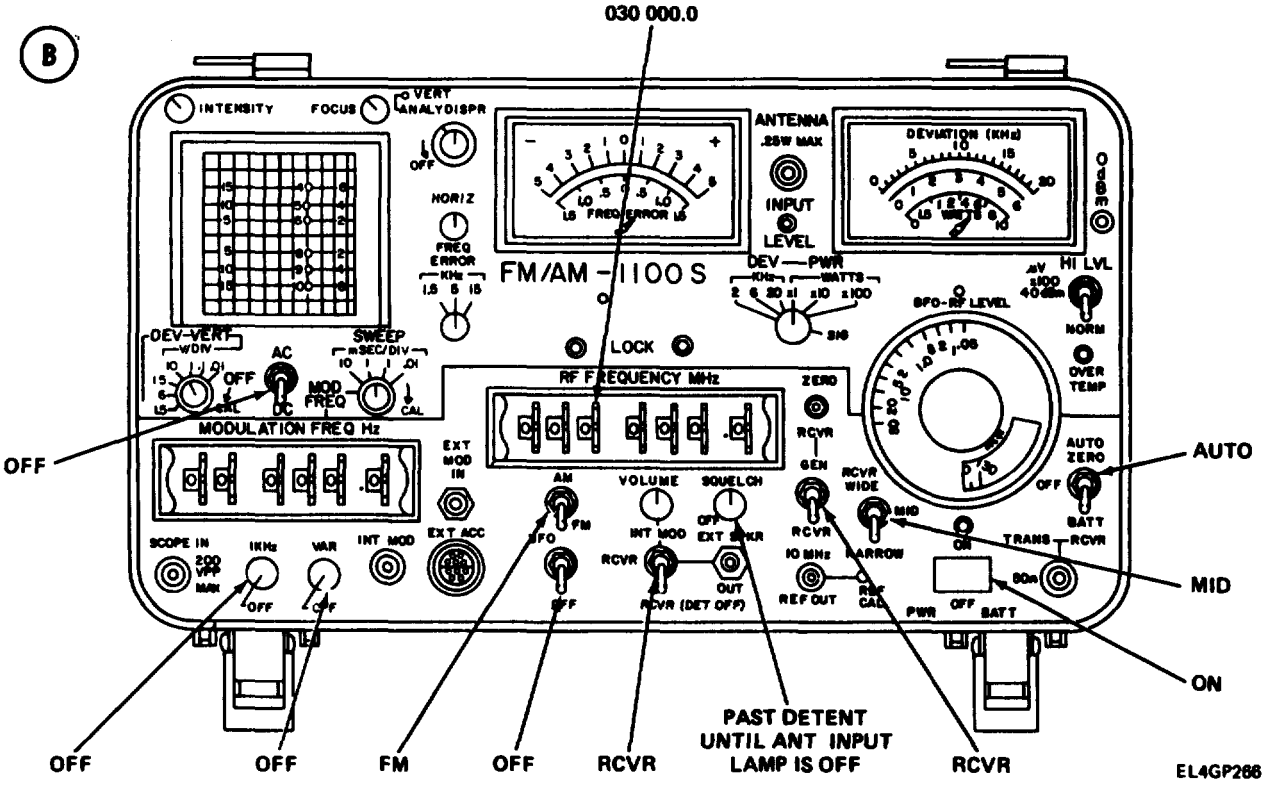
CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
MK-1978/VRC	POWER	ON
	AUDIO	MUTED
	KEY	RCVE
	AUX RCVR	NORMAL
	X-MODE (RT)	NORMAL
	SQUELCH	ON

4-20. ANTENNA INFORMATION (SWITCHING) TEST. (CONT)

CONTROL AND SWITCH SETTINGS (CONT)

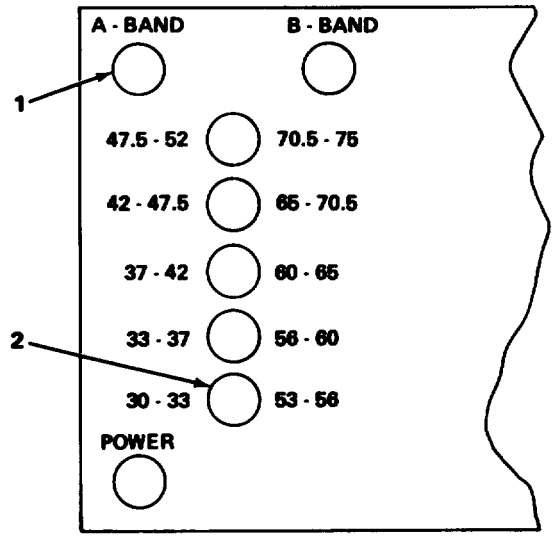
EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	LIGHT	ON
	BAND	(A)
	MC-TUNE-KC	30.00
	POWER	LOW
	SQUELCH	OLD ON
	VOLUME	Fully counterclockwise
	SPEAKER (RT-524/VRC)	OFF
AN/GRM-114A	See test setup diagram (B)	



4-20. ANTENNA INFORMATION (SWITCHING) TEST. (CONT)

TEST PROCEDURE

Ⓒ



EL4GP267

1. Observe MK-1978/VRC indicator lamps.

STANDARD. MK-1978/VRC Ⓐ BAND (1) and 30-33 (2) indicator lamps should be lit. (See test setup diagram Ⓒ .

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 Ⓑ for frequencies 53.00 MHz and above.

RT MC-TUNE-KC FREQUENCY MHZ	AN/GRM-114A RF FREQUENCY MHZ	MK-1978/VRC INDICATOR LAMPS	
		BAND	RANGE
35.05	035 050 0	Ⓐ	33-37
38.10	038 100 0	Ⓐ	37-42
41.20	041 200 0	Ⓐ	37-42
45.30	045 300 0	Ⓐ	42-45
52.80	052 800 0	Ⓐ	47.5-52
53.00	053 000 0	Ⓑ	53-56
54.40	054 400 0	Ⓑ	53-56
56.50	056 500 0	Ⓑ	56-60
61.60	061 600 0	Ⓑ	60-65
69.70	069 700 0	Ⓑ	65-70.5
75.95	075 950 0	Ⓑ	70.5-75

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.

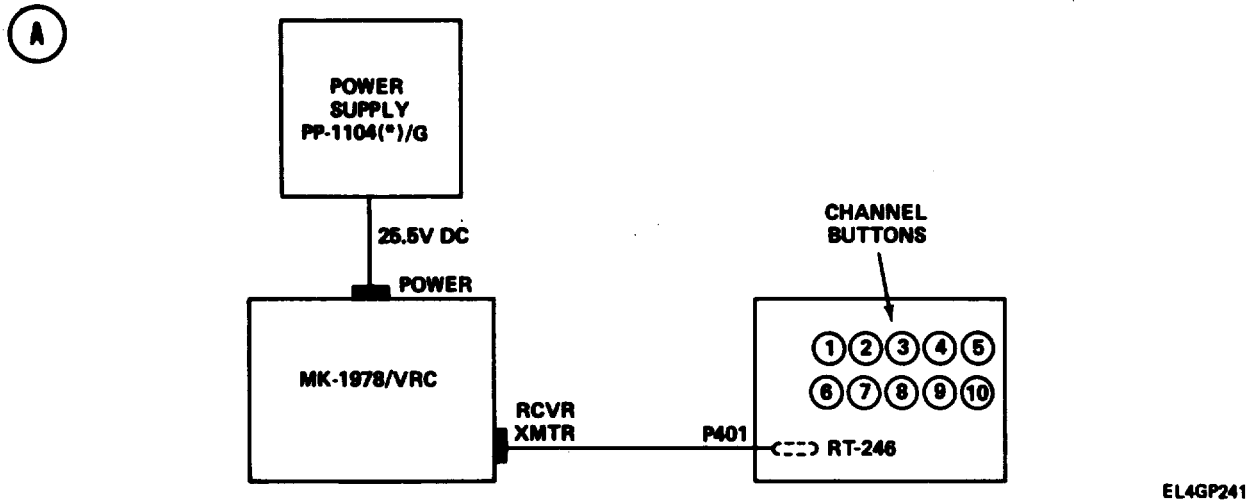
TEST EQUIPMENT AND MATERIALS

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

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 teat setup diagram (A) .



Turn on test equipment. Allow at least 15 to 30 minutes for warmup.

4-21. AUTOMATIC FREQUENCY SELECTION TEST. (CONT)

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

CONTROL AND SWITCH SETTINGS

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

NOTE

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

TEST PROCEDURE

1. Press RT-24/VRCchannei button ① (see test setup diagram Ⓐ 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/VRCdial window within 5 seconds, sea 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 asumes 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 VOLUMEcontrol test at any frequency setting of the MG-TUNE-KC control.However,cedain 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.

FAILURE MODE	CAUSE	CORRECTION
No audio on all channels ending In "O", (eg, 30.00, 30.10,30.20, etc).	Crystal Y2012 (5.65 MHz) in A2000 assembly.	Replace A2000 assembly.
No audio on all channels ending in "5", (eg, 30.05, 30.15, 30.25, etc).	Crystal Y2011 (5.60 MHz) in A2000 assembly.	Replace A2000 assembly.
No audio on the same 100-kHz segment for each MHz of tuning.	Defective interpolation oscillator crystal.	Replace A2000 assembly. See Interpolation oscillator crystal chart.

4-23. GROSS TROUBLESHOOTING PRELIMINARY INSTRUCTIONS. (CONT)

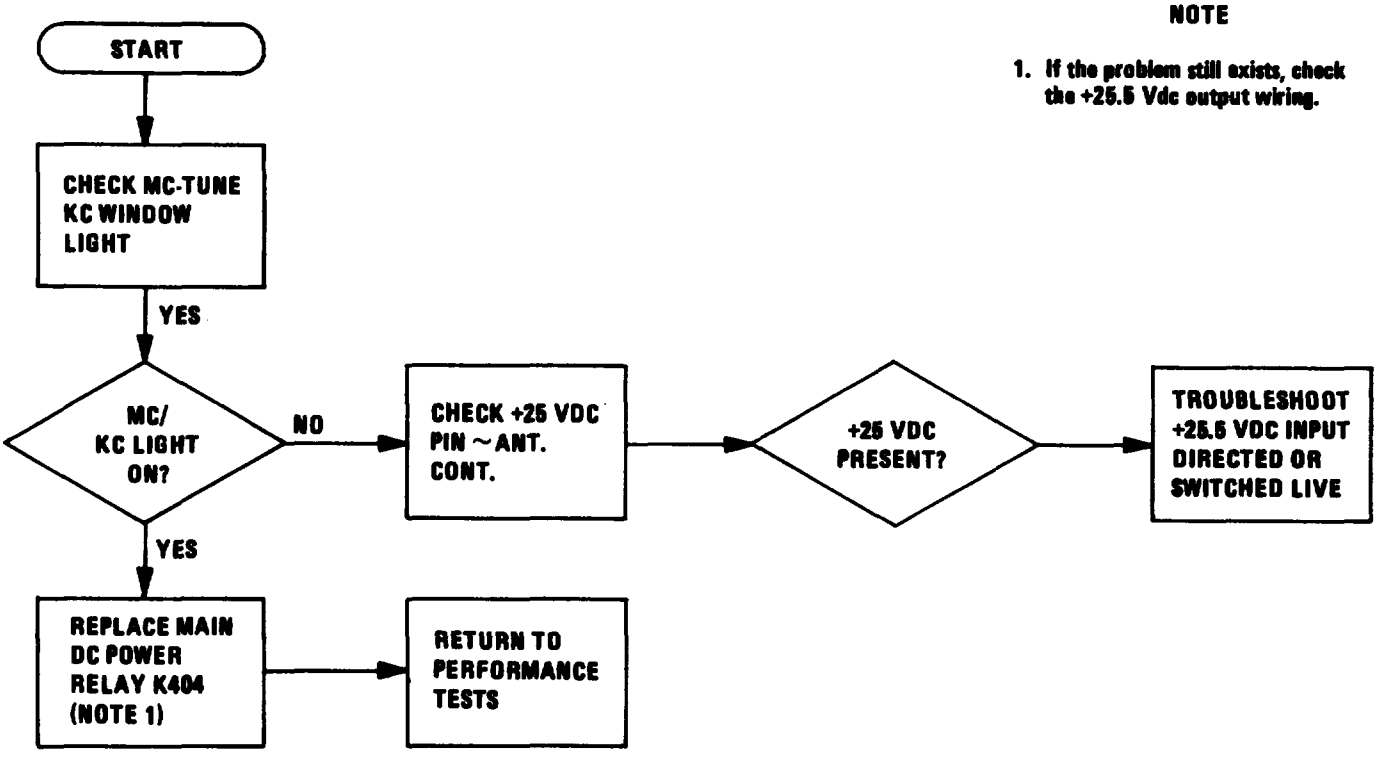
INTERPOLATION OSCILLATOR CRYSTAL CHART

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.

INTERPOLATION OSCILLATOR CRYSTAL CHART

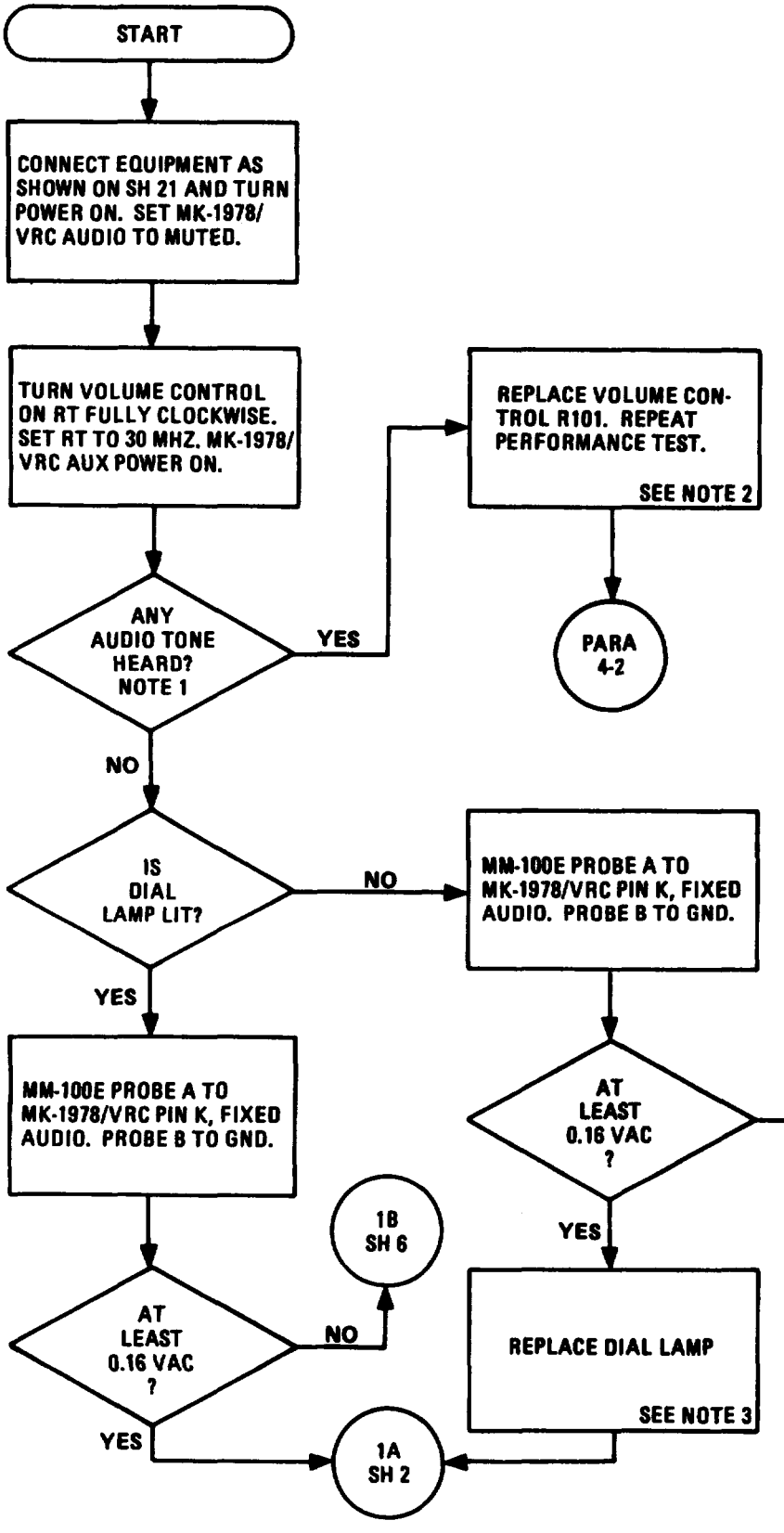
SEGMENT OF KC CONTROL WHERE AUDIO IS ABSENT	CAUSE	CORRECTION
05 and 10	Crystal Y2007	Replace A2000 assembly.
15 and 20	Crystal Y2008	Replace A2000 assembly.
25 and 30	Crystal Y2009	Replace A2000 assembly.
35 and 40	Crystal Y2010	Replace A2000 assembly.
45 and 50	Crystal Y2005	Replace A2000 assembly.
55 and 60	Crystal Y2004	Replace A2000 assembly.
65 and 70	Crystal Y2003	Replace A2000 assembly.
75 and 80	Crystal Y2002	Replace A2000 assembly.
85 and 90	Crystal Y2001	Replace A2000 assembly.
95 and 100	Crystal Y2006	Replace A2000 assembly.

+25 VOLT DC COMMON OUTPUT TROUBLESHOOTING CHART



4-24. TROUBLESHOOTING FLOW CHARTS.

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

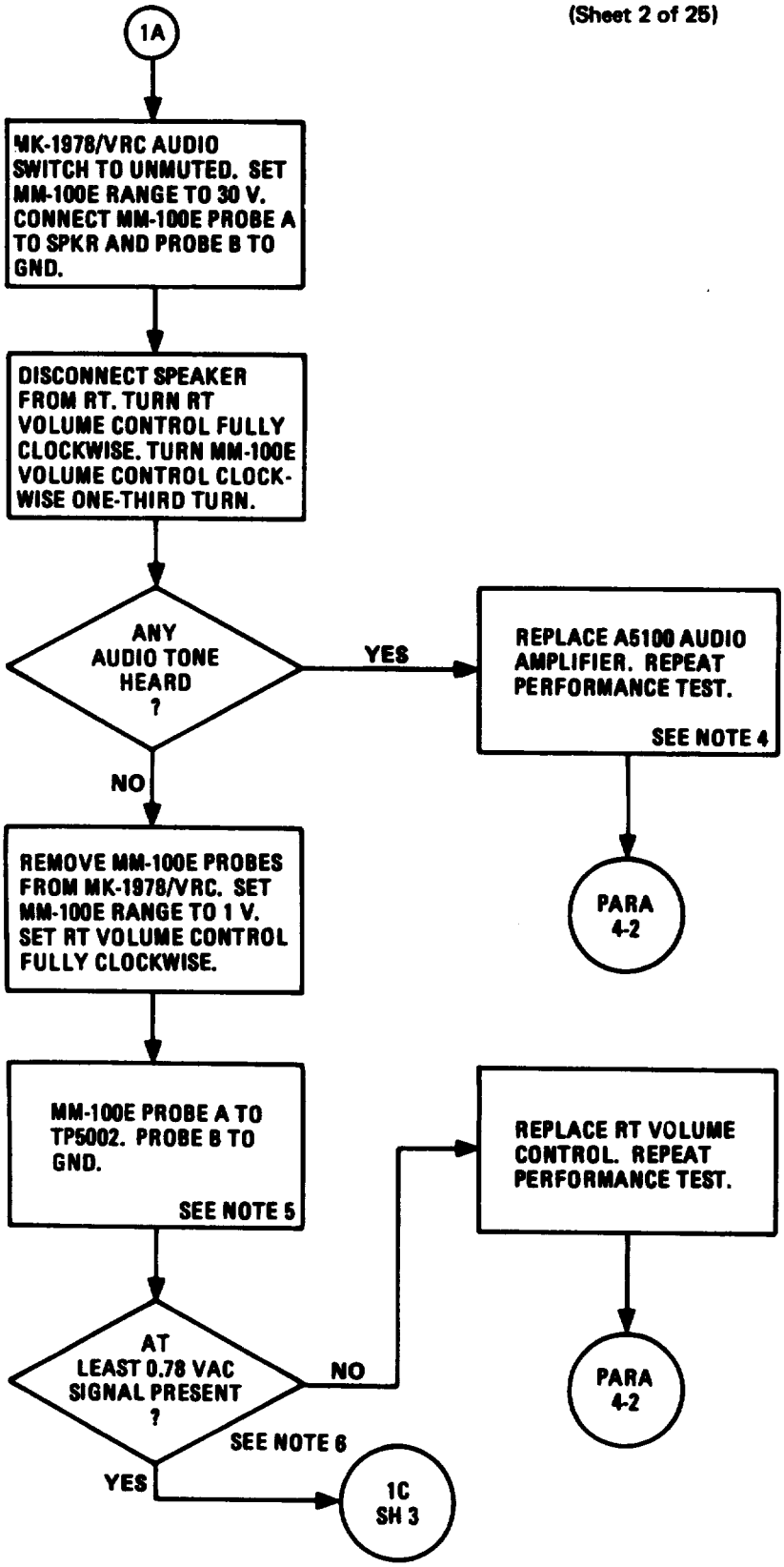


NOTES

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 amplifier is working, indicating a valid received audio from A4300. Therefore, 26.5 vdc power supply to prior stages and to lamp can be assumed ok.

4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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

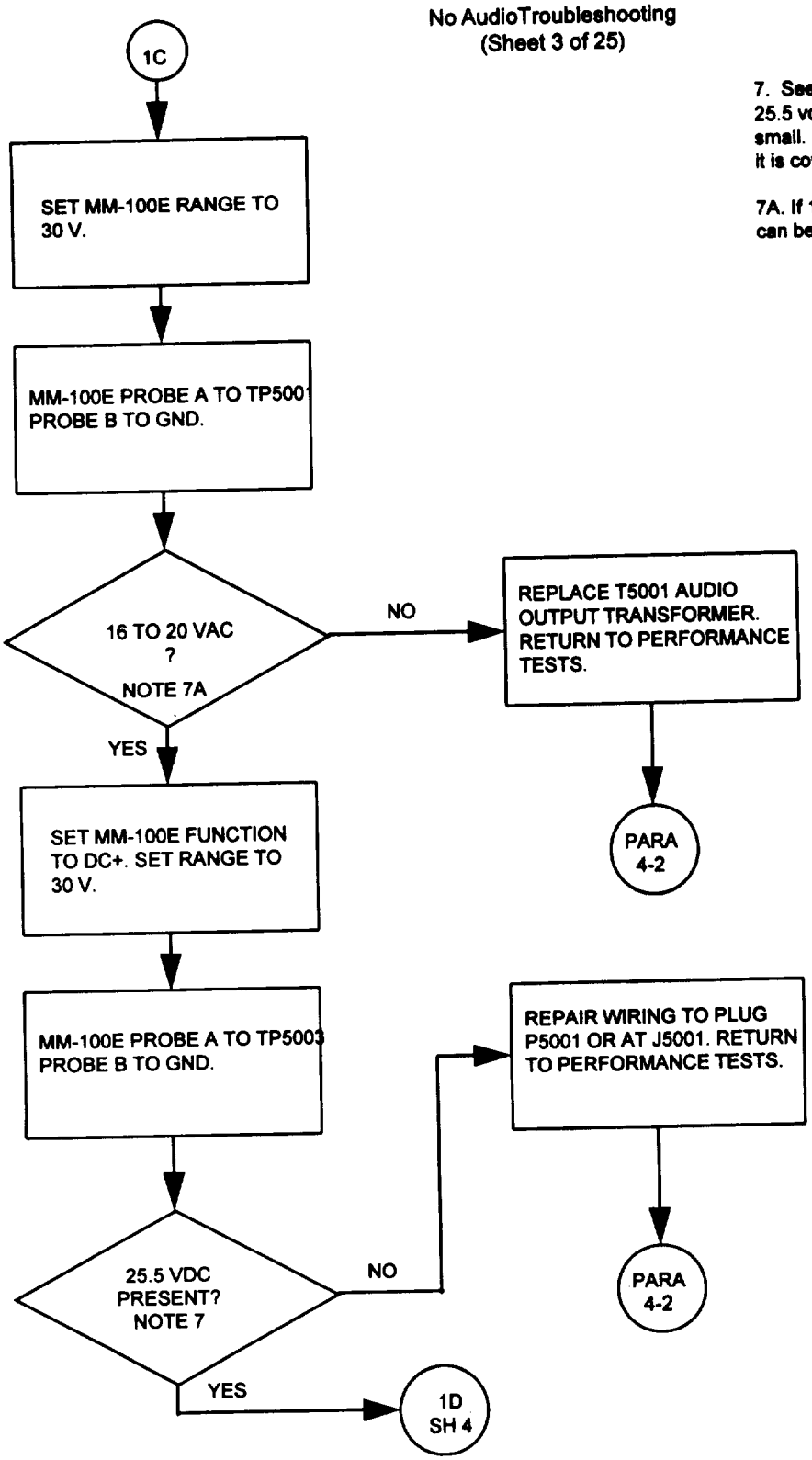


NOTES

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 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 volts.

4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



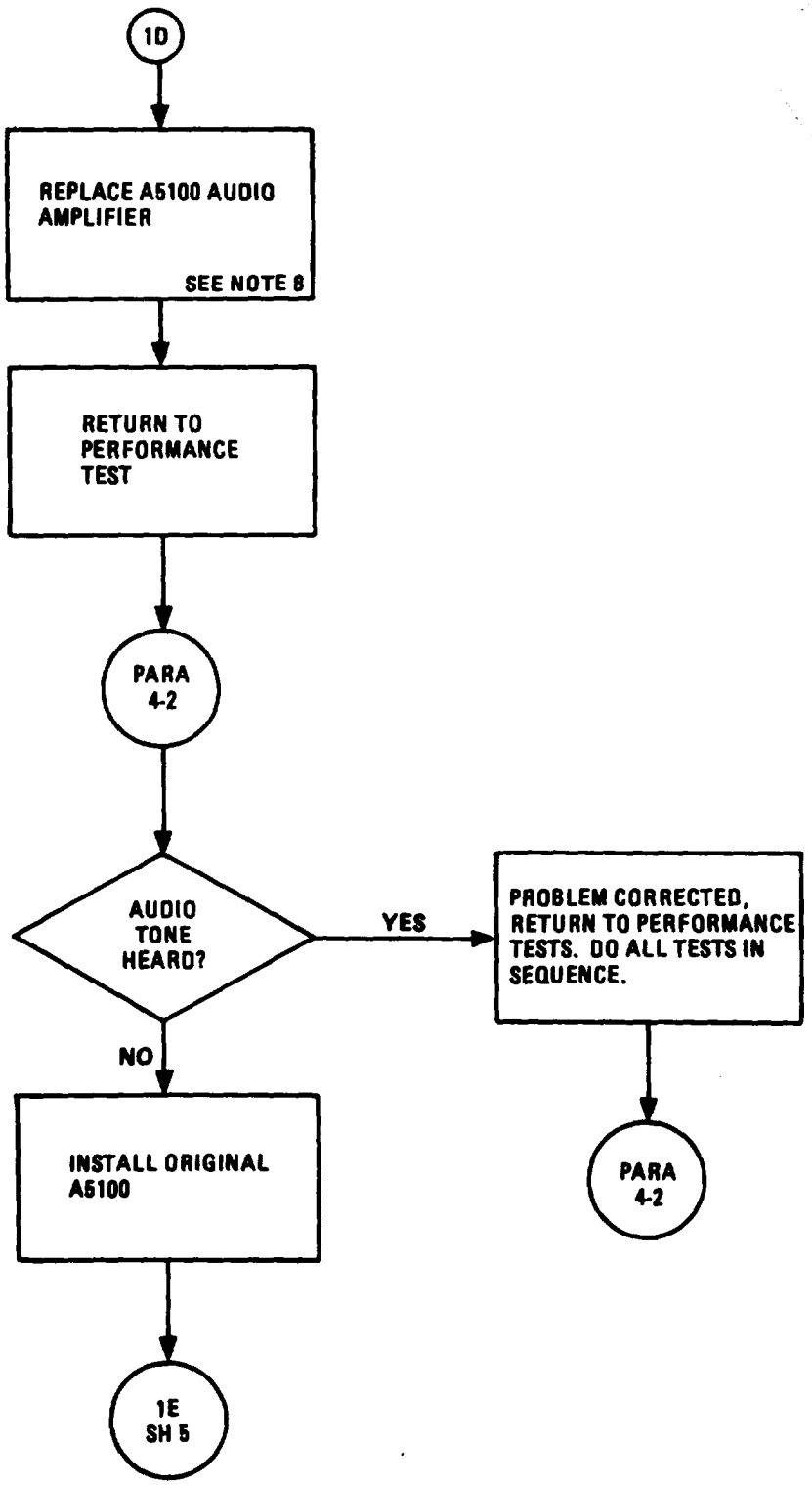
NOTE

7. See note 3, Sh 1. Possibility of failure of 25.5 vdc sullpy 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)

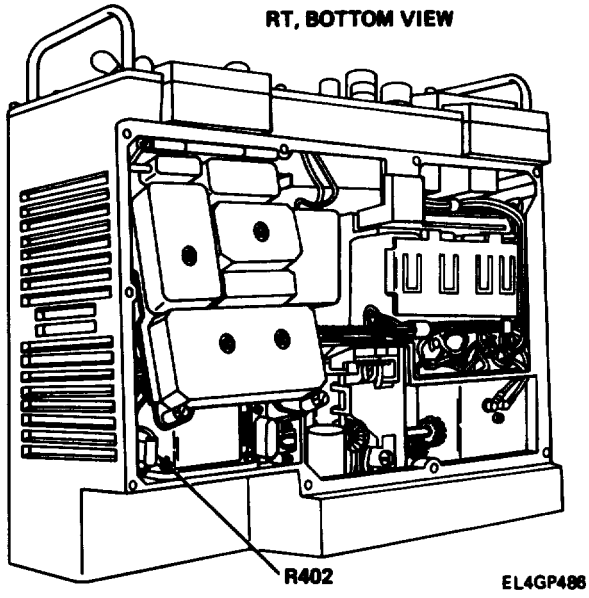


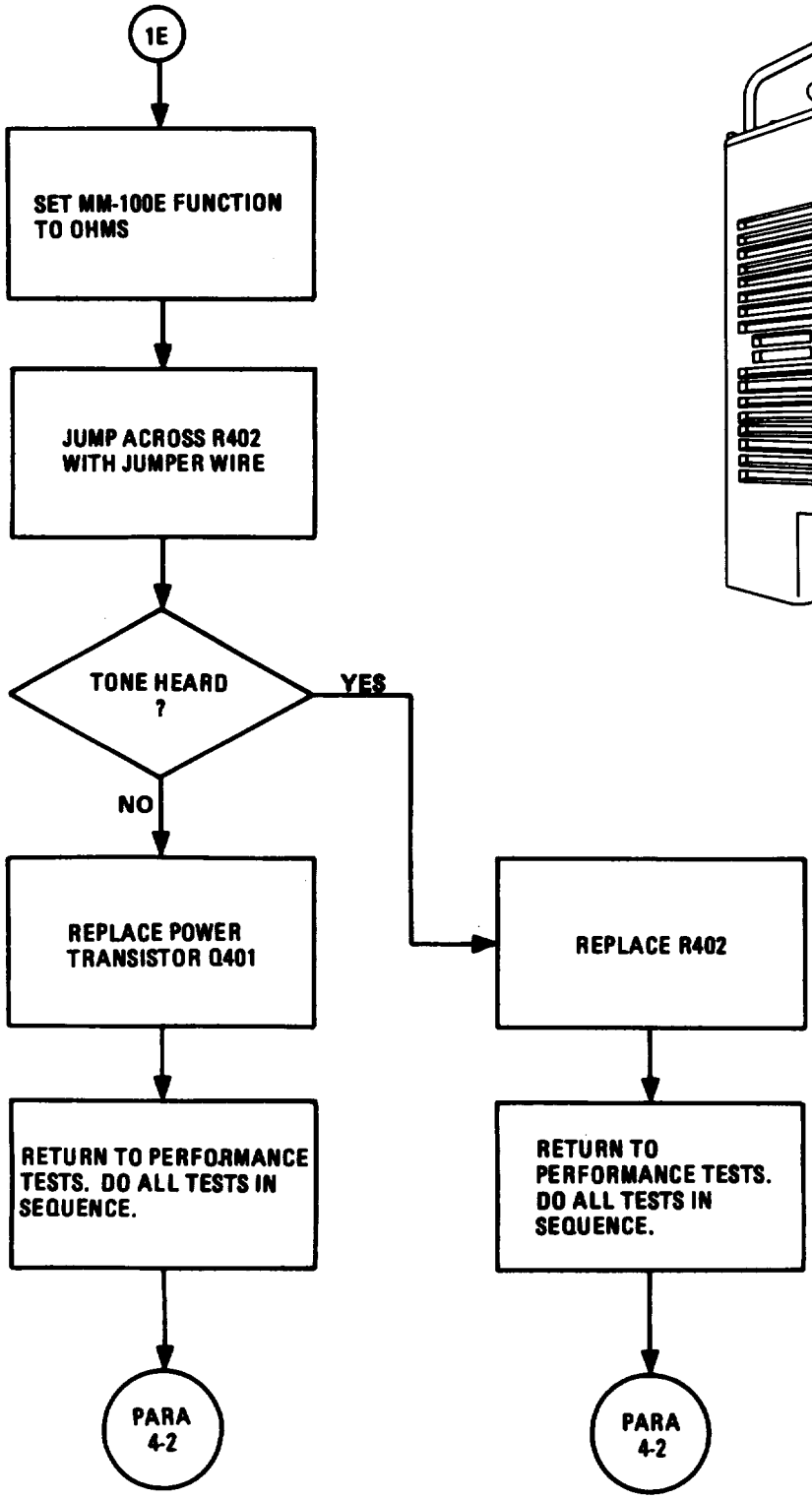
NOTE

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)

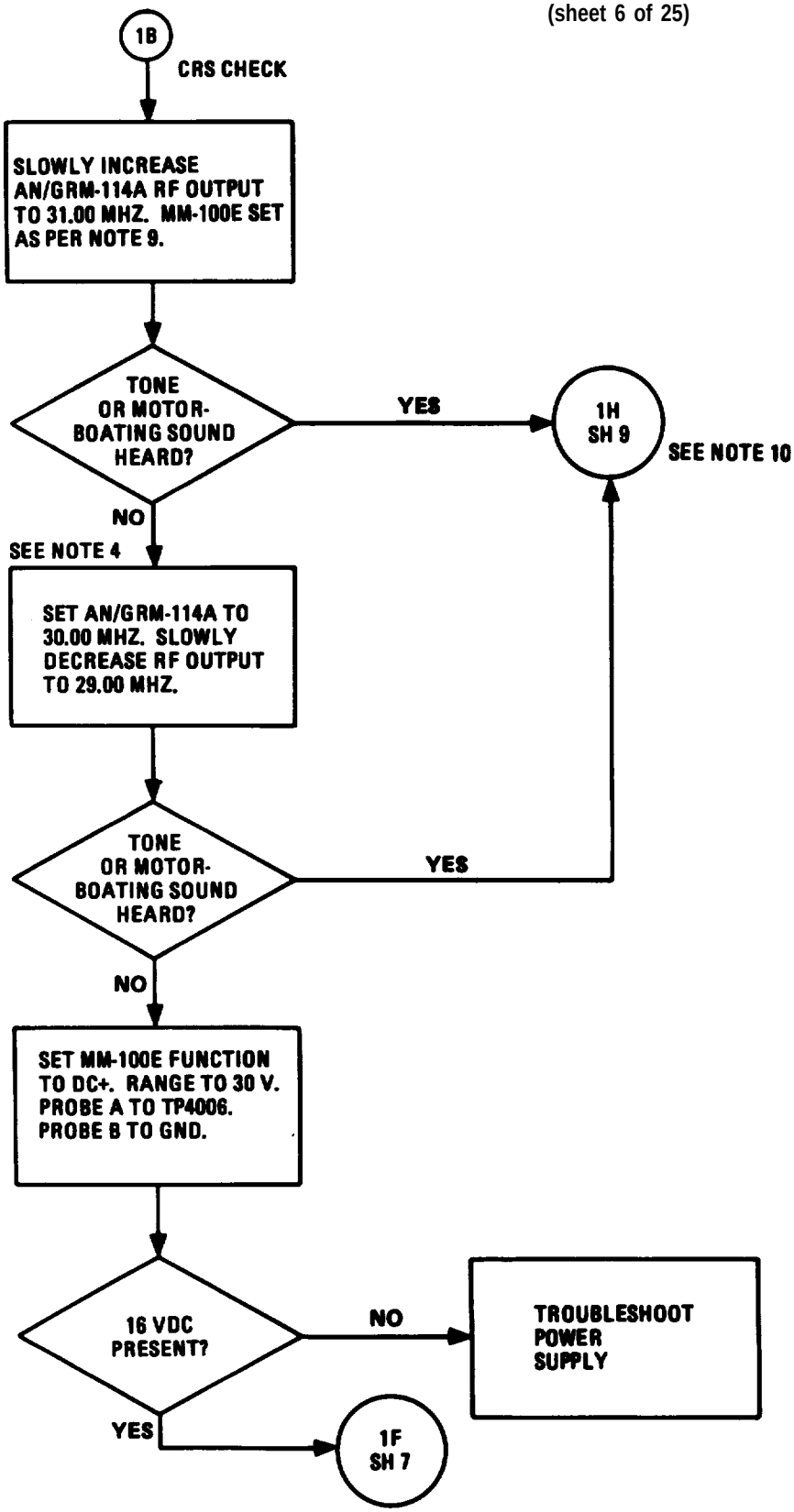
CHART 4-1
No Audio Troubleshooting
(Sheet 5 of 25)





4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



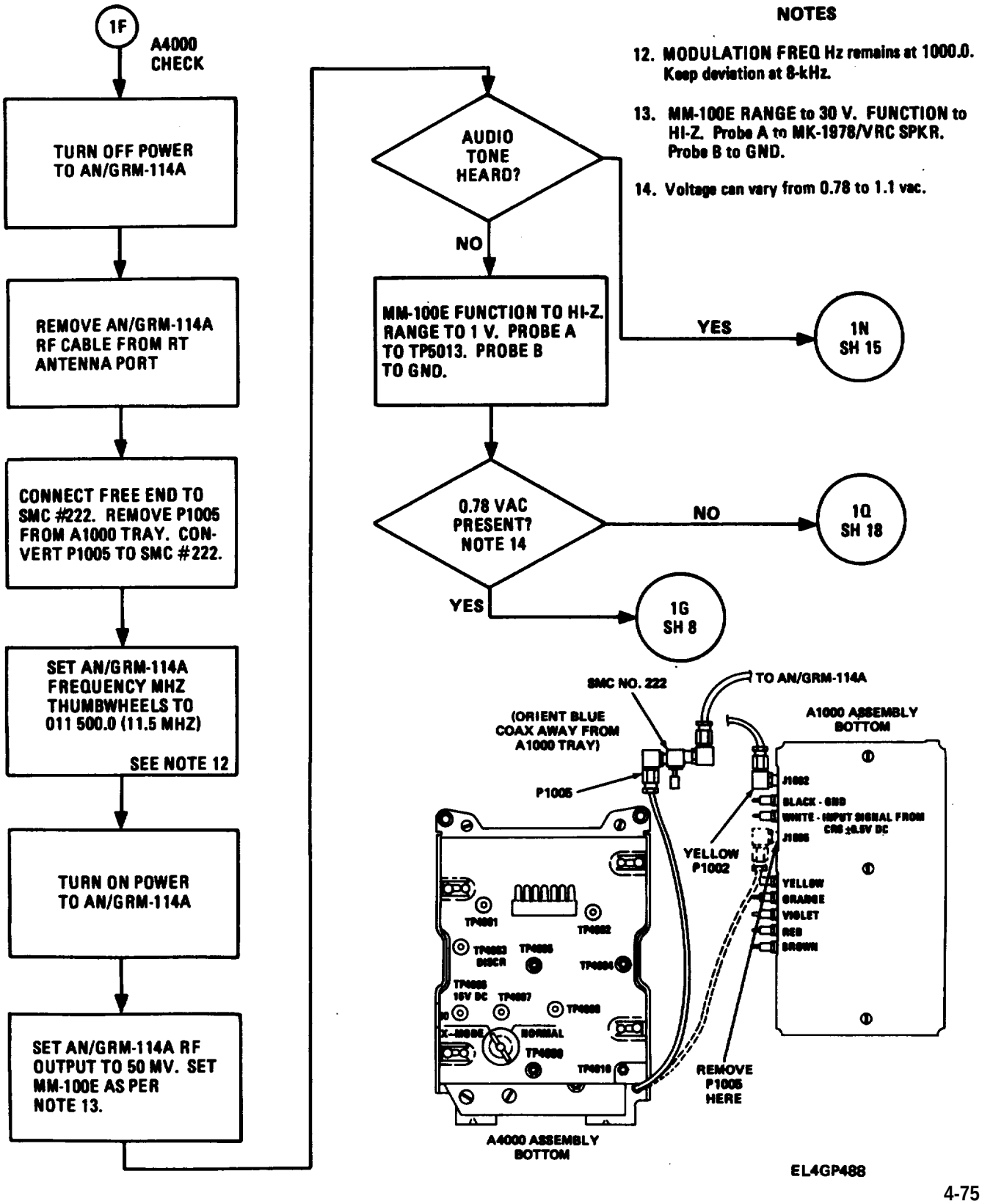
9. MM-100E FUNCTION to HI-Z, RANGE to 30 V. Probe A to MK-1978/VRC SPKR, Probe B to Ground.

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 (1H), Sh 9.

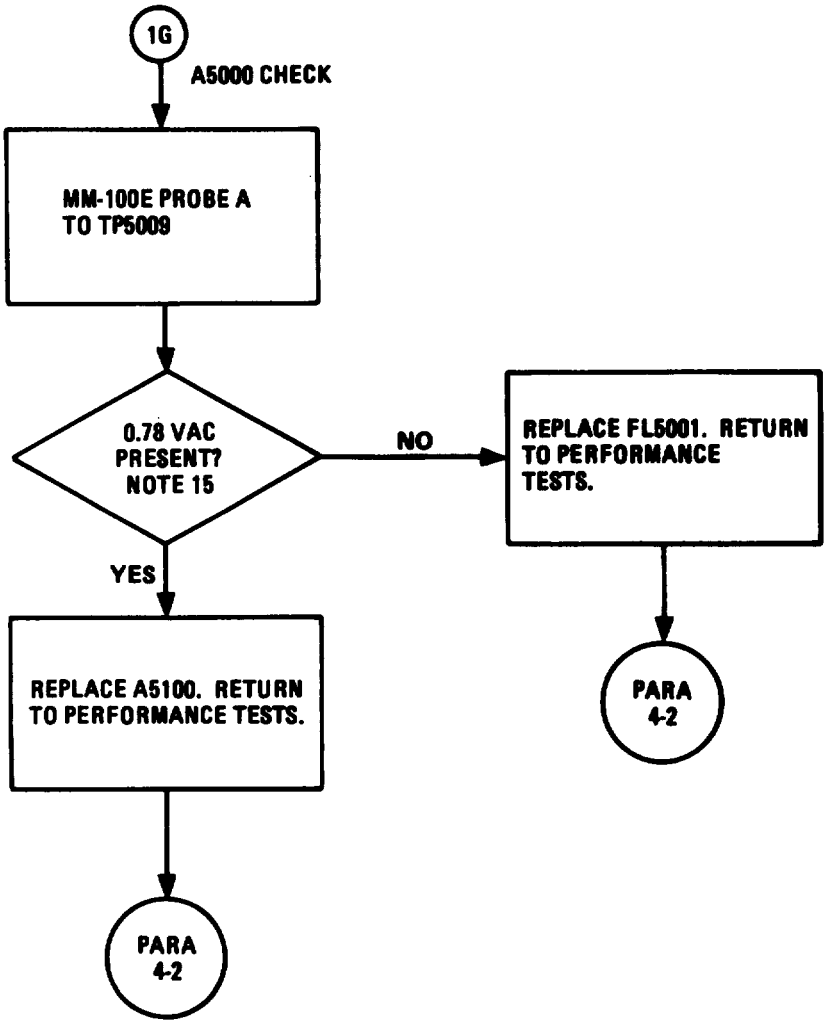
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



4-24. TROUBLESHOOTING FLOWCHARTS (CONT)

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

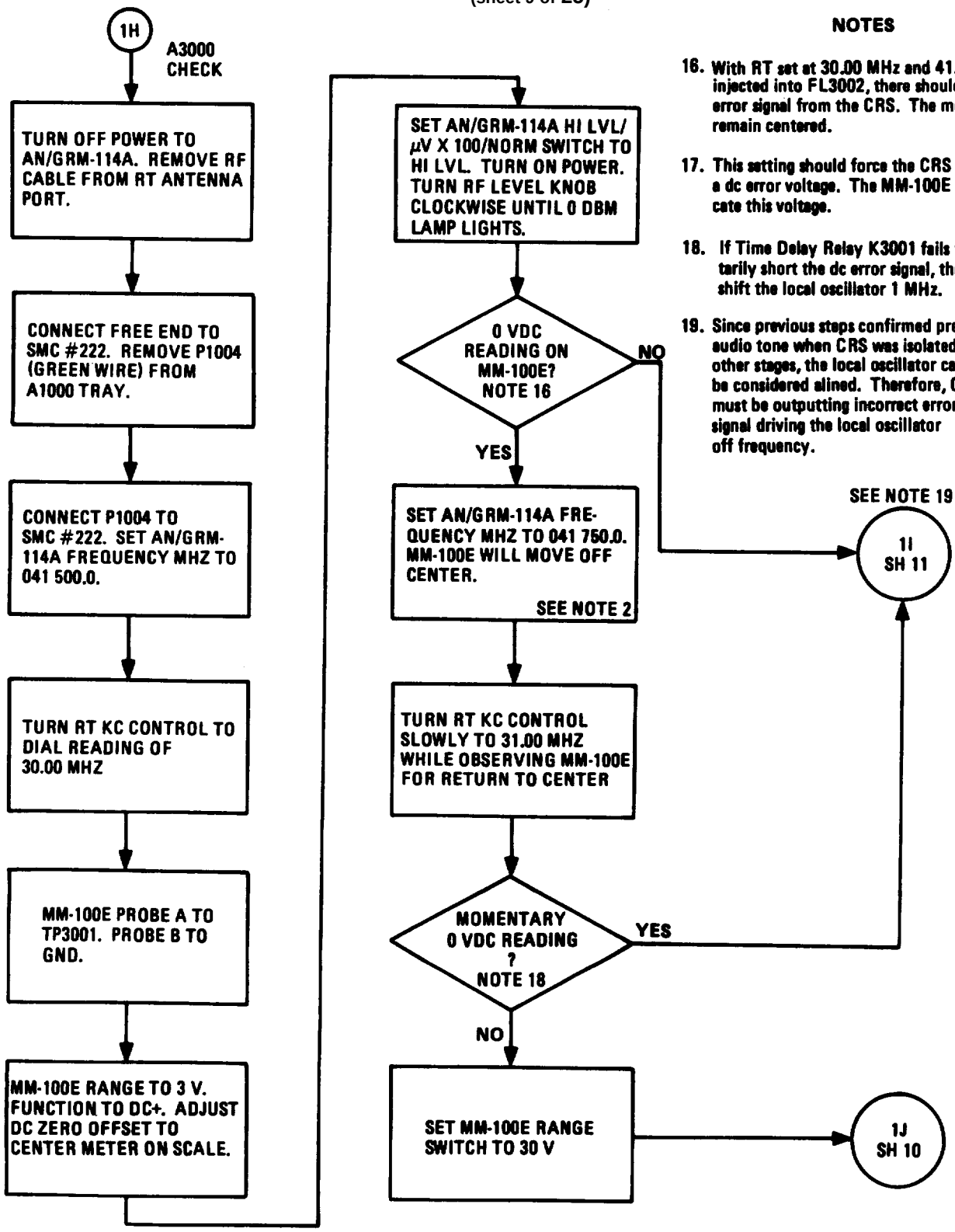


NOTE

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)

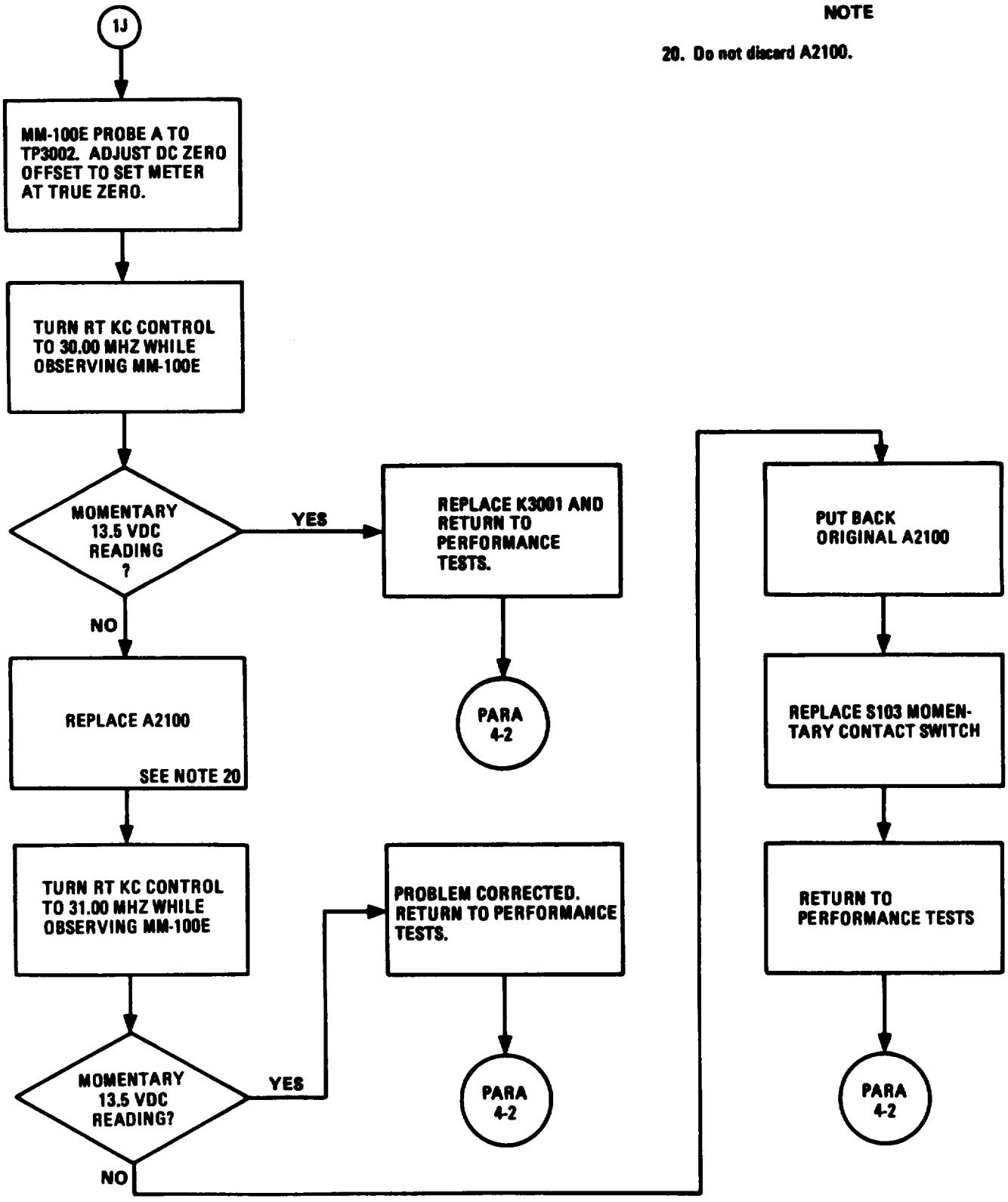


NOTES

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 alined. Therefore, CRS must be outputting incorrect error signal driving the local oscillator off frequency.

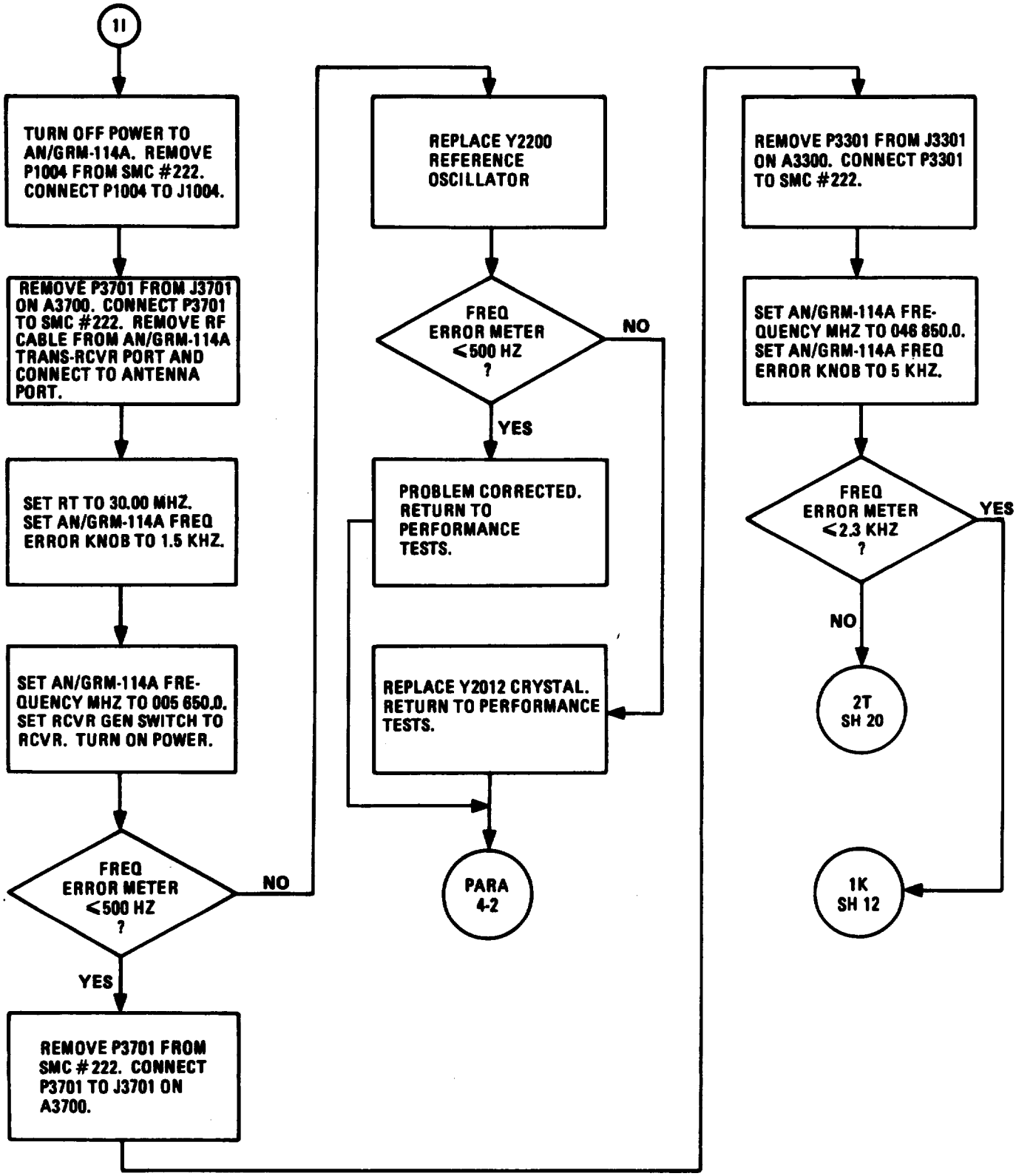
4-24. TROUBLESHOOTING Flowcharts (CONT)

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



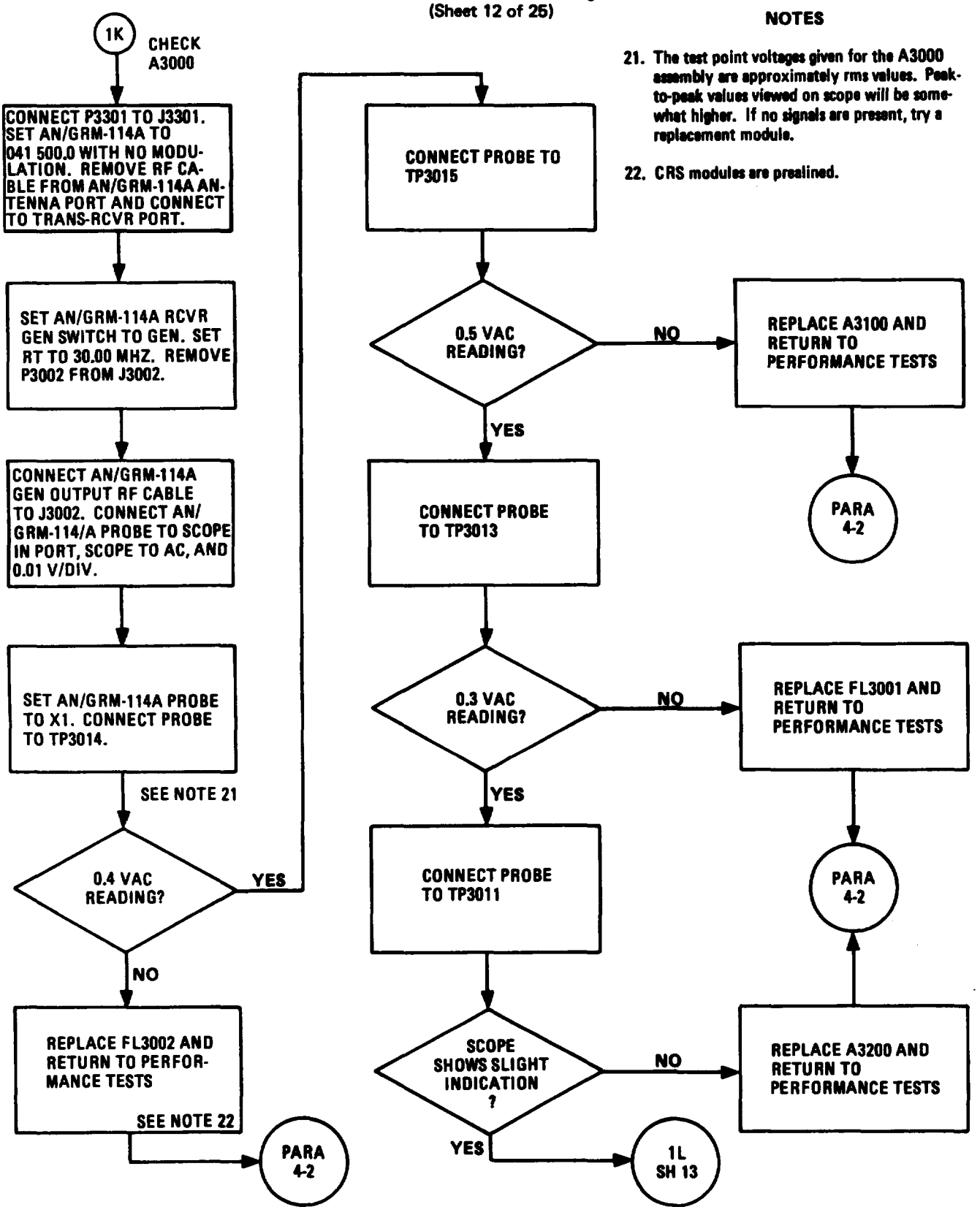
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



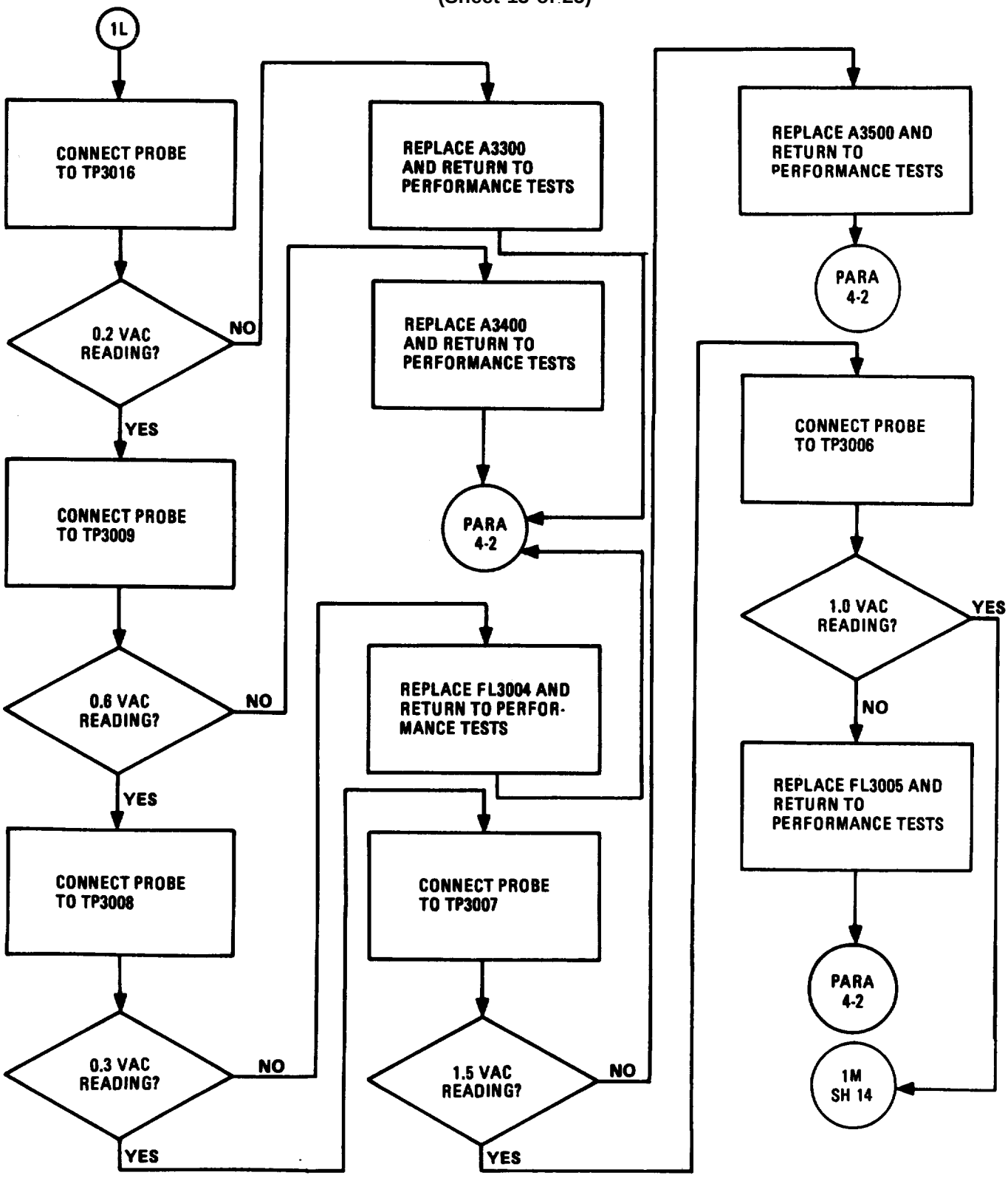
NOTES

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

22. CRS modules are prealined.

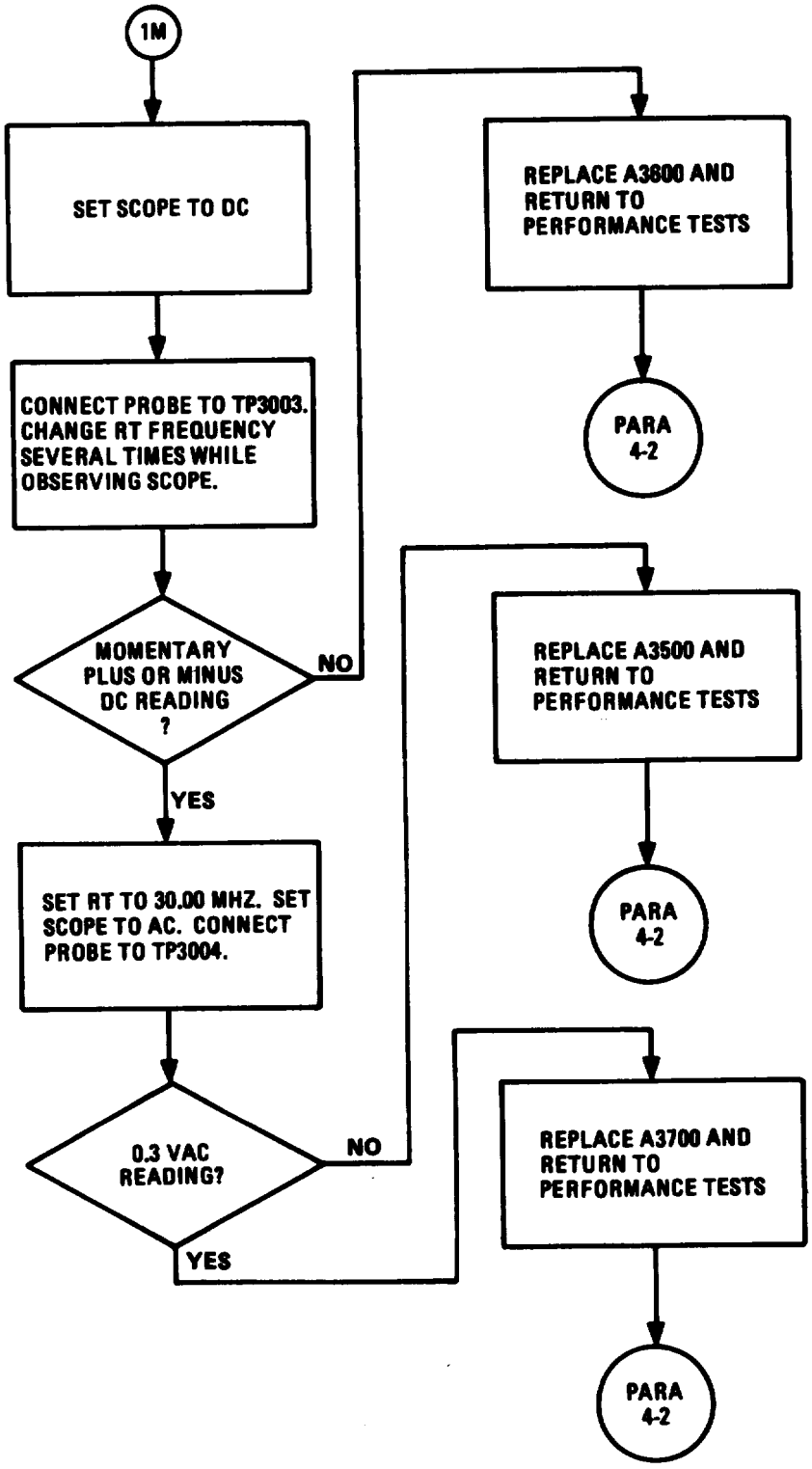
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



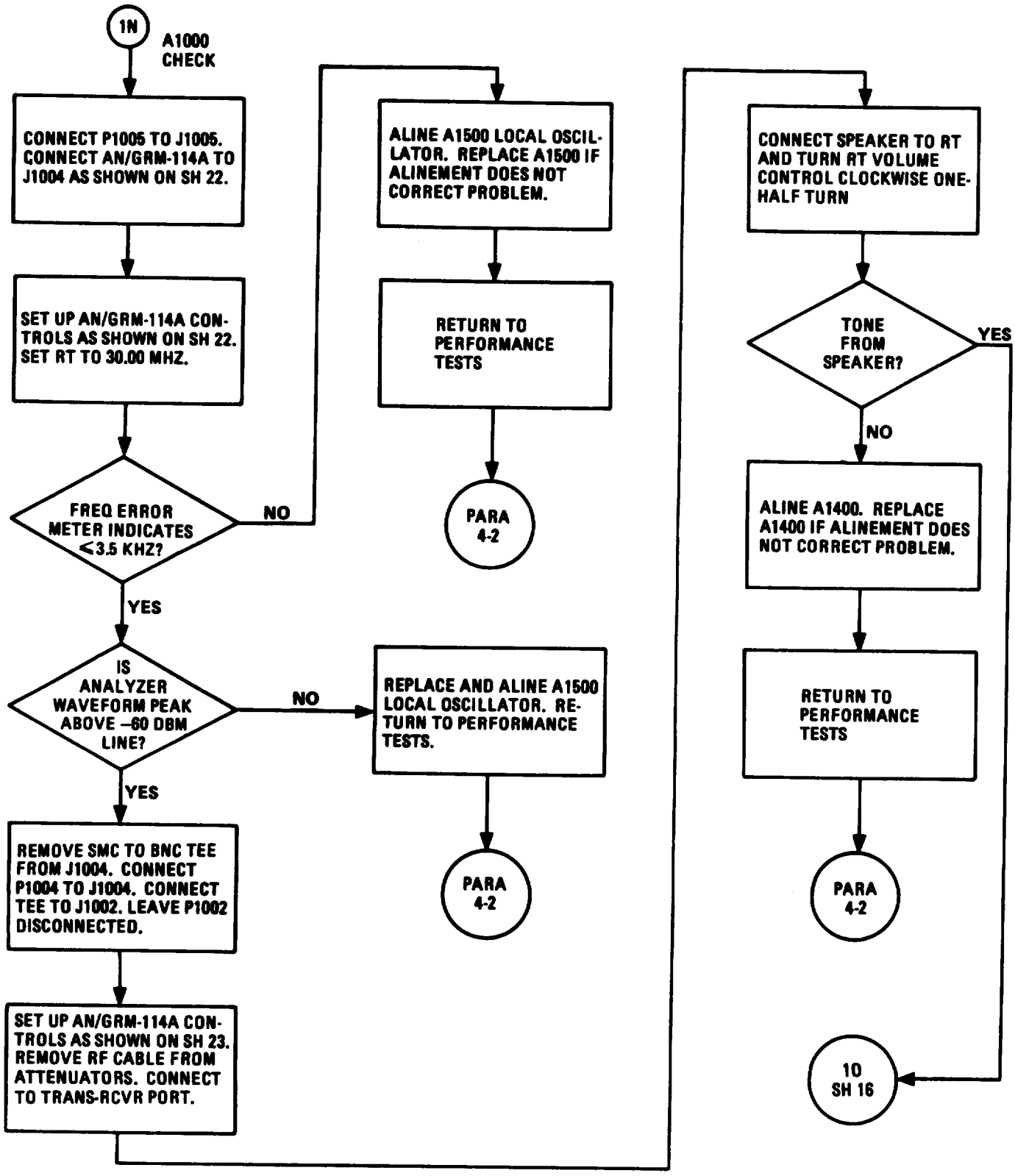
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



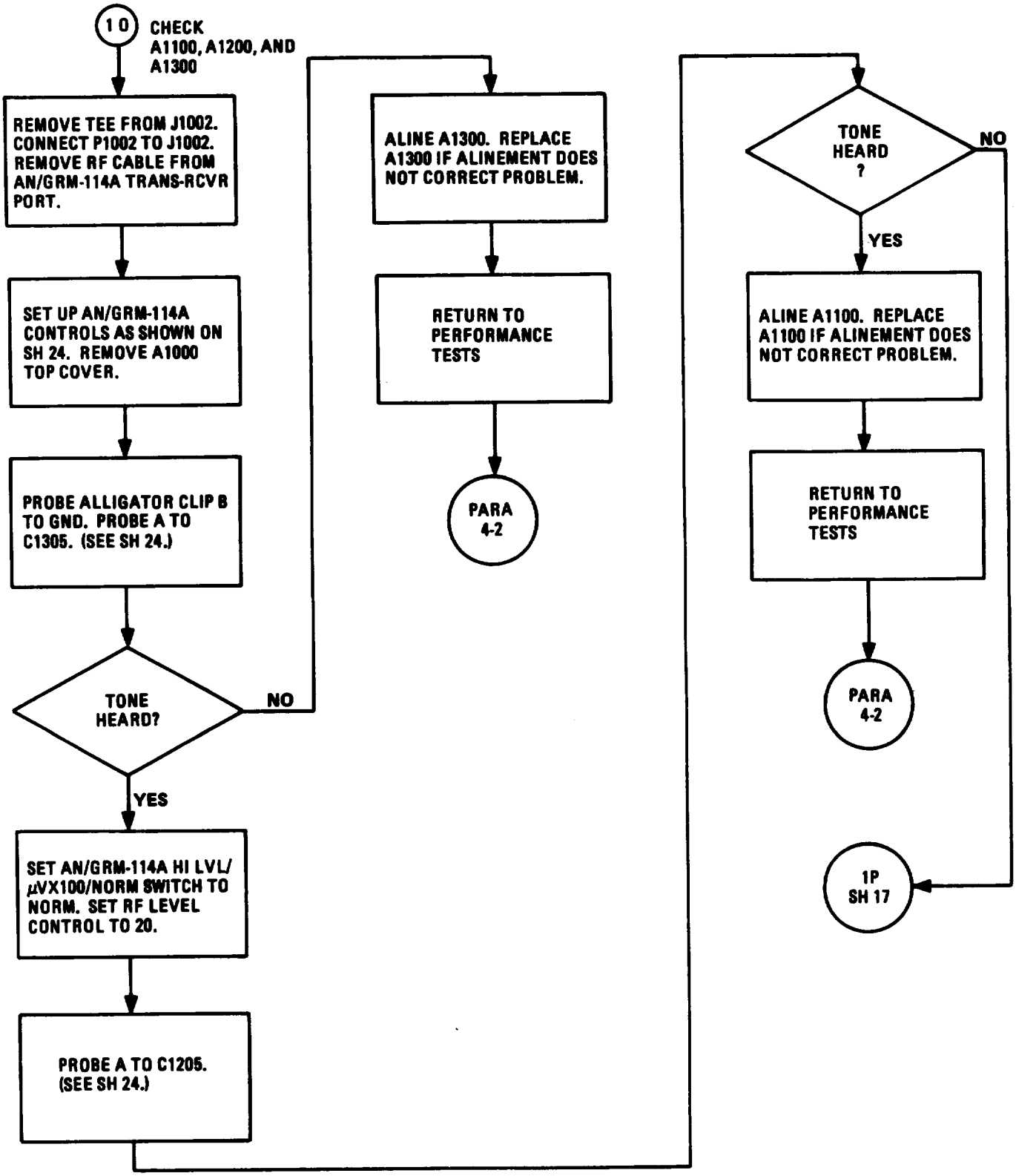
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



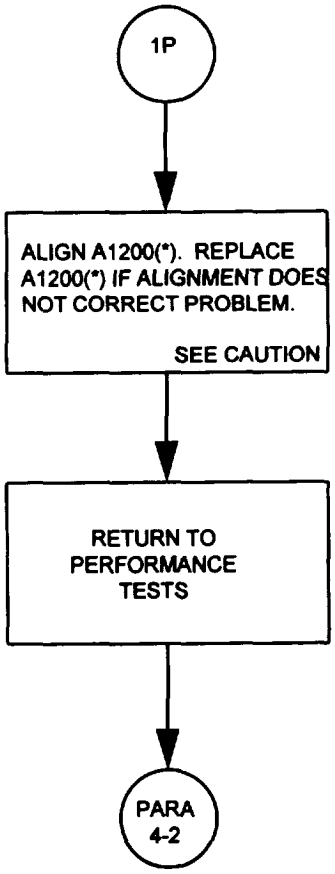
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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

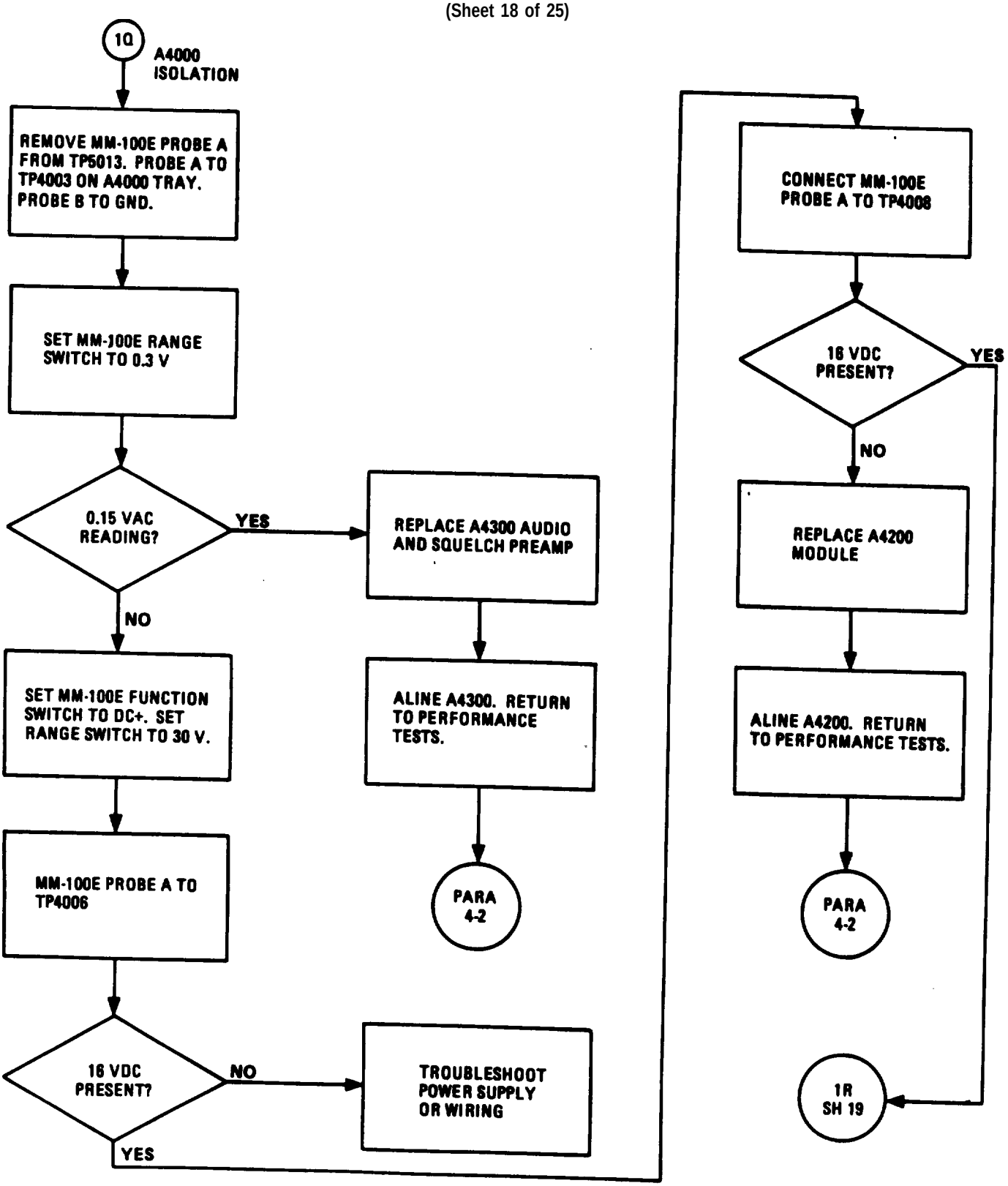


CAUTION

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

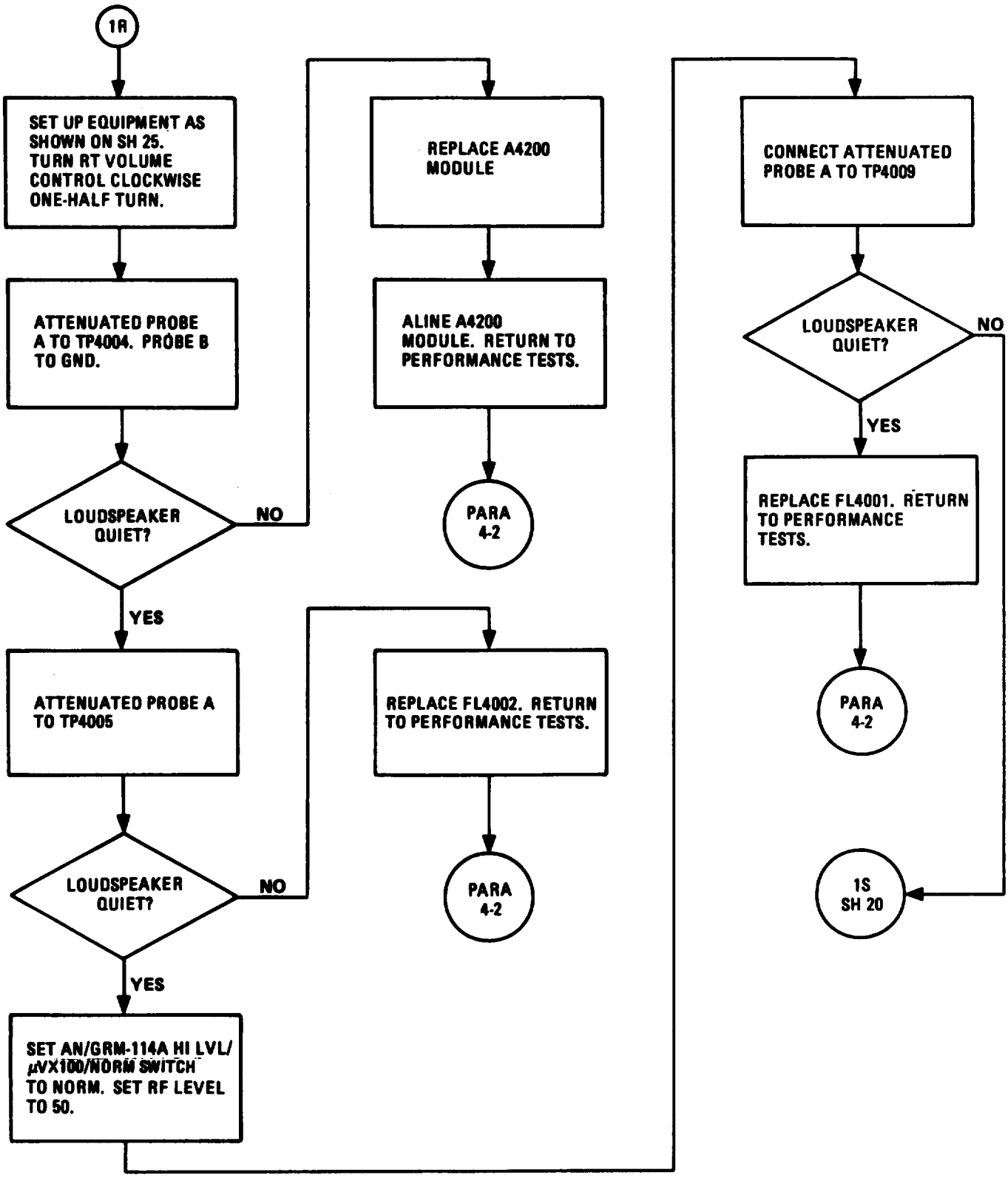
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



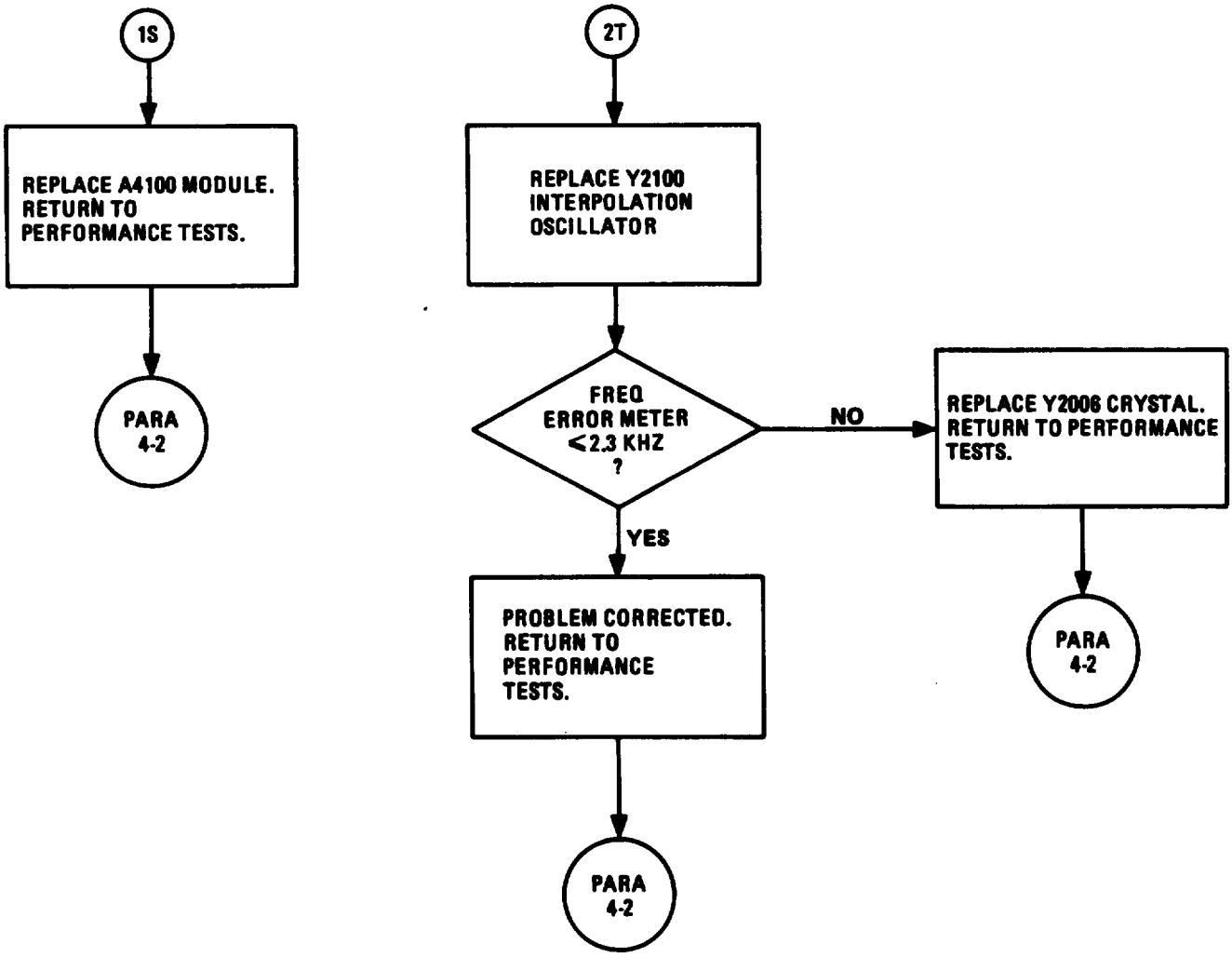
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



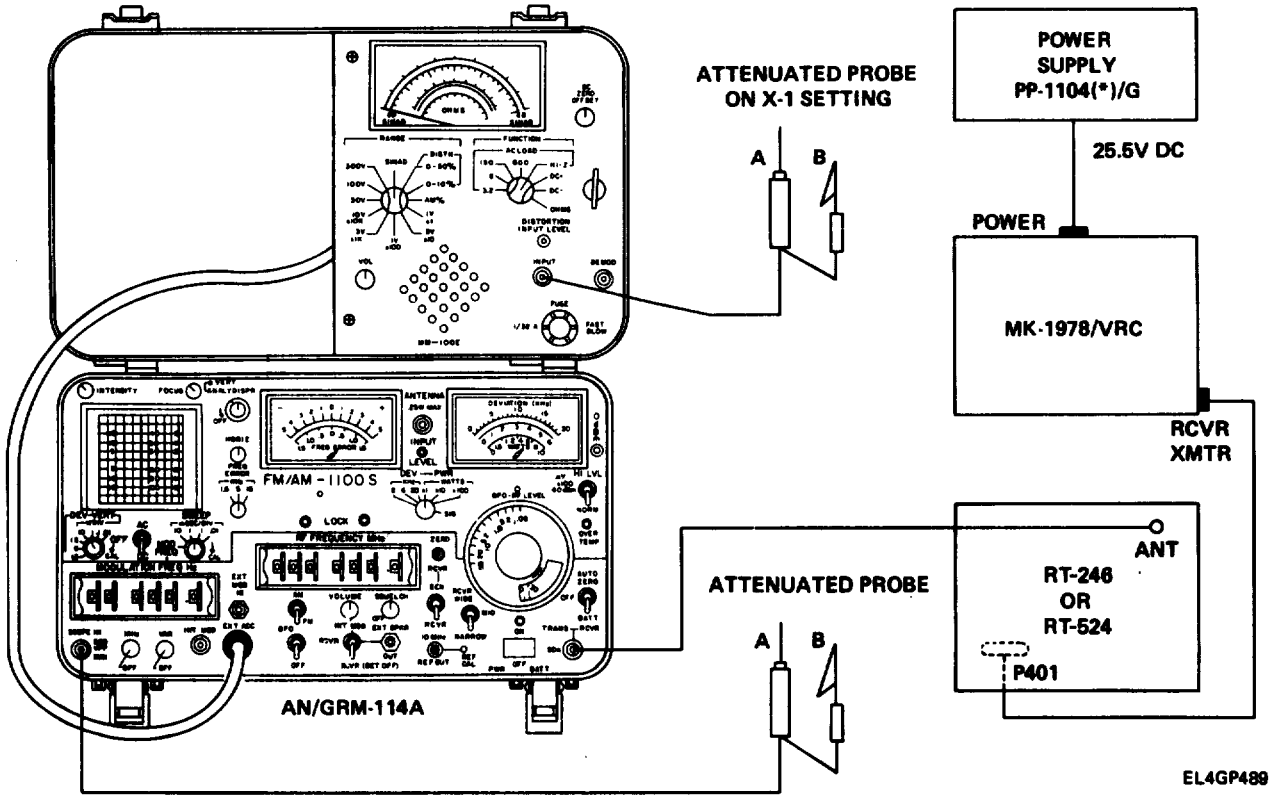
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

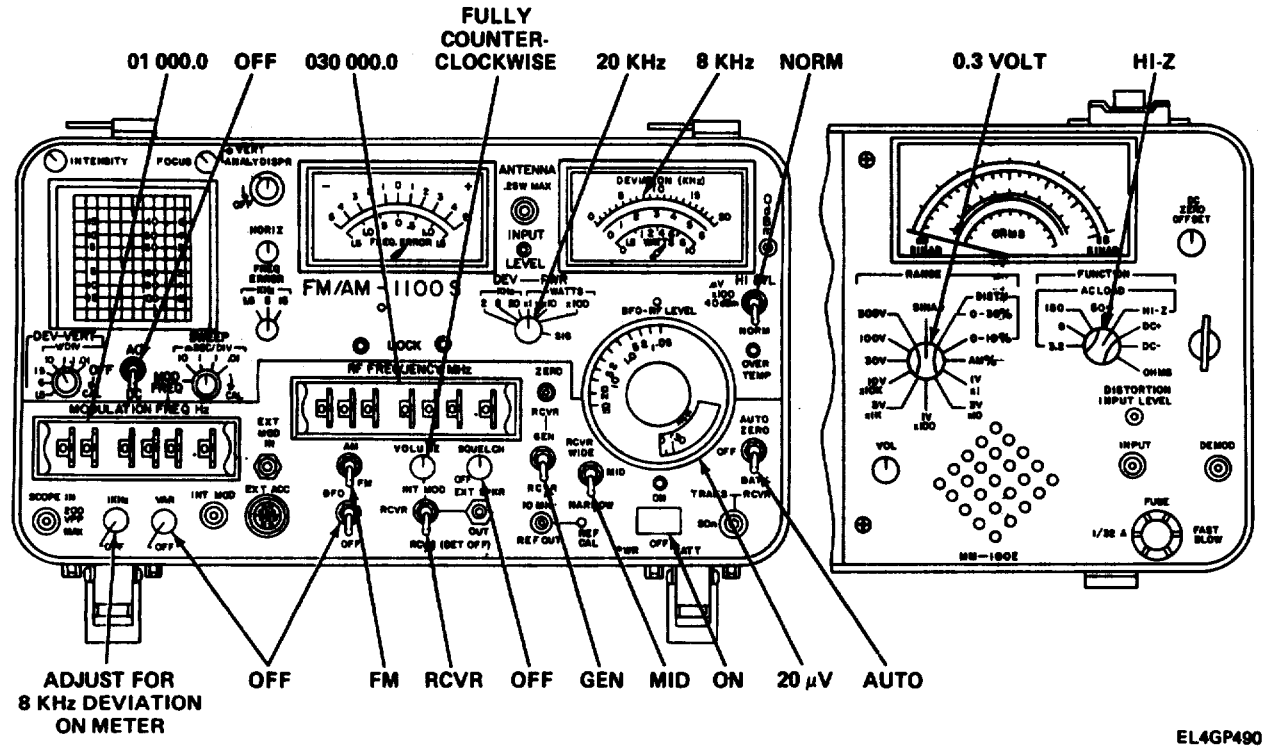
CHART 4-1
No Audio Troubleshooting
(Sheet 20 of 25)



4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

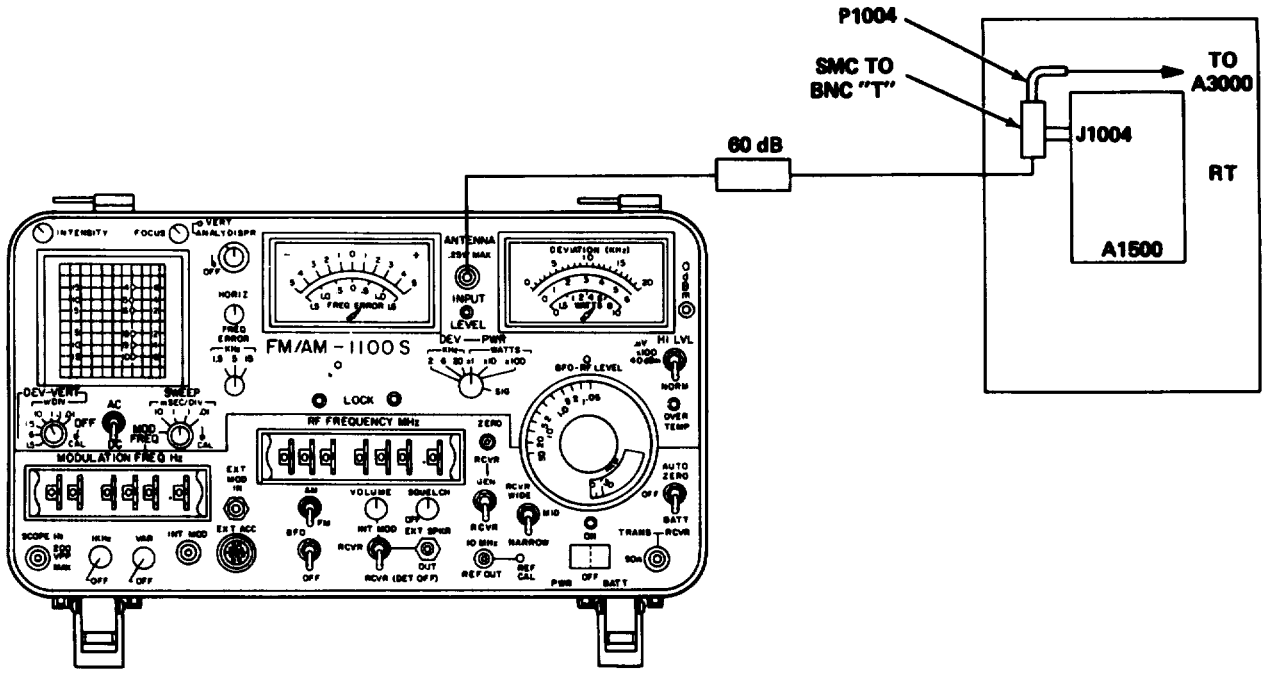
CHART 4-1
No Audio Troubleshooting
(Sheet 21 of 25)



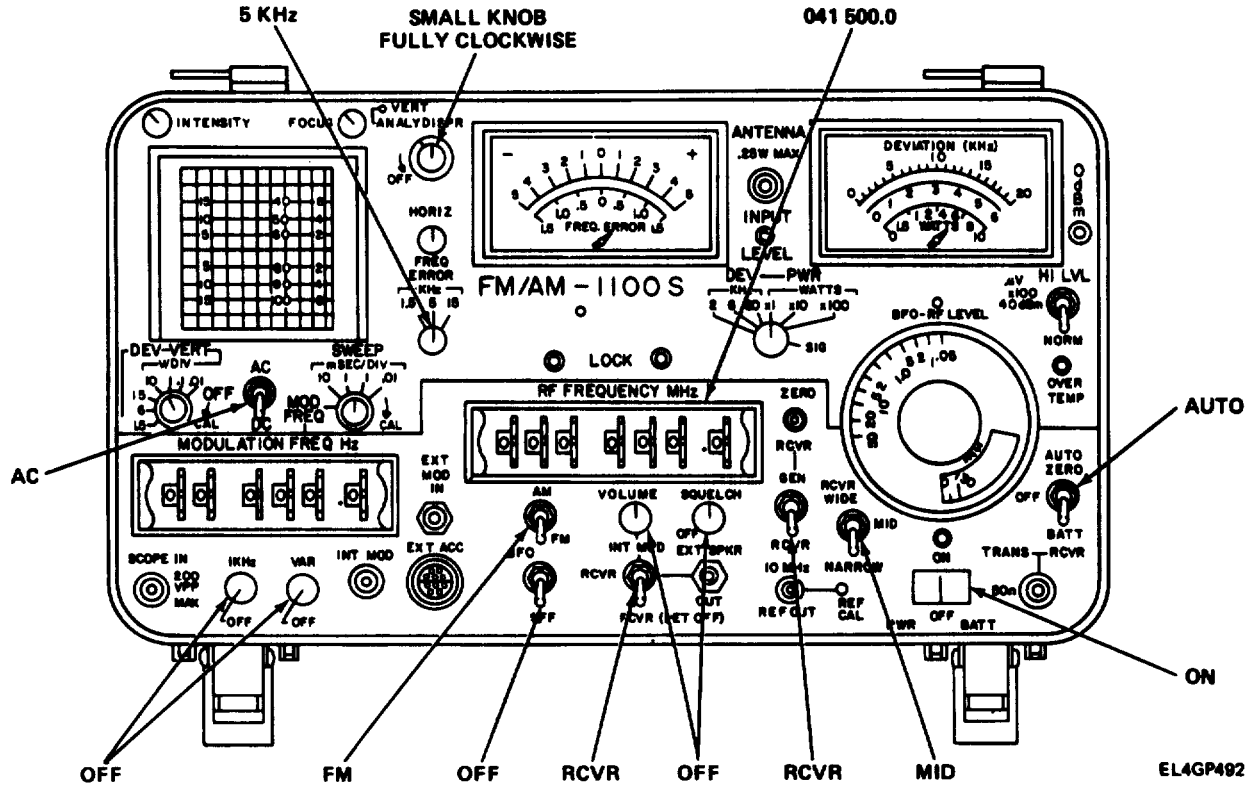


4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-1
No Audio Troubleshooting
(Sheet 22 of 25)



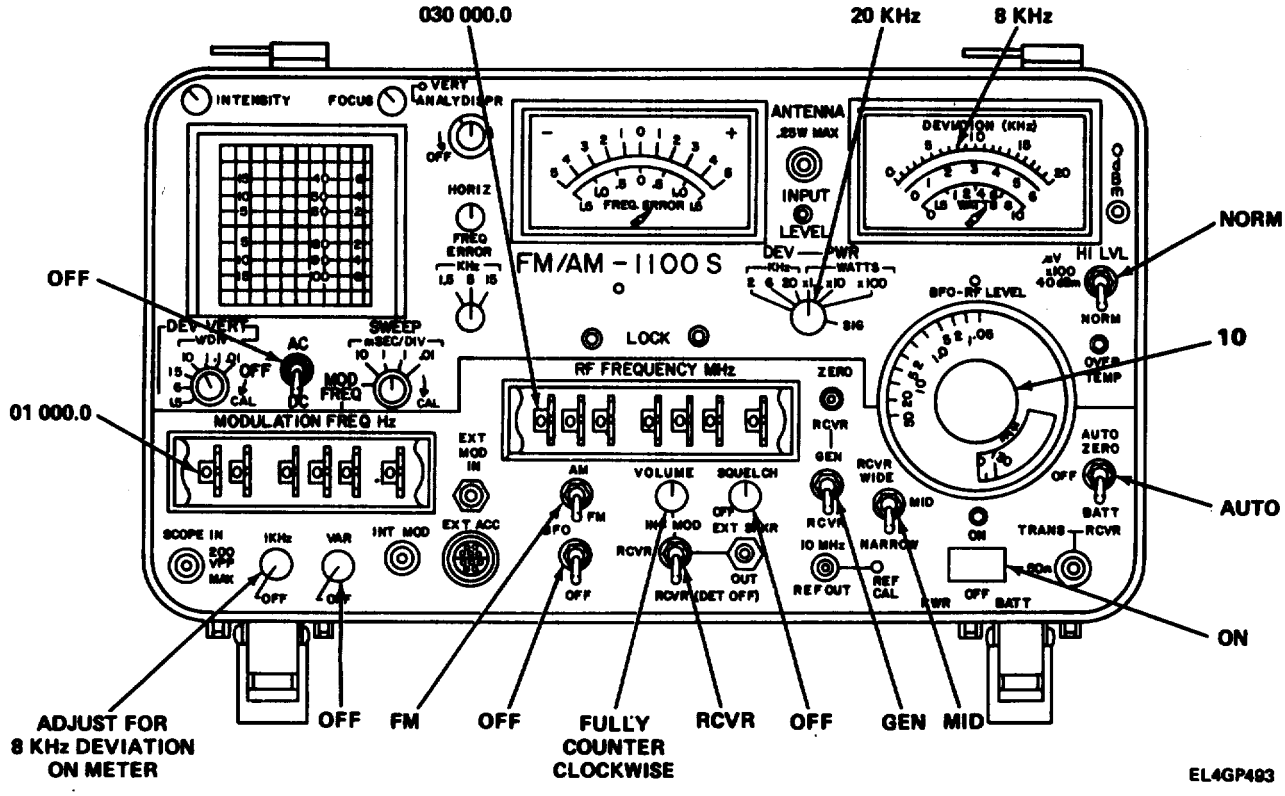
EL4GP491



EL4GP492

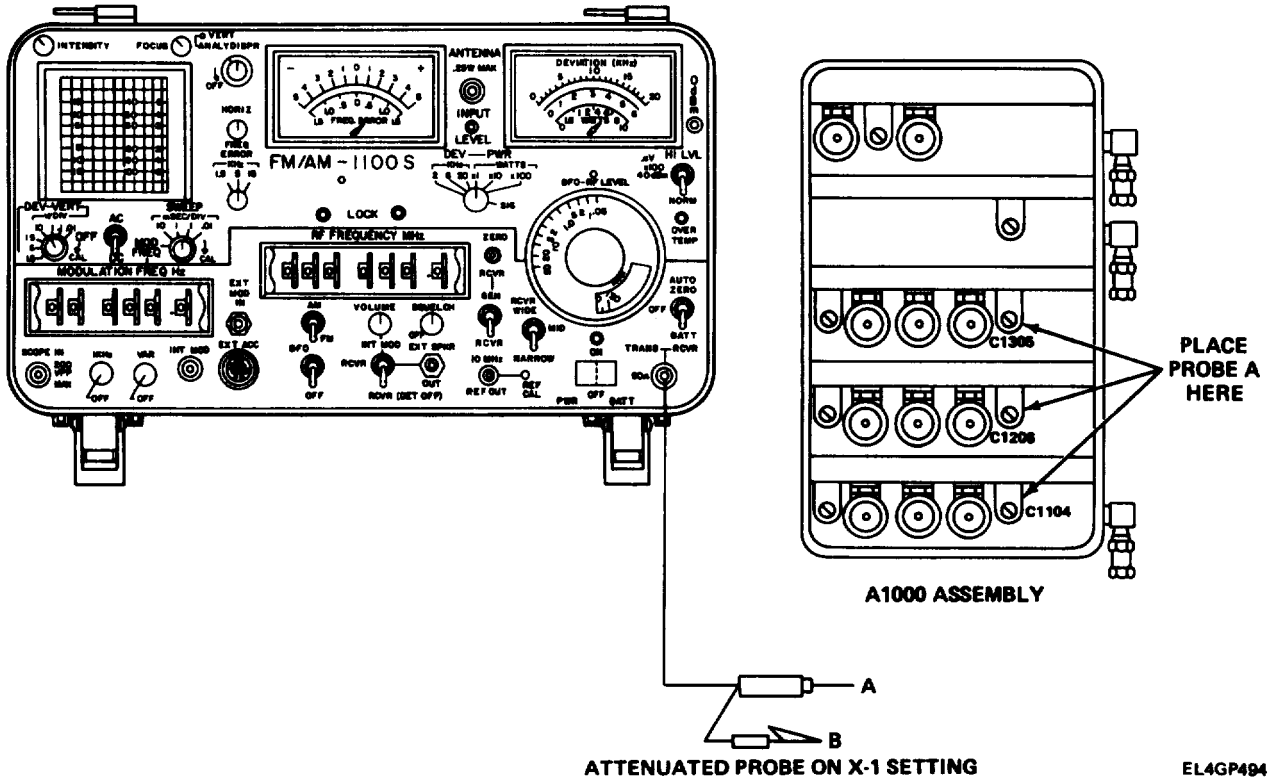
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

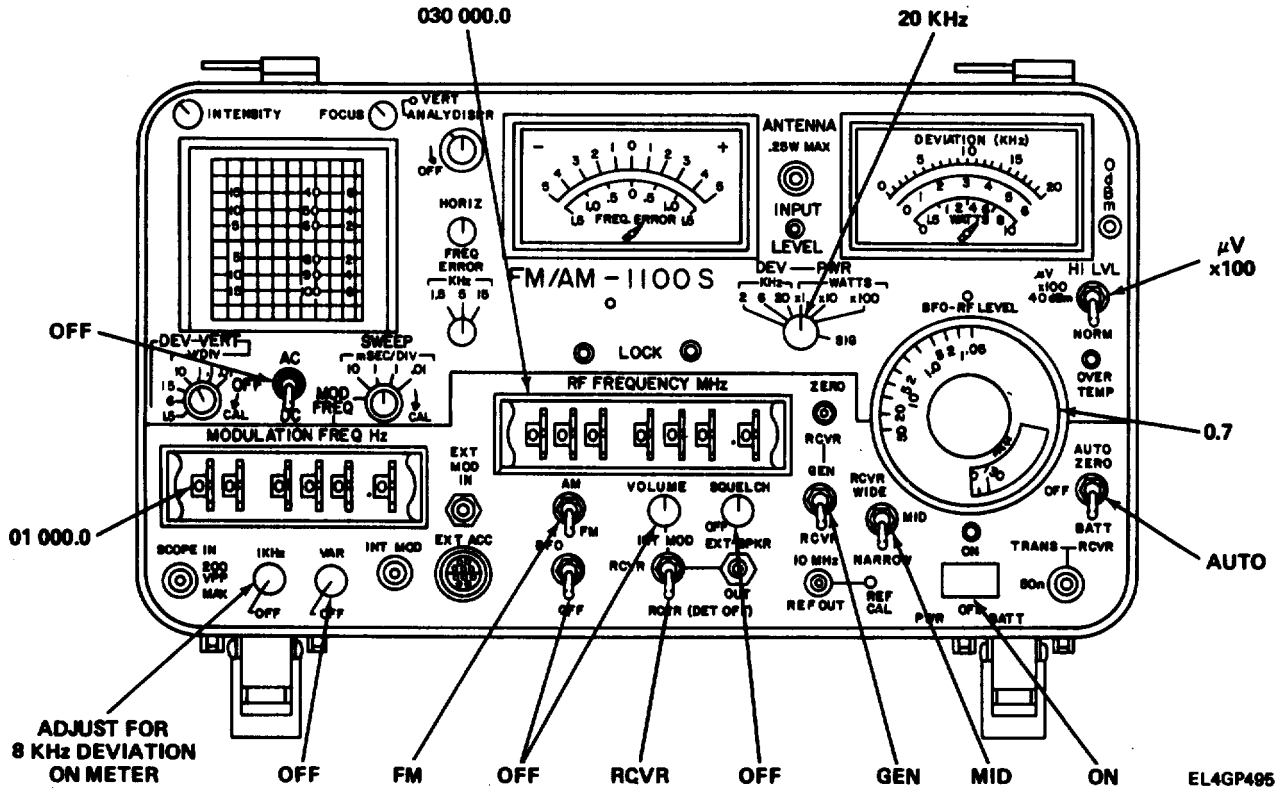
CHART 4-1
No Audio Troubleshooting
(Sheet 23 of 25)



4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-1
No Audio Troubleshooting
(Sheet 24 of 25)



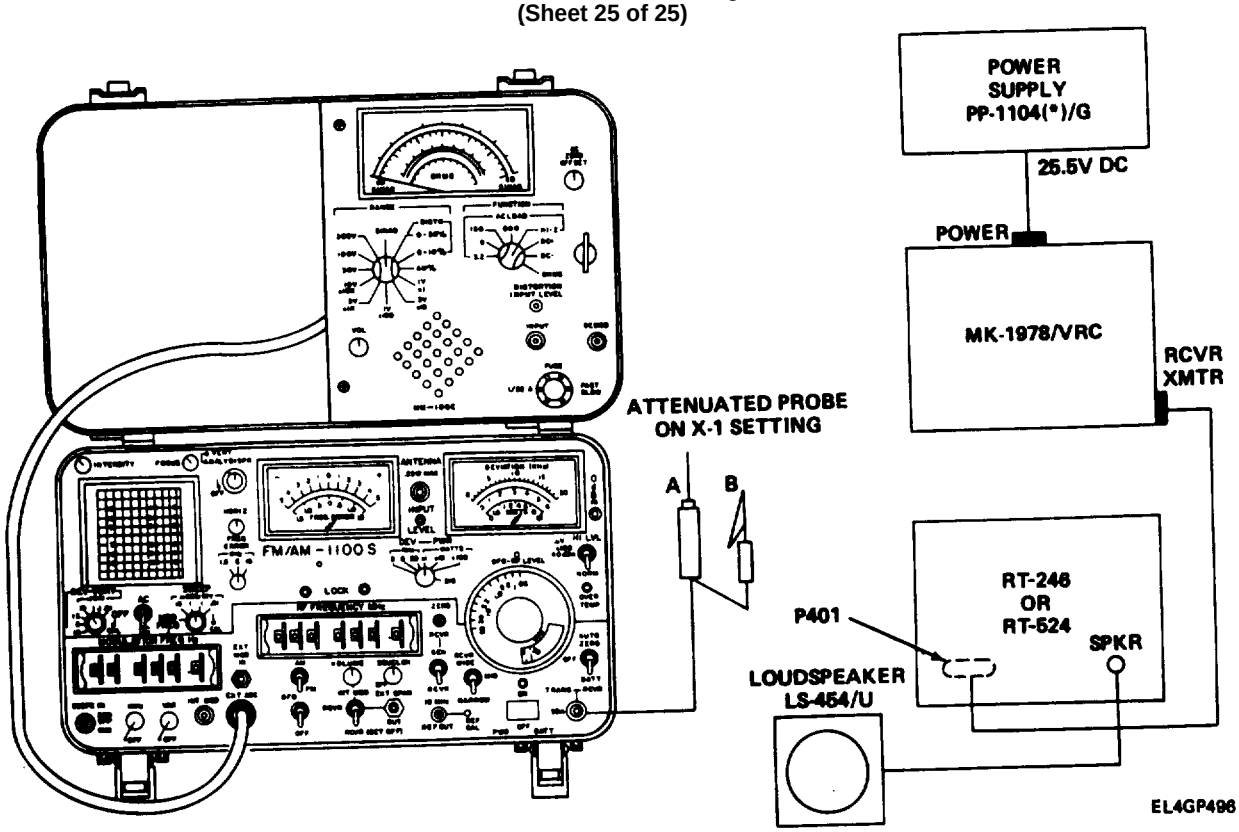


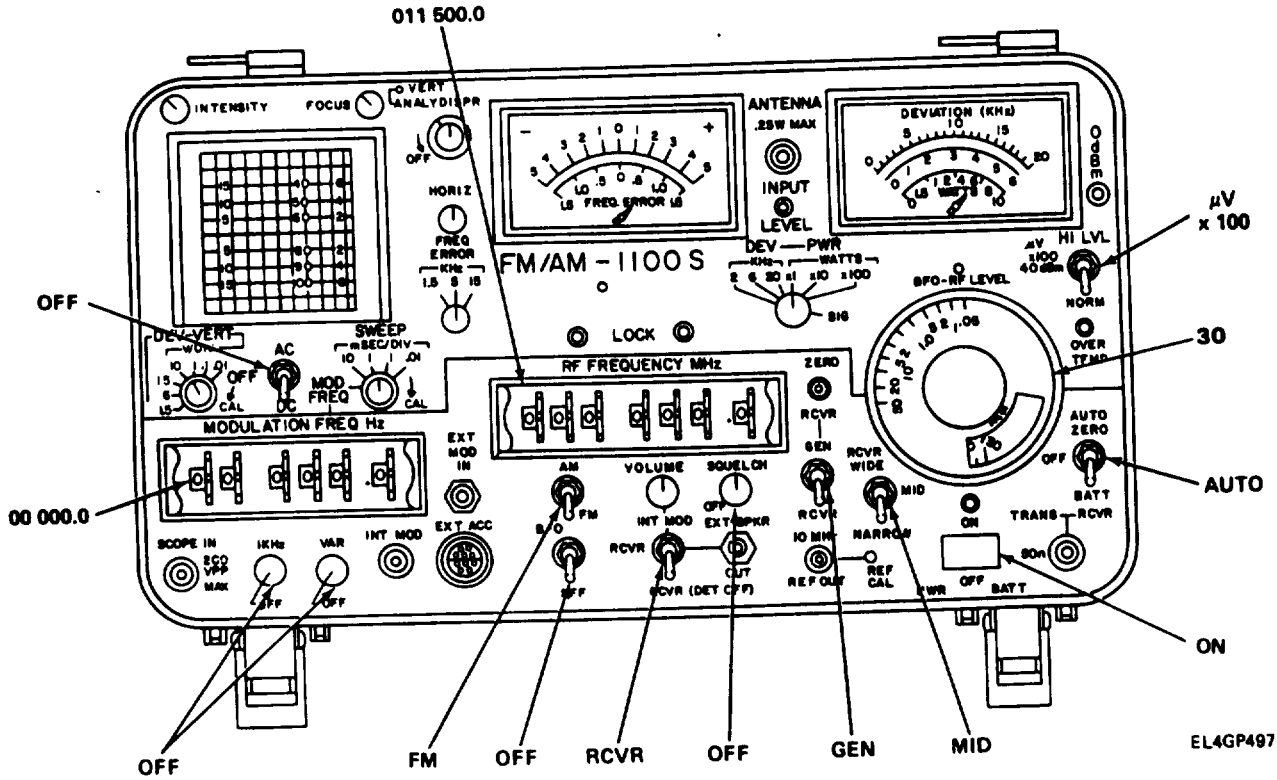
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-1

No Audio Troubleshooting

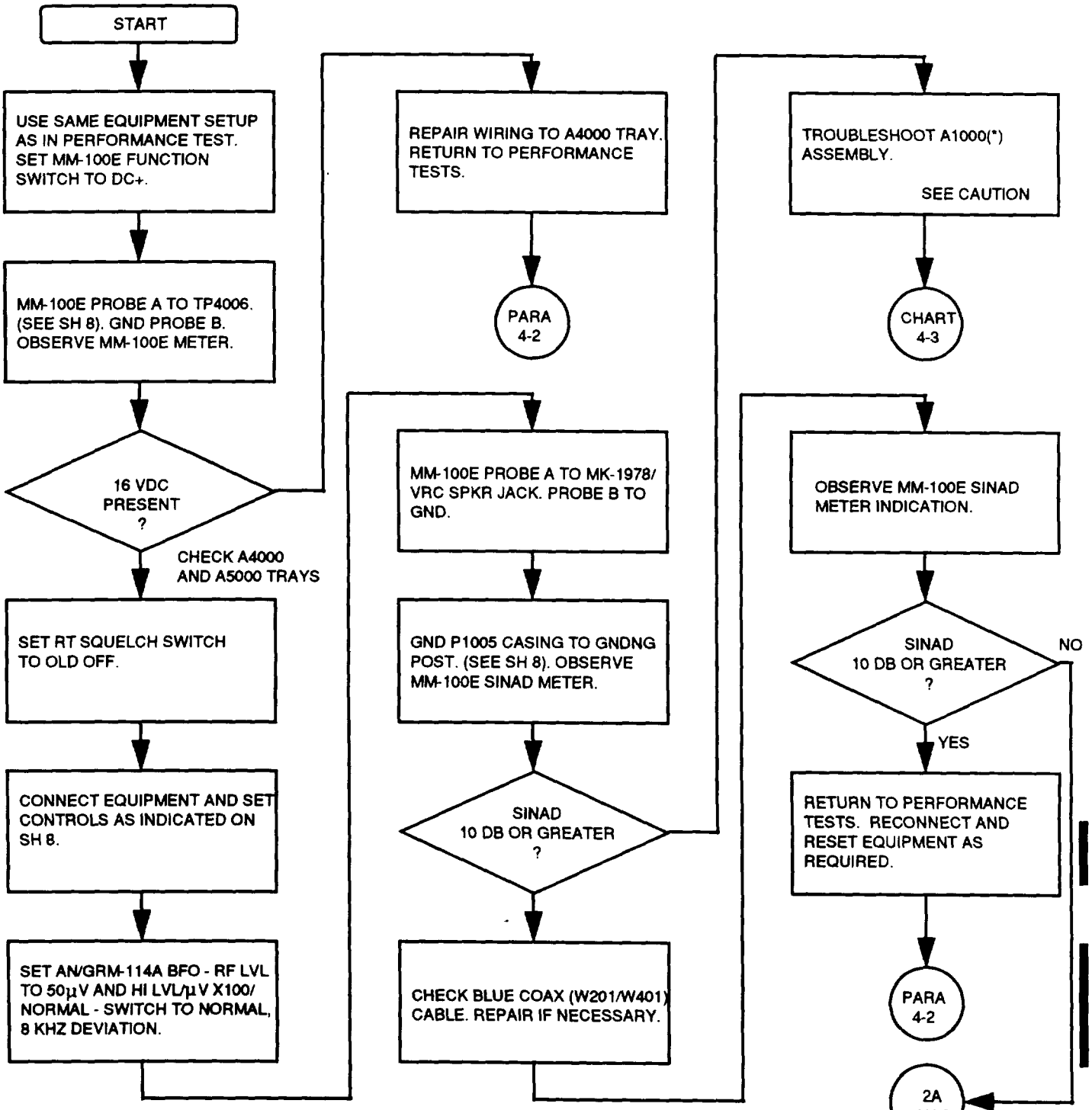
(Sheet 25 of 25)





4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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

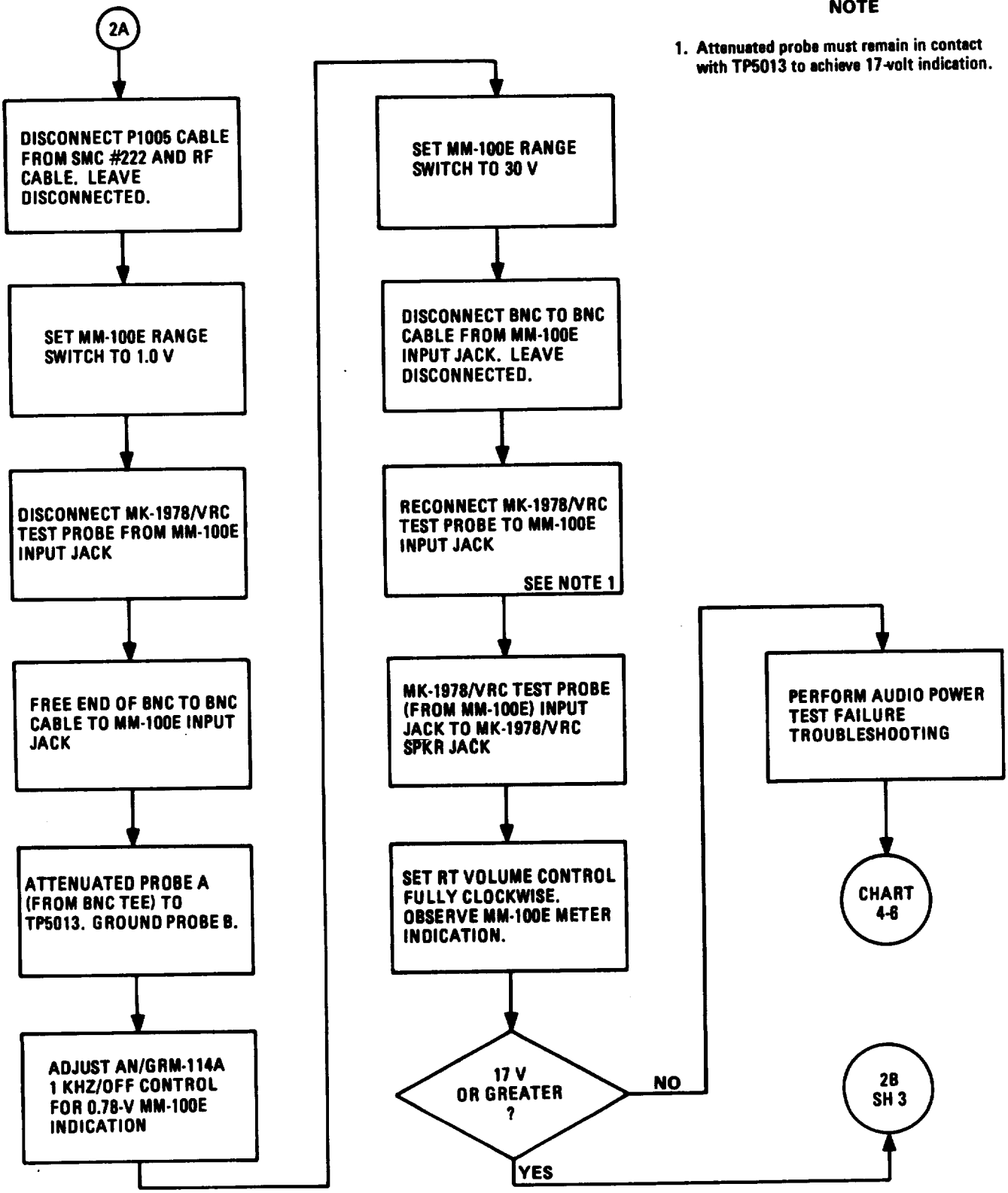


CAUTION

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

4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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

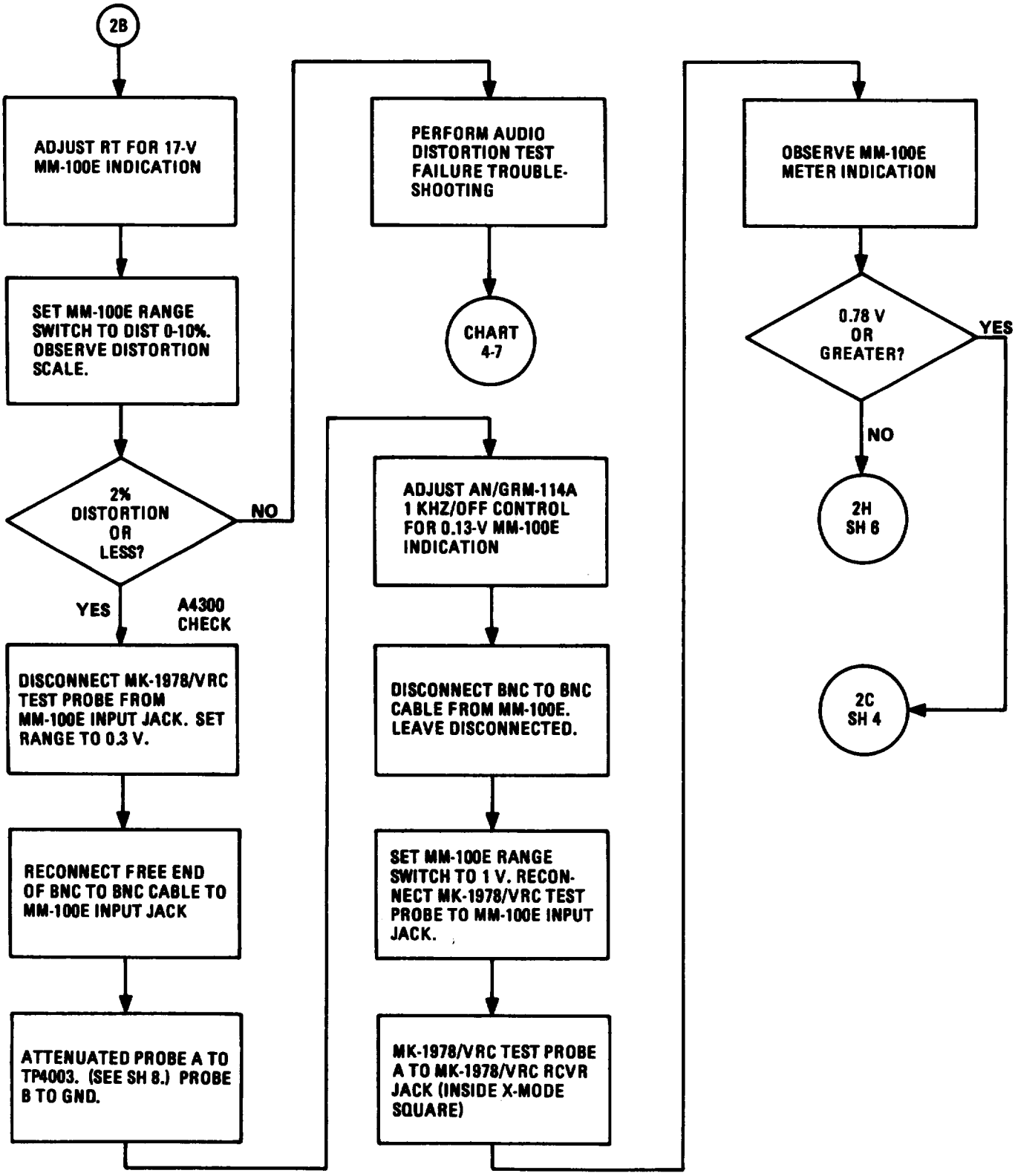


NOTE

1. Attenuated probe must remain in contact with TP5013 to achieve 17-volt indication.

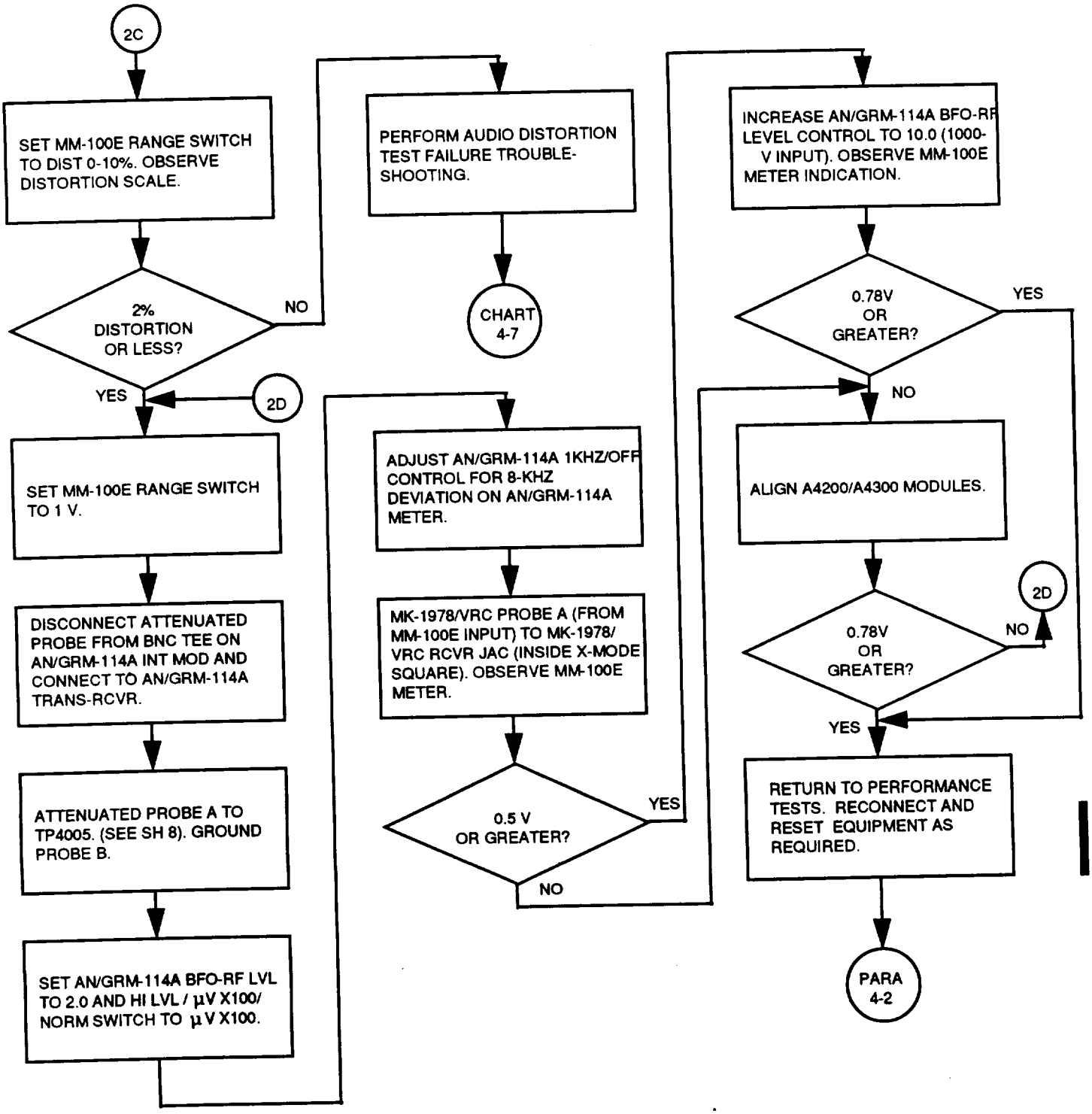
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



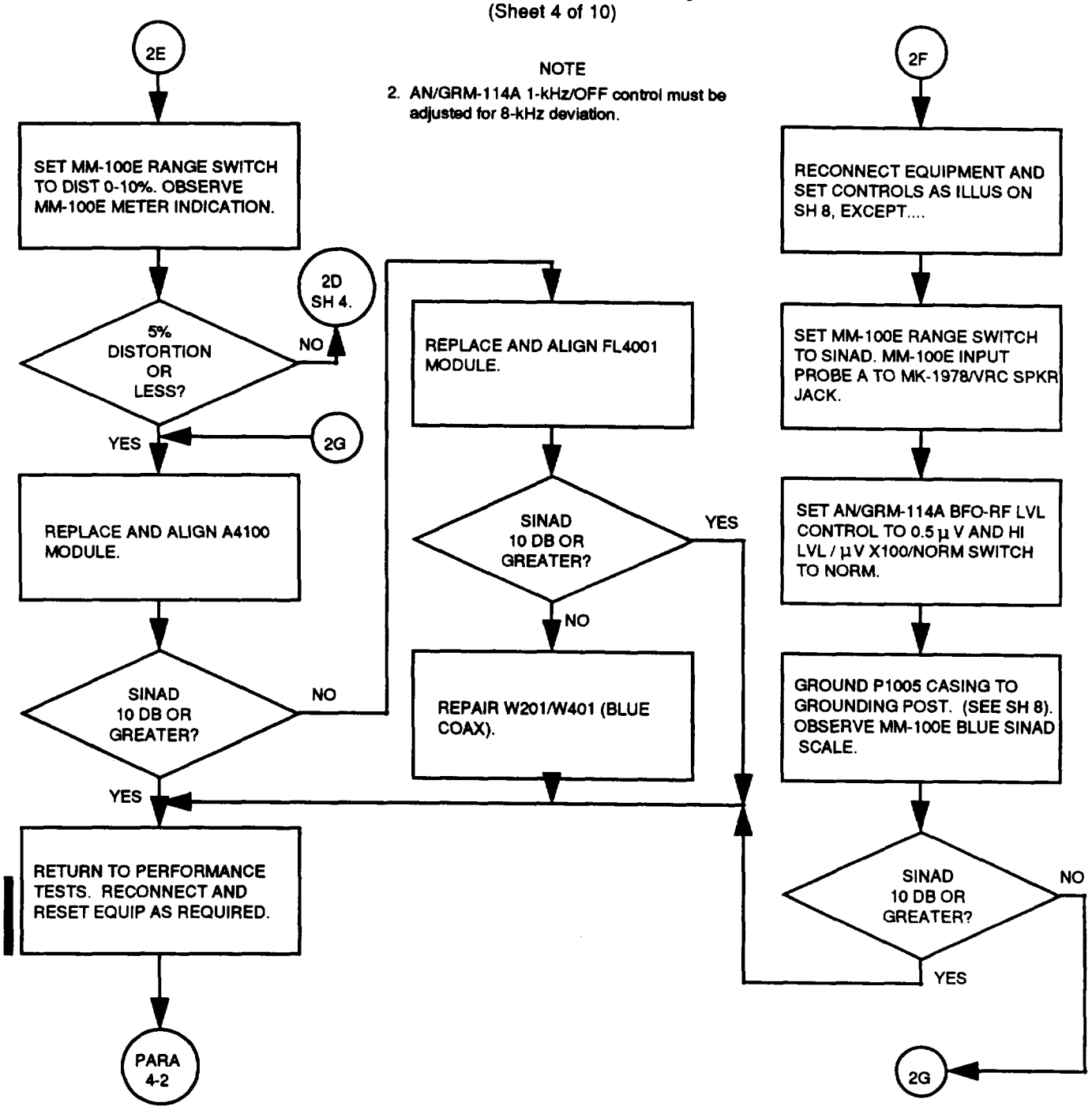
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



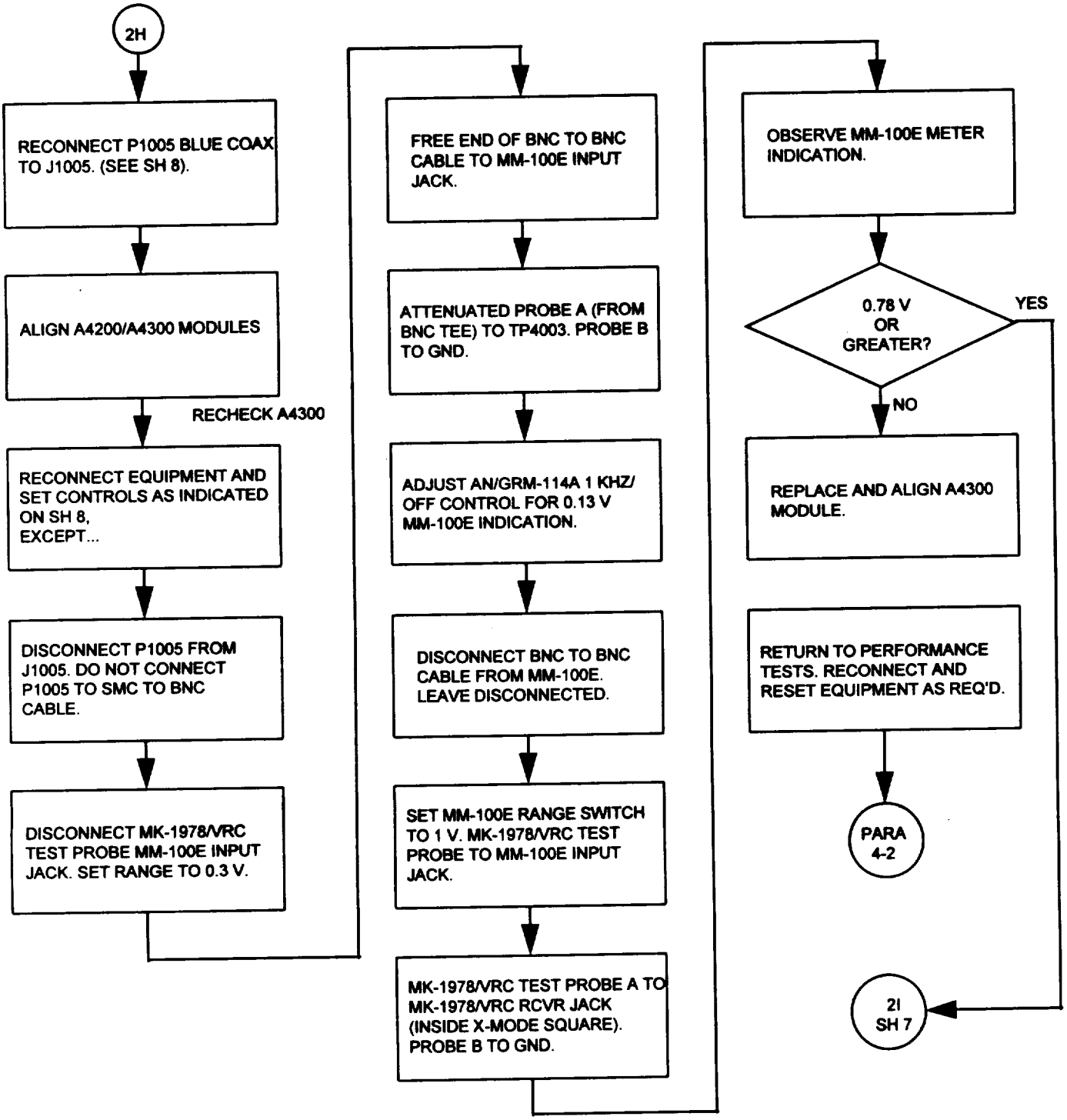
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



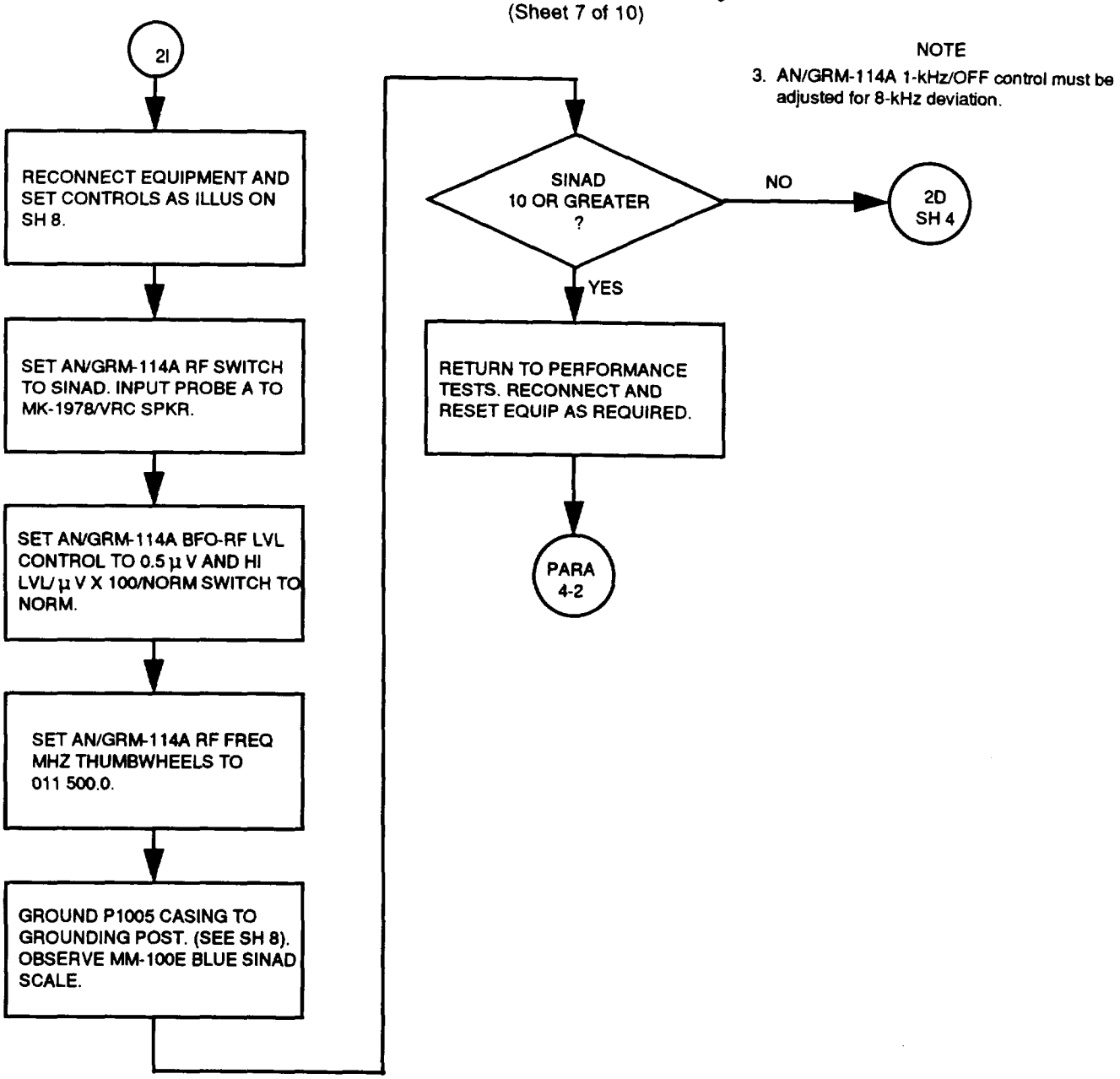
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



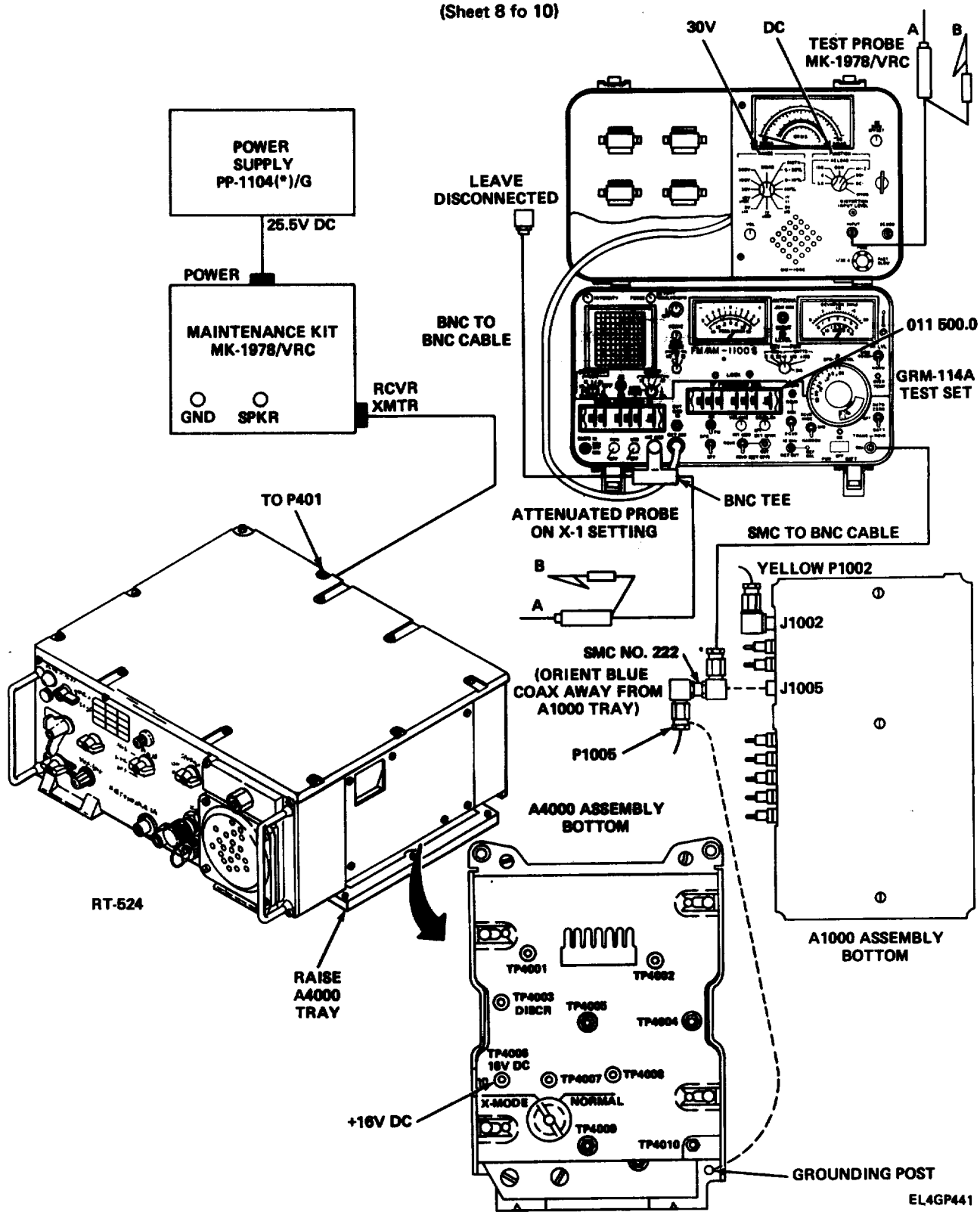
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



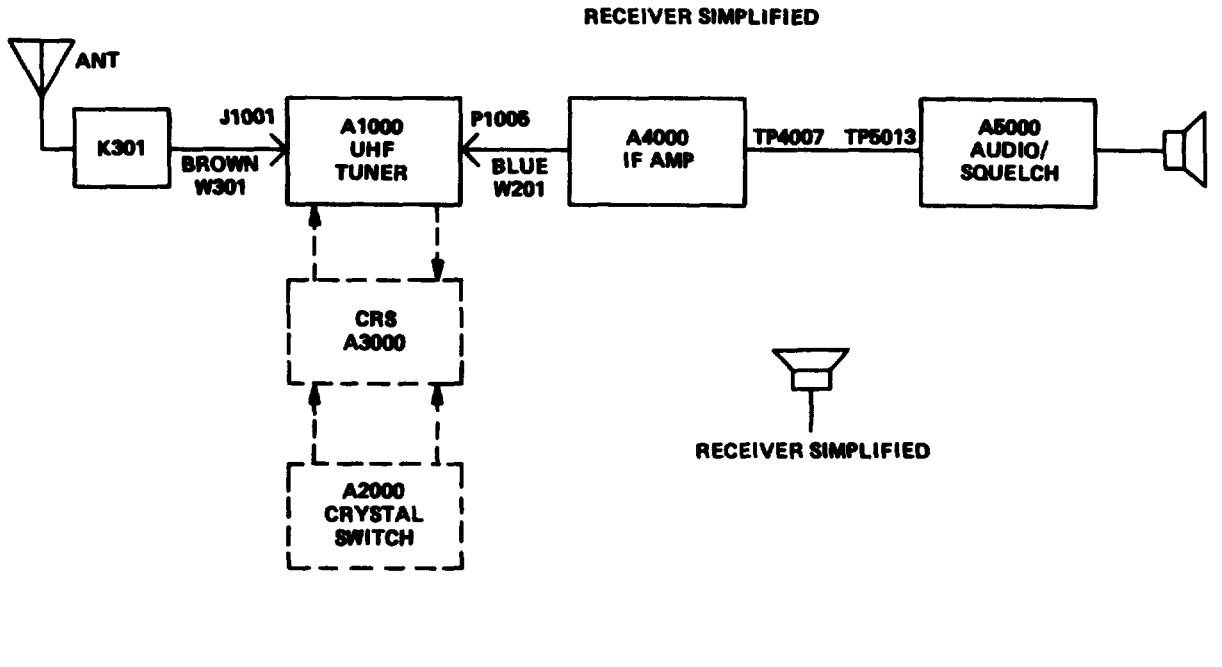
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-2
A4000 Assembly Troubleshooting
(Sheet 8 fo 10)



4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



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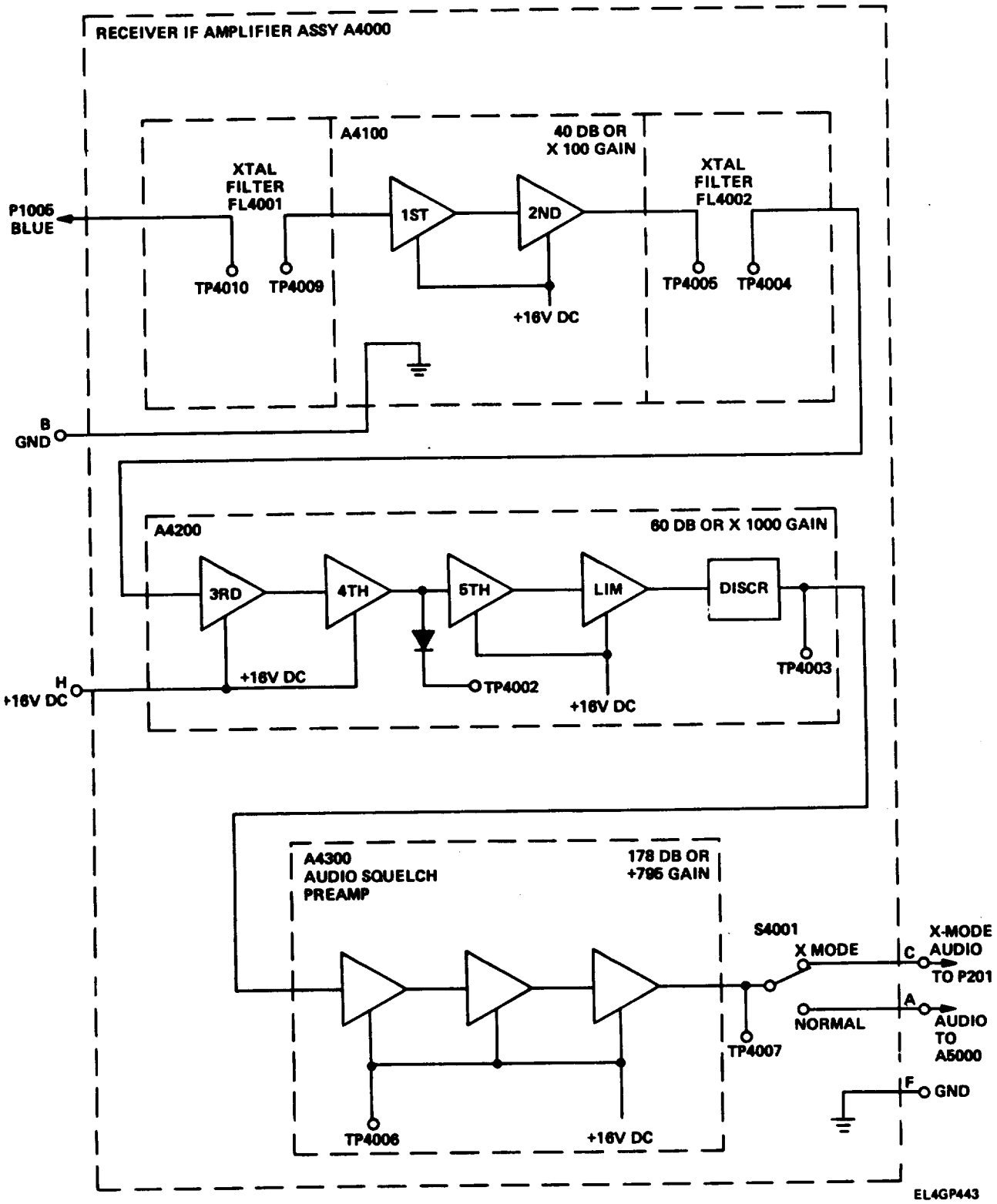
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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

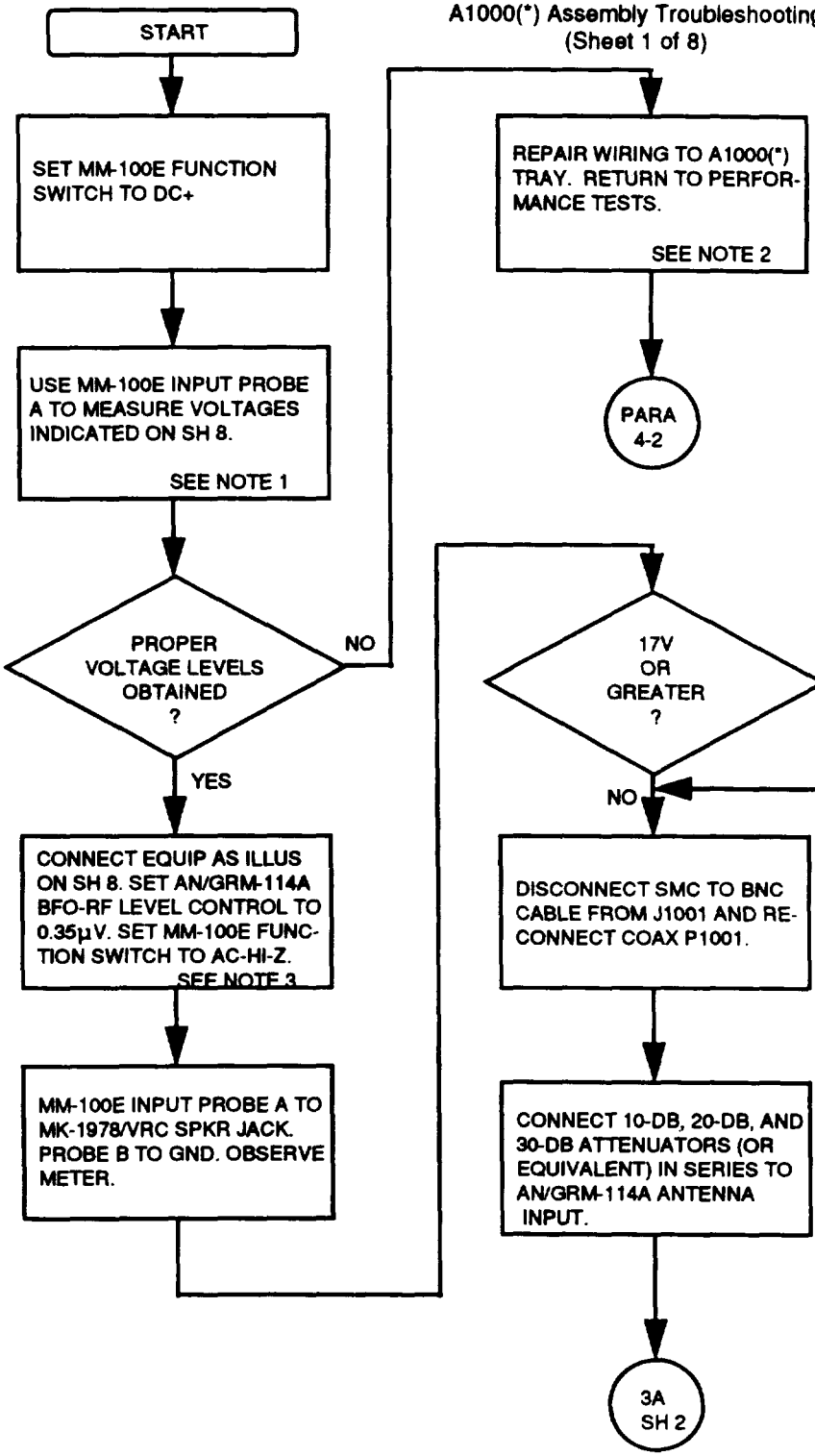


4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CAUTION

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

CHART 4-3
A1000(*) Assembly Troubleshooting
(Sheet 1 of 8)

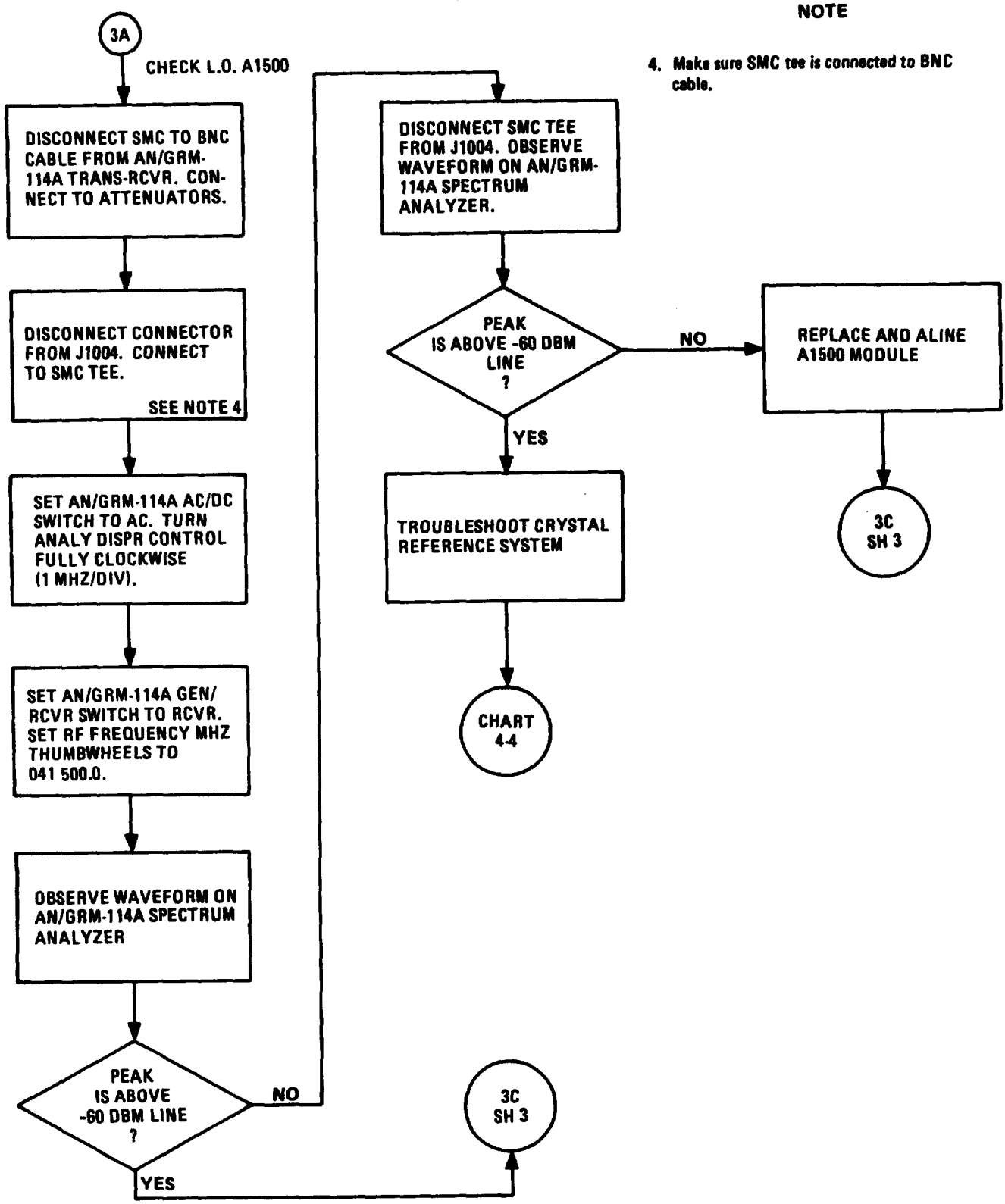


NOTES

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.

4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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

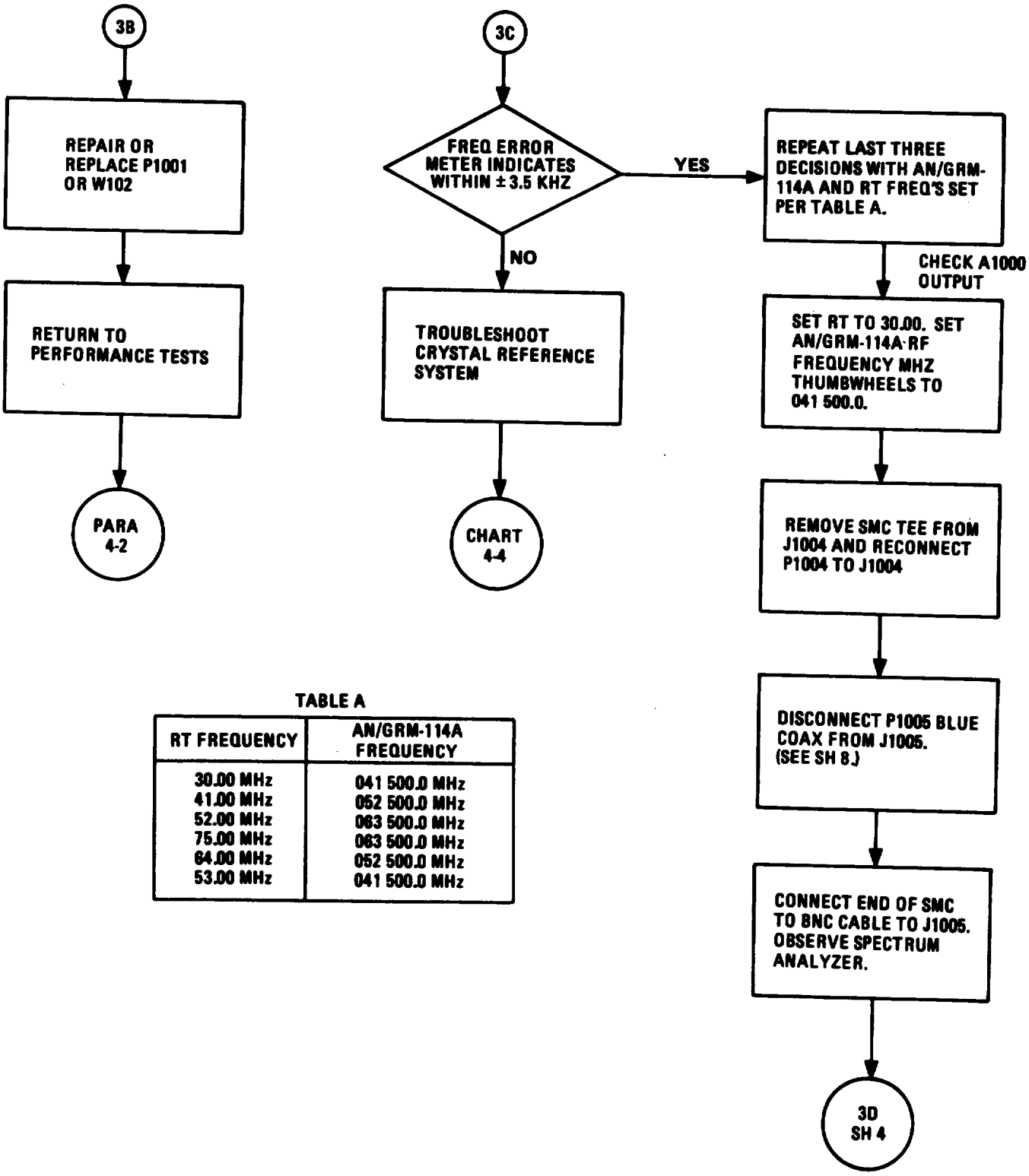
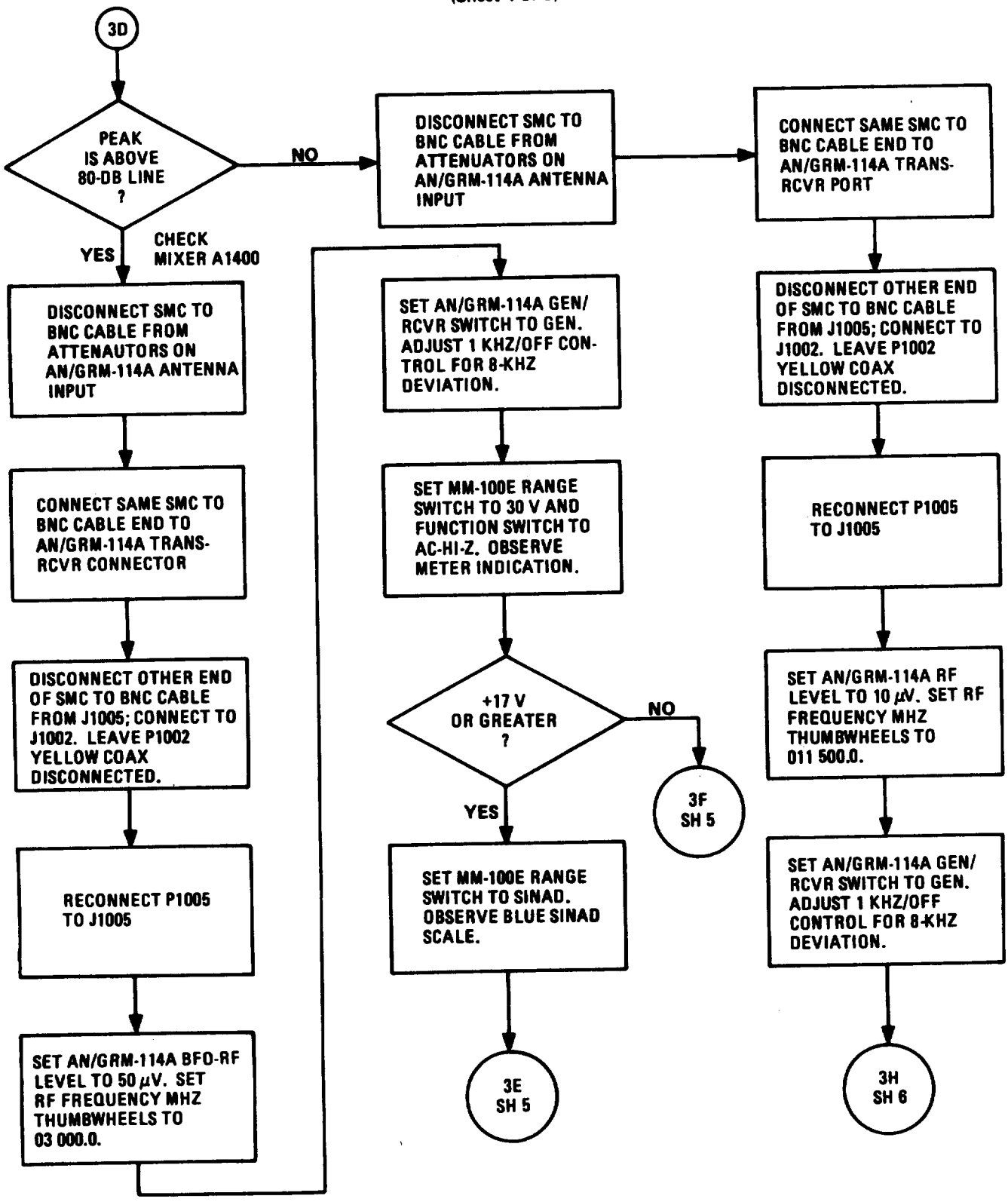


TABLE A

RT FREQUENCY	AN/GRM-114A FREQUENCY
30.00 MHz	041 500.0 MHz
41.00 MHz	052 500.0 MHz
52.00 MHz	063 500.0 MHz
75.00 MHz	063 500.0 MHz
64.00 MHz	052 500.0 MHz
53.00 MHz	041 500.0 MHz

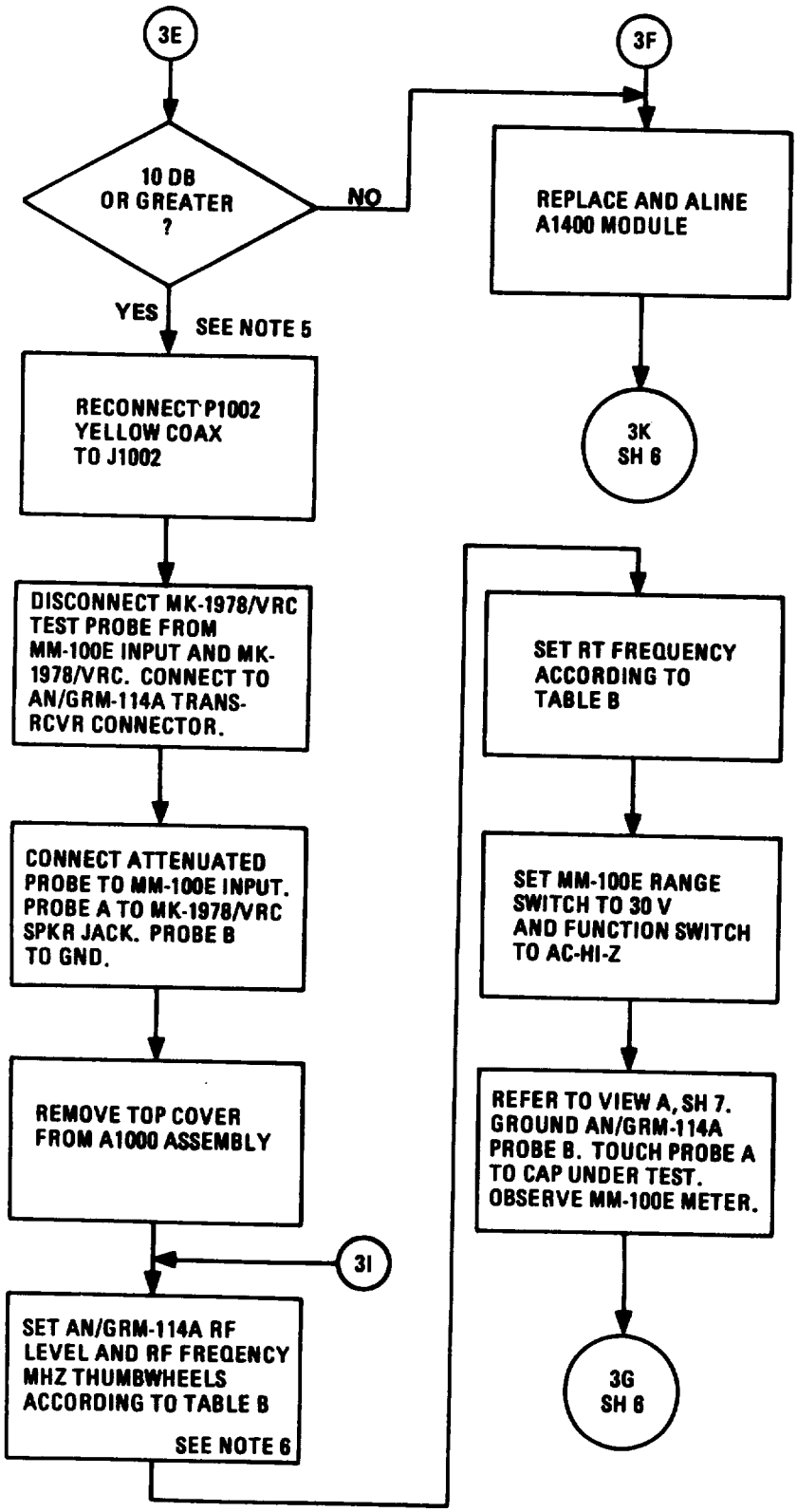
4-24. TROIJBLESHOOTING FLOW CHARTS. (CONT)

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



4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-3
A1000 Assembly Troubleshooting
(Sheet 5 of 8)

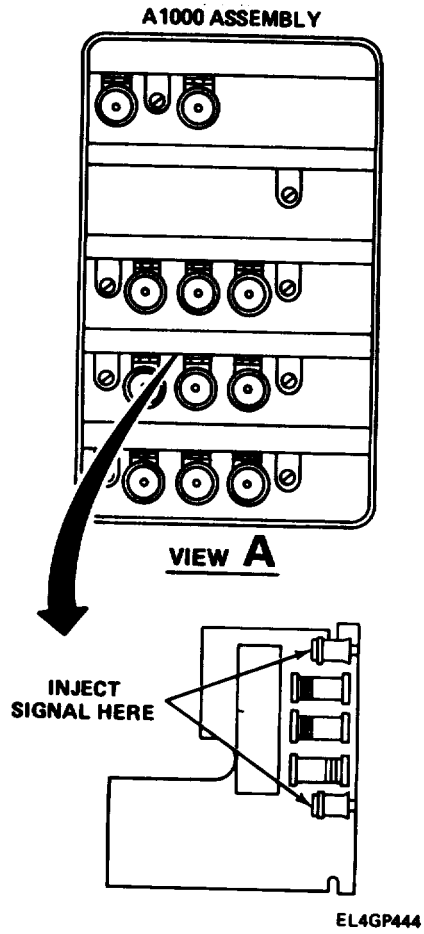


NOTES

5. The following steps check modules A1100, A1200, and A1300 by measuring SINAD and voltage at the six capacitors listed in table B.
6. Adjust 1-kHz/OFF control for 8-kHz deviation on DEV meter.

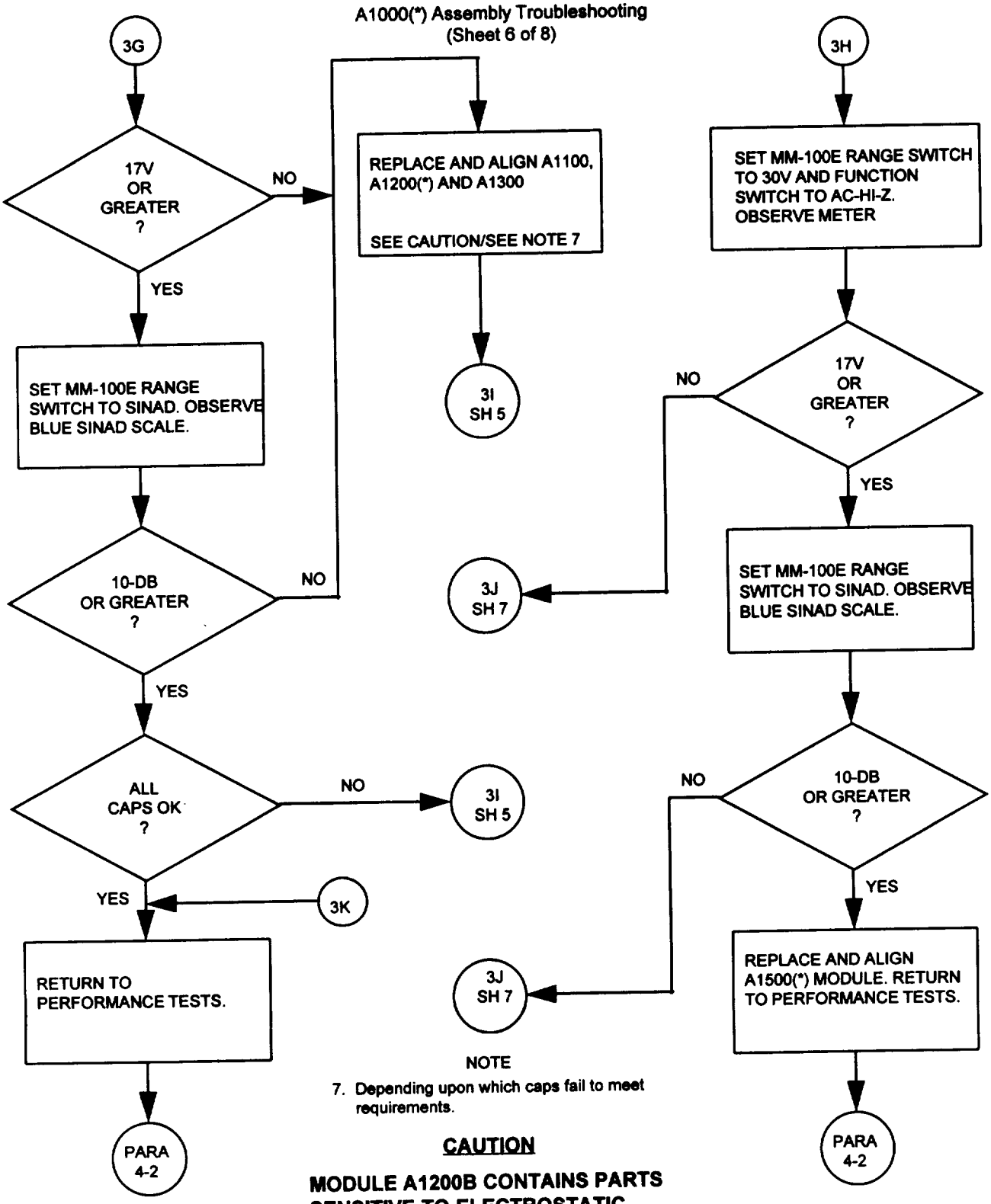
TABLE B

AN/GRM-114A AND RT FREQ SETTINGS	AN/GRM-114A RF LEVEL		
	70 μV	20 μV	3 μV
30.00 MHZ (BAND Ⓐ)	C1305	C1205	C1104
64.90 MHZ (BAND Ⓑ)	C1301	C1201	C1101



4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



NOTE

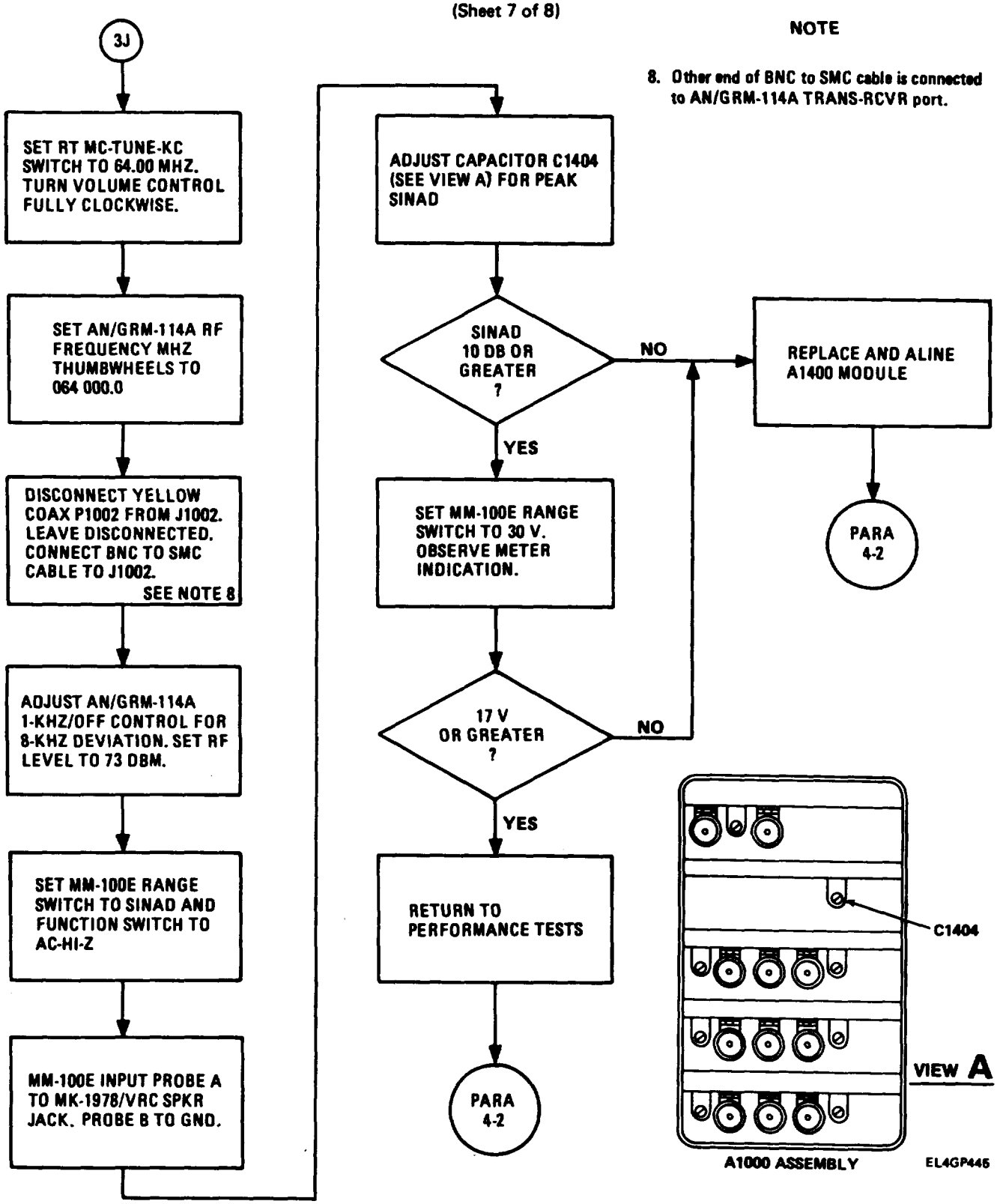
7. Depending upon which caps fail to meet requirements.

CAUTION

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

4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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

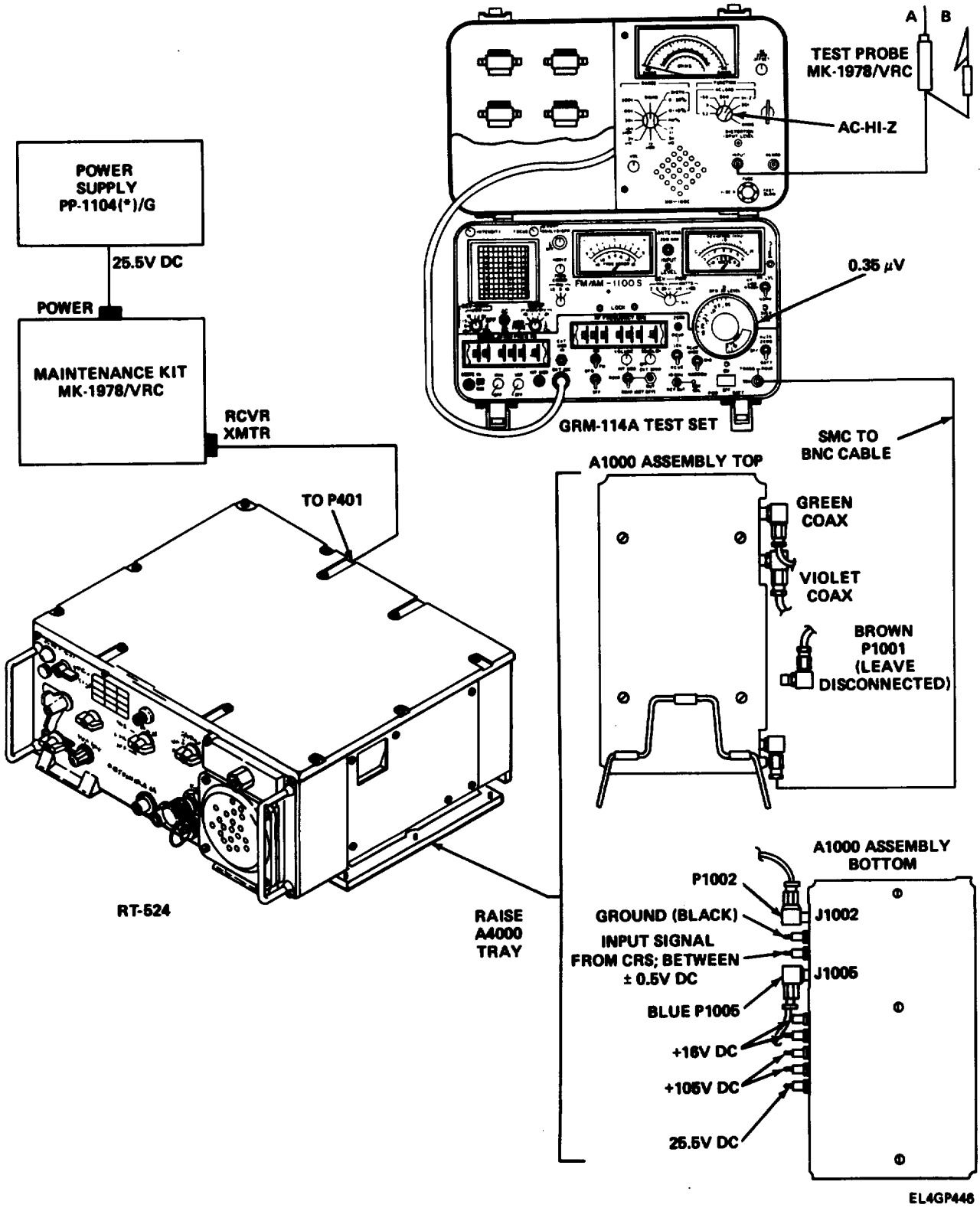


NOTE

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

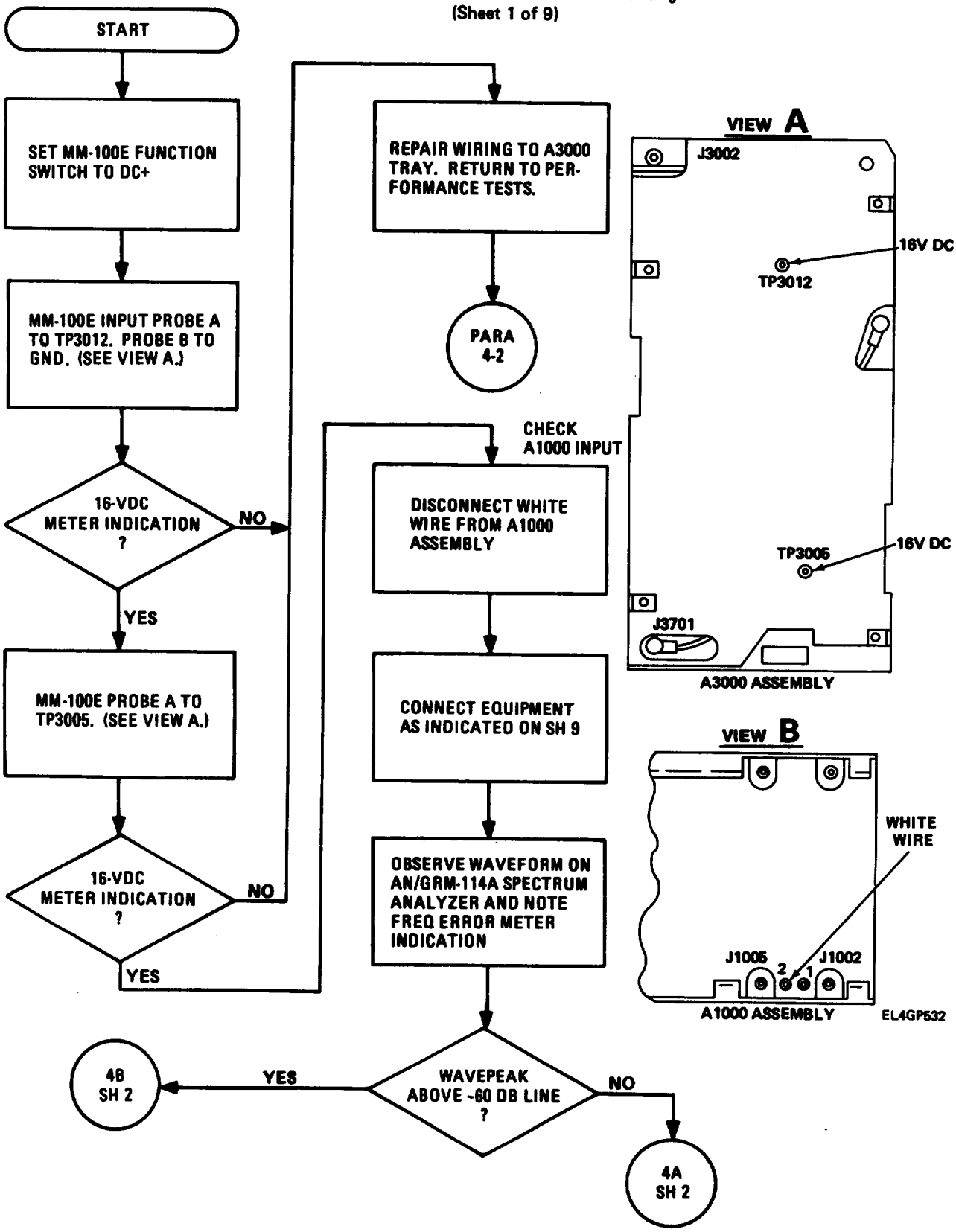
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-4
A 2000, A3000 Assemblies Troubleshooting
(Sheet 2 of 9)

CAUTION

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

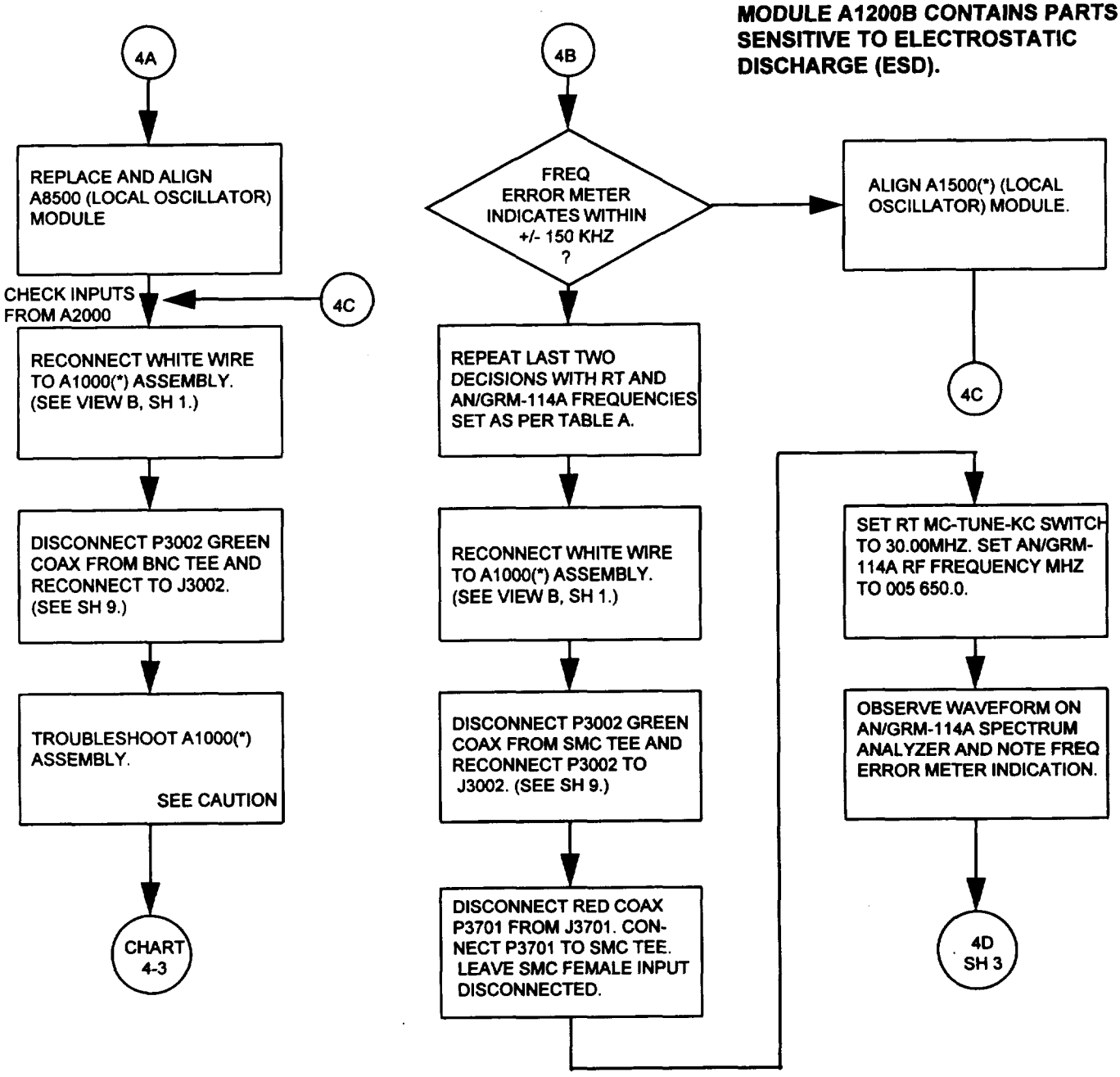
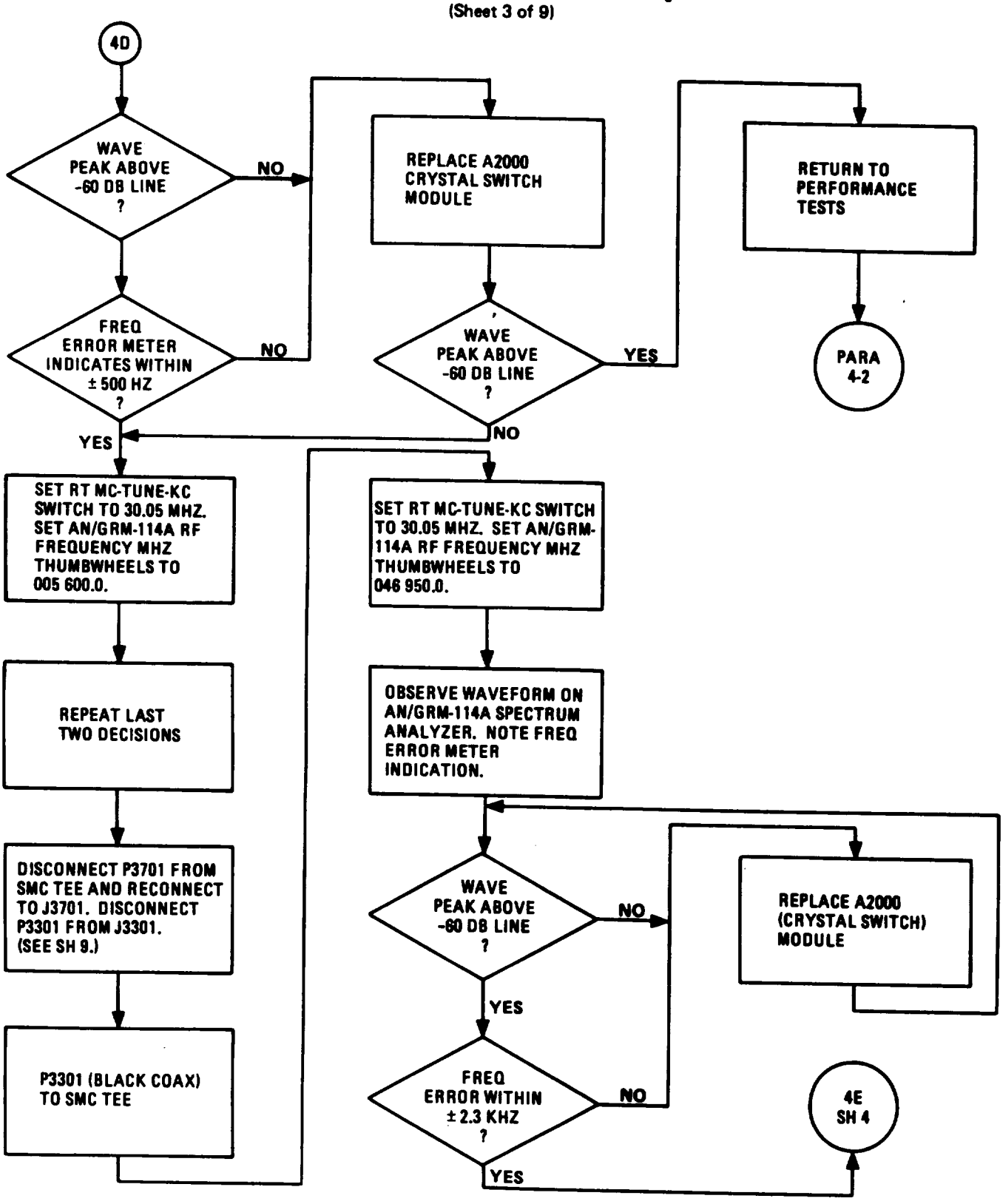


TABLE A

RT FREQUENCY	AN/GRM-114A FREQUENCY
30.00 MHz	041 500.0 MHz
41.00 MHz	052 500.0 MHz
52.00 MHz	063 500.0 MHz
75.00 MHz	063 500.0 MHz
64.00 MHz	052 500.0 MHz
53.00 MHz	041 500.0 MHz

4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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

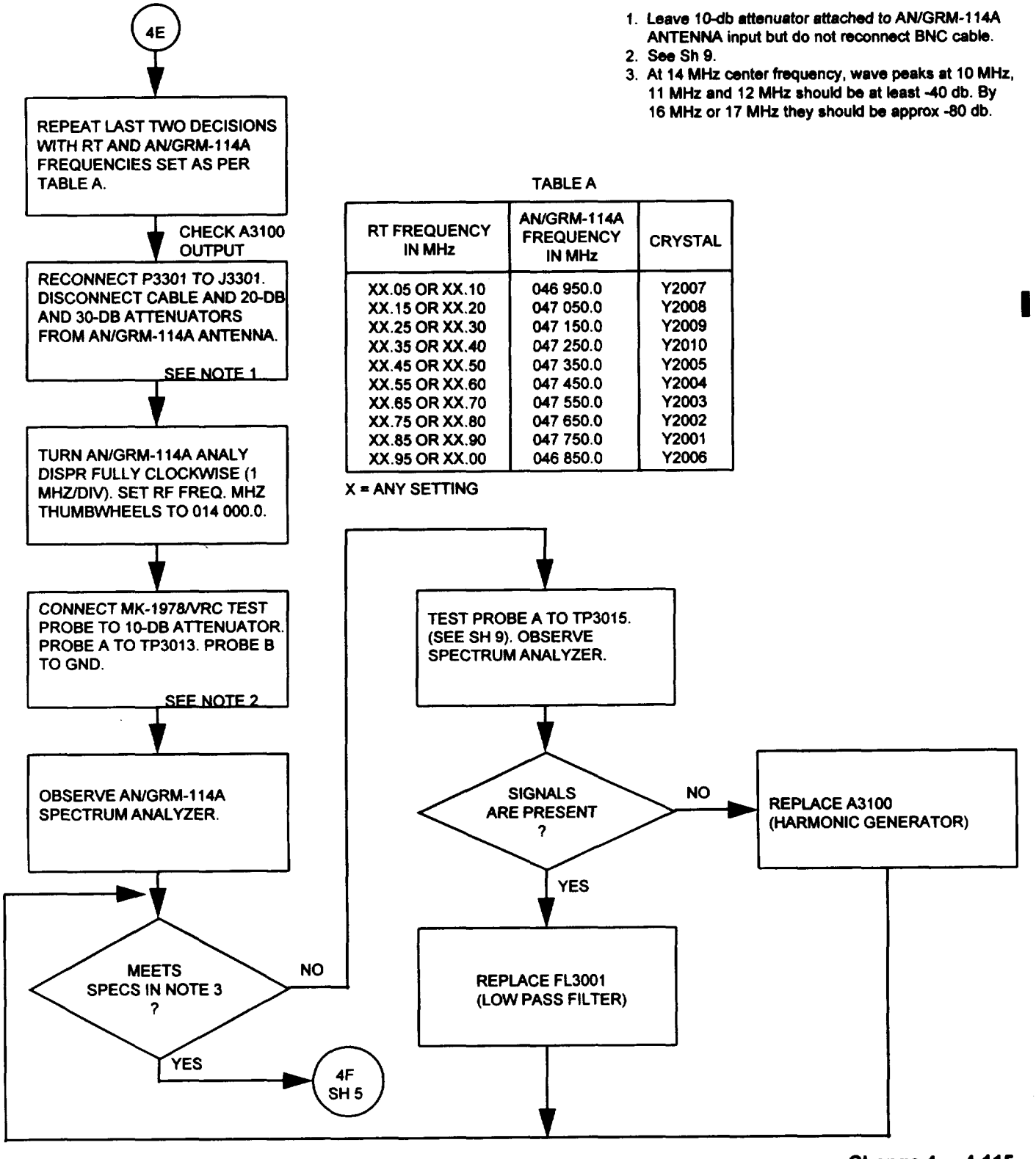
NOTES

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 -80 db.

TABLE A

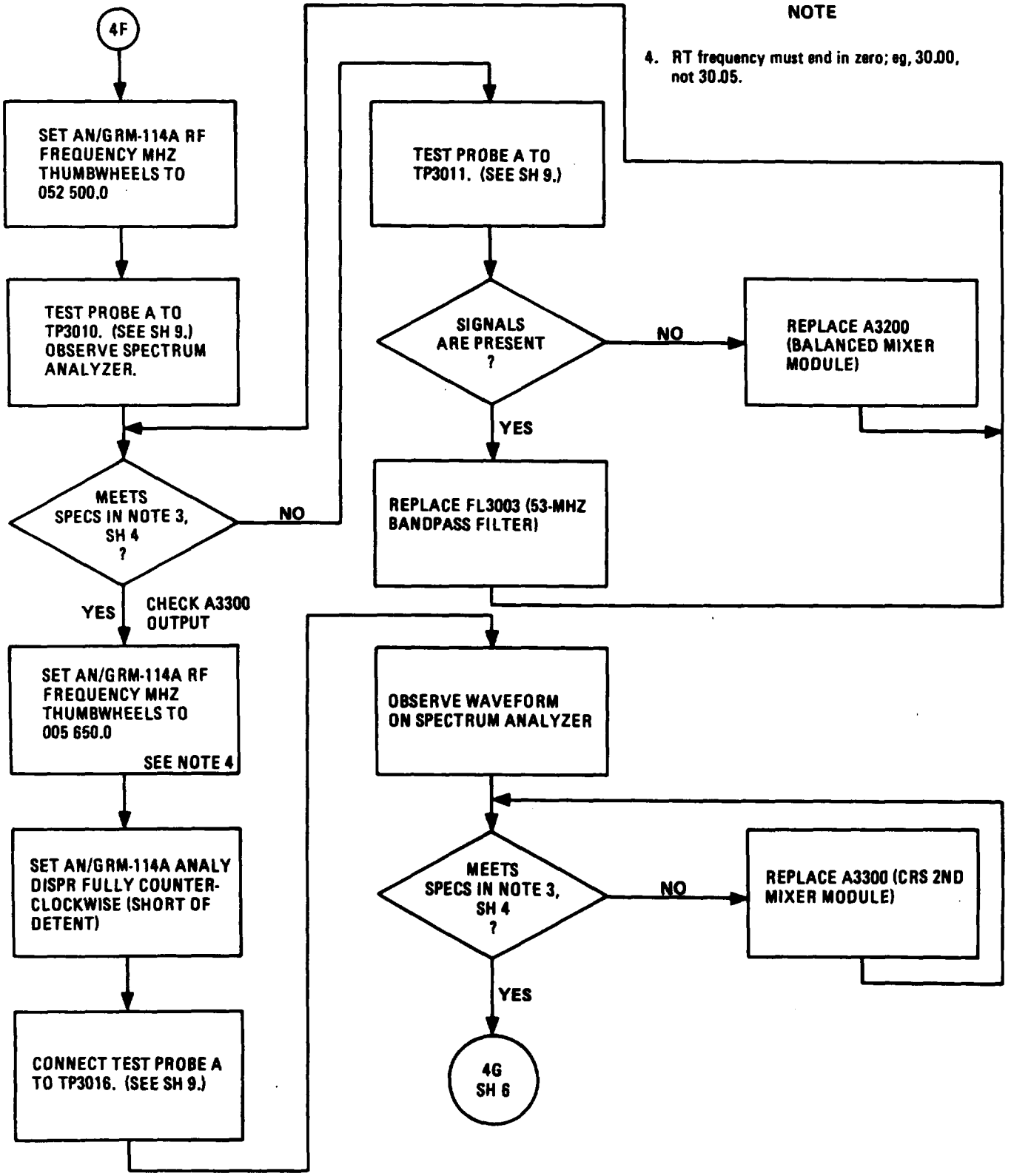
RT FREQUENCY IN MHz	AN/GRM-114A FREQUENCY IN MHz	CRYSTAL
XX.05 OR XX.10	046 950.0	Y2007
XX.15 OR XX.20	047 050.0	Y2008
XX.25 OR XX.30	047 150.0	Y2009
XX.35 OR XX.40	047 250.0	Y2010
XX.45 OR XX.50	047 350.0	Y2005
XX.55 OR XX.60	047 450.0	Y2004
XX.65 OR XX.70	047 550.0	Y2003
XX.75 OR XX.80	047 650.0	Y2002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

X = ANY SETTING



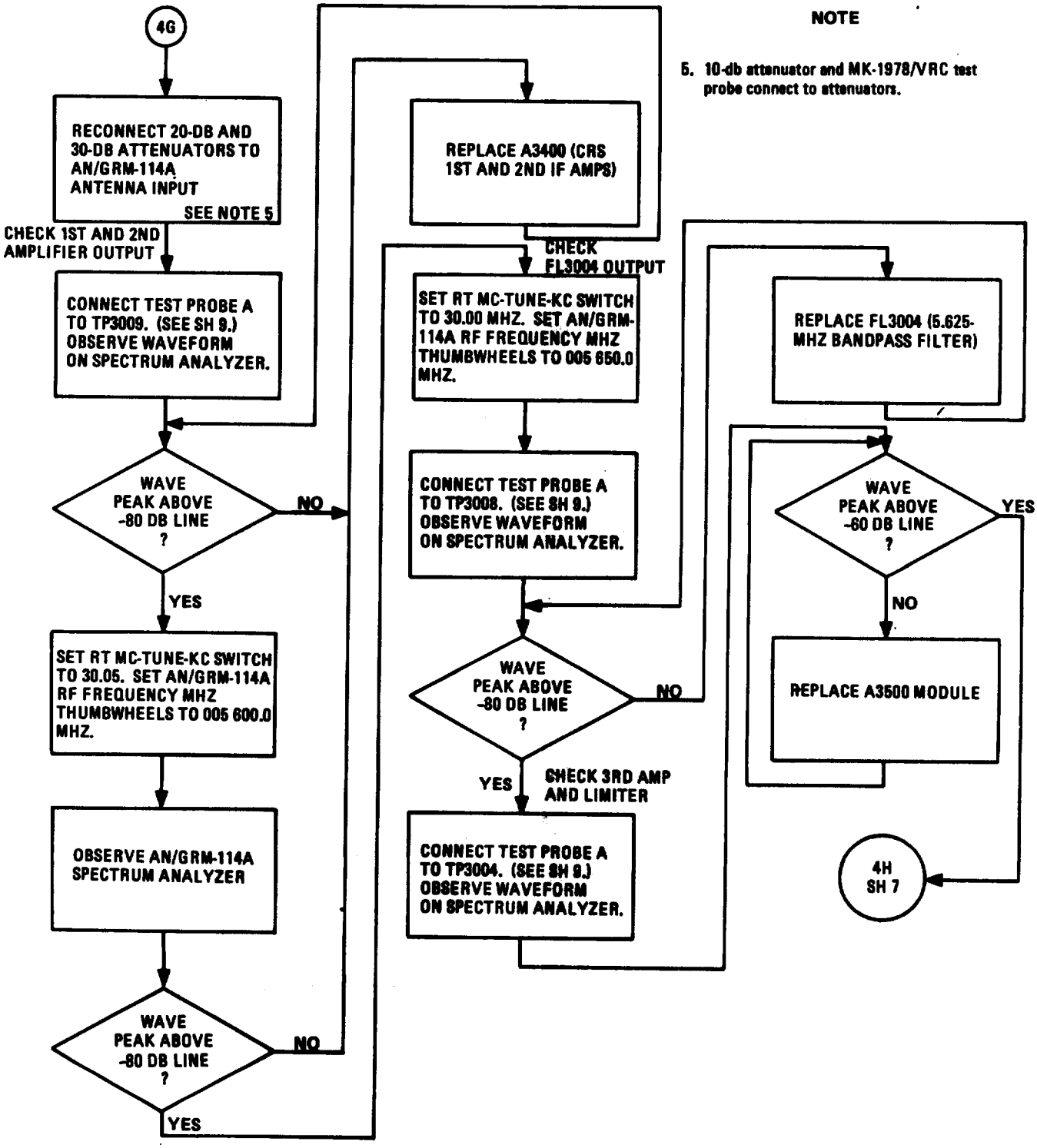
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



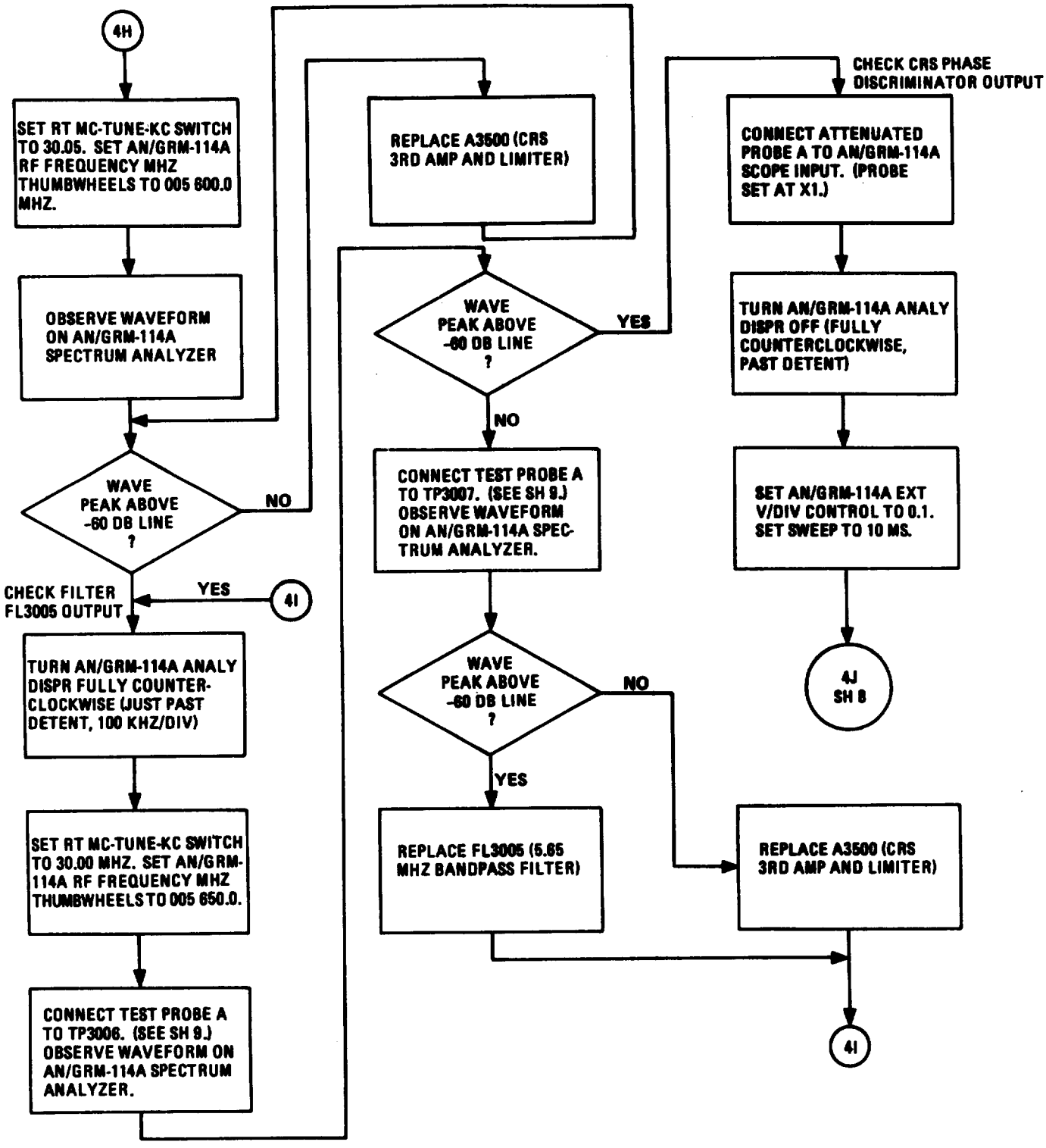
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-4
A2000, A3000 Assemblies Troubleshooting
(Sheet 6 of 9)



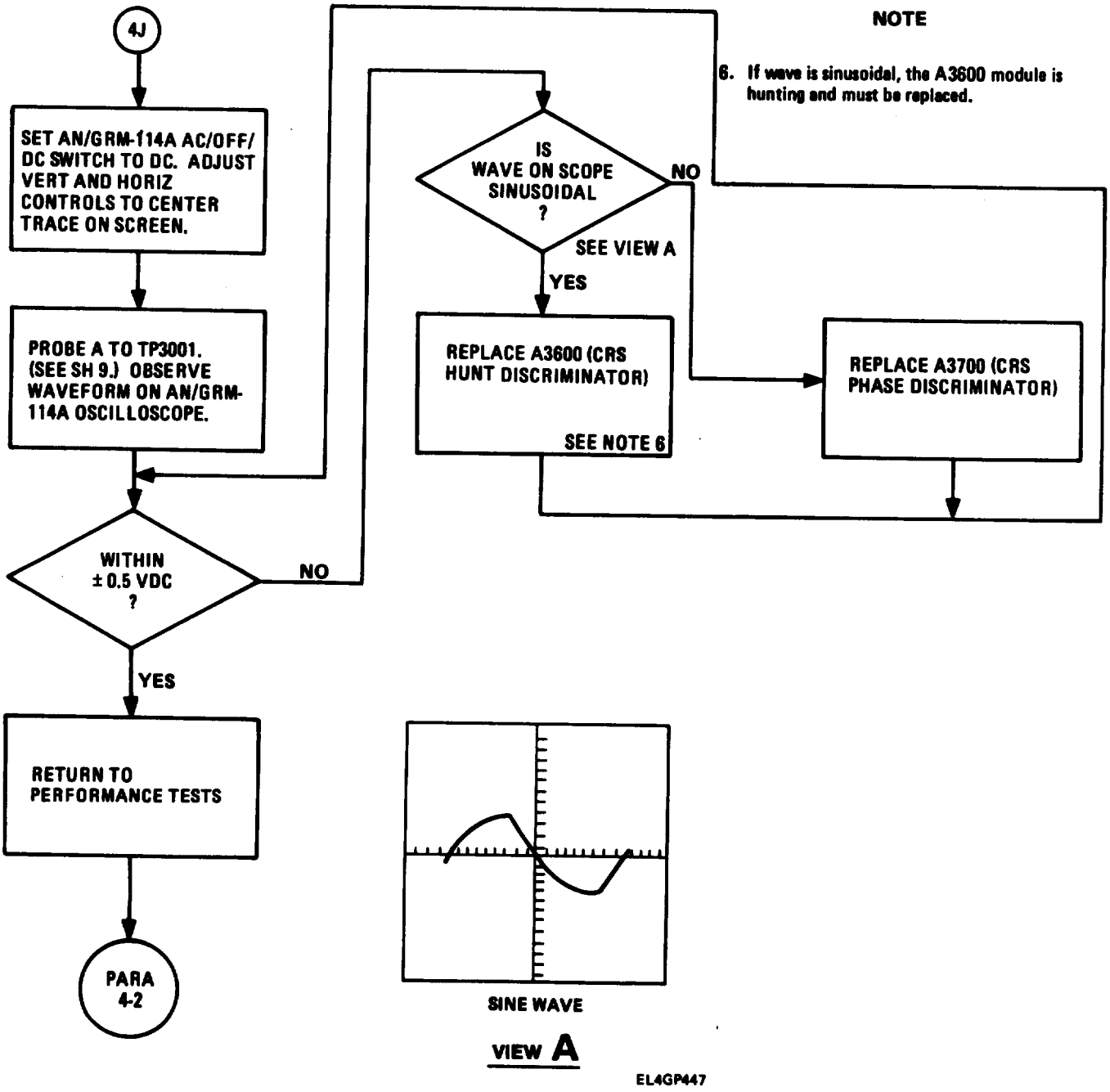
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



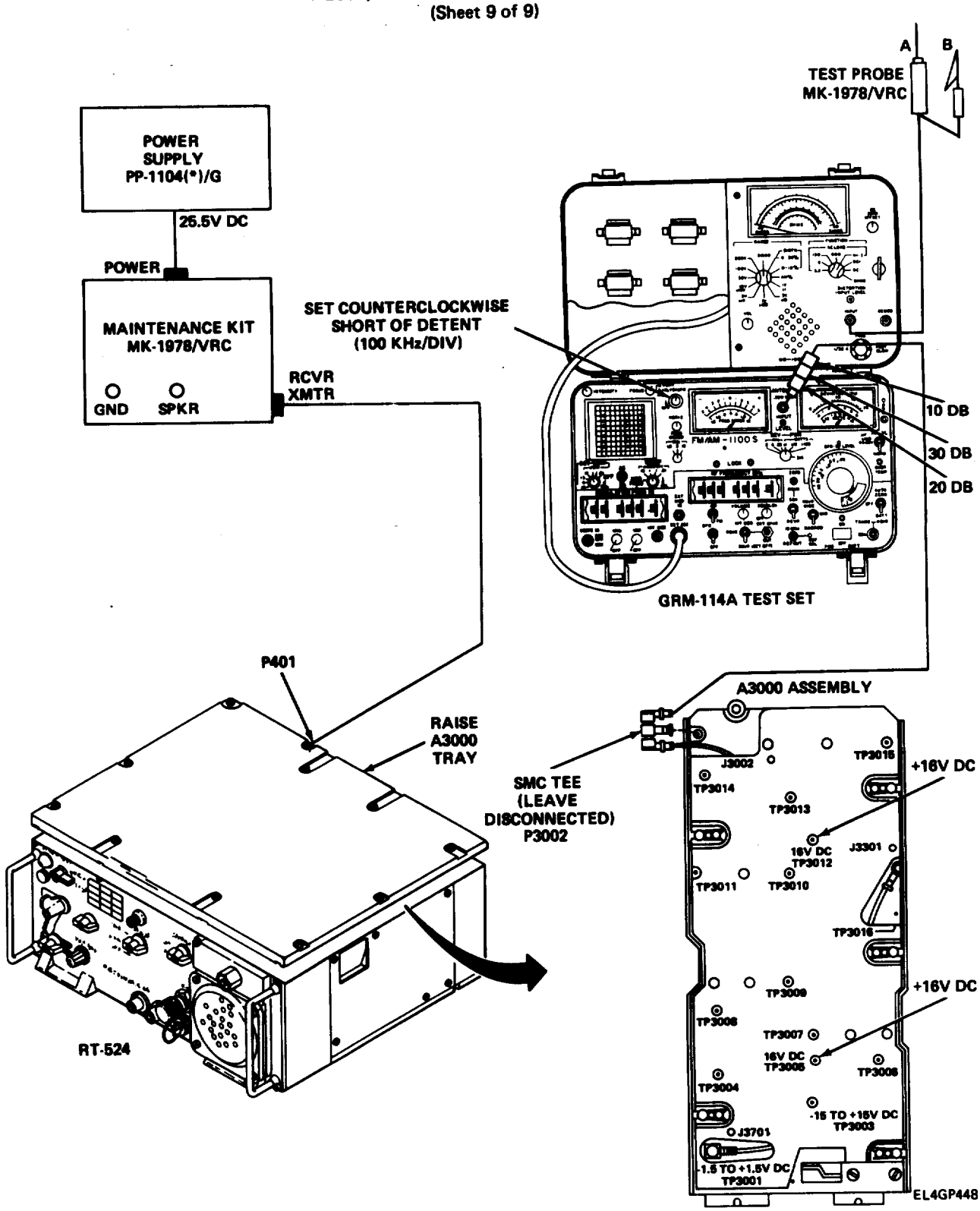
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



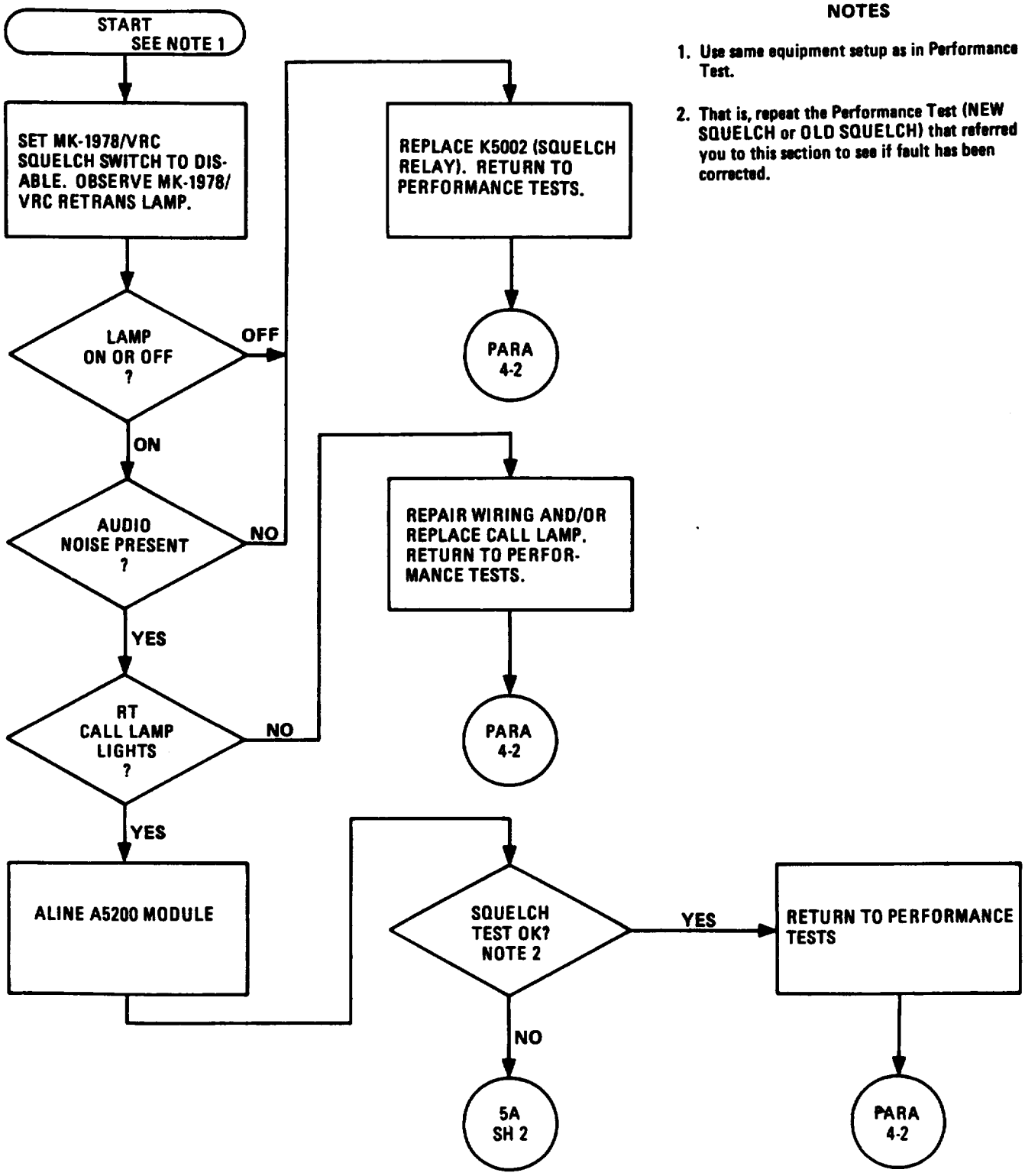
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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)

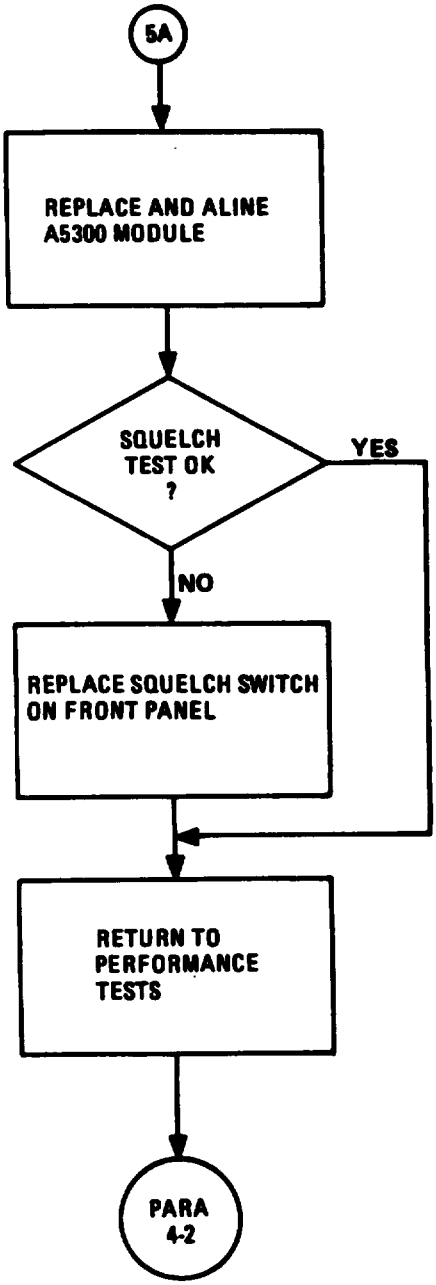


NOTES

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.

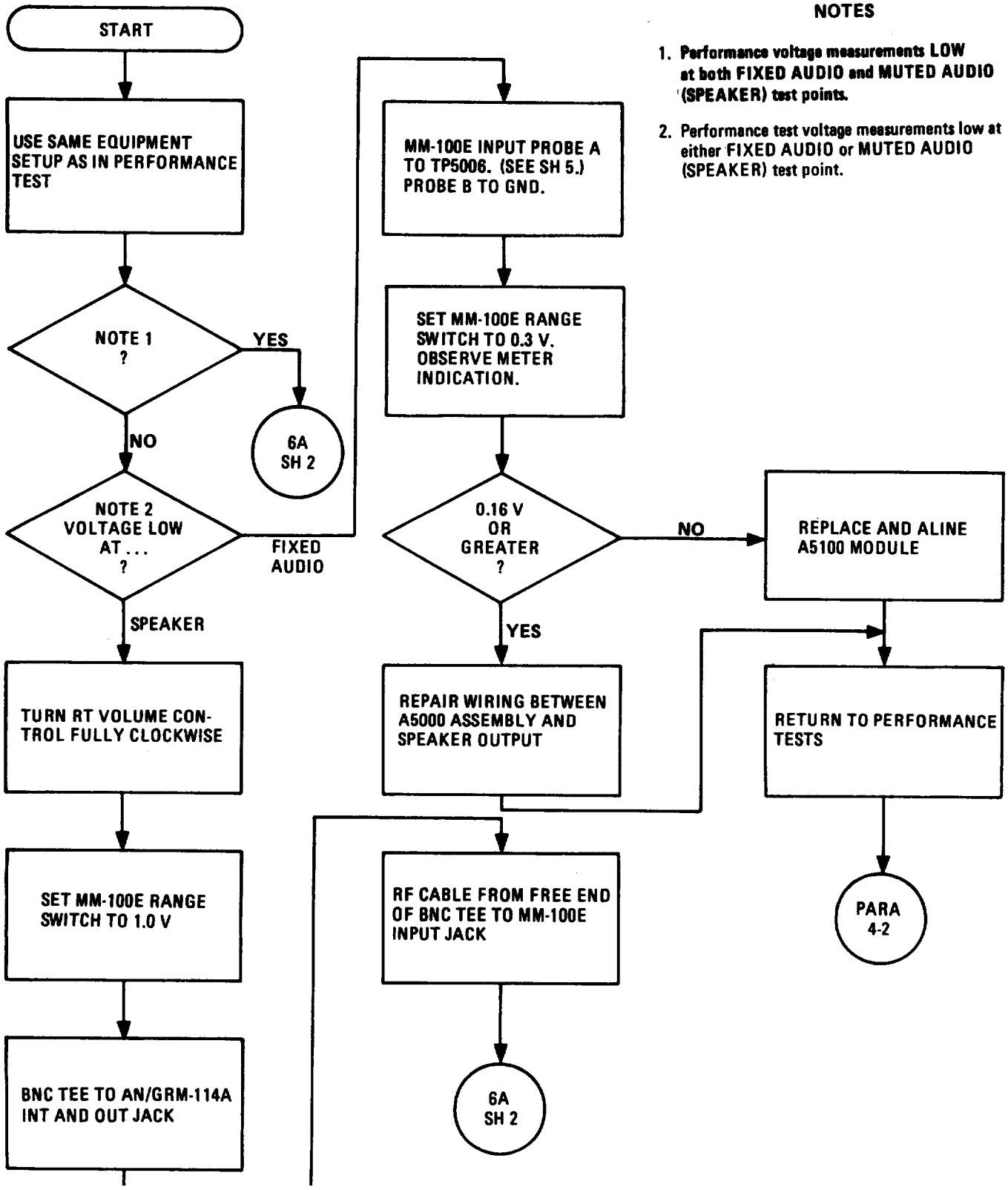
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



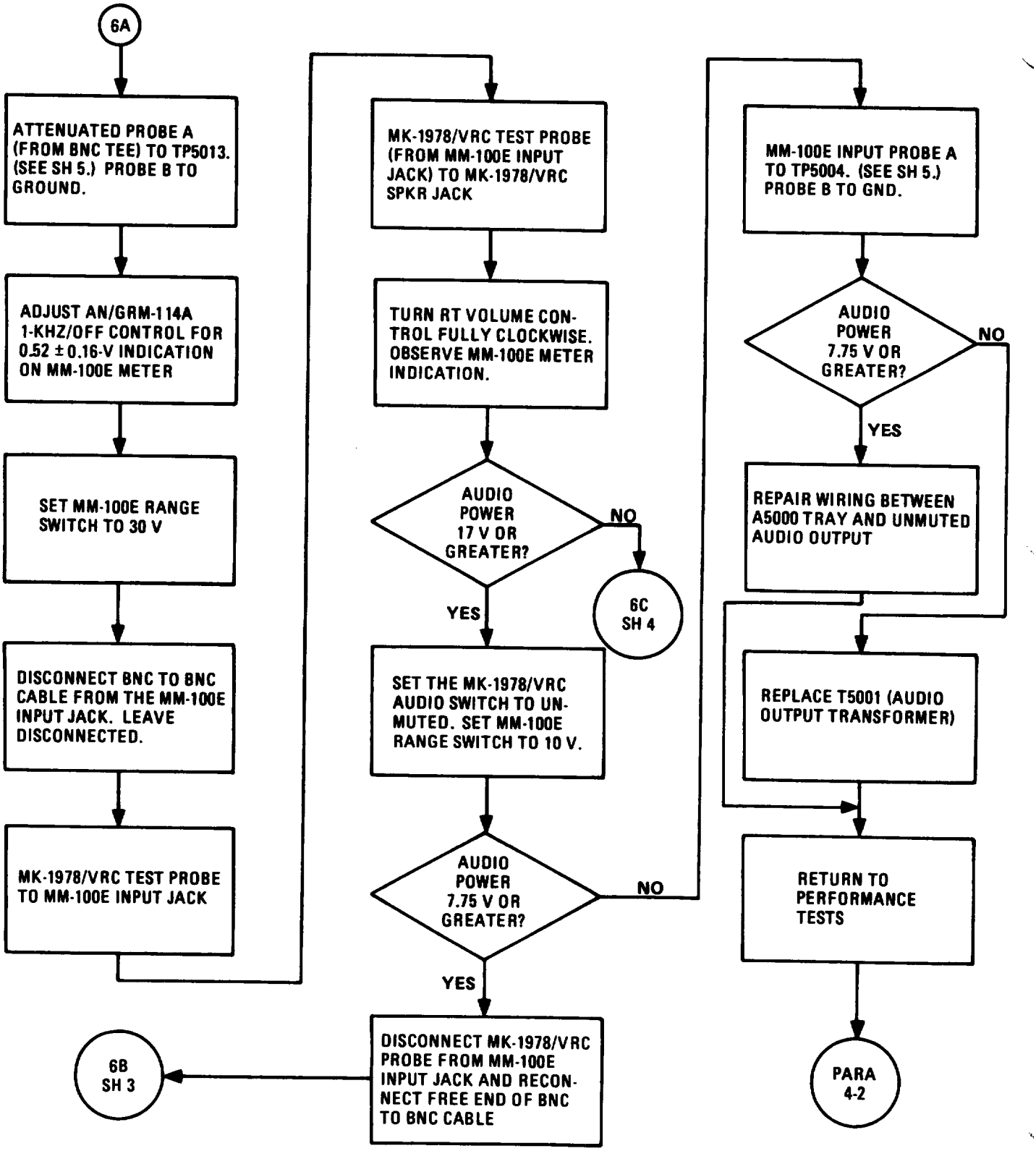
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



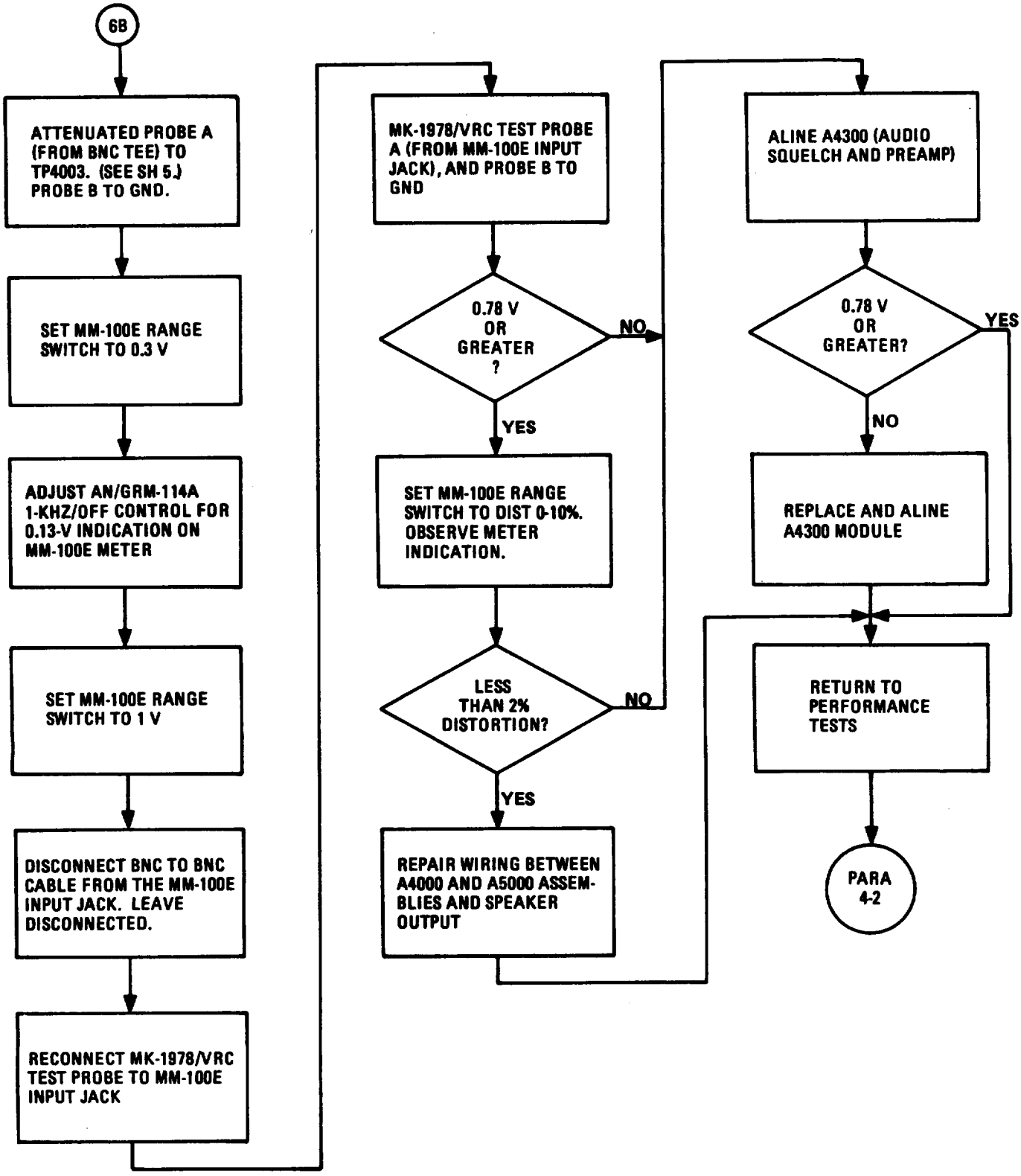
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



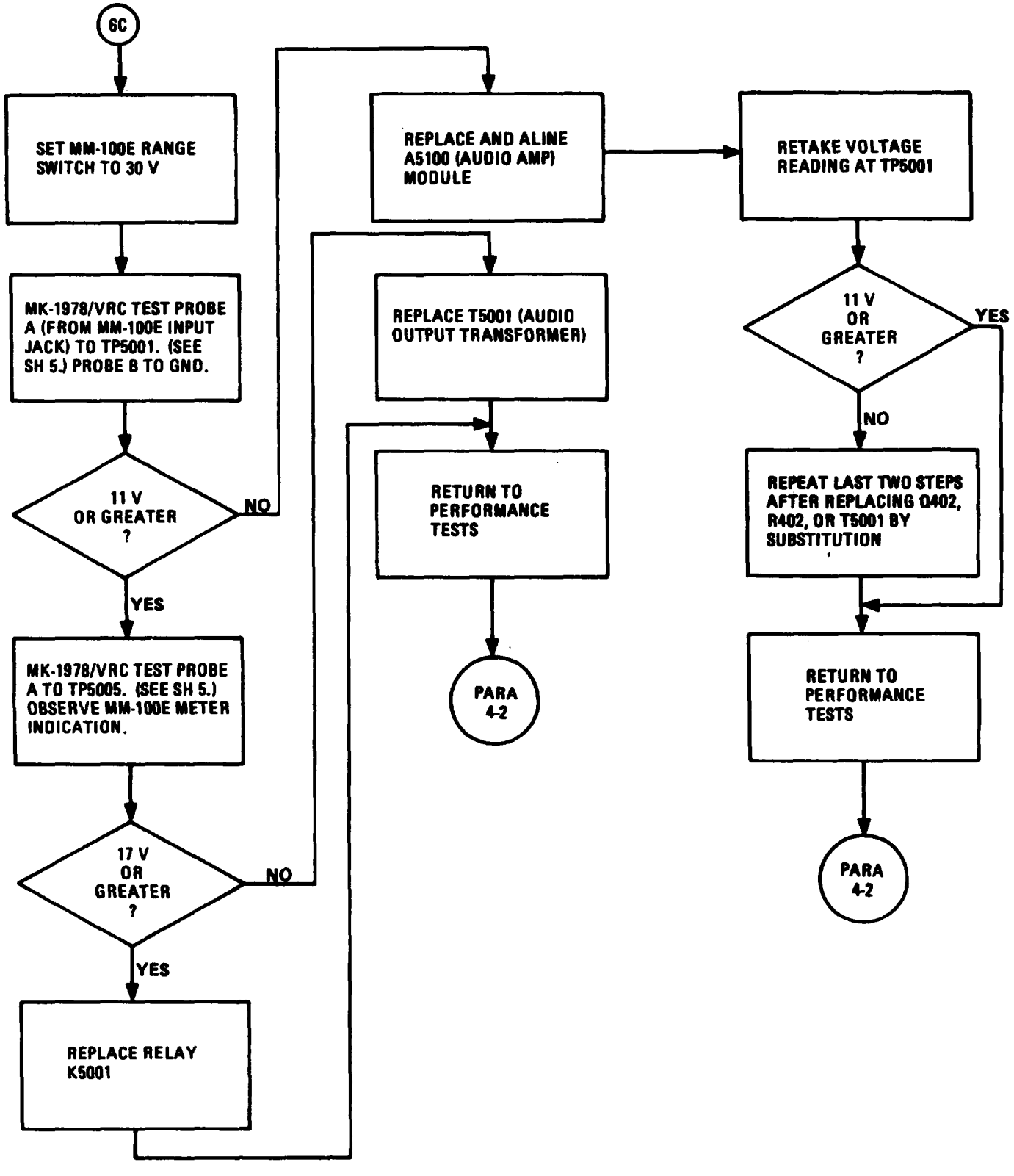
4-24 TROUBLESHOOTING FLOW CHARTS. (CONT)

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



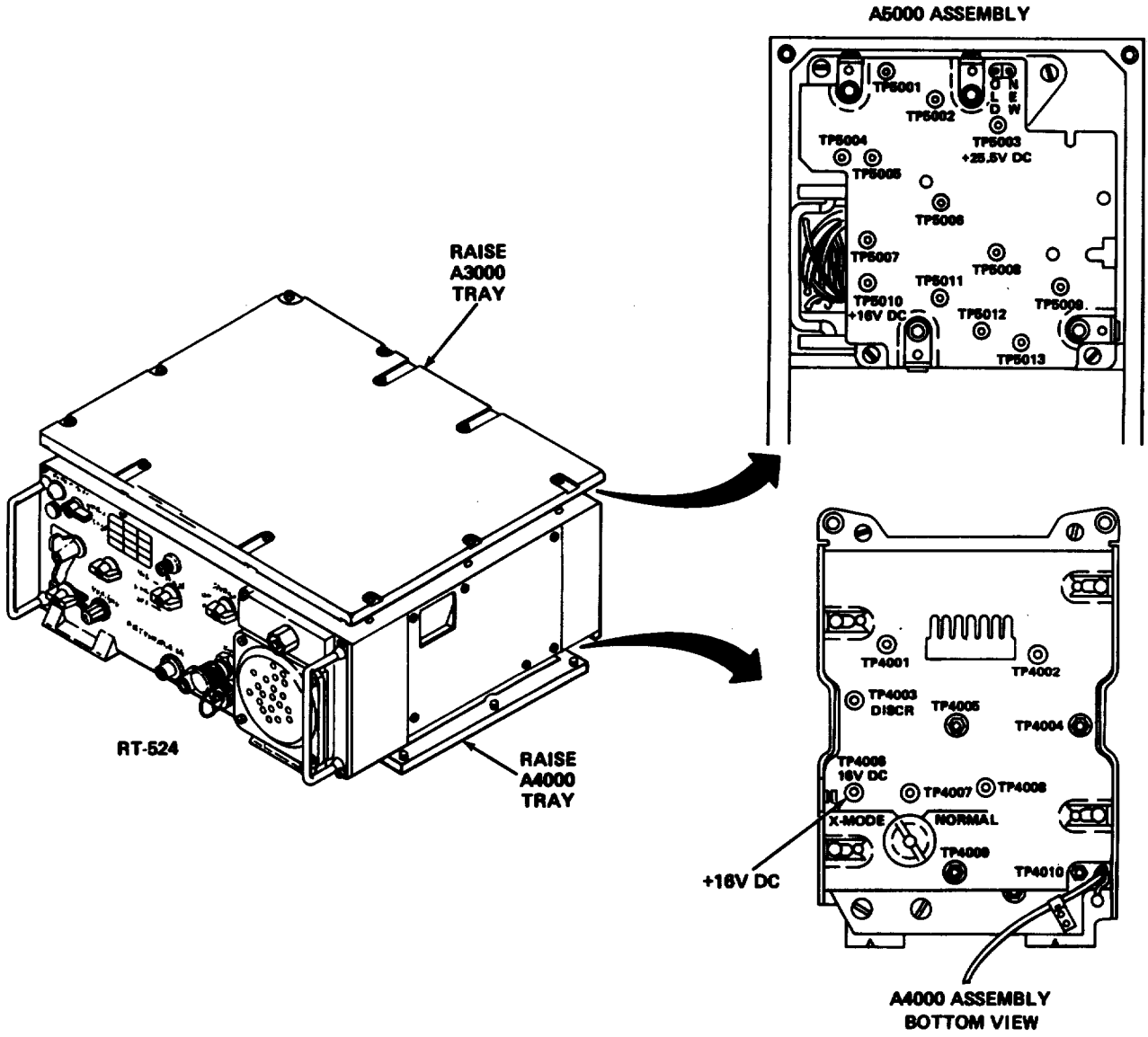
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



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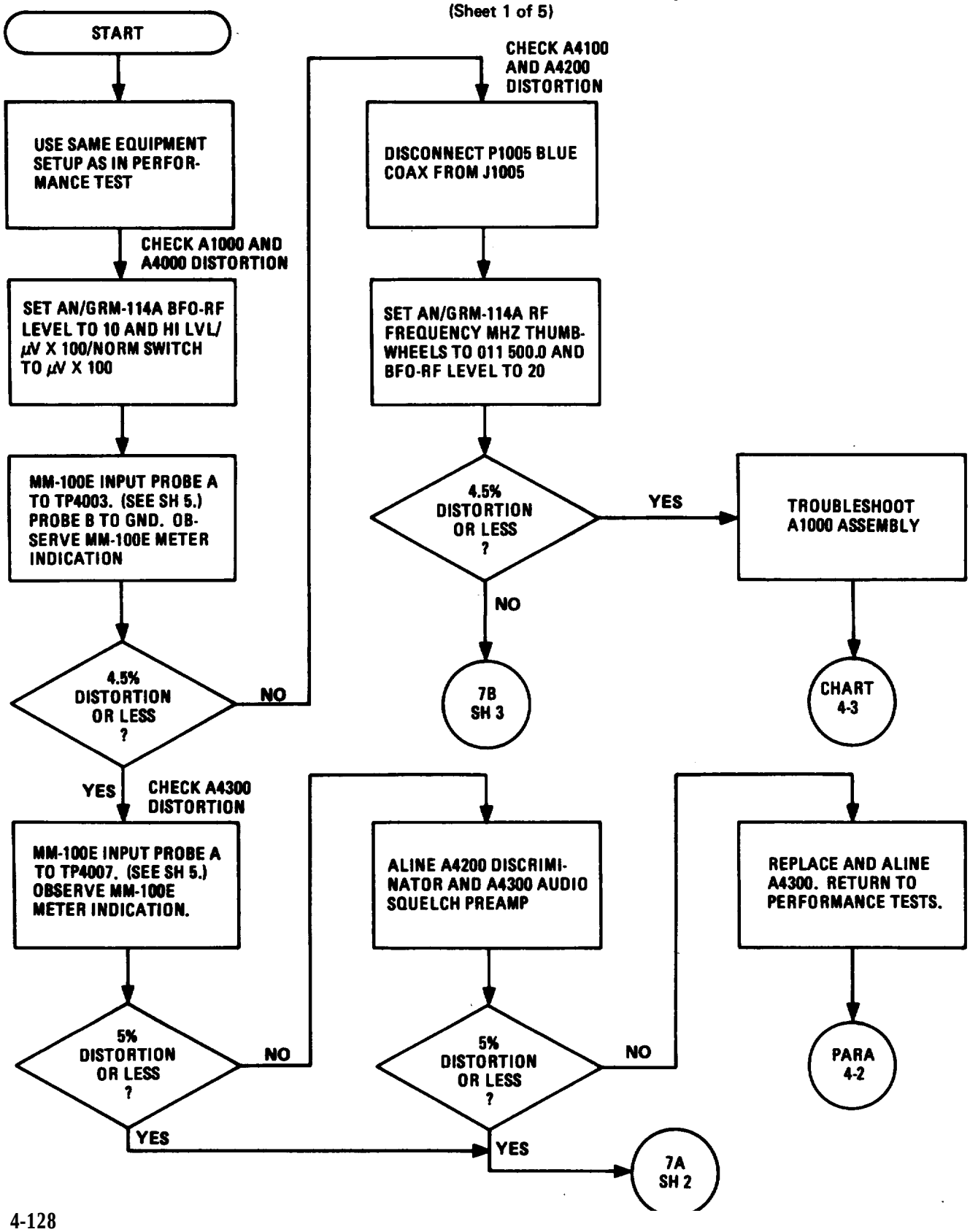
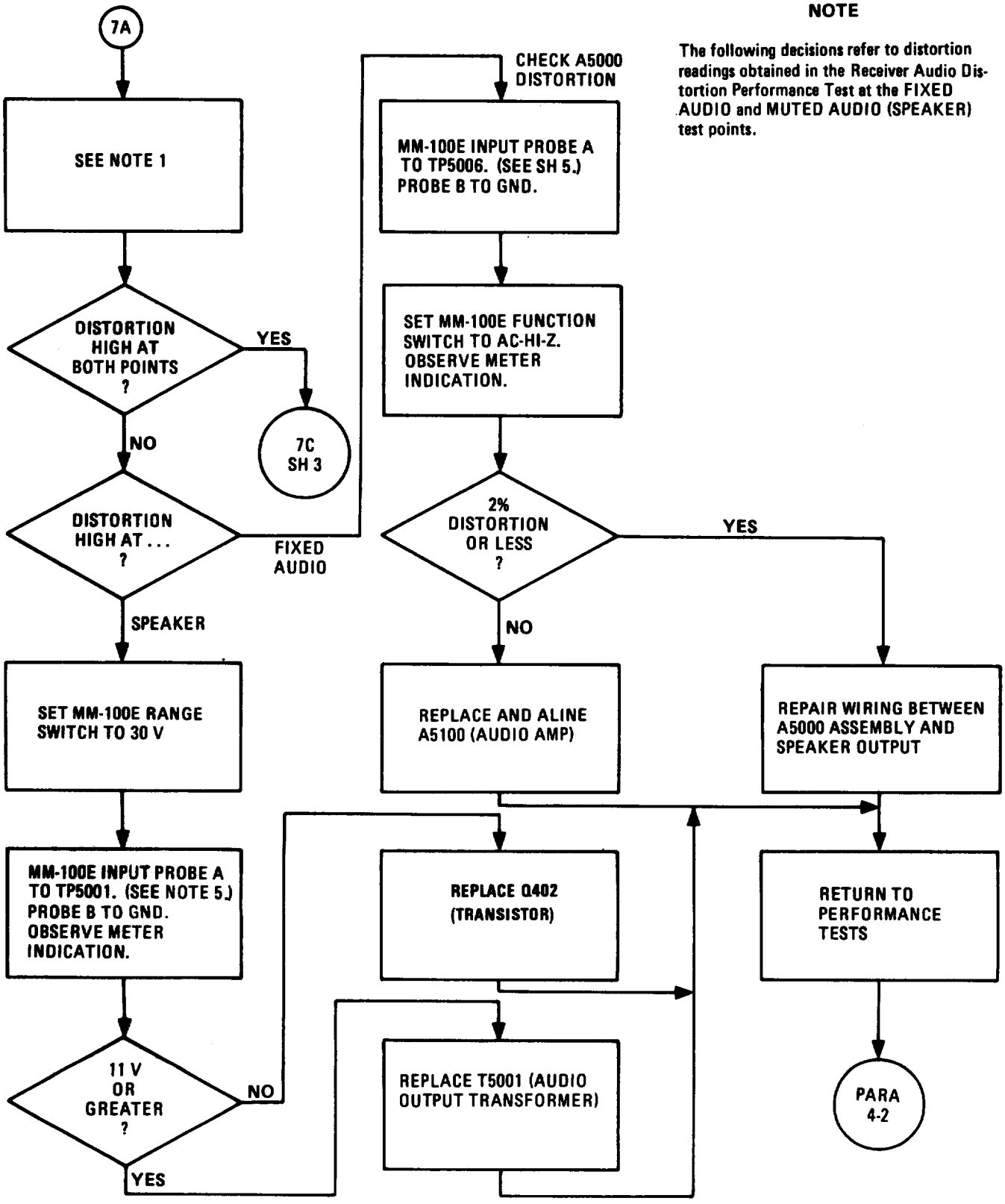
4-24. TROUBLESHOOTING FLOWCHARTS. (CONT)

CHART 4-7
Audio Distortion Test Failure Troubleshooting
(Sheet 1 of 5)



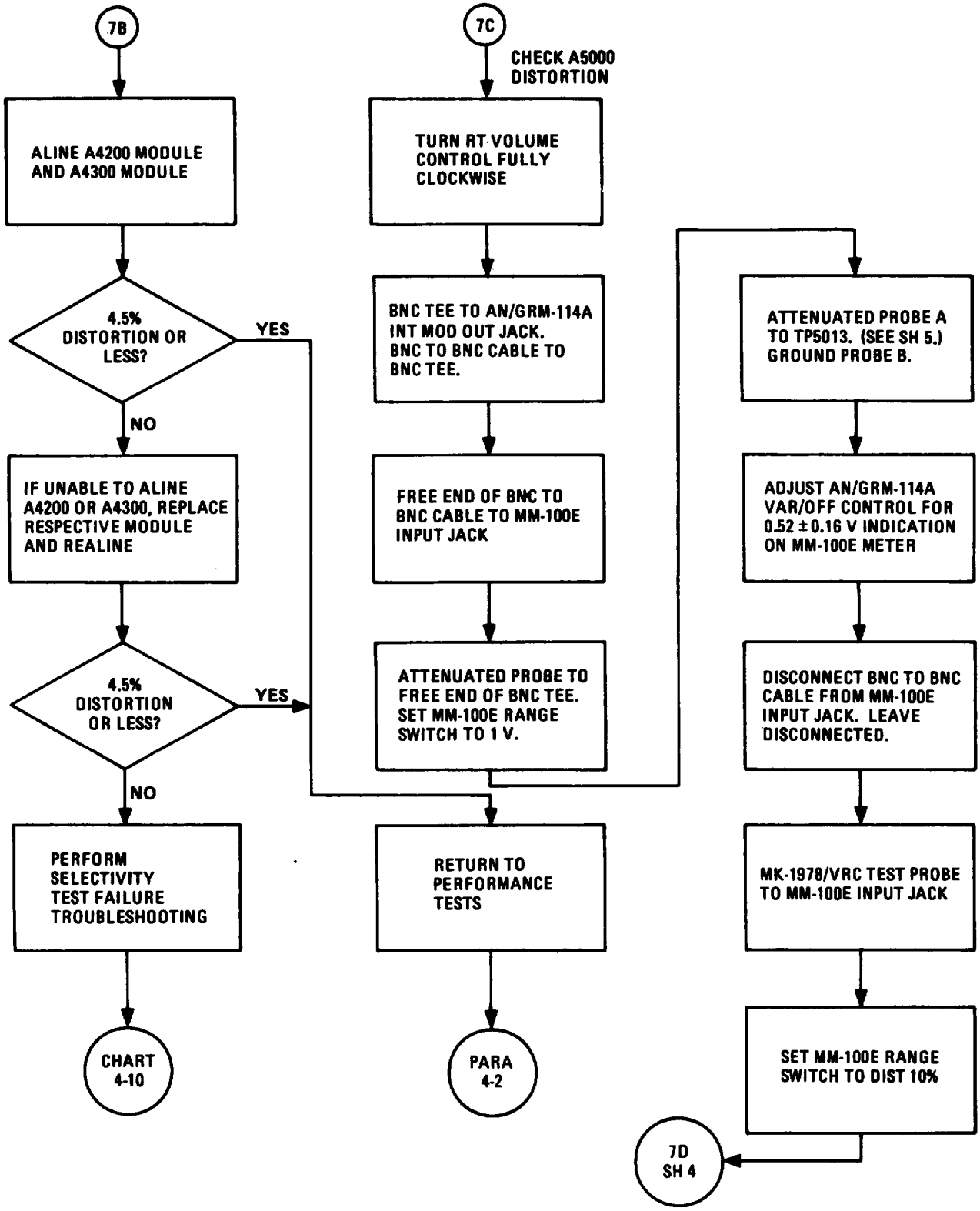
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



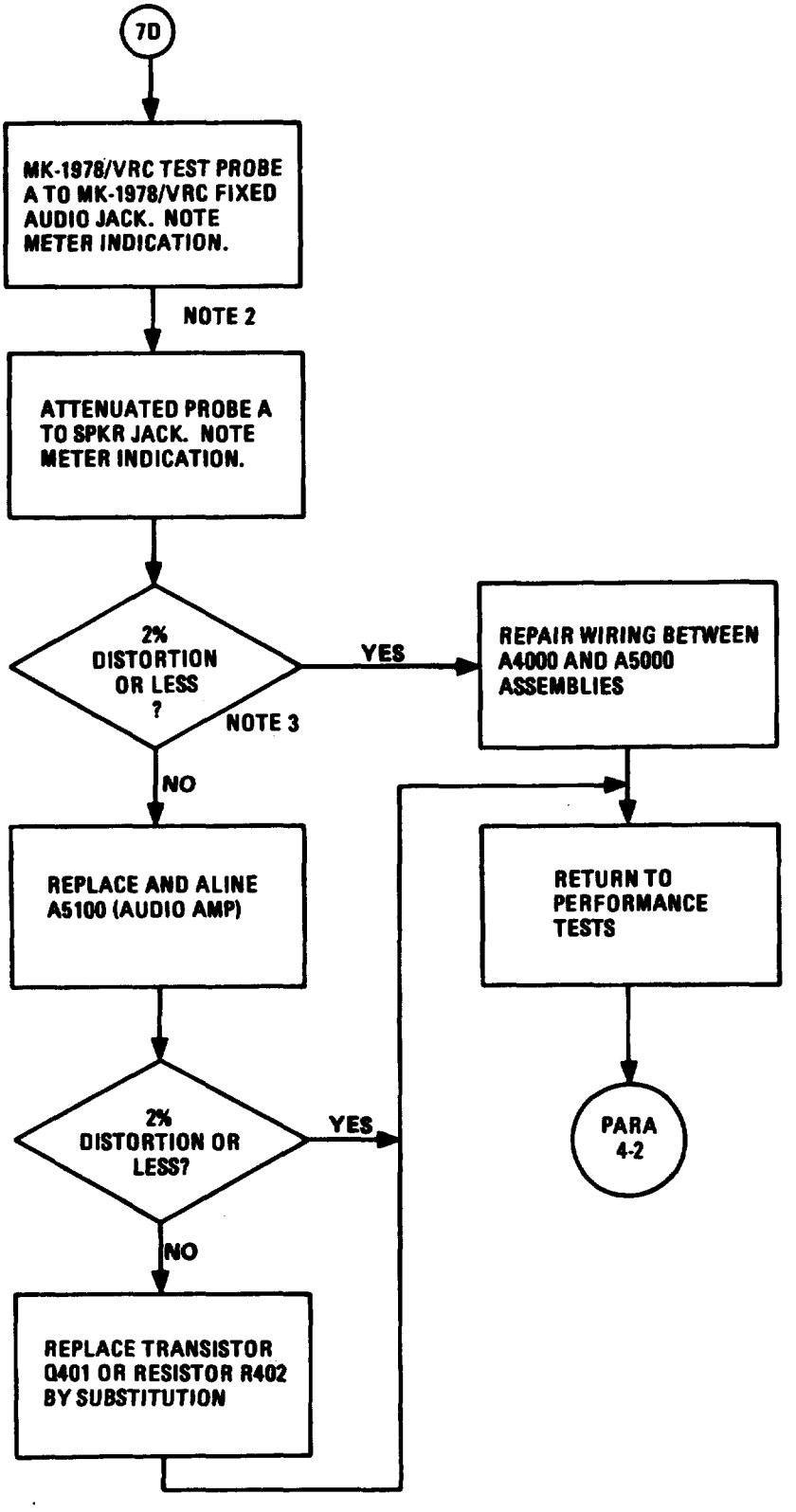
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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

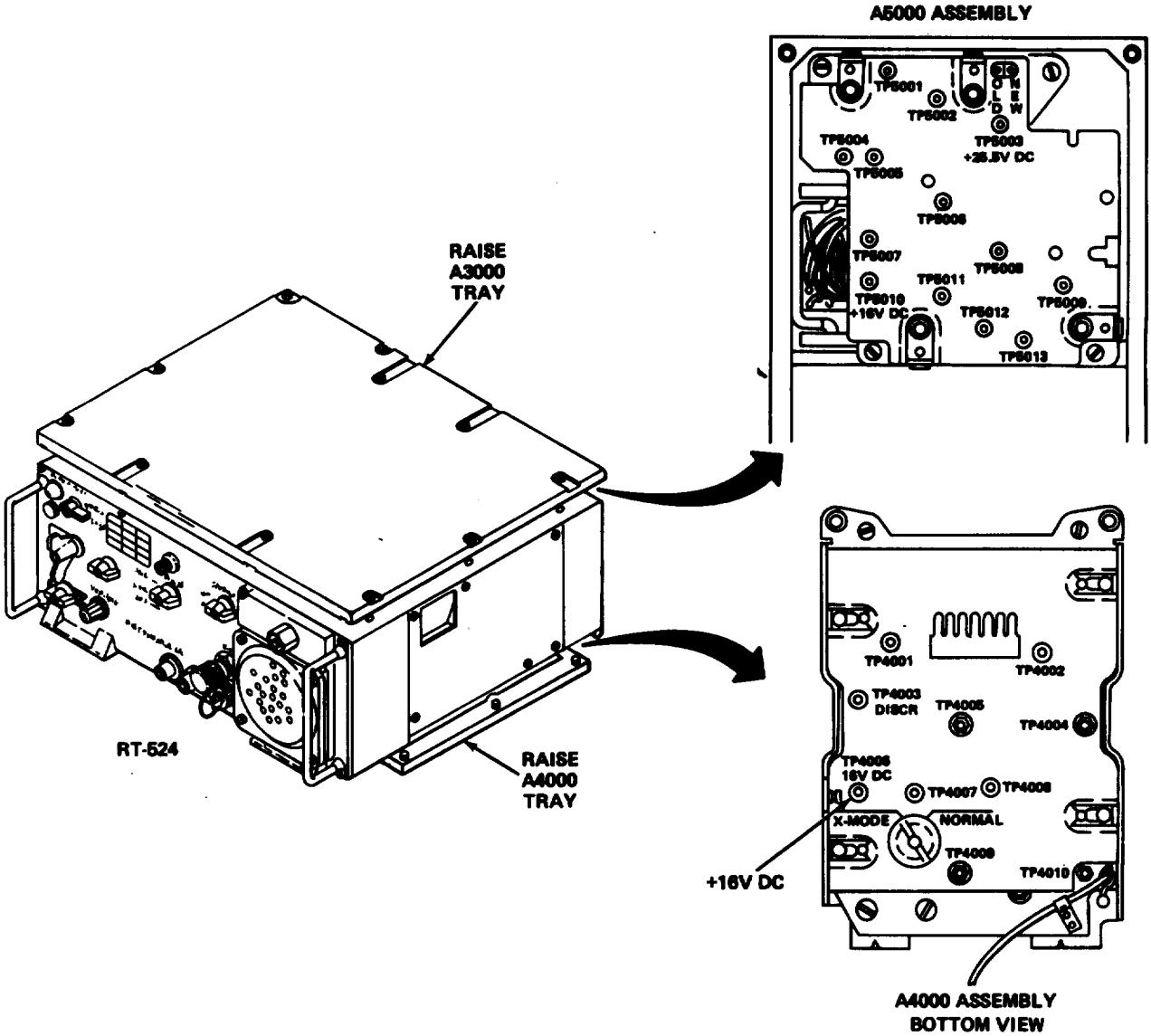


NOTES

2. Connect probe B to GND jack.
3. That is, 2% distortion or less at both FIXED AUDIO and SPKR jacks.

4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



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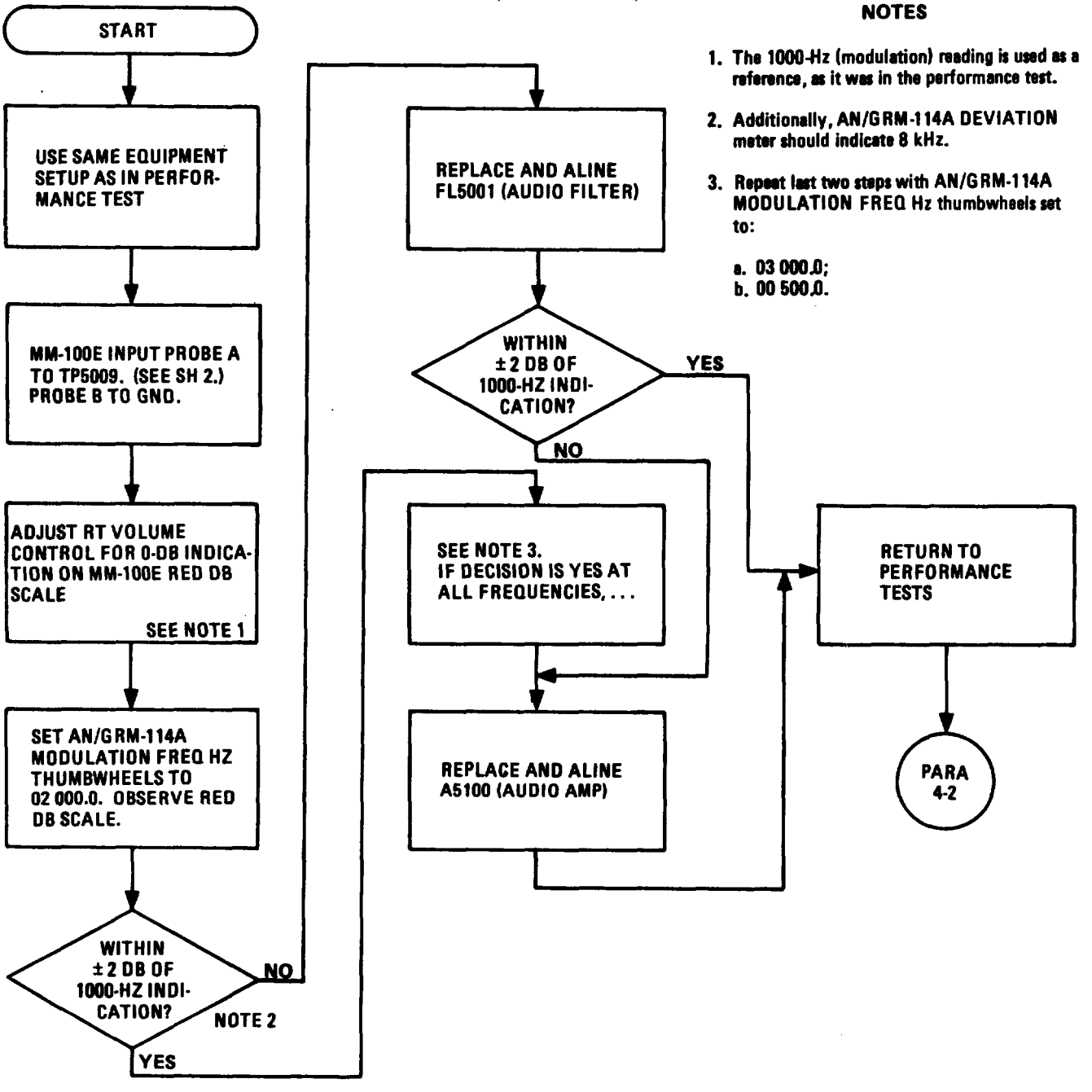
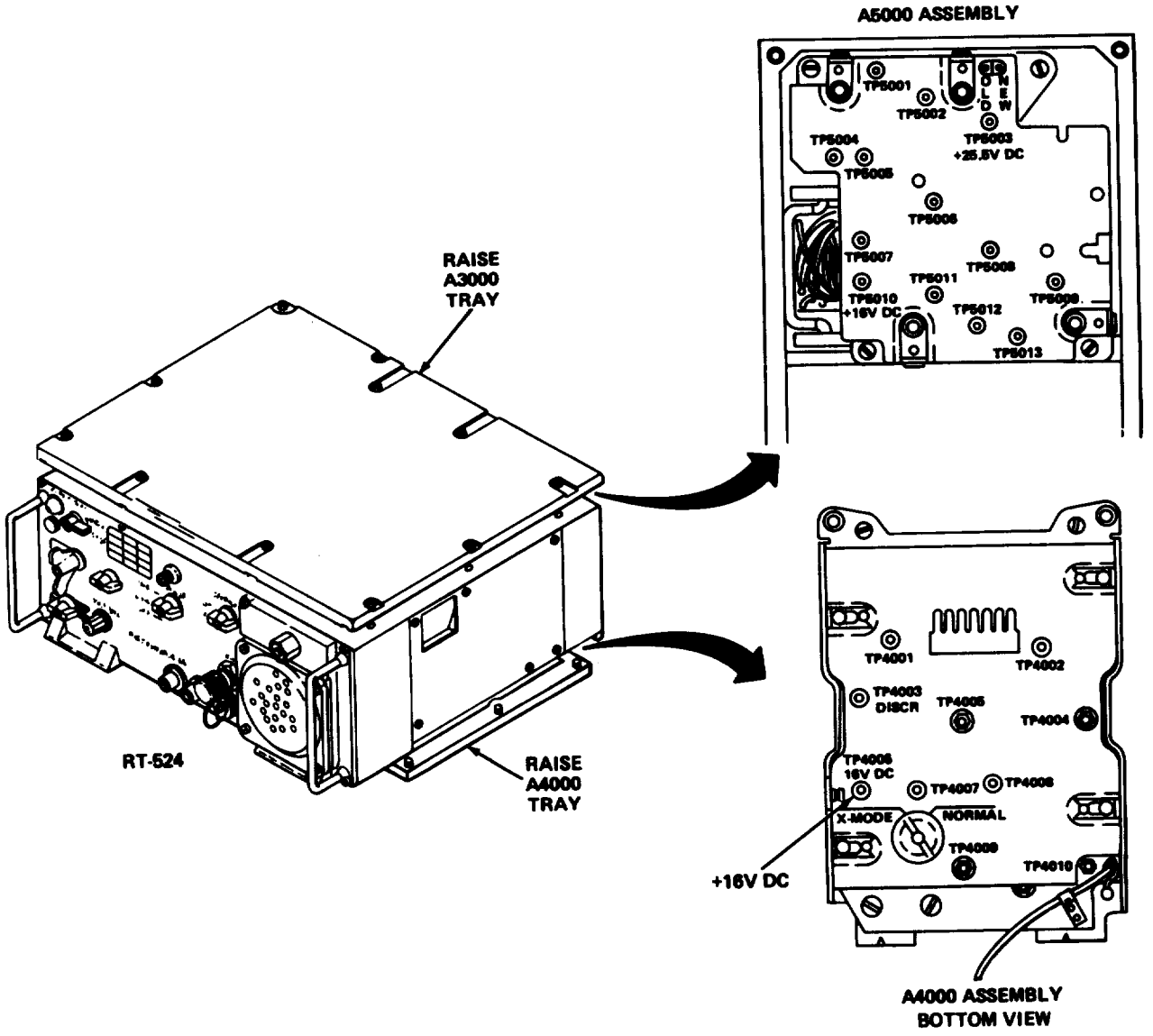
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



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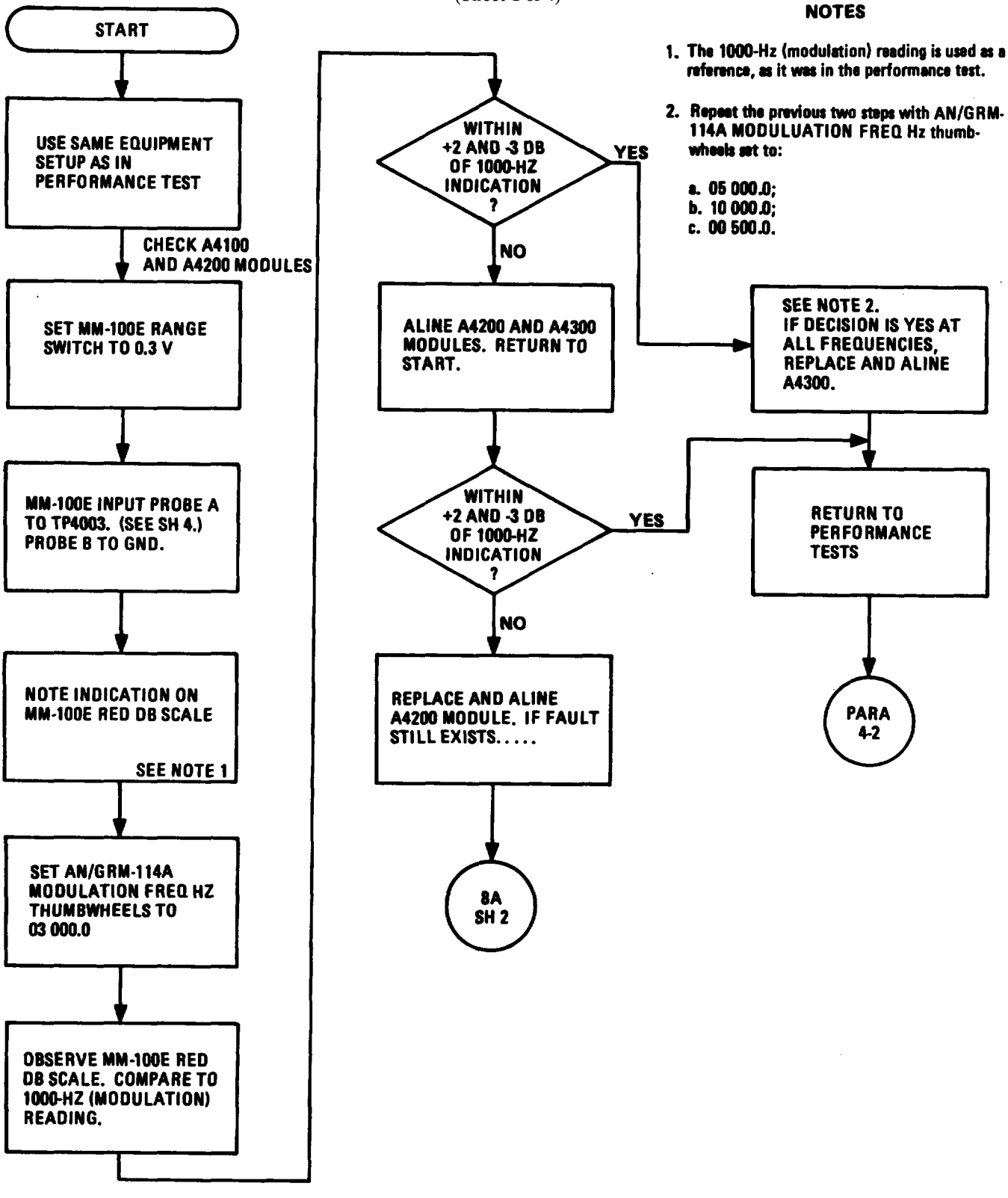
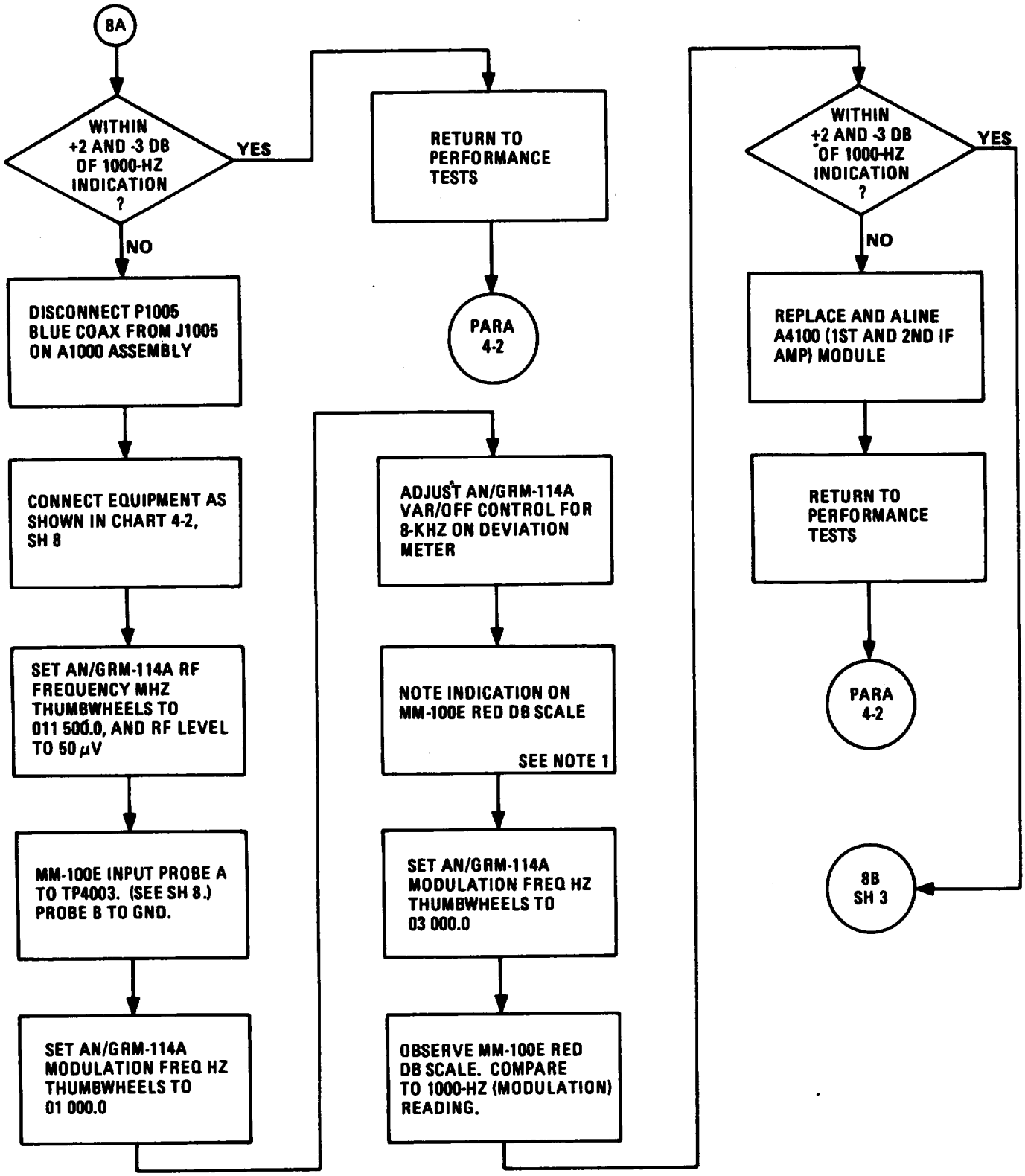
4--24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



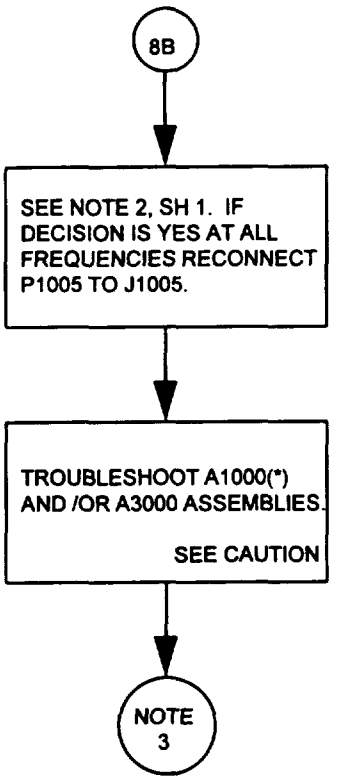
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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)



NOTE

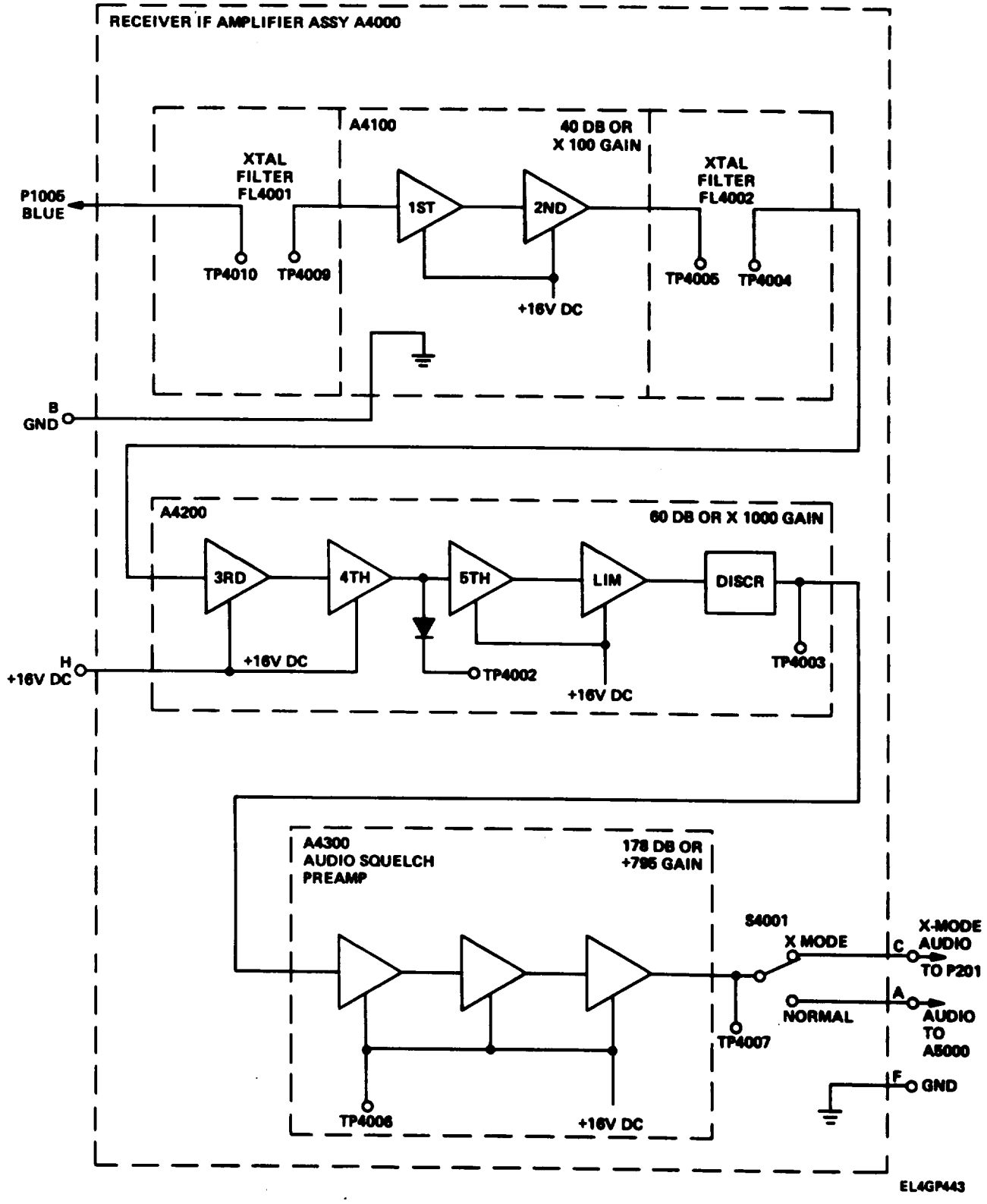
3. A1000(*) assembly troubleshooting is on chart 4-3; A3000 troubleshooting, Chart 4-4.

CAUTION

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

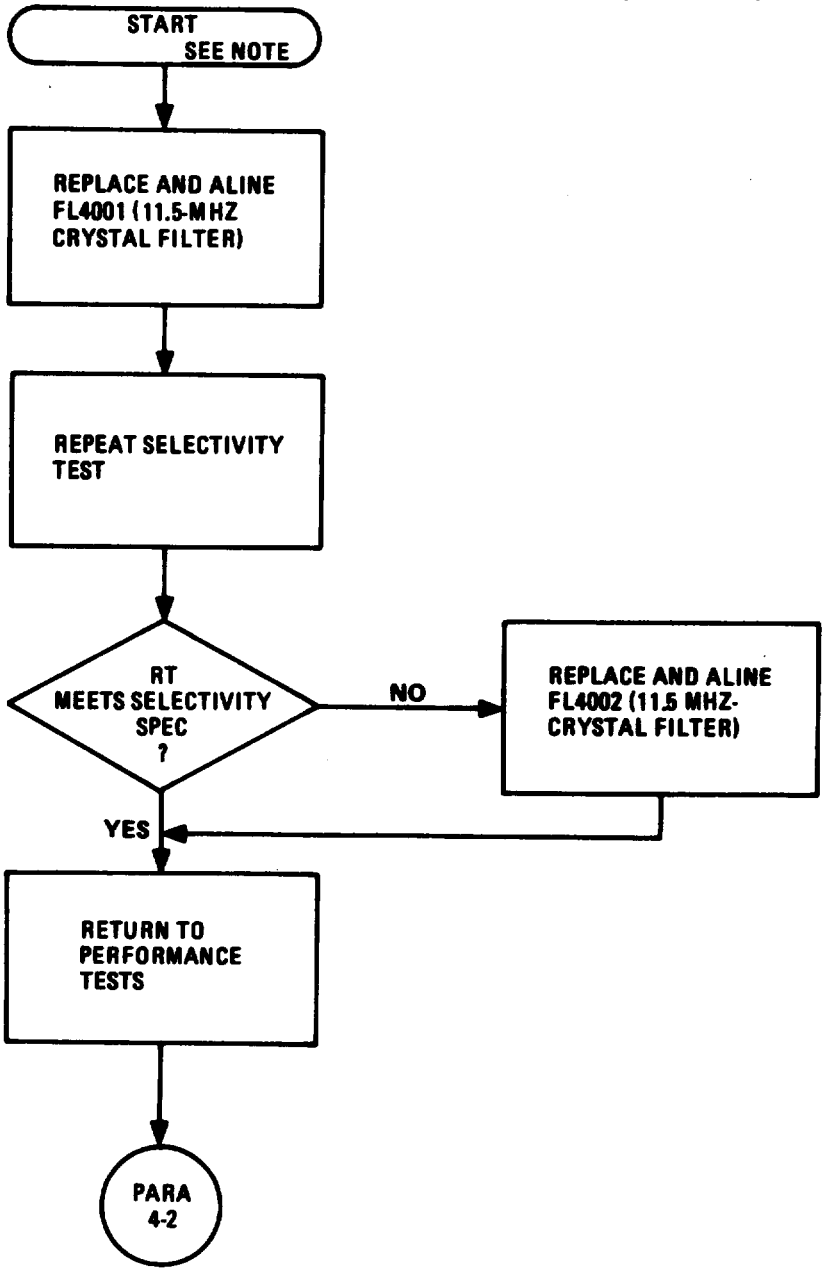
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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

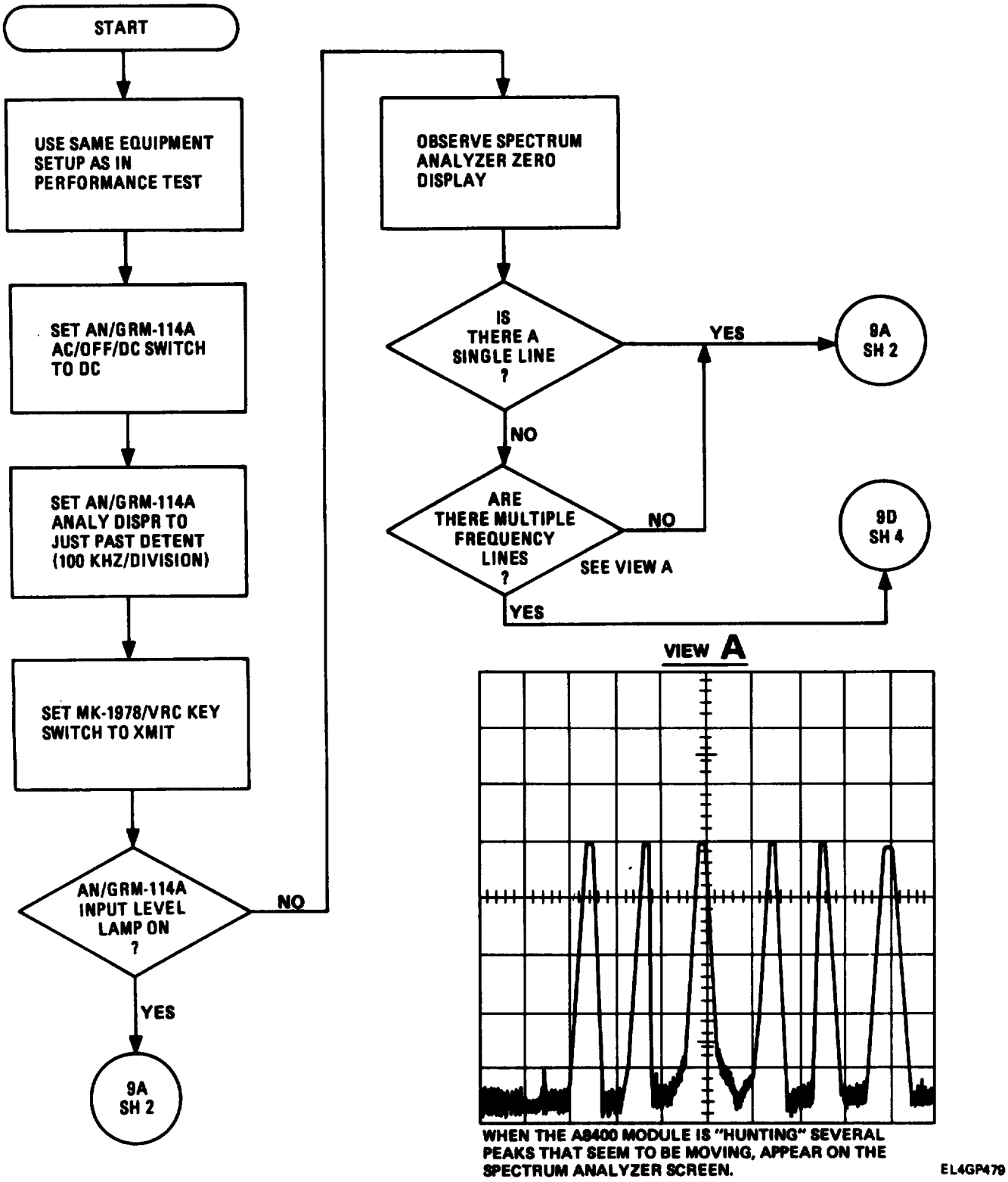


NOTE

Use same equipment setup as in performance test.

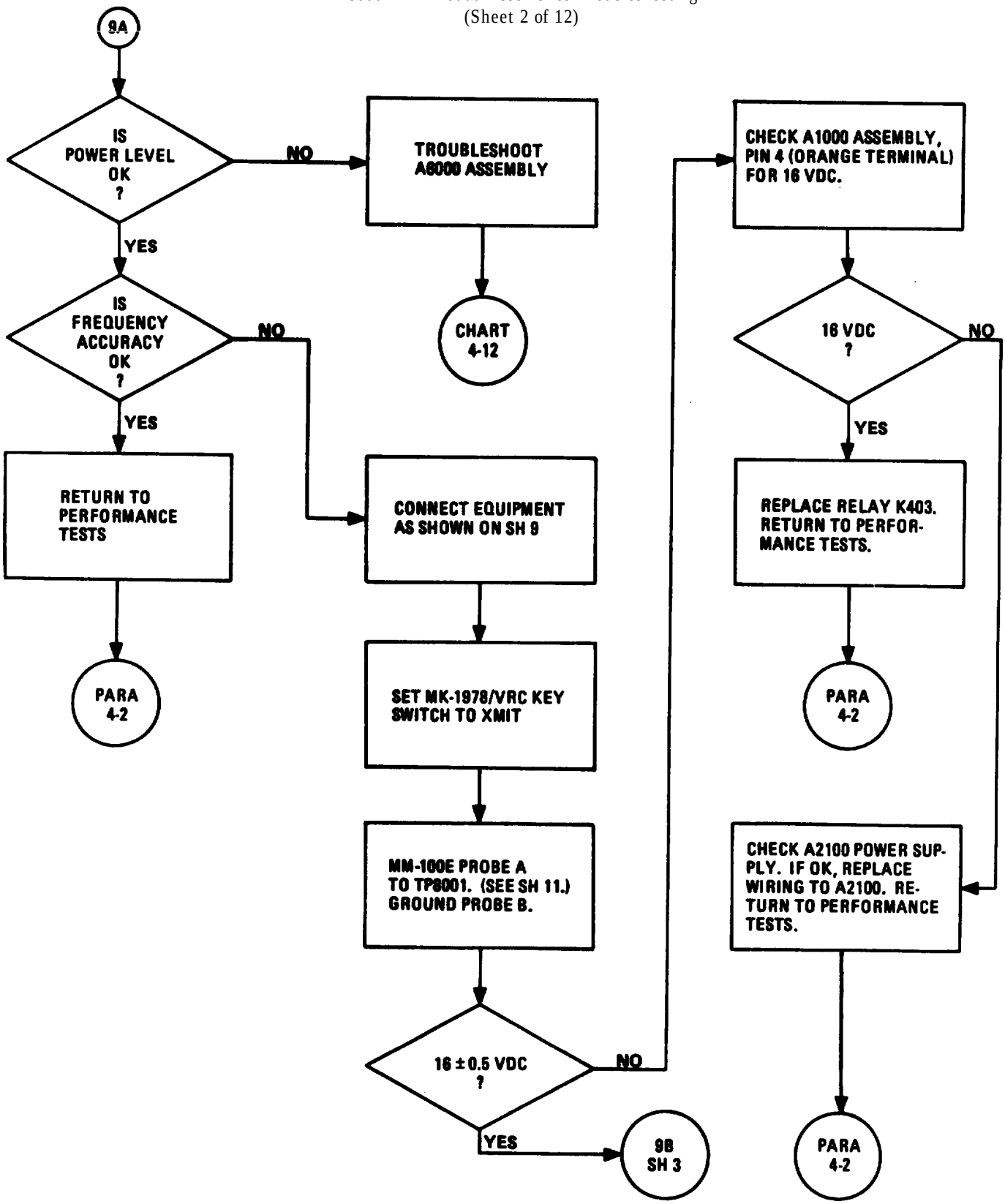
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



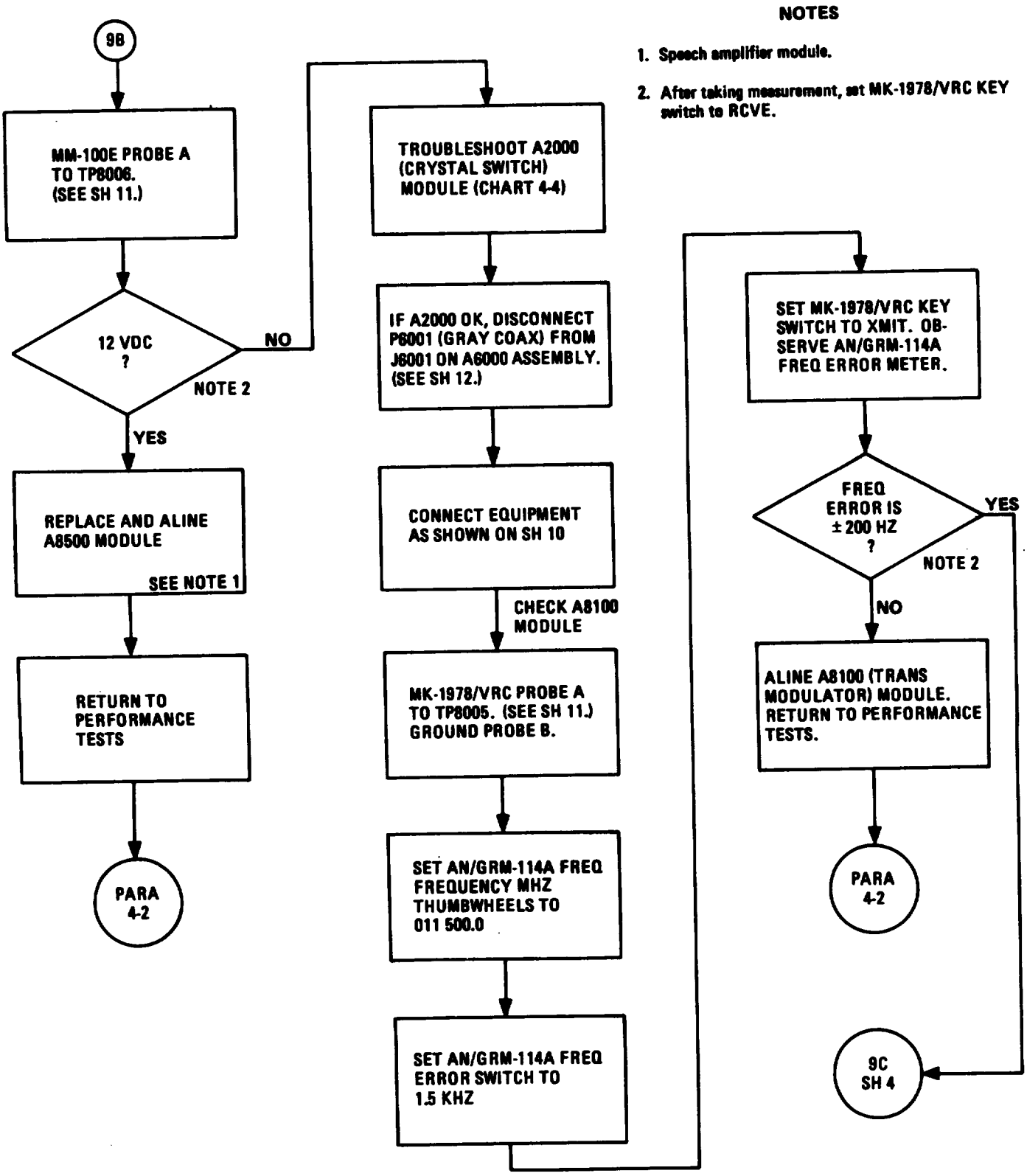
4-24. TROUBLESHOOTING FLOW CHARTS (CONT)

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



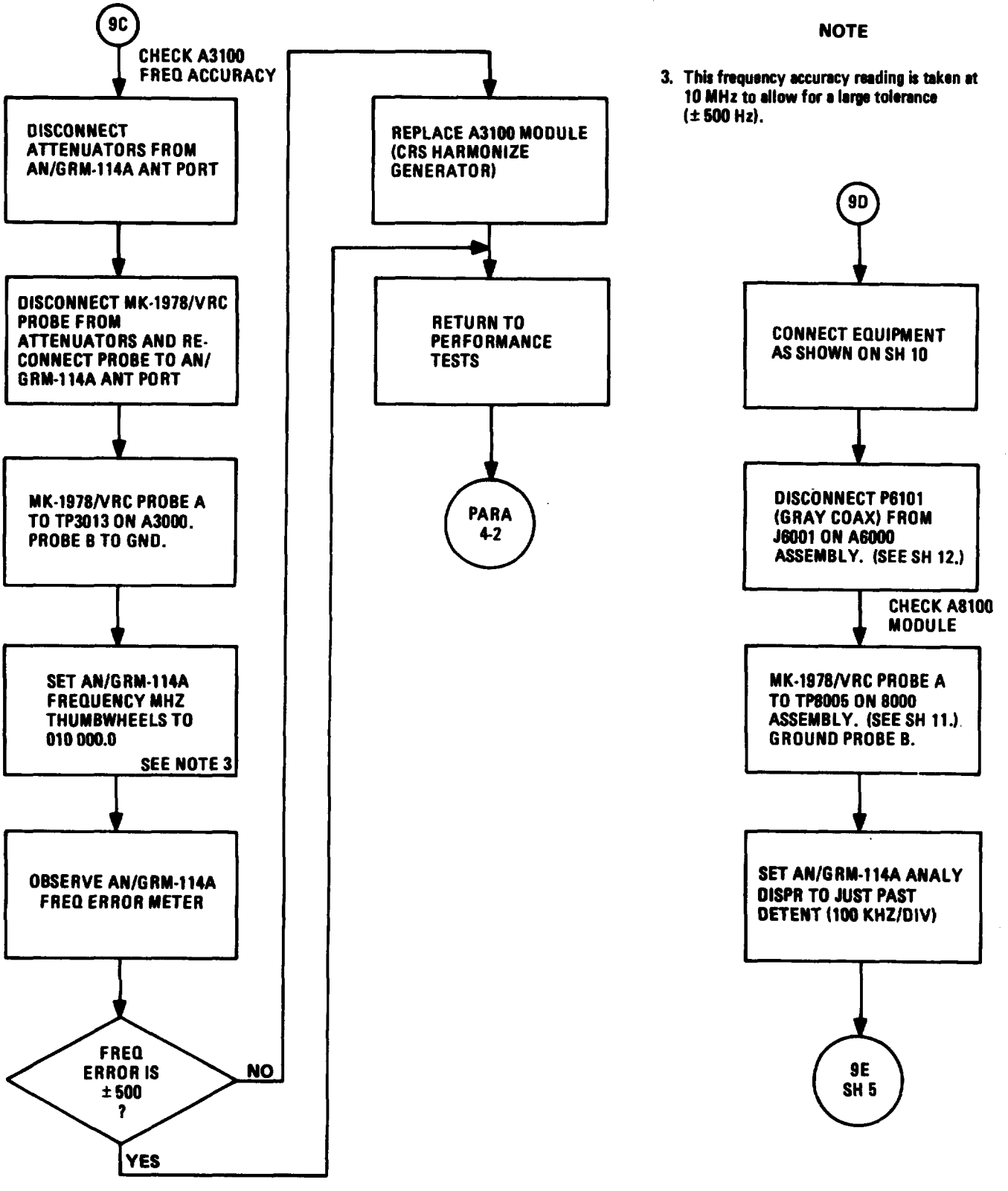
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

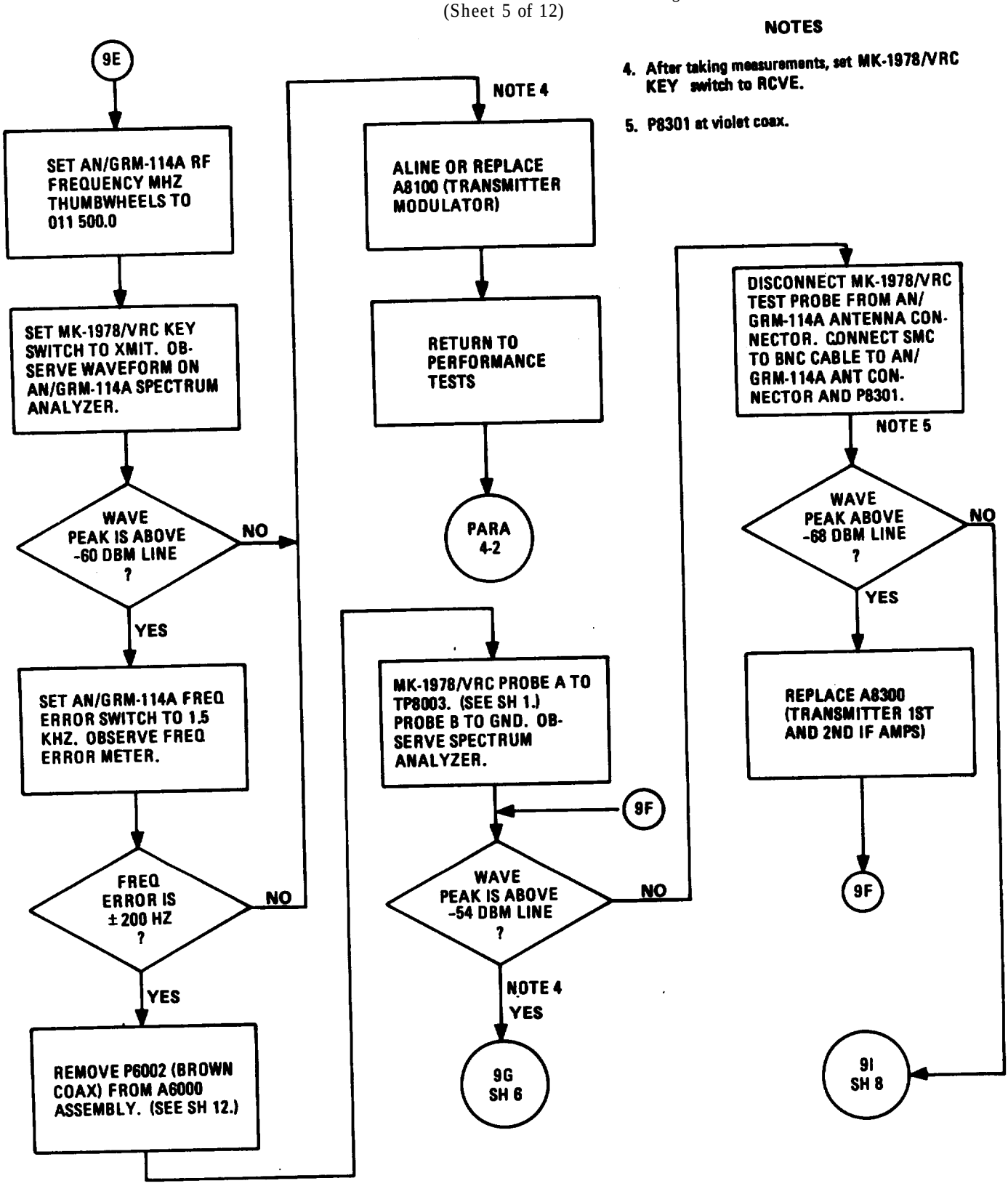
CHART 4-11
A8000 and A6000 Assemblies Troubleshooting
(Sheet 4 of 12)



4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

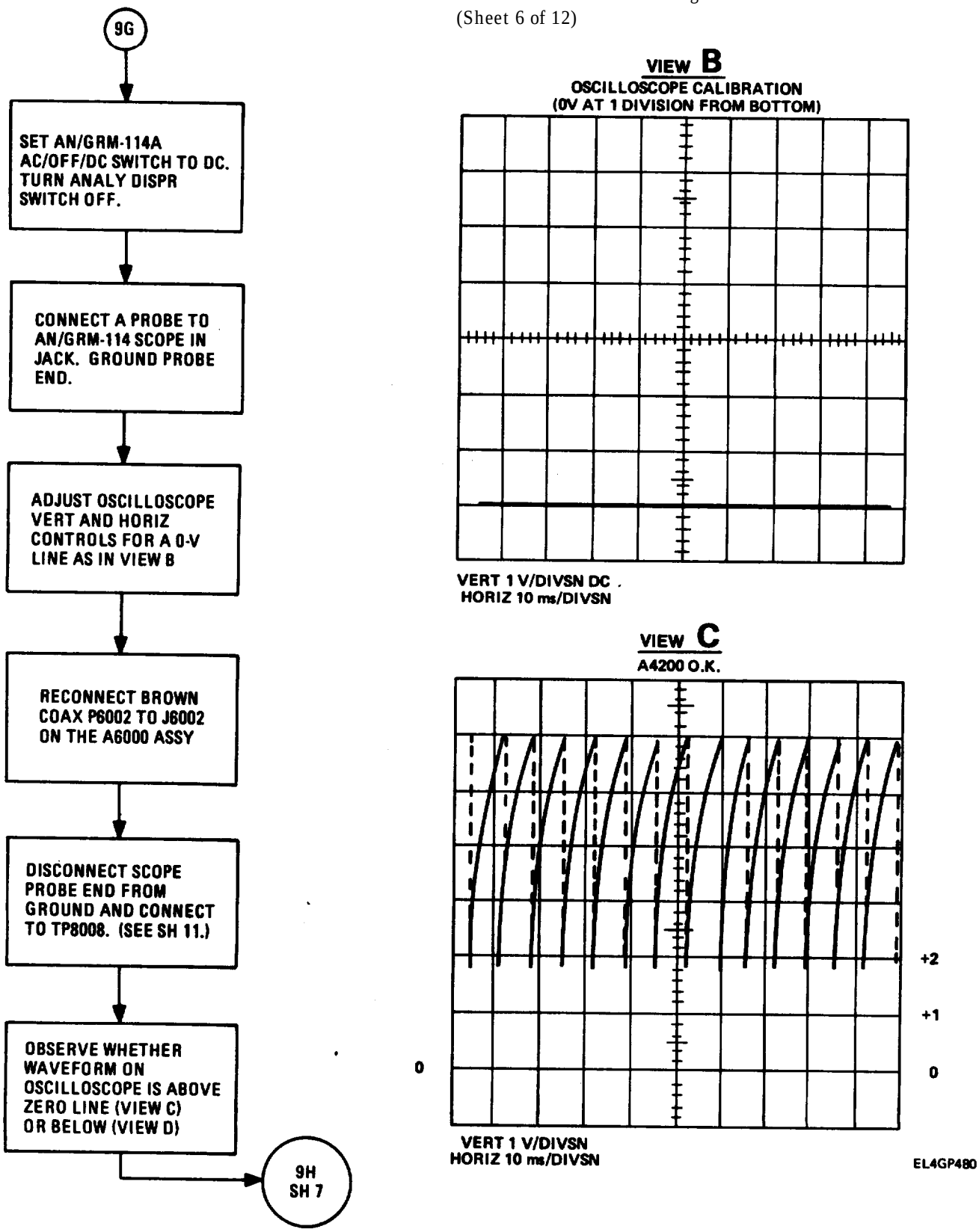
CHART 4-11

A8000 and A6000 Assemblies Troubleshooting
(Sheet 5 of 12)



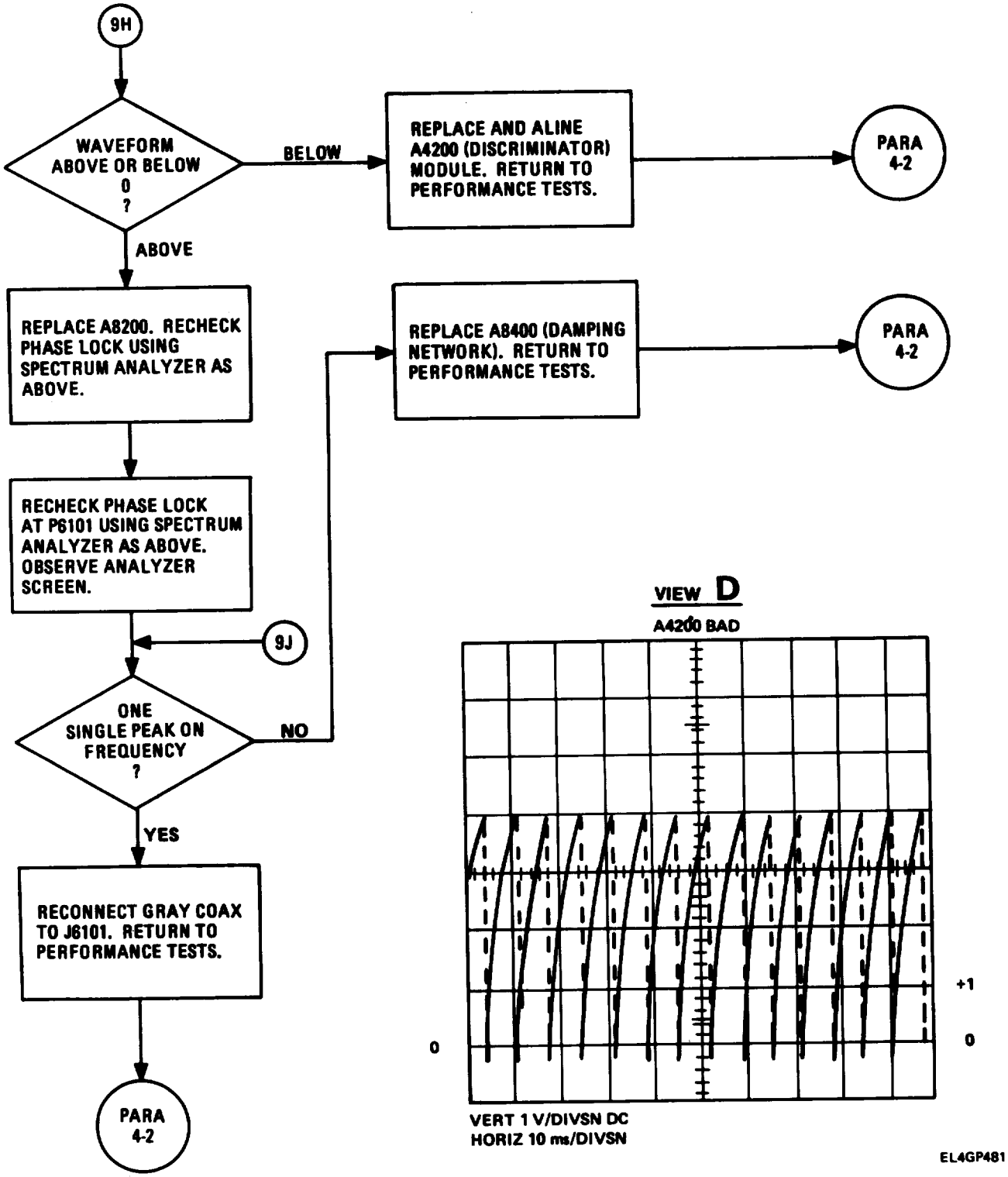
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



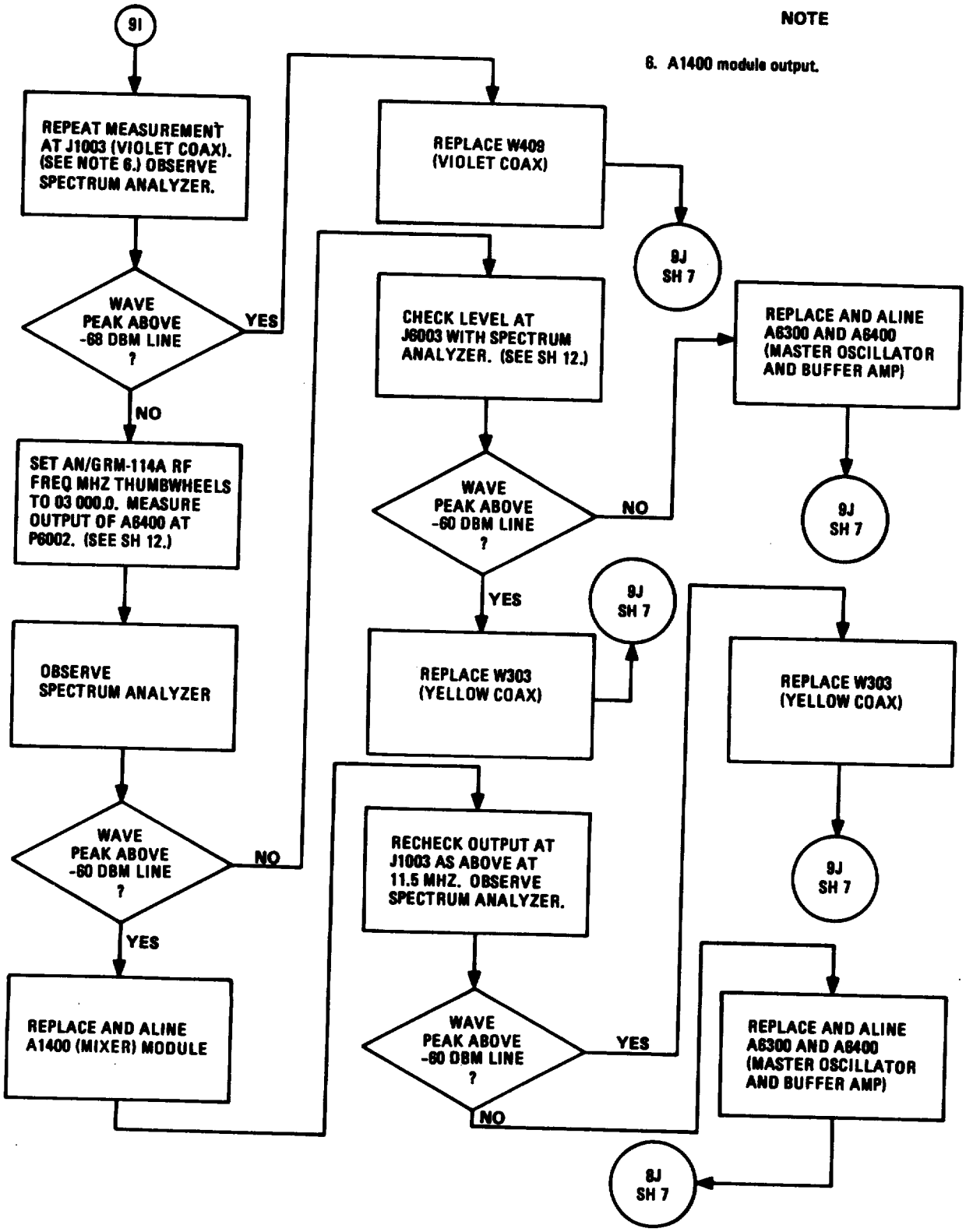
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



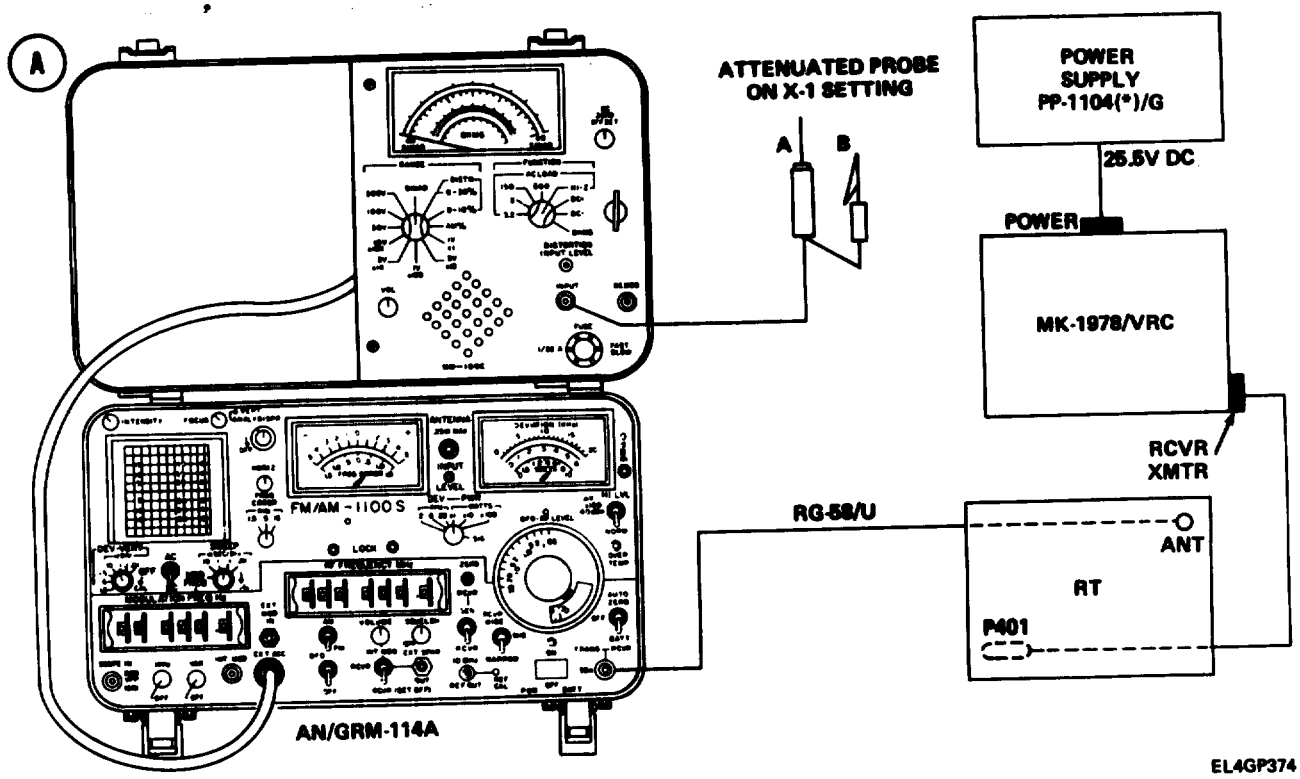
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



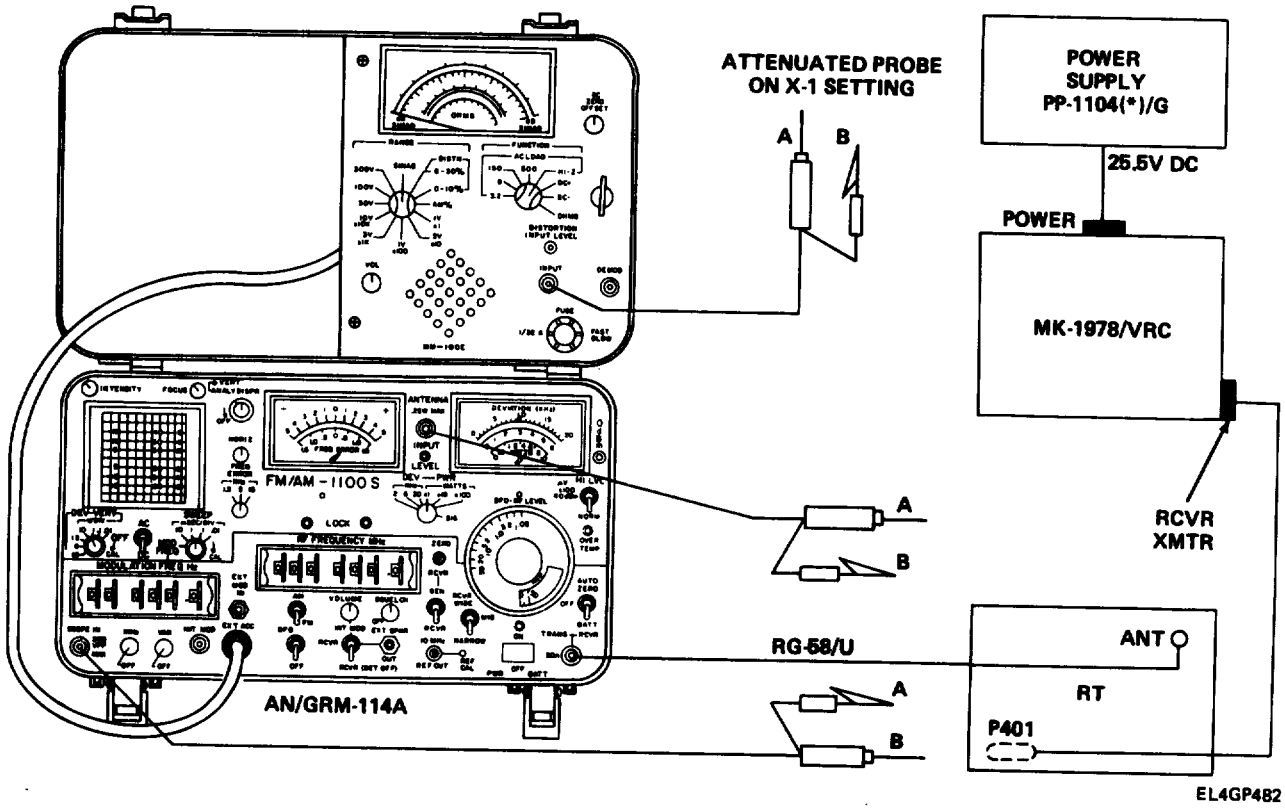
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-11
A8000 and A6000 Assemblies Troubleshooting
(Sheet 9 of 12)



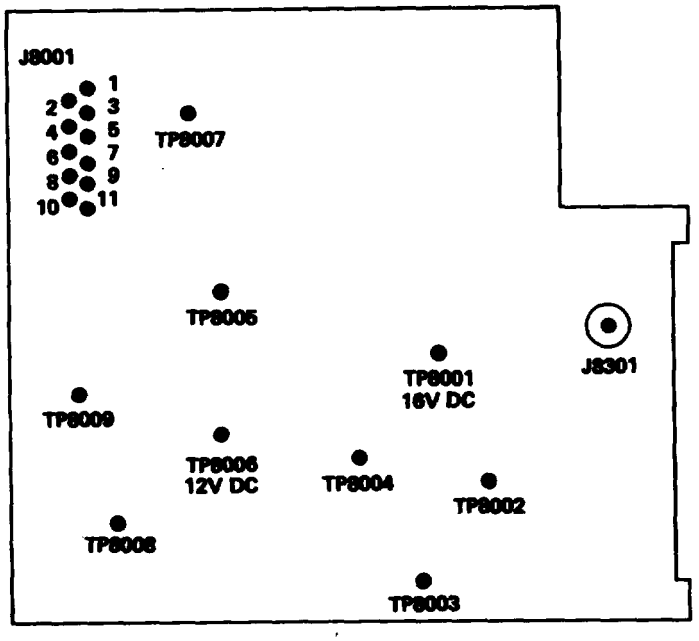
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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)



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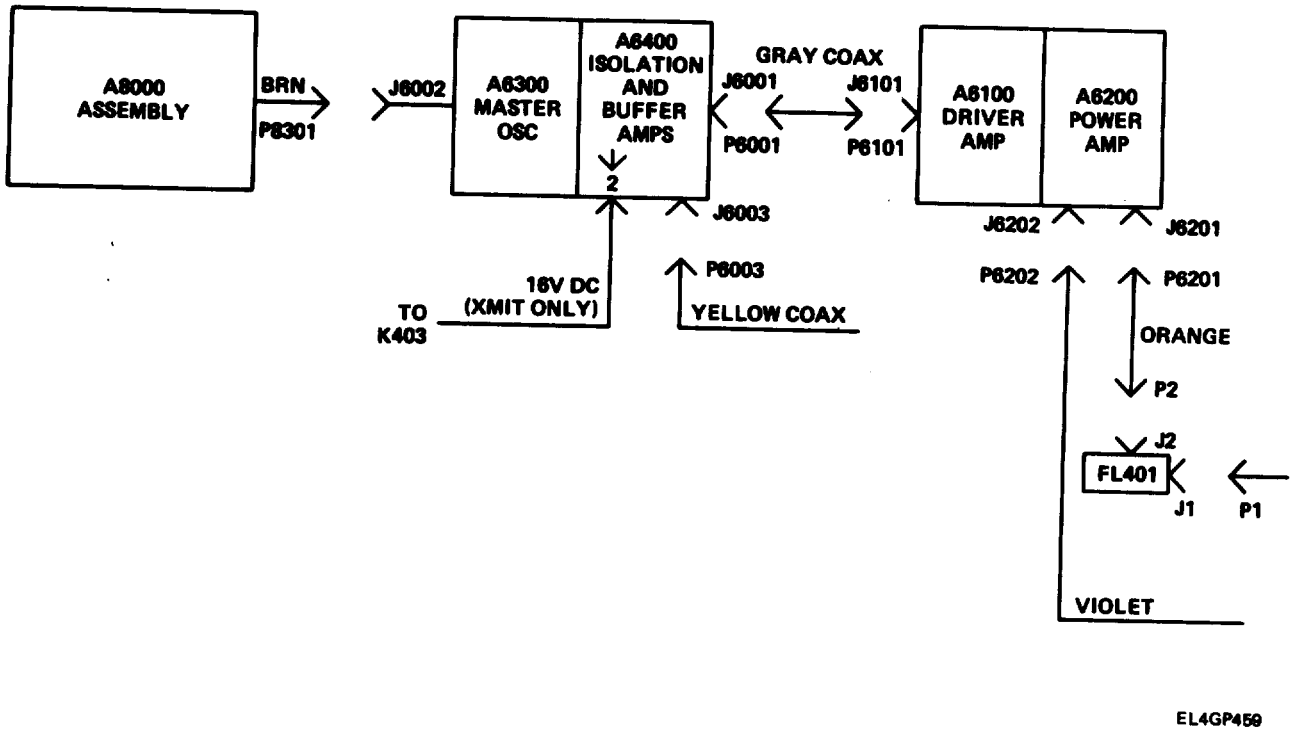
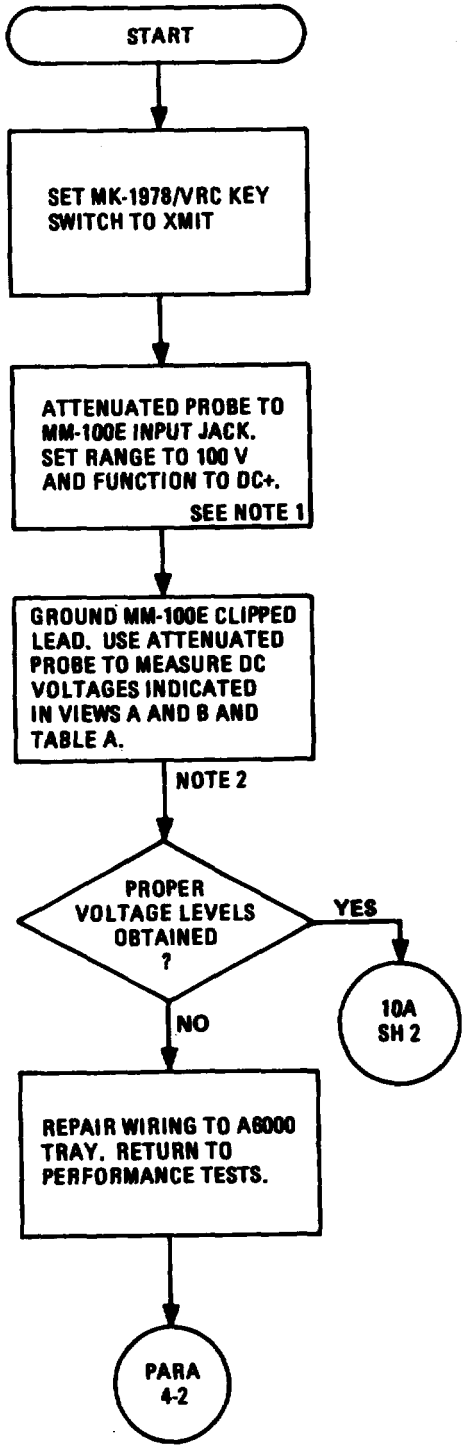
4-24. TROUBLESHOOTING FLOW CHARTS (CONT)

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-1978/VRC to RCVE.

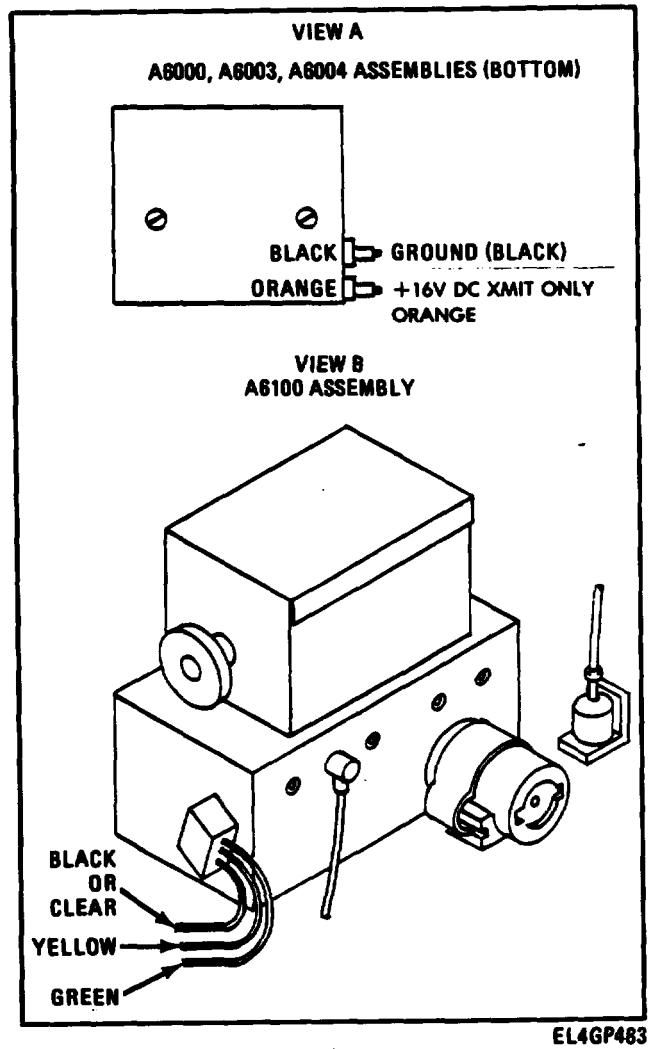
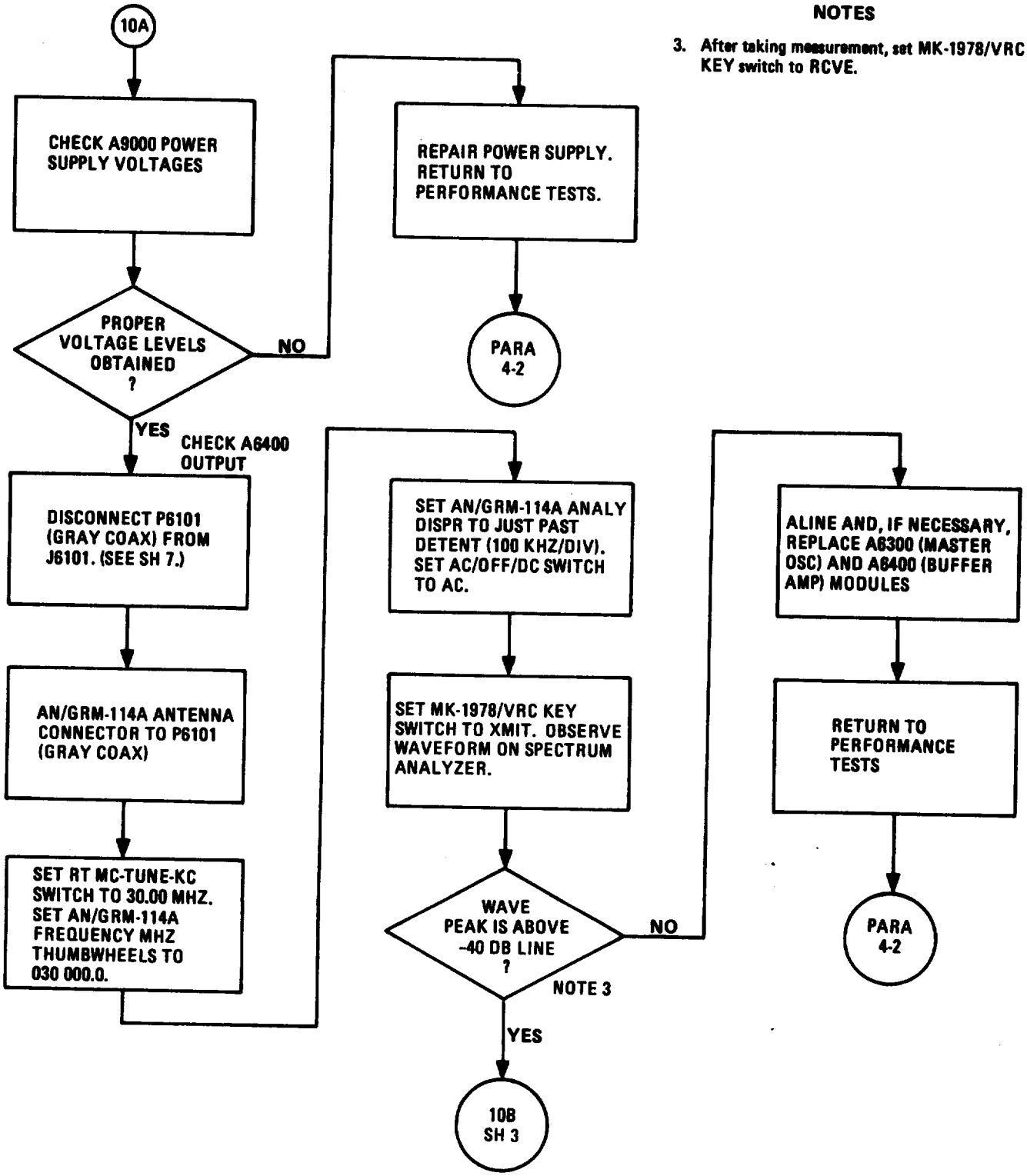


TABLE A

WIRE COLOR	RT HIGH POWER	RT LOW POWER
GREEN	205 ± 40 vdc	65 ± 13 vdc
YELLOW	220 ± 44 vdc	0 vdc
CLEAR	220 ± 44 vdc	0 vdc

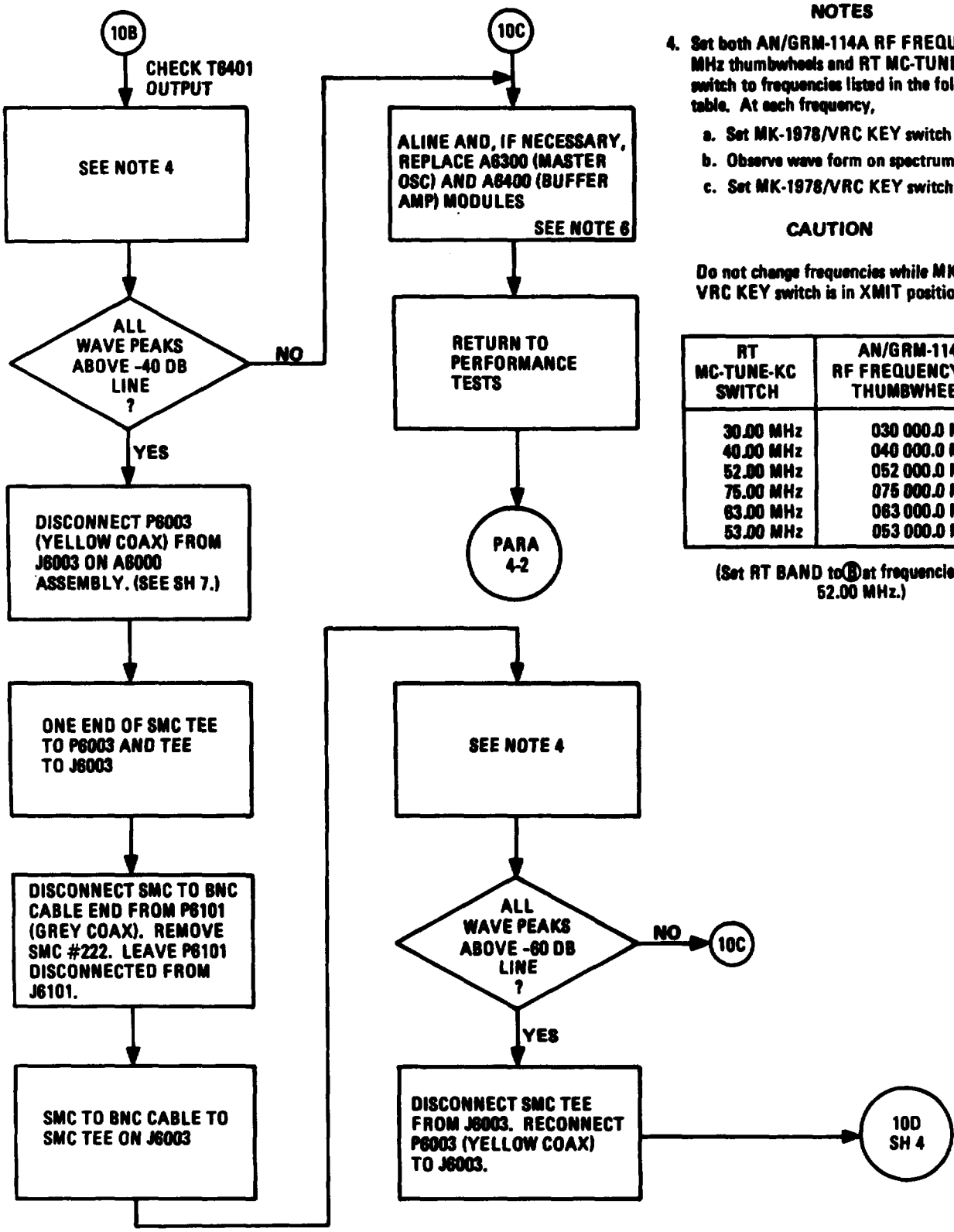
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



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

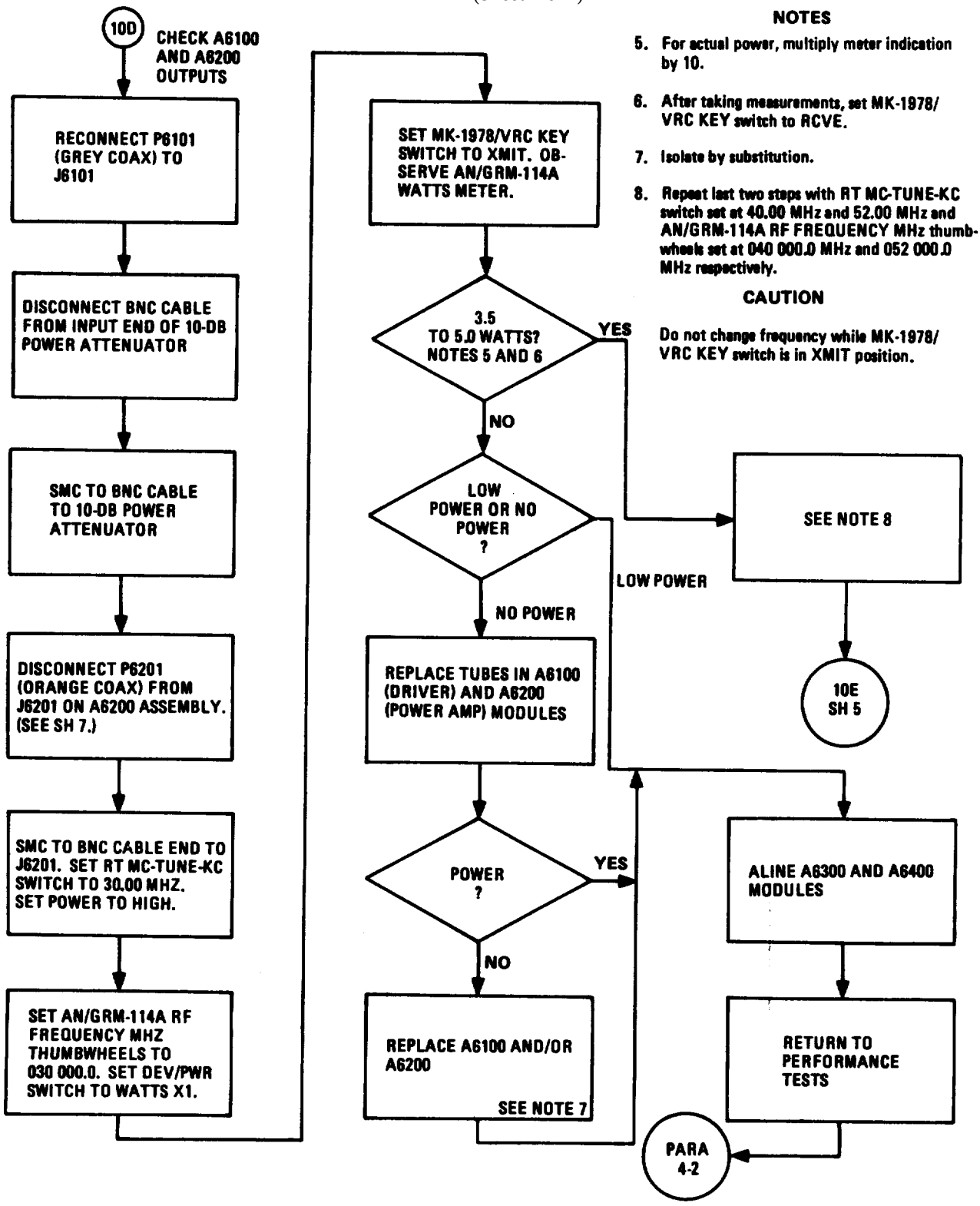
Do not change frequencies while MK-1978/VRC KEY switch is in XMIT position.

RT MC-TUNE-KC SWITCH	AN/GRM-114A RF FREQUENCY MHz THUMBWHEELS
30.00 MHz	030 000.0 MHz
40.00 MHz	040 000.0 MHz
52.00 MHz	052 000.0 MHz
75.00 MHz	075 000.0 MHz
63.00 MHz	063 000.0 MHz
53.00 MHz	053 000.0 MHz

(Set RT BAND to (B) at frequencies above 52.00 MHz.)

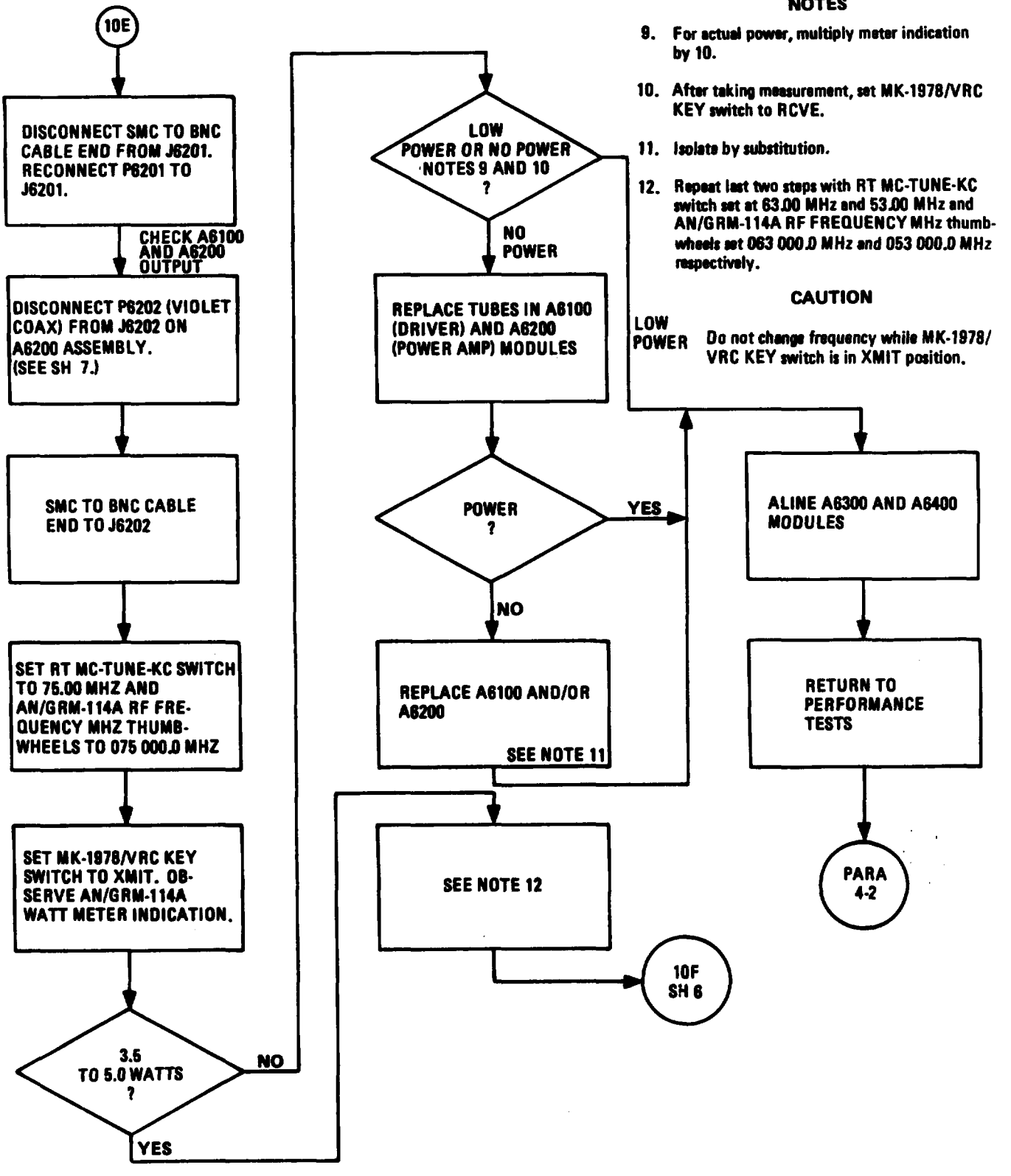
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



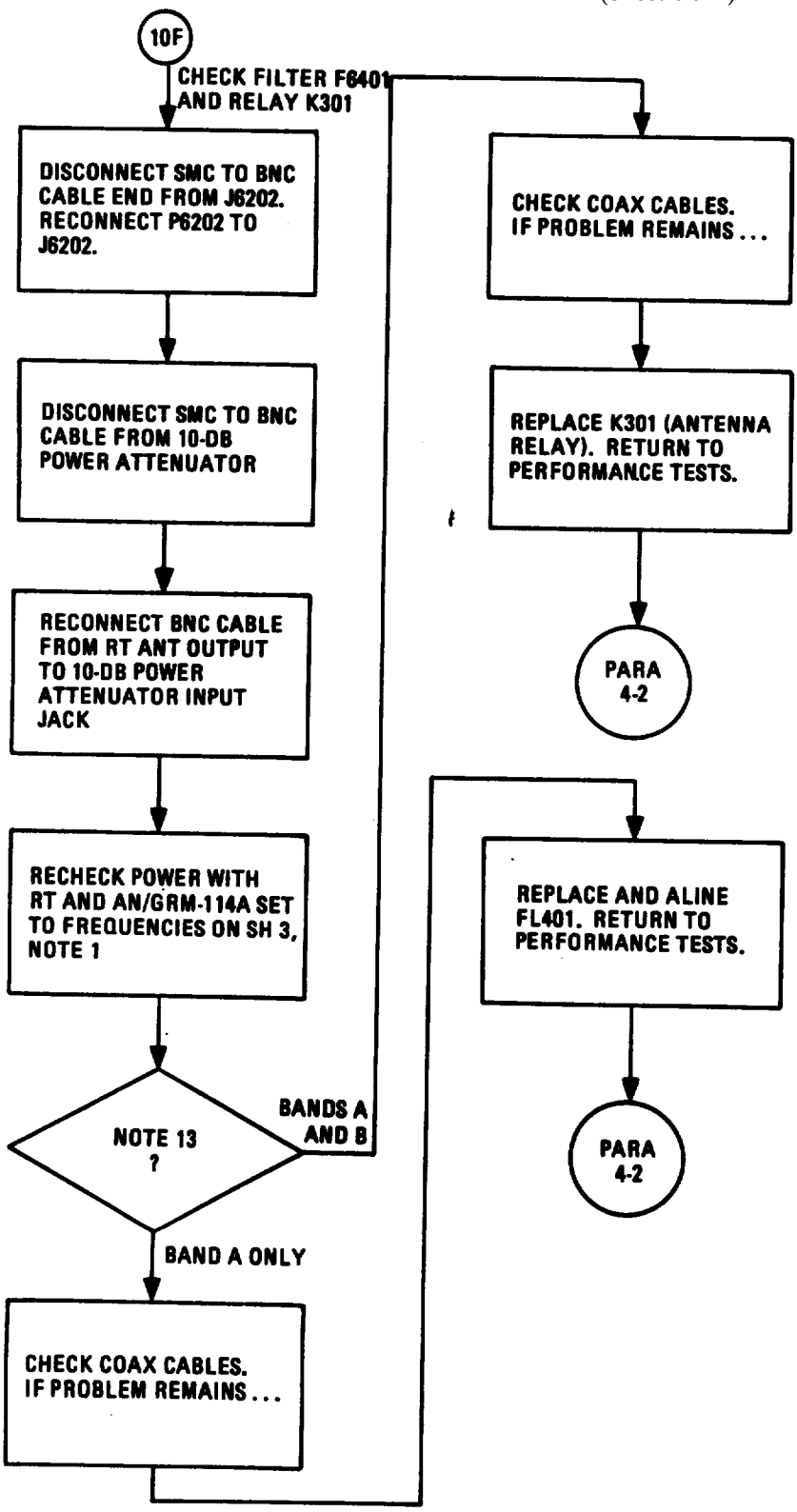
4-24. TROUBLESHOOTING FLOW CHARTS (CONT)

CHART 4-12
A6000 Assembly Troubleshooting
(Sheet 5 of 7)



4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-12
A6000 Assembly Troubleshooting
(Sheet 6 of 7)



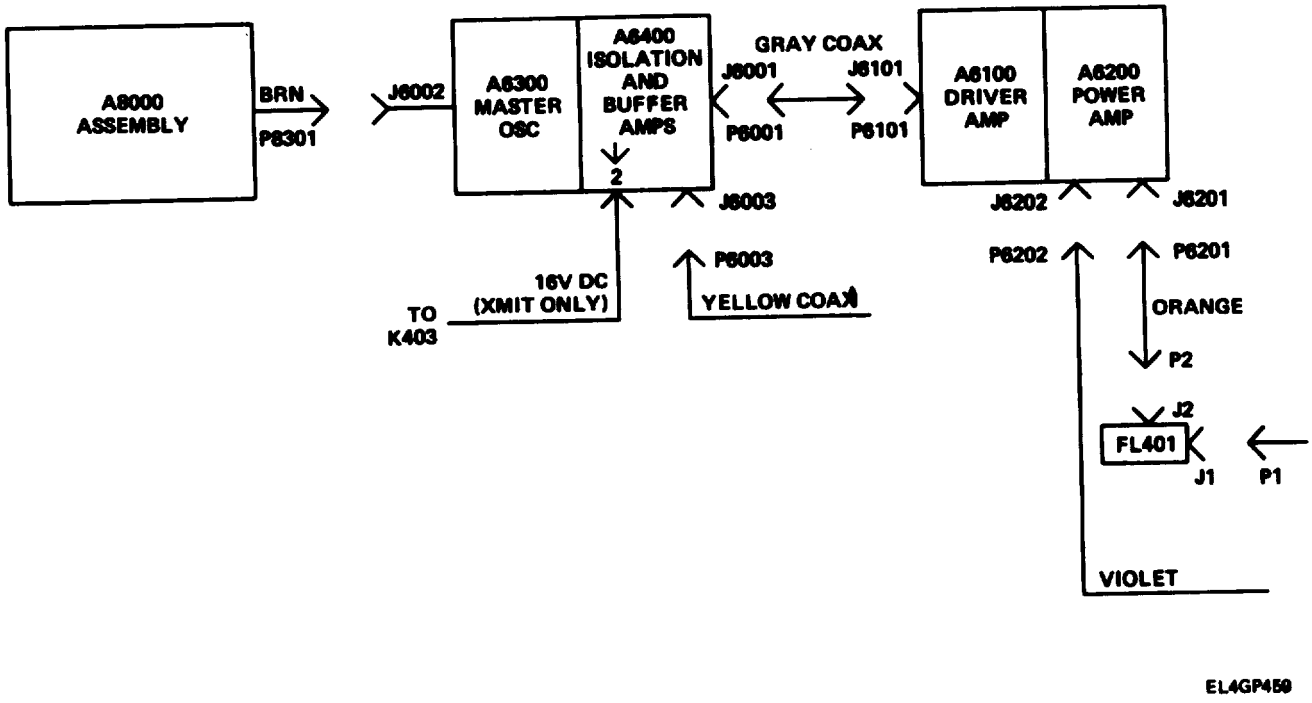
NOTE

13. Low power or no power across BAND Ⓐ or across BANDS Ⓐ and Ⓑ.

4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

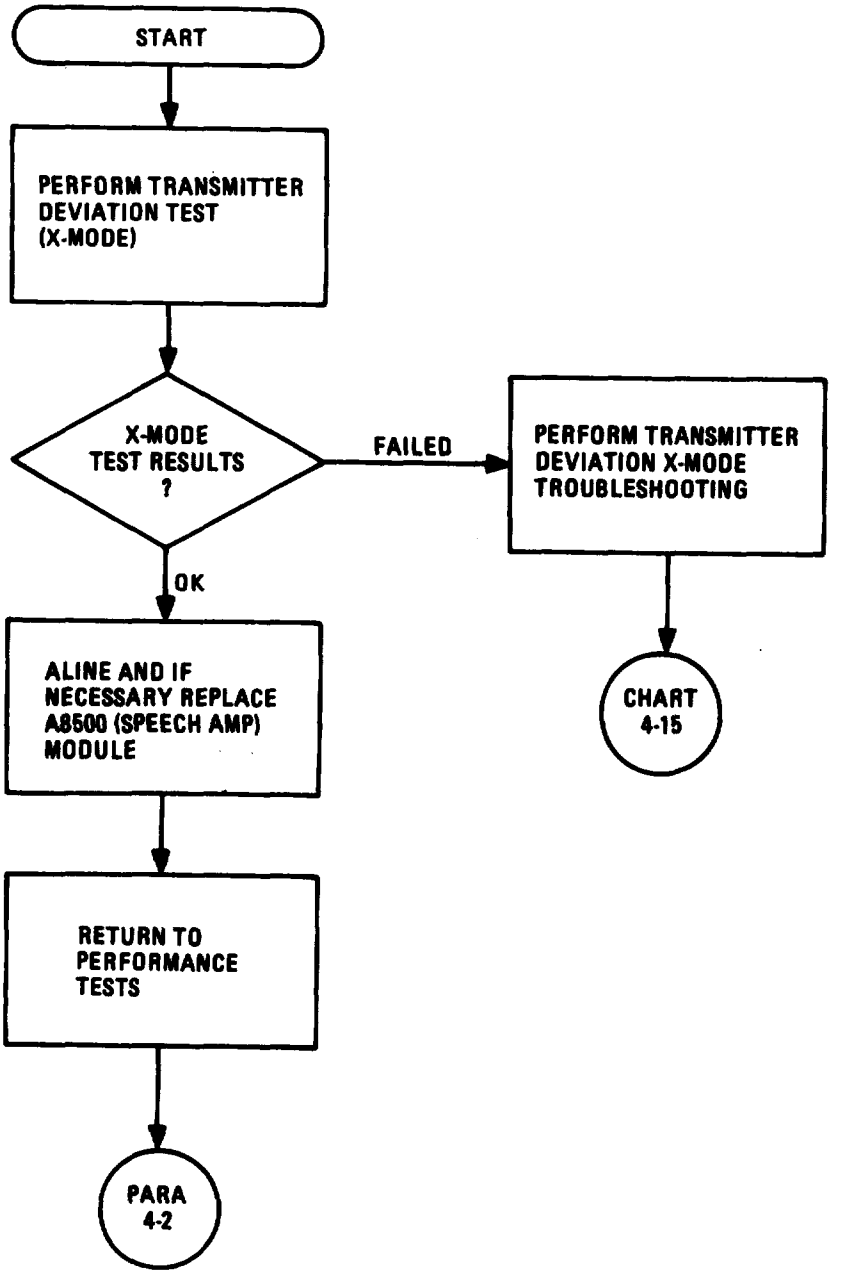
CHART 4-12

A6000 Assembly Troubleshooting
(Sheet 7 of 7)



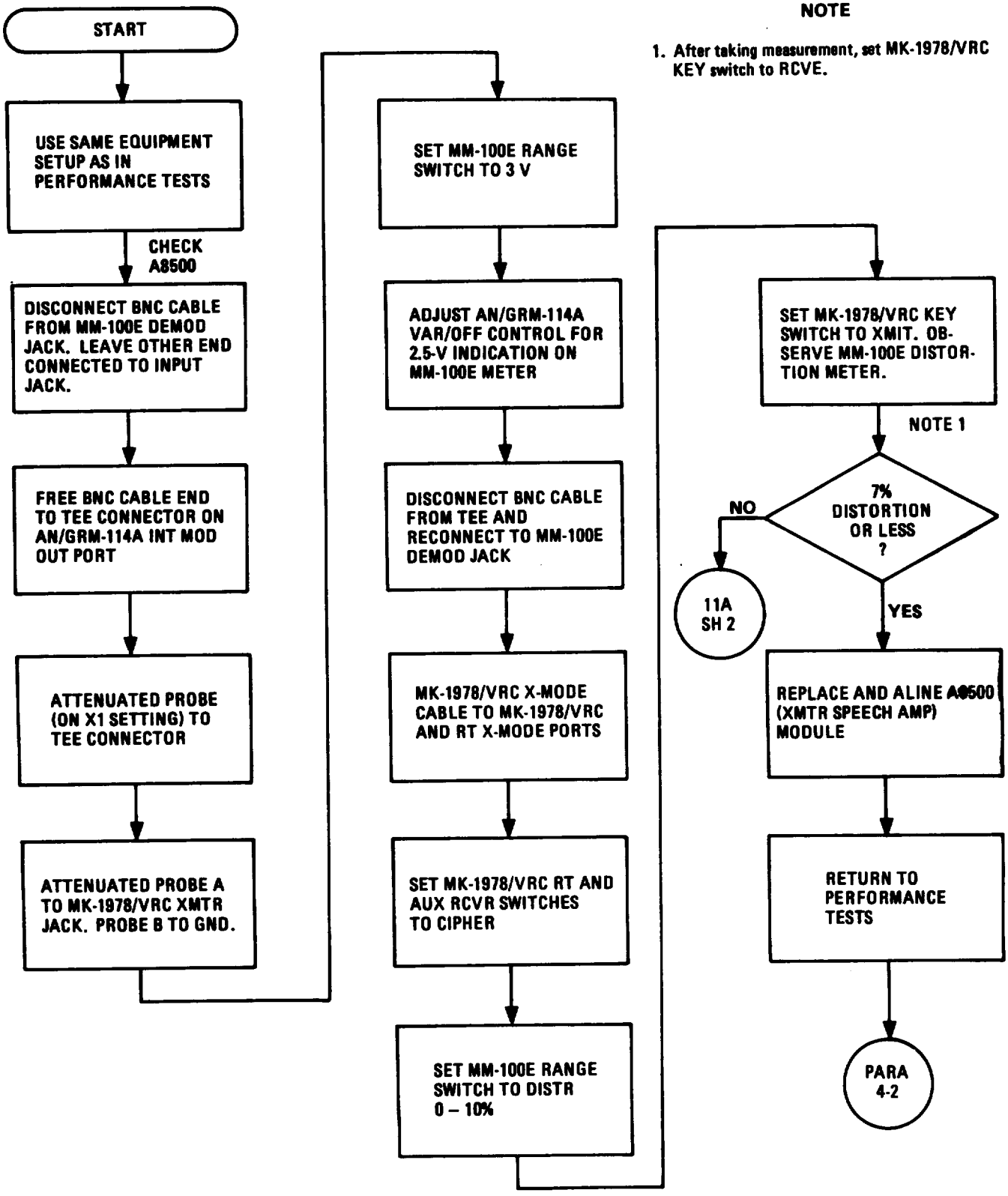
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-13
Transmitter Deviation (Normal Mode) Troubleshooting
(Sheet 1 of 1)



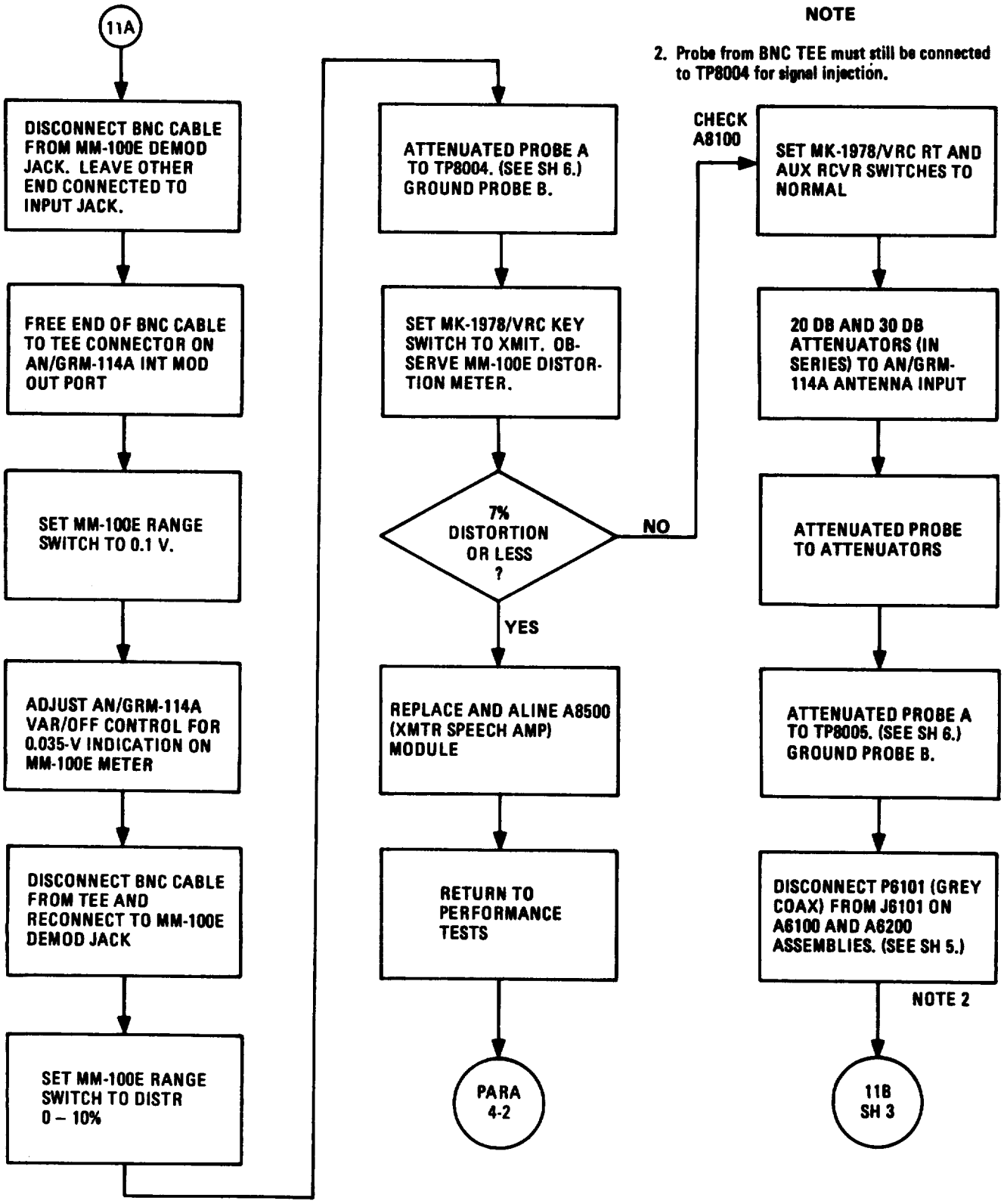
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-14
Transmitter Distortion (Normal Mode) Troubleshooting
(Sheet 1 of 6)



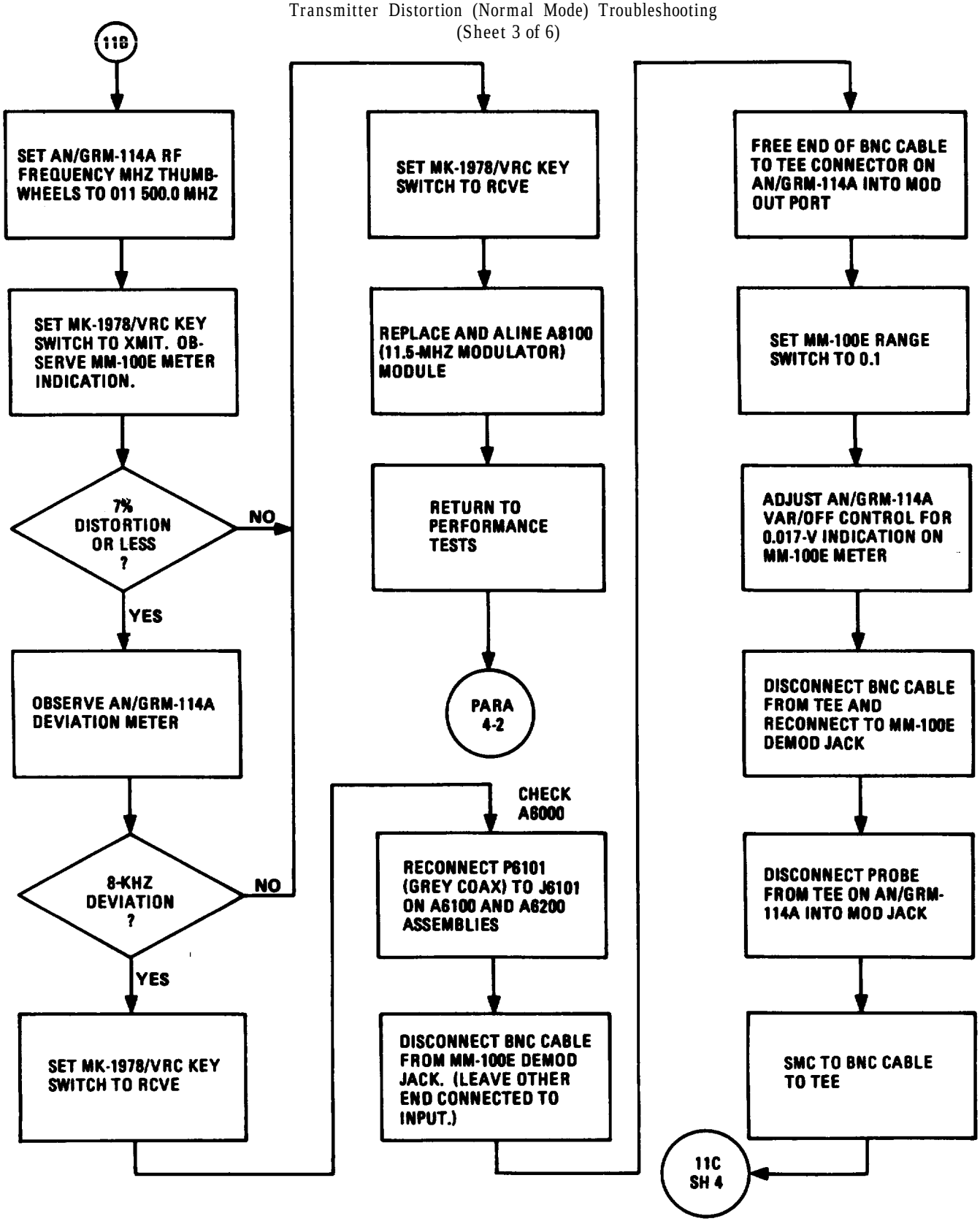
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-14
Transmitter Distortion (Normal Mode) Troubleshooting
(Sheet 2 of 6)



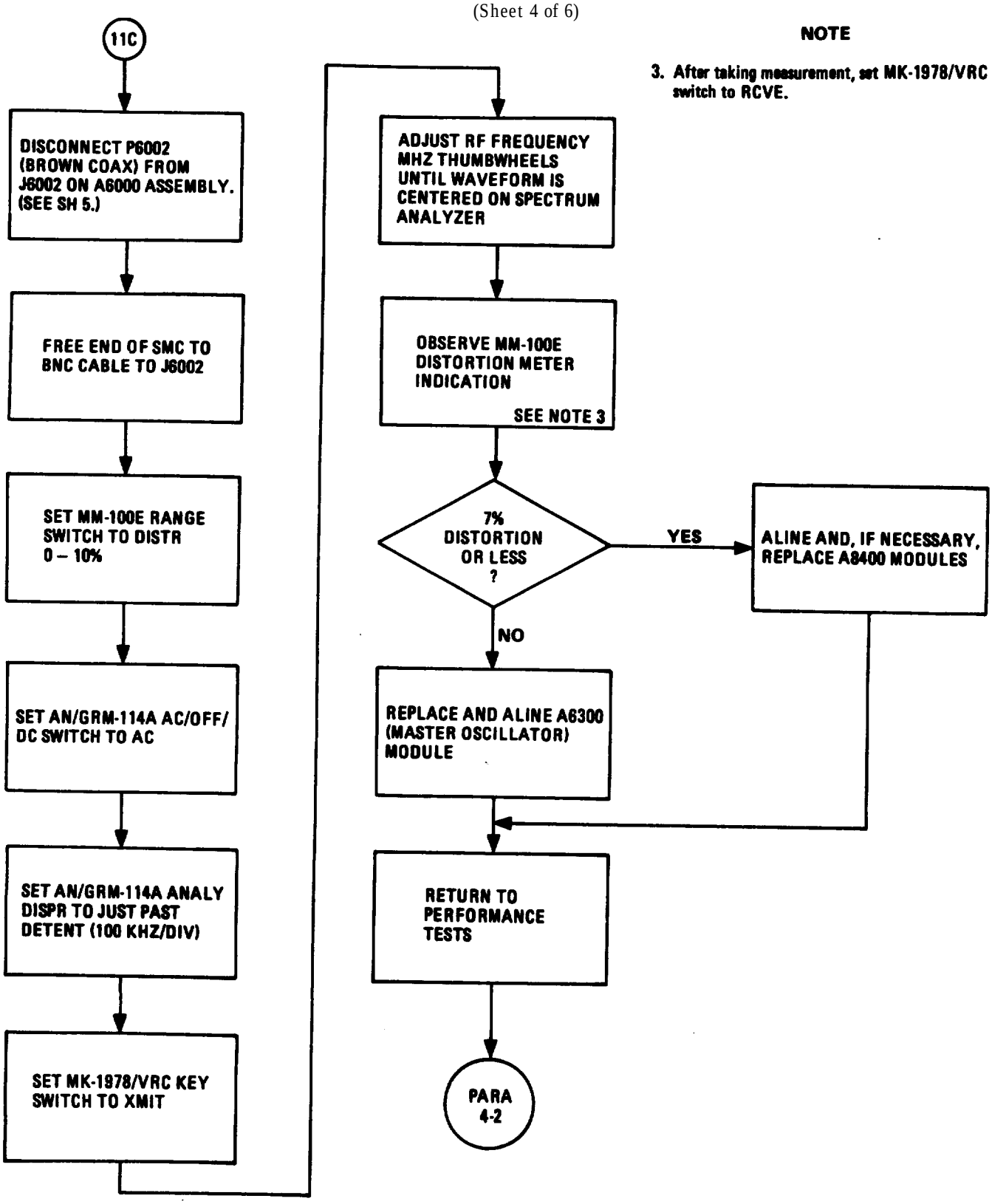
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-14
Transmitter Distortion (Normal Mode) Troubleshooting
(Sheet 3 of 6)



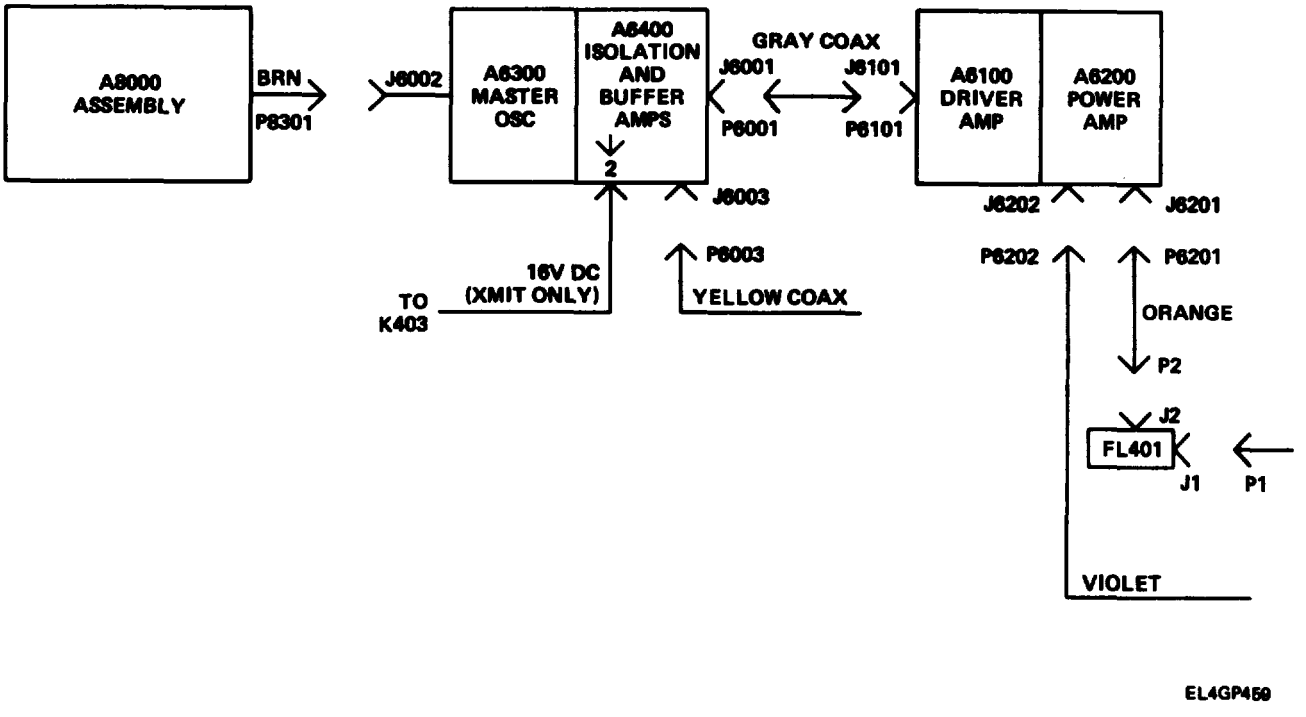
4-24 TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-14
Transmitter Distortion (Normal Mode) Troubleshooting
(Sheet 4 of 6)



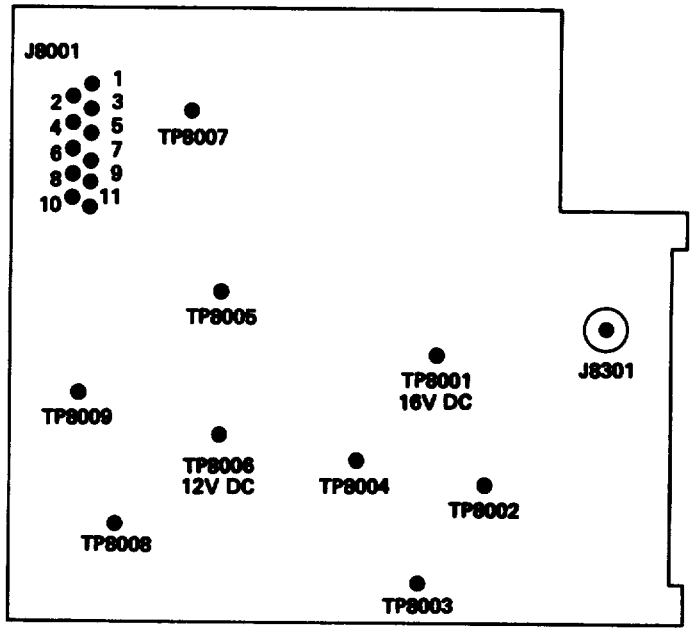
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-14
Trasmitter 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)



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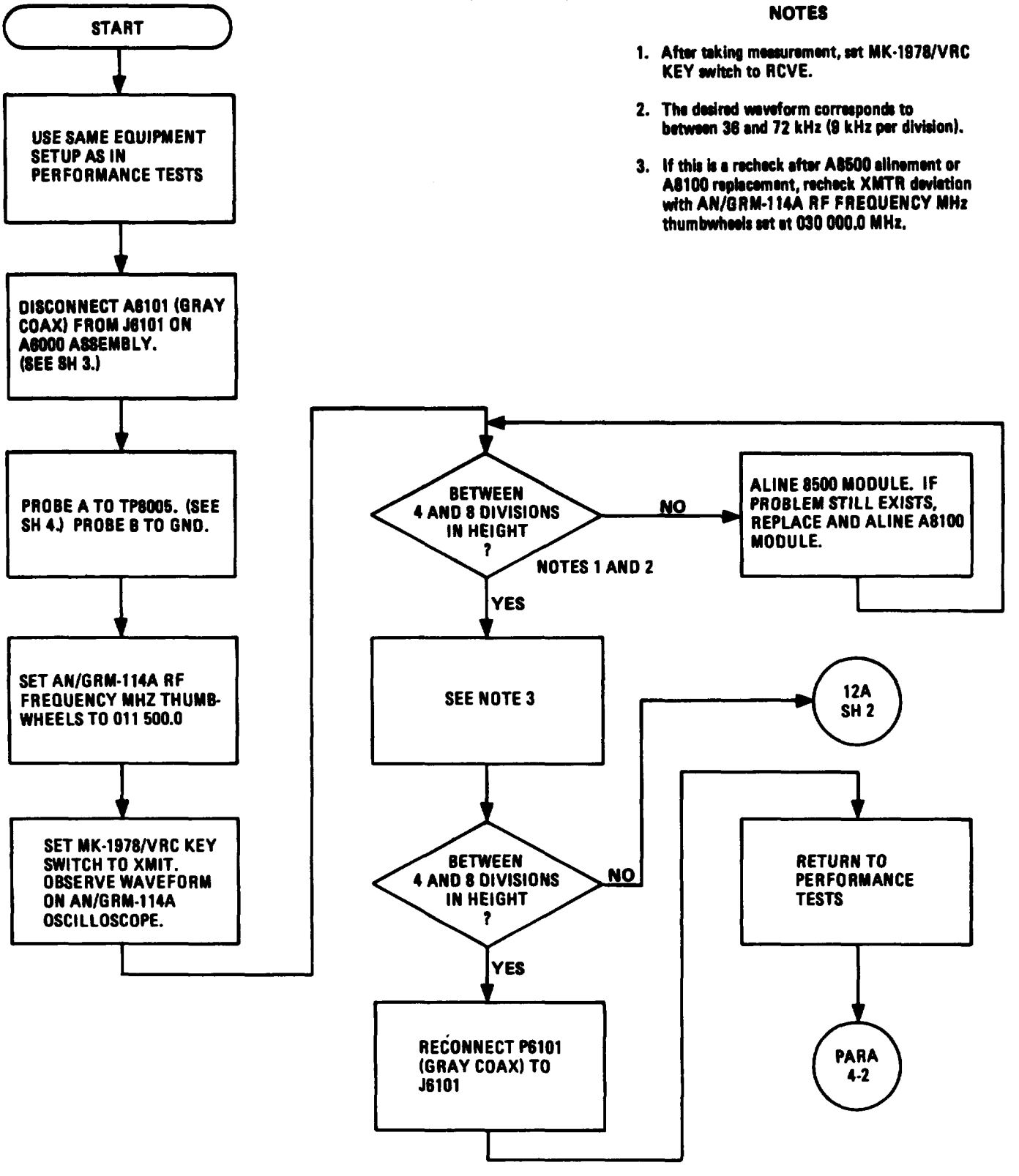
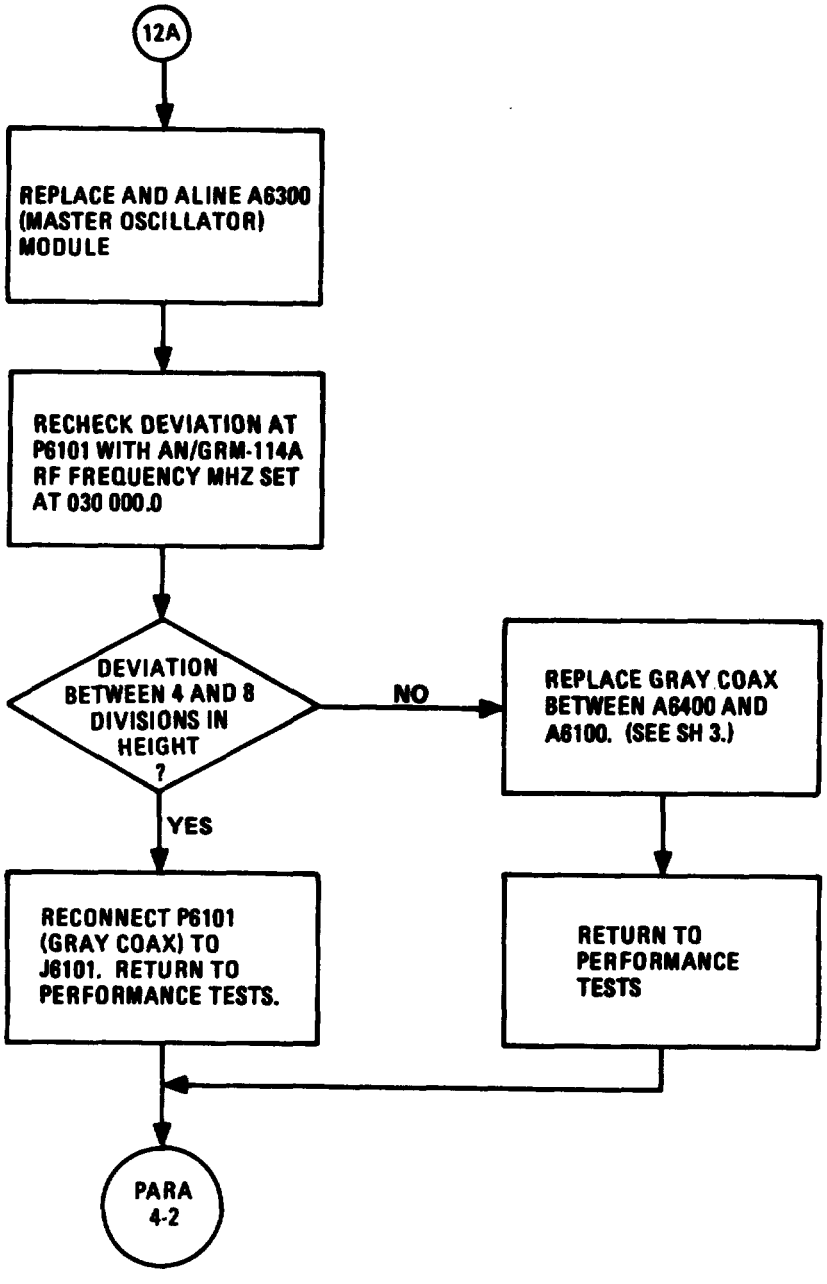
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-15
Transmitter Deviation (X-Mode) Troubleshooting
(Sheet 1 of 4)



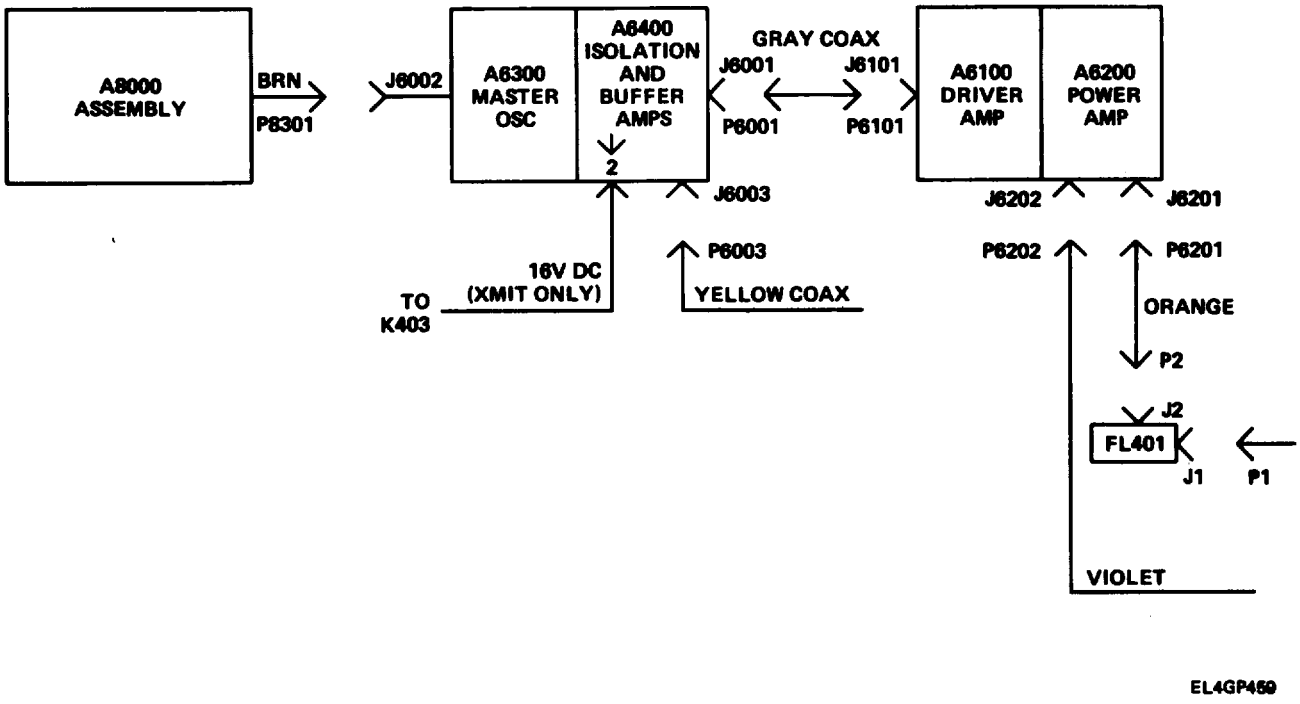
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-16
Transmitter Deviation (X-Mode) Troubleshooting
(Sheet 2 of 4)



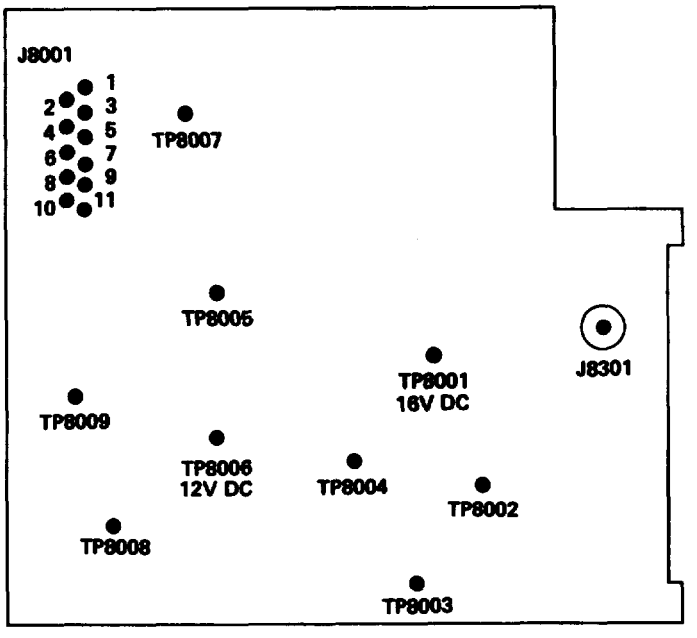
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

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)



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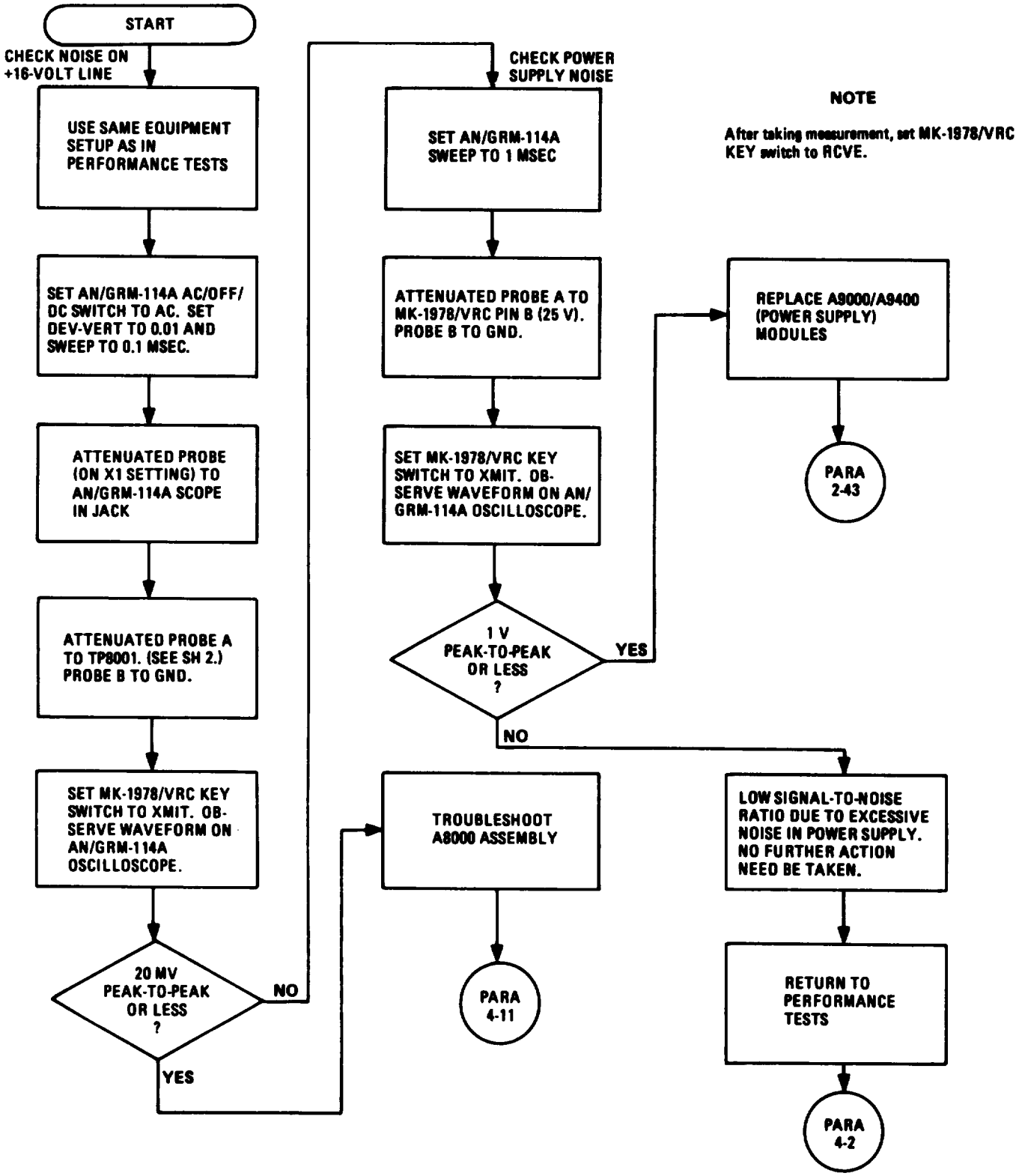
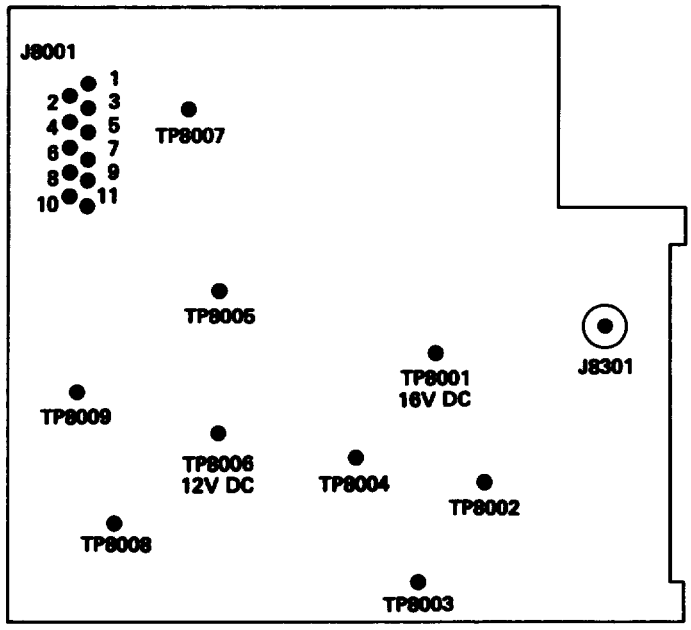
4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-16
Transmitter Signal-to-Noise Ratio Troubleshooting
(Sheet 1 of 2)



4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-16
Transmitter Signal-to-Noise Ratio Troubleshooting
(Sheet 2 of 2)



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4-24. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 4-17
Antenna Information (Switching) Troubleshooting
(Sheet 1 of 1)

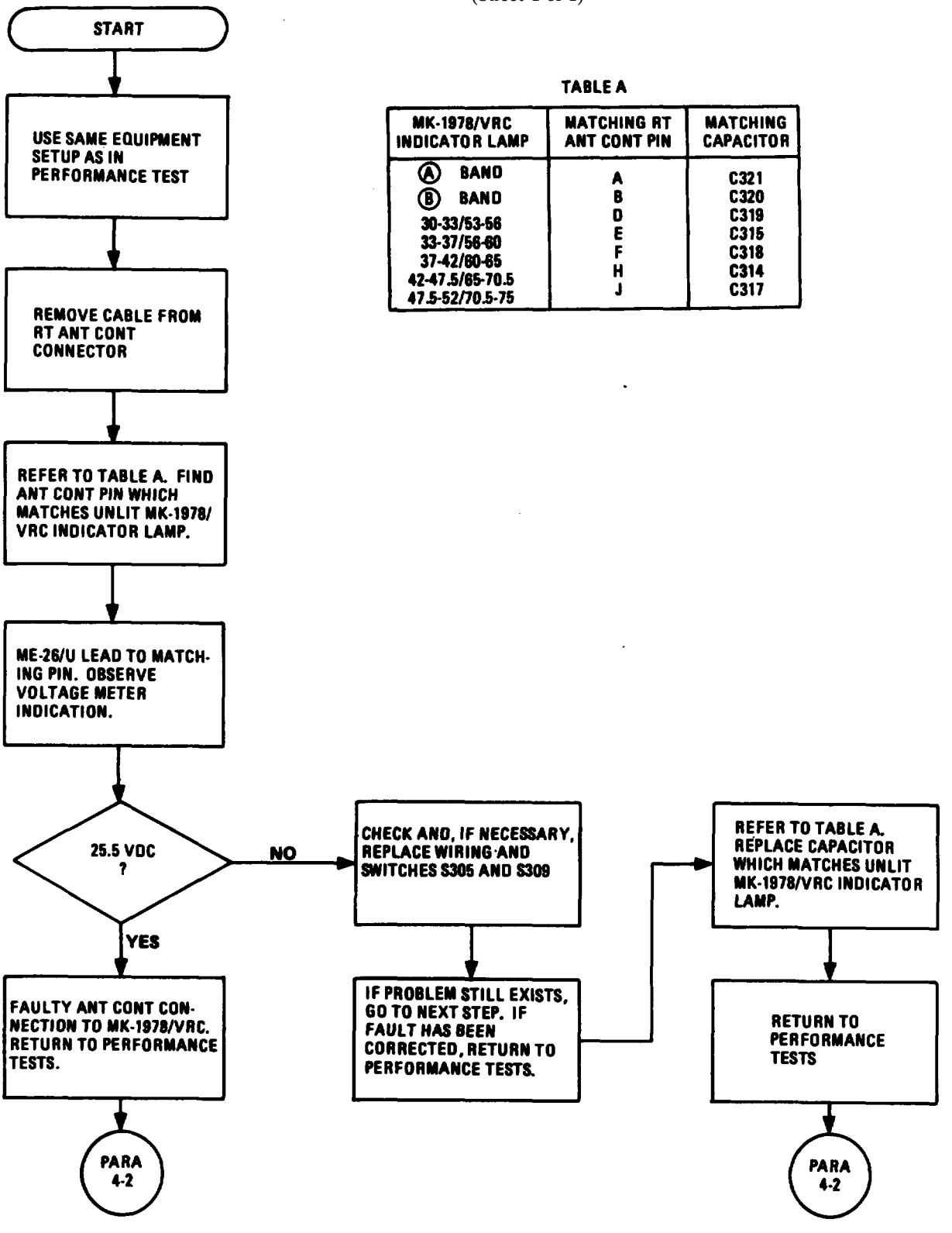


TABLE A

MK-1978/VRC INDICATOR LAMP	MATCHING RT ANT CONT PIN	MATCHING CAPACITOR
(A) BAND	A	C321
(B) BAND	B	C320
30-33/53-56	D	C319
33-37/56-60	E	C315
37-42/60-65	F	C318
42-47.5/65-70.5	H	C314
47.5-52/70.5-75	J	C317

Section III ALINEMENT AND ADJUSTMENT PROCEDURES

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 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.

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

Test Set AN/GRM-114A
Power Supply PP-1104(*)/G
Maintenance Kit MK-1978/VRC
T-Connector UG-274/U
Amphenol Adapter M-39012/16

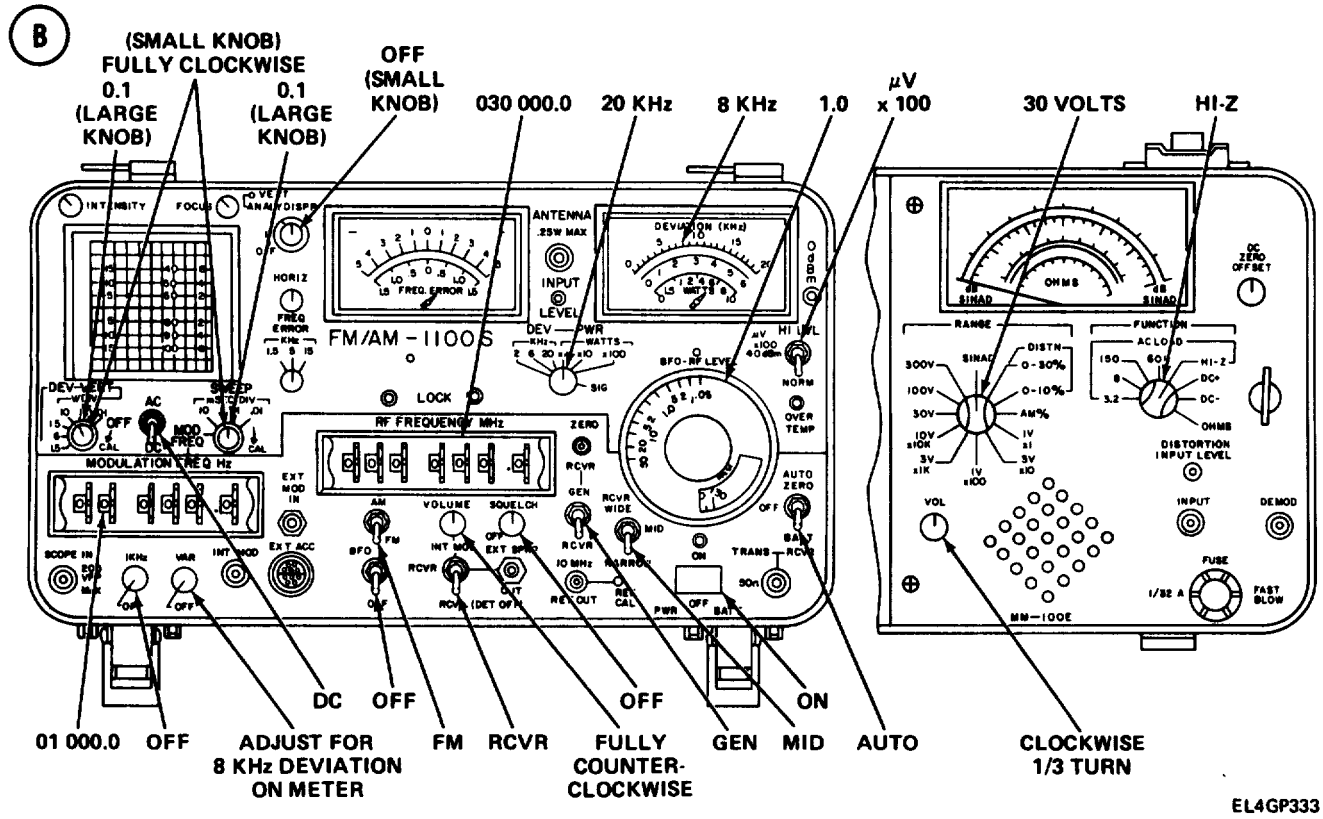
TEST SETUP. Connect the equipment as shown In test setup diagram A. Set A4000 X-MODE/ NORMAL switch to X-MODE.

4-26. CRYSTAL REFERENCE SYSTEM (CRS) TEST. (CONT)

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

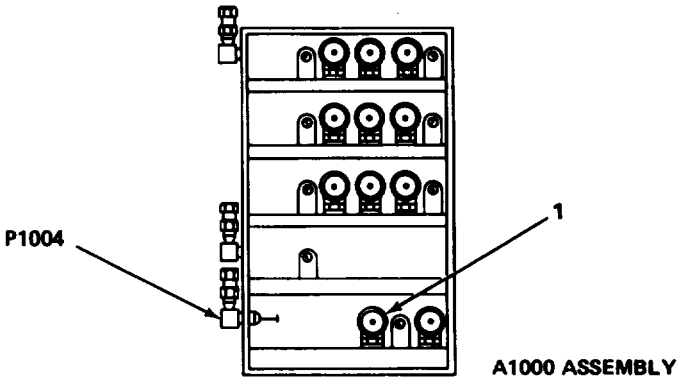
EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	(A)
	MC-TUNE-KC	30.00
	VOLUME	Fully clockwise
	SQUELCH	NEW OFF
	SPEAKER (RT-524/VRC)	OFF
MK-1978/VRC	All switches	Down, except POWER up
AN/GRM-114A; MM-100E	See test setup diagram (B)	



4-26. CRYSTAL REFERENCE SYSTEM (CRS) TEST. (CONT)

TEST PROCEDURE

Ⓒ



1. Connect MM-100E attenuated probe A to MK-1978/VRC SPKR jack in MK-1978/VRC AUDIO square. Connect probe B to MK-1978/VRC GND jack. A 1000-HZ tone will be heard on MM-100E speaker.
2. Adjust RT VOLUME control for 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. See test setup diagram Ⓒ .
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.

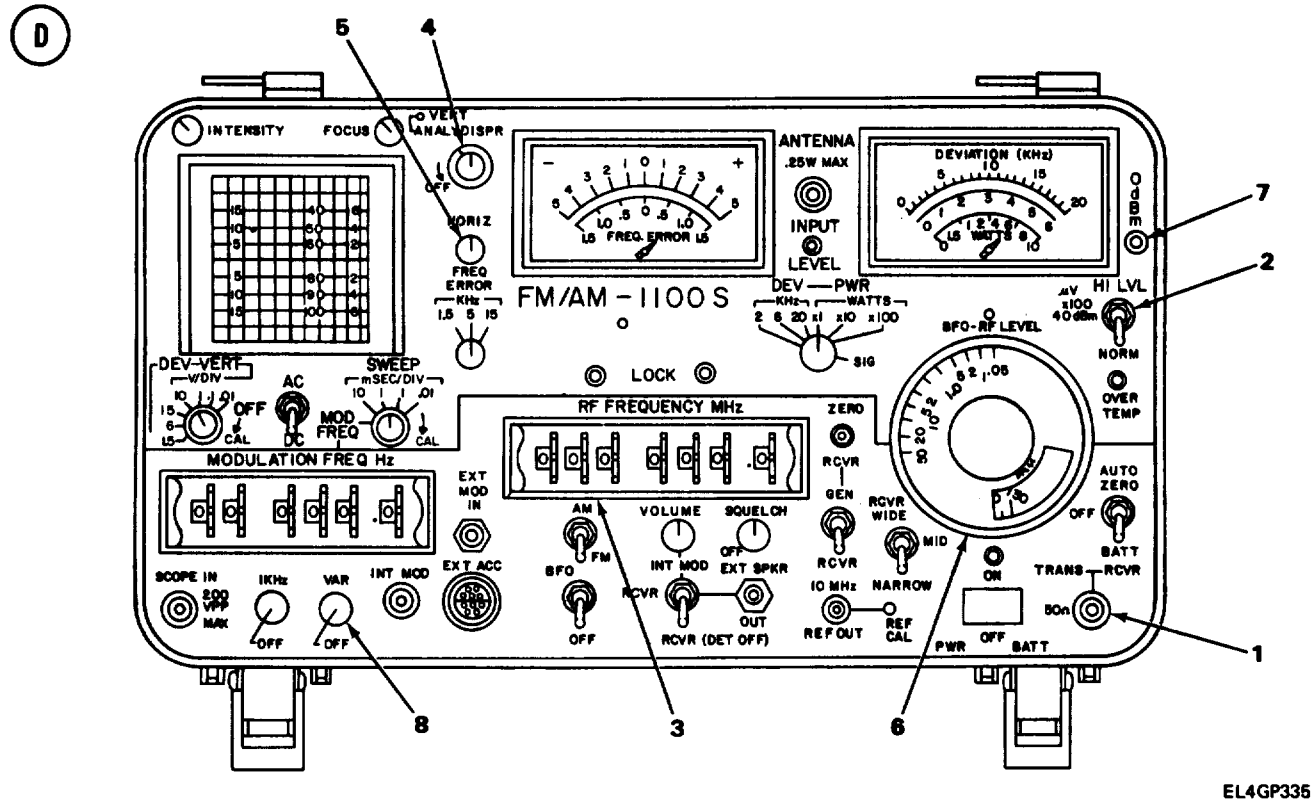
8. Set RT MC-TUNE-KC control to 40.00 MHz; then adjust back to 30.00 MHz. Tone must not change.

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.

4-26. CRYSTAL REFERENCE SYSTEM (CRS) TEST. (CONT)



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10. Disconnect rf cable from AN/GRM-114A TRANS-RCVR jack (1). (See test setup diagram Ⓓ .)
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 Ⓒ , 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 Ⓓ .)
15. Set AN/GRM-114A RF FREQUENCY MHz thumbwheels (3) to 042 000 0. (See test setup diagram Ⓓ .)
16. Adjust AN/GRM-114A VERT control (4) and HORIZ control (5) to center scope trace on screen. (See test setup diagram Ⓓ .)
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 Ⓓ .)
18. Set AN/GRM-114A VAR control (8) to OFF. (See test setup diagram Ⓓ .)
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 ALINEMENT.

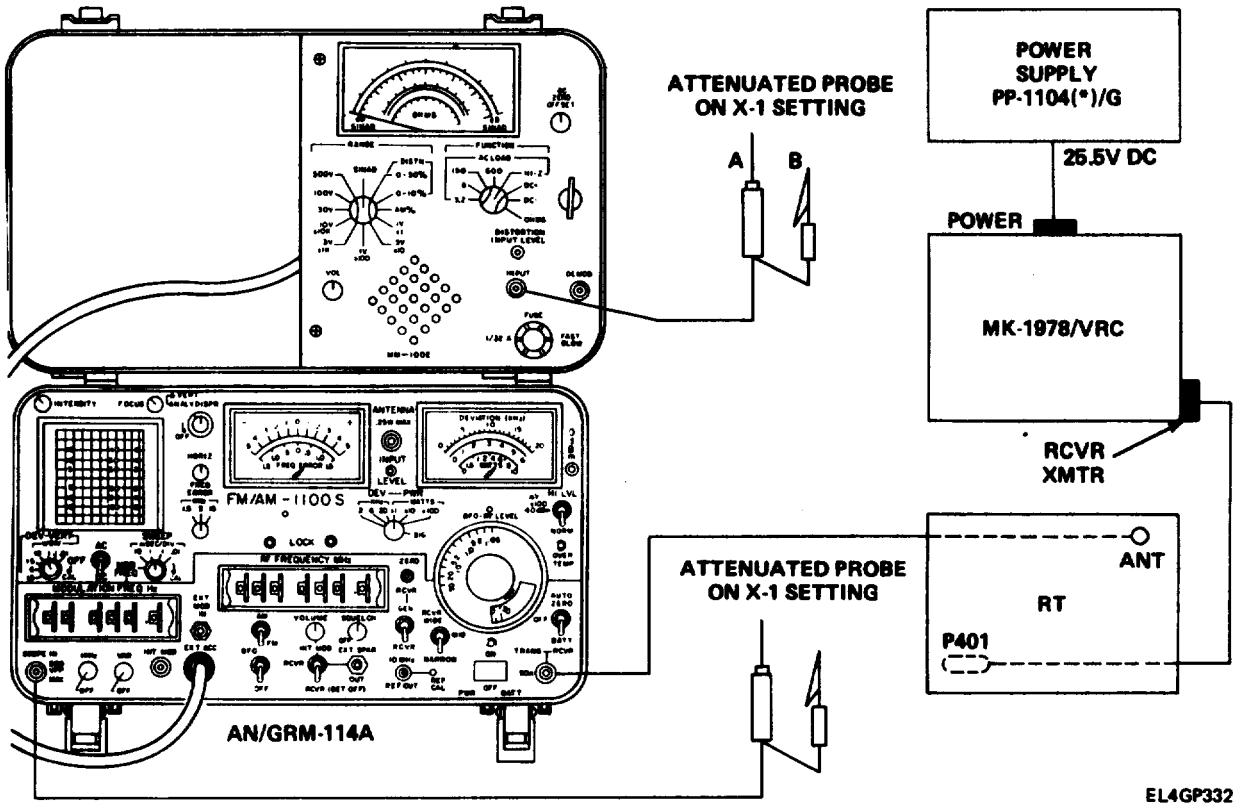
PURPOSE. If the local oscillator is operating at the correct frequency, the CRS will not output a dc error signal. This procedure alines the oscillator by tuning its circuits to bring the CRS error signal as close to zero as possible. The Crystal Reference System Test (paragraph 4-26) must be done prior to performing this alinement.

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 Ⓐ , page 4-179. Connect P1004 to J1004 on the A1000 tray.

LOCAL OSCILLATOR A1500 ALINEMENT. (CONT)

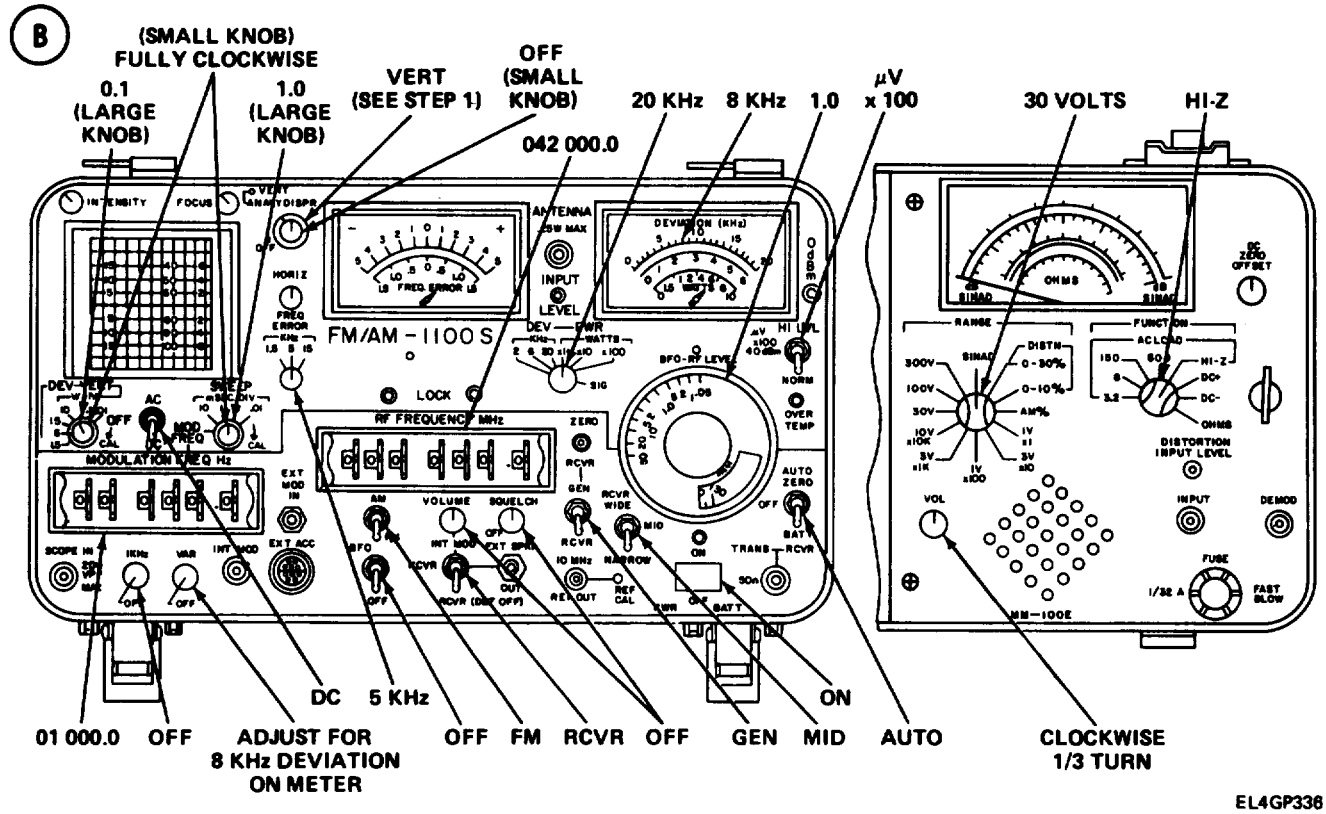


EQUIPMENTCONTROL SETTINGS. Set equipment controls as indicated in the following table. Inject at 30, 52 and 42 MHz, with 1000-HZ modulation; 8-kHz deviation. Short out TP 3001, adjust for clear test beat for 42 and 52 MHz). Once tone is established, go back to zero-scope and trace.

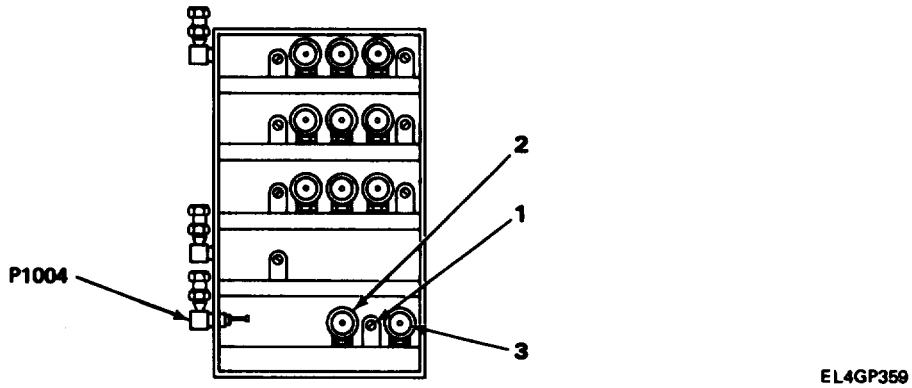
CONTROL AND SWITCH SETTINGS

IPMENT	CONTROL OR SWITCH	POSITION/SETTING
	POWER	LOW
	BAND	(A)
	MC-TUNE-KC	42.00
	VOLUME	Fully clockwise
	SQUELCH	NEW OFF
	SPEAKER (RT-524/VRC)	OFF
/VRC	All switches	Down, except POWER up
-114A,)0E	See test setup diagram (B), page 4-180	

4-27. LOCAL OSCILLATOR A1500 ALINEMENT. (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 ALINEMENT. (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.

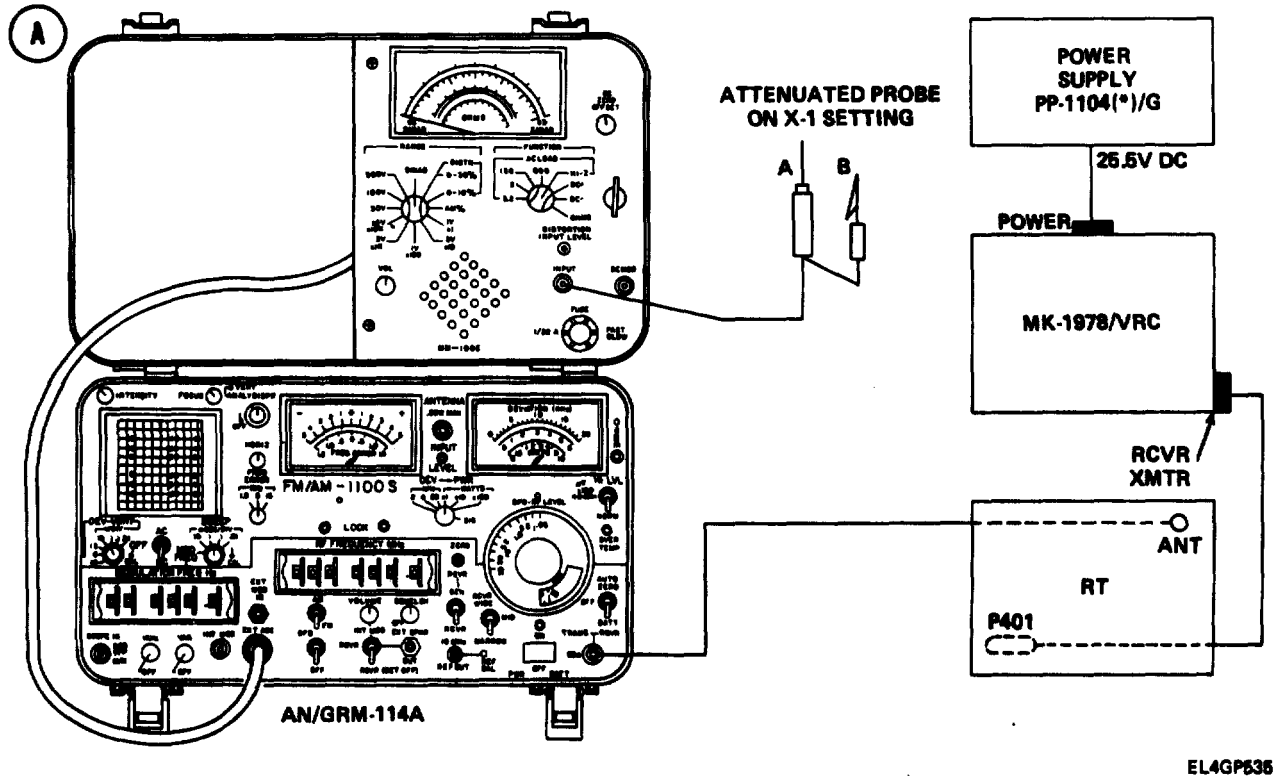
4-28. TUNER A1000 ALINEMENT

PURPOSE. This procedure tunes the A1000 assembly to produce maximum amplification of low-leve 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 Ⓐ.

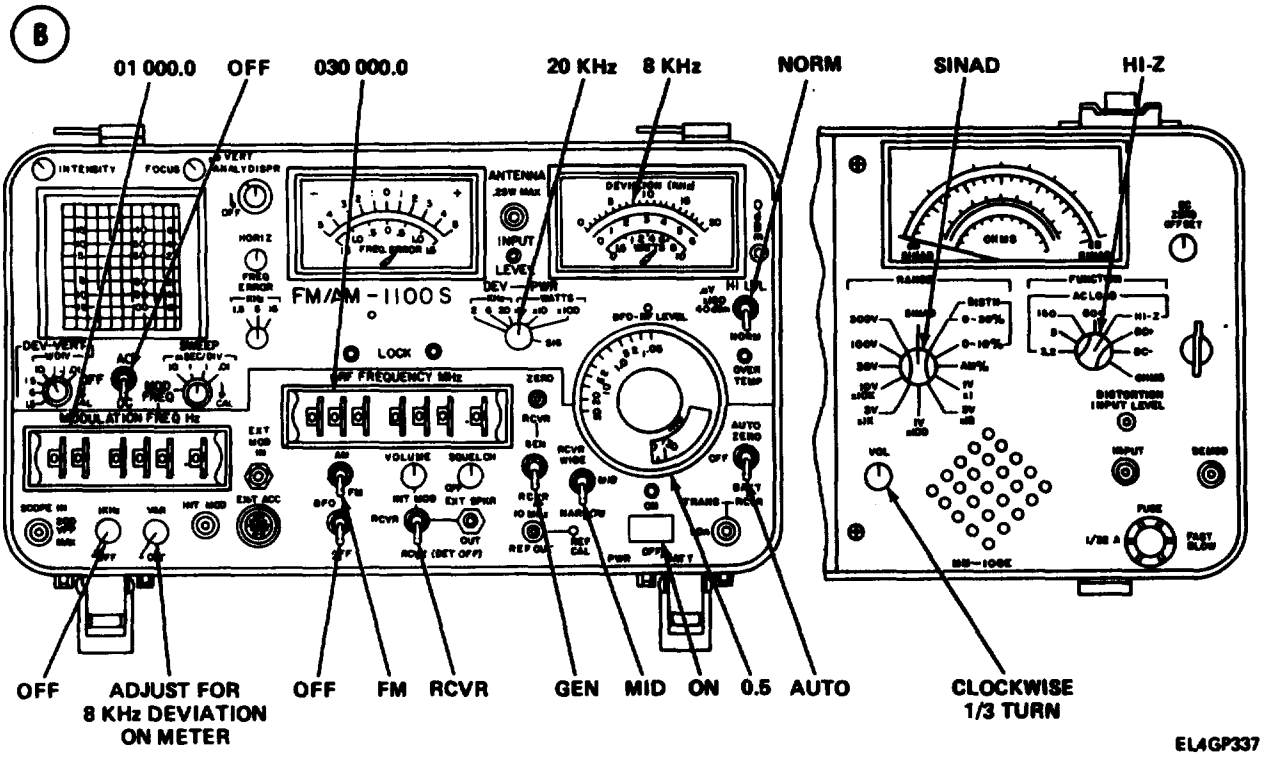


4-28. TUNER A1000 ALINEMENT. (CONT)

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

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	(A)
	MC-TUNE-KC	30.00
	VOLUME	Fully clockwise
	SQUELCH	NEW OFF
	SPEAKER (RT-524/VRC)	OFF
AN/GRM-114A; MM-100E	See test setup diagram (B)	
MK-1978/VRC	All switches	Down, except POWER up



4-28. TUNER A1OOO ALINEMENT. (CONT)

ALINEMENT PROCEDURE

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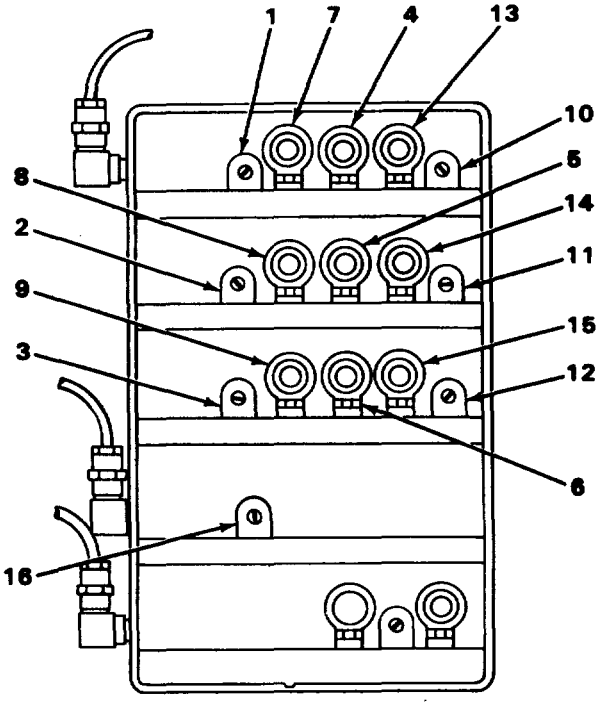

A1000 ASSEMBLY

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1. Connect MM-1OOE 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 A1OOO alinement cover, securing it with one screw.

NOTE

In the following steps, a 1OOO-HZ audio tone will be heard on the loudspeaker.

During alinement of AIOOO circuits, a reading of at least 10 db SINAD on the MM-1OOE blue scale at 0.5-µv rf indicates correct receiver sensitivity. However, problems in the A4000 or A5000 can result in a lower SINAD even through the A1OOO is properly alined. Therefore, adjust all Al 000 inductors and capacitors for best possible SINAD reading. Adjust BF pr RF LEVEL for SINAD meter indication.

3. Adjust Cl 104 (l), C1205 (2), and C1305 (3) for highest SINAD reading. (See test setup diagram © .)
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 A1OOO ALINEMENT. (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.

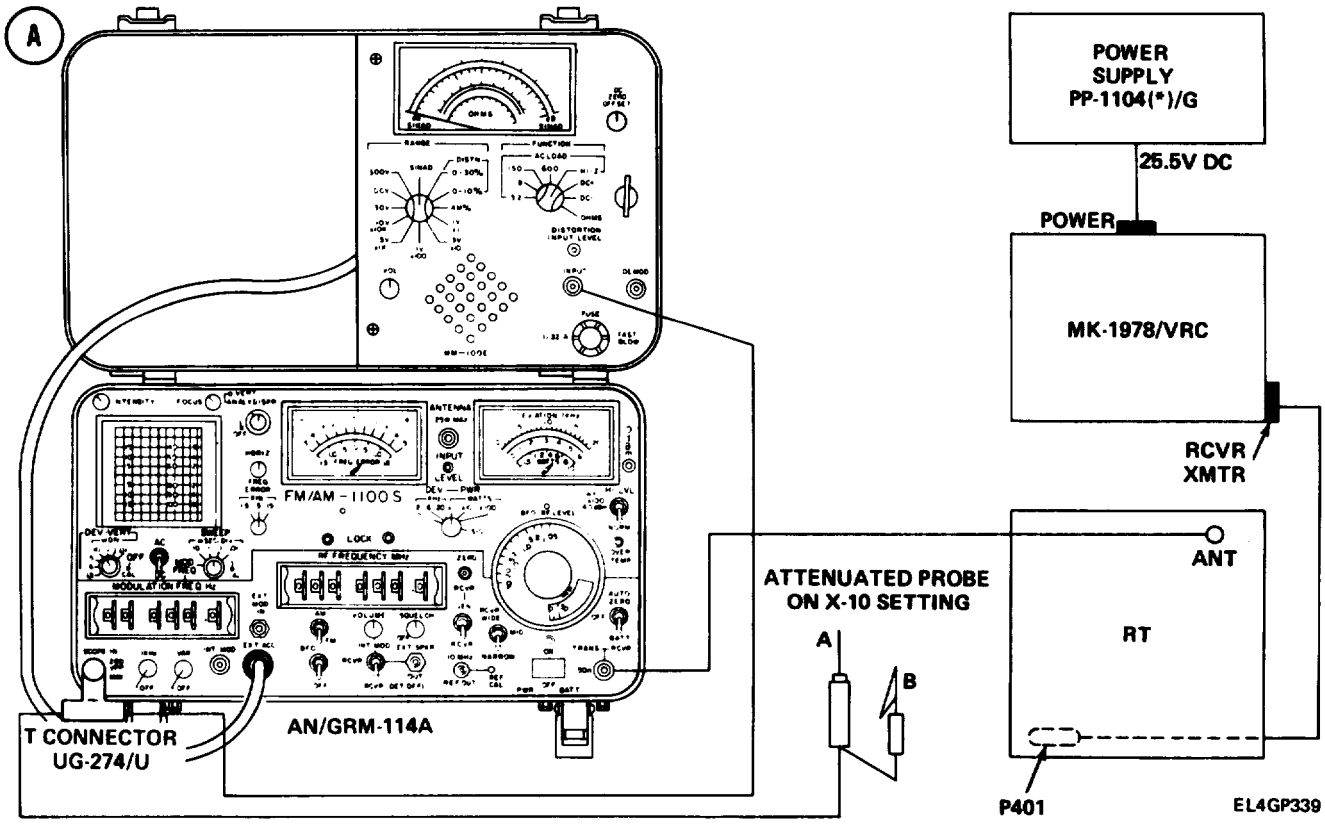
4-29. IF DISCRIMINATOR A4200 ALINEMENT.

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 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	Maintenance Kit MK-1978/VRC
Power Supply PP-1104(*)/G	T-Connector UG-274/U

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

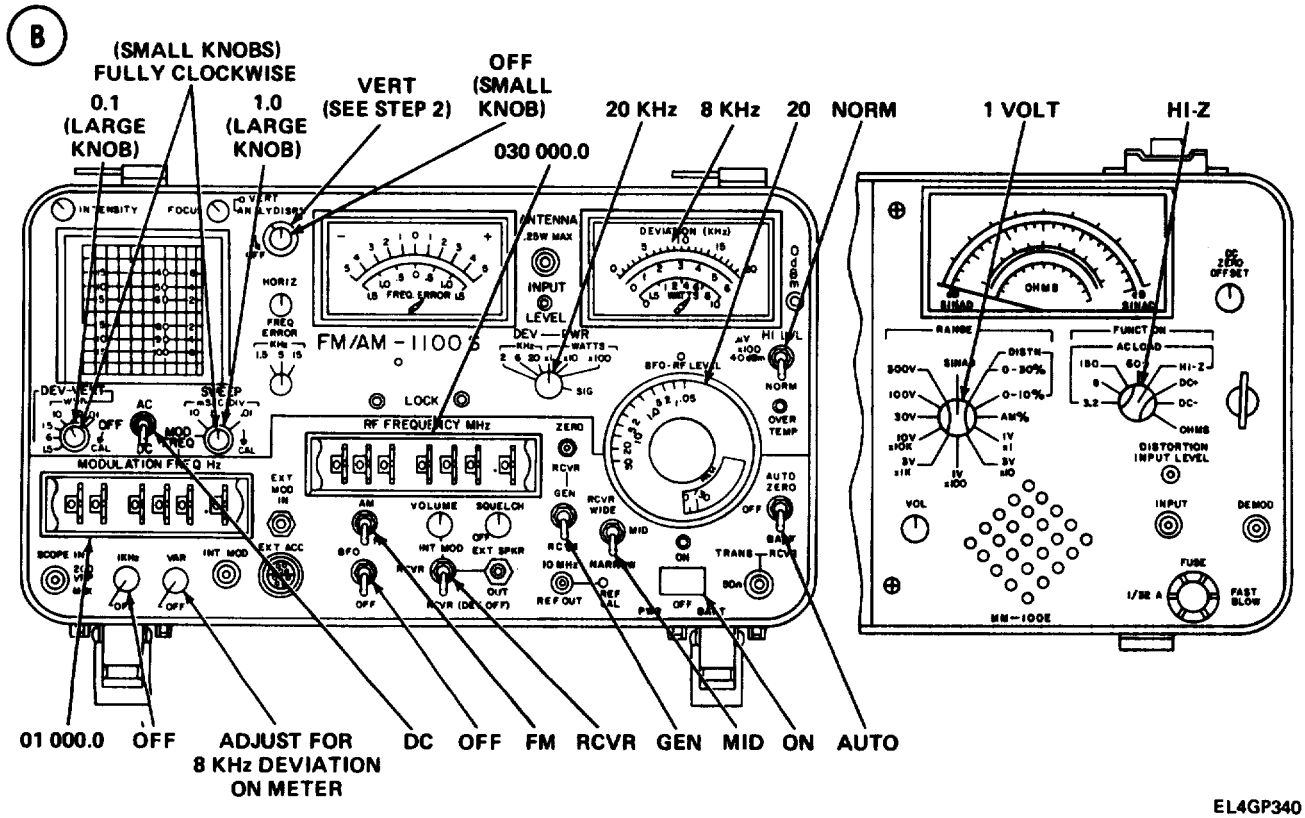


4-29. IF DISCRIMINATOR A4200 ALINEMENT. (CONT)

INITIAL EQIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. Inject 20-µv rf at 30 MHz, 1-kHz modulation; 8-kHz deviation.

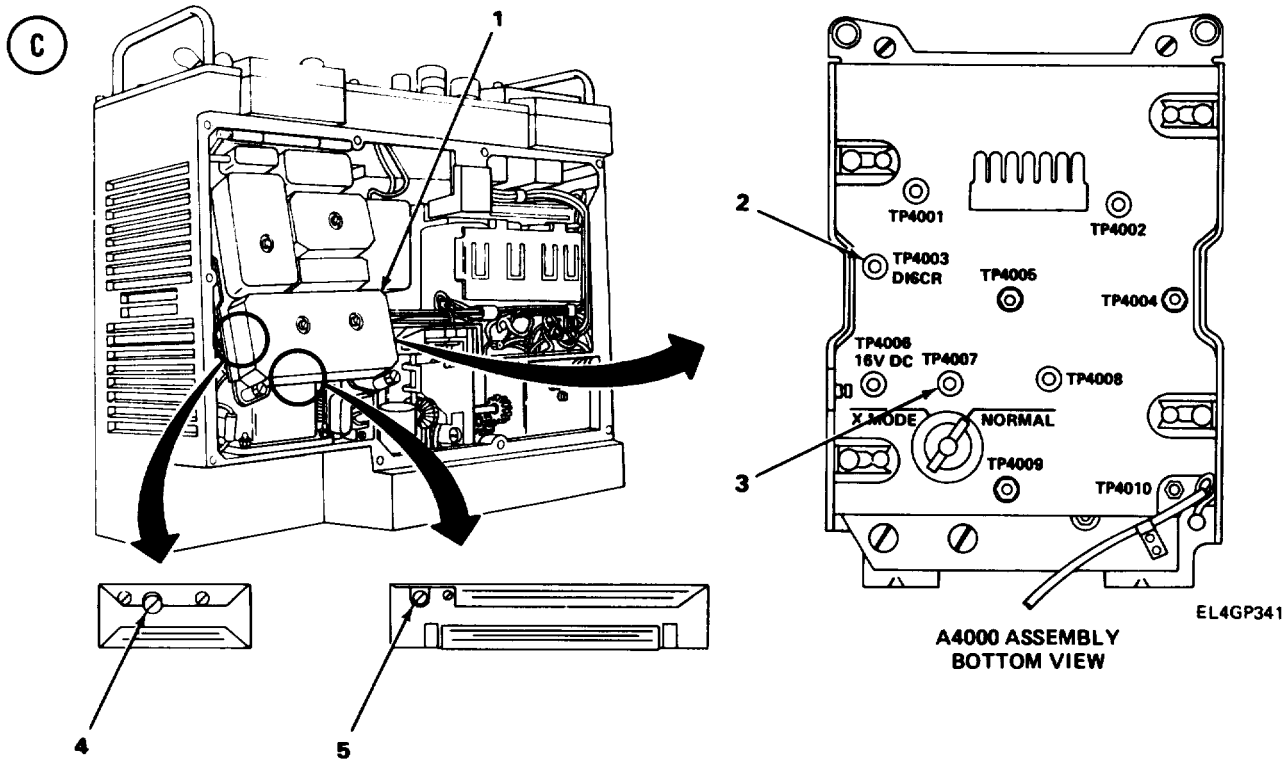
CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	(A)
	MC-TUNE-KC	30.00
	VOLUME	Fully clockwise
	SQUELCH	NEW OFF
	SPEAKER (RT-524/VRC)	OFF
MK-1978/VRC	All switches	Down, except POWER up
AN/GRM-114A; MM-1OOE	See test setup diagram (B)	



4-29. IF DISCRIMINATOR A4200 ALINEMENT. (CONT)

ALINEMENT PROCEDURE



1. Lift A4000 tray (l). (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-1OOE.
8. Repeat steps 3 through 7 until maximum MM-1OOE 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-1OOE 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-1OOE to 0-10% DIST.
12. Set AN/GRM-l14A HI LVLµ x1OO 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-1OOE slightly less than 5 percent.
15. If adjustment of T4207 is required in step 13, repeat steps 2 through 7 after first restoring MM-1OOE and AN/GRM-114A controls to the initial settings given in test setup diagram (B)

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.

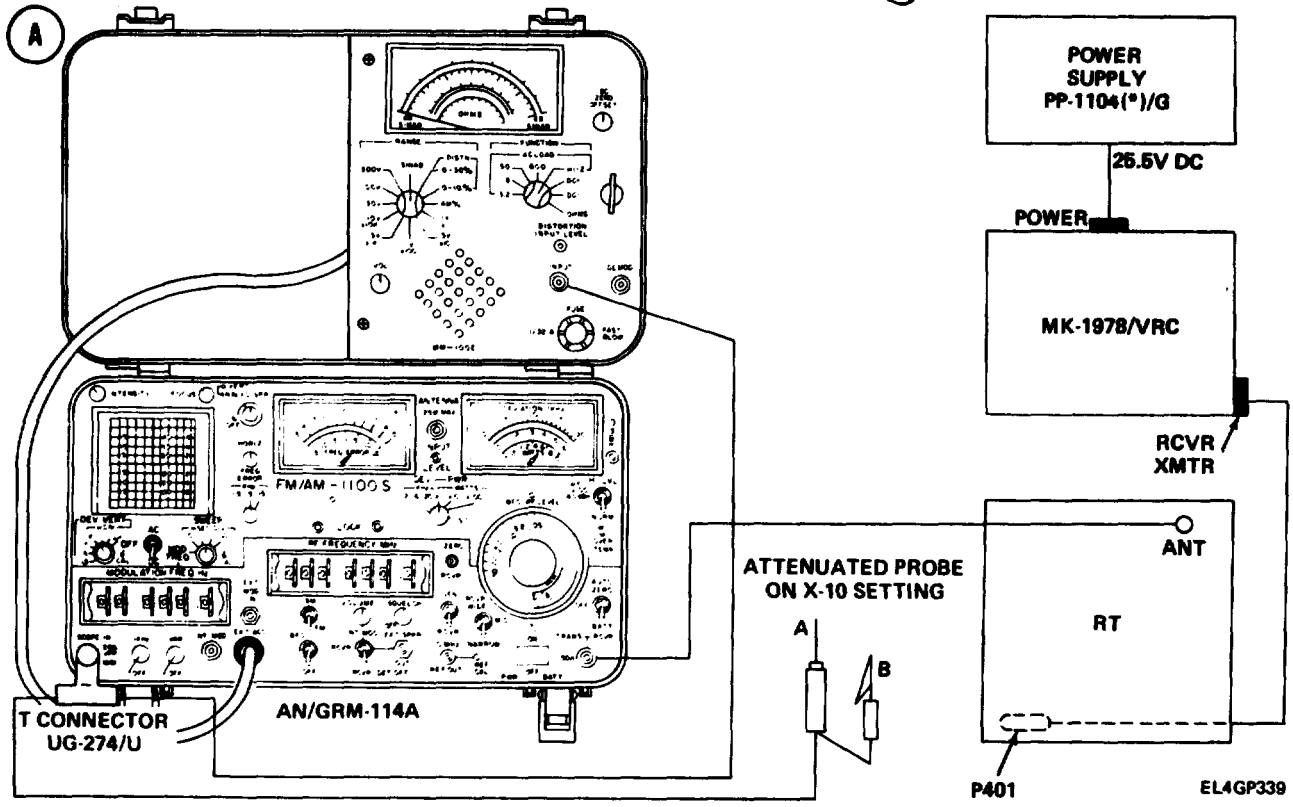
4-20. SILICON VERSION IF DISCRIMINATOR A4209A ALINEMENT. (CONT)

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) .

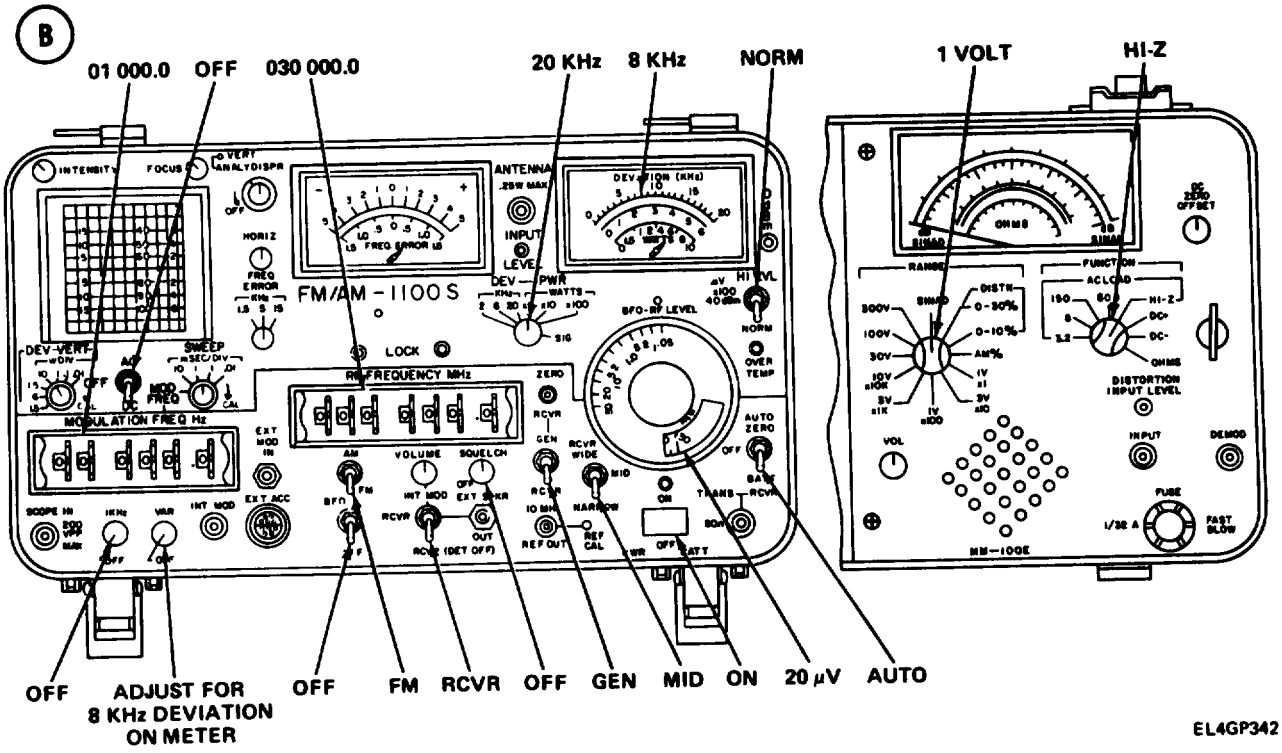


INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table. Inject 20-μv rf at 30 MHz, 1-kHz modulation; 8-kHz deviation.

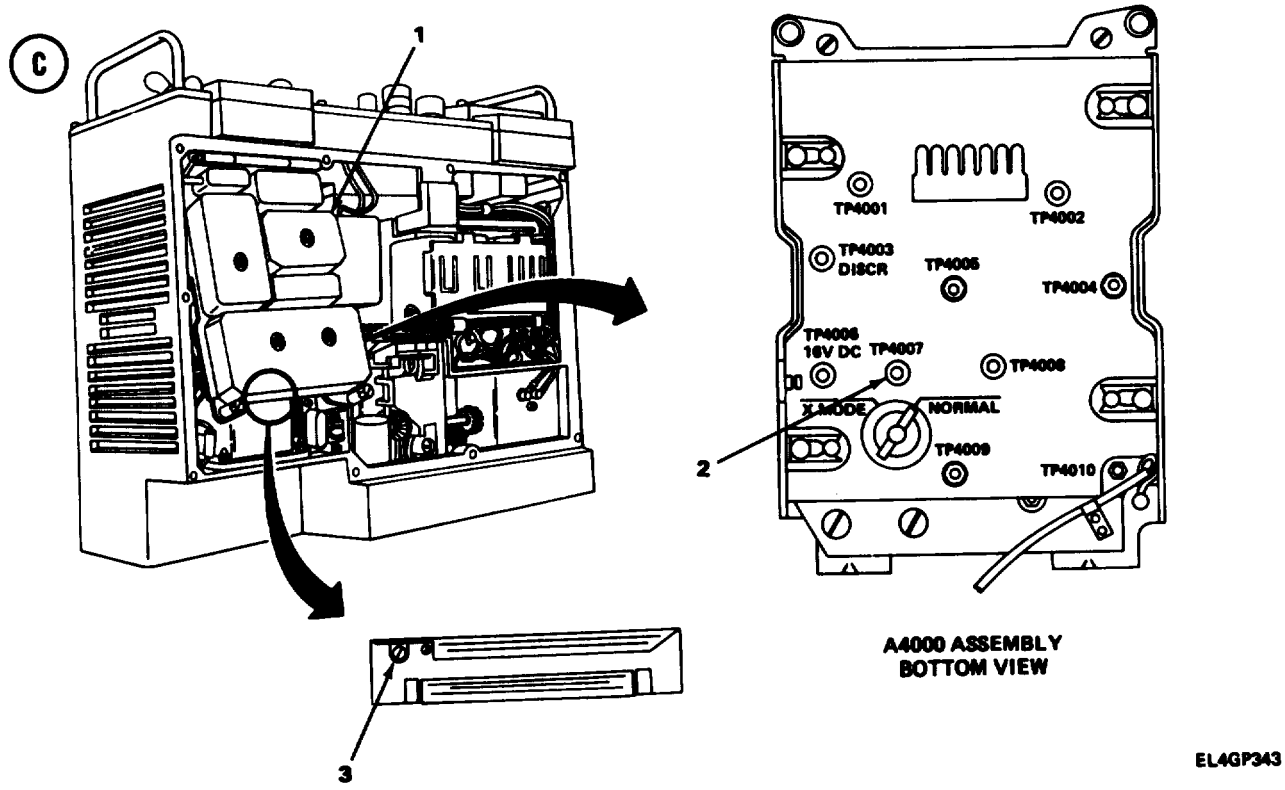
CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/GRM-114A; MM-100E	See test setup diagram (B) , page 4-188	
RT	POWER	LOW
	BAND	(A)
	MC-TUNE-KC	30.00
	VOLUME	Fully clockwise
	SQUELCH	NEW OFF
	SPEAKER (RT-524/VRC)	OFF
MK-1978/VRC	All switches	Down, except POWER up

4-20. SILICON VERSION IF DISCRIMINATOR A4200A ALINEMENT. (CONT)



ALINEMENT PROCEDURE



4-39. SILICON VERSION IF DISCRIMINATOR A4209A ALINEMENT. (CONT)

1. Lift A4000 tray (1). (See test setup diagram Ⓒ , page 4-188.)
2. Connect MM-100E attenuated probe A (test setup diagram Ⓐ , page 4-187) to TP4007 (2); connect alligator clip to ground.
3. Adjust L4202 (3) for maximum indication on MM-100E.

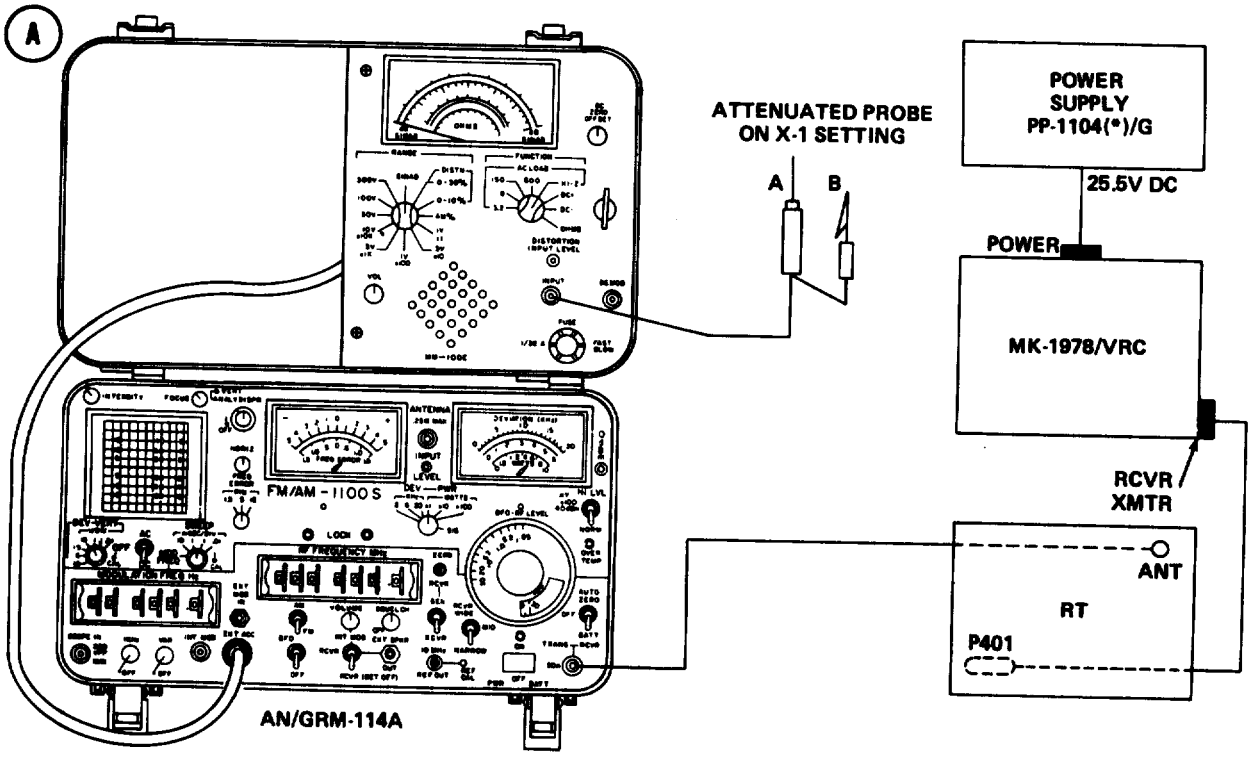
4-31. AUDIO AND SQUELCH PREAMPLIFIER A4300 ALINEMENT.

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 Ⓐ .



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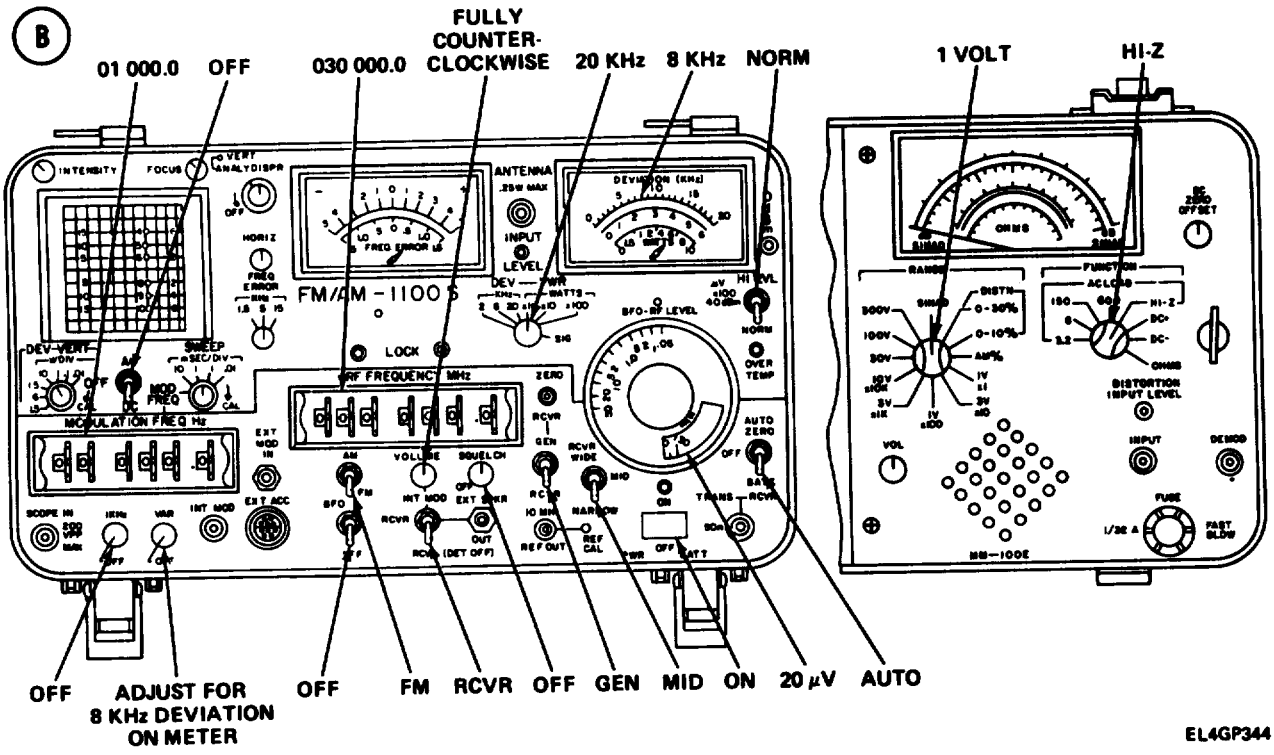
4-31. AUDIO AND SQUELCH PREAMPLIFIER A4300 ALINEMENT. (CONT)

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

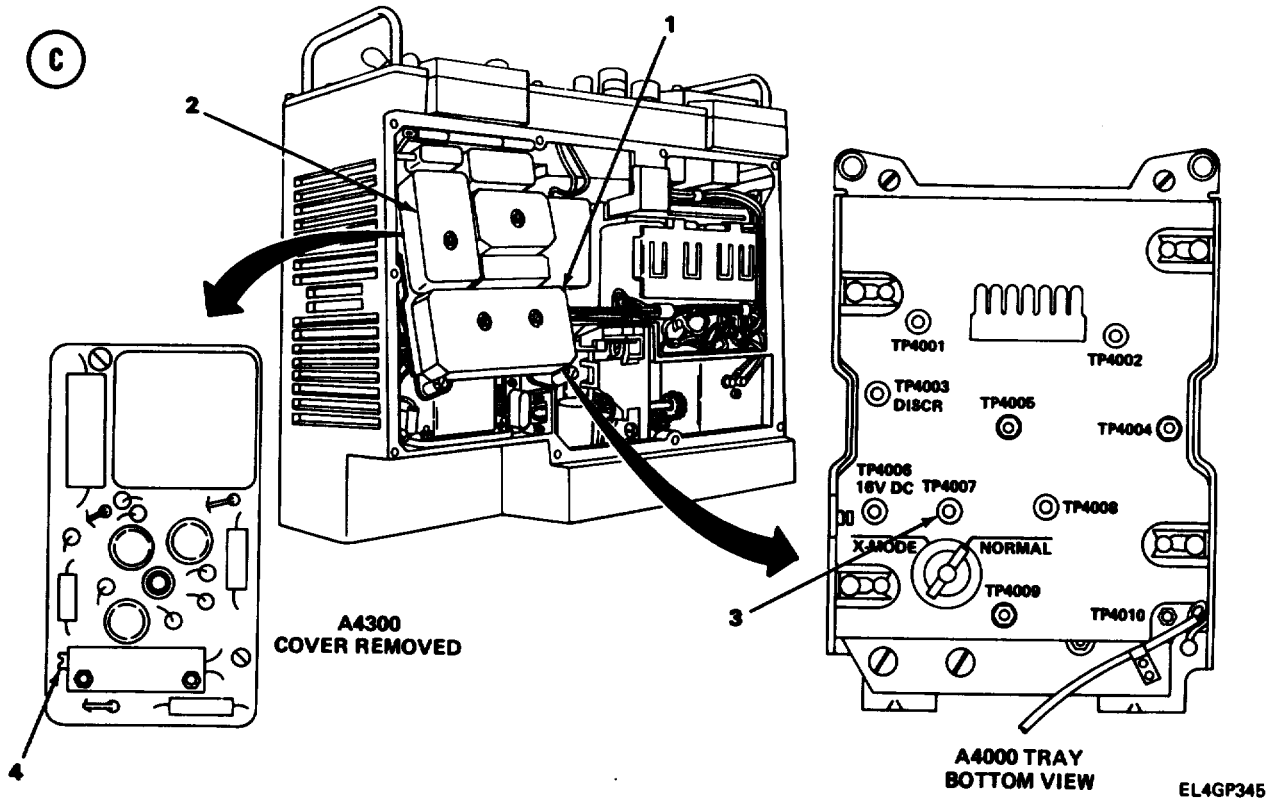
CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	(A)
	MC-TUNE-KC	30.00
	VOLUME	Fully clovkwise
	SQUELCH	NEW OFF
	SPEAKER (RT-524/VRC)	OFF
MK-1978/VRC	All switches	Down, except POWER up
AN/GRM-114A; MM-100E	See test setup diagram (B)	



4-31. AUDIO AND SQUELCH PREAMPLIFIER A4300 ALINEMENT. (CONT)

ALINEMENT PROCEDURE



1. Lift RT A4000 tray (1). (See test setup diagram © .)
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.

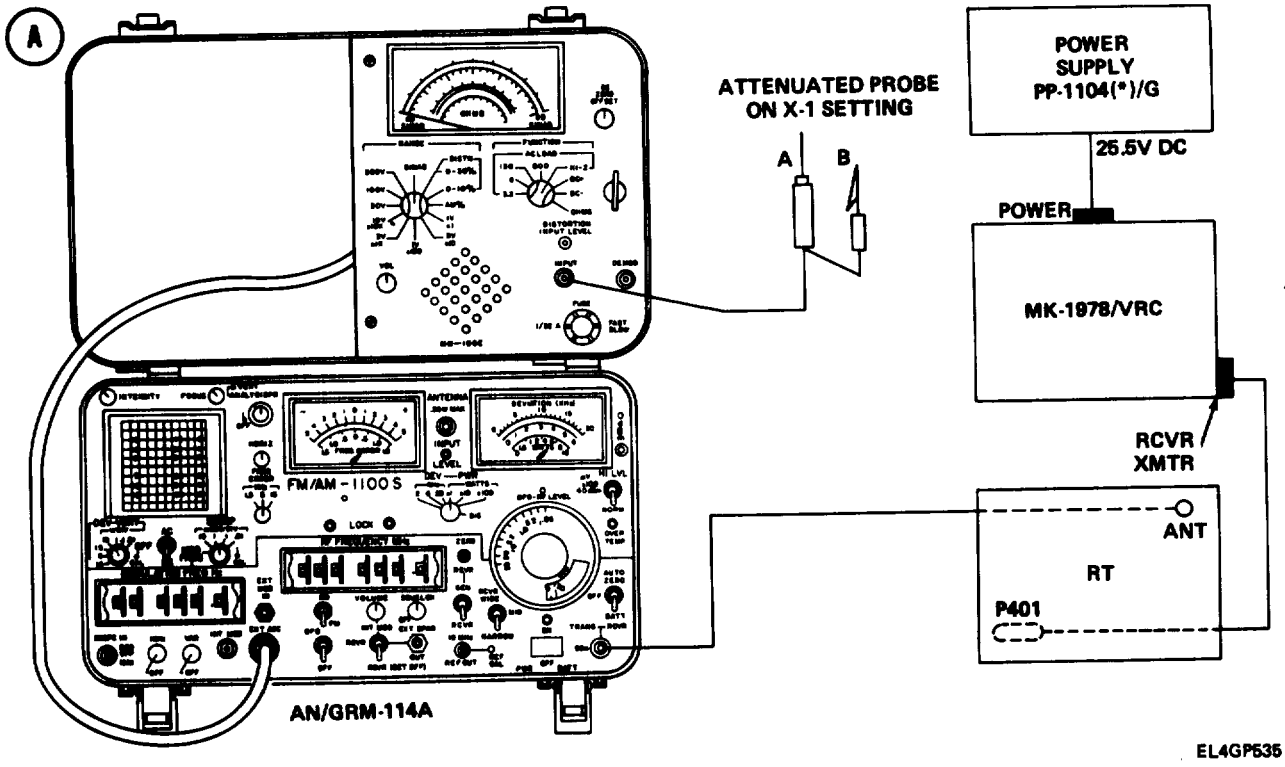
4-32 SILICON VERSION AUDIO AND SQUELCH PREAMPLIFIER A430OA ALINEMENT.

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) .

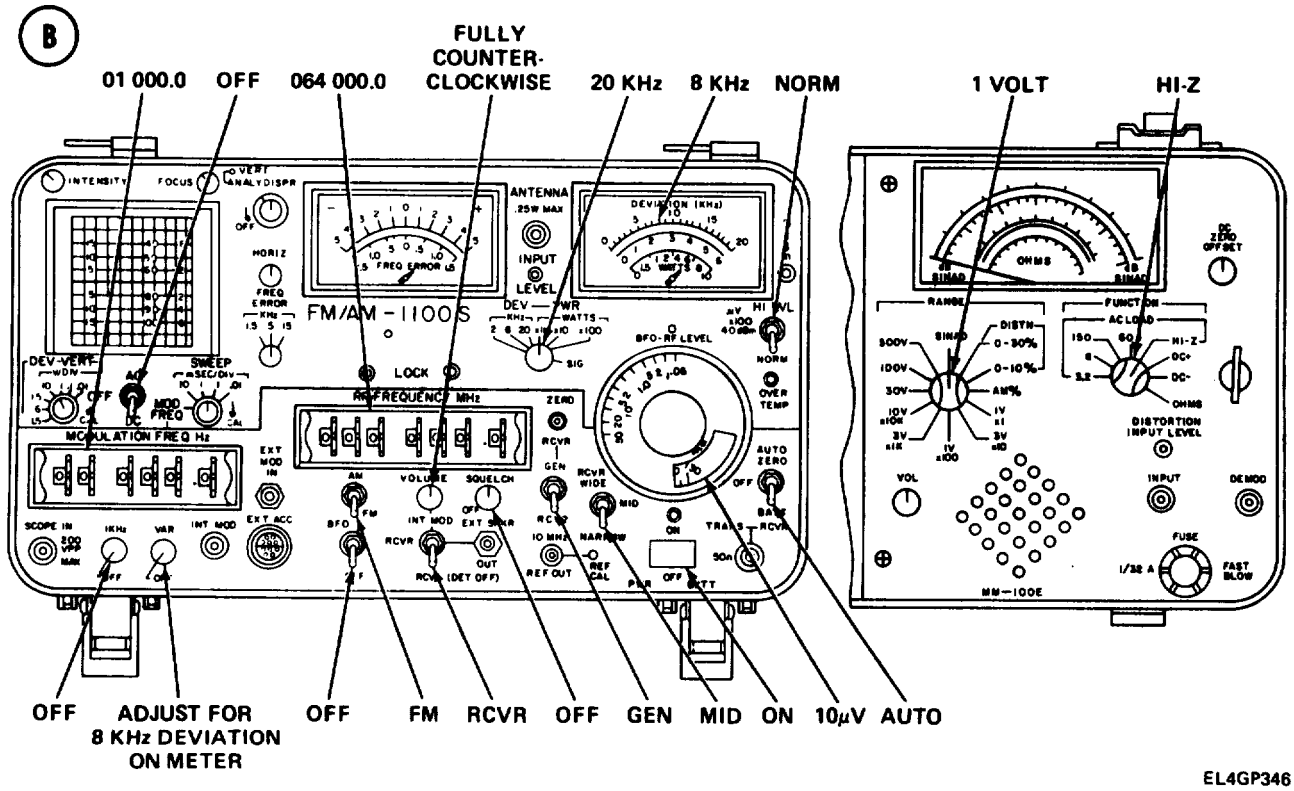


4-32. SILICON VERSION AUDIO AND SQUELCH PREAMPLIFIER A4300A ALINEMENT. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as illustrated in the followina table.

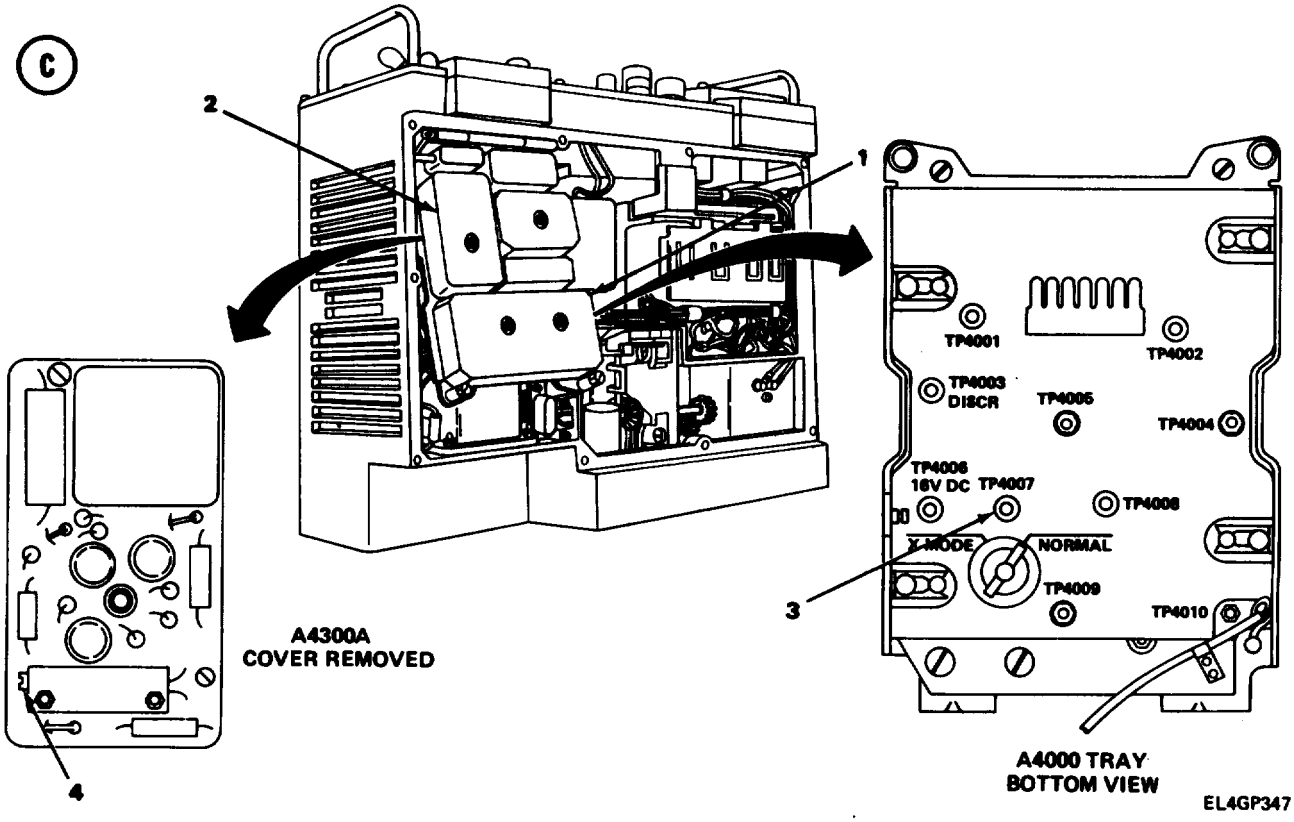
CONTROL AND SWITCH SETTINGS

	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	(B)
	MC-TUNE-KC	64.00
	VOLUME	Fully clockwise
	SQUELCH	NEW OFF
MK-1978/VRC	All switches	Down, except POWER up
AN/GRM-114A; MM-1OOE	See test setup diagram (B)	



4-32. SILICON VERSION AUDIO AND SQUELCH PREAMPLIFIER A4300A ALINEMENT. (CONT)

ALINEMENT 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 O.8-volt reading on MM-1OOE.

4-33 ALINEMENT 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.

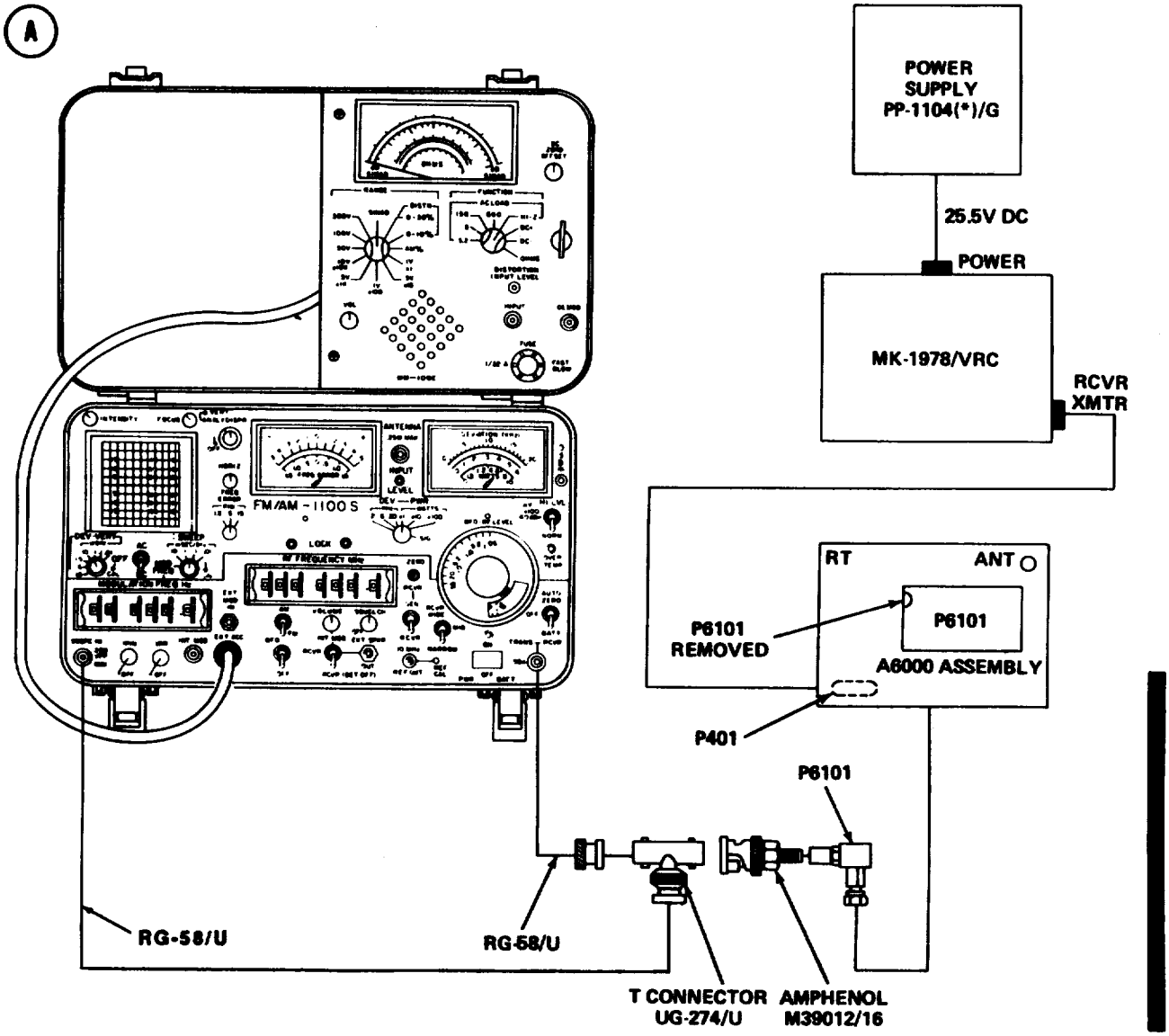
TEST EQUIPMENT AND MATERIALS

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)

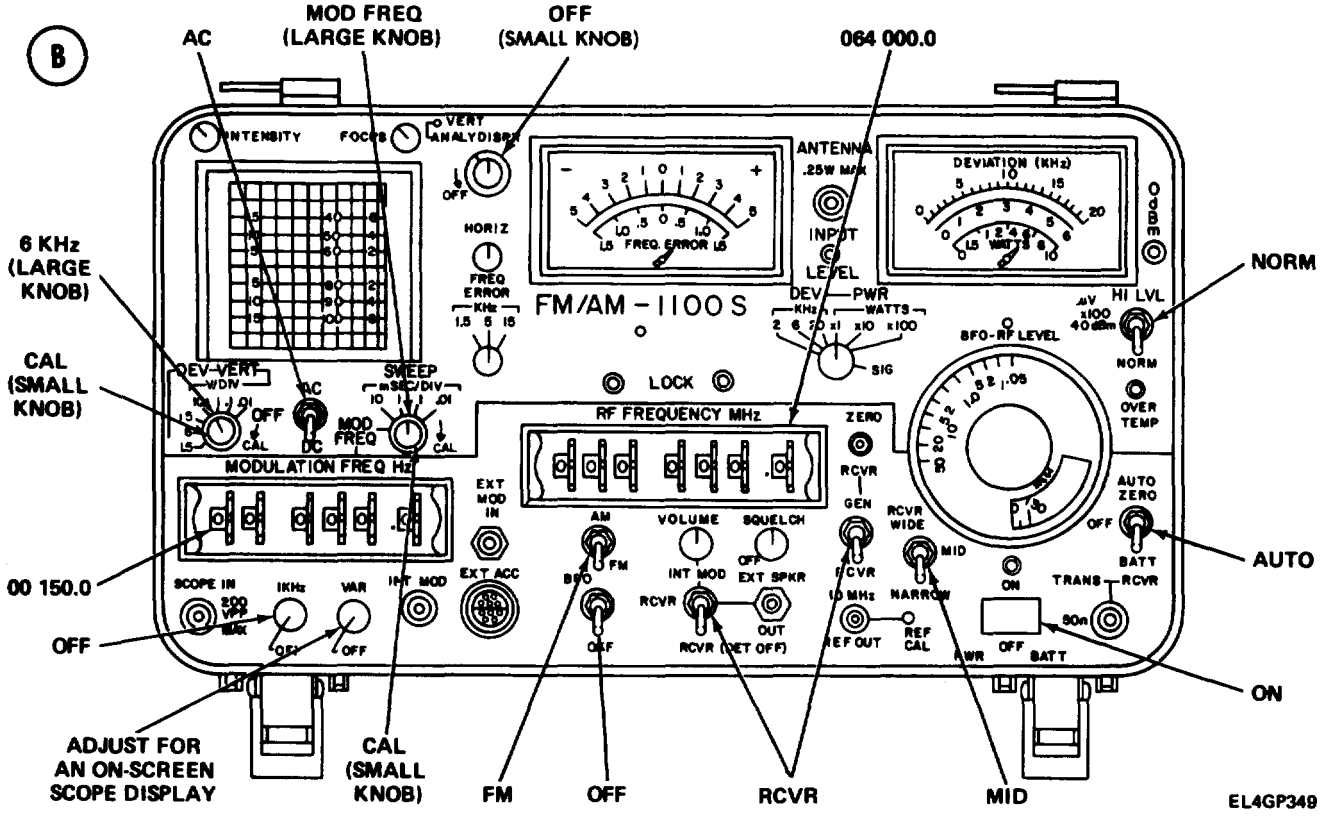


4-23. ALINEMENT OF AS300 SQUELCH FILTER FOR CORRECT TRANSMITTED SQUELCH TONE. (CONT)

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

CONTROL AND SWITCH SETTINGS

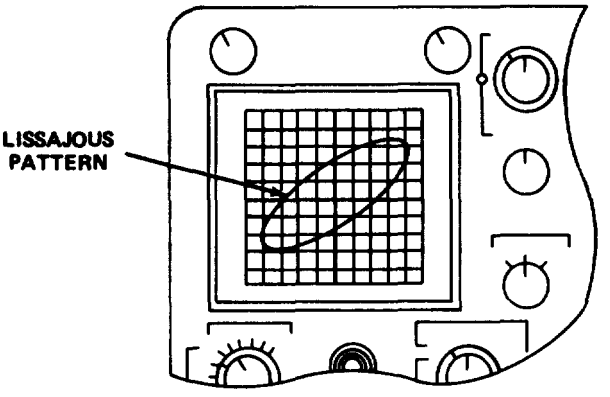
EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	(B)
	MC-TUNE-KC	64.00
	VOLUME	Counterclockwise
	SQUELCH	NEW ON
MK-1978/VRC	All switches	Down, except POWER up
AN/GRM-114A; MM-1OOE	See test setup diagram (B)	



4-33 ALINEMENT OF A5300 SQUELCH FILTER FOR CORRECT TRANSMITTED SQUELCH TONE (CONT)

ALINEMENT PROCEDURE

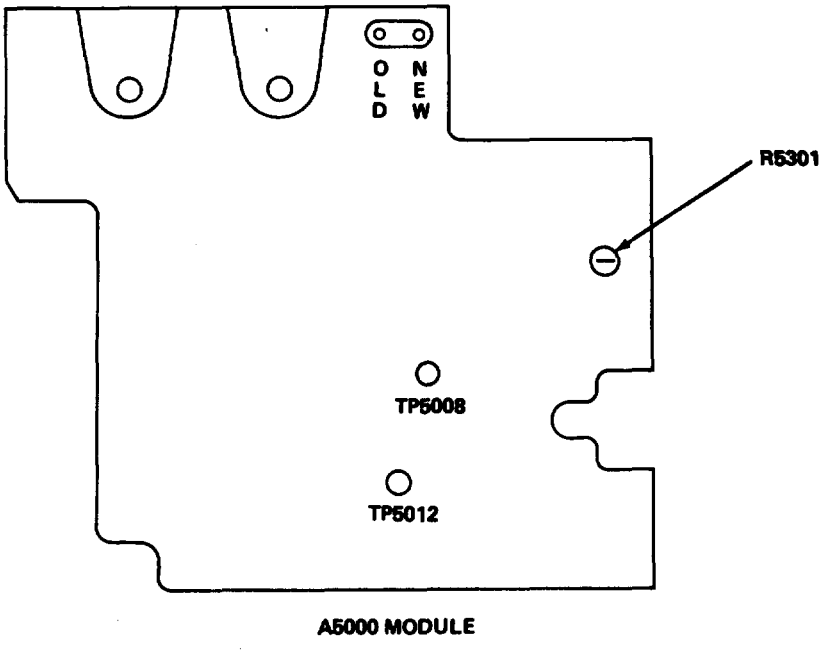
Ⓒ



EL4GP350

1. Set MK-1978/VRC KEY switch to XMIT.
2. Cheek 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.

Ⓓ



EL4GP351

3. Adjust R5301 (test setup diagram Ⓓ) until lissajous pattern stops rotating.
4. Unkey transmitter.

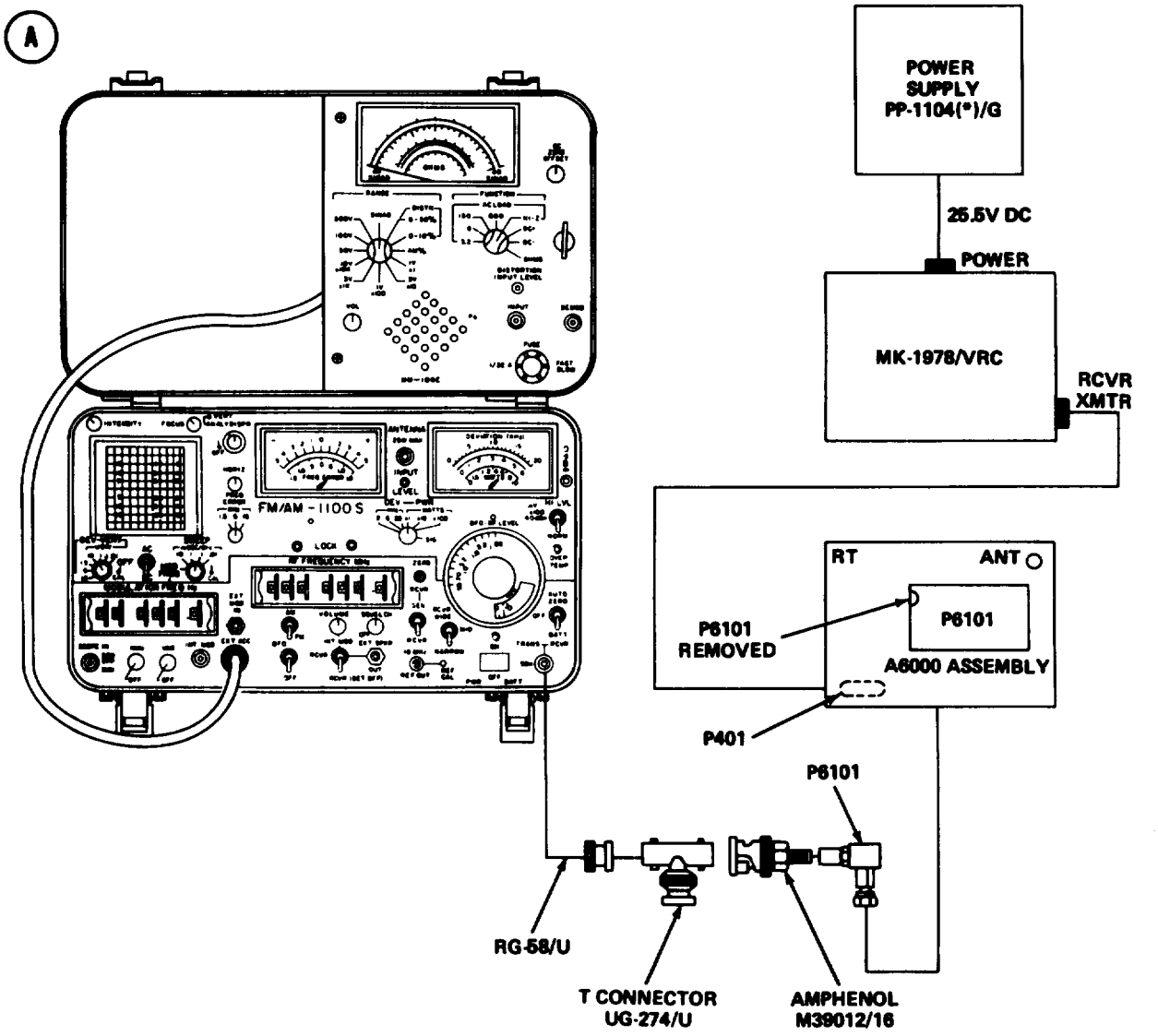
4-34. ALINEMENT OF SILICON A5300A SQUELCH FILTER FOR CORRECT TRANSMITTED SQUELCH TONE.

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) .

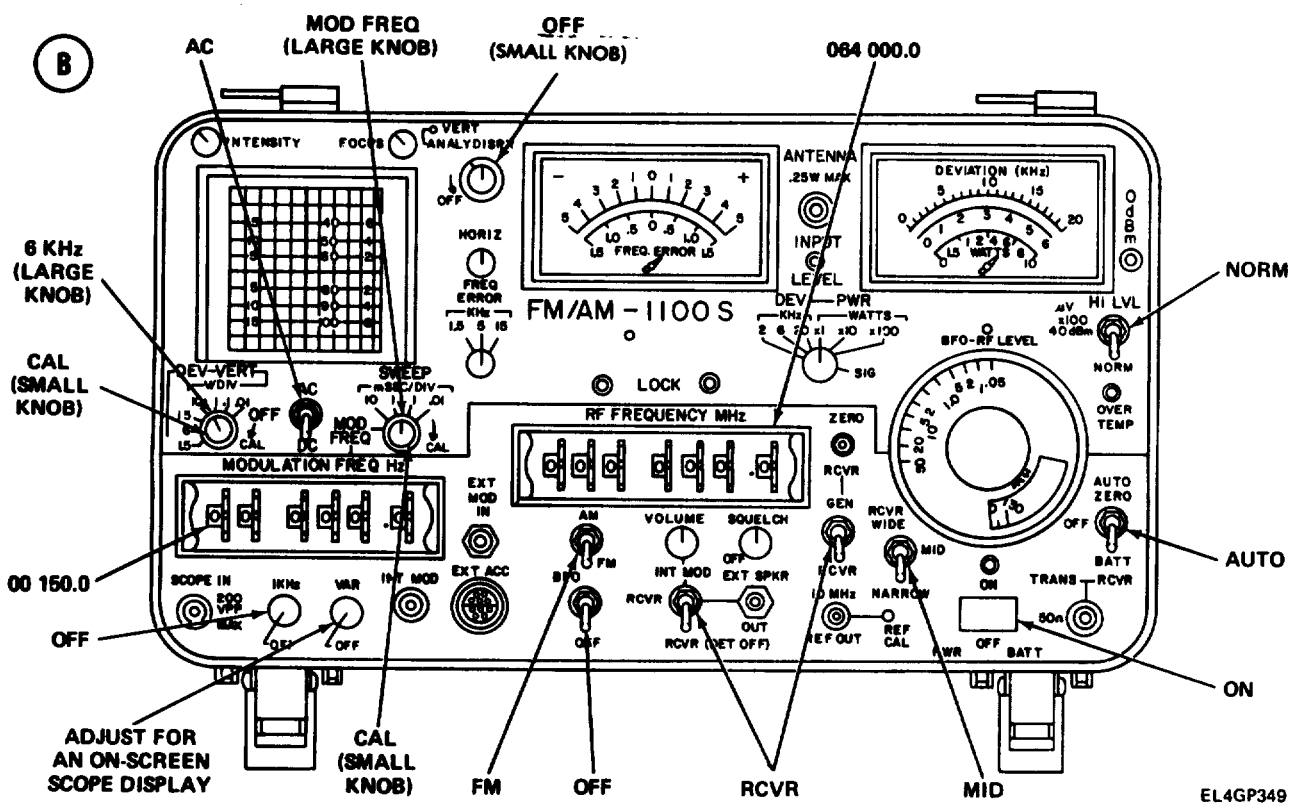


4-34 ALINEMENT OF SILICON A5300A SQUELCH FILTER FOR CORRECT TRANSMITTED SQUELCH TONE. (CONT)

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

CONTROL AND SWITCH SETTINGS

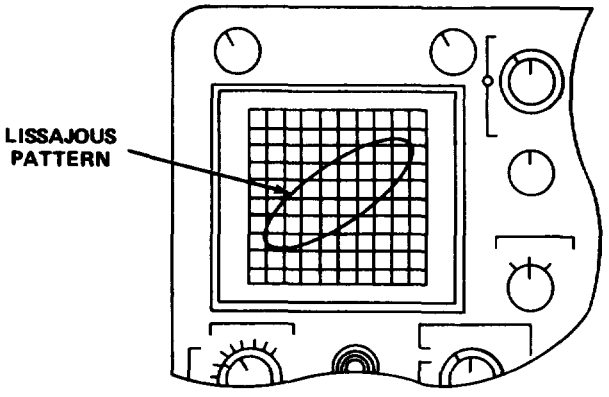
EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	(B)
	MC-TUNE-KC	064.00
	VOLUME	Counterclockwise
	SQUELCH	NEW ON
MK-1978/VRC	All switches	Down, except POWER up
AN/GRM-l14A; MM-100E	See test setup diagram (B)	



4-34. ALINEMENT OF SILICON A5300A SQUELCH FILTER FOR CORRECT TRANSMITTED SQUELCH TONE. (CONT)

ALINEMENT PROCEDURE

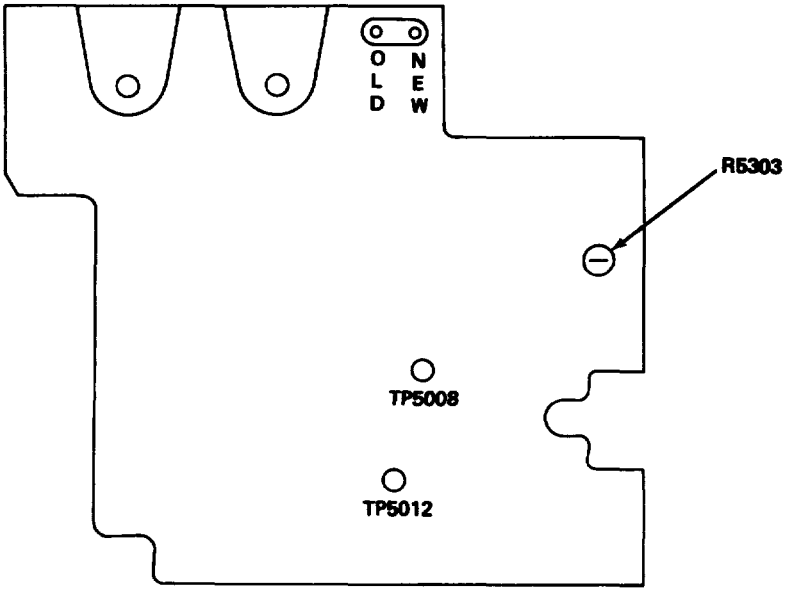
Ⓒ



EL4GP350

1. **Set MK-1978/VRC KEY switch to XMIT.**
2. **Check lissjous 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.**

Ⓓ



EL4GP352

3. Adjust R5303 (test setup diagram Ⓓ) until lissajous pattern stops rotating.
4. Unkey transmitter.

4-35. A5200 SQUELCH AMPLIFIED? ALINEMENT, NEW SQUELCH LEVEL.

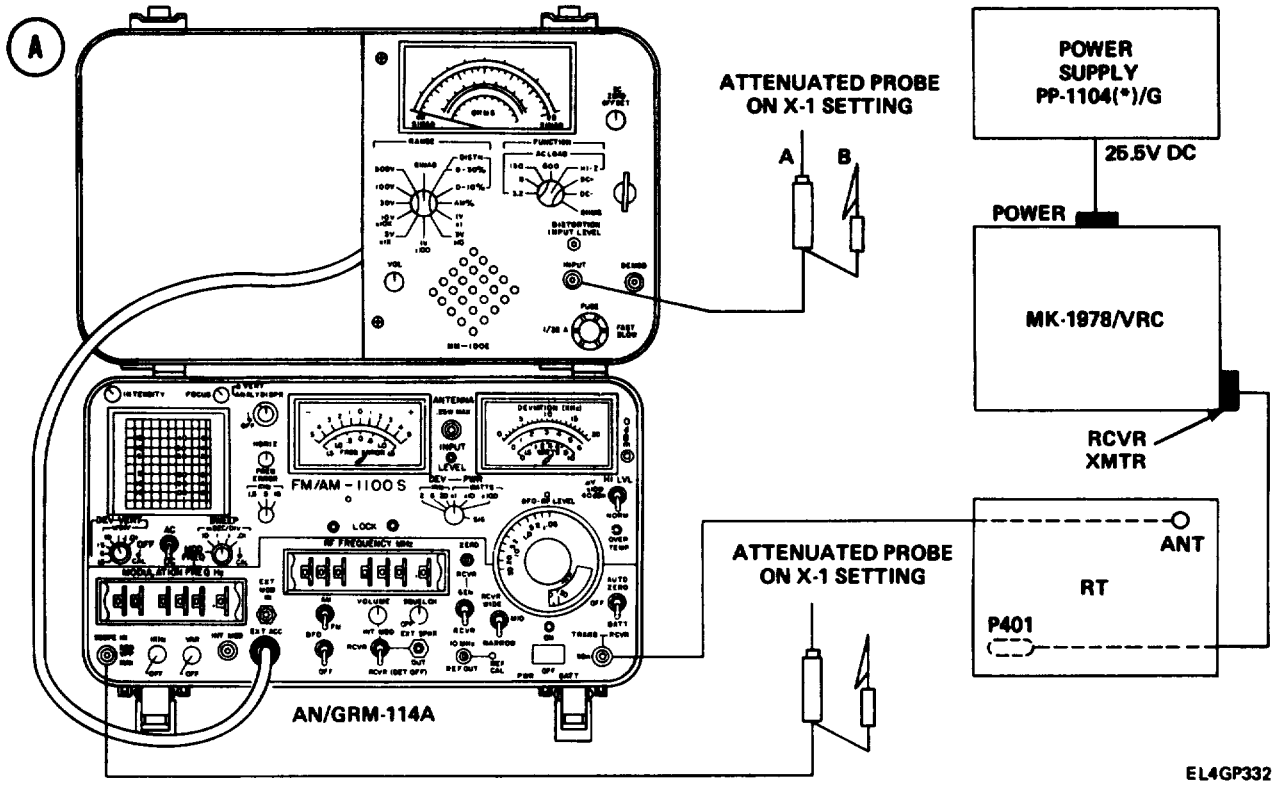
PURPOSE. This procedure adjusts the receiver sensitivity to the 150-Hz NEW SQUELCH tone.

4-35. A5200 SQUELCH AMPLIFIER ALINEMENT, NEW SQUELCH LEVEL. (CONT)

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 (A) .

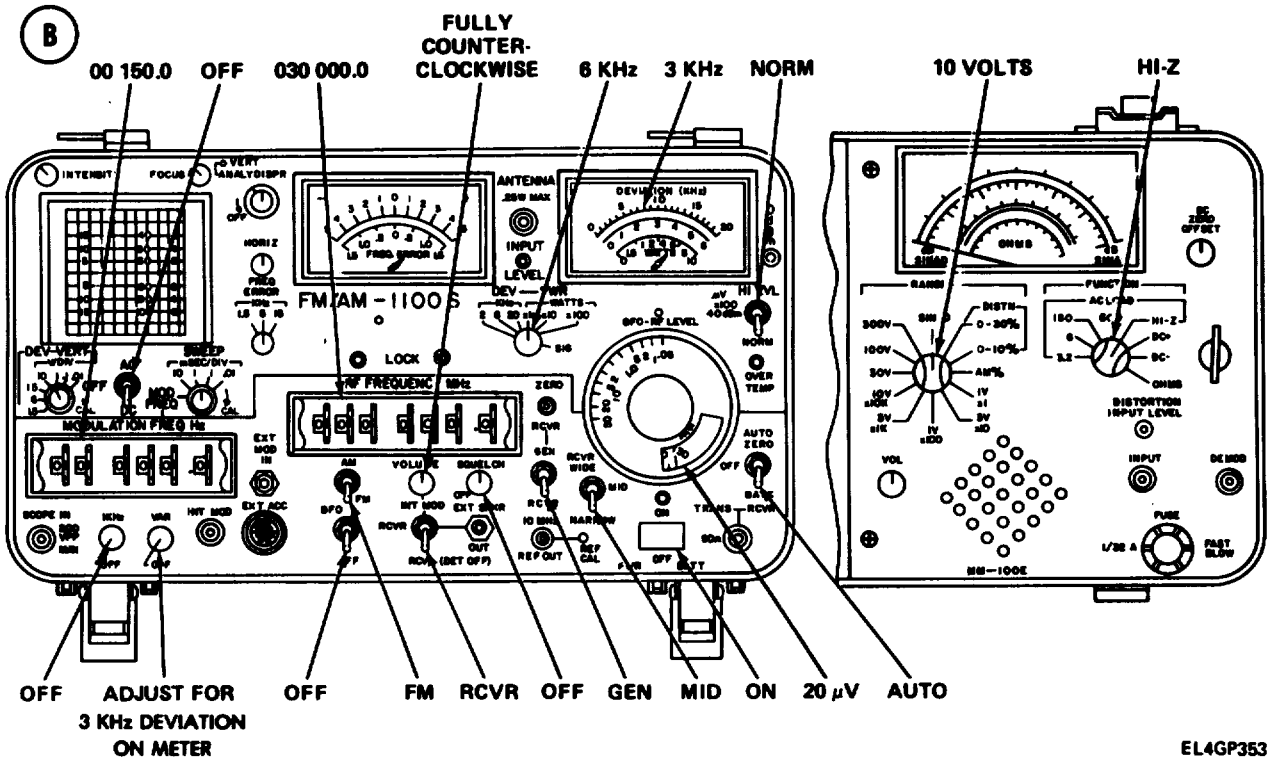


INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment as indicated In the following table.

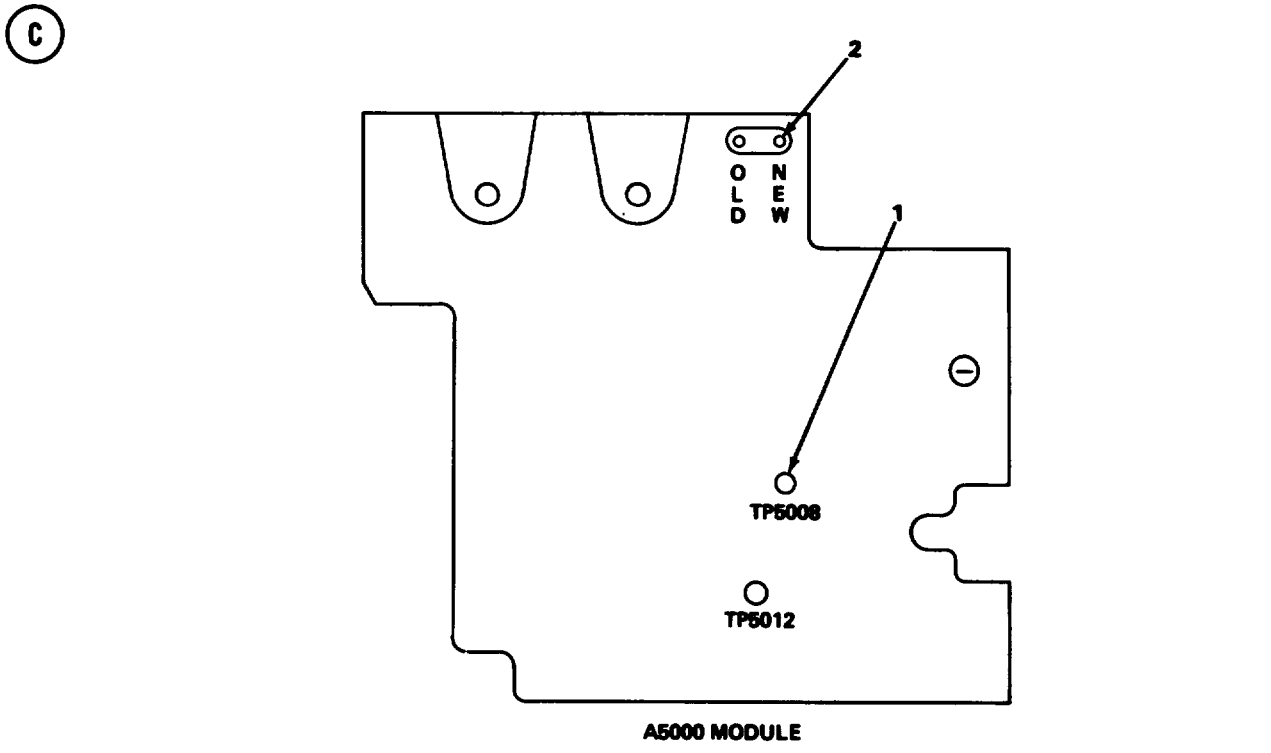
CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	(A)
	MC-TUNE-KC	30.00
	VOLUME	Fully clockwise
	SQUELCH	NEW ON
	SPEAKER (RT-524/VRC)	OFF
ANIGRM-114A; MM-100E	See test setup diagram (B) , page 4-202	
MK-1978/VRC	All switches	Down, except POWER up

4-35. A5290 SQUELCH AMPLIFIER ALINEMENT, NEW SQUELCH LEVEL. (CONT)



ALINEMENT PROCEDURE



4-35. A5200 SQUELCH AMPLIFIER ALINEMENT, NEW SQUELCH LEVEL. (CONT)

1. Lift RT A3000 tray.
2. Connect MM-1OOE 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-1OOE.
4. Adjust NEW Squelch Resistor R5217 (2) until RT CALL light just comes on. (See test setup diagram © .)

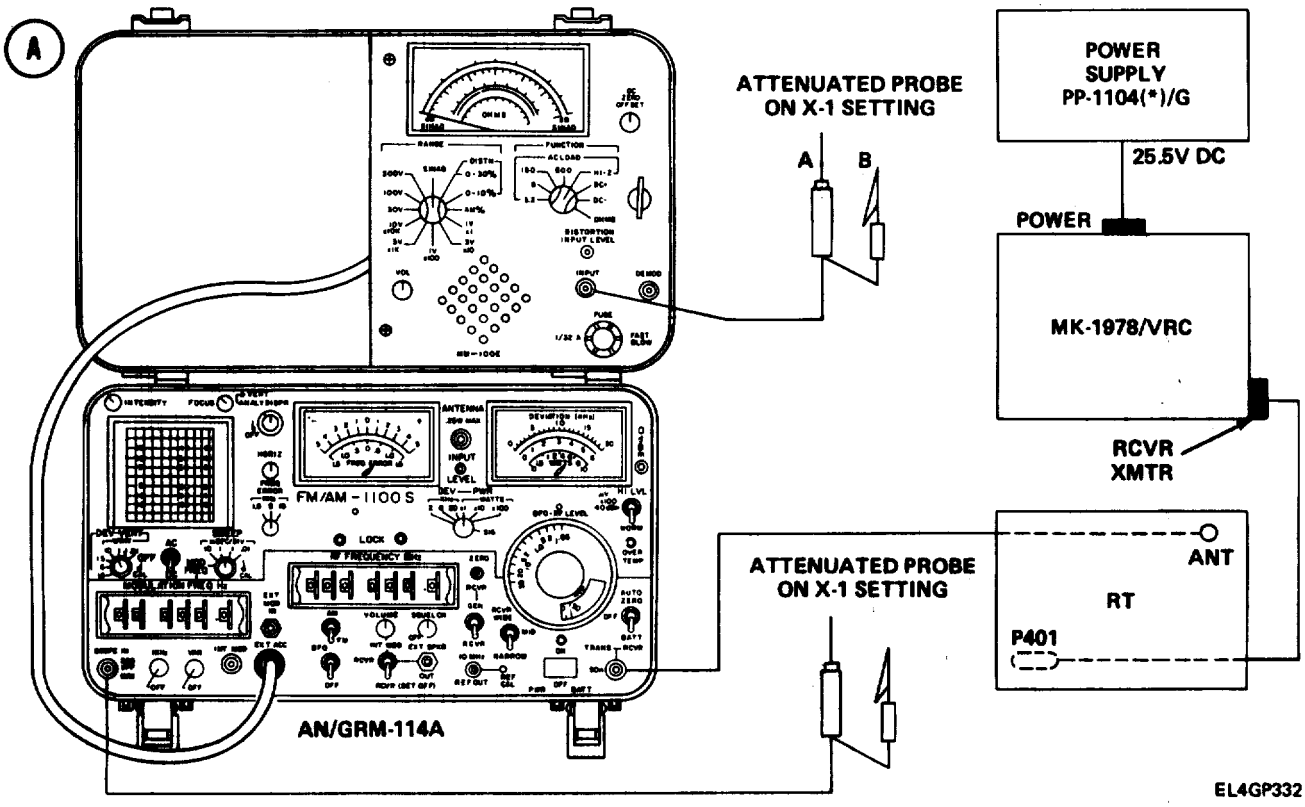
4-36. SILICON VERSION A5200A SQUELCH AMPLIFIER ALINEMENT, NEW SQUELCH LEVEL.

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 Ⓐ .

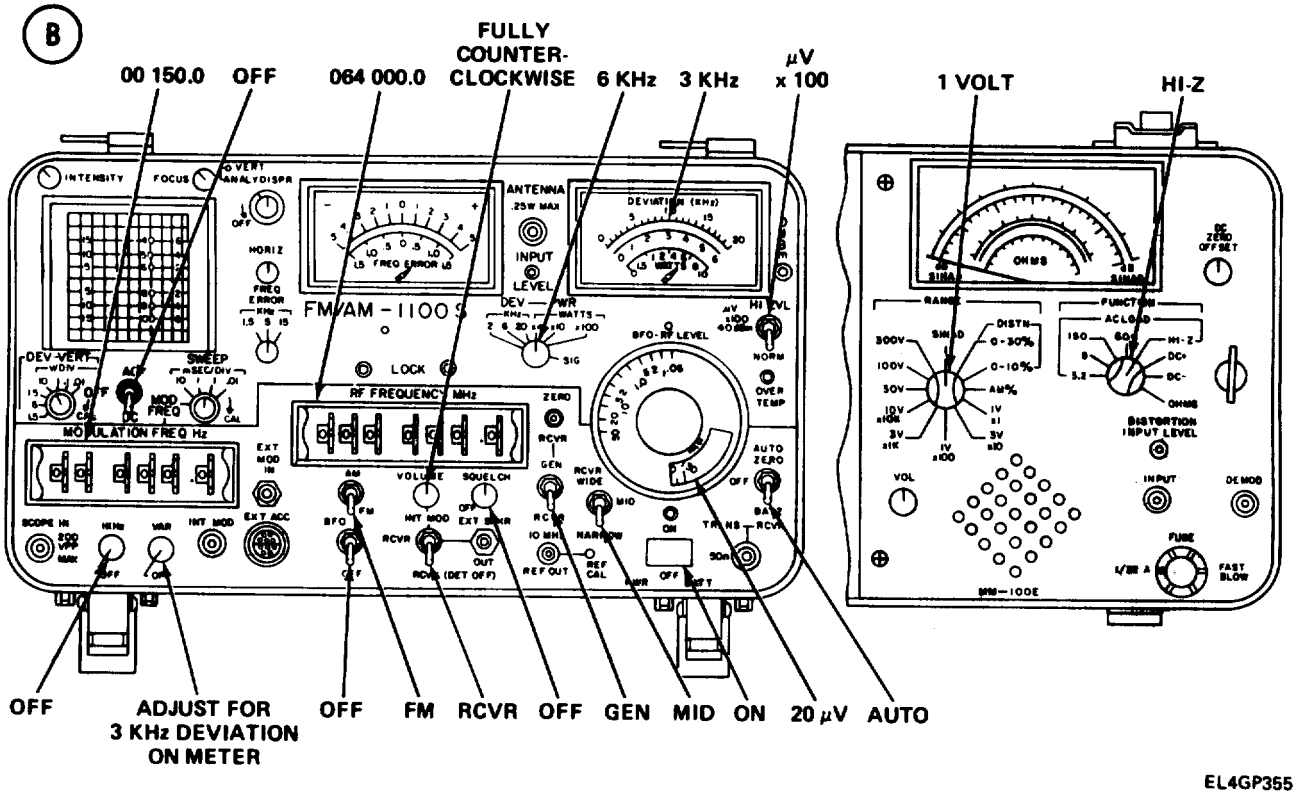


4-46. SILICON VERSION A5200A SQUELCH AMPLIFIER ALINEMENT, NEW SQUELCH LEVEL. (CONT)

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

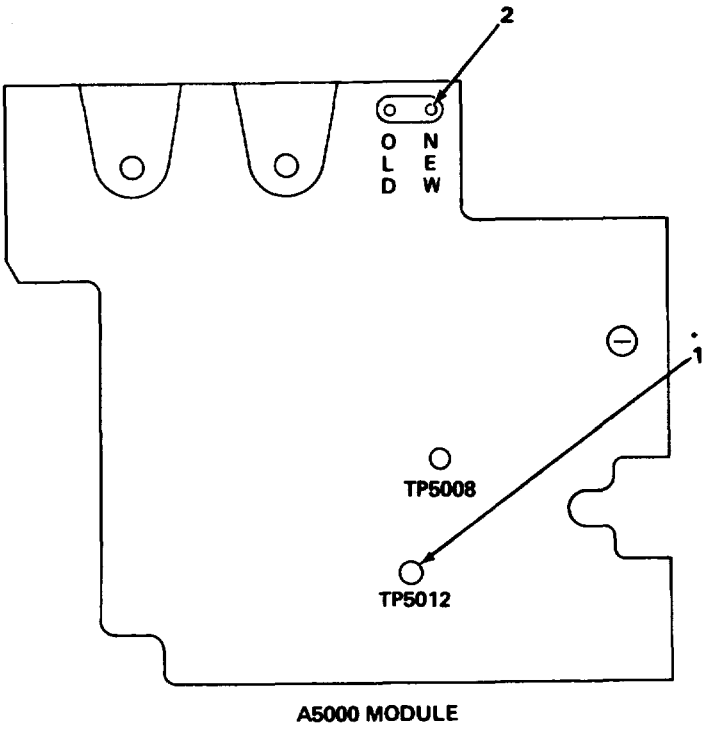
CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	(B)
	MC-TUNE-KC	64.00
	VOLUME	Fully clockwise
	SQUELCH	NEW ON
	SPEAKER (RT-524/VRC)	OFF
AN/GRM-114A; MM-1OOE	See test setup diagram (B)	
MK.1978/VRC	All switches	Down, except POWER up



4-36. SILICON VERSION A5200A SOUELCH AMPLIFIER ALINEMENT, NEW SQUELCH LEVEL. (CONT)

ALINEMENT PROCEDURE



EL4GP354

1. Lift RT A3000 tray.
2. Connect MM-1OOE 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-1OOE.
4. Adjust NEW Squelch Resistor R5217 (2) until RT CALL light just comes on.

4-37. A5200 SQUELCH AMPLIFIER ALINEMENT, OLD SQUELCH LEVEL.

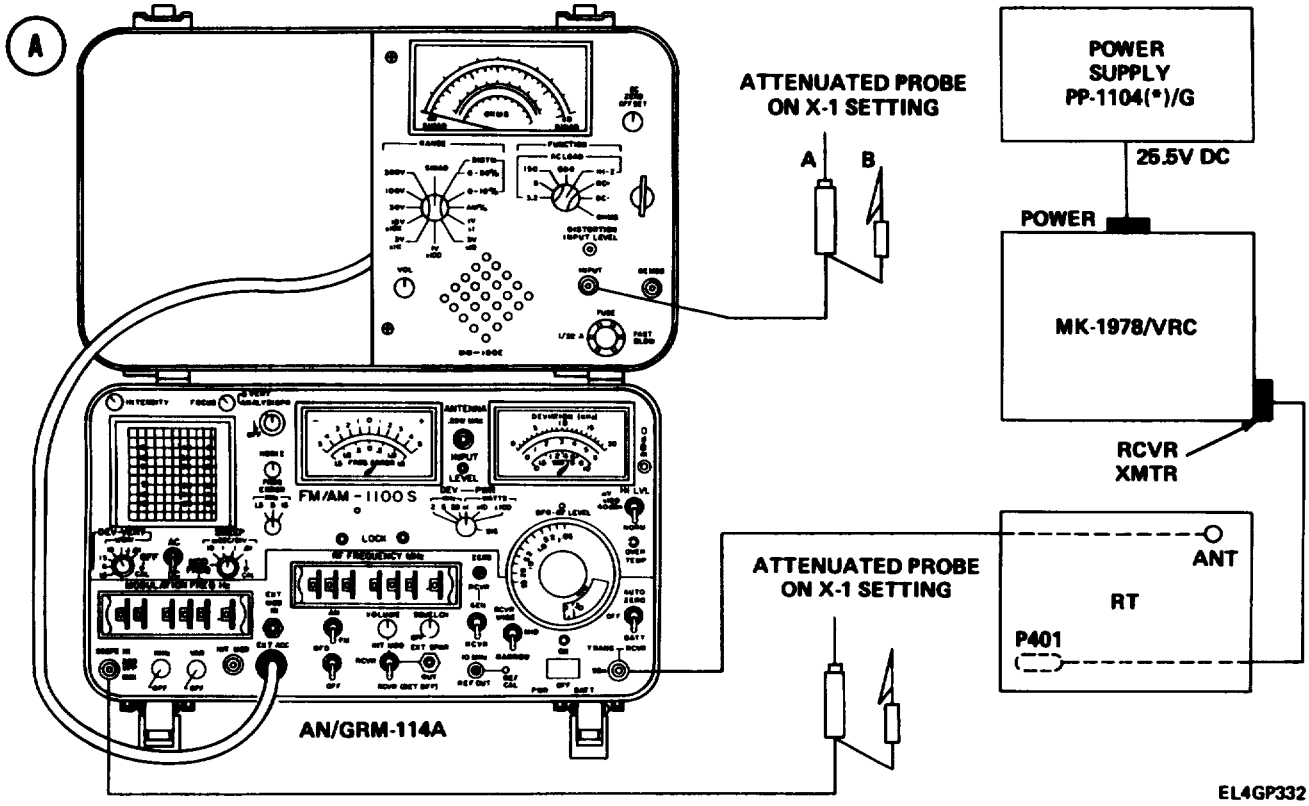
PURPOSE. This procedure adjusts the receiver sensitivity to the OLD SQUELCH signals which include internal noise and the received carrier.

TEST EQUIPMENT AND MATERIALS

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

TEST SETUP. Connect the equipment as shown in test setup diagram Ⓐ, page 4-206.

4-47. A5200 SQUELCH AMPLIPIER ALINEMENT, OLD SQUELCH LEVEL. (CONT)

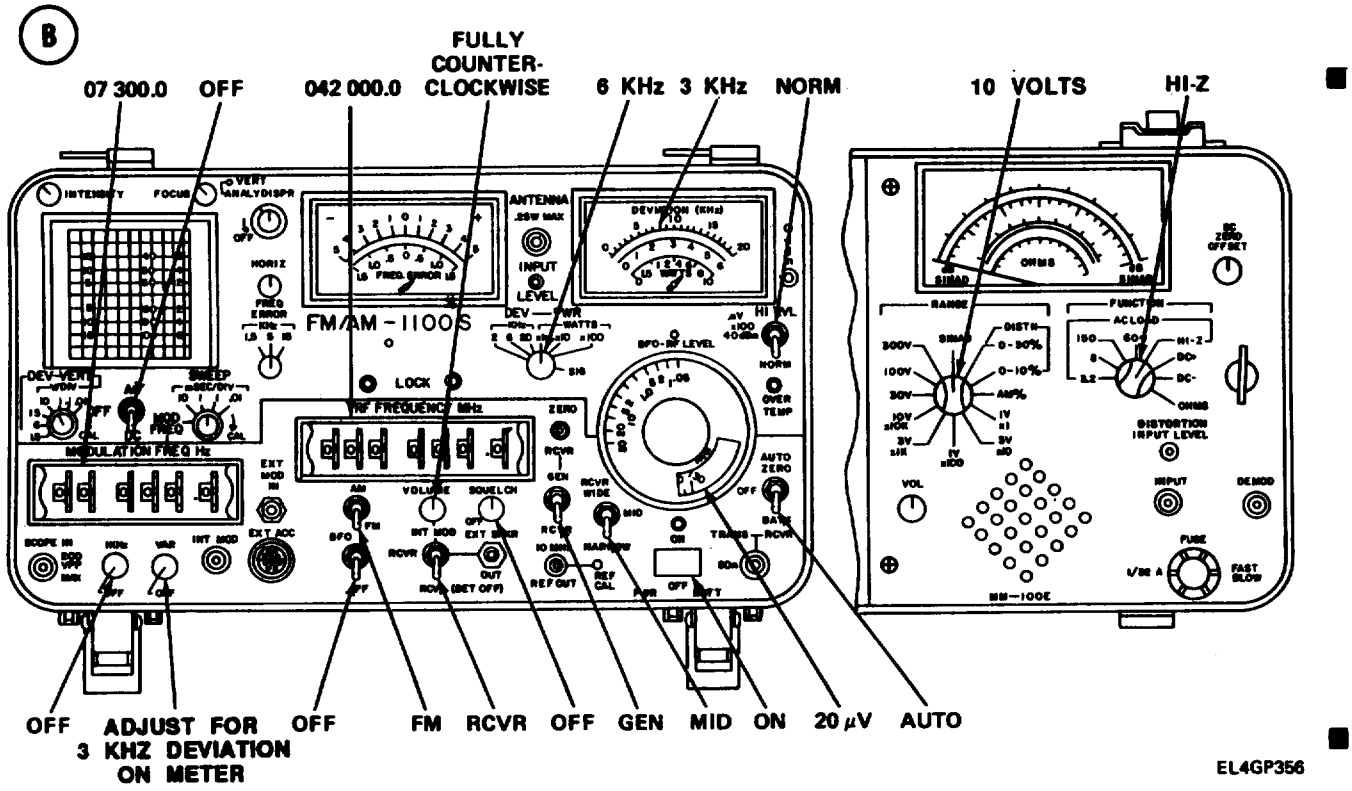


INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment as indicated in the following table.

CONTROL AND SWITCH SETTINGS

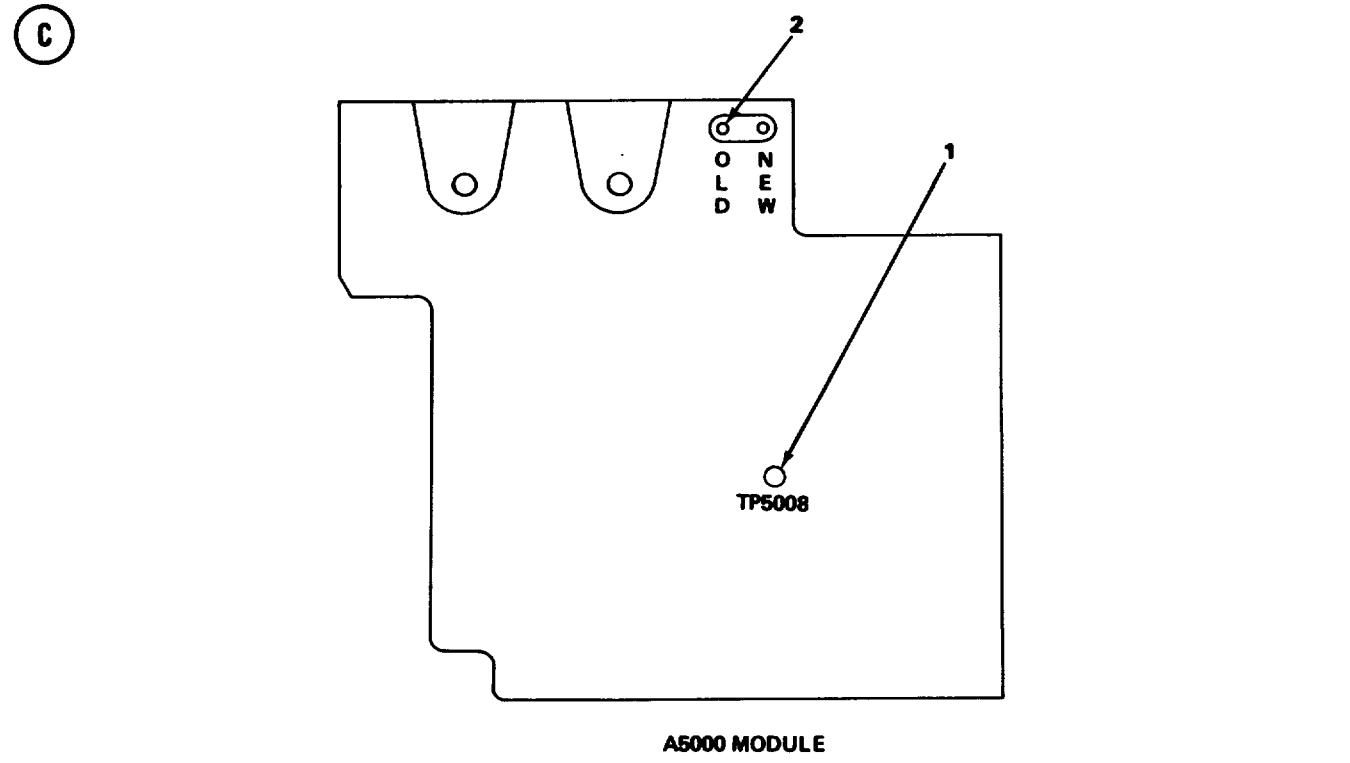
EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	(A)
	MC-TUNE-KC	42.00
	VOLUME	Fully clockwise
	SQUELCH	OLD ON
	SPEAKER (RT-524/VRC)	OFF
AN/GRM-114A; MM-1OOE	See test setup diagram (B) page 4-207	
MK-1978/VRC	All switches	Down, except POWER up

4-37. A5200 SQUELCH AMPLIPIER ALINEMENT, OLD SQUELCH LEVEL. (CONT)



EL4GP356

ALINEMENT PROCEDURE



EL4GP357

4-37. A5200 SQUELCH AMPLIFIER ALINEMENT, 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 alligatorcllp 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 ALINEMENT, OLD SQUELCH LEVEL.

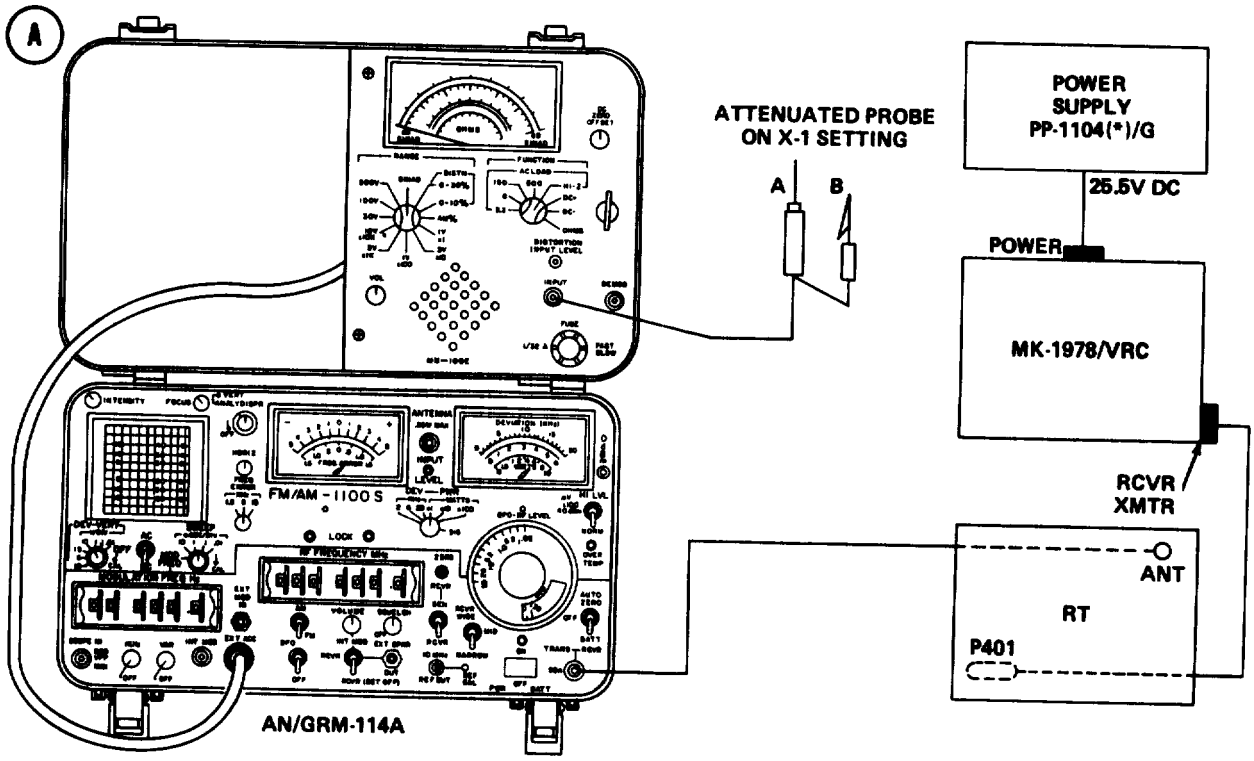
PURPOSE. This procedure adjusts the receiver sensitivity to the OLD SQUELCH signals which include internal noise and the received carrier.

TEST EQUIPMENT AND MATERIALS

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

TEST SETUP. Connect the equipment as shown in test setup diagram Ⓐ , page 4-209.

4-38. SILICON VERSION A5200A SQUELCH AMPLIFIER ALINEMENT, OLD SQUELCH LEVEL. (CONT)



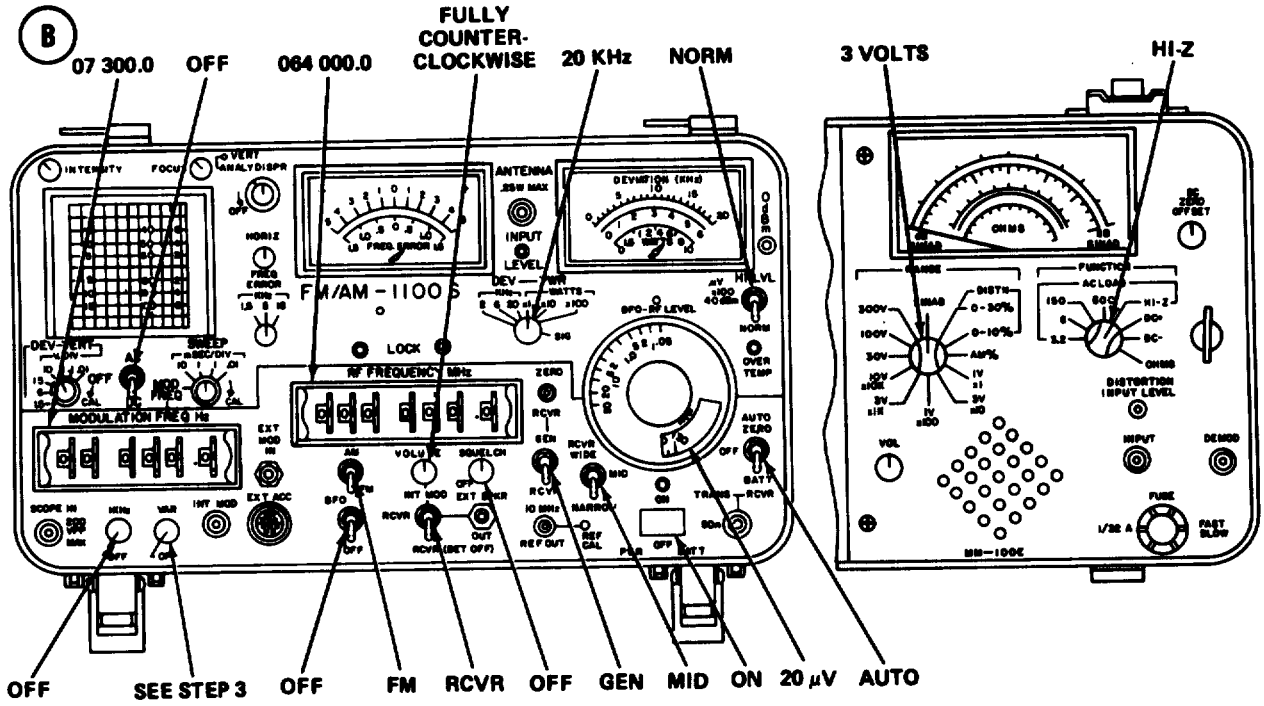
EL4GP535

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

CONTROL AND SWITCH SETTINGS

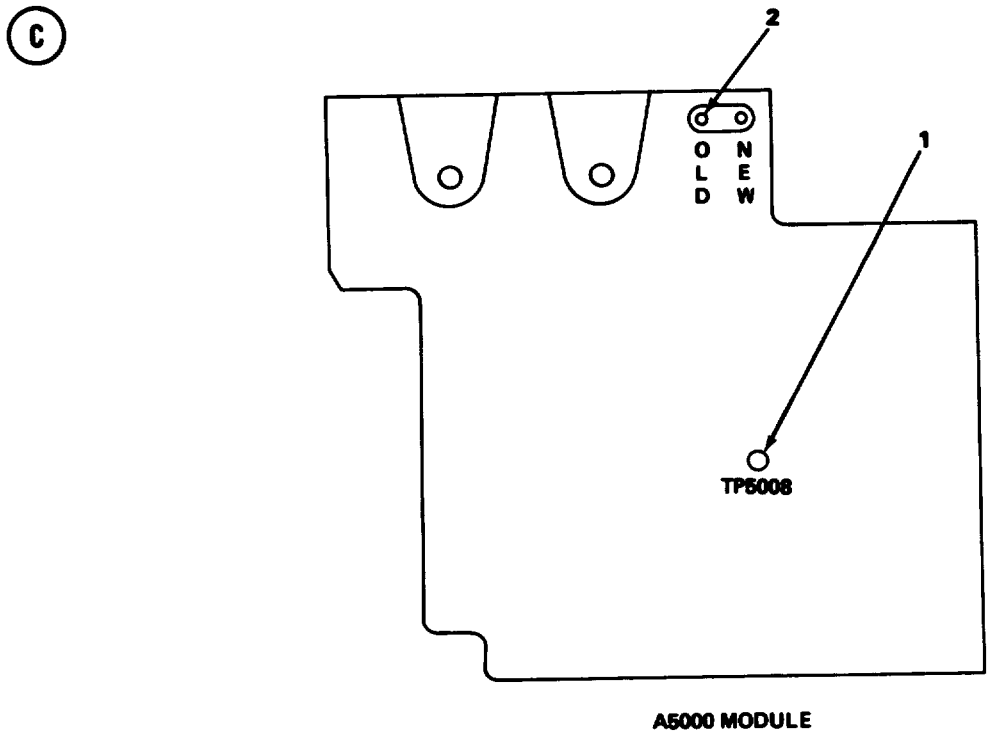
EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	(B)
	MC-TUNE-KC	64.00
	VOLUME	Fully clockwise
	SQUELCH	OLD ON
	SPEAKER (RT-524/VRC	OFF
AN/GRM-114A; MM-1OOE	Sea test setup diagrarn (B), page 4-210	
MK-1978/VRC	All switches	Down, except POWER up

4-36. SILICON VERSION A5200a SQUELCH **AMPLIFIER ALINEMENT. OLD SQUELCH LEVEL (CONT**



EL4GP358

ALINEMENT PROCEDURE



EL4GP357

4-38 SILICON VERSION A5200A SQUELCH AMPLIFIER ALINEMENT, 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-1OOE.
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) clockwlse until light goes out, then perform step 5,

4-39. POWER SUPPLY A9000/A9400A (A9000AIA9400B) TESTS.

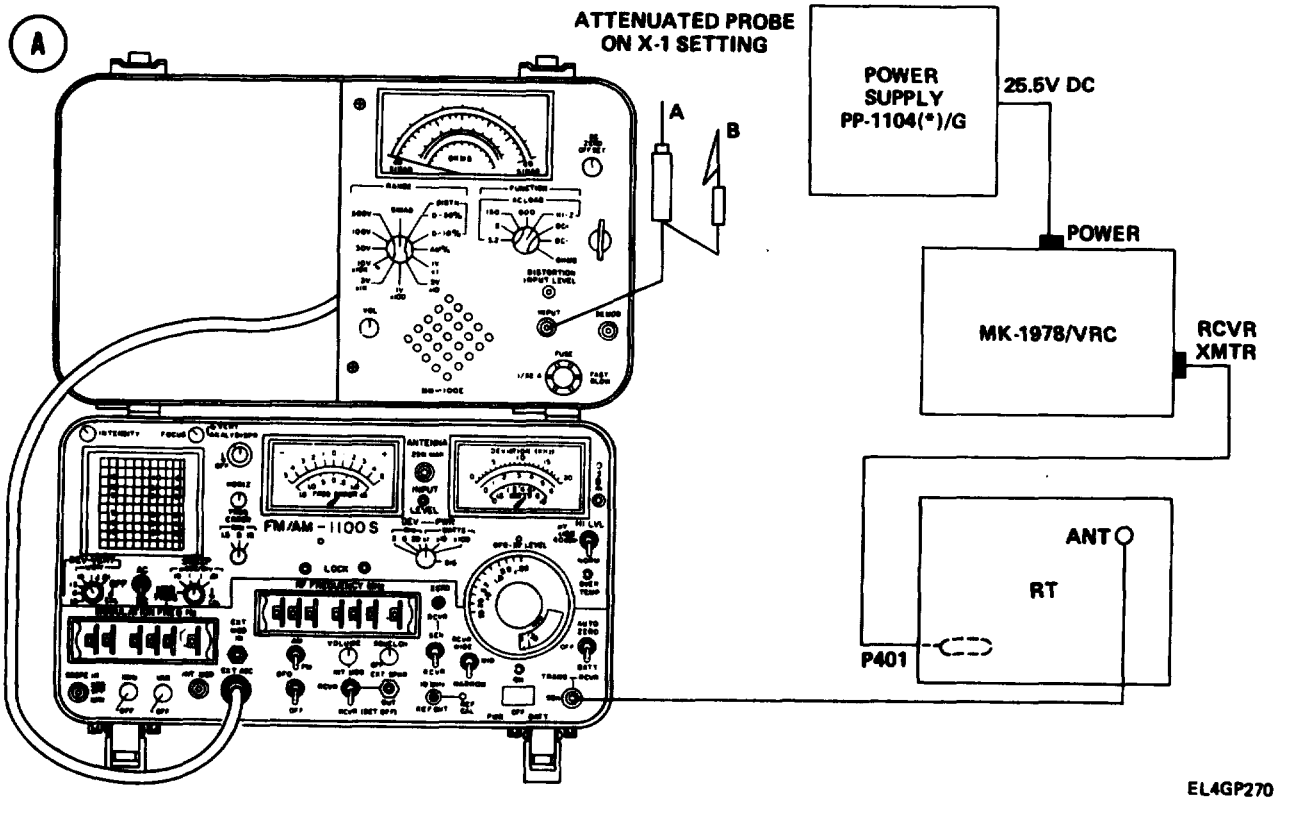
PURPOSE. This test verifies the availability of adequate power before the transmitter is alined.

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 Ⓐ .



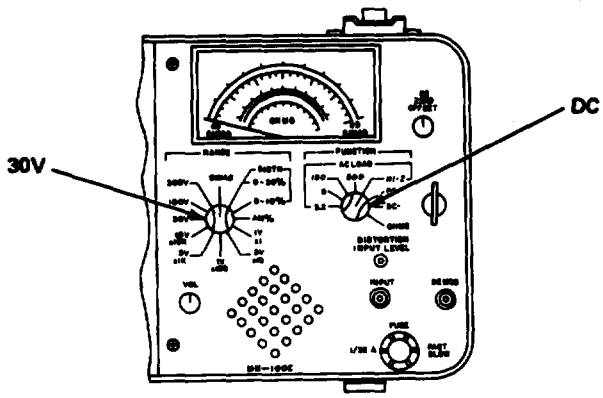
4-29. POWER SUPPLY A9000A/A9400A (A9000A/A9400B) TESTS (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as Indicated In the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	BAND	(A)
	MC-TUNE-KC	30.00
	POWER	HIGH
	SQUELCH	NEW ON
MM-100E	See test setup diagram (B)	
MK-1978/VRC	All switches	Down, except POWER up

(B)



EL4GP271

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 alinement, causing excessive current draw. if TP9005 voltage is satisfactory, but other test points given in the followlng table are not up to normal readings, troubleshoot the power supply.

Check power supply voltages at test points given in following table. Change MM-1OOE RANGE setting as indicated in table.

NOTE

Key the transmitter before performing voltage checks.

4-39. POWER SUPPLY A9000/A9000B) TESTS. (CONT)

A9000 TEST POINT	MM-100E RANGE	ATTENUATED PROBE	VOLTAGE
TP9005	30 volts (dc +)	x1	25 vdc minimum
TP9001	100 volts (dc +)	x10	640 to 760 vdc
TP9002	300 volts (dc +)	x1	250 to 300 vdc
TP9003	100 volts (AC-H1-Z)	x1	90 vac minimum
TP9004	30 volts (dc-)	x1	-20 vdc minimum (-14 vdc min, older units)

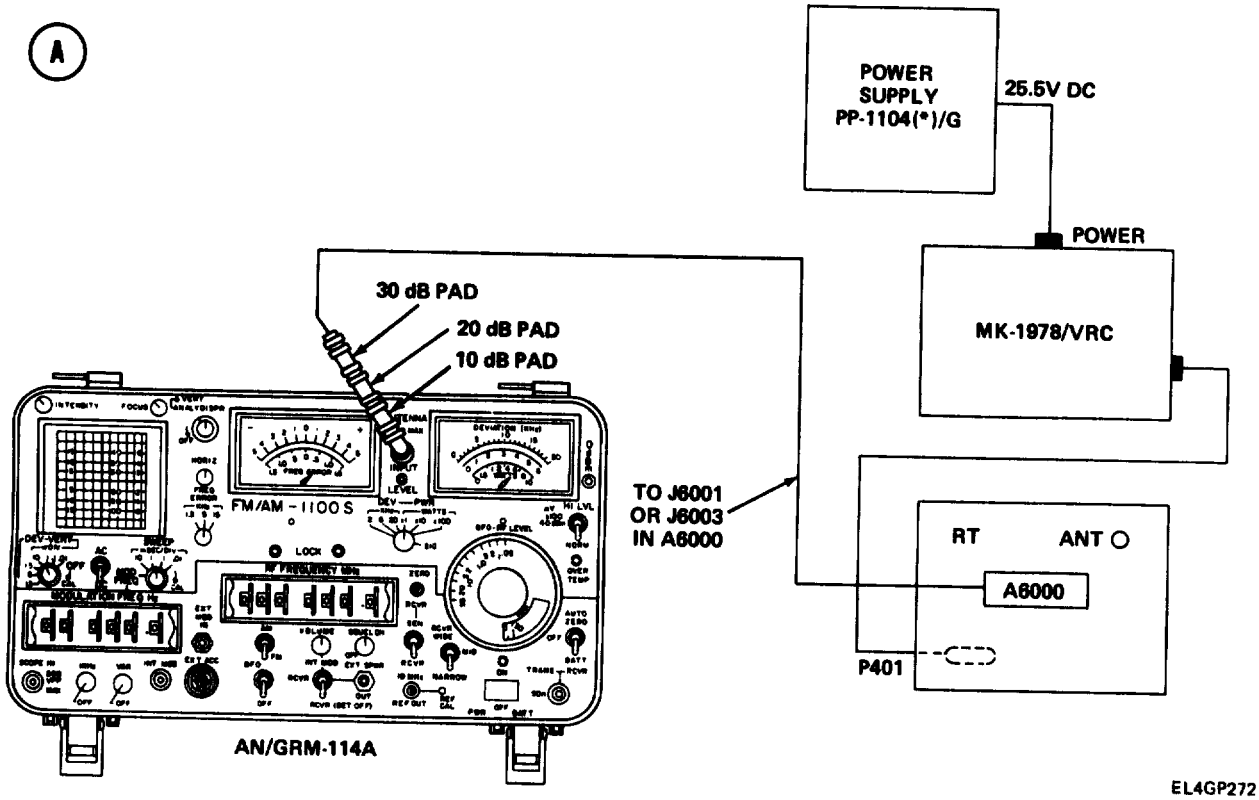
4-40. MASTER OSCILLATOR A6300 AND BUFFER AMPLIFIER A6400 ALINEMENT.

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) .

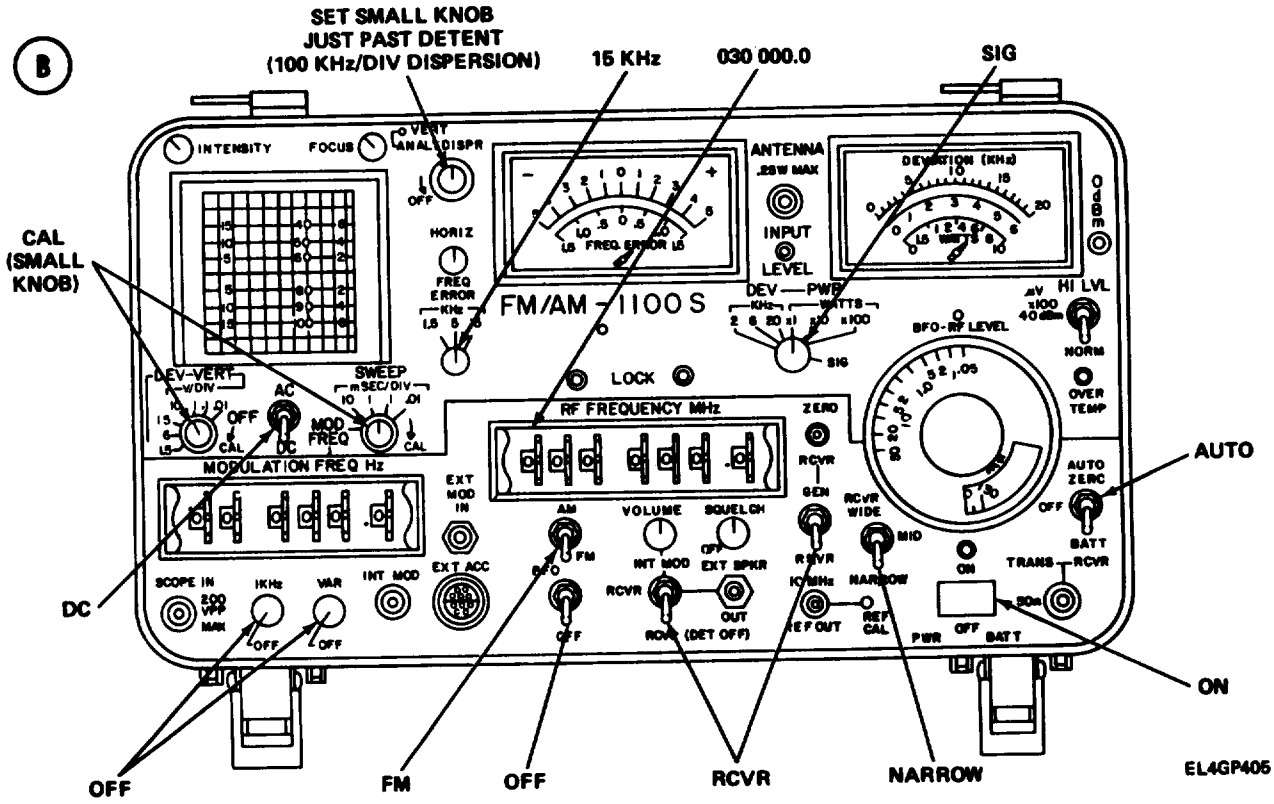


4-49. MASTER OSCILLATOR A6300 AND BUFFER AMPLIFIER ALINEMENT. (CONT)

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

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND Ⓐ	
	MC-TUNE-KC	30.00
AN/GRM-114A; MM-1OOE	See test setup diagram Ⓑ	



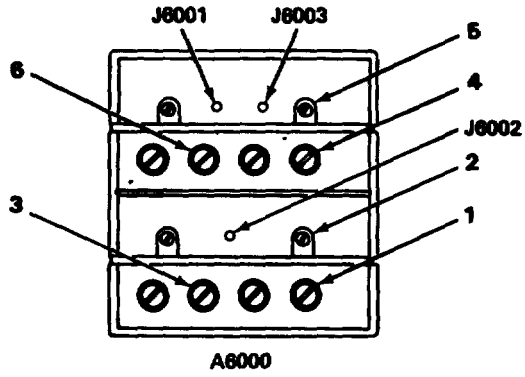
ALINEMENT PROCEDURE

Ⓐ **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 J6O03. (See test setup diagram Ⓐ, page 4-213.)
5. Set MK-1978/VRC KEY switch to XMIT.

4-40. MASTER OSCILLATOR A6300 AND BUFFER AMPLIFIER A3400 ALINEMENT. (CONT)

Ⓒ



6, Adjust L6305 (1) for 30 MHz ±100 kHz reading on AN/GRM-114A spectrum analyzer. The signaltrace 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 030 000 0;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.

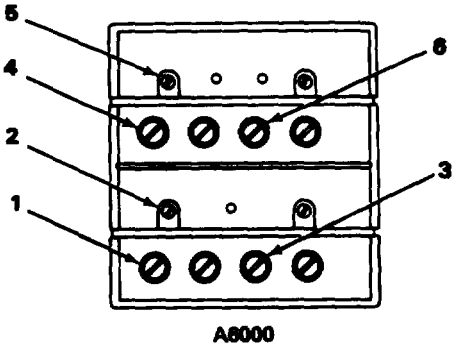
4-40. **MASTER OSCILLATOR A6300 AND BUFFER AMPLIFIER A6400 ALINEMENT.** (CONT)

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 Ⓒ) 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 Ⓒ) 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 Ⓐ .)
35. Set RT BAND switch to Ⓑ .
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.

Ⓓ



EL4GP407

39. Adjust L6302 ((1), test setup diagram Ⓓ) 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 Ⓓ .)
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 Ⓓ .)
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 ALINEMENT. (CONT)

53. Remove rf cable from J6003 and connect to J6001. (See test setup diagram Ⓐ .)
54. Set MK-1978/VRC KEY switch to XMIT.
55. Adjust L6402 ((4), test setup diagram Ⓓ) 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 Ⓓ) 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 Ⓓ) for peak reading on AN/GRM-114A DEVIATION/ WATTS meter.
66. Unkey transmitter.

4-41. MASTER OSCILLATOR TEST

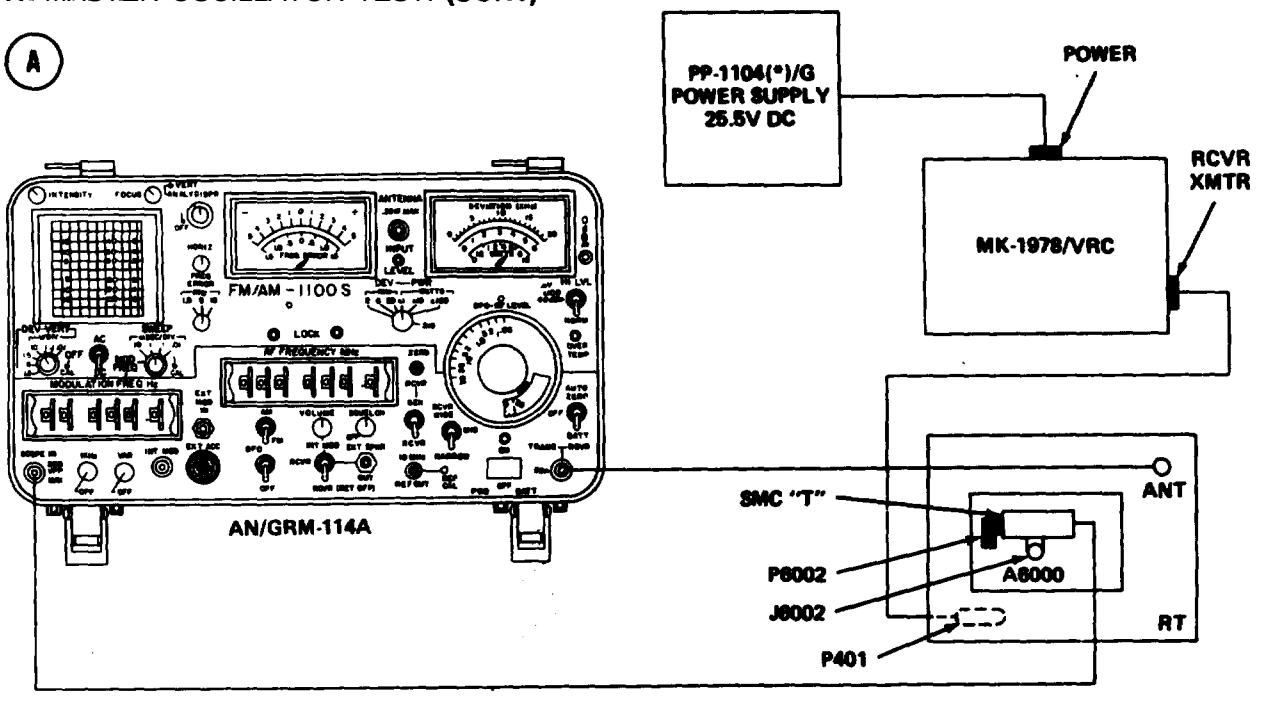
PURPOSE. This test checks the amount of dc correction voltage required to keep the transmitter master oscillator on frequency. If the correction voltage is greater than 0.45 vdc, the A6300 and A6400 must be replaced. The master oscillator and buffer amplifier must be alined before performing this test.

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 Ⓐ , page 4-218.

4-41. MASTER OSCILLATOR TEST. **(CONT)**



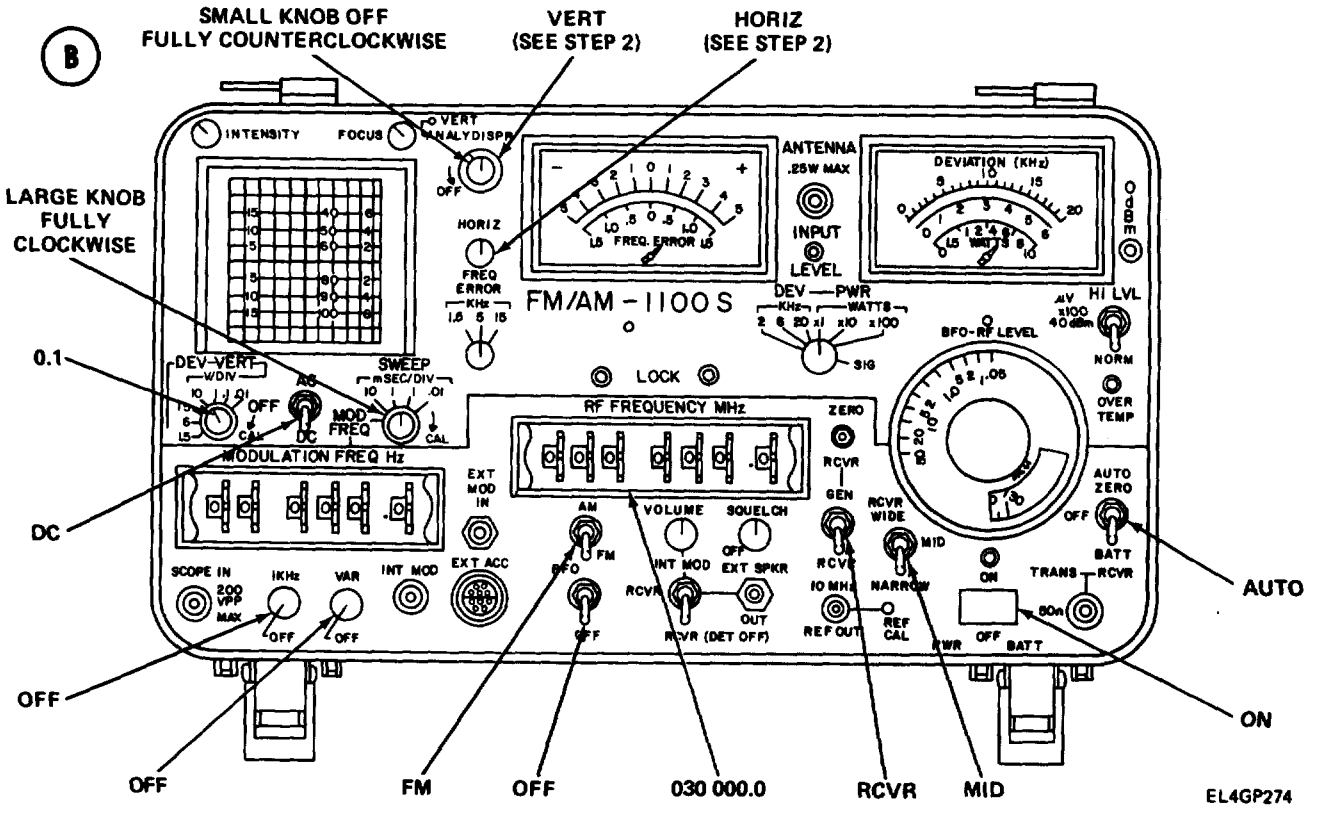
EL4GP273

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

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	BAND MC-TUNE-KC POWER	(A) 30.00 LOW
AN/GRM-114A	See test setup diagram (B), page 4-219	
MK-1978/VRC	All switches	Down, except POWER up

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-19768VRC KEY switch to XMIT.
4. Check that oscilloscope trace does not shift more than ±0.45vdc 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.

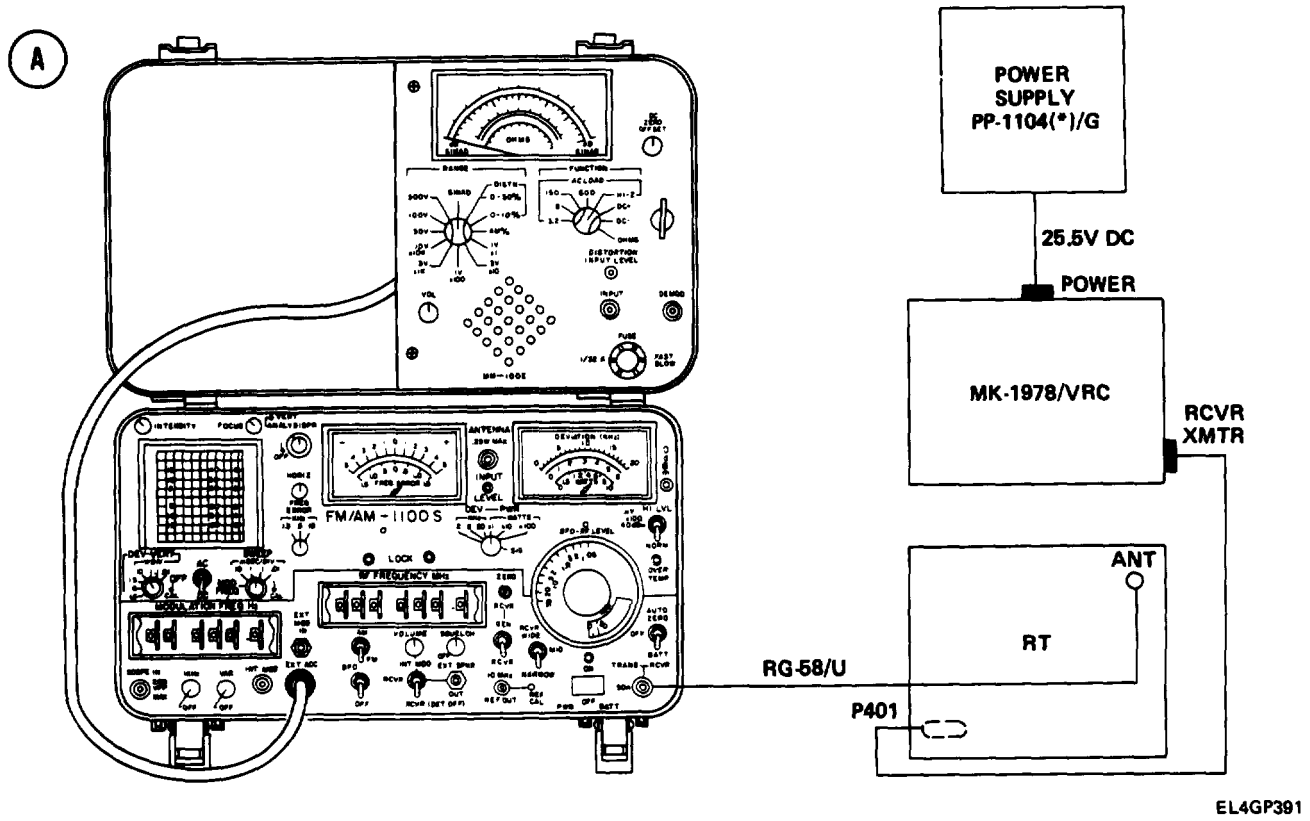
PURPOSE. Resistor R8515 is used to control the overall gain of the squeloh amplifier. When the resistor is property adjusted, the 150-Hz NEW SQUELCH tone causes a carrier deviation of 3.0 kHz. The alinement is performed at 3.0 kHz and the tolerance for the test is ±O.5 kHz.

TEST EQUIPMENT AND MATERIALS

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

4-42. ADJUSTMENT OF **A8500** RESISTOR **R8515** FOR TRANSMITTED NEW SQUELCH TONE **DEVIATION.** (CONT)

TEST SETUP. Connect the equipment as shown in test setup diagram (A), page 4-220.



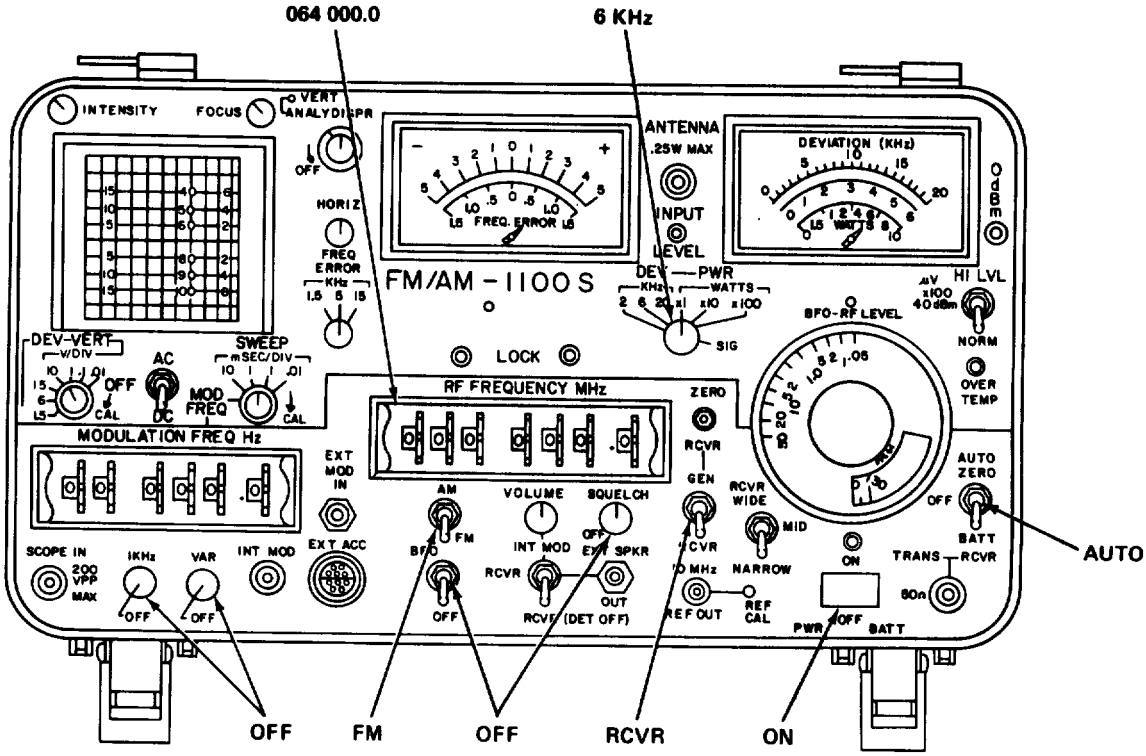
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment as indicated in the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	BAND	(B)
	MC-TUNE-KC	64.00
	POWER	LOW
	SQUELCH	NEW ON
MK-1978/VRC	All switches	Down, except POWER up
AN/GRM-114A	See test setup diagram (B) page 4-221	

442 ADJUSTMENT OF A8500 RESISTOR R8515 FOR TRANSMITTED NEW SQUELCH TONE DEVIATION. (CONT)

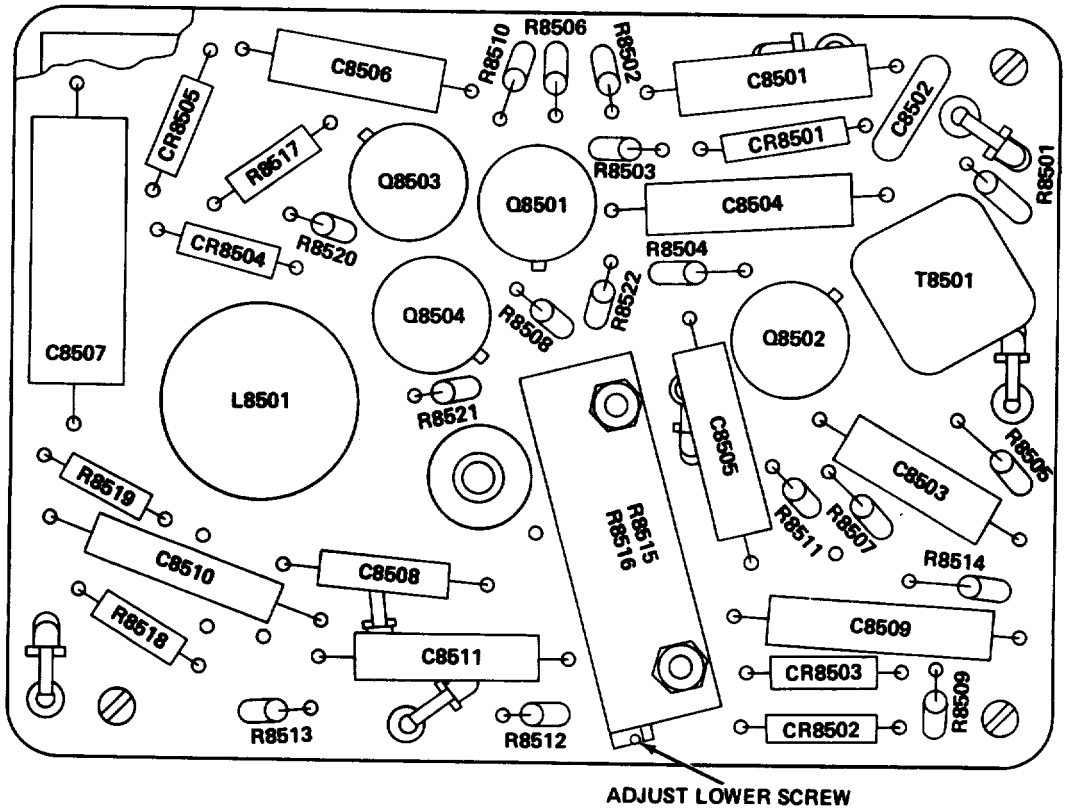
B



EL4GP390

ADJUSTMENT PROCEDURE

C



EL4GP278

4-42. ADJUSTMENT OF A8500 RESISTOR R8515 FOR TRANSMITTED NEW SQUELCH TONE DEVIATION. (CONT)

1. Using MK-1978/VRC KEY switch, key transmitter.
2. Check indication of AN/GRM-114A DEVIATlON (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.O-kHz deviation.
7. Unkey transmitter.

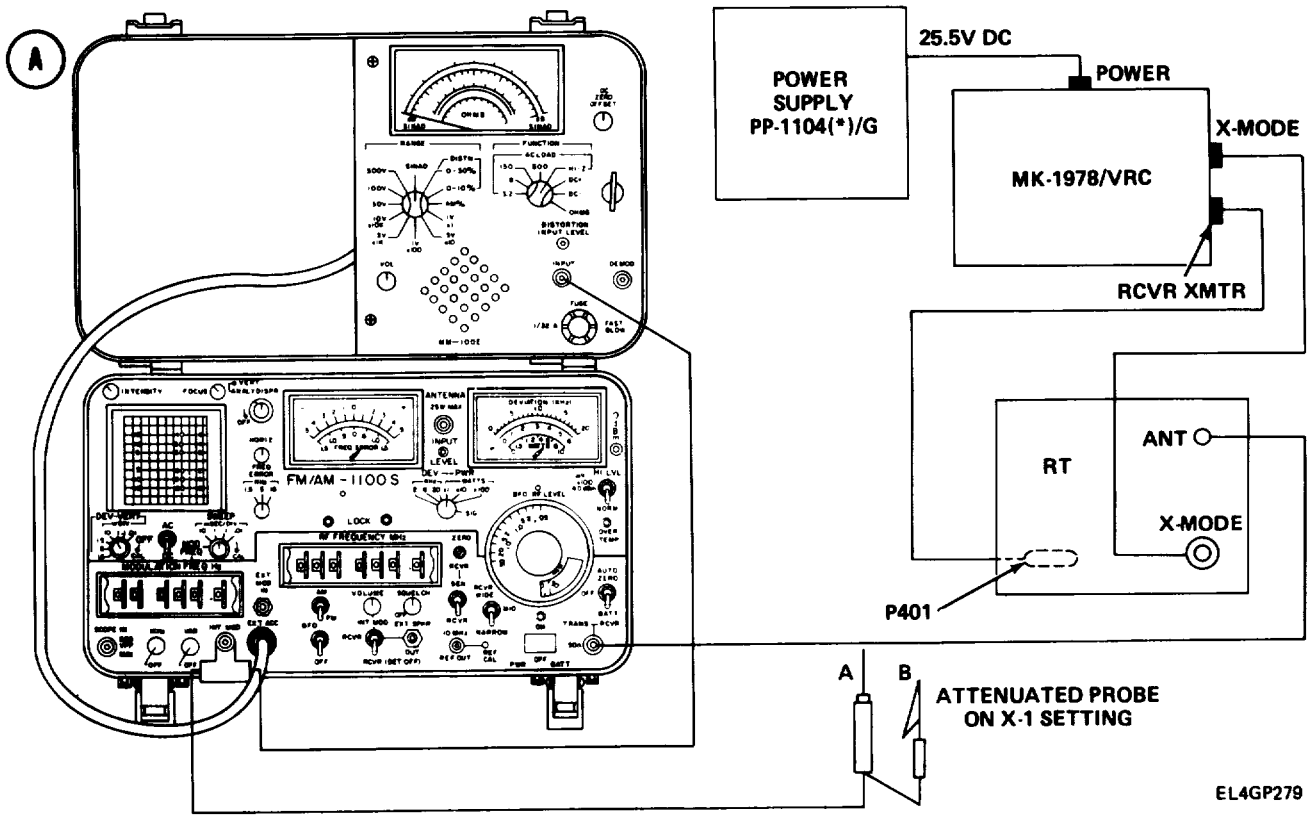
4-43. ALINEMENT OF A8500 RESISTOR R8516 FOR CORRECT TRANSMITTER NARROWBAND DEVIATION.

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 A81OO 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 Ⓐ

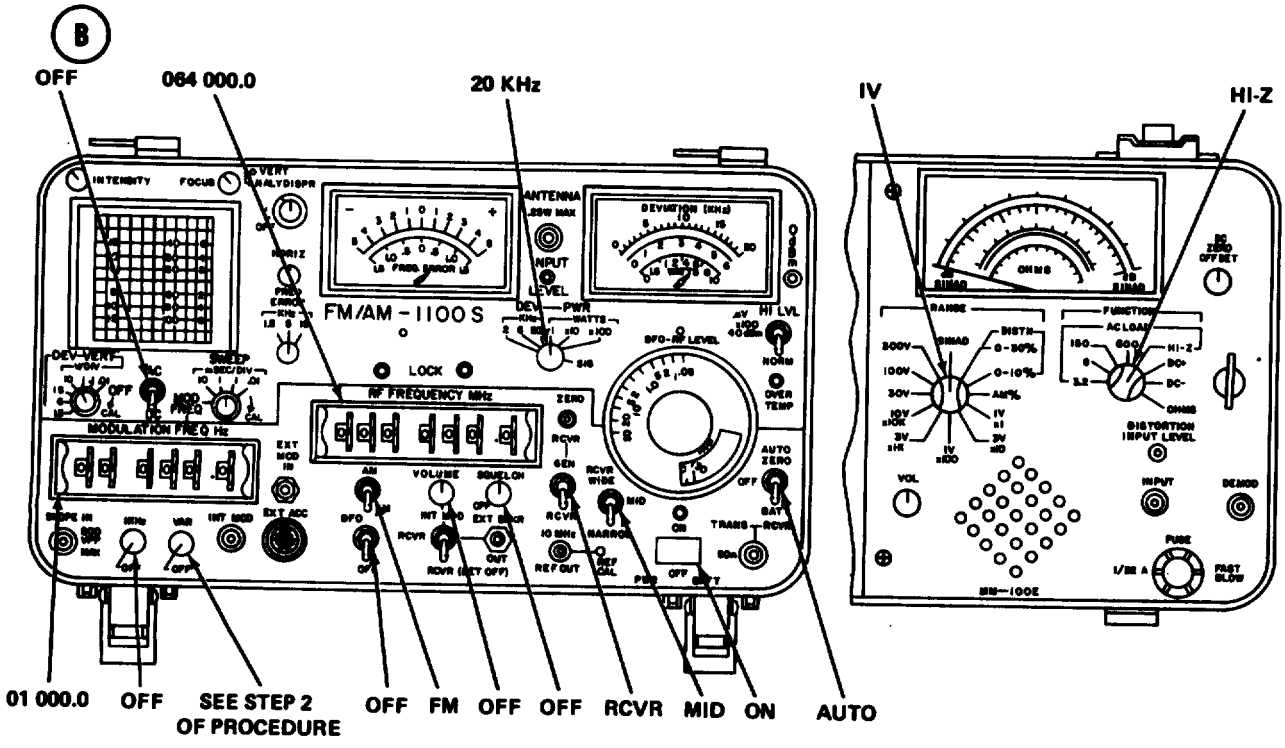


4-42. ALINEMENT OF A8500 RESISTOR R8516 FOR CORRECT TRANSMITTER NARROWBAND DEVIATION. CONT)

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

CONTROL AND SWITCH SETTINGS

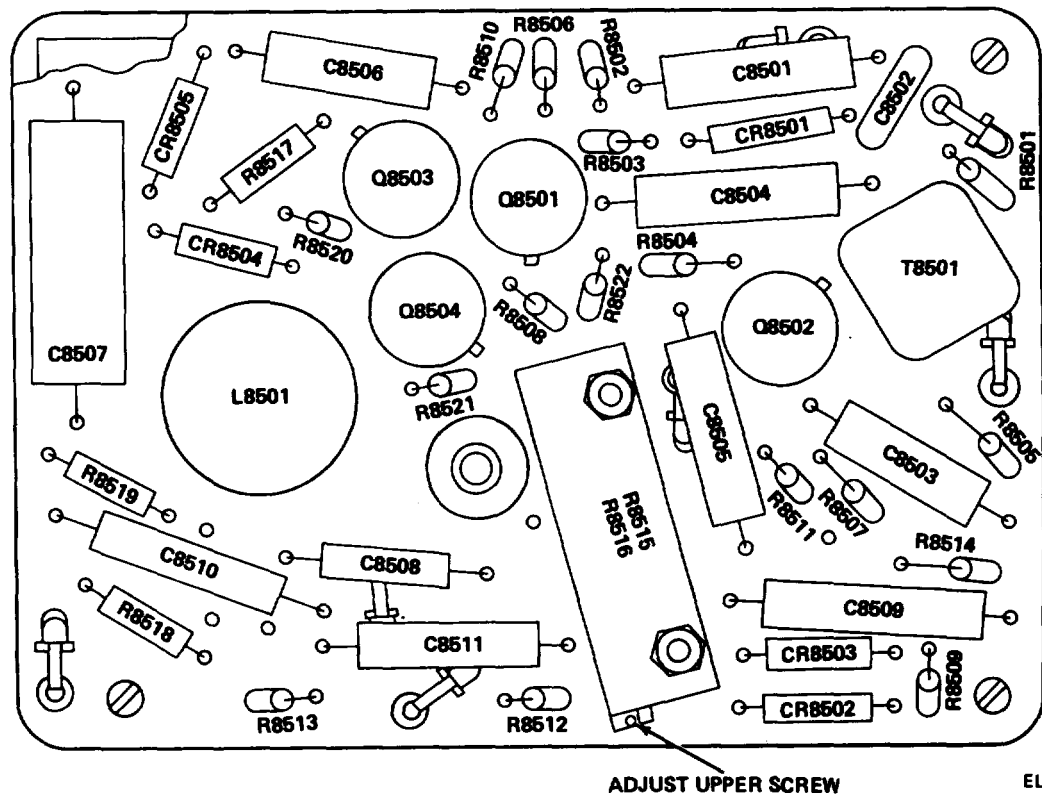
EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	BAND	(B)
	MC-TUNE-KC	64.00
	POWER	LOW
	SQUELCH	OLD ON
MK-1978/VRC	POWER	ON
	X-MODE (RT and AUX RCVR)	CIPHER
	AUDIO	MUTED
	SQUELCH	ON
	KEY	RCVE
AN/GRM-114A; MM-1OOE	See test setup diagram (B)	



4-43. ALINEMENT OF A8500 RESISTOR R85l6 FOR CORRECT TRANSMITTER NARROWBAND DEVIATION. (CONT)

ALINEMENT PROCEDURE

Ⓒ



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-l14A VAR knob for 0.78-vac reading on MM-1OOE.
3. Set MK-1978/VRC KEY switch to XMIT.
4. Check AN/GRM-l14A 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.&kHzdeviation 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-1OOE.
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.

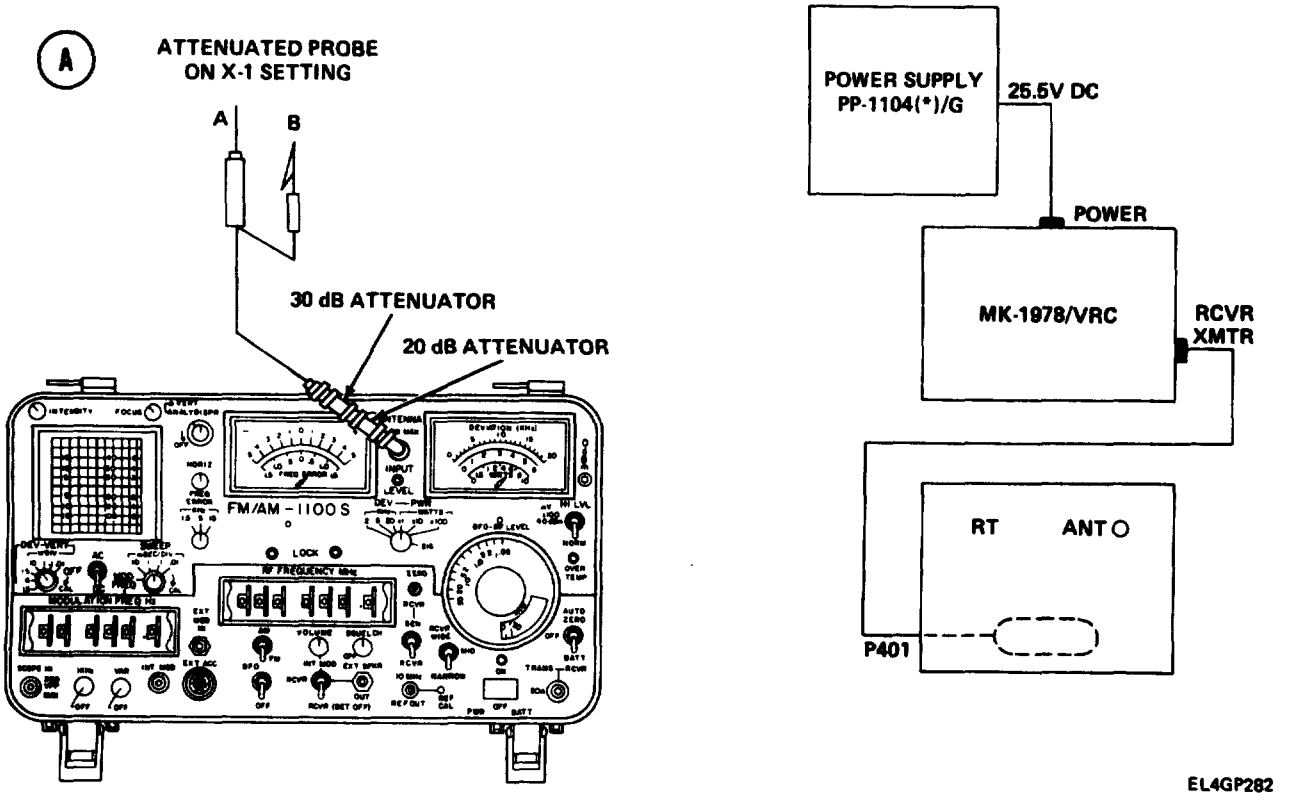
4-44. A8190 MODULATOR ALINEMENT.

PURPOSE. This procedure ensures that the A81OO 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
Maintenance Kit MK-1978/VRC
Test Set AN/GRM-114A

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

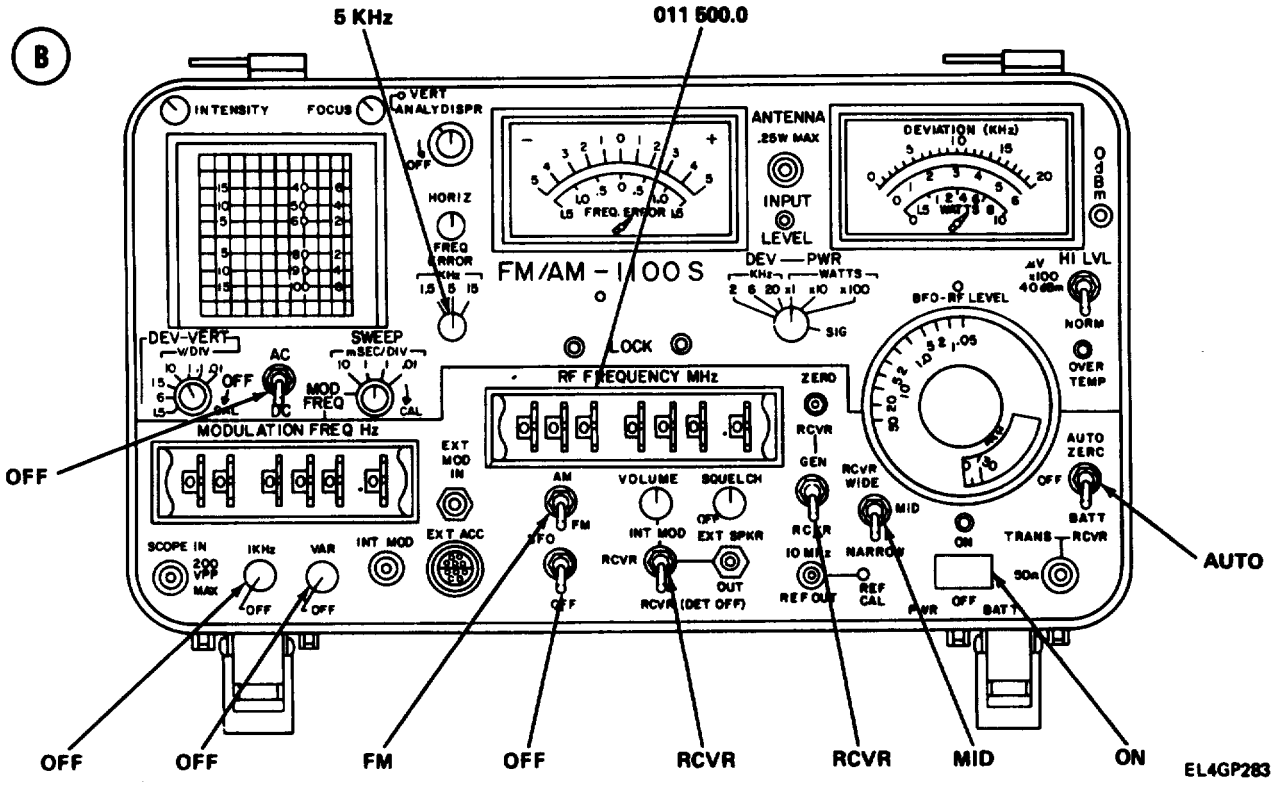


4-44. A8100 MODULATOR ALINEMENT. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as Indicated In the following table.

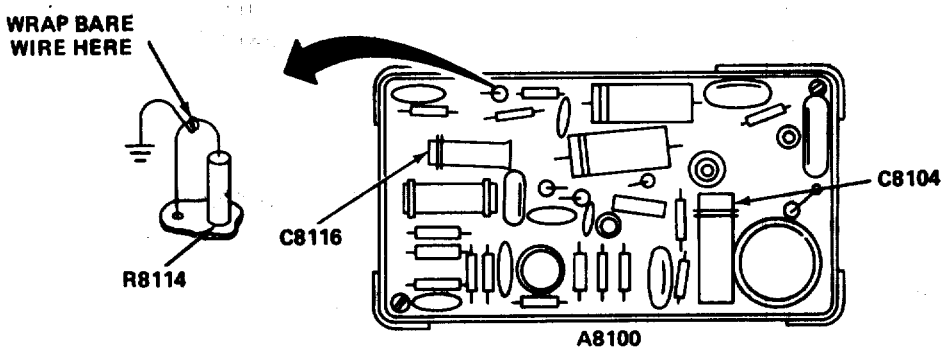
CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	BAND	(A)
	MC-TUNE-KC	30.00
	POWER	LOW
	SQUELCH	OLD OFF
MK-1978/VRC	All switches	Down, except POWER up
AN/GRM-114A	See test setup diagram 1 (B)	



4-44. A8100 MODULATOR ALINEMENT. (CONT)

Ⓒ



EL4GF284

• See pg. 5-201 for grounding wire hook-up for A81OOA module. Alinement is the same except for this difference,

ALINEMENT PROCEDURE

1. Disconnect P6001 from J6001.
   Remove A81OO cover.
2. Wrap grounding wire around exposed terminal of R8114. (See test setup diagram © , page 4-226.)*
4. Reinstall A81OO 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.
   Unkey transmitter.
9. Remove A81OO cover.
10. install A81OO 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 A81OO output to a ±150 Hz tolerance using the attenuated probe. To avoid misadjustment of the A81OO, 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.

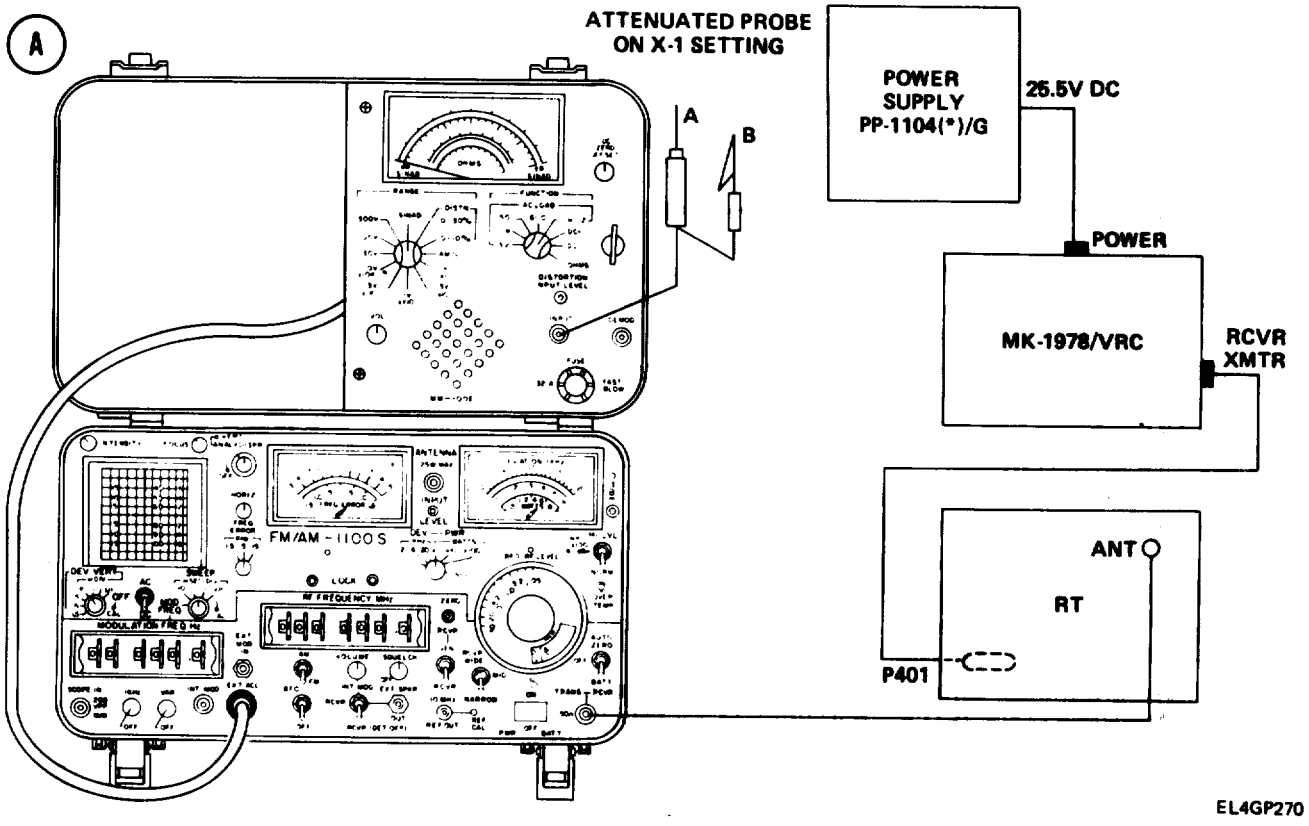
4-45. DRIVER A61OO AND POWER AMPLIFIER A6200 ALINEMENT.

PURPOSE. This procedure enables the transmitter to generate maximum rf power without overdriving the power stages. Correct alinement 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 (A).



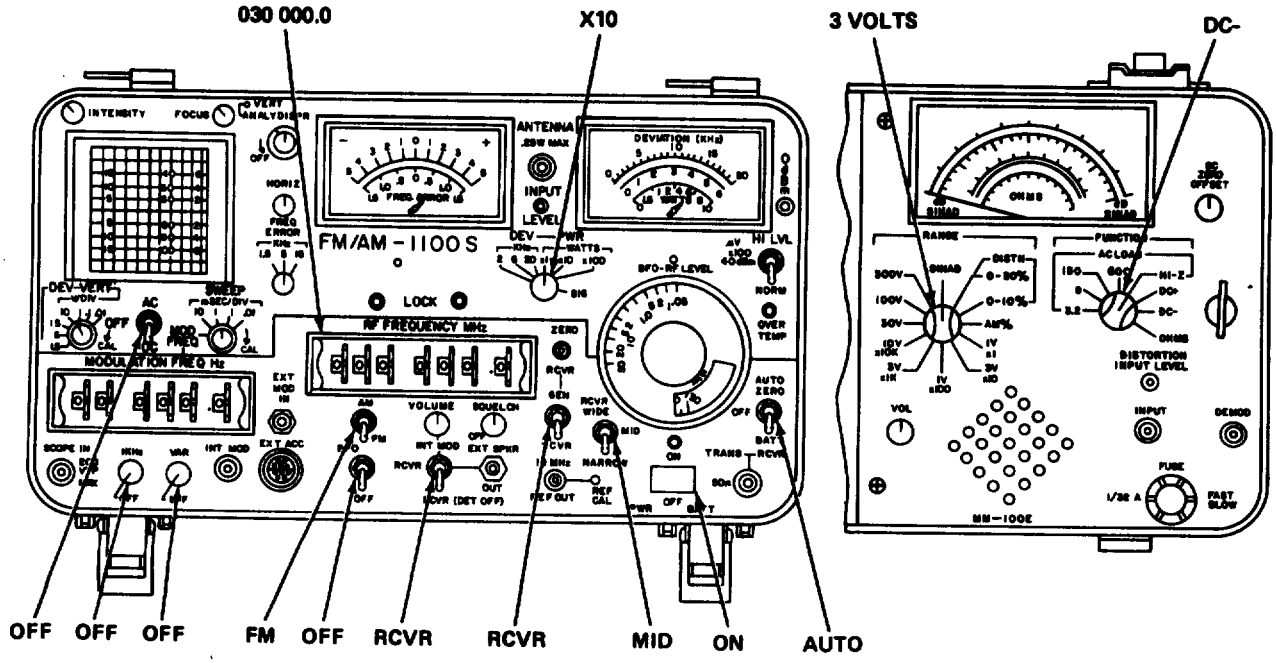
4-45 DRIVER A61OO AND POWER AMPLIFIER A6200 ALINEMENT. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment as indicated In the following table,

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	MC-TUNE-KC POWER	30.00 HIGH
MK-1978/VRC	All switches	Down, except POWER up
AN/GRM-114 A; MM-100E	See test setup diagram (B)	

(B)



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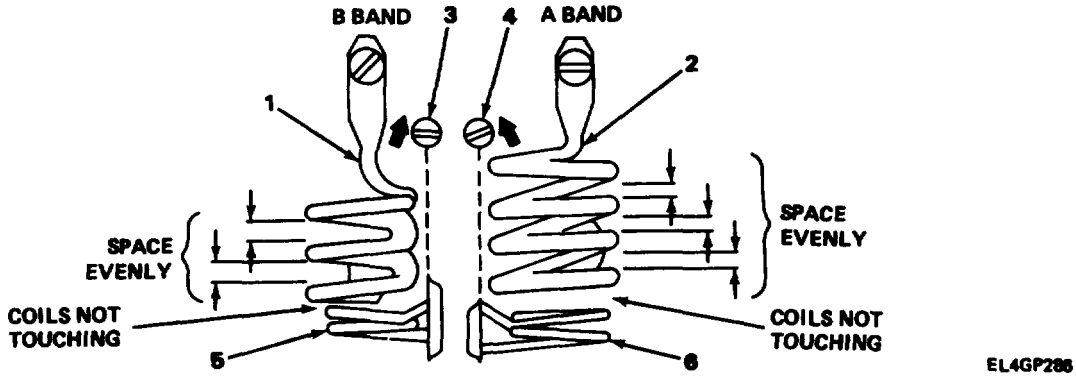
4-45 DRIVER A6100 AND POWER AMPLIFIER A8200 ALINEMENT. (CONT)

ALINEMENT PROCEDURE

Tuning Coil Adjustment

Ⓒ



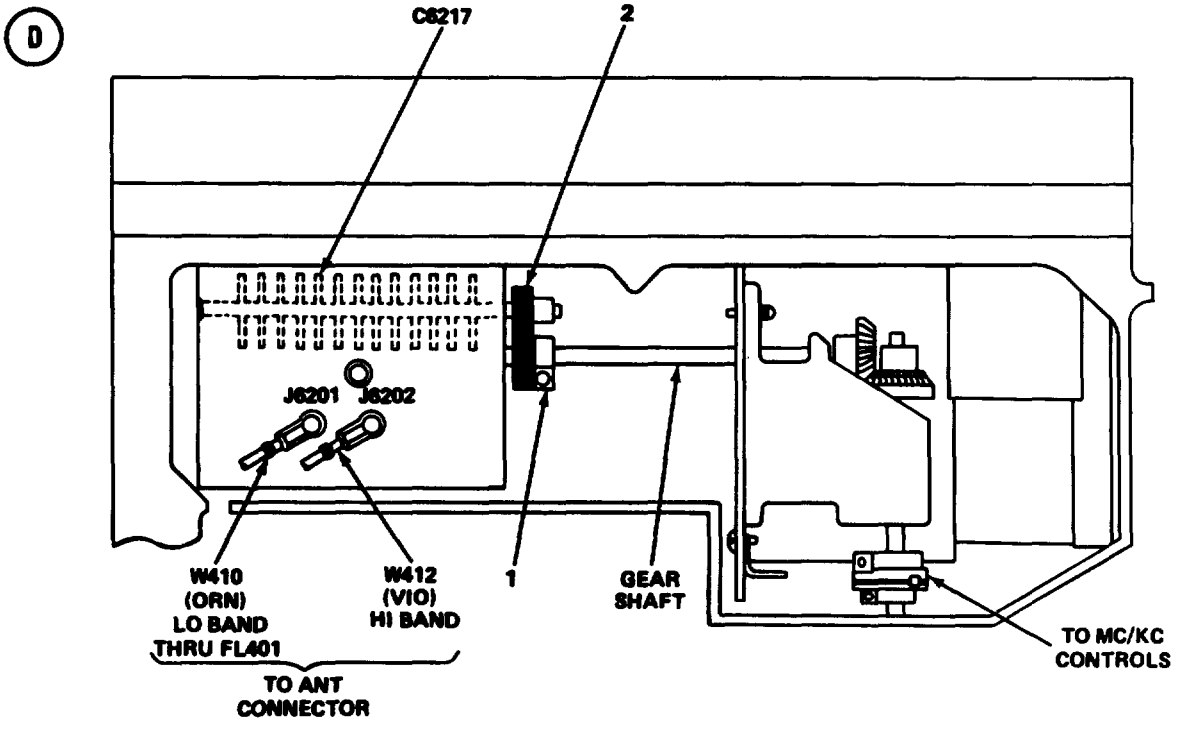
CAUTION

Do not use pliers B or any metal tool to adjust Tuning Coils L6206 and L6203.

1. Remove A61OOI/A62OO 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 coi; (6) as close as possible to Coil (2) without touching.
9. Install A6100/A6200 assembly. (See paragraphs 2-46 and 2-48).

4-45 DRIVER A61OO AND POWER AMPLIFIER A6200 ALINEMENT. (CONT)

Air Capacitor Adjustment



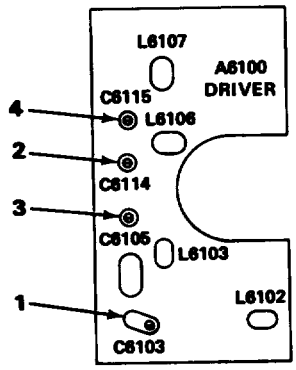
REAR BOTTOM VIEW EL4GP287

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.

4-45 DRIVER A6100 AND POWER AMPLIFIER A6200 ALINEMENT. (CONT)

A6100 Tuning Procedure

(E)



EL4GP314

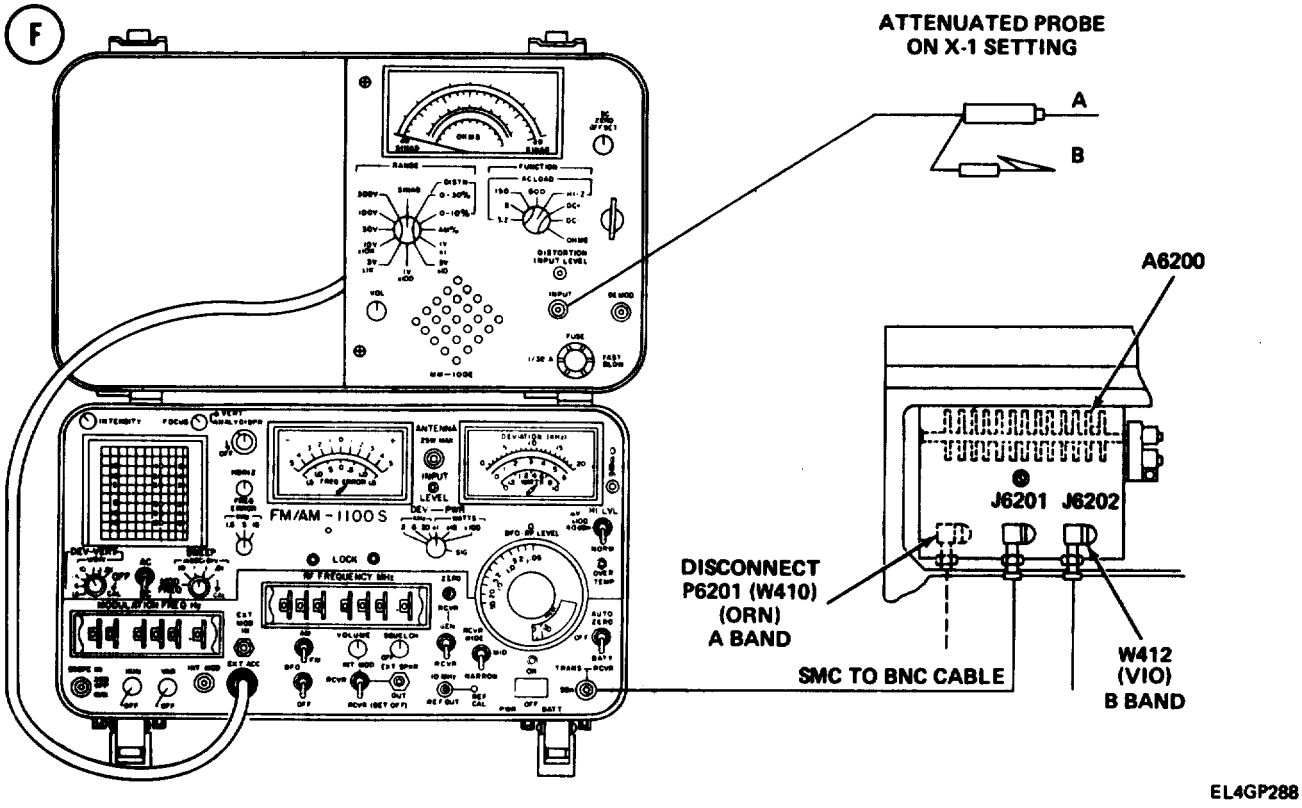
NOTE

Replace Tube V6201 If 35-watt minimum power output cannot be obtained.

16. Connect MM-1OOE 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-l00E. (See test setup diagram (E) .)
19. Unkey transmitter.
20. Set RT to 53.00 MHz.

4-45. DRIVER A6100 AND POWER AMPLIFIER A6200 ALINEMENT. (CONT)

A6200 Tuning Procedure



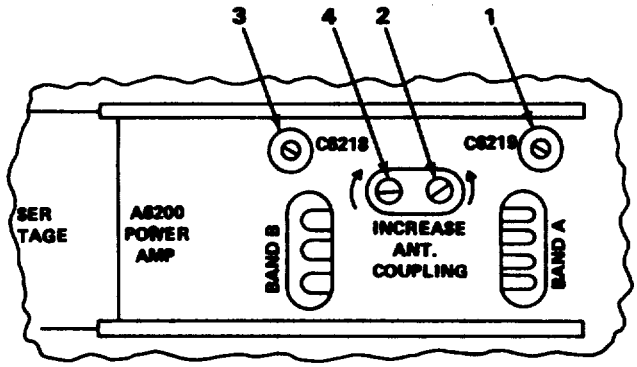
21. Set MK-1978/VRC KEY switch to XMIT.
22. Adjust B-BAND Capacitors C6105 (3) and C6115 (4) for maximum negative voltage reading on MM-1OOE. (See test setup diagram (E) .)
23. Connect equipment as shown in test setup diagram (F) .

NOTE

See chapter 1, section iii, Principles of Operation, for details covering use of TP9007.

4-45. DRIVER A6100 AND POWER AMPLIFIER A6200 ALINEMENT. (CONT)

Ⓖ



EL4GP269

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 Ⓖ .)
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 Ⓖ
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 ((l), test setup diagram Ⓖ) 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.
33. Key transmitter.
39. Adjust C6103 ((1), test setup diagram Ⓔ , page 4-232) for minimum one-half watt indication.
40. Unkey transmitter.
41. Reconnect P6201 to J6201.
42. Connect AN/GRM-l14A 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-O.7 watts of step 31 reading.
47. Unkey transmitter.
43. 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-1OOE to TP9007.
56. Key transmitter.
59. Adjust Capacitor C8218 ((3), test setup diagram (G)) for minimum negative MM-1OOE 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 (G)) until output powers at all frequencies fan within 3 to 4 wafts 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.
88. Tune RT to 75.00 MHz.
69. Key transmitter.
70. Adjust C6105 ((3) test setup diagram (E), page 4-232) for at least one-half watt indication on wattmeter.
71. Unkey transmitter.

4-46. **ALINEMENT OF RT-2046(*)VRC SERVOSYSTEM.**

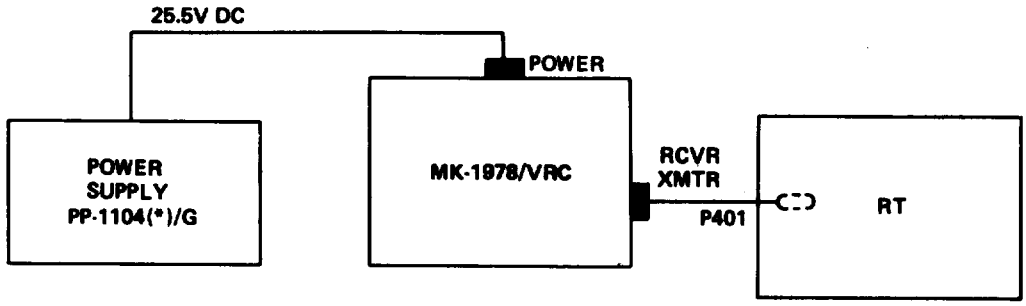
PURPOSE. This procedure adjusts the sensitivity of the servoamplifier to ensure correct frequency tuning in response to the preset pushbuttons.

TEST EQUIPMENT AND MATERIALS

Power Supply PP-1104(*)/G

TEST SETUP. Connect the equipment as shown In test setup diagram (A)

4-46. ALINEMENT OF RT-246(*)/VRC SERVOSYSTEM. (CONT)



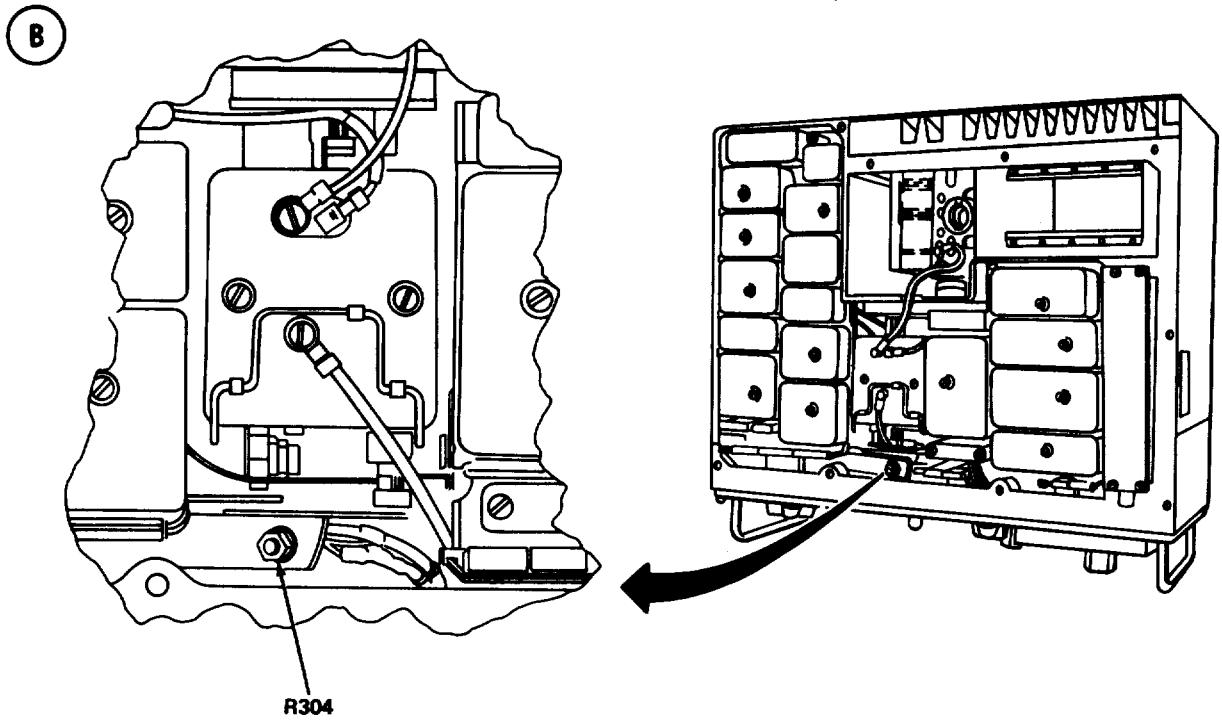
EL4GP290

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

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	BAND POWER	AUTO LOW

ALINEMENT PROCEDURE



EL4GP291

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.
7. Back off R304 shaft fully counterclockwise.
8. Press pushbutton ①. Before servomotor stops, press TUNE button. Servo will hunt (chattering sound). Keep TUNE button pressed.
9. Turn R304 shaft clockwise and stop at point where servomotor just stops hunting.
10. Press pushbutton ② . Wait for servomotor to stop.
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 alinement 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 misalinements.

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 overail operating efficiency, the replacement, repair, or realinement of even one component could alter the RT's signals enough to create the need for other realinements. Therefore, after making any alterations in the RT, do all the performance tests, even those you have done already.

Section I PERFORMANCE TESTS

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 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 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.

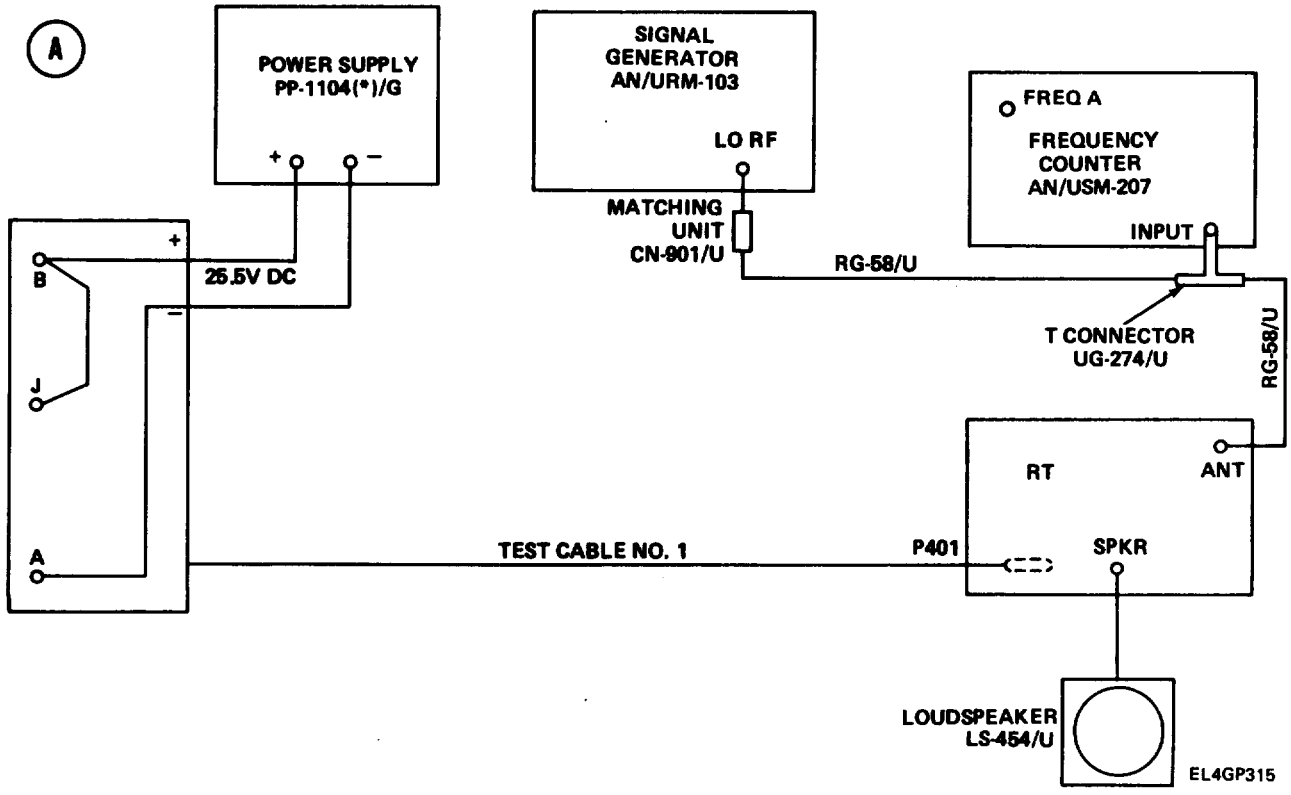
5-2. VOLUME CONTROL TEST.

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 (A) .



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

EQUiPMENT	CONTROL OR SWITCH	POSTiON/SElliNG
AN/USM-207	FREQUENCY TUNING-MC	100
	POWER	TRACK
	DiSPLAY ,	MIN (fully counterclockwise)
	iNPUT	0.3 V MAX (both switches to left)
	GATE TiME	10^3 (black knob)
	Sensitively	PLUG IN
	FUNCTiON	FREQ
	DiRECT/HETERODYNE	DIRECT
AN/URM-103	OPERATE/OFF/STAND BY	OPERATE
	BAND SWITCH	(B)
	RF TUNING	30.00
	DEVIATION RANGE KHZ	10
	FUNCTION	1000 Hz
	DEVIATION	Adjust for 8-kHz meter indication
	RF SET TO LINE	To red line
	RF OUTPUT	LO, 0-10 KUV
	LO RF UV	20µV
RT	BAND	(A)
	MC-TUNE-KC	30.00
	SQUELCH	OLD OFF
	LGHT	ON
	VOLUME	Fully counterclockwise
	POWER	LOW
	SPEAKER (RT-524/VRC)	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 trouble-shooting 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:

Signal + noise + distortion /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

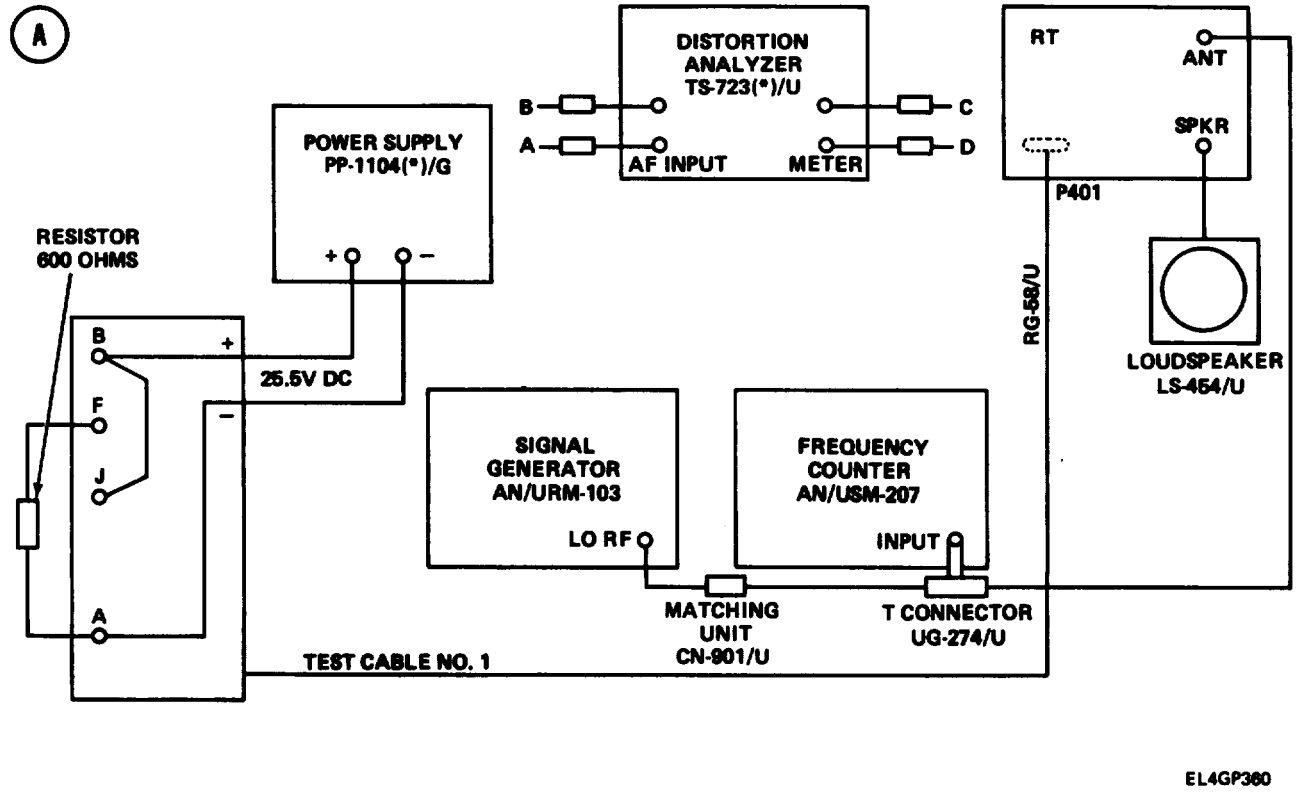
Power Supply PP-1104(*)/G
Distortion Analyzer TS-723(*)/U
Frequency Counter AN/USM-207
Signal Generator AN/URM-103
Adapter (T-Connector) UG-274 B/U
Matching Unit CN-901/U
Resistor, 600-ohm ±5%, 2 watt (RT-246/VRC)
Rf Cables (two) RG-58/U
Test Cable No. 1

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 (A).



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

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/USM-207	FREQUENCY TUNING - MC	100
	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	INPUT	0.3 V MAX (both switches to left)
	GATE TiME	10^3 (black knob)
	Sensitivity	PLUG IN
	FUNCTION	FREQ
	DIRECT/HETERODYNE	DIRECT

53. RECEIVER SENSITIVITY TEST. (CONT)

CONTROL AND SWITCH SETTINGS (CONT)

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/URM-103	OPERATE/OFF/STAND BY	OPERATE
	BAND SWITCH	(B)
	RF TUNING	30.00
	DEVIATION RANGE KHZ	10
	FUNCTION	1000 Hz
	DEVIATION	Adjust for 8-kHz meter indication
	RF SET TO LINE	To red line
	RF OUTPUT	LO, 0-10 KUV
	LO RF UV	0.5 μv
TS-723(*)/U	RANGE	x10
	AF INPUT	MIN
	AF-RF	AF
	FREQUENCY	100
	FUNCTION	METER
	R.M.S. VOLTS/DB	30 v
RT	BAND	(A)
	MC-TUNE-KC	30.00
	SQUELCH	OLD OFF
	LIGHT	ON
	VOLUME	Fully counterclockwise
	POWER	LOW
	SPEAKER (RT-524/VRC)	OFF

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.
4. Adjust RT VOLUME control for 17-volt indication on TS-723(*)/U meter.
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.
9. Adjust TS-723(*)/U AF INPUT control for zero-db indication on meter.
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.

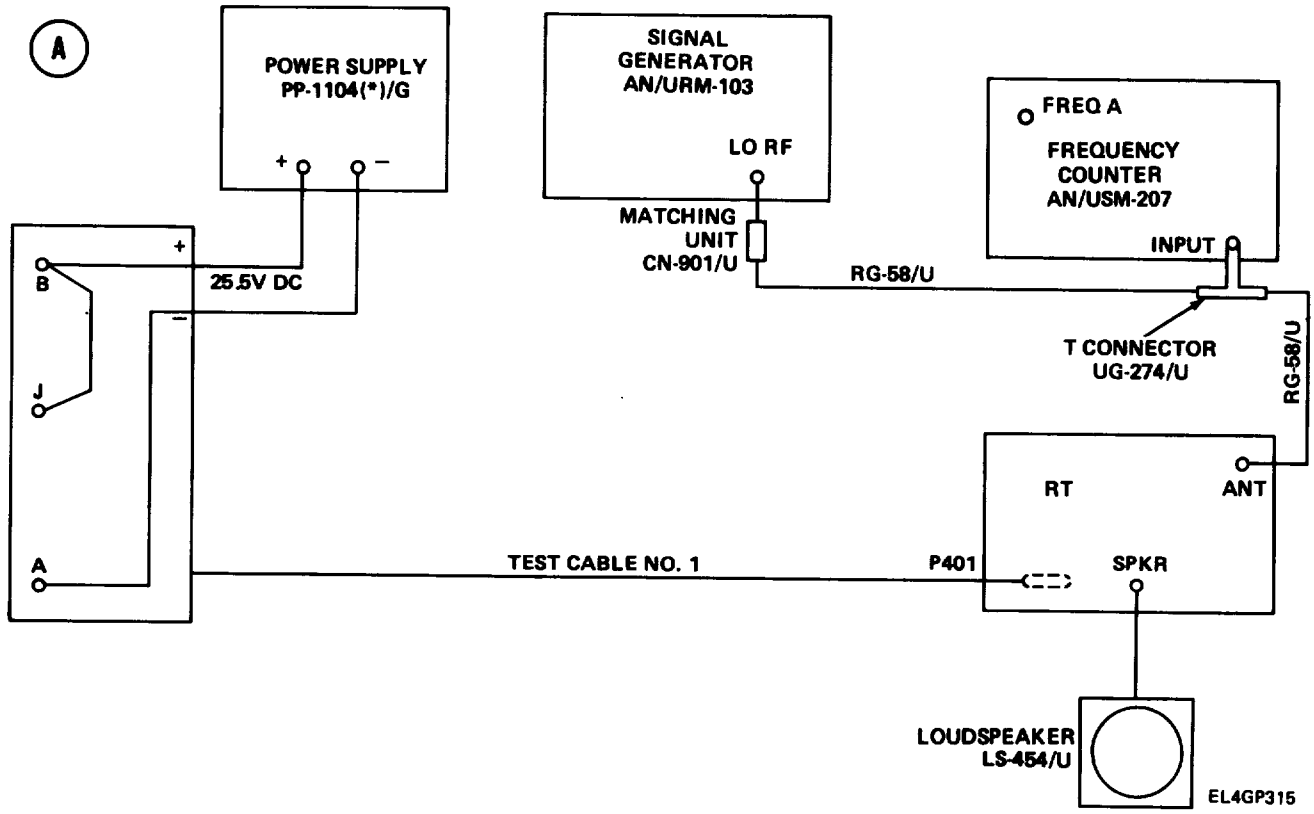
PURPOSE. This test checks the sensitivity of the RT squelch modules (A5200, A5300) to the NEW SQUELCH signal (150 Hz) at several carrier frequencies. The 150-Hz signal is injected into the RT ANTENNA port, energizing Squelch Module Relay K5002, which unsquelches the receiver. Proper operation of the 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

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

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.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/USM-207	FREQUENCY TUNING-MC	100
	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	INPUT	0.3 V MAX (both switches to left)
	GATE TIME	10^3 (black knob)
	SENSITIVITY	PLUG IN
	FUNCTION	FREQ
	DIRECT/HETERODYNE	DIRECT

5-4 NEW SQUELCH TEST. (CONT)

CONTROL AND SWITCH SETTINGS (CONT)

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	BAND	(A)
	MC-TUNE-KC	30.00
	SQUELCH	NEW ON
	VOLUME	Fully counterclockwise
	POWER	LOW
	LIGHT	ON
	SPEAKER (RT-524/VRC)	OFF
AN/URM-103	OPERATE/OFF/STAND BY	OPERATE
	BAND SWITCH	(B)
	RF TUNING	30.00
	DEVIATION RANGE KHZ	10
	FUNCTION	150 Hz
	DEVIATION	Adjust for 3-kHz meter indication
	RF SET TO LINE	To red line
	RF OUTPUT	LO, 0-10 KUV
	LO RF UV	Minimum setting

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.

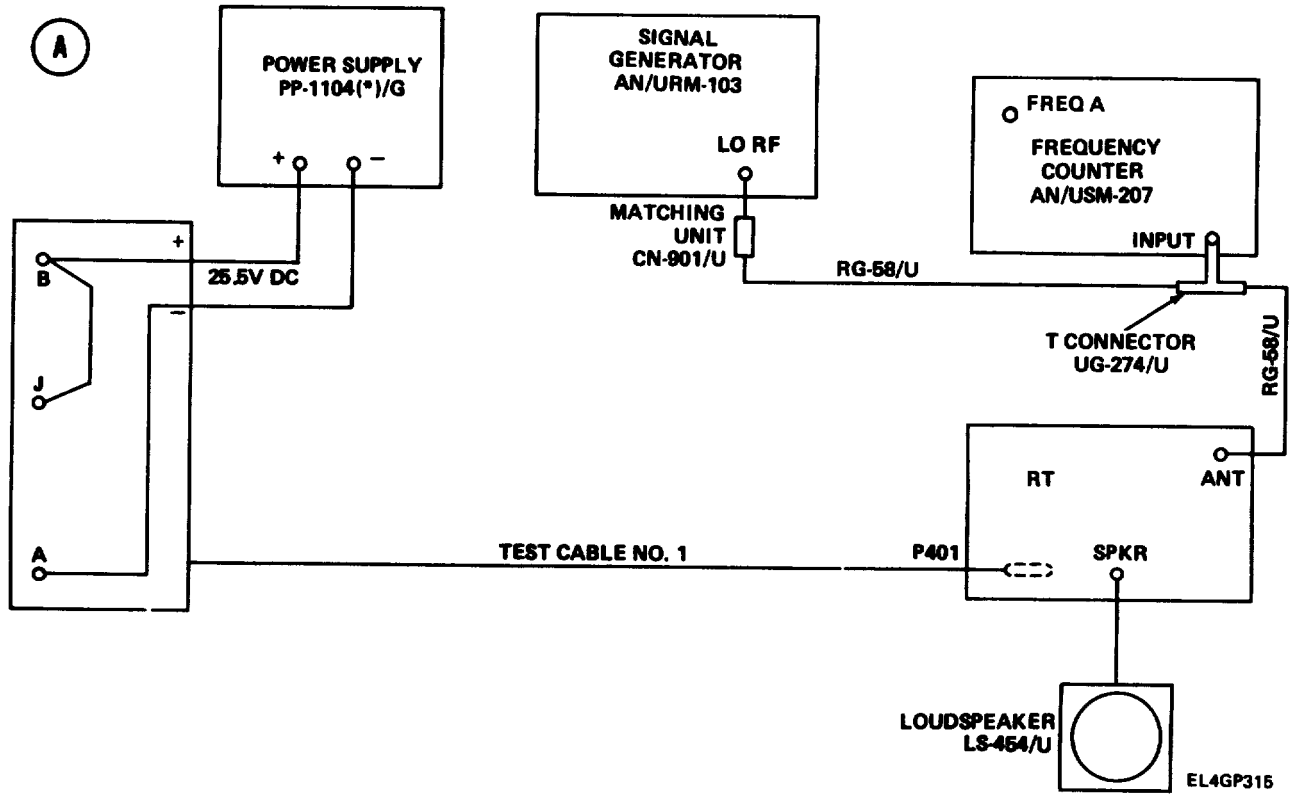
5-6 OLD SQUELCH TEST.

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

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 (RT-246/VRC) LS-454/U
Rf Cables (two) RG-58/U
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.

5-5. OLD SQUELCH TEST. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as Indicated In the followlng 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

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/USM-207	FREQUENCY TUNING-MC	100
	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	INPUT	0.3 V MAX (both switches to left)
	GATE TIME	10^3 (black knob)
	SENSITIVITY	PLUG IN
	FUNCTION	FREQ
	DIRECT/HETERODYNE	DIRECT
AN/URM-103	OPERATE/OFF/STAND BY	OPERATE
	BAND SWITCH	Ⓑ
	RF TUNING	30.00
	DEVIATION RANGE KHZ	10
	FUNCTION	1000 Hz
	DEVIATION	Adjust for 8-kHz meter indication
	RF SET TO LINE	To red line
	RF OUTPUT	LO, 0-10 KUV
	LO RF UV	Minimum setting
RT	BAND	Ⓐ
	MC-TUNE-KC	30.00
	SQUELCH	OLD ON
	LIGHT	ON
	VOLUME	Fully counterclockwise
	POWER	LOW
	SPEAKER (RT-524/VRC)	OFF

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. 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 0.7µv, 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 troubleshootlng 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 (C) 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 swltch 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 t o (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, sea 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 indicatlon.
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

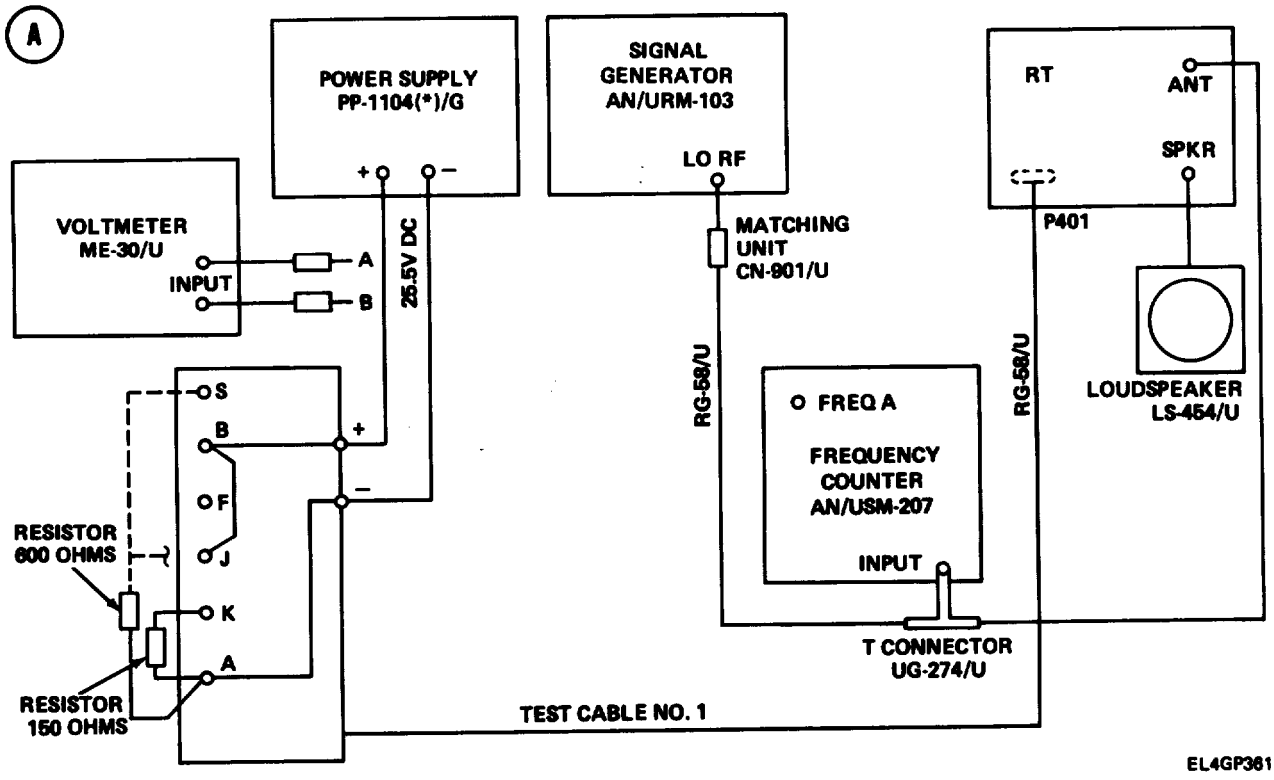
Power Supply PP-1104(*)/G
Ac Voltmeter ME-30(*)/U
Frequency Counter AN/USM-207
Signal Generator AN/URM-103
Adapter (T-Connector) UG-274 B/U
Matching Unit CN-901/U
Resistor, 600-ohm ±5%, 2 watt (RT-246/VRC)
Resistor, 150-ohm ±5%, 2 watt (RT-246/VRC)
Rf Cables (two) RG-58/U
Test Cable No. 1

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 Ⓐ .)

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.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/USM-207	FREQUENCY TUNING-MC	100
	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	INPUT	0.3 V MAX (both switches to left)
	GATE TIME	10^3 (black knob)
	SENSITIVITY	PLUG IN
	FUNCTION	FREQ
	DIRECT/HETERODYNE	DIRECT

5-6. RECEIVER AUDIO POWER TEST. (CONT)

CONTROL AND SWITCH SETTINGS (CONT)

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/URM-103	OPERATE/OFF/STAND BY	OPERATE
	BAND SWITCH	Ⓓ
	RF TUNING	60.00
	DEVIATION RANGE KHZ	10
	FUNCTION	1000 Hz
	DEVIATION	Adjust for 8-kHz meter indication
	RF SET TO LINE	To red line
	RF OUTPUT	LO, 0-10 KUV
	LO RF UV	20 μv
	SPEAKER (RT-524/VRC)	OFF
RT	BAND	Ⓑ
	MC-TUNE-KC	60.00
	SQUELCH	OLD OFF
	LIGHT	ON
	VOLUME	Fully counterclockwise
	POWER	LOW
ME-30(*)/U	RANGE selector switch	30 v

TEST PROCEDURE

Muted Audio Power Test

1. Connect free lead of 600-ohm resistor to Test Cable No. 1 terminal F. (See test setup Ⓐ , 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 Ⓐ .)
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 Ⓐ .)
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

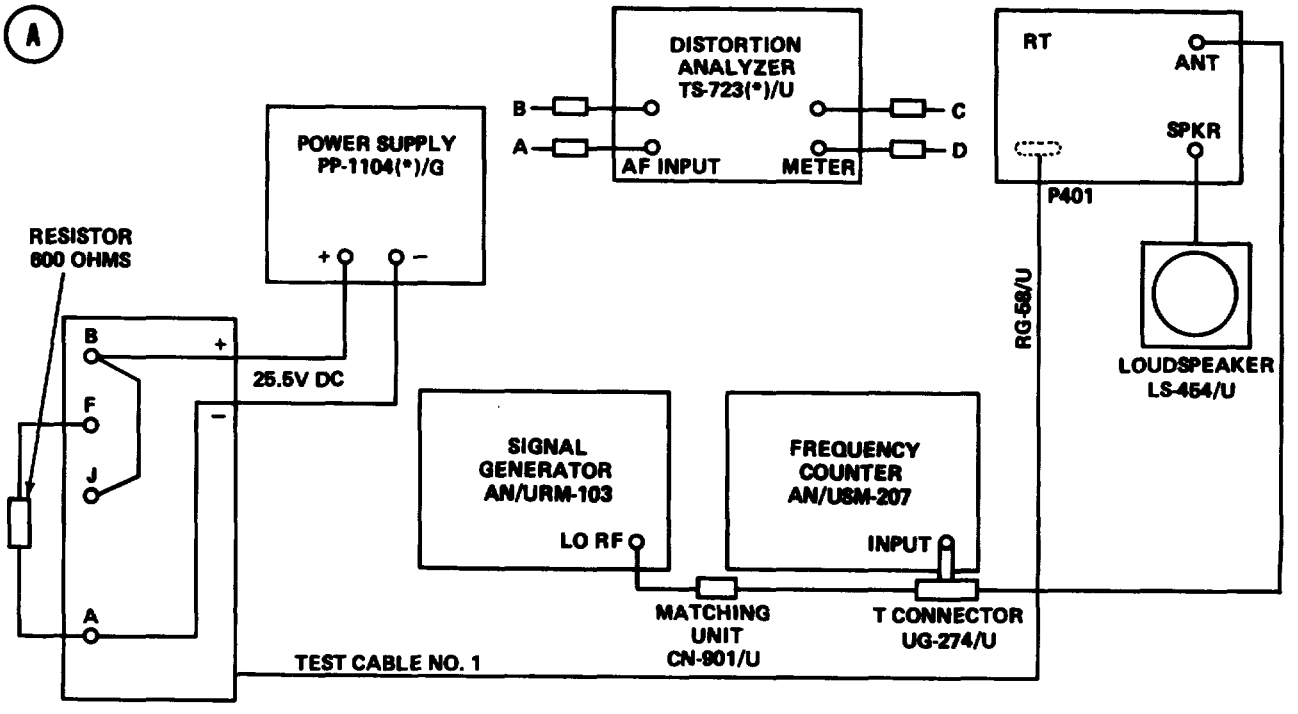
Power Supply PP-1104(*)/G
Distortion Analyzer TS-723(*)/U
Frequency Counter AN/USM-207
Signal Generator AN/URM-103
Adapter (T-Connector) UG-274 B/U
Matching Unit CN-901/U
Resistor, 600-ohm ± 5%, 2 watt (RT-246/VRC)
Rf Cables (two) RG-58/U
Test Cable No. 1

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 Ⓐ , page 5-20.)

5-7. RECEIVER AUDIO DISTORTION TEST. (CONT)

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



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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.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/USM-207	FREQUENCY TUNING – MC	100
	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	INPUT	0.3 V MAX (both switches to left)
	GATE TIME	10^3 (black knob)
	SENSITIVITY	PLUG IN
	FUNCTION	FREQ
	DIRECT/HETERODYNE	DIRECT

5-7. RECEIVER AUDIO DISTORTION TEST. (CONT)

CONTROL AND SWITCH SETTINGS (CONT)

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/URM-103	OPERATE/OFF/STAND BY	OPERATE
	BAND SWITCH	(D)
	RF TUNING	64.00
	DEVIATION RANGE KHZ	10
	FUNCTION	1000 Hz
	DEVIATION	Adjust for 8-kHz meter indication
	RF SET TO LINE	To red line
	RF OUTPUT	LO, 0-10 KUV
	LO RF UV	20 μv
RT	BAND	(B)
	MC-TUNE-KC	64.00
	SQUELCH	OLD OFF
	LIGHT	ON
	VOLUME	Fully counterclockwise
	POWER	LOW
	SPEAKER (RT-524/VRC)	OFF
TS-723(*)/U	RANGE	x10
	AF INPUT	MIN
	AF – RF	AF
	FREQUENCY	100
	FUNCTION	METER
	R.M.S. VOLTS/DB	30 v

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.
4. Adjust RT VOLUME control for 17-volt indication on TS-723(*)/U meter.
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. lf TS-723(*)/U meter lndicates 8 percent or above, see troubleshooting chart 5-4.

5& RECEIVER AUDIO RESPONSE TEST (NORMAL MODE)m

PURPOSE. This test checks the RT A5000 tray circuits for a fiat response to modulating frequencies at and below 3 kHz Receiver circuits are said to have a fiat 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

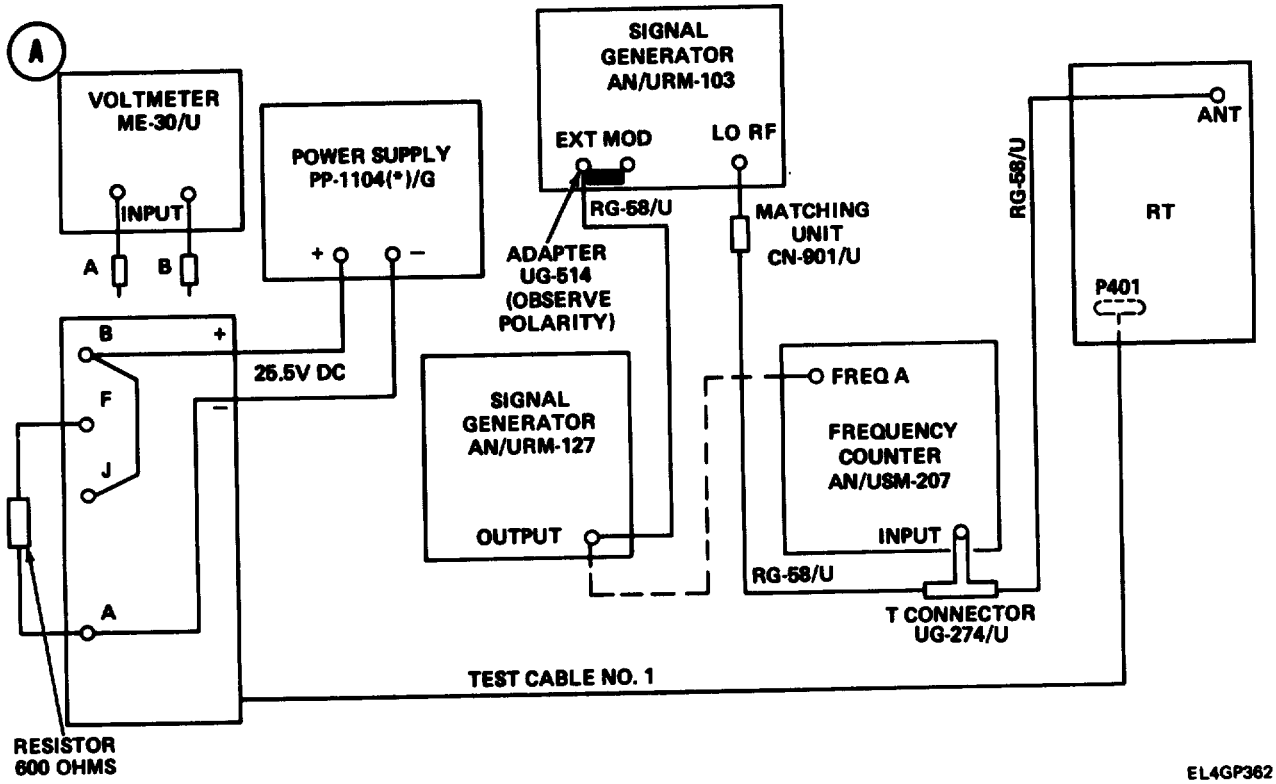
Power Supply PP-1104(*)/G
Frequency Counter AN/USM-207
Signal Generator AN/URM-127
Signal Generator AN/URM-103
Ac Voltmeter ME-30(*)/U
Adapters (two) UG-274 S/U (T-Connector) and UG-514
Matching Unit CN-901/U
Rf Cables (two) RG-58/U
Resistor, 600-ohm ±5%, 2 watt (RT-246/VRC)
Test Cable No. 1

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 Ⓐ .)

5-8. RECEIVER AUDIO RESPONSE TEST (NORMAL MODE). (CONT)

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



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.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/USM-207	FREQUENCY TUNING – MC	100
	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	INPUT	0.3 V MAX (both switches to left)
	GATE TIME	10^3 (black knob)
	SENSITIVITY	PLUG IN
	FUNCTION	FREQ
	DIRECT/HETERODYNE	DIRECT
ME-30(*)/U	RANGE selector switch	30 v

5-8. RECEIVER AUDIO RESPONSE TEST (NORMAL MODE). (CONT)

CONTROL AND SWITCH SETTINGS (CONT)

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/URM-103	OPERATE/OFF/STAND BY	OPERATE
	BAND SWITCH	Ⓓ
	RF TUNING	64.00
	DEVIATION RANGE KHZ	10
	FUNCTION	EXT MOD
	DEVIATION	Adjust for 8-kHz meter indication
	RF SET TO LINE	To red line
	RF OUTPUT	LO, 0-10 KUV
	LO RF UV	20 μv
RT	BAND	Ⓑ
	MC-TUNE-KC	64.00
	SQUELCH	OLD OFF
	LIGHT	ON
	VOLUME	Fully counterclockwise
	POWER	LOW
	SPEAKER (RT-524/VRC)	OFF
	X-MODE-NORMAL	NORMAL

NOTE

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

AN/URM-127	FREQ RANGE MULTIPLIER	x10
	FREQ RANGE DIAL	100
	ATTENUATOR	x1
	OUTPUT CONTROL	Fully clockwise (maximum)

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.

5-8. 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:

CONTROL/SWITCH	POSITION/SETTING
POWER	TRACK
DISPLAY	MIN (fully counterclockwise)
SENSITIVITY	0.1 v
GATE TIME	1 (black knob)
FUNCTION	FREQ

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 22volts, 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:

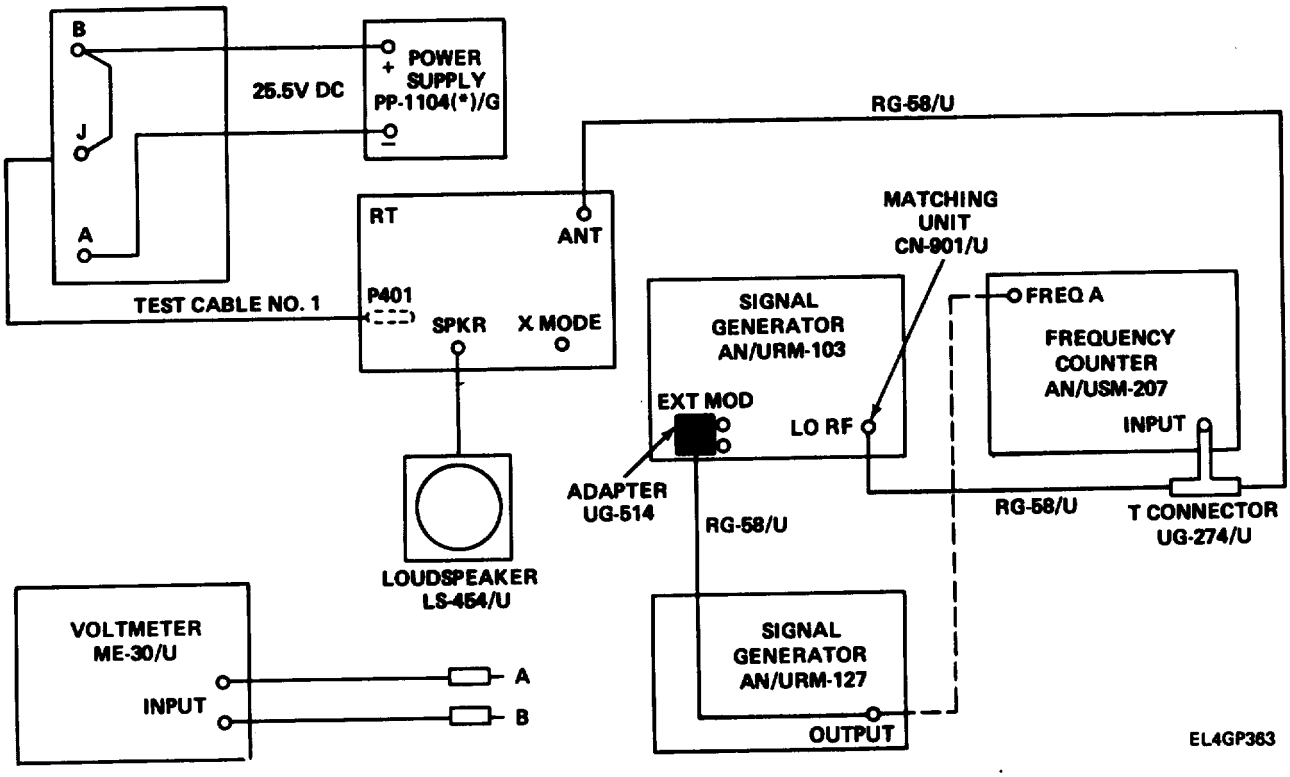
1. **Injecting 1-kHz modulation Into the RT ANTENNA port while measuring the voltage at the RT X-MODE port (pin A),**
2. **Changing the modulation rate to 500 Hz, 3 kHz, 5 kHz, and 10 kHz while taking db readings at the RT X-MODE port (pin A).**
3. **Comparing the db readings taken in step 2 to the reference voltage taken in step 1 to see if the standard is met.**

TEST EQUIPMENT AND MATERIALS

Power Supply PP-1104(*)/G
Frequency Counter AN/USM-207
Signal Generator AN/URM-103
Signal Generator AN/URM-127
Ac Voltmeter ME-30(*)/U
Loudspeaker LS-454/U (RT-246/VRC)
Adapter (two) UG-274 B/U and UG-514
Matching Unit CN-901/U
Rf Cables (three) RG-58/U
Test Cable No. 1

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

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/USM-207	FREQUENCY TUNING-MC	100
	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	INPUT	0.3 V MAX (both switches to left)
	GATE TIME	10^3 (black knob)
	SENSITIVITY	PLUG IN
	FUNCTION	FREQ
	DIRECT/HETERODYNE	DIRECT
AN/URM-103	OPERATE/OFF/STAND BY	OPERATE
	BAND SWITCH	Ⓓ
	RF TUNING	64.00
	DEVIATION RANGE KHZ	10
	FUNCTION	EXT MOD
	DEVIATION	Adjust for 8-kHz meter reading
	RF SET TO LINE	To red line
	RF OUTPUT	LO, 0-10 KUV
	LO RF UV	20 μv
AN/URM-127	FREQ RANGE MULTIPLIER	x10
	FREQ RANGE DIAL	100
	ATTENUATOR	x1
	OUTPUT CONTROL	Fully clockwise (maximum)
ME-30(*)/U	RANGE selector switch	3 v
RT	BAND	Ⓑ
	MC-TUNE-KC	64.00
	SQUELCH	OLD OFF
	LIGHT	ON
	VOLUME	Fully counterclockwise
	POWER	LOW
	SPEAKER (RT-524/VRC)	OFF

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.

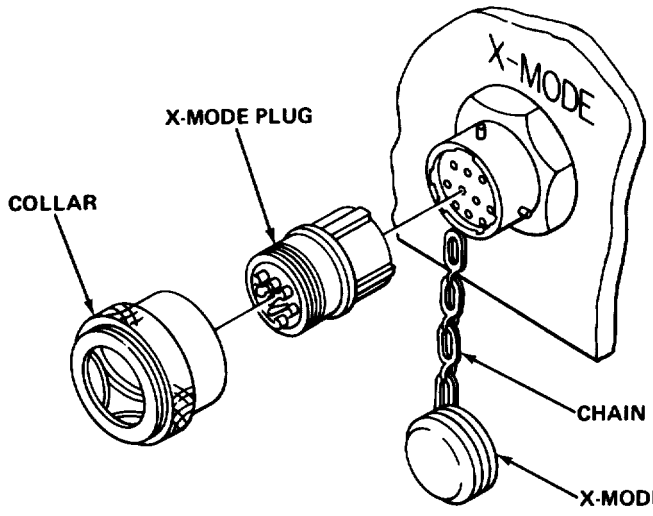
5-0. RECEIVER AUDIO RESPONSE TEST (X-MODE). (CONT)

Audio Response (X-Mode) at 1 kHz(For Reference)

3. Set AN/USM-207 controls to the following positions:

CONROL/SWITCH	POSITION/SETTING
POWER	TRACK
DISPLAY	MIN (fully counterclockwise)
Sensitivity	0.1 v
GATE TIME	1 (black knob)
FUNCTION	FREQ

4. Disconnect rf cable from Adapter UG-514. (See test setup diagram (A) , 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.



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9. Pull out X-MODE plug.
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 (A) .)
13. Connect rf cable to AN/USM-207 FREQ A connector.
14. Adjust AN/URM-127 FREQ RANGE DIAL for 500-Hz display on AN/USM-207.
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.

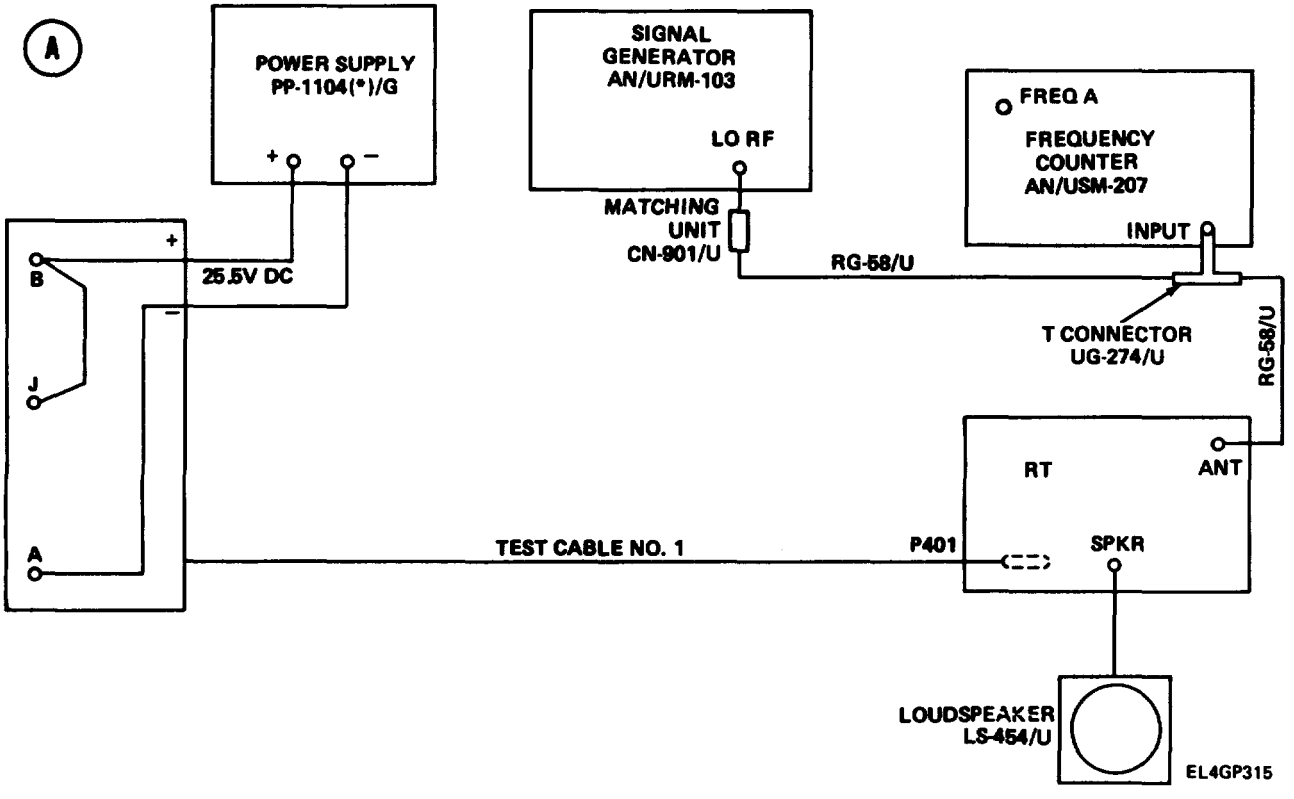
PURPOSE. This test checks the ability of the RT A4000 tray IF Filters FL4001 and FL4002 to reject unwanted signals and, thus, determine bandwidth. The RT should have a minimum bandwidth of 32 kHz at the filters' 6-db attenuation point and a maximum bandwidth of 80 kHz at their 60-db attenuation point. 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
Frequency Counter AN/USM-207
Signal Generator AN/URM-103
Loudspeaker LS-454/U (RT-246/VRC)
Adapter (T-Connector) UG-274 B/U
Matching Unit CN-901/U
Rf Cables (two) RG-58/U
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.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/USM-207	FREQUENCY TUNING-MC	100
	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	INPUT	0.3 V MAX (both switches to left)
	GATE TIME	10^3 (black knob)
	SENSITIVITY	PLUG IN
	FUNCTION	FREQ
	DIRECT/HETERODYNE	DIRECT
AN/URM-103	OPERATE/OFF/STAND BY	OPERATE
	BAND SWITCH	Ⓑ
	RF TUNING	30.00
	DEVIATION RANGE KHZ	10
	FUNCTION	MOD OFF
	RF SET TO LINE	To red line
	RF OUTPUT	LO, 0-10 KUV
	LO RF UV	Minimum setting
RT	BAND	Ⓐ
	MC-TUNE-KC	30.00
	SQUELCH	OLD ON
	LIGHT	ON
	VOLUME	Fully counterclockwise
	POWER	LOW
	SPEAKER (RT-524/VRC)	OFF

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.
6. Change AN/USM-207 GATE TIME to 10^2.
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.
19. Reattach T-connector to AN/USM-207.
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.
24. Change AN/USM-207 GATE TIME to 10^4.
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

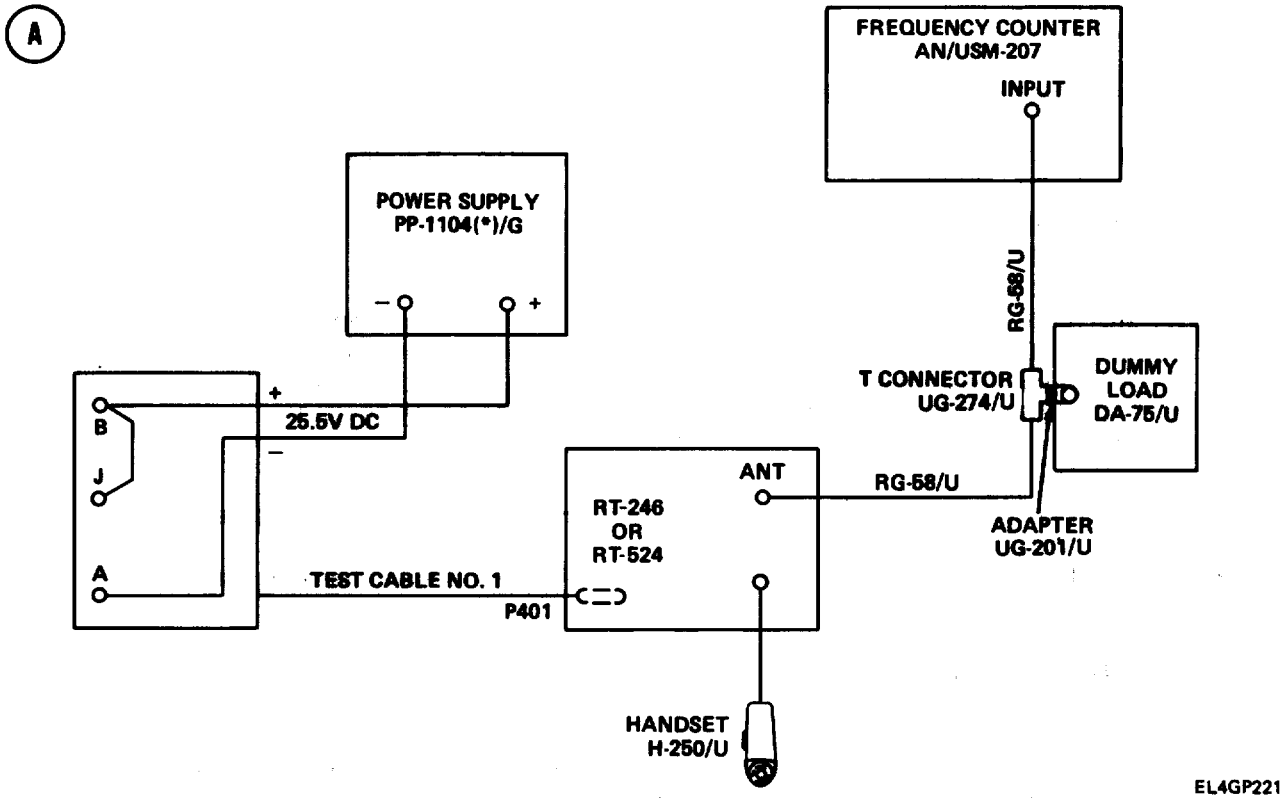
Power Supply PP-1104(*)/G
Frequency Counter AN/USM-207
Dummy Load DA-75/U
Adapters (two) UG-274/U (T-Connector), UG-201/U
Handset H-250/U
Rf Cables (two) RG-58/U
Test Cable No. 1

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

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

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/USM-207	FREQUENCY TUNING-MC	100
	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	INPUT	0.3 V MAX (both switches to left)
	GATE TIME	10^2 (black knob)
	SENSITIVITY	PLUG IN
	FUNCTION	FREQ
	DIRECT/HETERODYNE	DIRECT
RT	LIGHT	ON
	BAND	(A)
	MC-TUNE-KC	30.00
	POWER	LOW
	SQUELCH	OLD ON
	VOLUME	Fully counterclockwise
	SPEAKER (RT-524/VRC)	OFF

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	Handset H-250/U
Wattmeter AN/URM-120	Rf Cable RG-58/U
Dummy Load DA-75/U	Test Cable No. 1

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

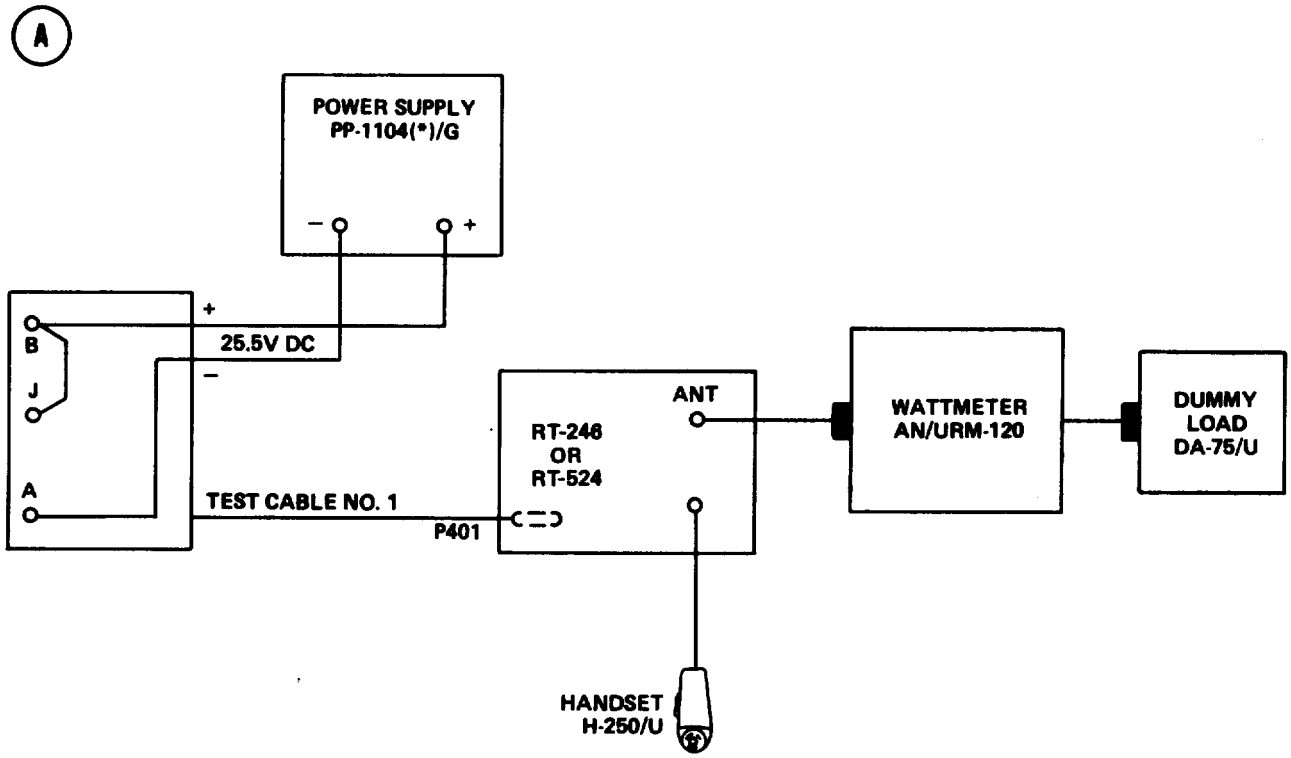
CAUTION

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)



EL4GP222

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

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/URM-120	10 W – 500 W	10 W
RT	LIGHT	ON
	BAND	(A)
	MC-TUNE-KC	30.00
	POWER	LOW
	SQUELCH	OLD OFF
	VOLUME	Fully counterclockwise
	SPEAKER (RT-524/VRC)	OFF

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 Ⓑ 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 A6300. 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-246/VRC)
Rf Probe

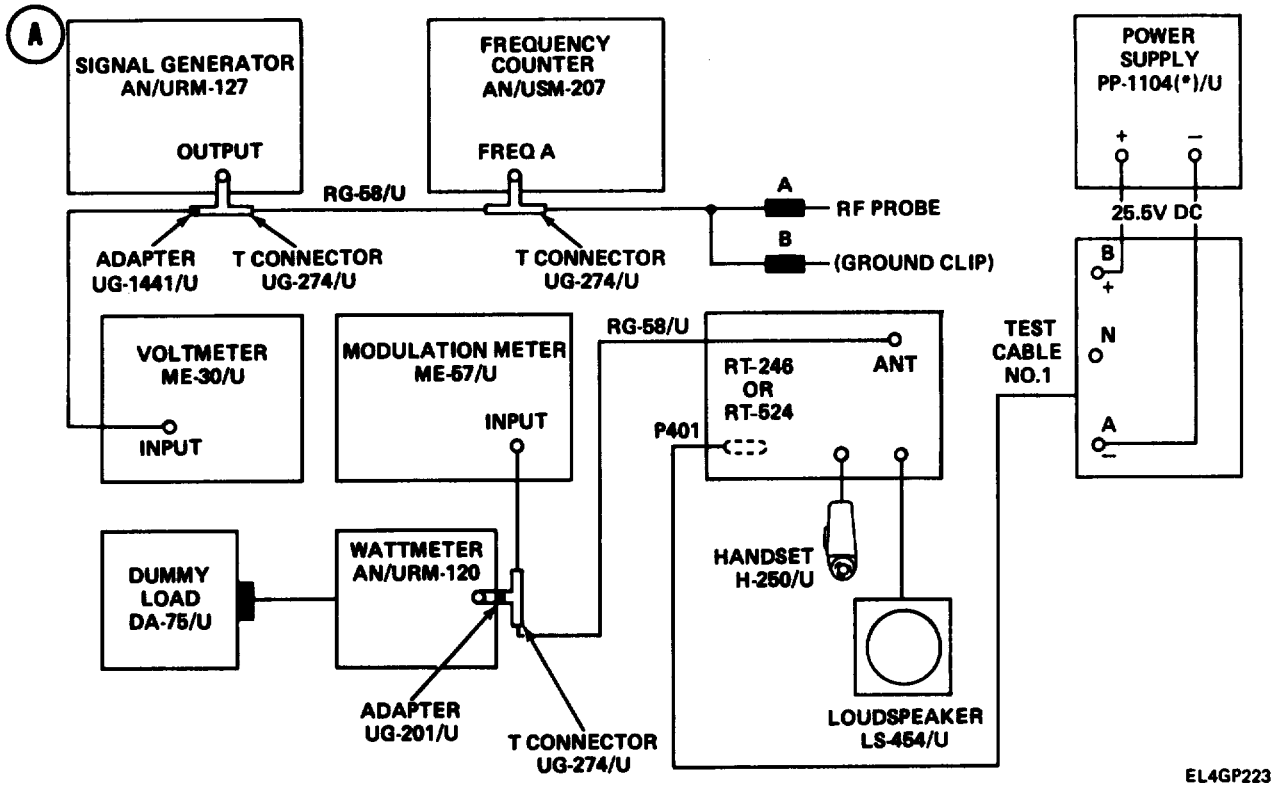
TEST SETUP. Connect equipment as shown in test setup diagram Ⓐ .

CAUTION

Do not key transmitter unless AN/URM-120 and DA-75/U are connected to ANTENNA 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

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/URM-127	FREQ RANGE MULTIPLIER	x10
	FREQ RANGE DIAL	100
	ATTENUATOR	x1
	OUTPUT CONTROL	Fully counterclockwise (maximum)
ME-30(*)/U	RANGE selector switch	0.3 v
AN/URM-120	10 W – 500 W	10 W
ME-57/U	TUNE-FINE TUNE	TUNE
	DEVIATION RANGE-KC	1000 TUNE
	FREQUENCY RANGE-MC	20-55
	TUNING	30-MHz indication on FREQUENCY-MC meter with transmitter keyed
	POWER	ON
AN/USM-207	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	SENSITIVITY	0.1 v
	GATE TIME	1 (black knob)
	FUNCTION	FREQ
RT	LIGHT	ON
	BAND	(A)
	MC-TUNE-KC	30.00
	POWER	LOW
	SQUELCH	OLD ON
	VOLUME	Fully counterclockwise
	SPEAKER (RT-524/VRC)	OFF

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 Ⓐ , 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.

16. 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

21. Connect T-connector to AN/USM-207.
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

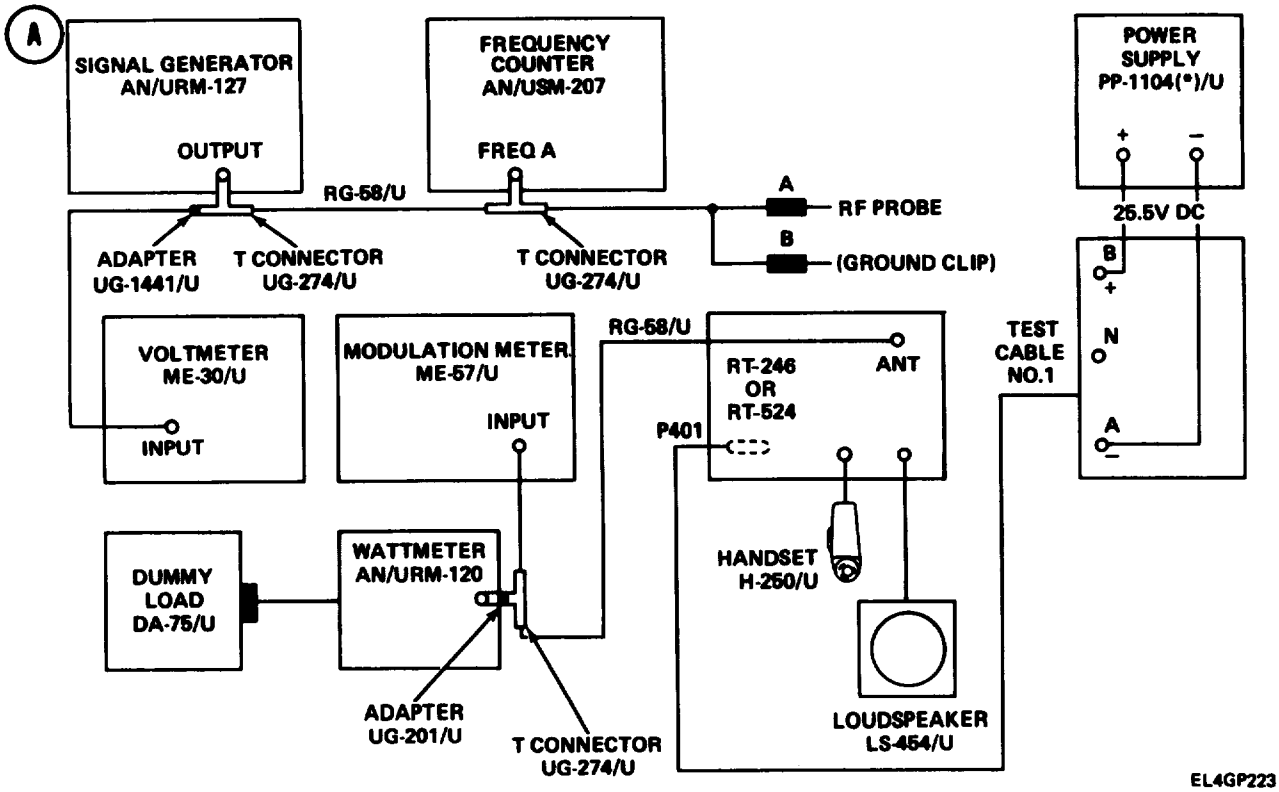
Power Supply PP-1104(*)/G
Signal Generator AN/URM-127
Voltmeter ME-30(*)/U
Wattmeter AN/URM-120
Dummy Load DA-75/U
Frequency Counter AN/USM-207
Adapters UG-274/U(three), UG-1441/U, UG-201/U
Modulation Meter ME-57/U
Handset H-250/U
Test Cable No. 1
Rf Cables (three) RG-58/U
Loudspeaker LS-454/U (RT-246/VRC)
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.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/URM-127	FREQ RANGE MULTIPLIER	x10
	FREQ RANGE DIAL	100
	ATTENUATOR	x1
	OUTPUT CONTROL	Fully counterclockwise (maximum)
ME-30(*)/U	RANGE selector switch	3 v
AN/URM-120	10 W – 500 W	10 W
ME-57/U	TUNE-FINE TUNE	TUNE
	DEVIATION RANGE-KC	1000 TUNE
	FREQUENCY RANGE-MC	20-55
	TUNING	30-MHz indication on FREQUENCY-MC meter with transmitter keyed
	POWER	ON
AN/USM-207	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	SENSITIVITY	0.1 v
	GATE TIME	1 (black knob)
	FUNCTION	FREQ
RT	LIGHT	ON
	BAND	(A)
	MC-TUNE-KC	30.00
	POWER	LOW
	SQUELCH	OLD ON
	VOLUME	Fully counterclockwise
	SPEAKER (RT-524/VRC)	OFF

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

21. Connect T-connector to AN/USM-207.
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

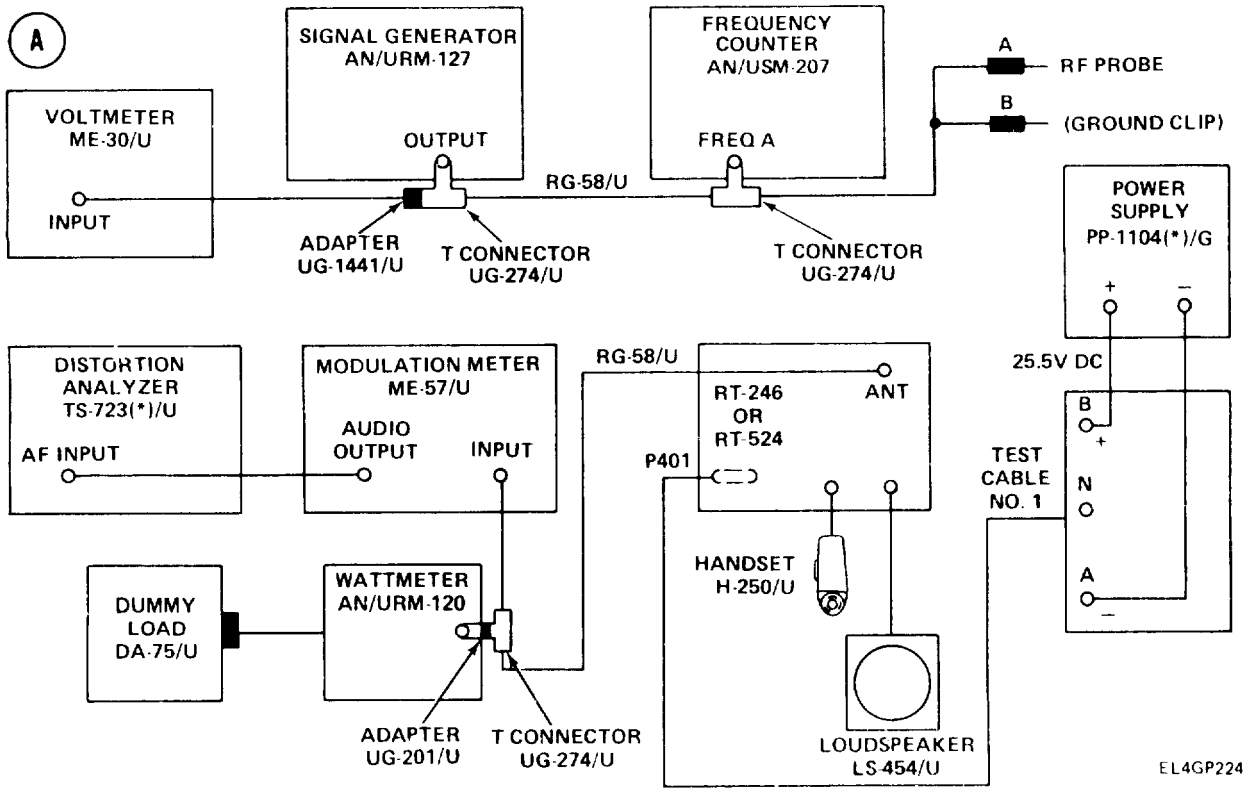
Power Supply PP-1104(*)/G
Signal Generator AN/URM-127
Voltmeter ME-30(*)/U
Wattmeter AN/URM-120
Dummy Load DA-75/U
Frequency Counter AN/USM-207
Adapters UG-274 (three), UG-1441/U, UG-201/U
Modulation Meter ME-57/U
Distortion Analyzer TS-723(*)/U
Loudspeaker LS-454/U(RT-246/VRC)
RF Cables (three) RG-58/U
Test Cable No.1
Handset H-250
Rf Probe

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

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/URM-127	FREQ RANGE MULTIPLIER	x10
	FREQ RANGE DIAL	100
	ATTENUATOR	x1
	OUTPUT CONTROL	Fully counterclockwise (maximum)
ME-30(*)/U	RANGE selector switch	0.3 v
AN/URM-120	10 w -500 w	10 w
ME-57/U	TUNE-FINE TUNE	TUNE
	DEVIATION RANGE-KC	1000 TUNE
	FREQUENCY RANGE-MC	20-55
	TUNING	30-MHz indication on FREQUENCY-MC meter with transmitter keyed
	POWER	ON
AN/USM-207	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	SENSITIVITY	0.1 v
	GATE TIME	1 (black knob)
	FUNCTION	FREQ
TS-723(*)/U	RANGE	x10
	AF INPUT	MIN
	AF-RF	AF
	FREQUENCY	100
	FUNCTION	SET LEVEL
	R.M.S. VOLTS/DB	100%
RT	LIGHT	ON
	BAND	Ⓐ
	MC-TUNE-KC	30.00
	POWER	LOW
	SQUELCH	OLD ON
	VOLUME	Fully counterclockwise
	SPEAKER (RT-524/VRC)	OFF

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

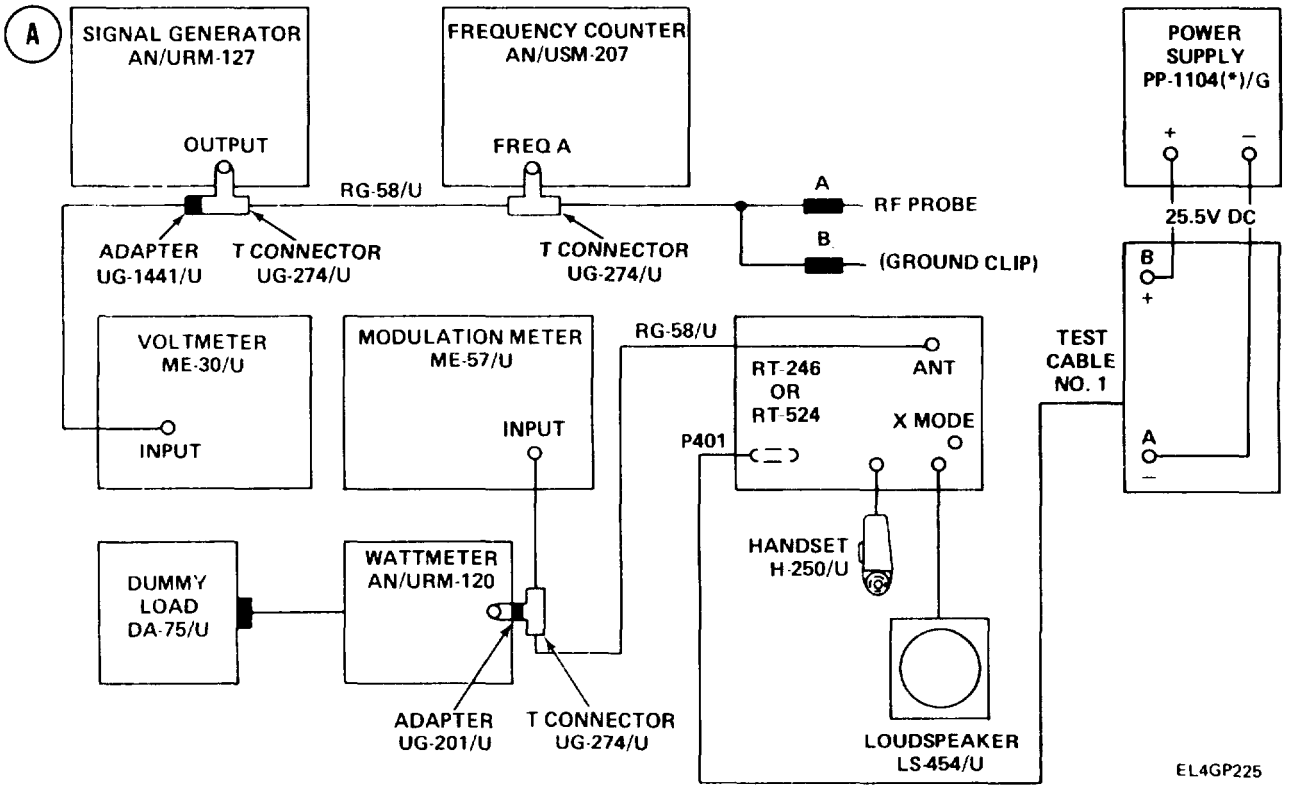
5-16. TRANSMITTER DEVIATION TEST (X-MODE). (CONT)

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

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/URM-127	FREQ RANGE MULTIPLIER	x10
	FREQ RANGE DIAL	100
	ATTENUATOR	xl
	OUTPUT CONTROL	Fully counterclockwise
ME-30(*)/U	RANGE selector switch	1v
AN/URM-120	10 W-500 w	10 w
ME-57/U	TUNE-FINE TUNE	TUNE
	DEVIATION RANGE-KC	1000 TUNE
	FREQUENCY RANGE-MC	20-55
	TUNING	30-MHz indication on FREQUENCY-MC meter with transmitter keyed
	POWER	ON
AN/USM-207	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	SENSITIVITY	0.1 v
	GATE TIME	1 (black knob)
	FUNCTION	FREQ
RT	LIGHT	ON
	BAND	Ⓐ
	MC-TUNE-KC	30.00
	POWER	LOW
	SQUELCH	OLD ON
	VOLUME	Fully counterclockwise
	SPEAKER (RT-524/VRC)	OFF

TEST PROCEDURE

Deviation Test (X-Mode) at 1 kHz

1. Key transmitter.
2. Rotate ME-57/U TUNING knob until CARRIER SHIFT meter indicates O 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 O KC.

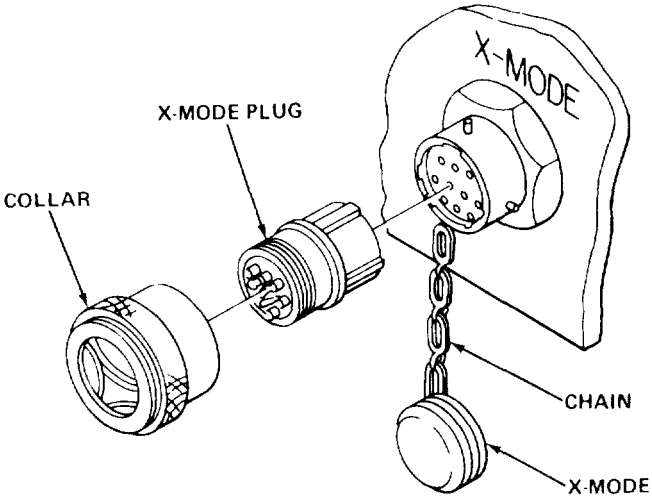
NOTE

ME-57/U LIMITING meter pin must be in BLACK area.

5. Unkey transmitter.

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.



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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 Bon 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

26. Connect T-connector to AN/USM-207.
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

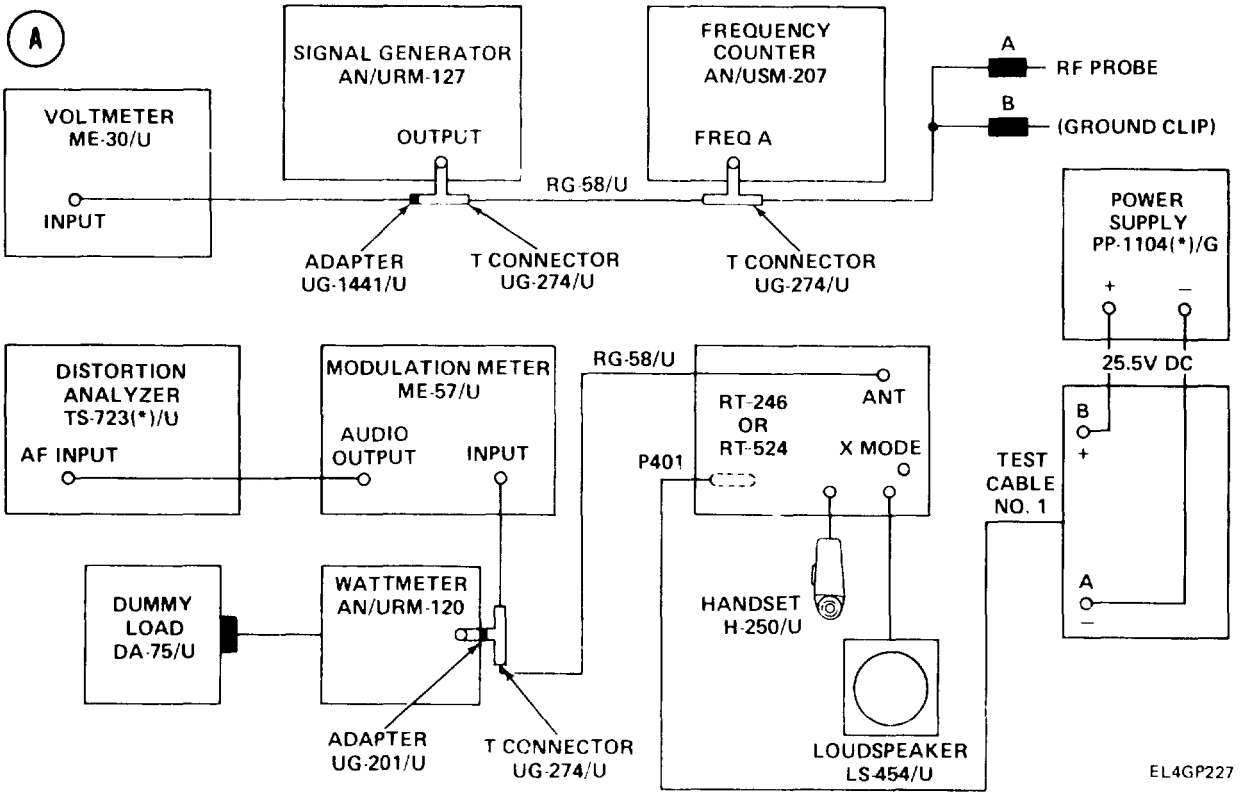
Power Supply PP-1104(*)/G	Modulation Meter ME-57/U
Signal Generator AN/URM-127	Distortion Analyzer TS-723(*)/U
Voltmeter ME-30(*)/U	Loudspeaker LS-454/U (RT-246/VRC)
Wattmeter AN/URM-120	Rf Cables (three) RG-58/U
Dummy Load DA-75/U	Handset H-250/U
Frequency Counter AN/USM-207	Test Cable No. 1
Adapters UG-274B/U, UG-1441/U, UG-201/U	Rf Probe

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.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/URM-127	FREQ RANGE MULTIPLIER	x10
	FREQ RANGE DIAL	100
	ATTENUATOR	xl
	OUTPUT CONTROL	Fully counterclockwise
ME-30(*)/U	RANGE selector switch	3 v
AN/URM-120	10 W-500 w	10 w
ME-57/U	TUNE-FINE TUNE	TUNE
	DEVIATION RANGE-KC	1000 TUNE
	FREQUENCY RANGE-MC	20-55
	TUNING	30-MHz indication on FREQUENCY-MC meter with transmitter keyed
	POWER	ON
AN/USM-207	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	SENSITIVITY	0.1 v
	GATE TIME	1 (black knob)
	FUNCTION	FREQ
RT	LIGHT	ON
	BAND	Ⓐ
	MC-TUNE-KC	30.00
	POWER	LOW
	SQUELCH	OLD ON
	VOLUME	Fully counterclockwise
	SPEAKER (RT-524/VRC)	OFF
TS-723(*)/U	RANGE	x10
	AF INPUT	MIN
	AF-RF	AF
	FREQUENCY	100
	FUNCTION	SET LEVEL
	R.M.S. VOLTS/DB	100 %

5-17. TRANSMITTER DISTORTION TEST (X-MODE). (CONT)

TEST PROCEDURE

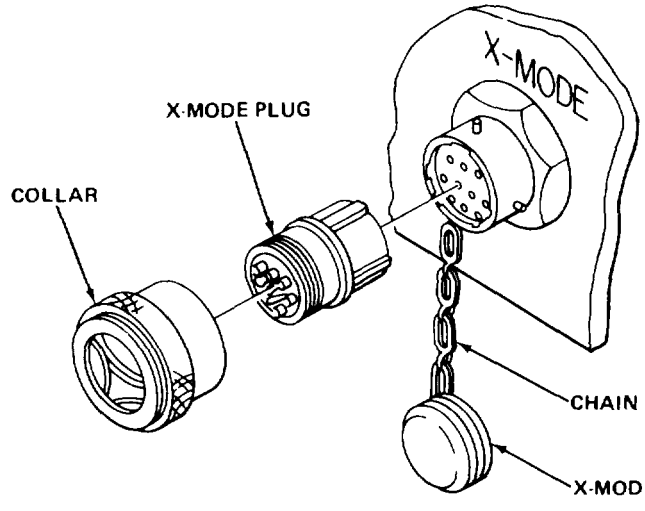
Distortion Test (X-Mode) at 1 kHz

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.



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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 Bon 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

21. Connect T-connector to AN/USM-207.
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.

5-18. 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. Frequency accuracy and deviation are then measured at the ANTENNA output with a frequency counter and a deviation meter.

TEST EQUIPMENT AND MATERIALS

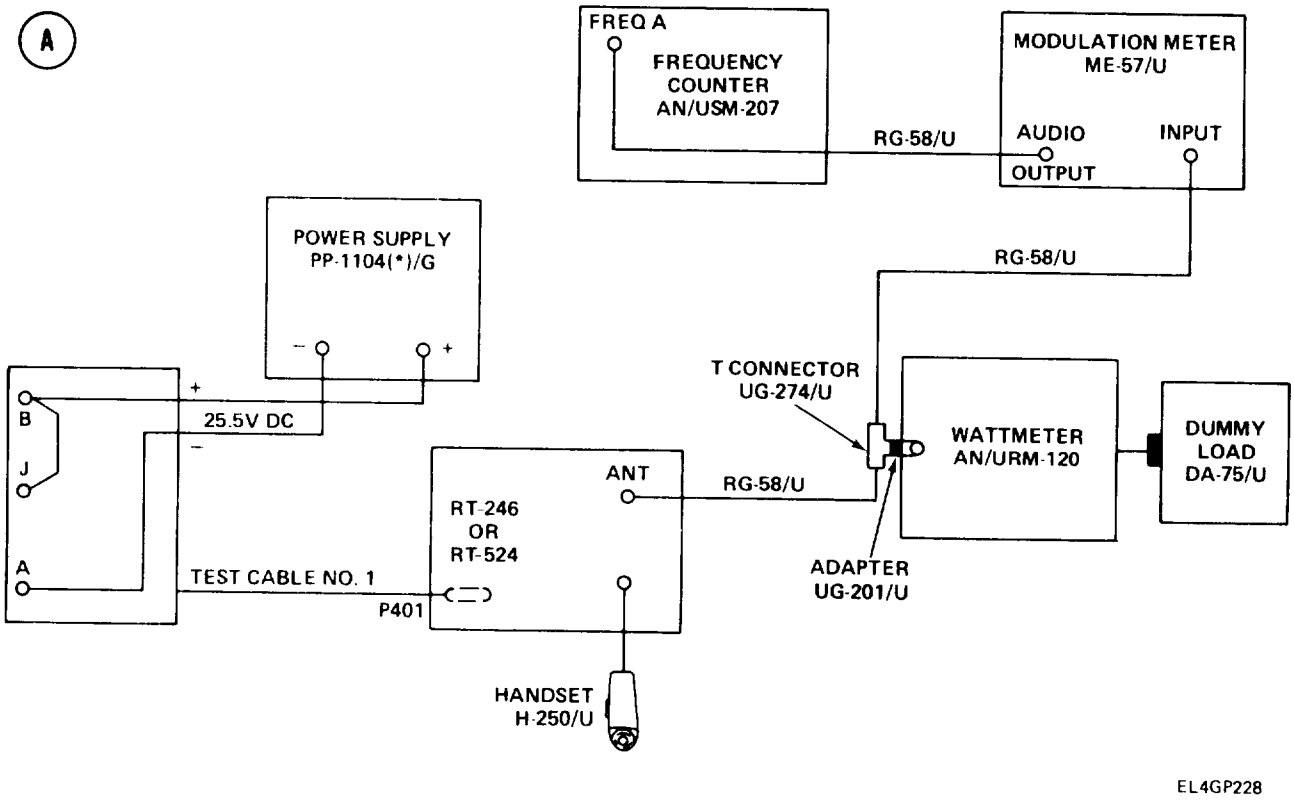
Power Supply PP-1104(*)/G
Frequency Counter AN/USM-207
Modulation Meter ME-57/U
Wattmeter AN/URM-120
Dummy Load DA-75/U
Adapters UG-274/U , UG-201/U
Test Cable No. 1
Rf Cables (three) RG-58/U
Handset H-250

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

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.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
ANA/URM-120	10 W – 500 W	10 W
ME-57/U	TUNE-FINE TUNE	TUNE
	DEVIATION RANGE-KC	1000 TUNE
	FREQUENCY RANGE-MC	20-55
	TUNING	30-MHz indication on FREQUENCY-MC meter with transmitter keyed
	POWER	ON
AN/USM-207	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	SENSITIVITY	0.1 v
	GATE TIME	10^{-1} (black knob)
	FUNCTION	FREQ
RT	LIGHT	ON
	BAND	Ⓐ
	MC-TUNE-KC	30.00
	POWER	LOW
	SQUELCH	OLD ON
	VOLUME	Fully counterclockwise
	SPEAKER (RT-524/VRC)	OFF

TEST PROCEDURE

1. Key transmitter.
2. Rotate ME-57/U TUNING knob until CARRIER SHIFT meter indicates O 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 O 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.

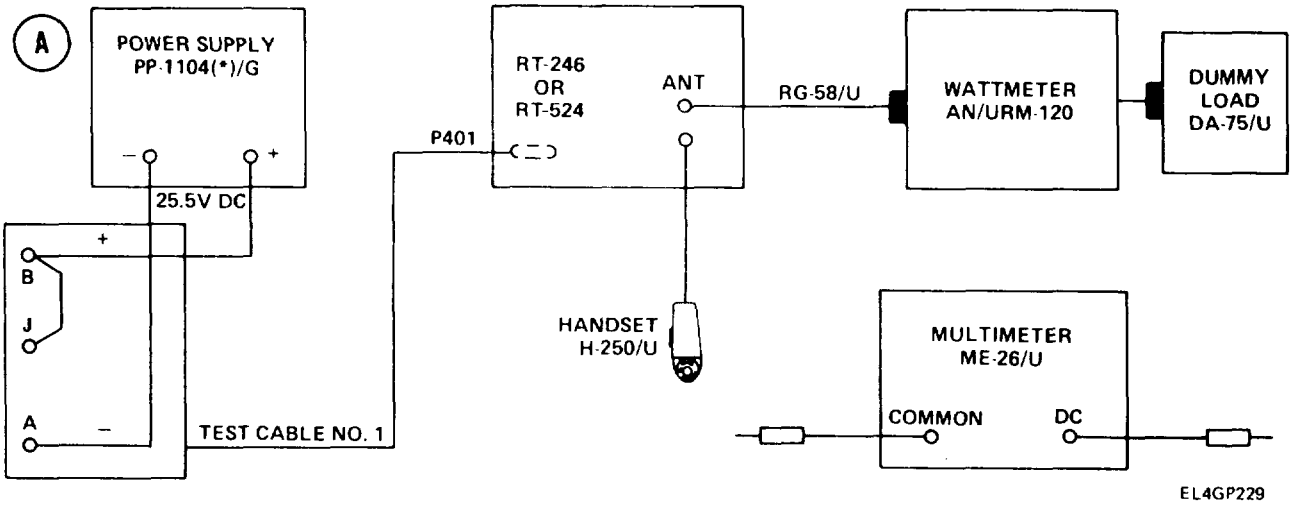
TEST EQUIPMENT AND MATERIALS

Power Supply PP-1104(*)/G	Handset H-250
Wattmeter AN/URM-120	Test Cable No. 1
Dummy Load DA-75/U	Rf Cable RG-58/U
Multi meter ME-26(*)/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.

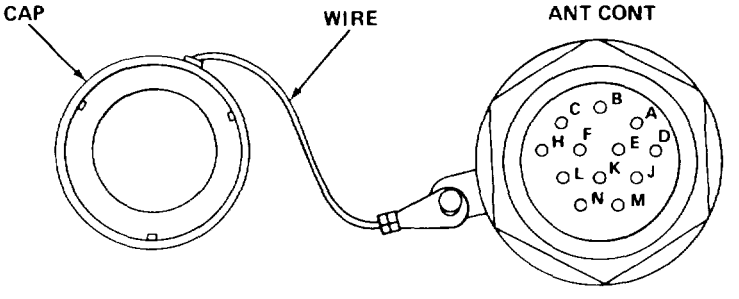
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

5-19. ANTENNA INFORMATION (SWITCHING) TEST. (CONT)

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
ME-26(*)/U	RANGE selector switch	30 v
AN/URM-120	10 W-500 W	10 W
RT	LIGHT	ON
	BAND	(A)
	MC-TUNE-KC	30.00
	POWER	LOW
	SQUELCH	OLD ON
	VOLUME	Fully counterclockwise
	SPEAKER (RT-524/VRC)	OFF

TEST PROCEDURE



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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.

MC-TUNE-KC FREQUENCY SETTING	MATCHING ANT CONT PIN
30.00-32.95	D
33.00-36.95	E
37.00-41.95	F
42.00-47.45	H
47.50-52.55	J

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.

MC-TUNE-KC FREQUENCY SETTING	MATCHING ANT CONT PIN
53.00-55.95	D
56.00-59.95	E
60.00-64.95	F
65.00-70.45	H
70.50-75.95	J

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.

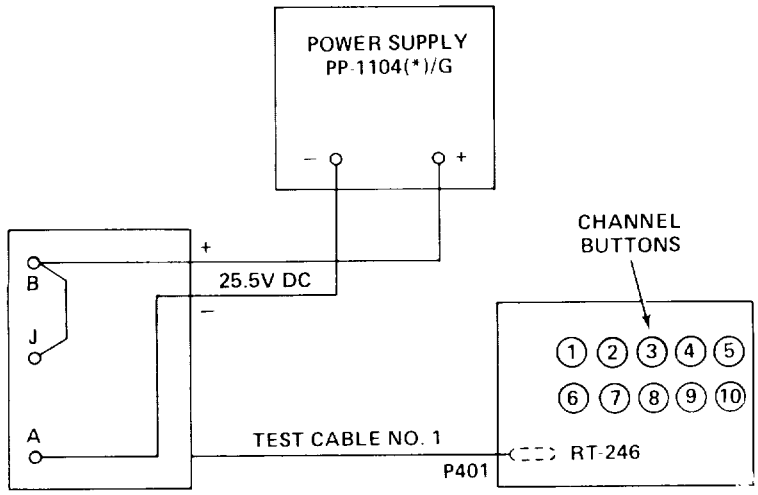
PURPOSE. This test checks the RT-246/VRC servosystem which allows the operator to pretune the radio to any 10 of the 920 available channels. Each channel button is preset, then pressed in turn. The selected frequency should appear in the dial window within 5 seconds.

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)



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.

CONTROL/SWITCH		POSITION/SETTING
LIGHT		ON
BAND		AUTO
MC-TUNE-KC		75.95
POWER		LOW
SQUELCH		OLD OFF
VOLUME		Fully counterclockwise
Channel Buttons (preset)	①	30.00 MHz
	②	39.15
	③	42.20
	④	43.30
	⑤	54.40
	⑥	56.55
	⑦	67.60
	⑧	68.70
	⑨	71.80
	⑩	75.95

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 (1). (See test setup diagram (A), 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.

FAILURE MODE	CAUSE	CORRECTION
No audio on all channels ending in 0, eg, 30.00, 30.10,30.20, etc.	Crystal Y2012 (5.65 MHz) in A2000 assembly	Replace A2000 assembly.
No audio on all channels ending in 5, eg, 30.05, 30.15,30.25, etc.	Crystal Y2011 (5.60 MHz) in A2000 assembly	Replace A2000 assembly.
No audio on the same 100-kHz segment for each megahertz of tuning.	Defective interpolation oscillator crystal	Replace A2000 assembly. See interpolation oscillator crystal chart.

5-22. GROSS TROUBLESHOOTING PRELIMINARY INSTRUCTIONS. (CONT)

INTERPOLATION OSCILLATOR CRYSTAL CHART

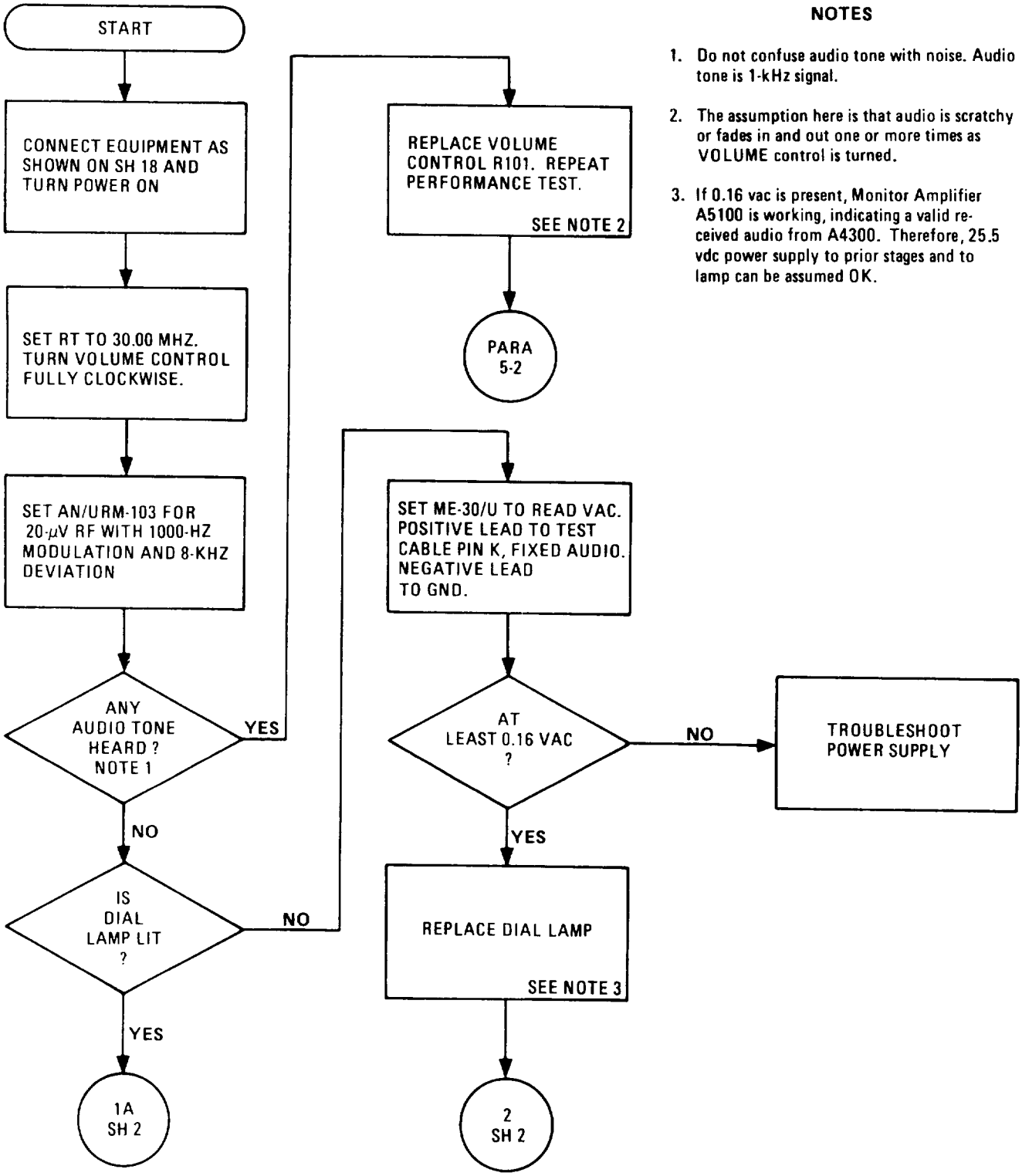
The following chart is used to isolate the particular crystal responsible for audio failure in the same 100-kHz segment for each MHz of tuning. In this failure mode, if audio is absent at 30.05 and 30.10, it will be absent at 40.05 and 40.10; 50.05 and 50.10, etc.

INTERPOLATION OSCILLATOR CRYSTAL CHART

SEGMENT OF KC CONTROL WHERE AUDIO IS ABSENT	CAUSE	CORRECTION
05 and 10	Crystal Y2007	Replace A2000 assembly.
15 and 20	Crystal Y2008	Replace A2000 assembly.
25 and 30	Crystal Y2009	Replace A2000 assembly.
35 and 40	Crystal Y2010	Replace A2000 assembly.
45 and 50	Crystal Y2005	Replace A2000 assembly.
55 and 60	Crystal Y2004	Replace A2000 assembly.
65 and 70	Crystal Y2003	Replace A2000 assembly.
75 and 80	Crystal Y2002	Replace A2000 assembly.
85 and 90	Crystal Y2001	Replace A2000 assembly.
95 and 100	Crystal Y2006	Replace A2000 assembly.

5-23. TROUBLESHOOTING FLOW CHARTS.

CHART 5-1
No Audio Troubleshooting
(Sheet 1 of 18)

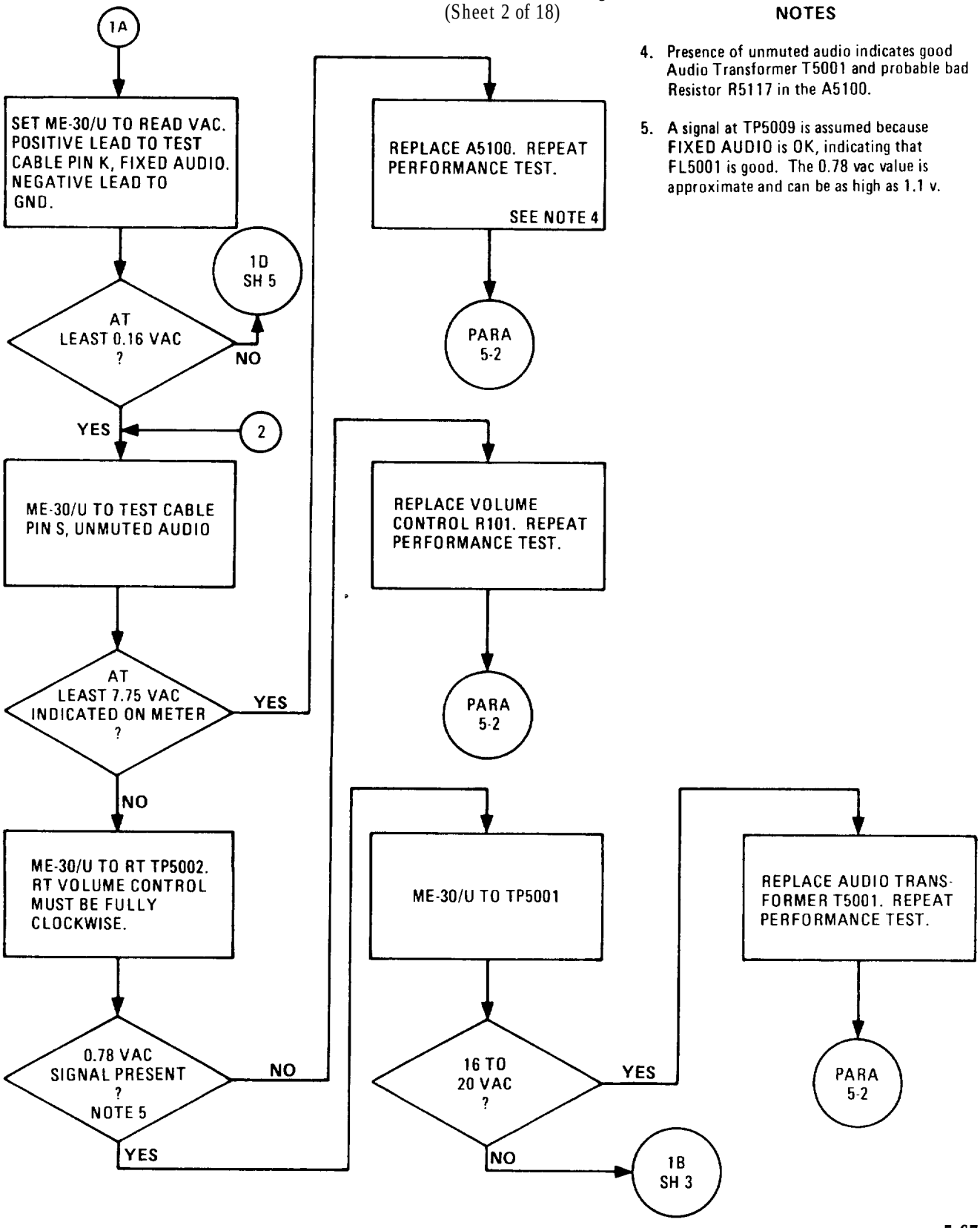


NOTES

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)



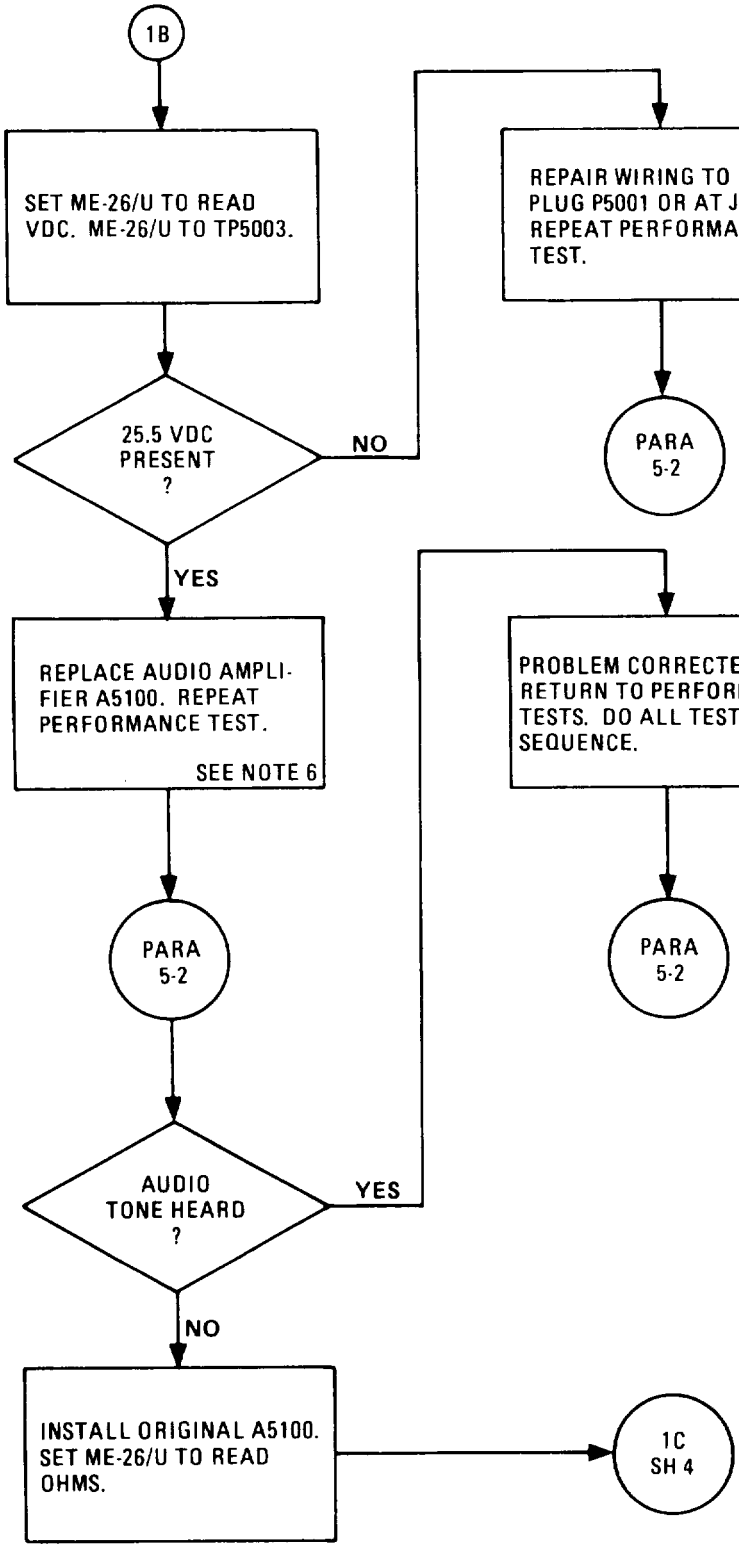
NOTES

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)

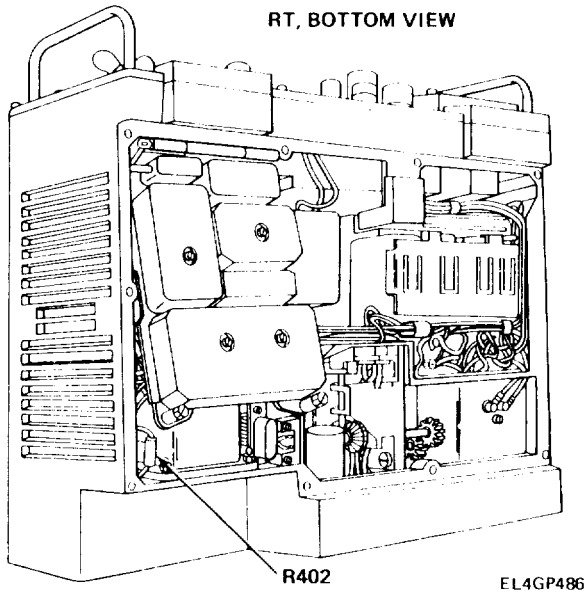


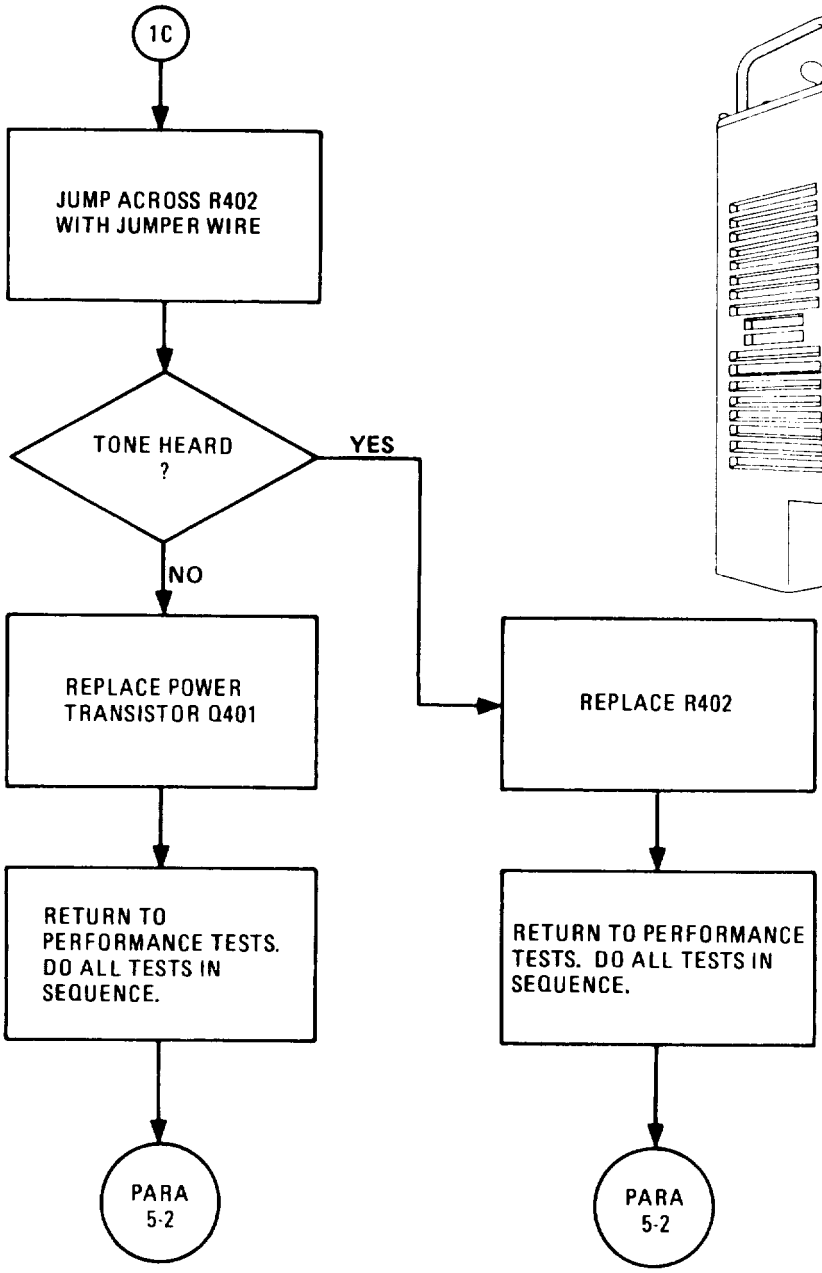
NOTE

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.

5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

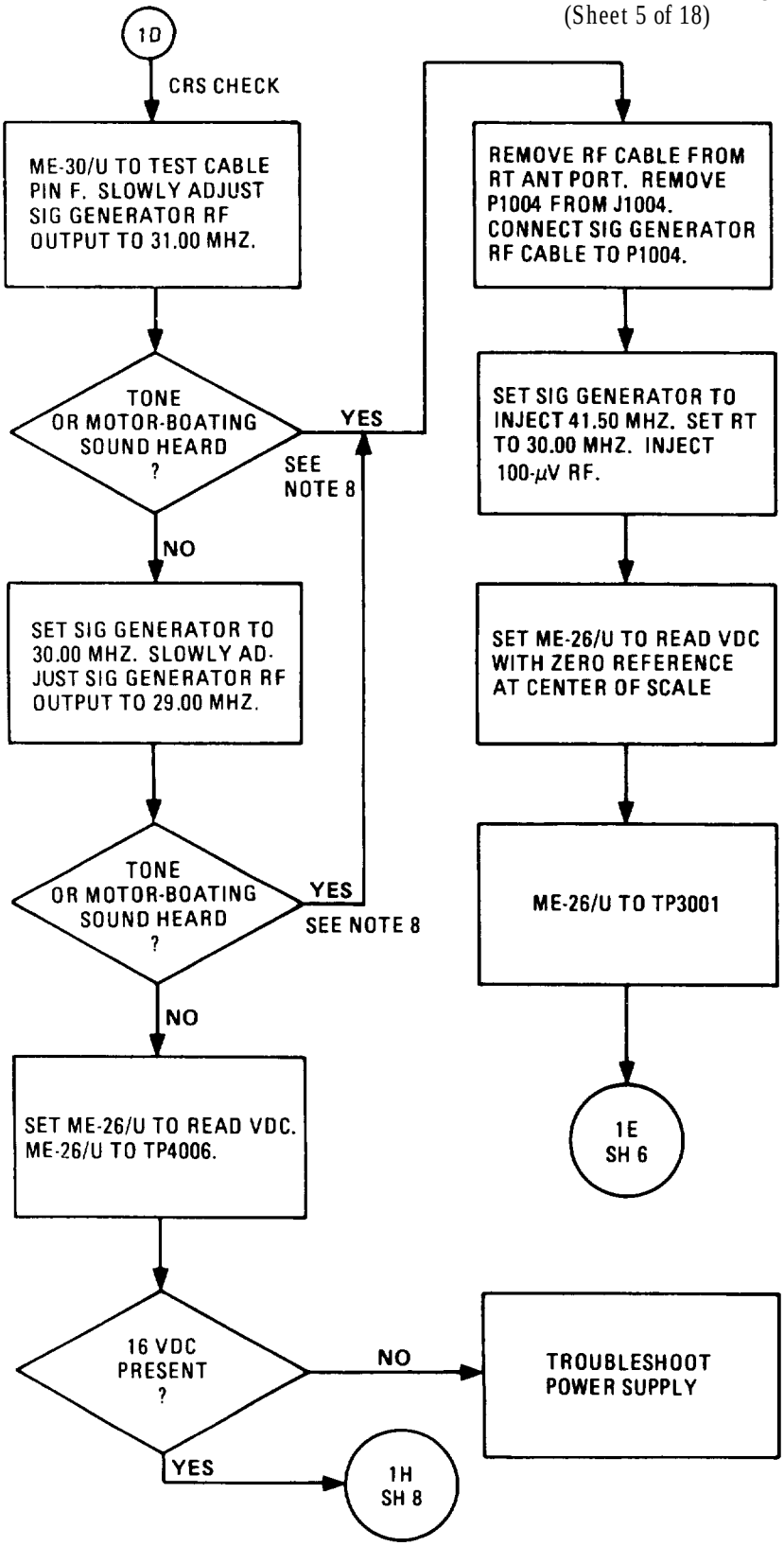
CHART 5-1
No Audio Troubleshooting
(Sheet 4 of 18)





5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 5 of 18)

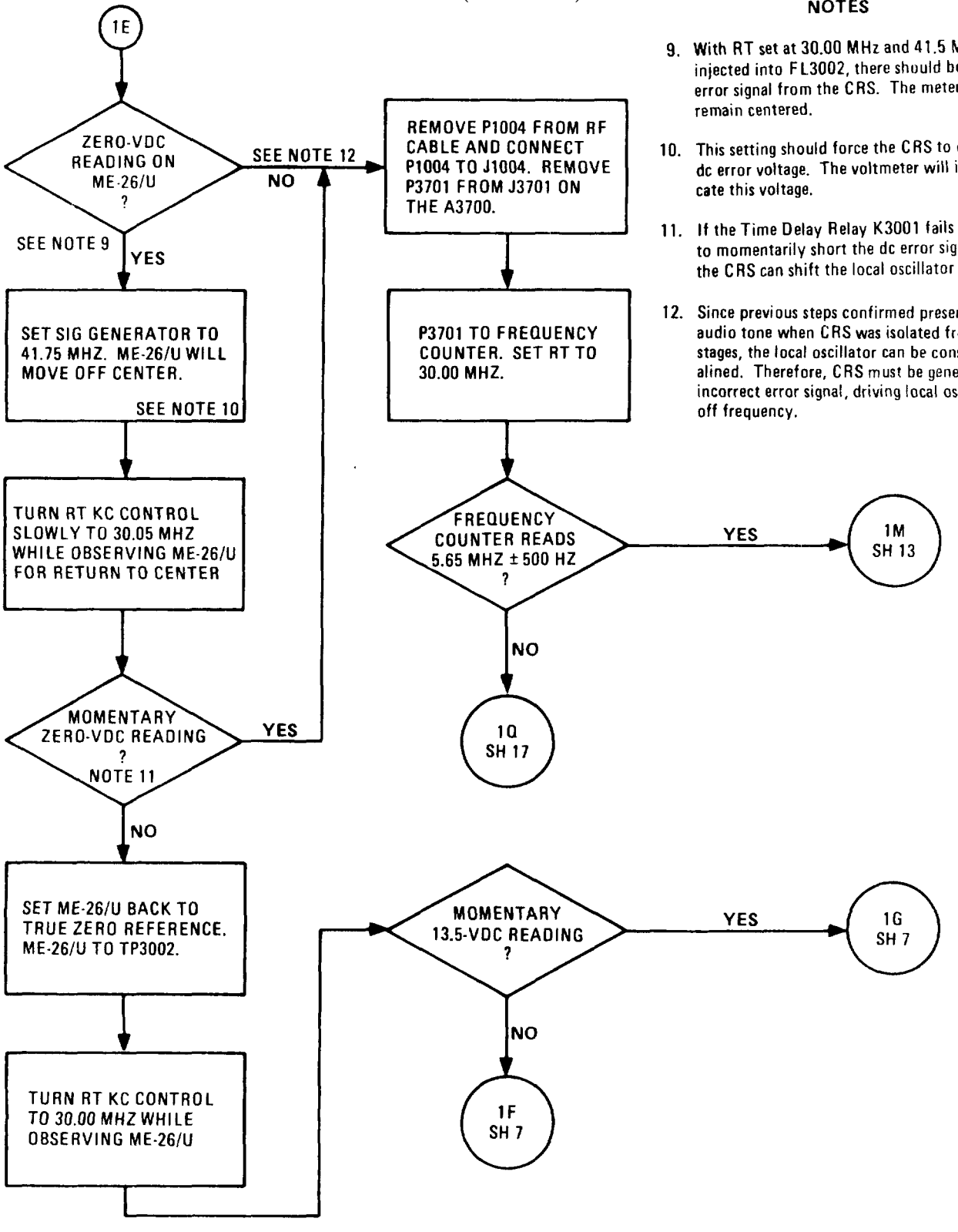


NOTES

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)

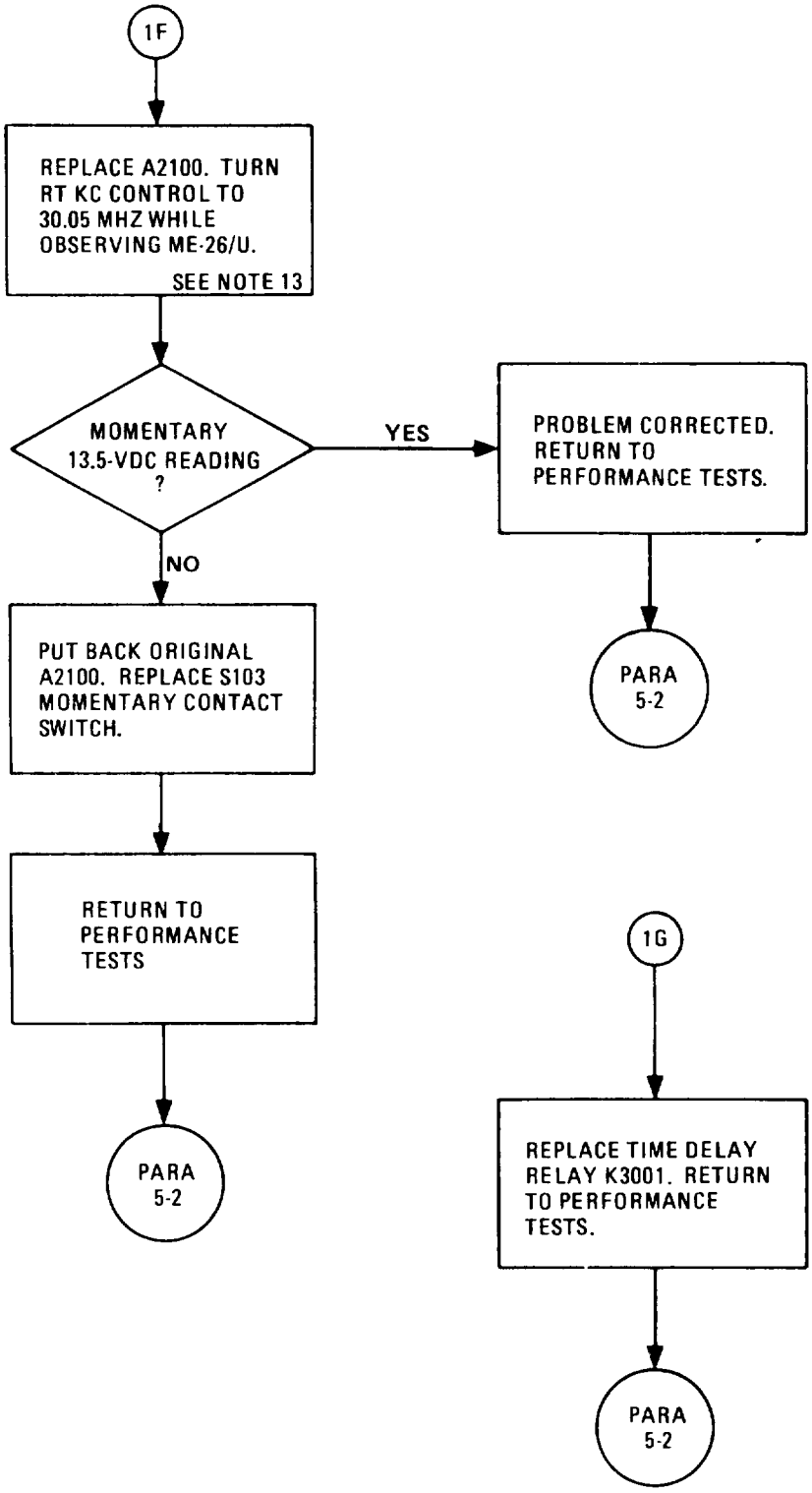


NOTES

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 alined. Therefore, CRS must be generating incorrect error signal, driving local oscillator off frequency.

5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART **5-1**
No Audio Troubleshooting
(Sheet 7 of 18)

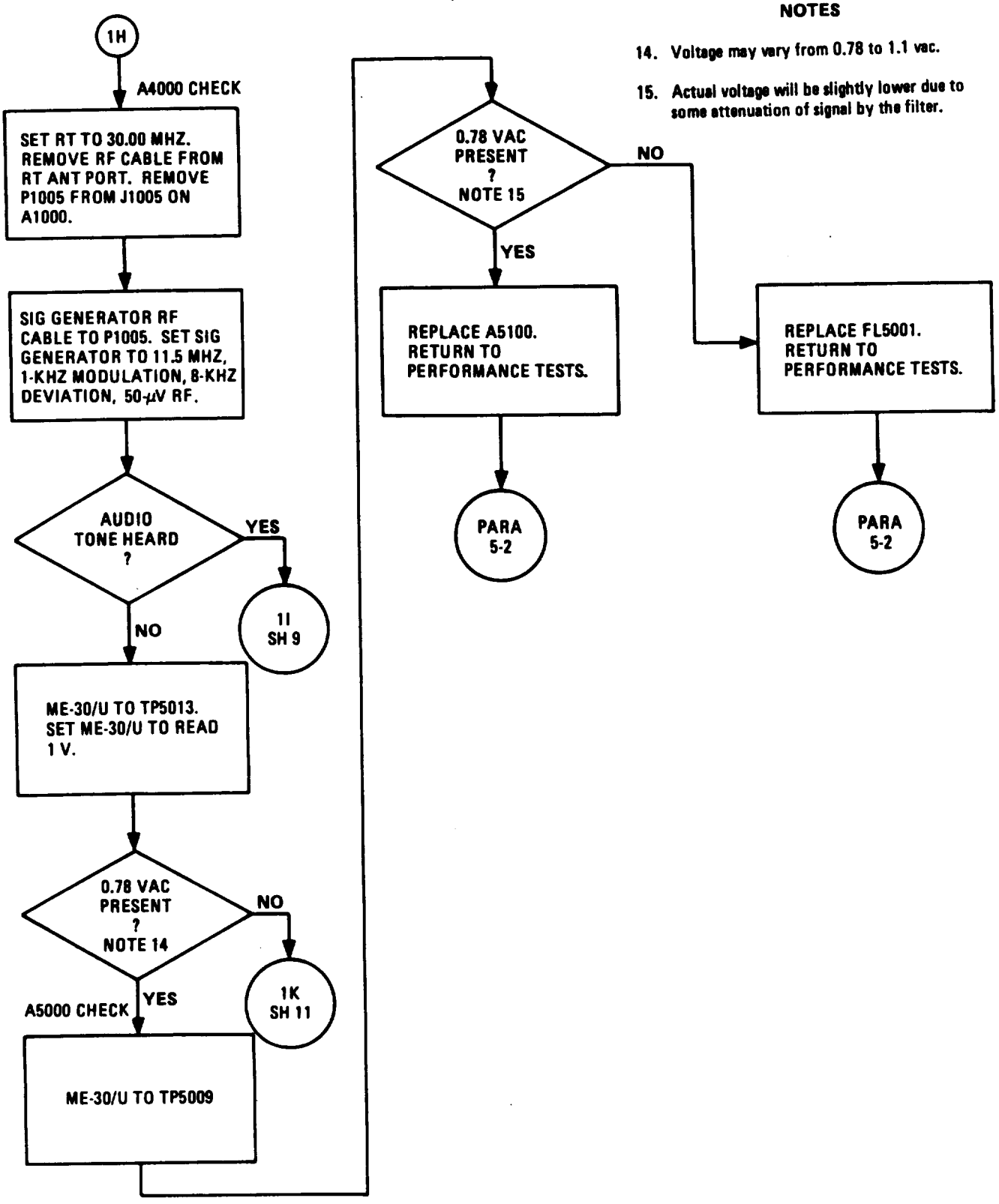


NOTE

13. Do not discard A2100.

5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 8 of 18)

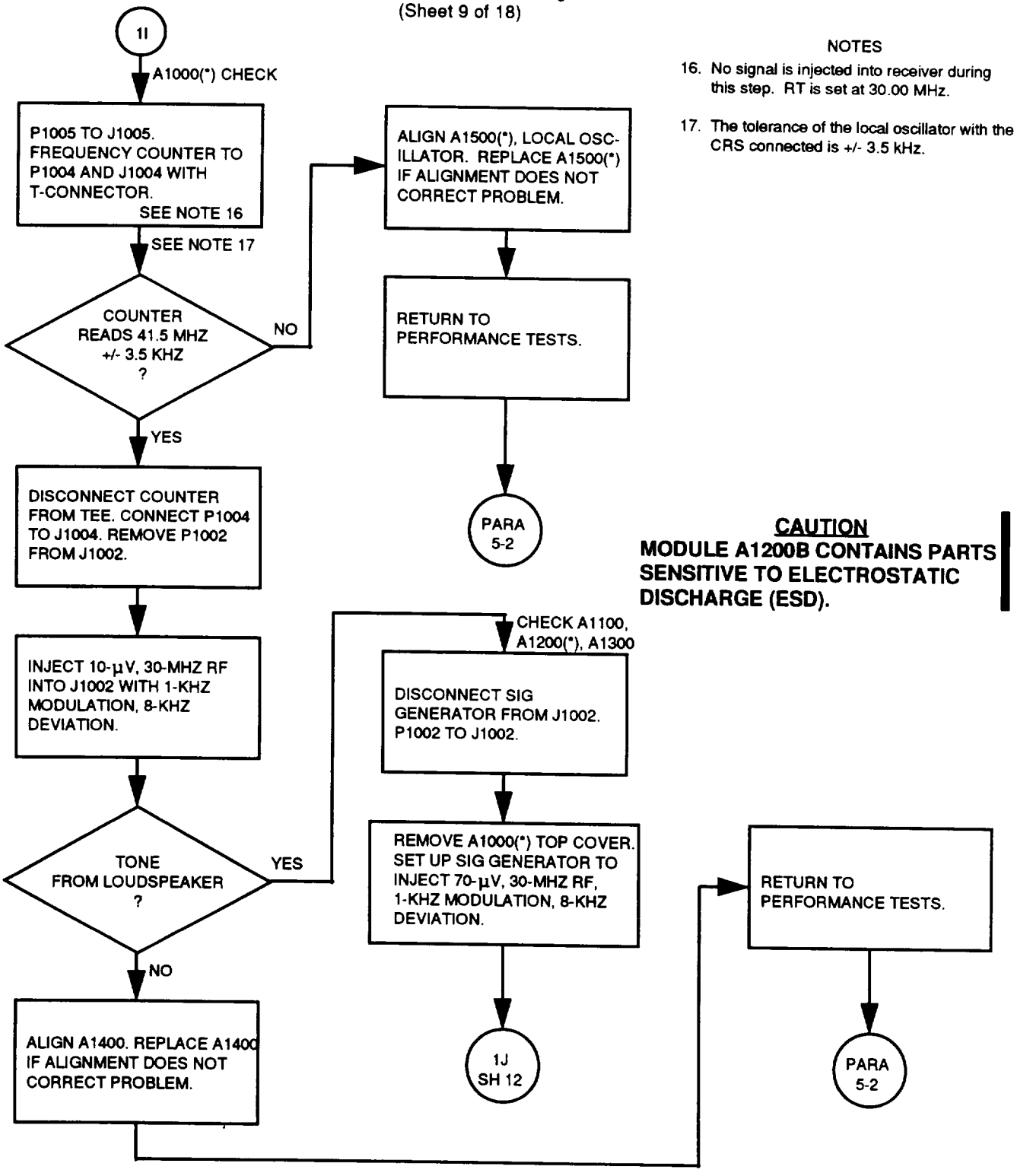


NOTES

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.

5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 9 of 18)



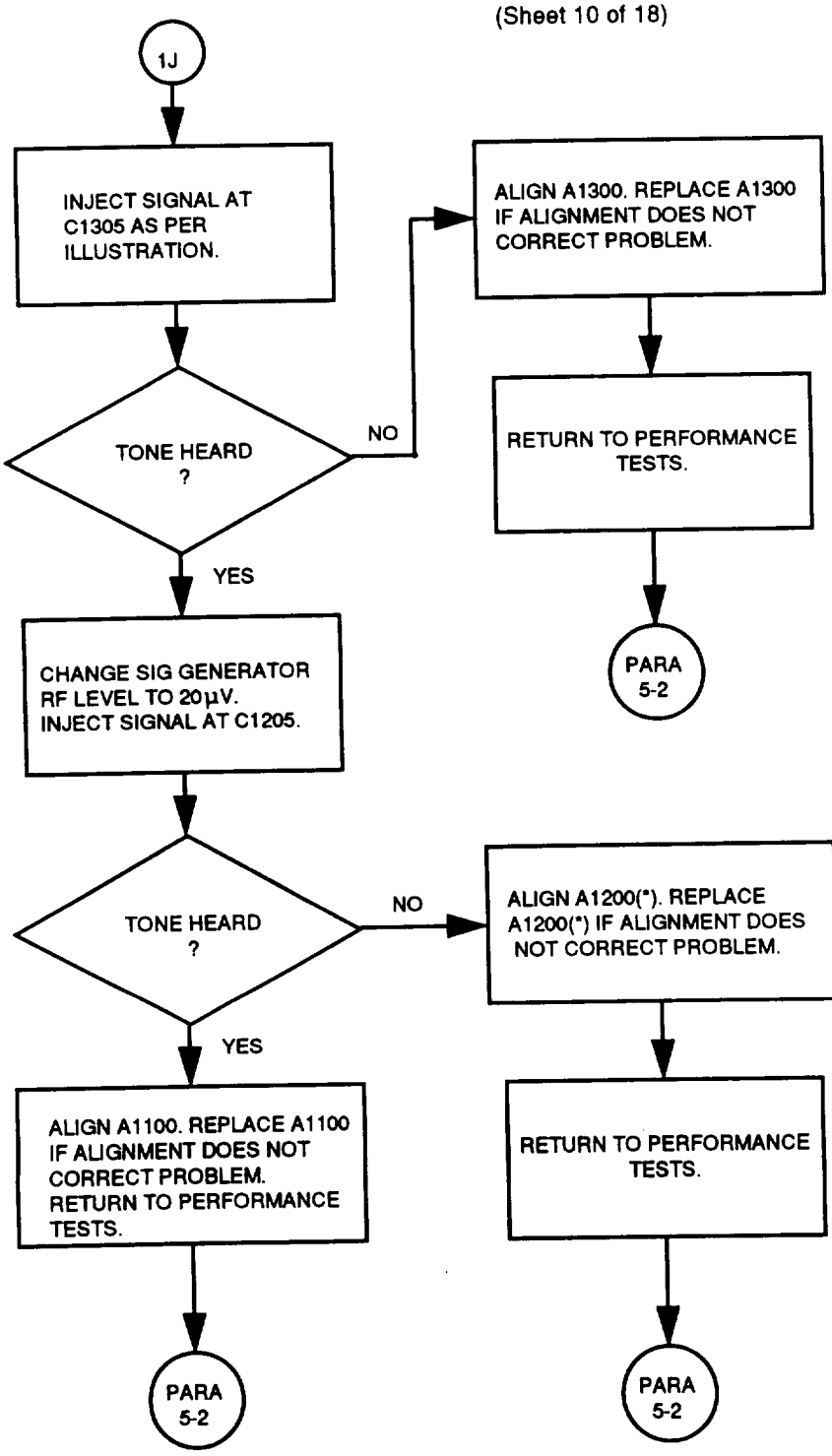
NOTES

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)

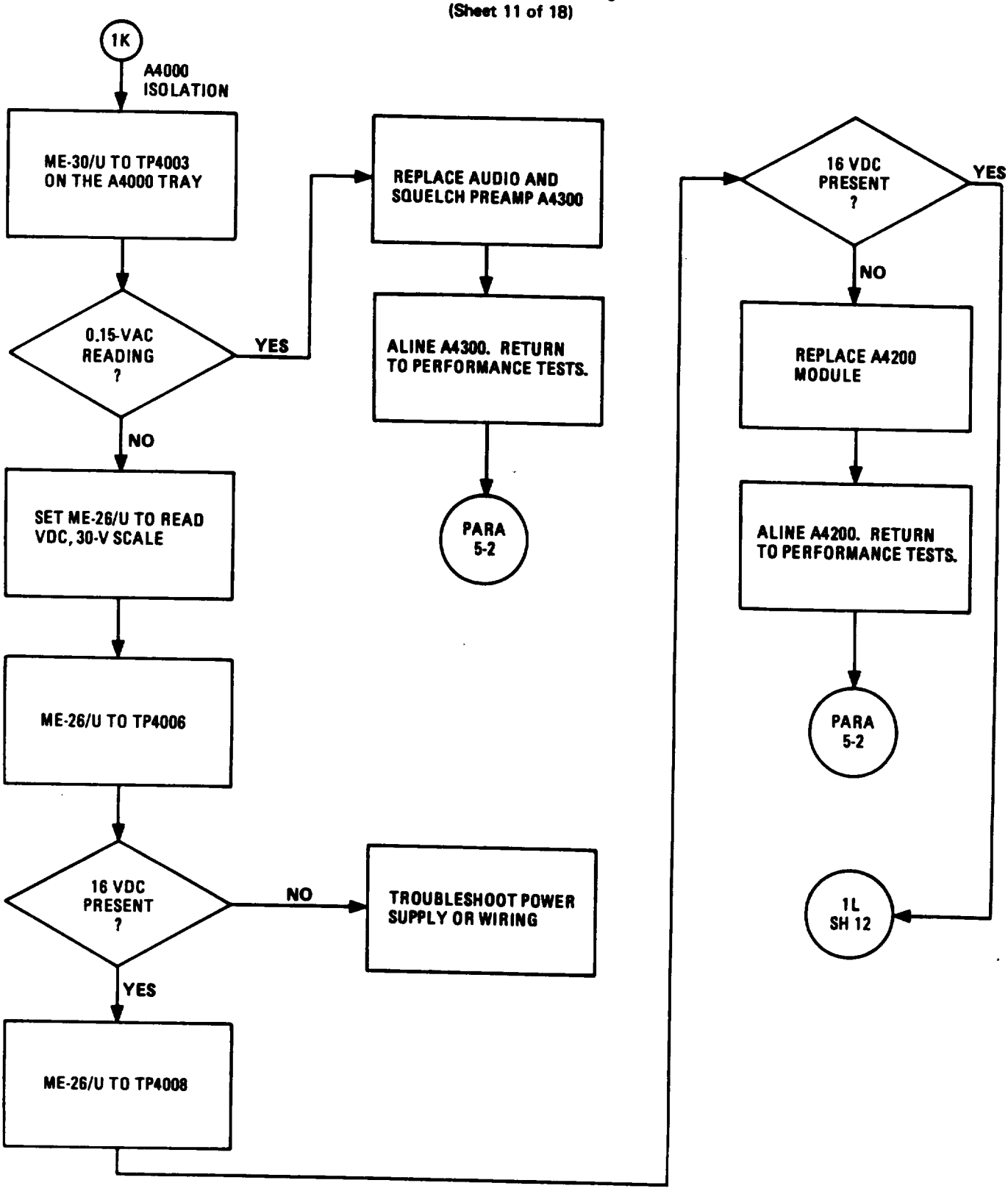


CAUTION

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

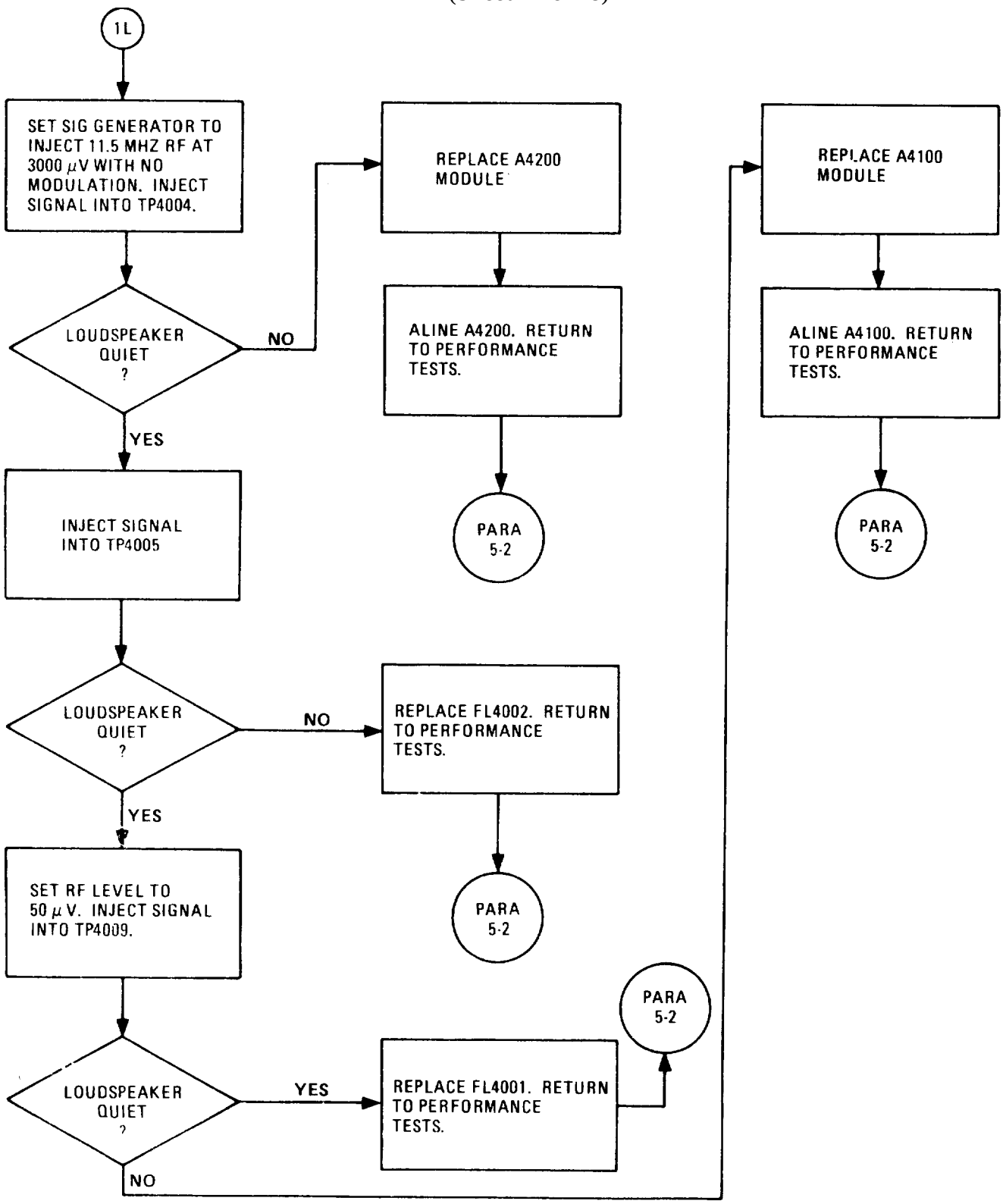
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 11 of 18)



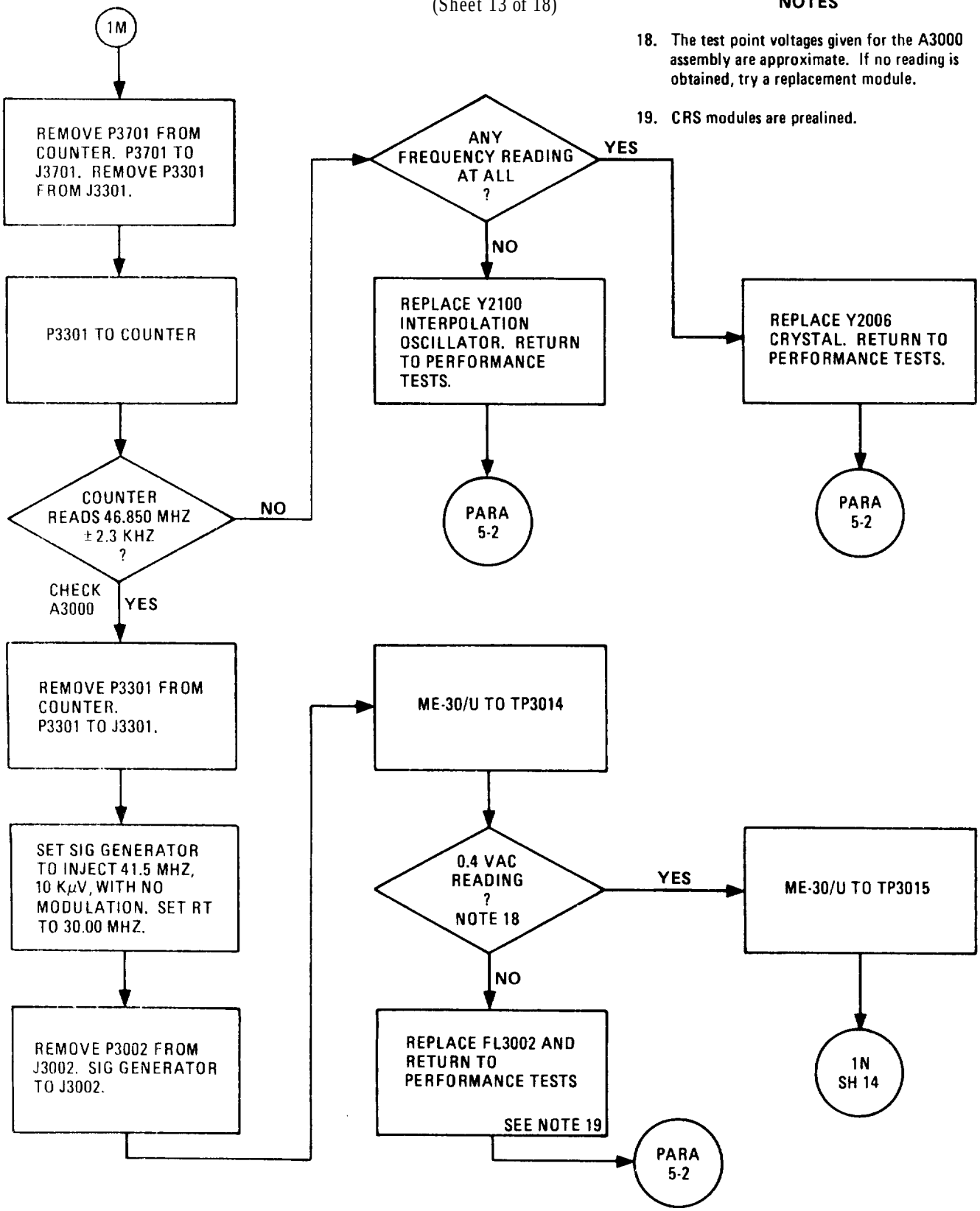
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 12 of 18)



5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 13 of 18)



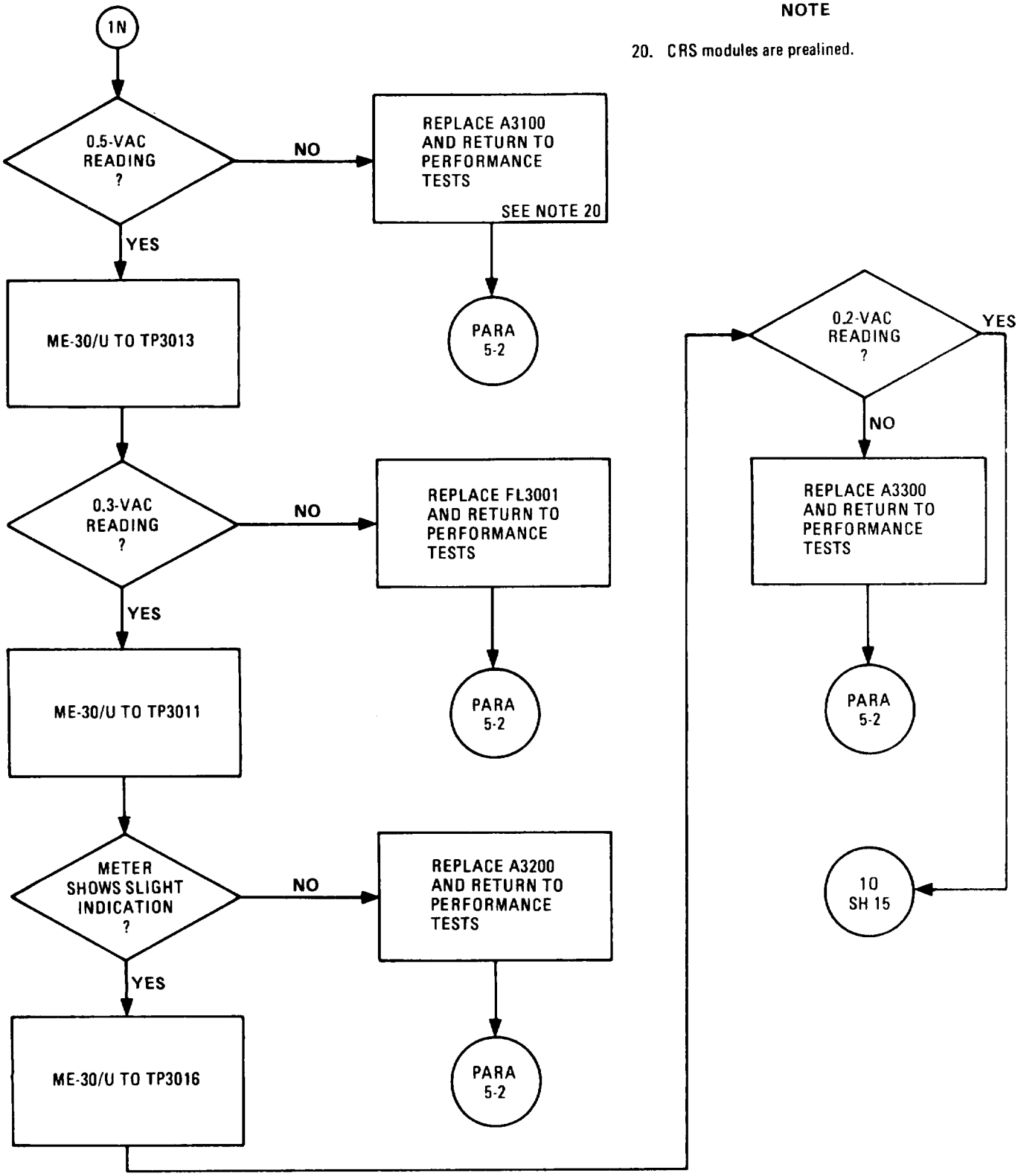
NOTES

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.

5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART5-1
No Audio Troubleshooting
(Sheet 14 of 18)

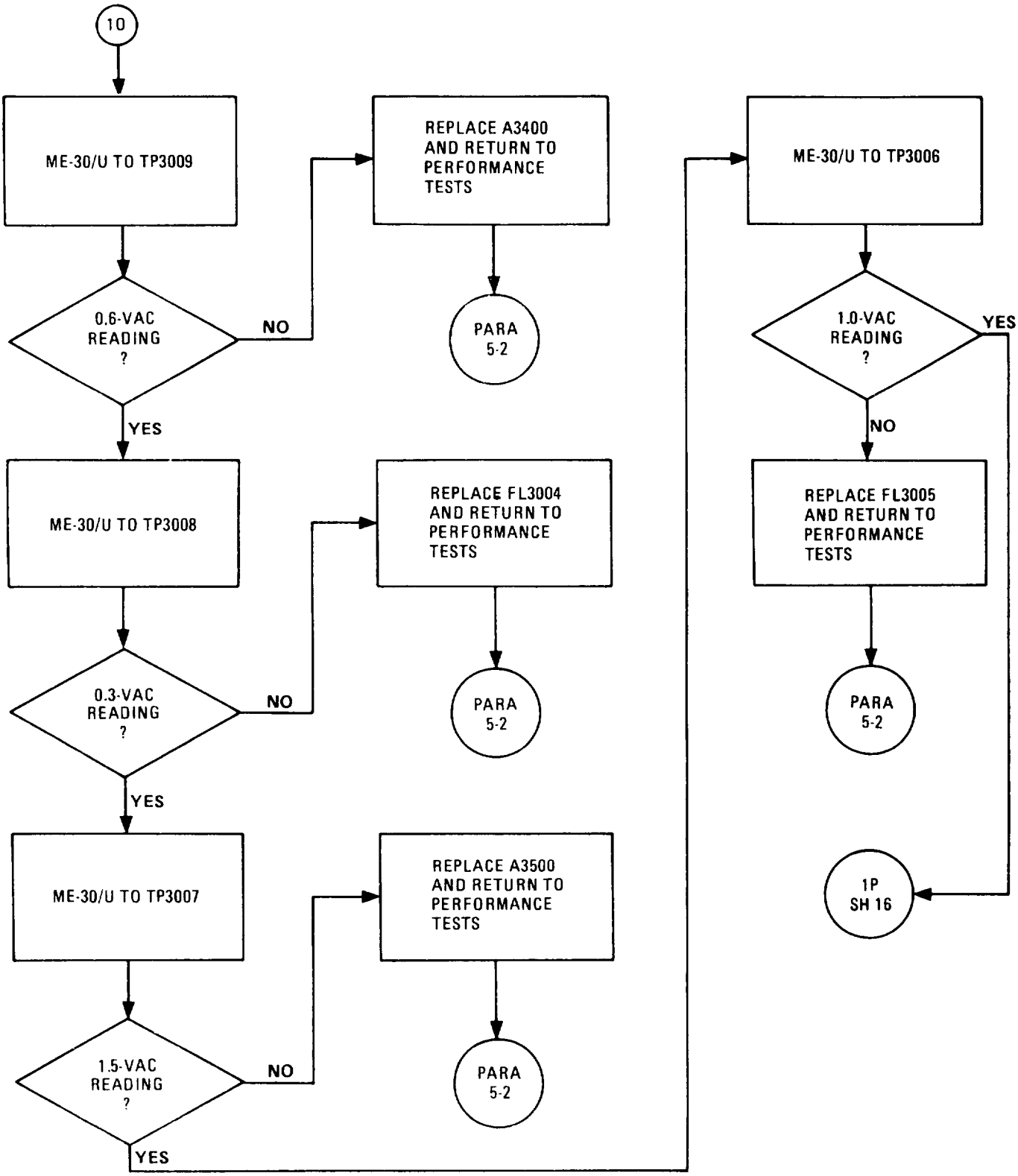


NOTE

20. CRS modules are prealined.

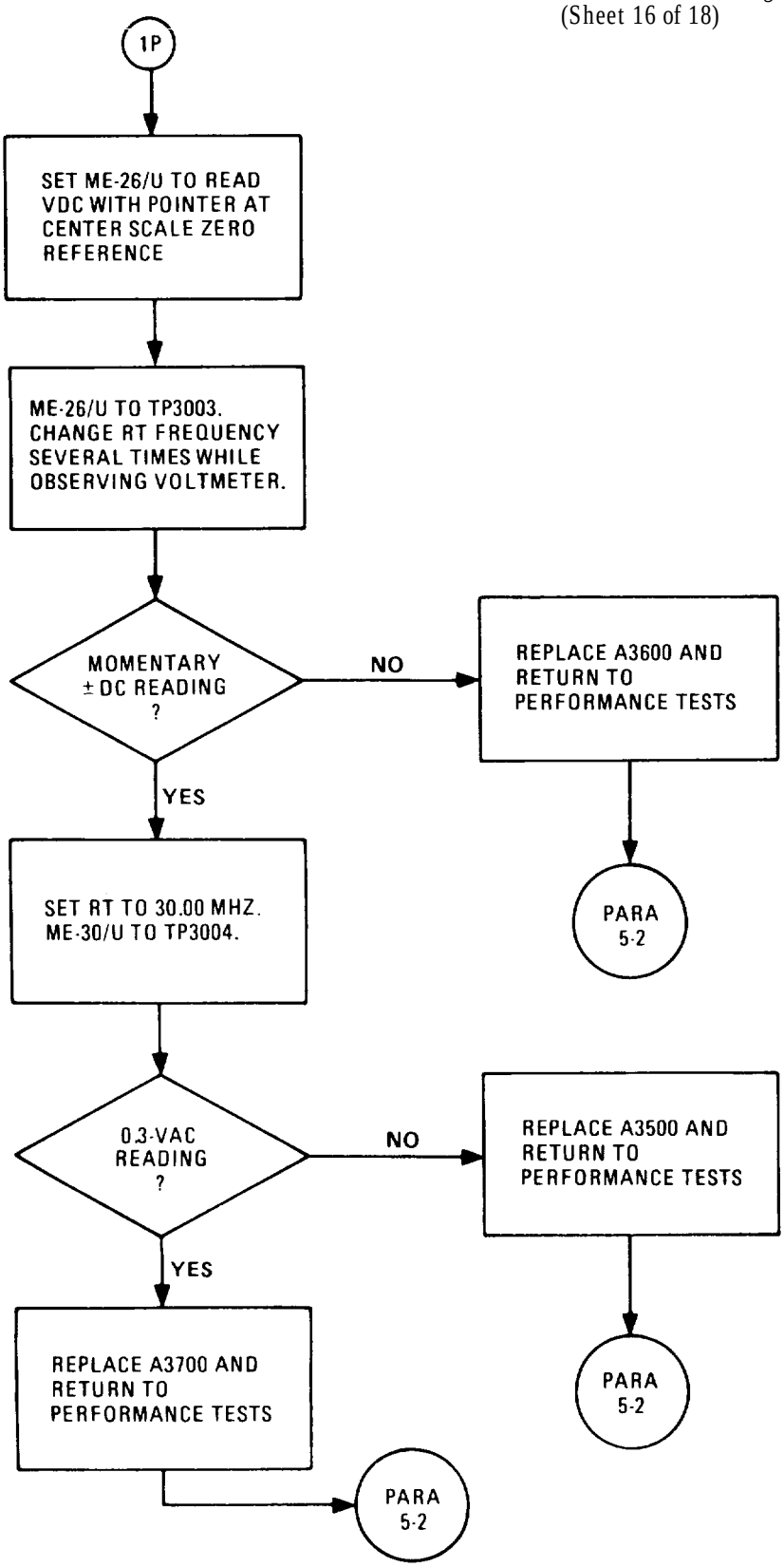
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 15 of 18)



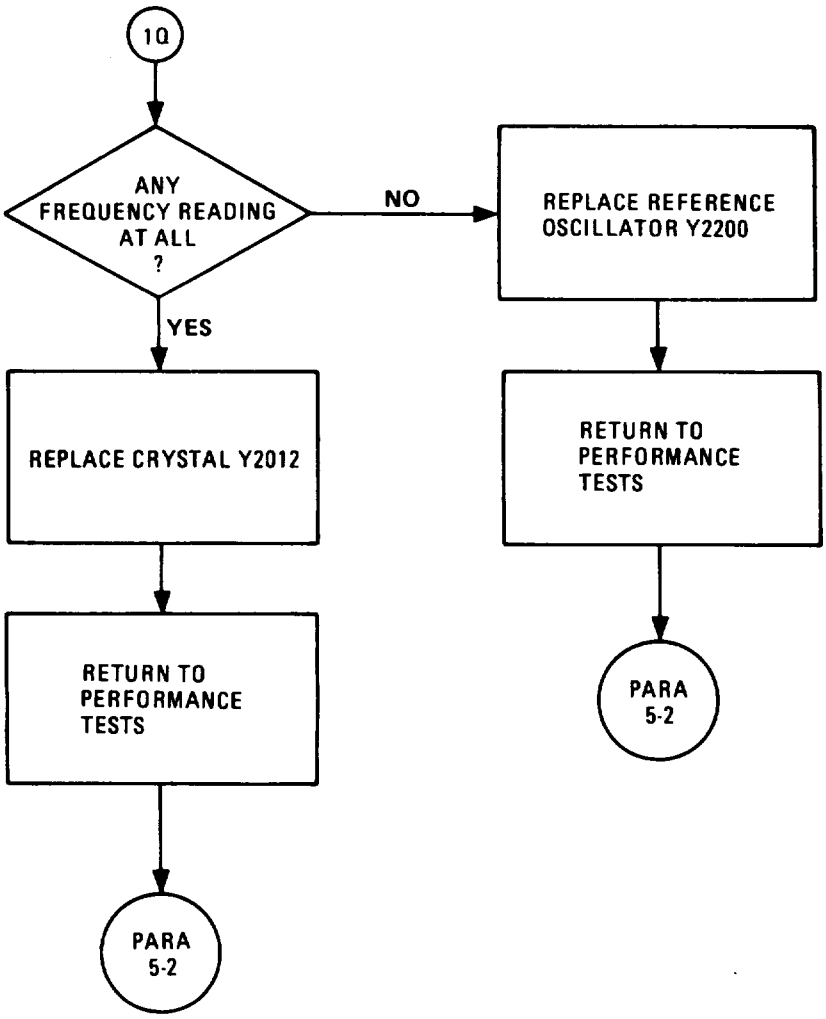
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 16 of 18)



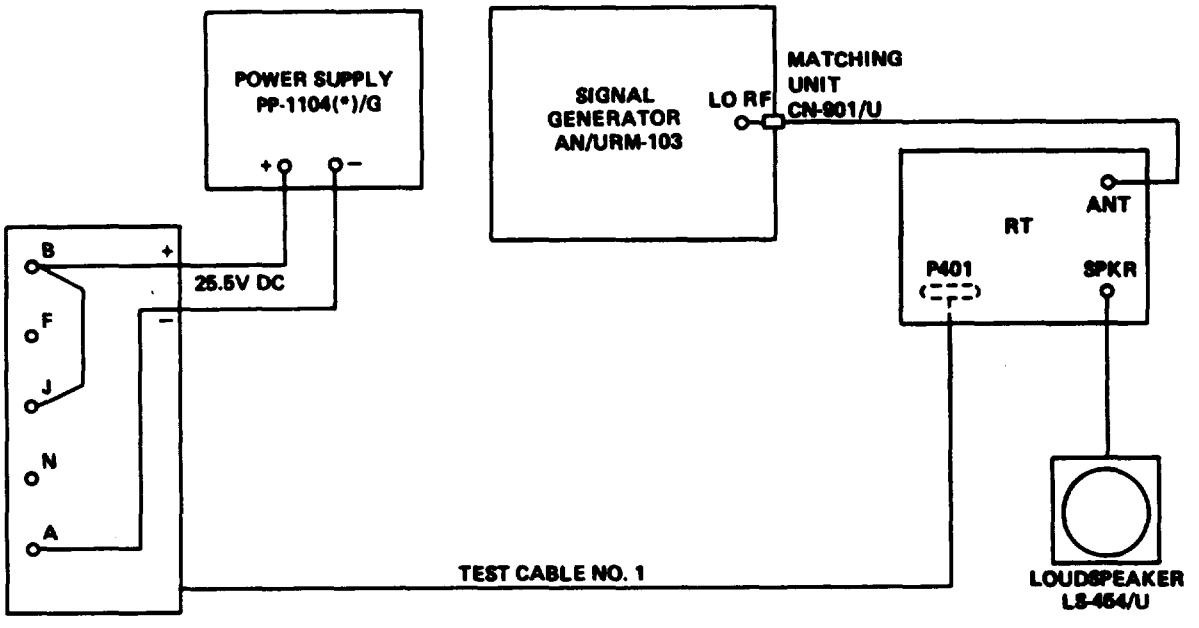
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 17 of 18)



5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-1
No Audio Troubleshooting
(Sheet 18 of 18)



EQUIPMENT SETUP USING TEST CABLE NO. 1

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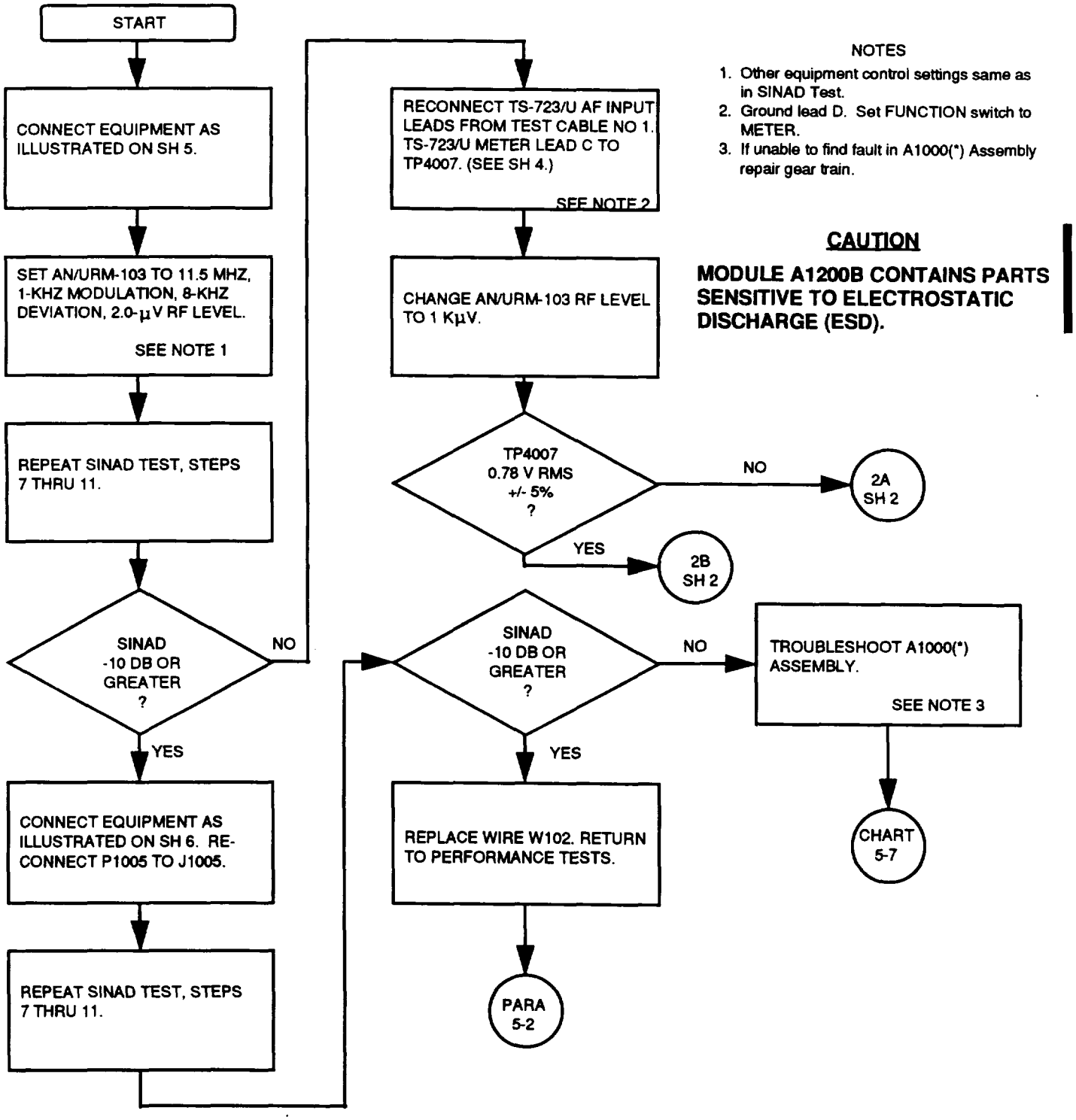
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-2
SINAD Test Failure Troubleshooting
(Sheet 1 of 7)



NOTES

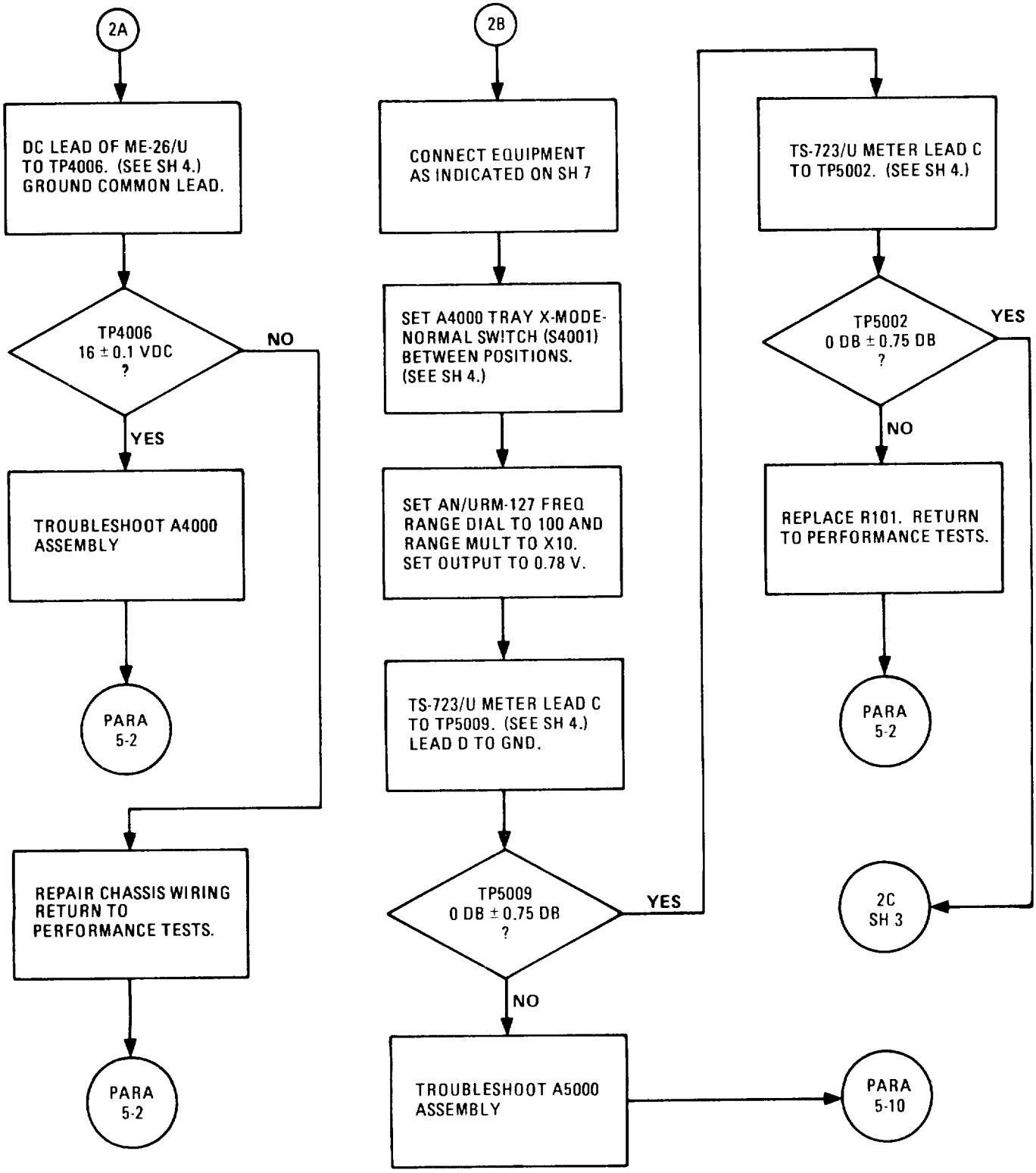
1. Other equipment control settings same as in SINAD Test.
2. Ground lead D. Set FUNCTION switch to METER.
3. If unable to find fault in A1000(*) Assembly repair gear train.

CAUTION

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

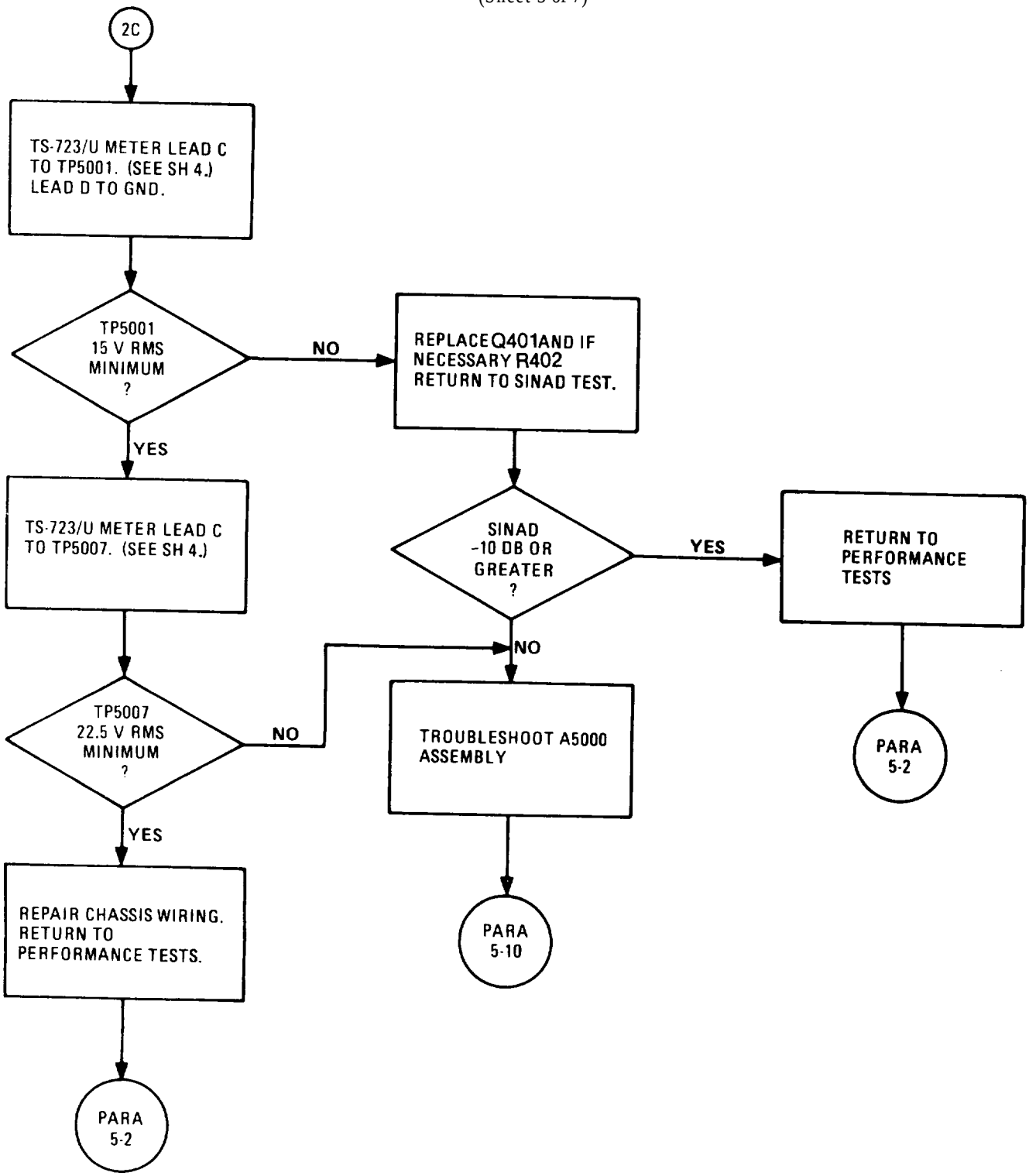
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-2
SINAD Test Failure Troubleshooting
(Sheet 2 of 7)



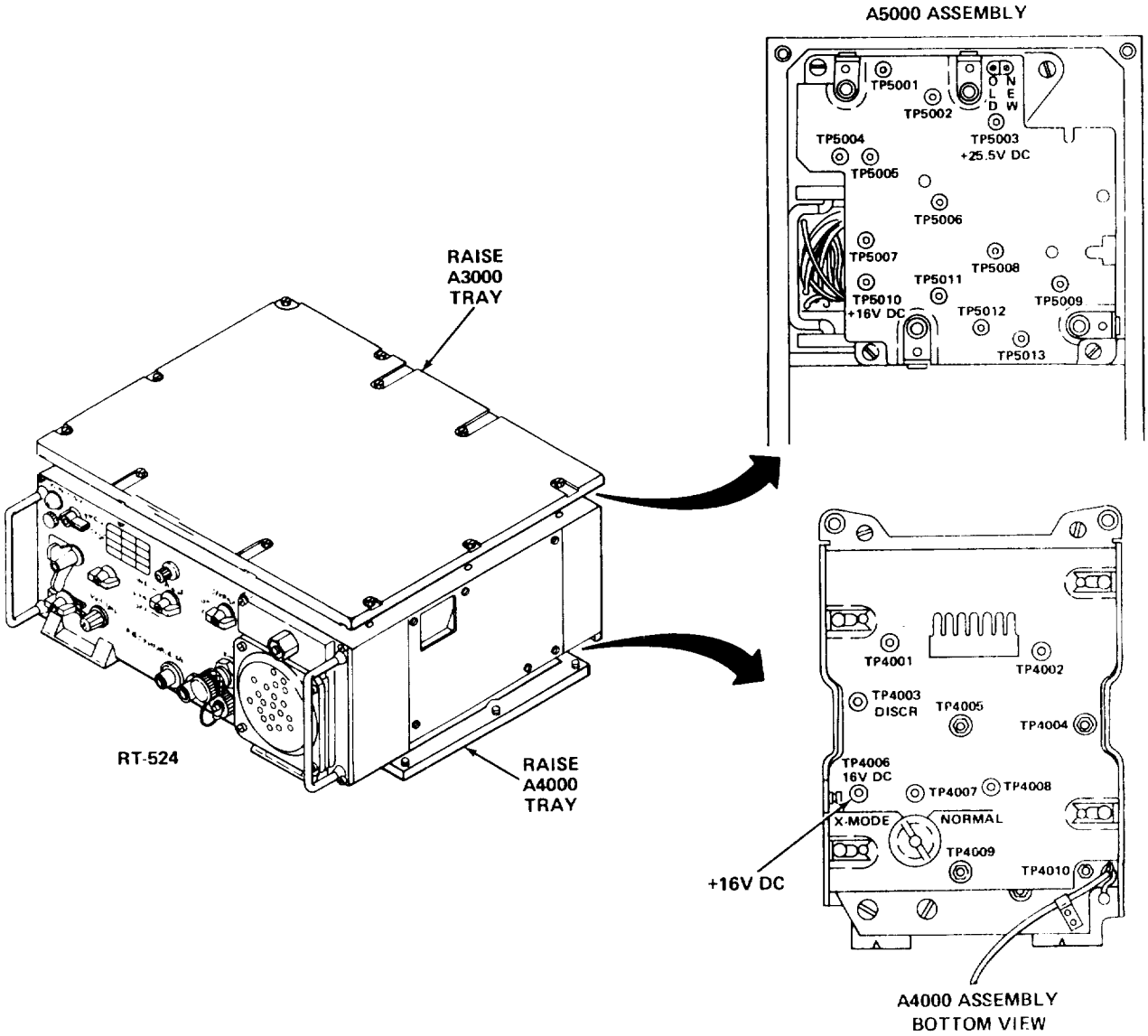
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-2
SINAD Test Failure Troubleshooting
(Sheet 3 of 7)



5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

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



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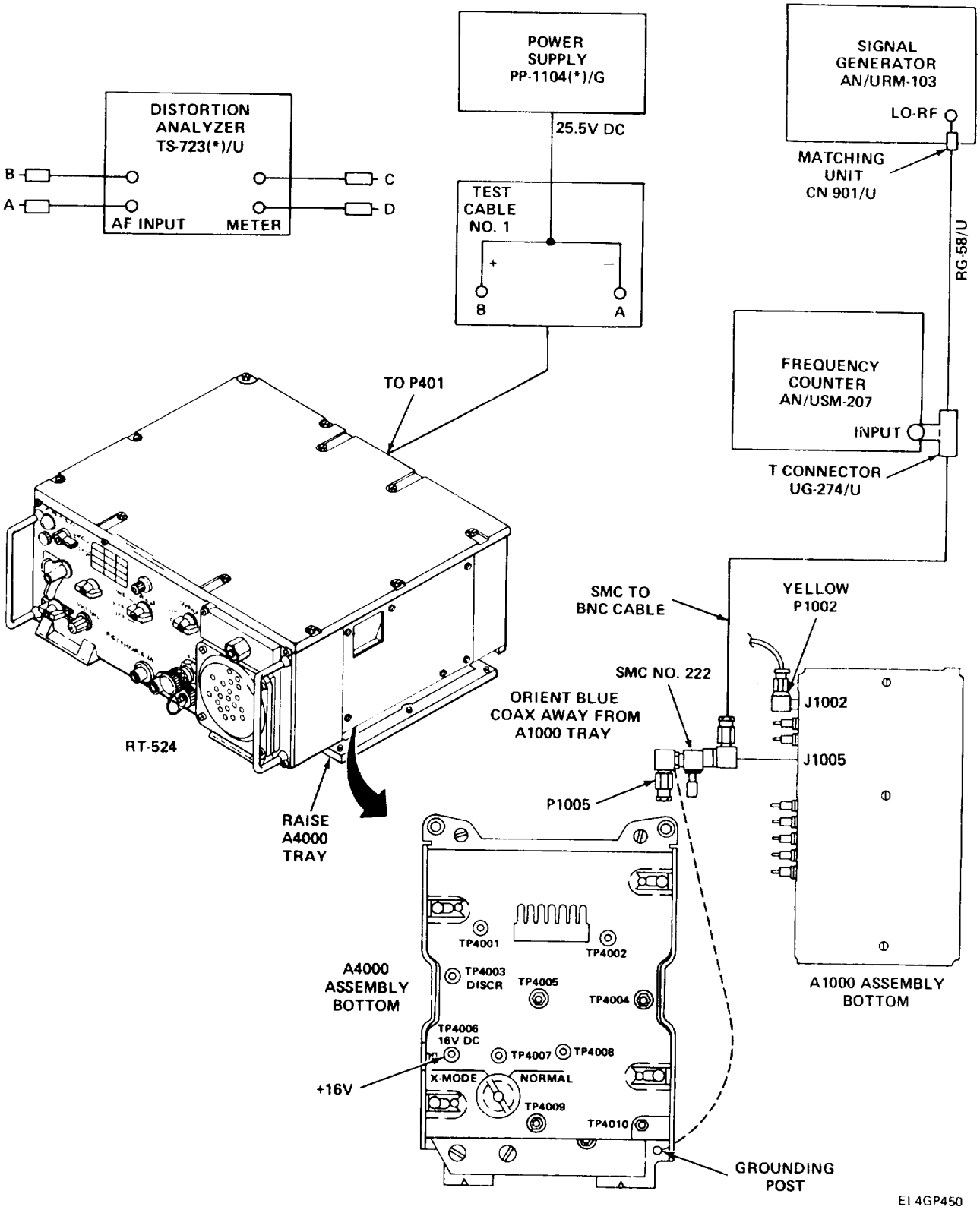
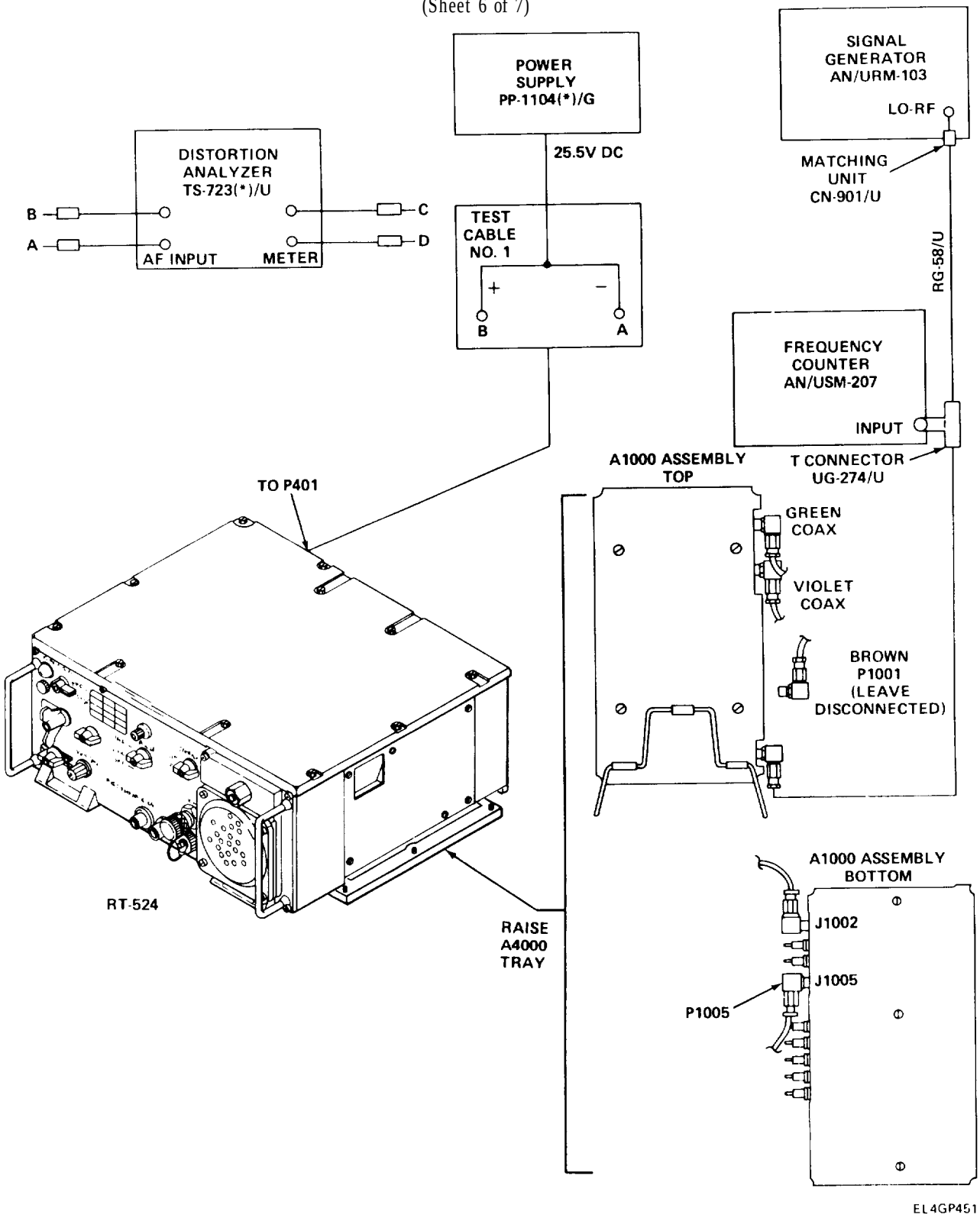
5-23. TROUBLESHOOTING FLOW CHARTS. (CONTI

CHART 5-2
SINAD Test Failure Troubleshooting
(Sheet 5 of 7)



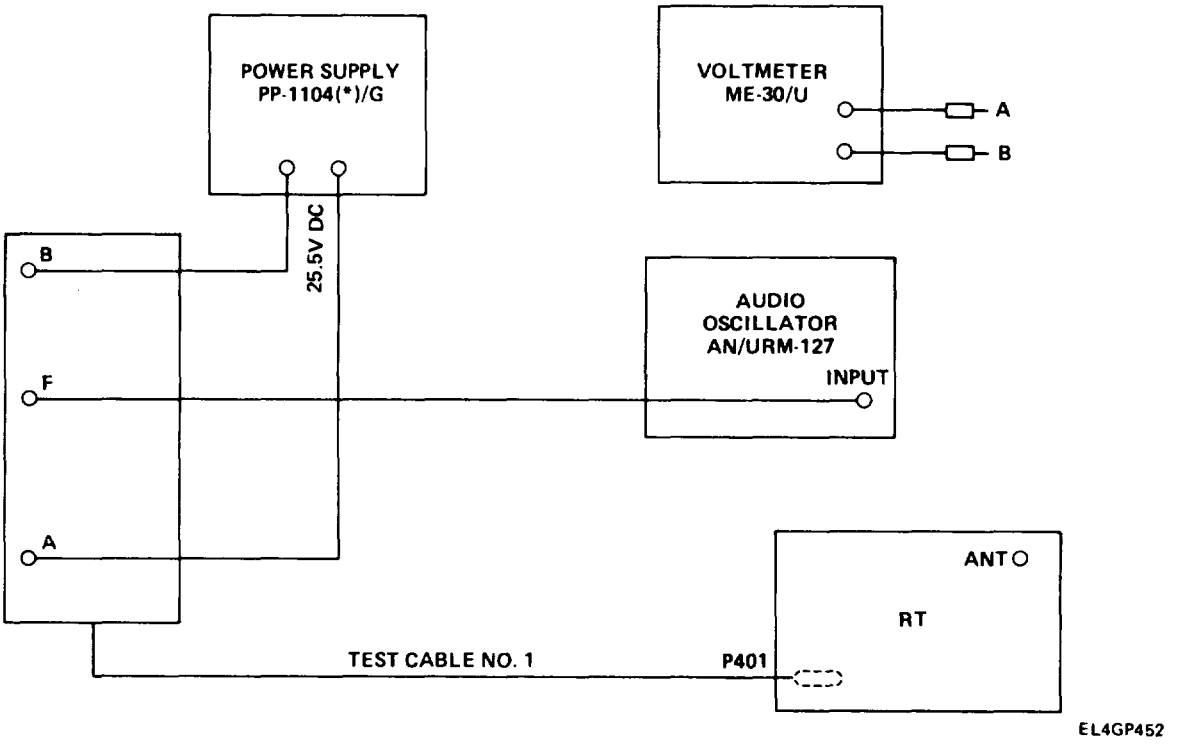
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-2
SINAD Test Failure Troubleshooting
(Sheet 6 of 7)



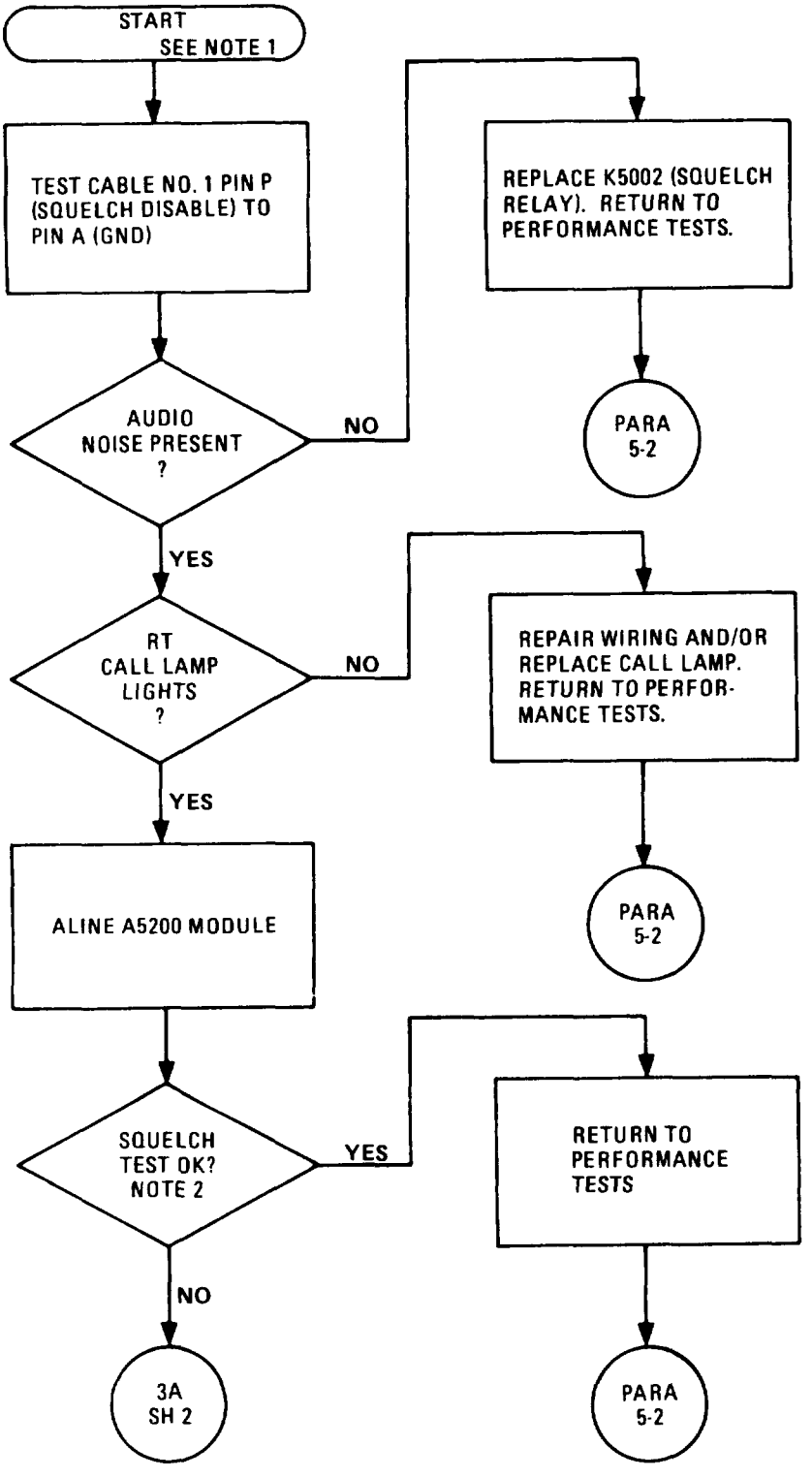
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

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)

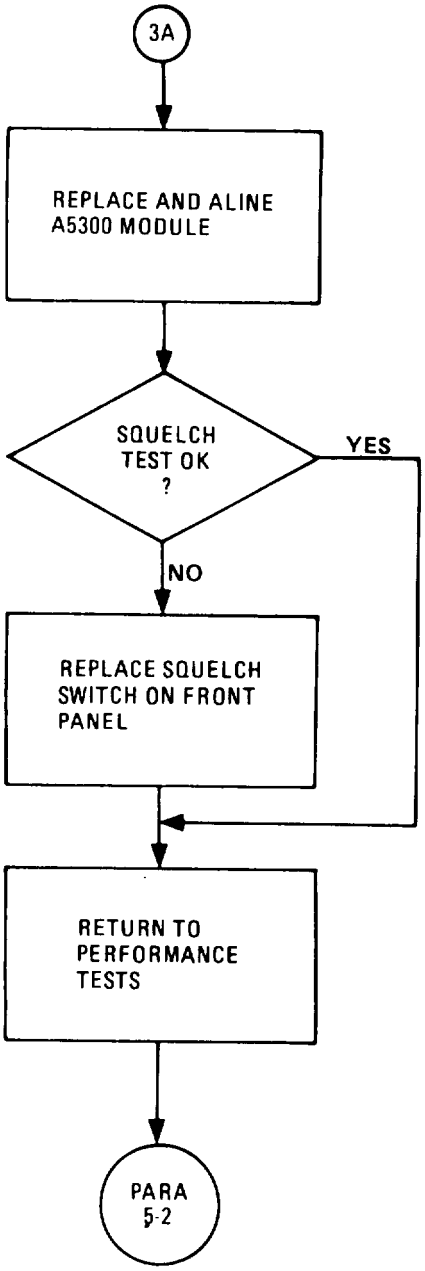


NOTES

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.

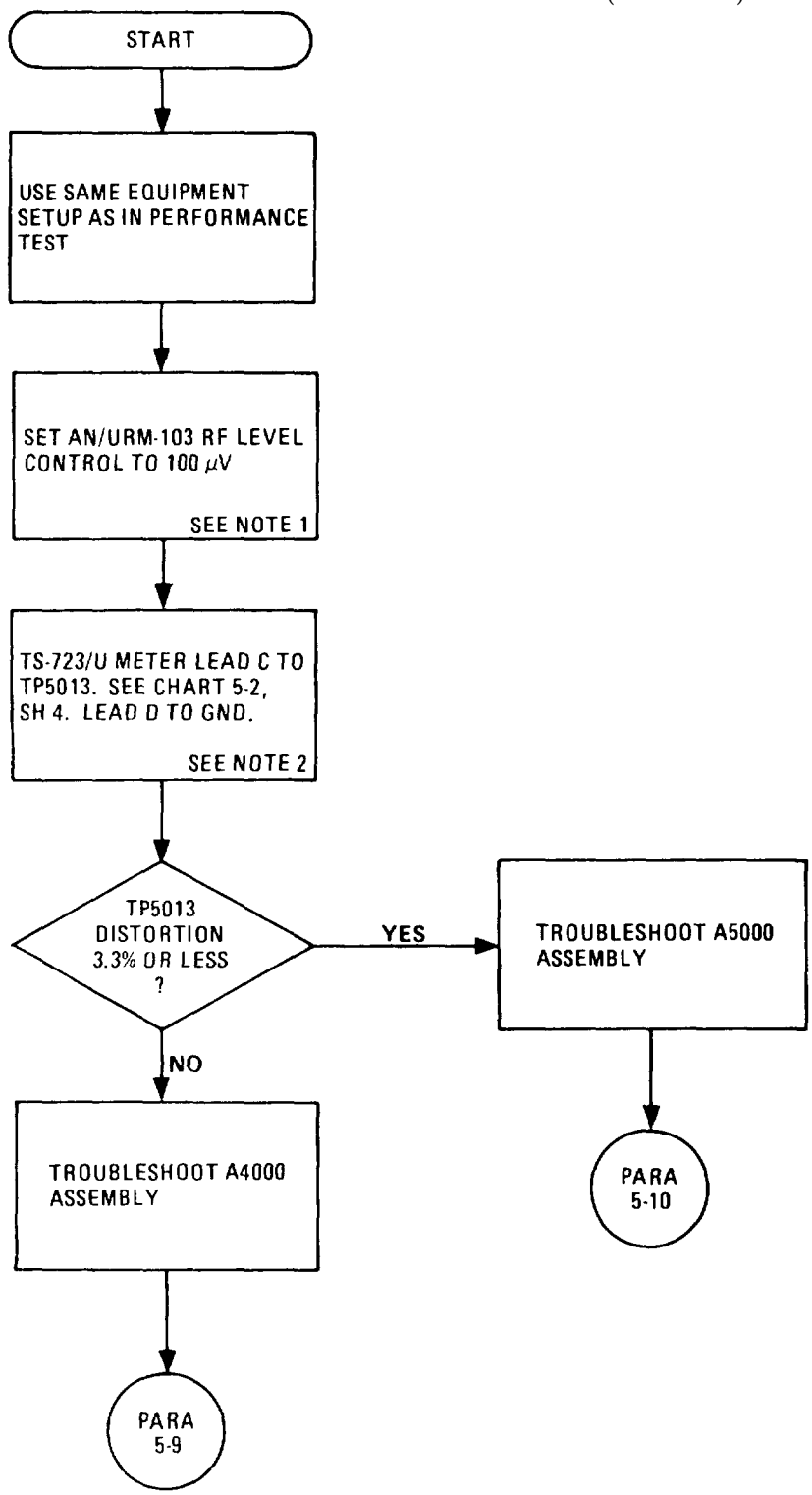
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

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)

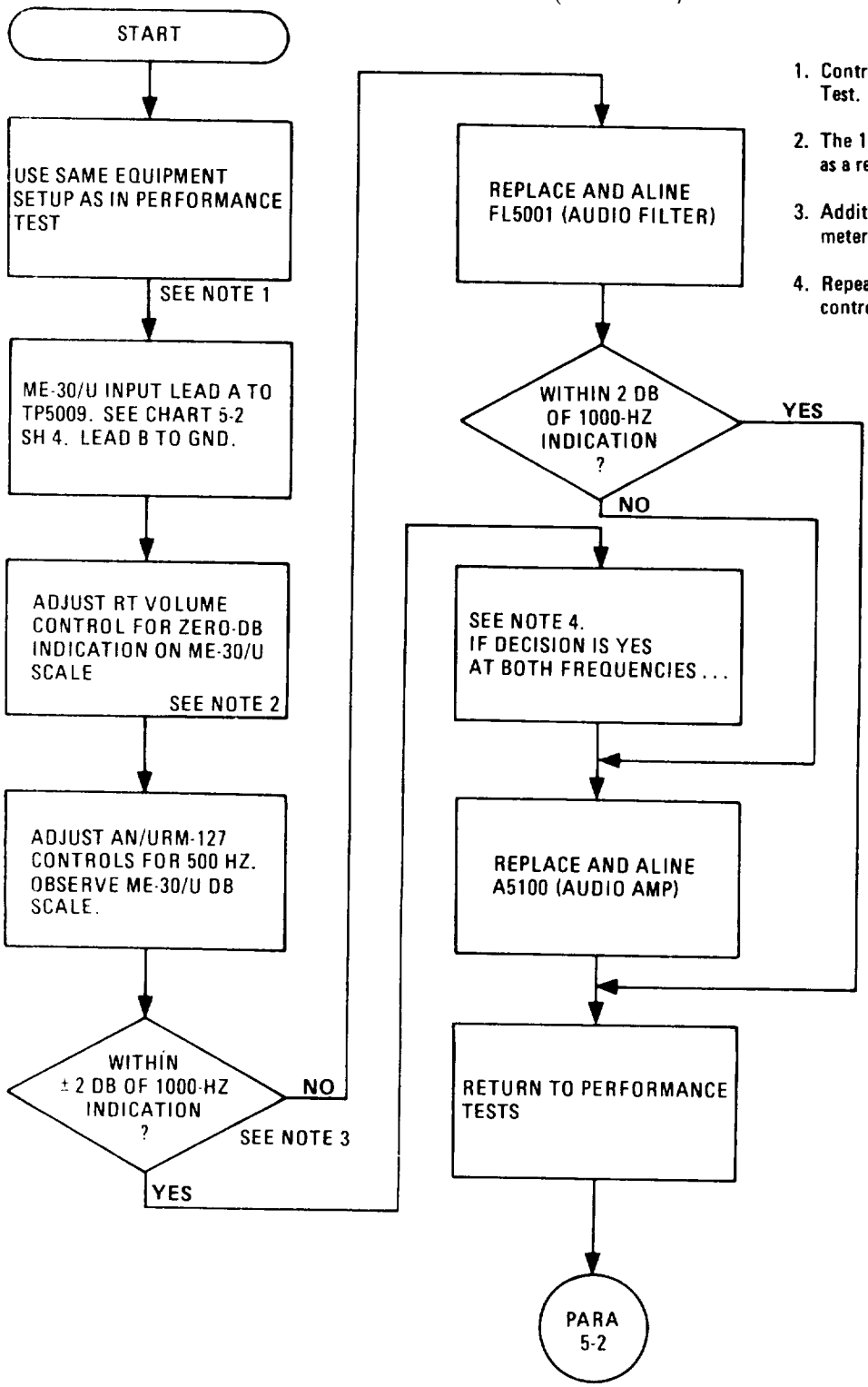


NOTES

1. Other equipment control settings same as in Distortion Test.
2. Set TS-723/U FUNCTION switch to DISTORTION.

5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-5
Audio Response Test Failure (Normal Mode) Troubleshooting
(Sheet 1 of 1)

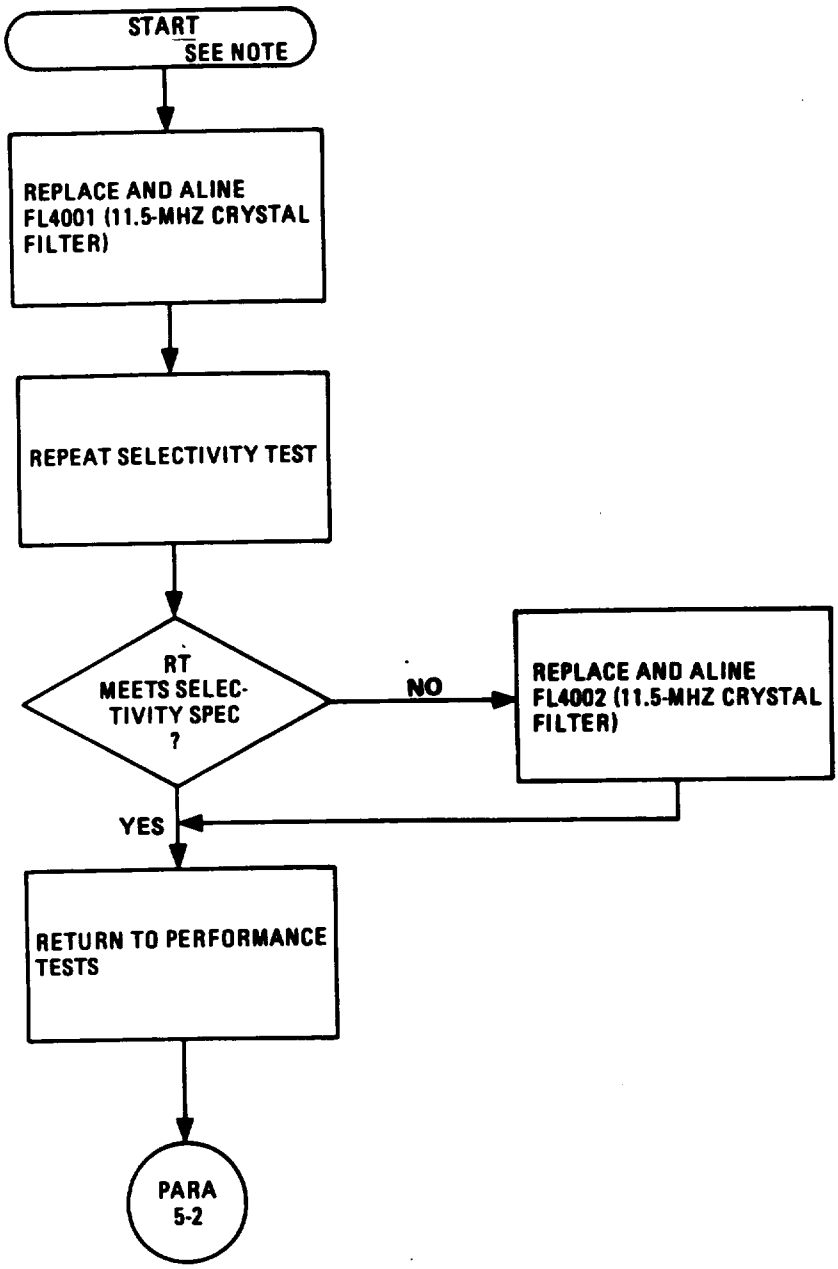


NOTES

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)

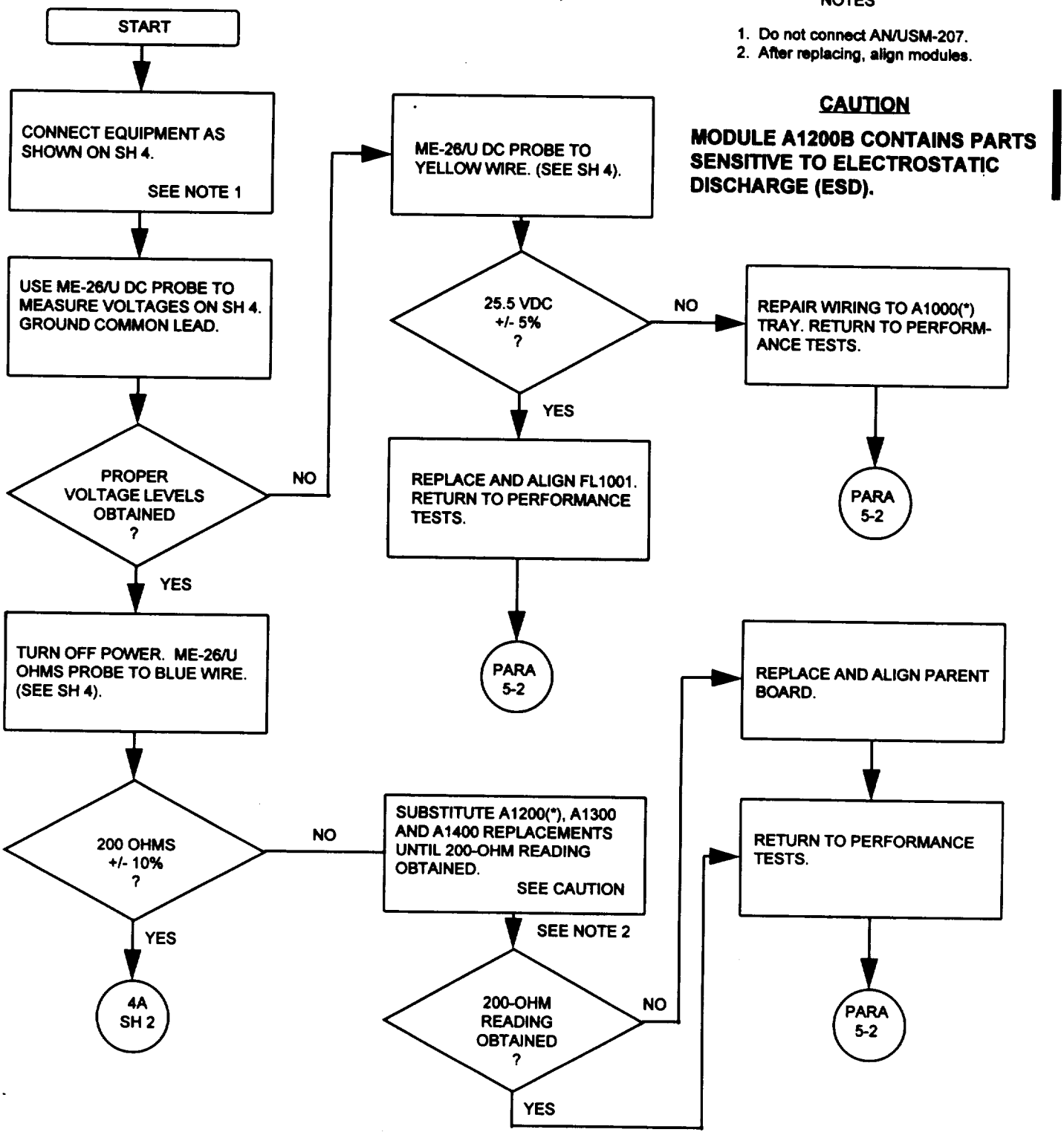


NOTE

Use same equipment setup as in Performance Test.

5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-7
A1000(*) Assembly Troubleshooting
(Sheet 1 of 5)



5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-7
A1000 Assembly Troubleshooting
(Sheet 2 of 5)

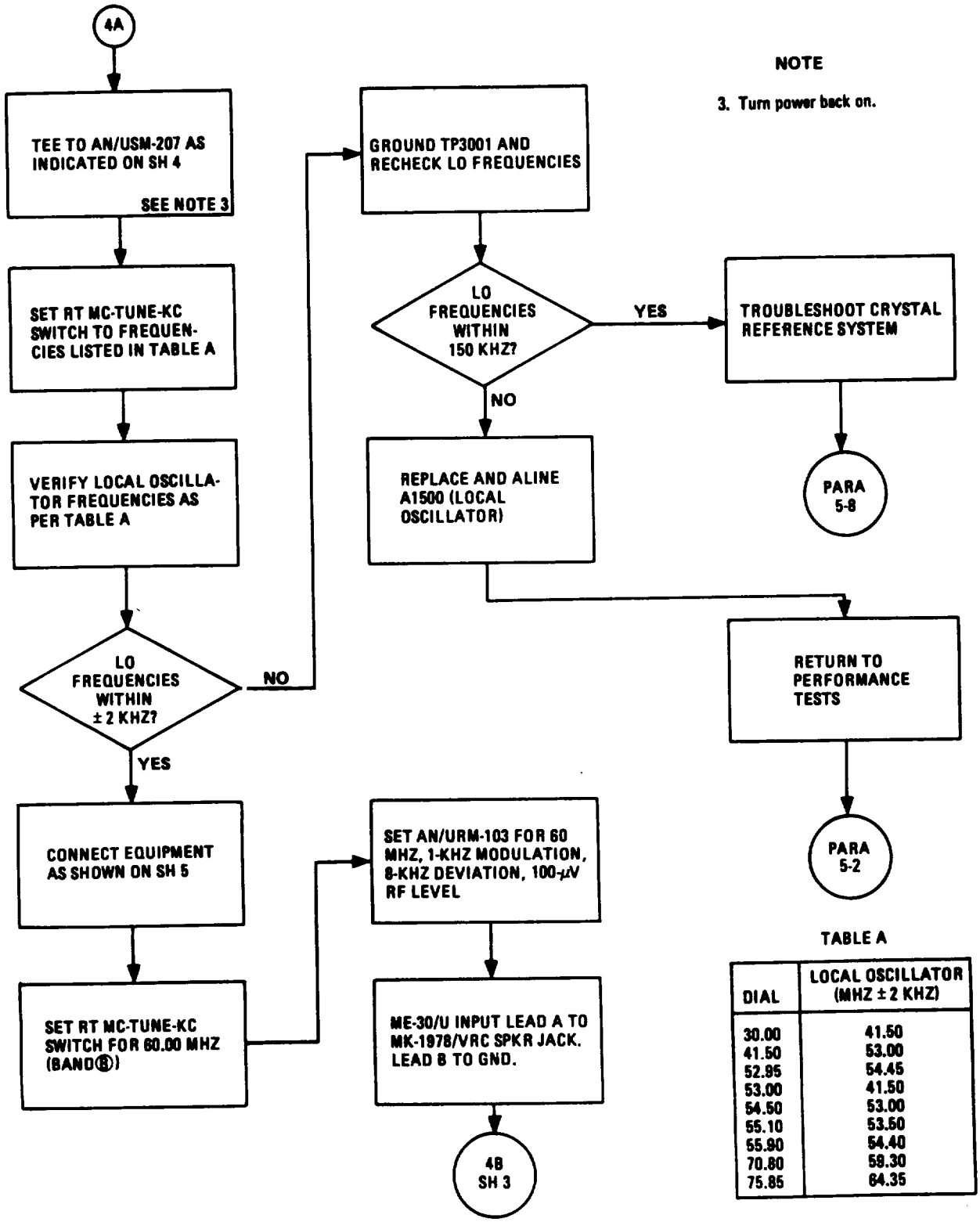
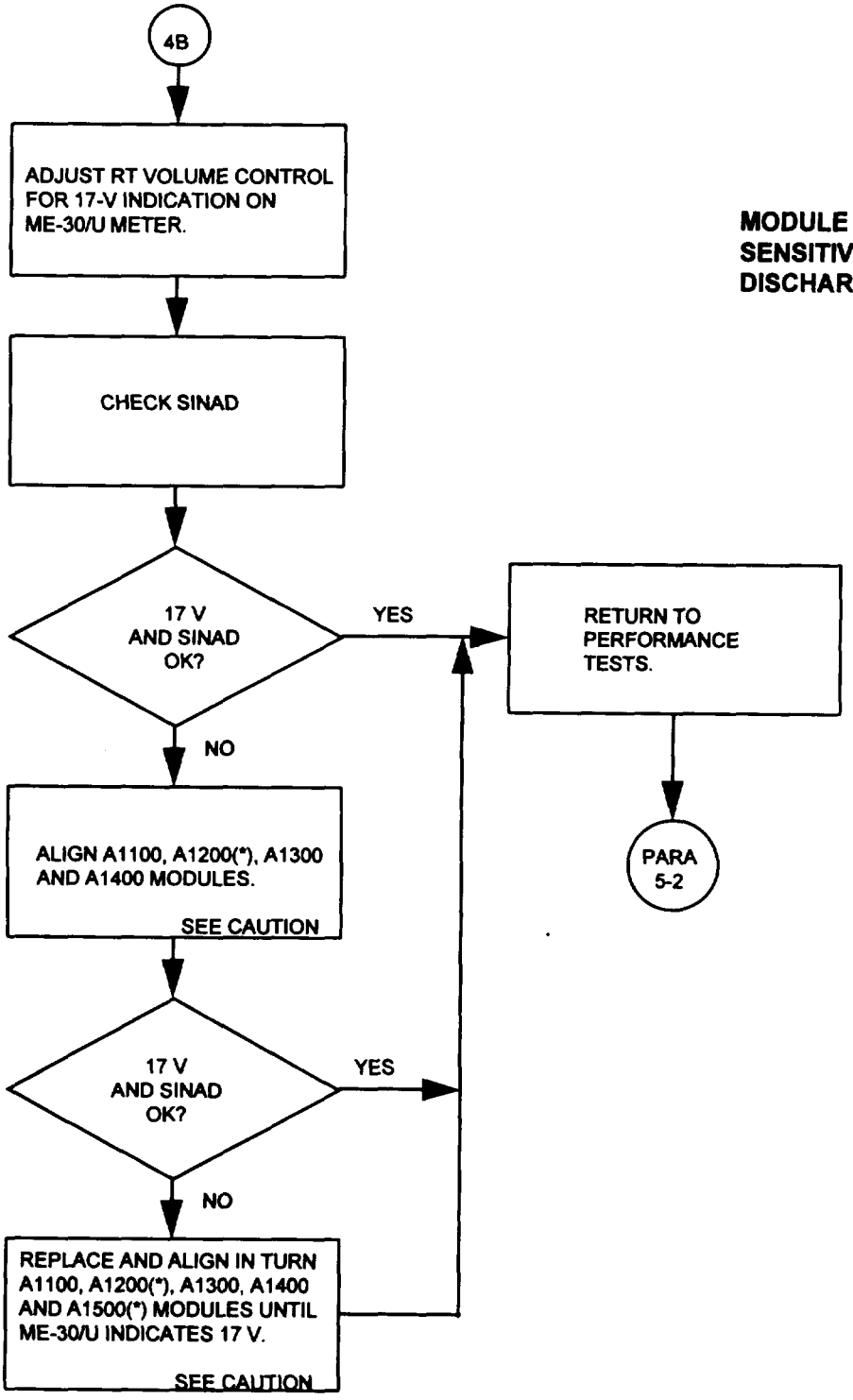


TABLE A

DIAL	LOCAL OSCILLATOR (MHZ ± 2 KHZ)
30.00	41.50
41.50	53.00
52.95	54.45
53.00	41.50
54.50	53.00
55.10	53.50
55.90	54.40
70.80	59.30
75.85	64.35

5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-7
A1000(*) Assembly Troubleshooting
(Sheet 3 of 5)

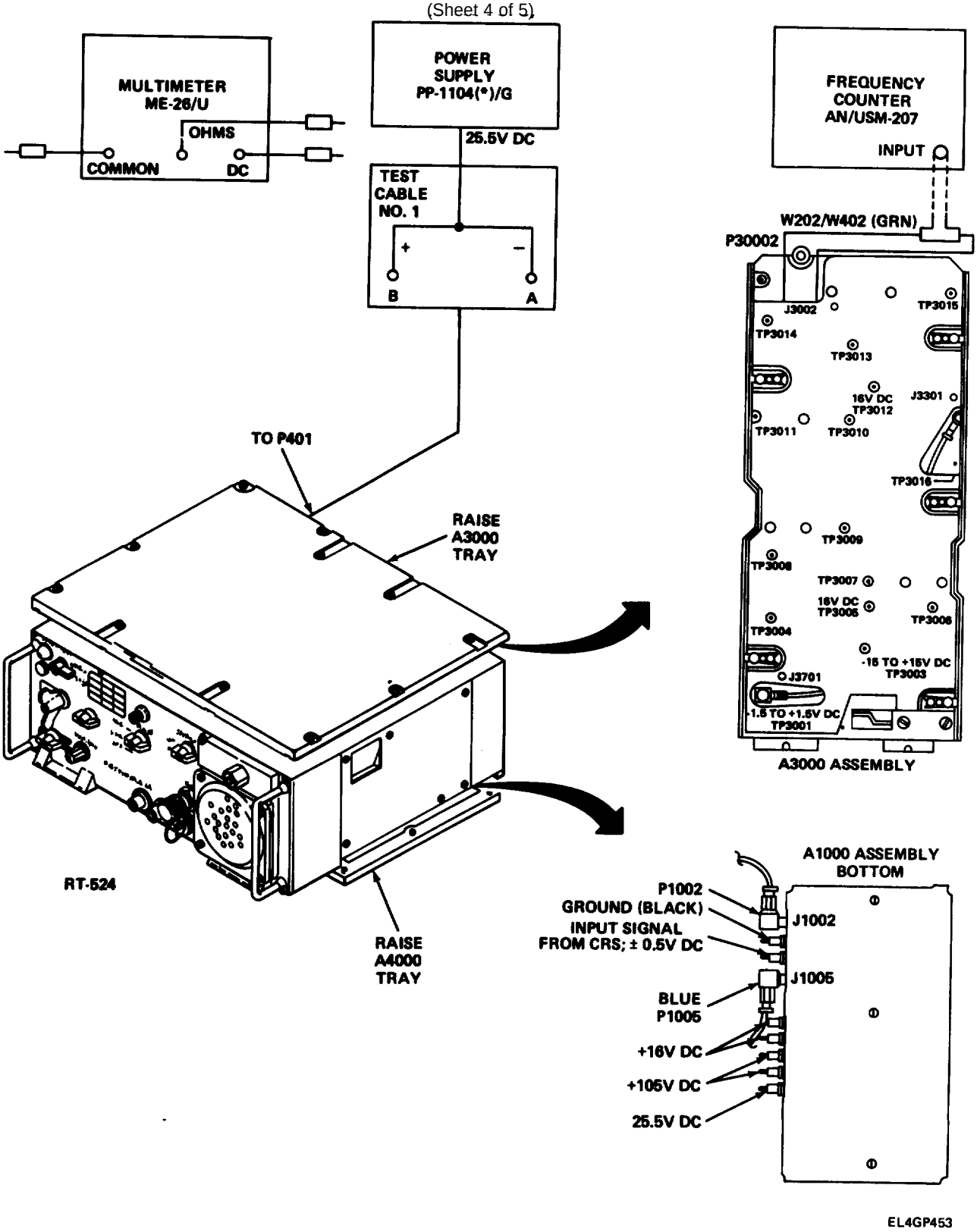


CAUTION

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

5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-7
A1000 Assembly Troubleshooting
(Sheet 4 of 5)



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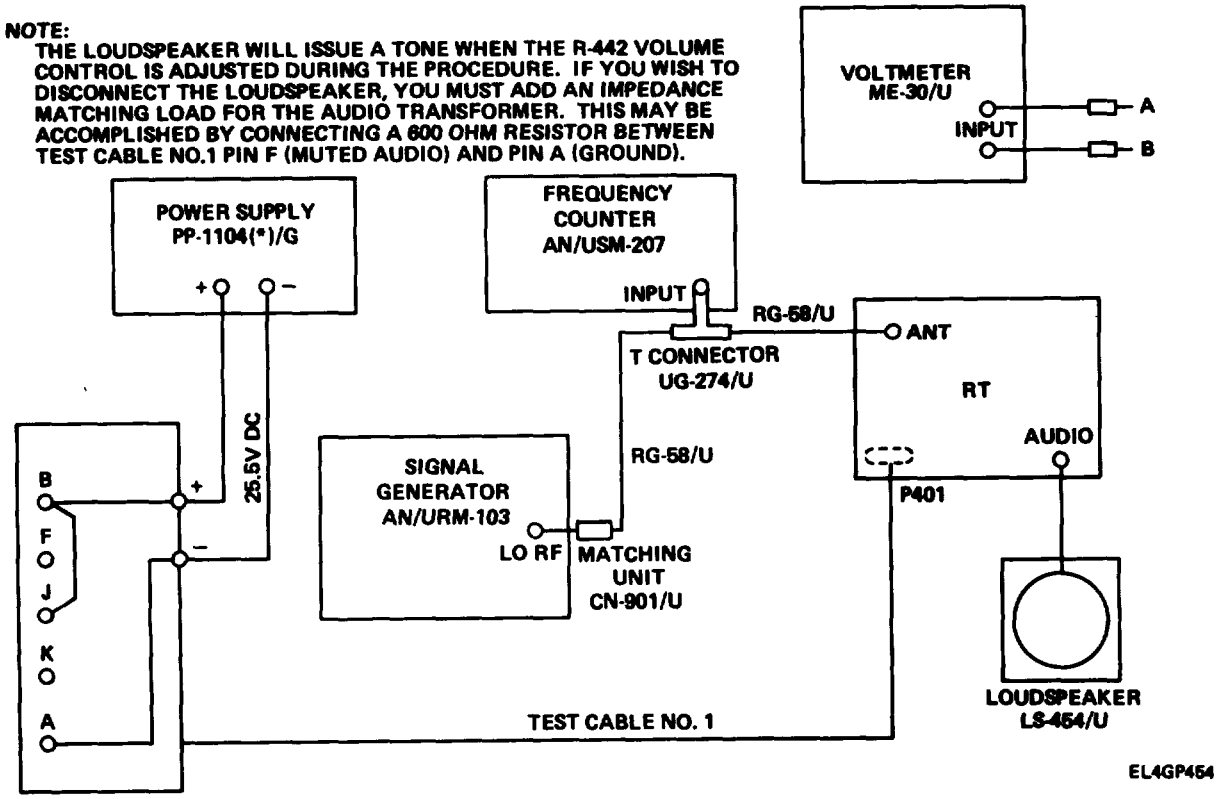
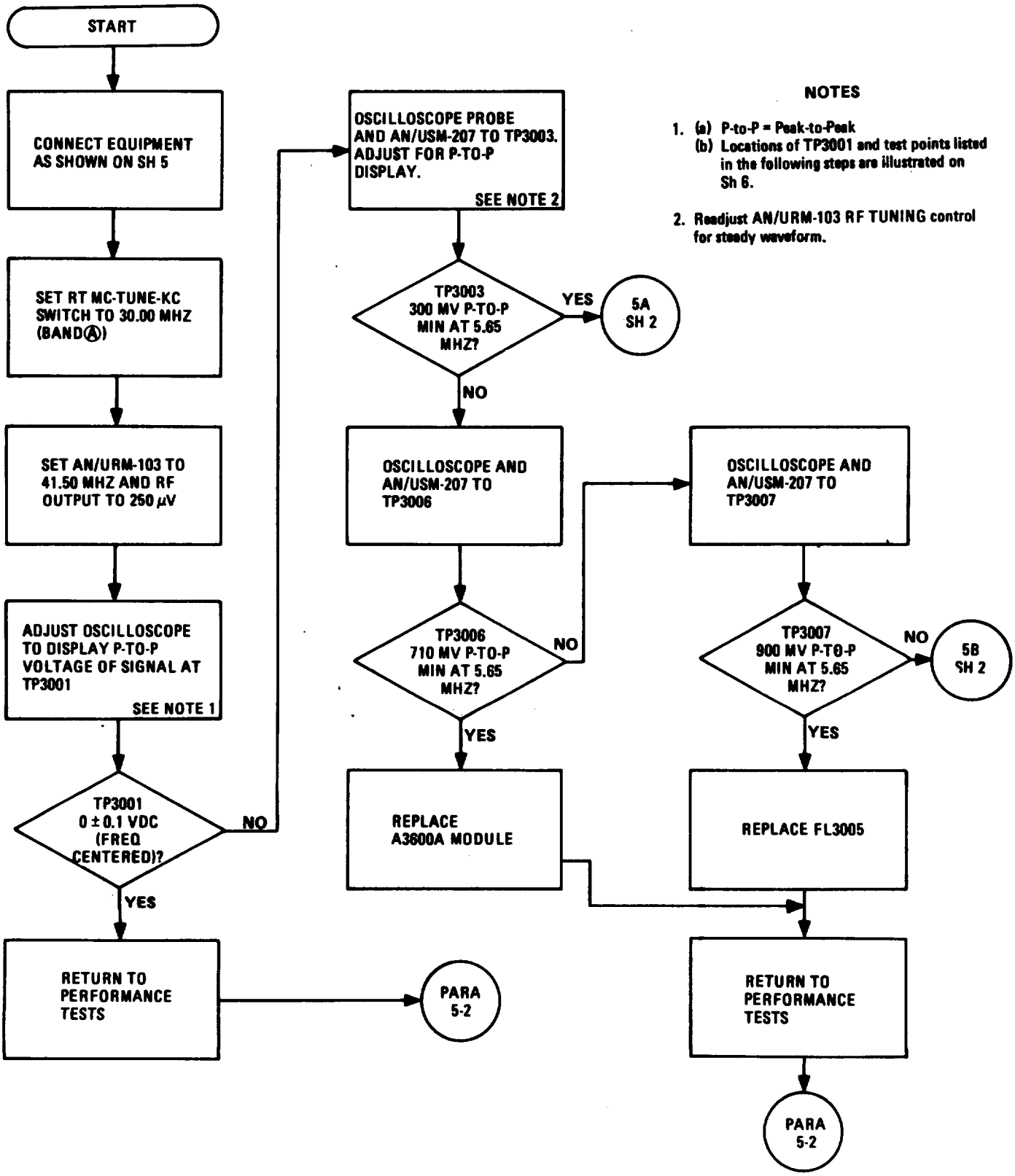
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-7
A1000 Assembly Troubleshooting
(Sheet 5 of 5)



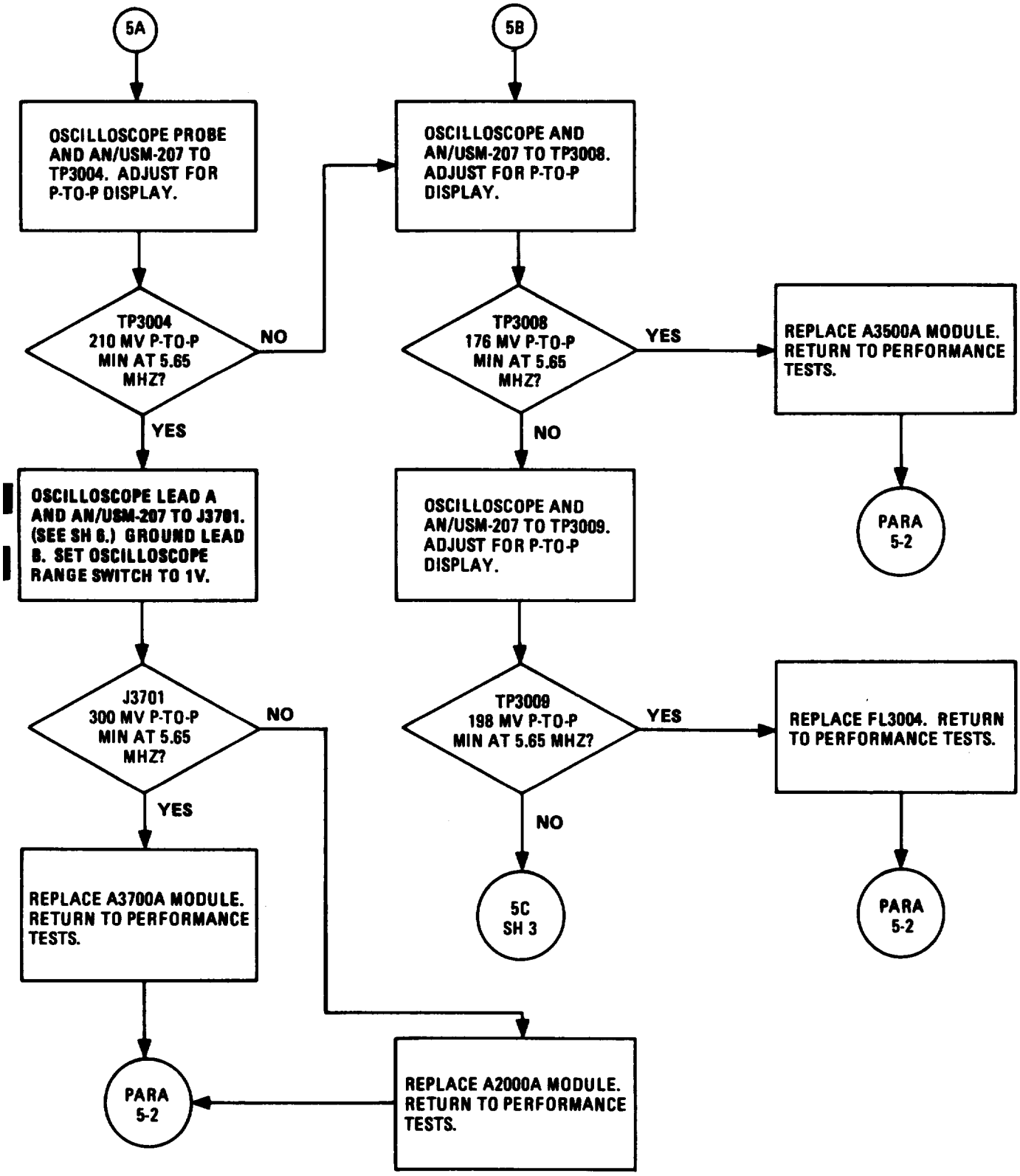
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-8
A2000, A3000 Assemblies Troubleshooting
(Sheet 1 of 5)



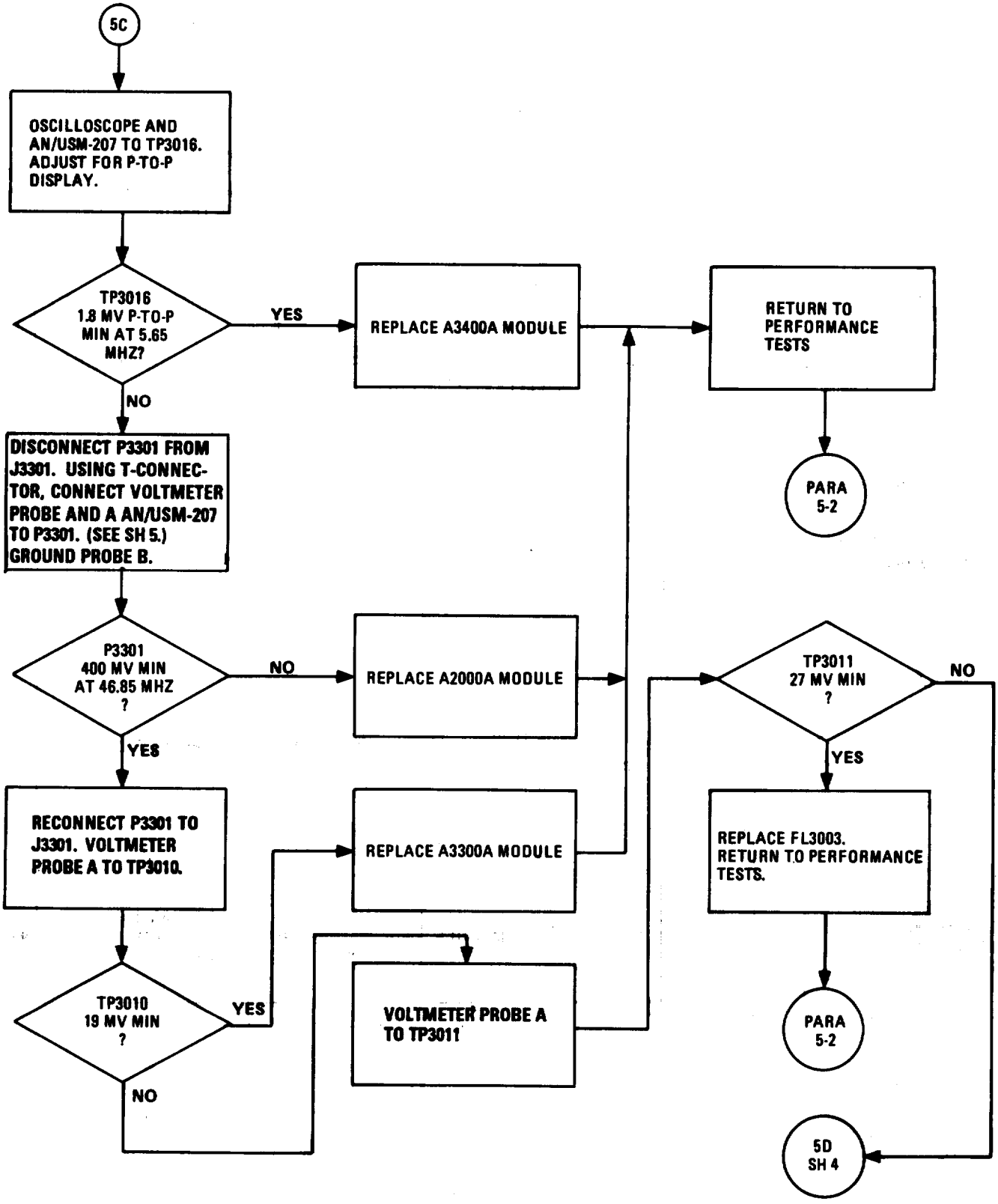
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-8
A2000, A3000 Assemblies Troubleshooting
(Sheet 2 of 5)



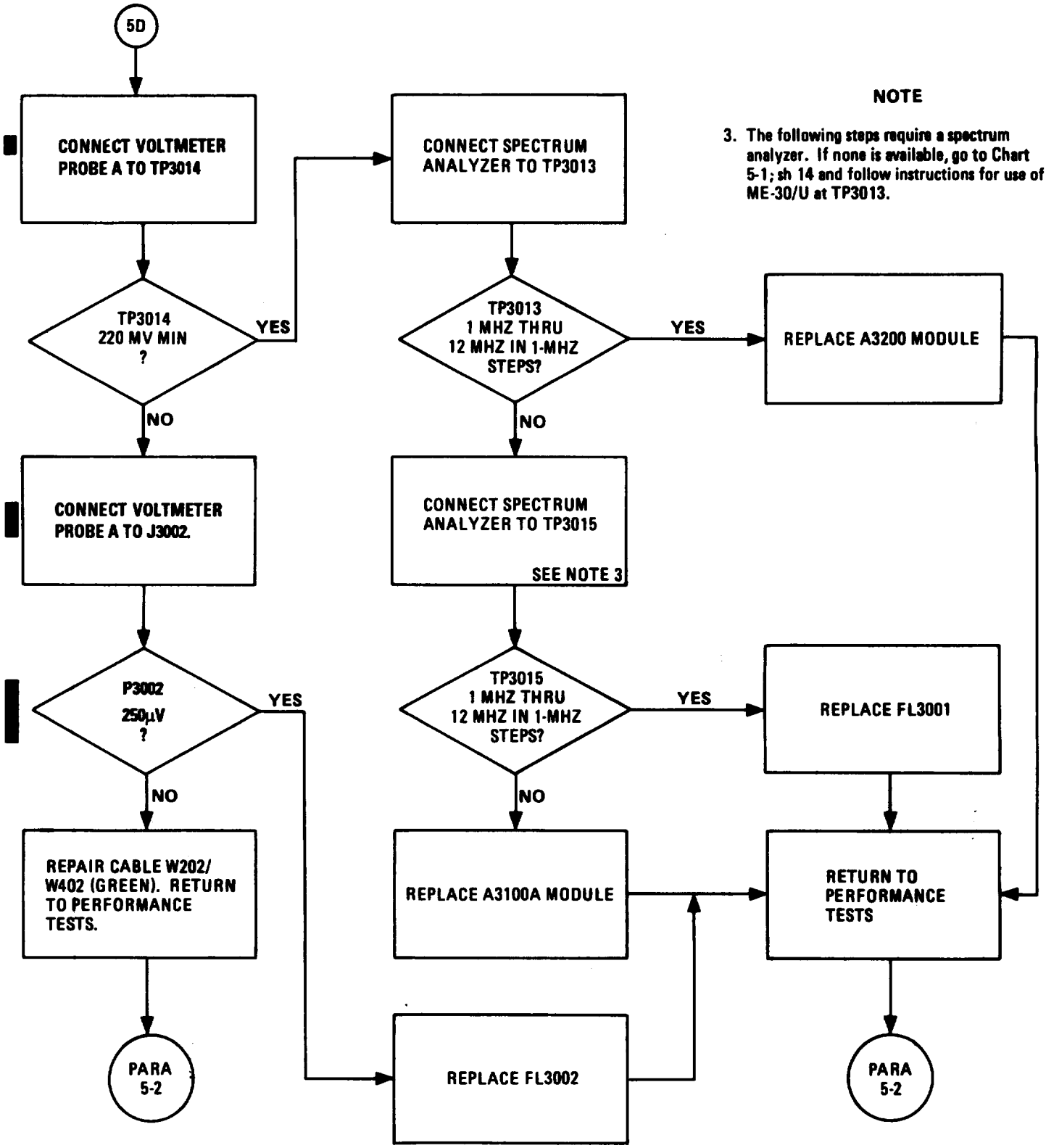
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-8
A2000, A3000 Assemblies Troubleshooting
(sheet 3 of 5)



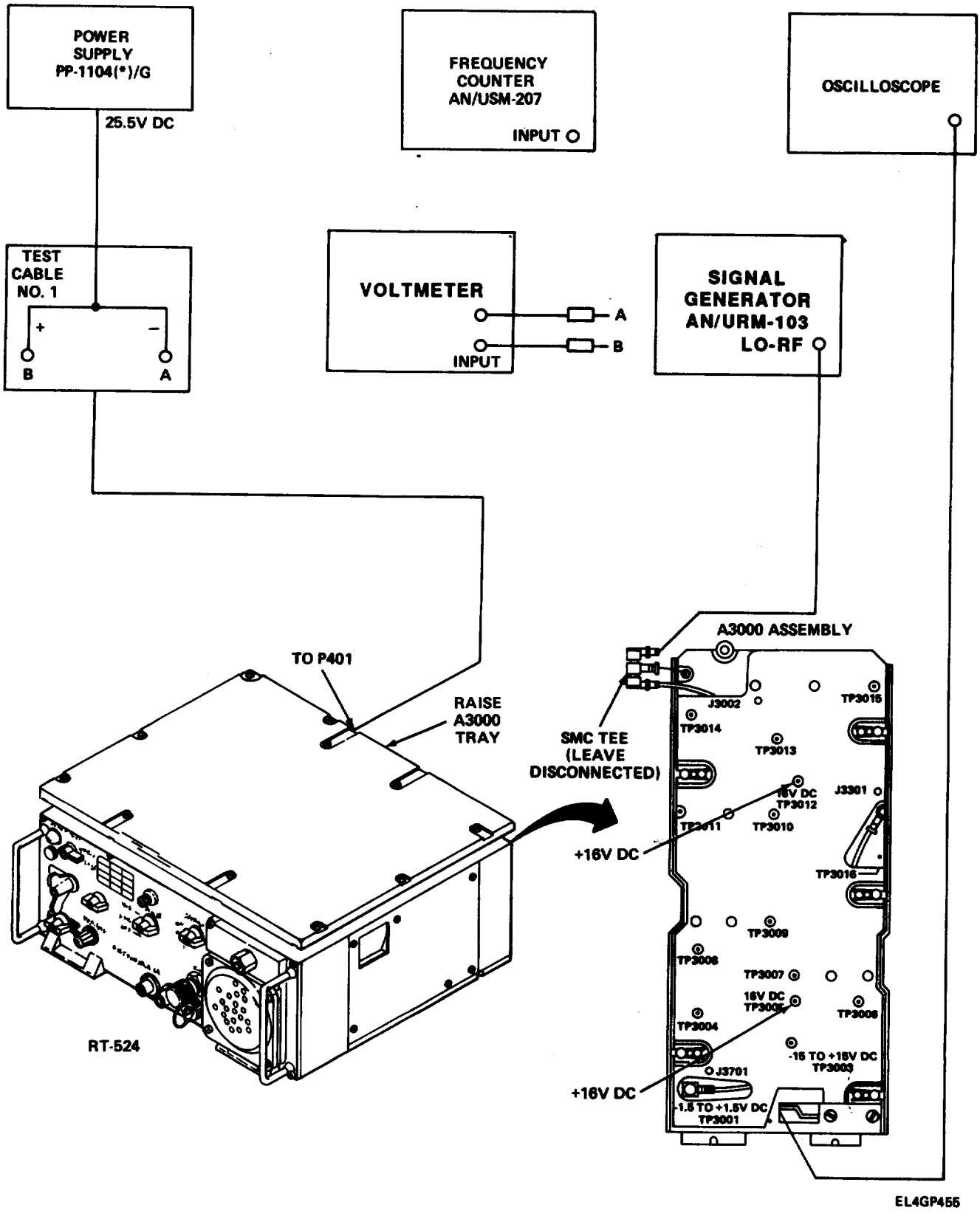
5-23. TROUBLESHOOTTNG FLOW CHARTS. (CONT)

CHART 5-8
A2000, A3000 Assemblies Troubleshooting
(Sheet 4 of 5)



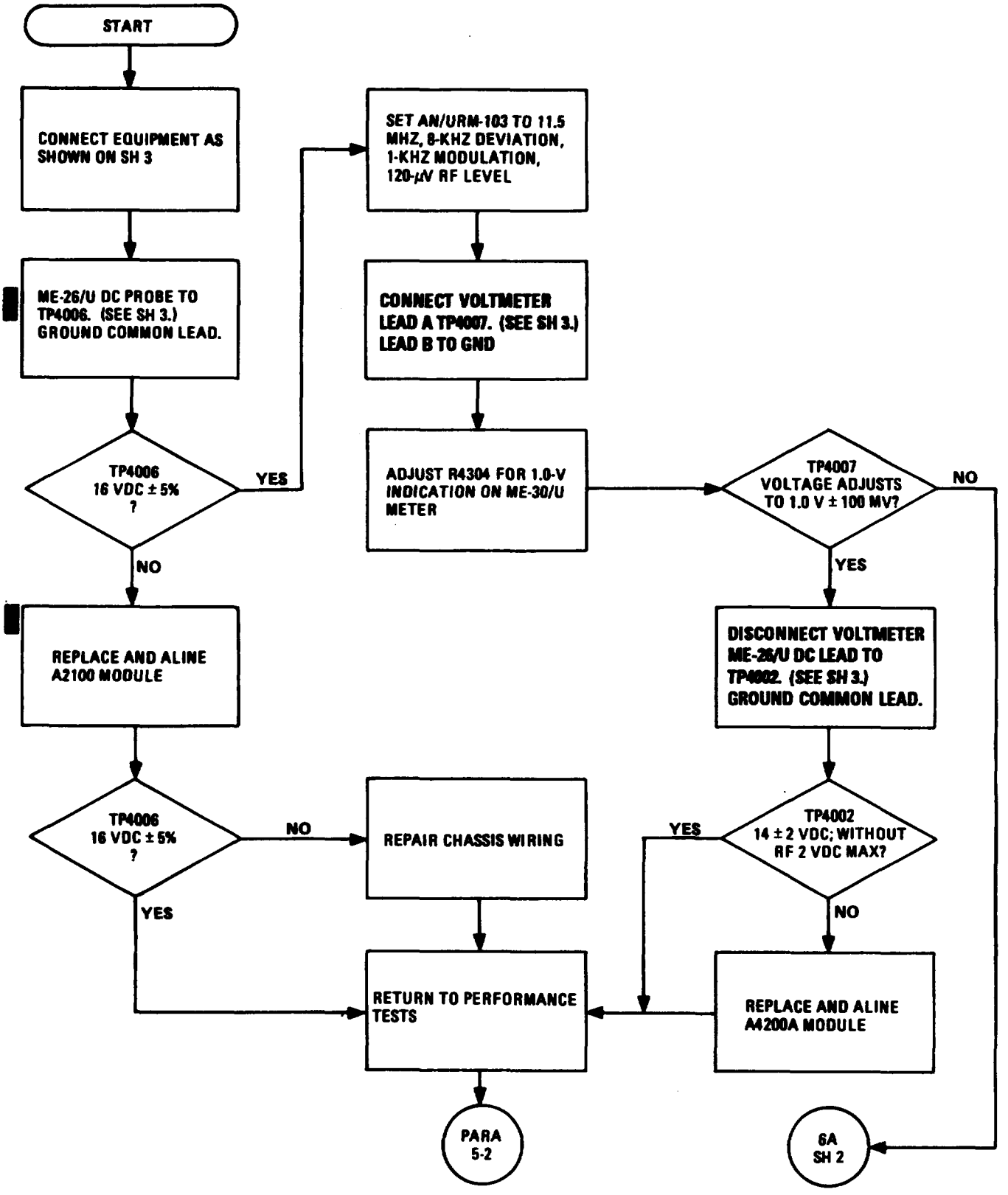
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-8
A2000, A3000 Assemblies Troubleshooting
(Sheet 5 of 5)



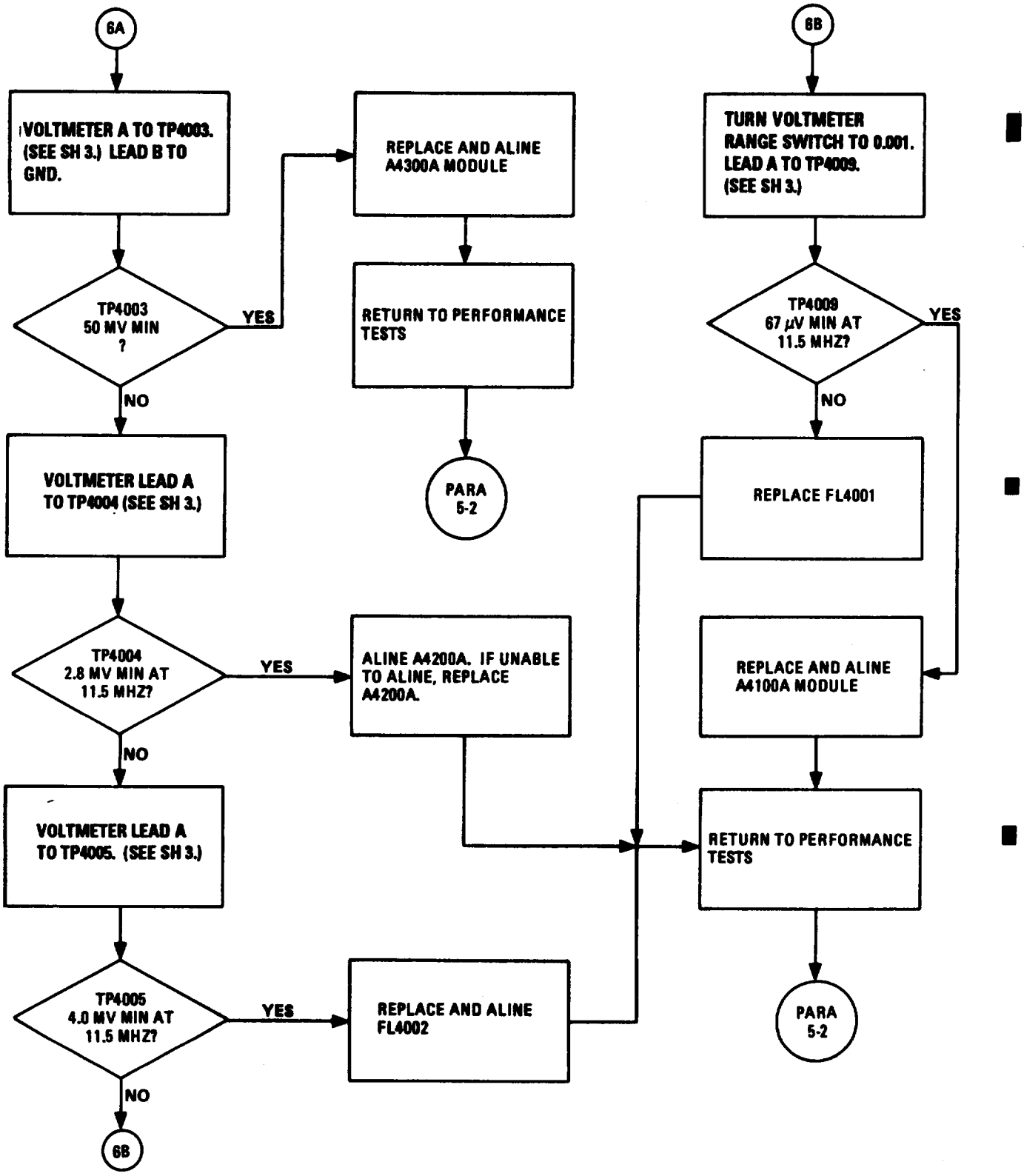
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-9
A4000 Assembly Troubleshooting
(Sheet 1 of 3)



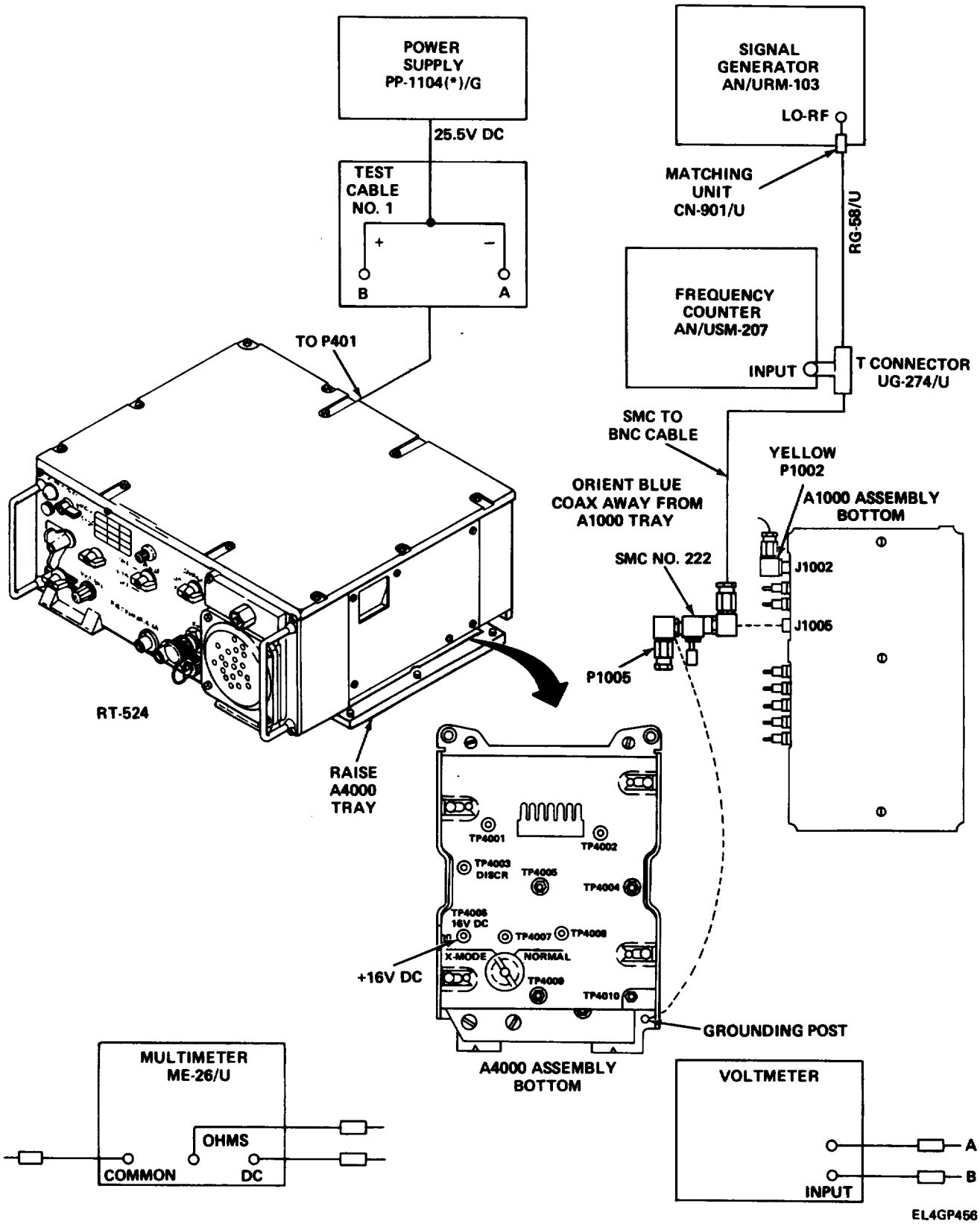
5-23 TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-9
A4000 Assembly Troubleshooting
(Sheet 2 of 3)



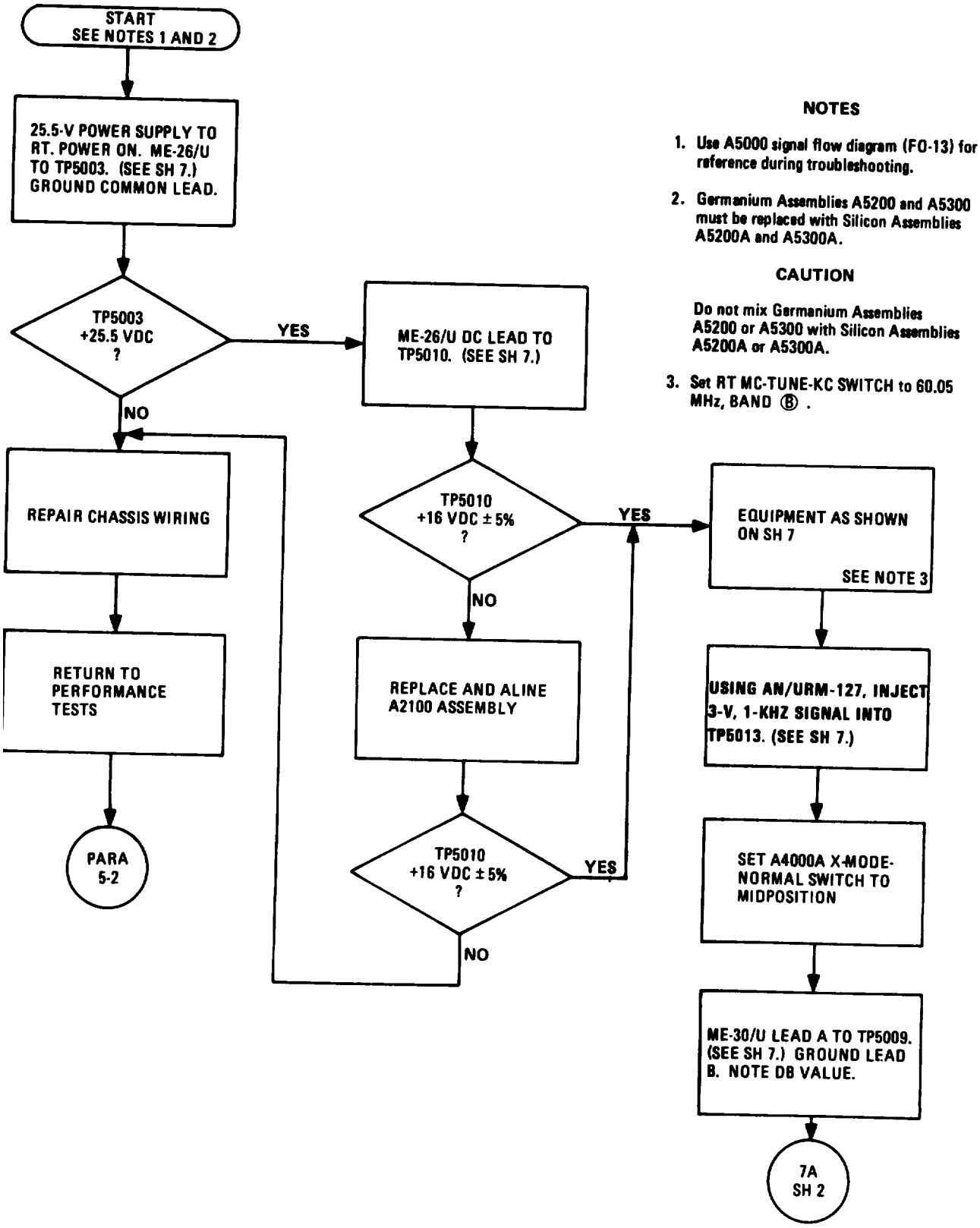
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

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 (FO-13) for reference during troubleshooting.
2. Germanium Assemblies A5200 and A5300 must be replaced with Silicon Assemblies A5200A and A5300A.

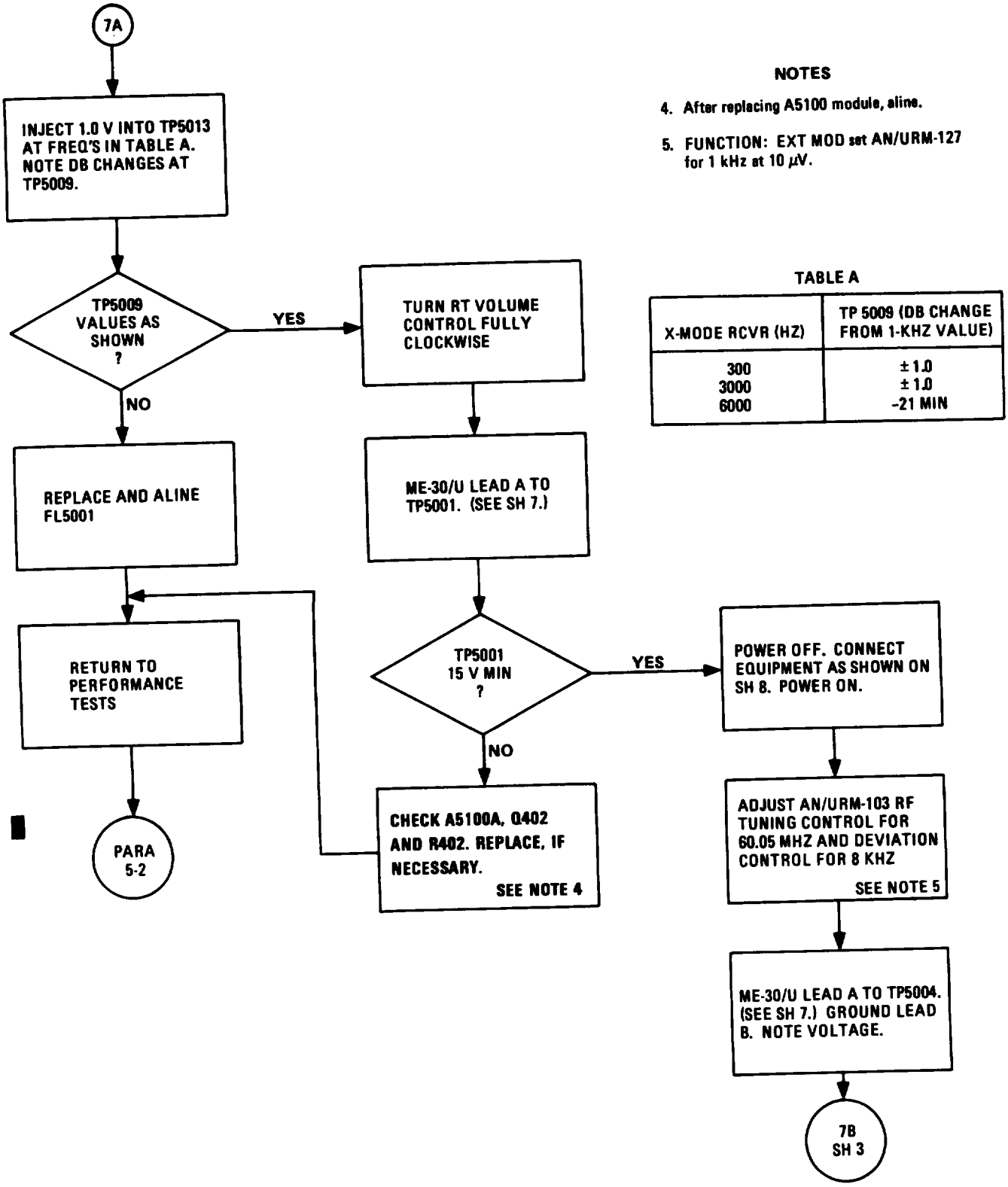
CAUTION

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 Ⓑ .

5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-10
A5000 Assembly Troubleshooting
(Sheet 2 of 8)



NOTES

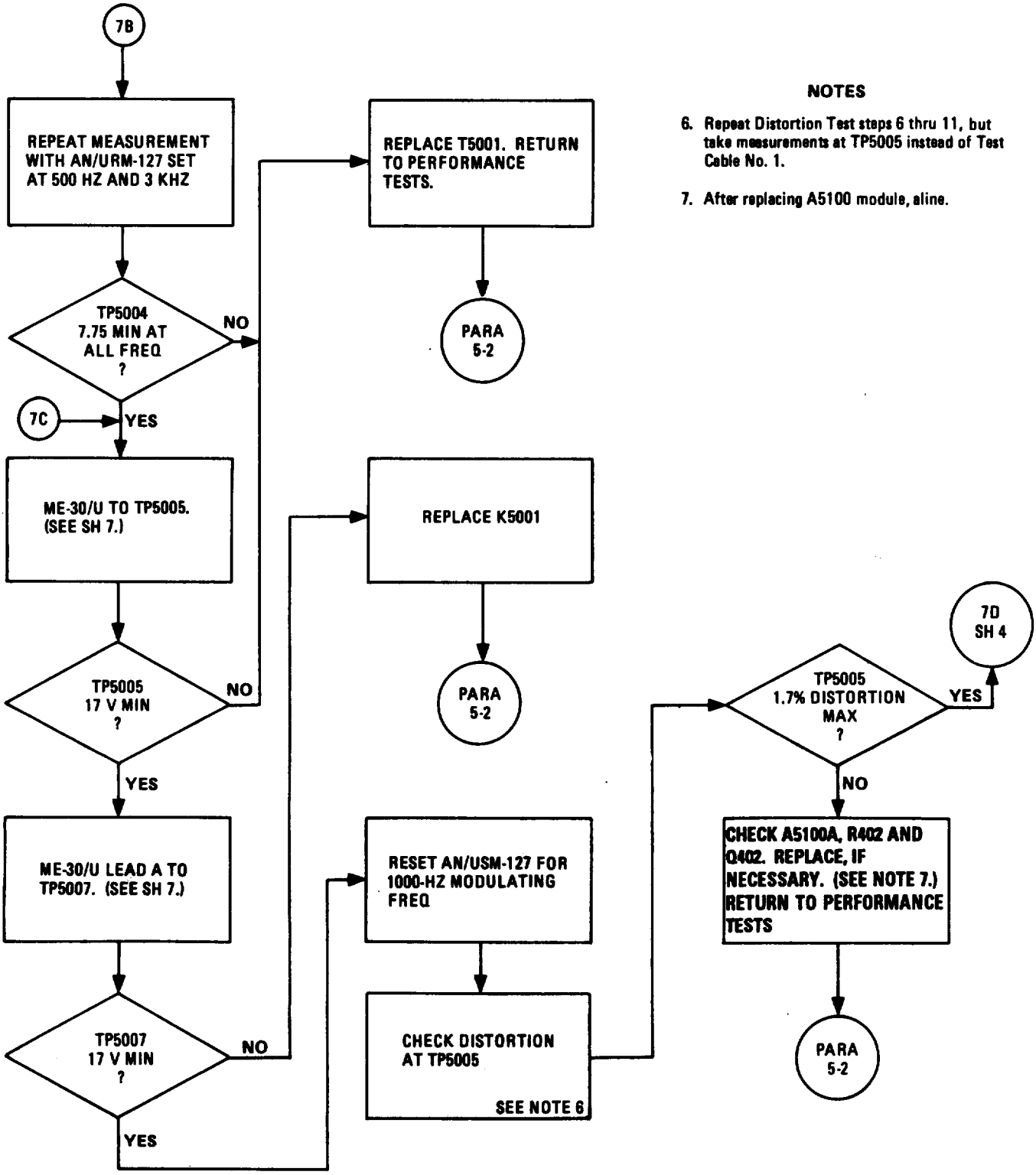
4. After replacing A5100 module, aline.
5. FUNCTION: EXT MOD set AN/URM-127 for 1 kHz at 10 μV.

TABLE A

X-MODE RCVR (HZ)	TP 5009 (DB CHANGE FROM 1-KHZ VALUE)
300	±1.0
3000	±1.0
6000	-21 MIN

5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-10
A5000 Assembly Troubleshooting
(Sheet 3 of 8)

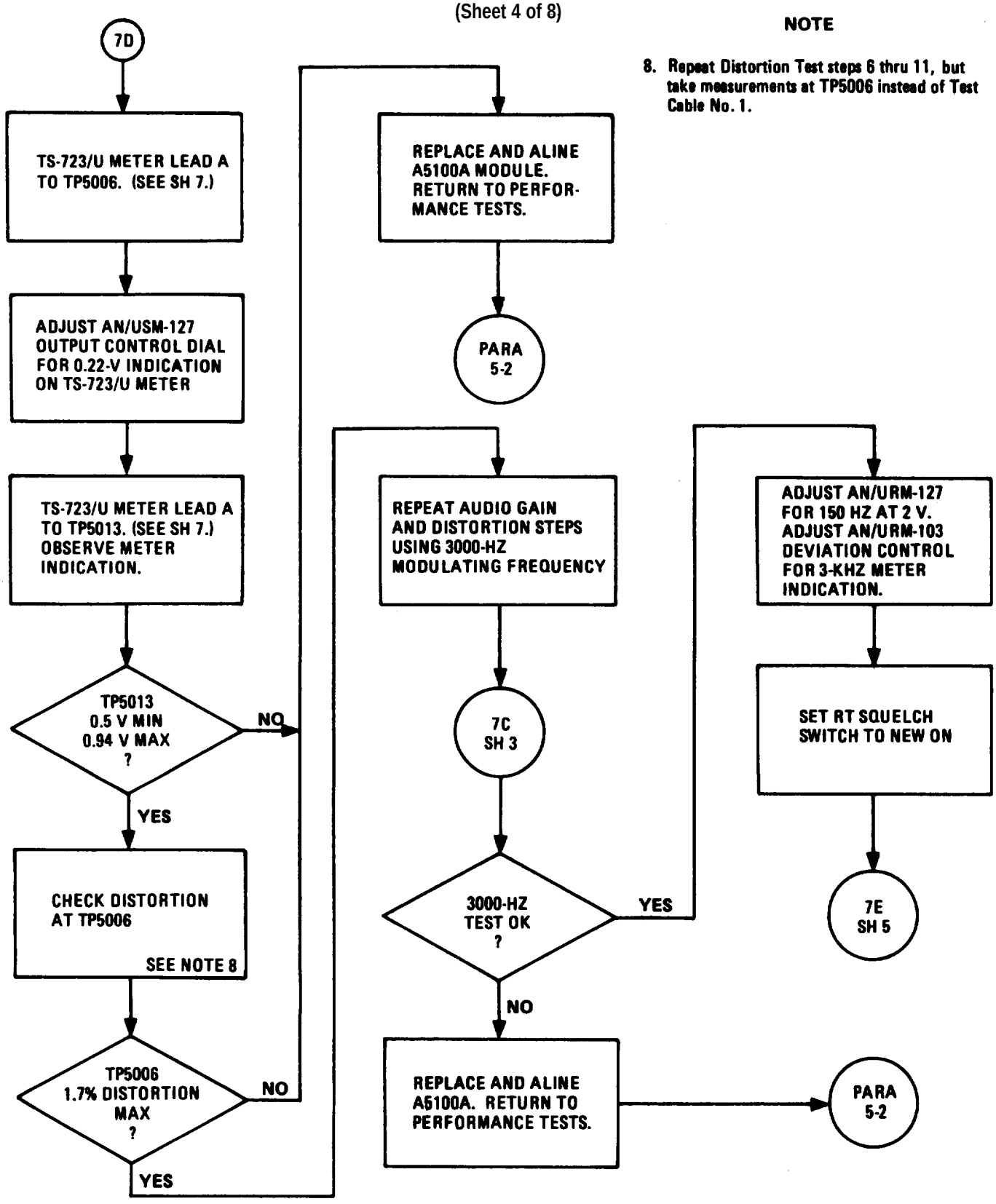


NOTES

6. Repeat Distortion Test steps 6 thru 11, but take measurements at TP5005 instead of Test Cable No. 1.
7. After replacing A5100 module, aline.

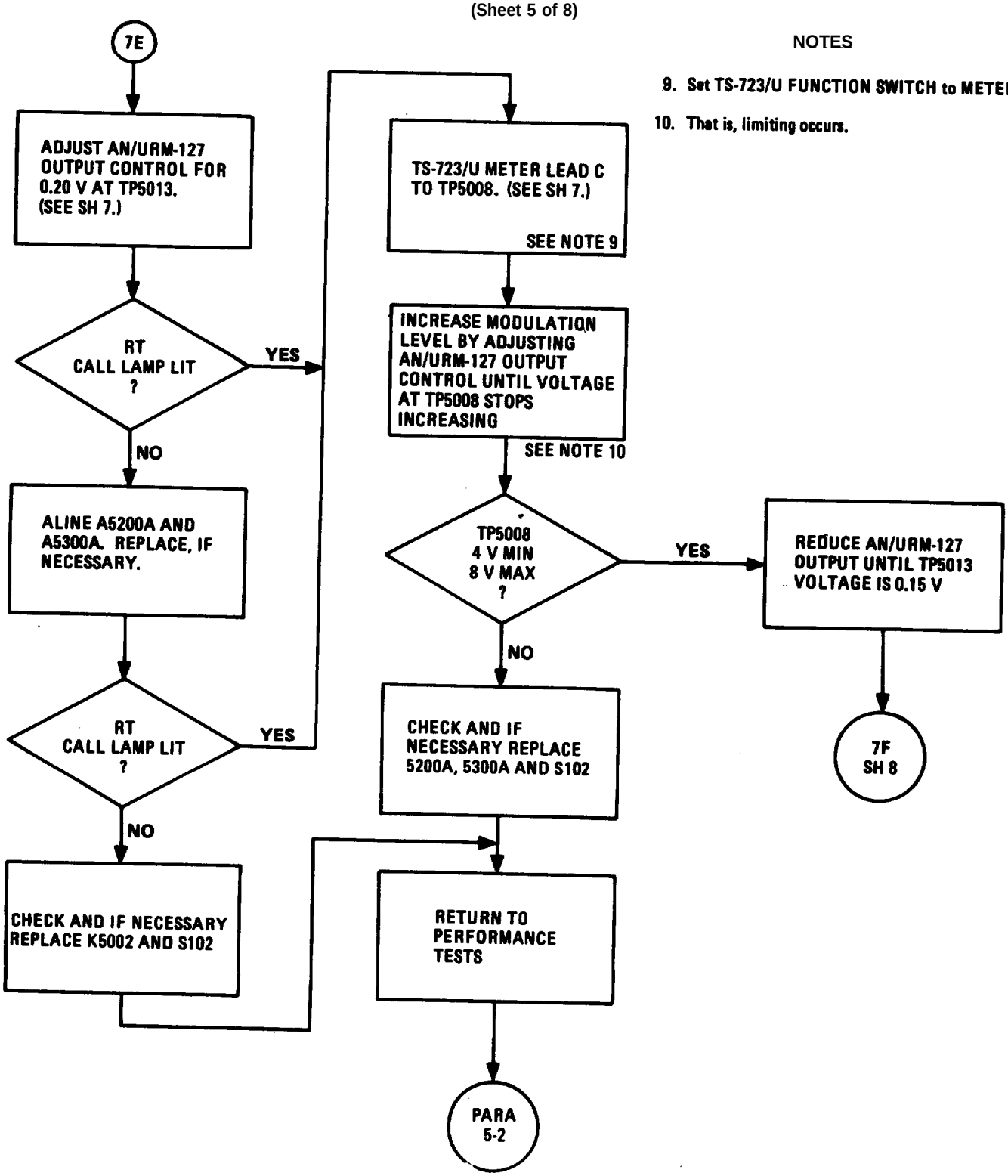
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 6-10
A5000 Assembly Troubleshooting
(Sheet 4 of 8)



5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-10
A5000 Assembly Troubleshooting
(Sheet 5 of 8)

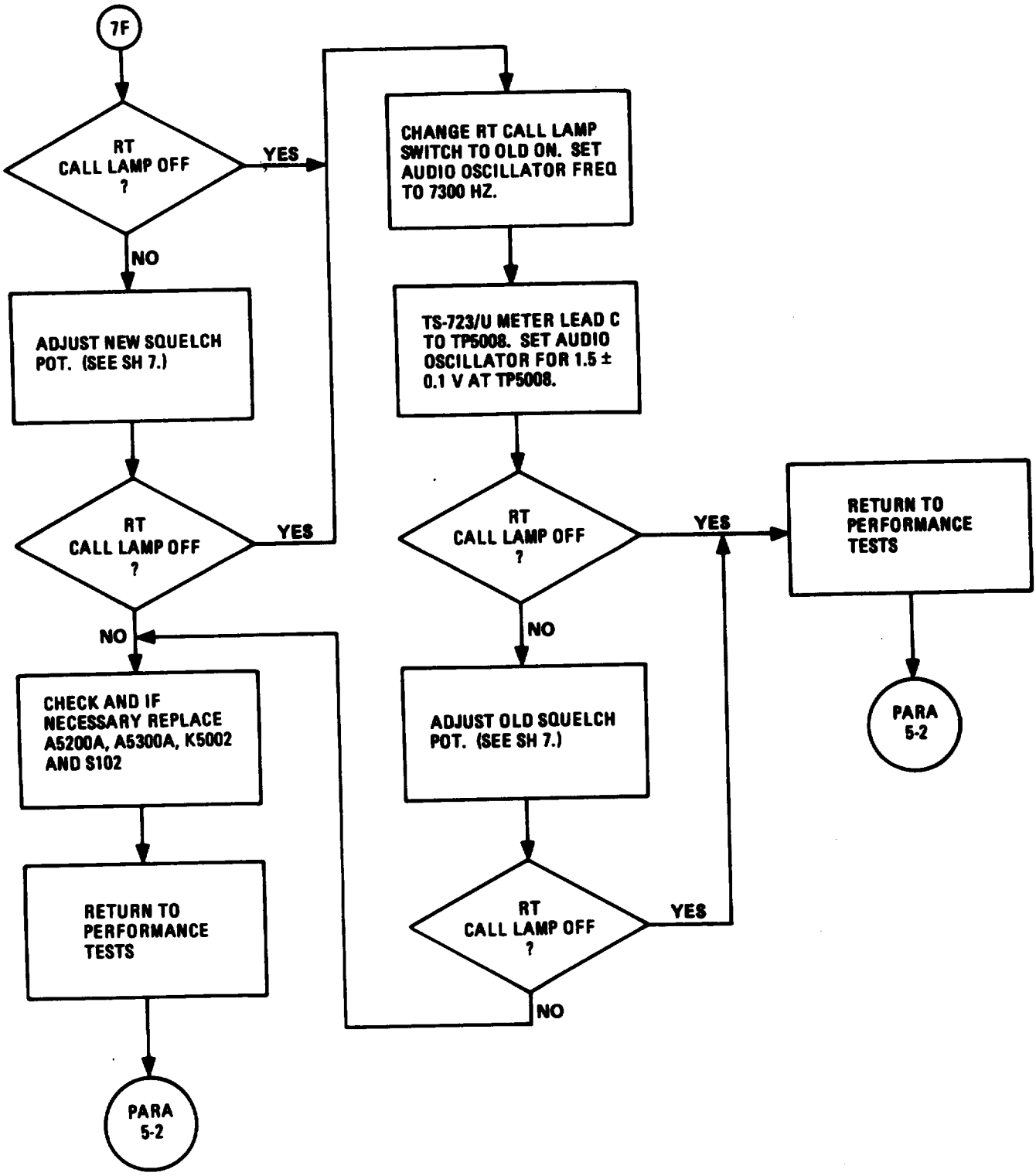


NOTES

9. Set TS-723/U FUNCTION SWITCH to METER.
10. That is, limiting occurs.

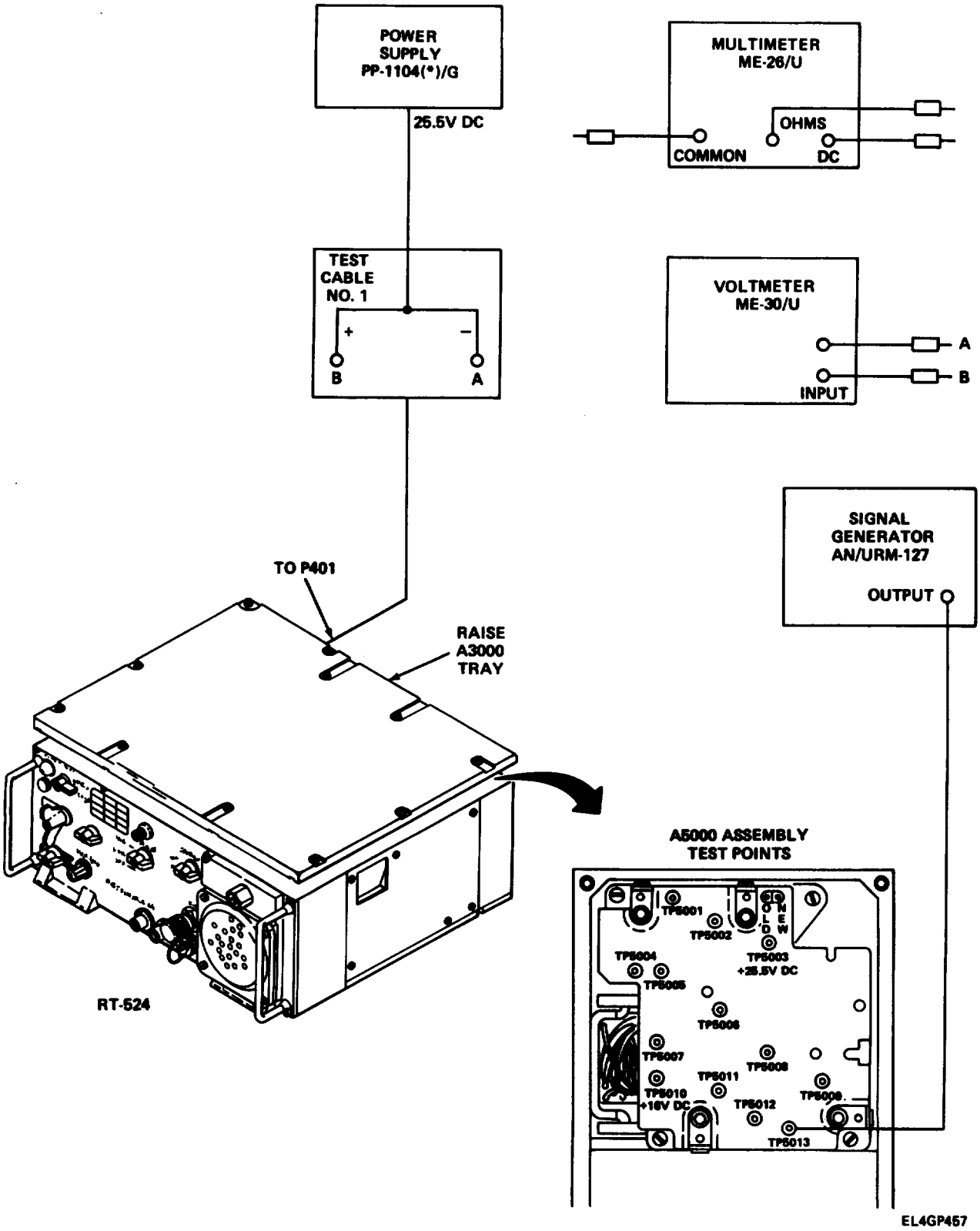
5-23 TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-10
A5000 Assembly Troubleshooting
(Sheet 6 of 8)



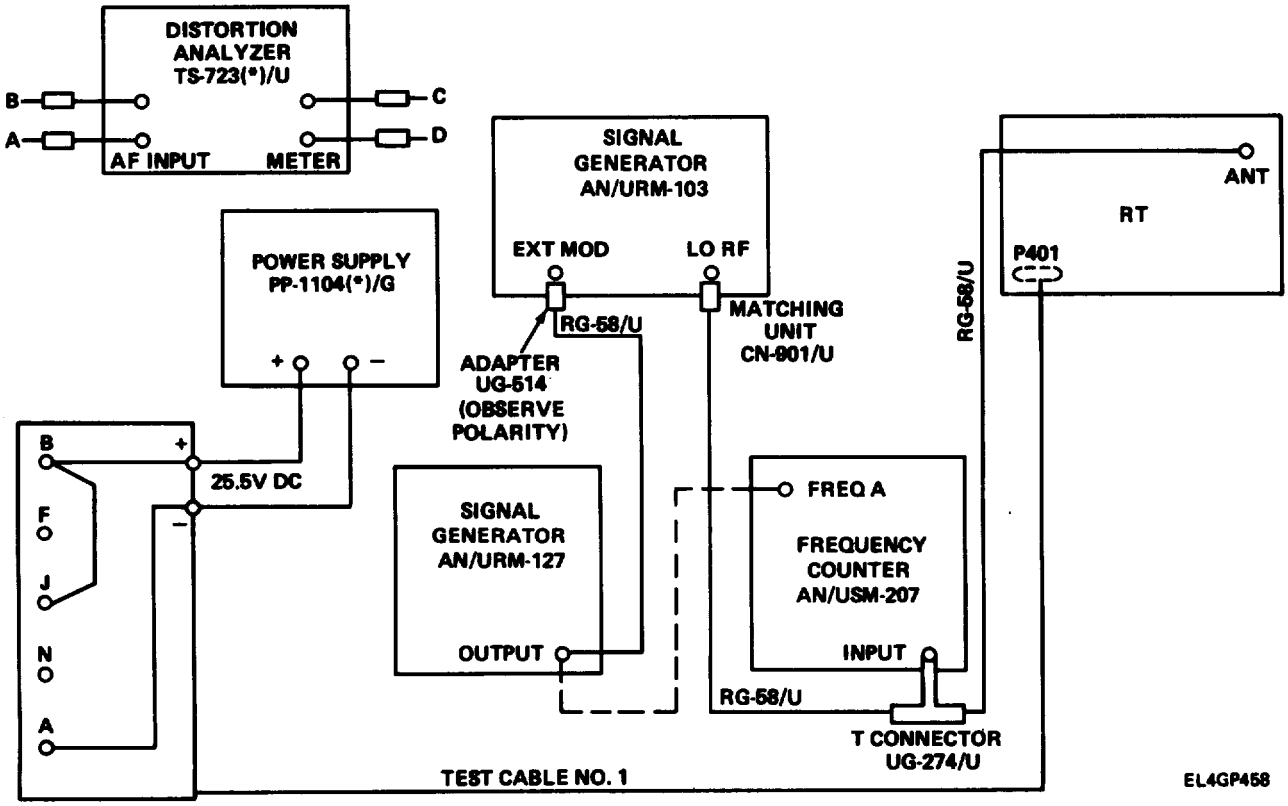
5-23 TROUBLESHOOTING FLOW CHARTS (CONT)

CHART 510
A5000 Assembly Troubleshooting
(Sheet 7 of 8)



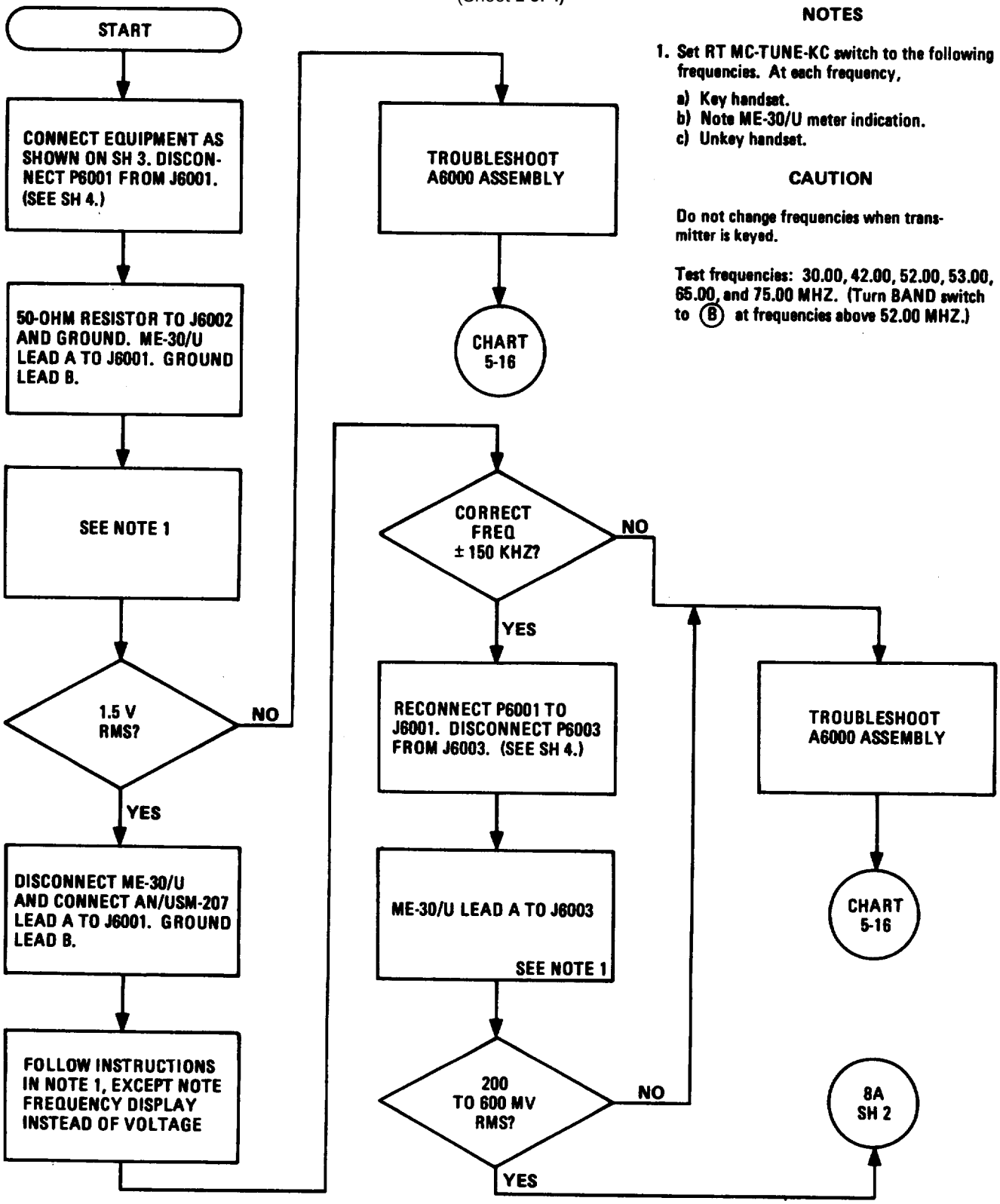
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 6-10
A6000 Assembly Troubleshooting
(Sheet 8 of 8)



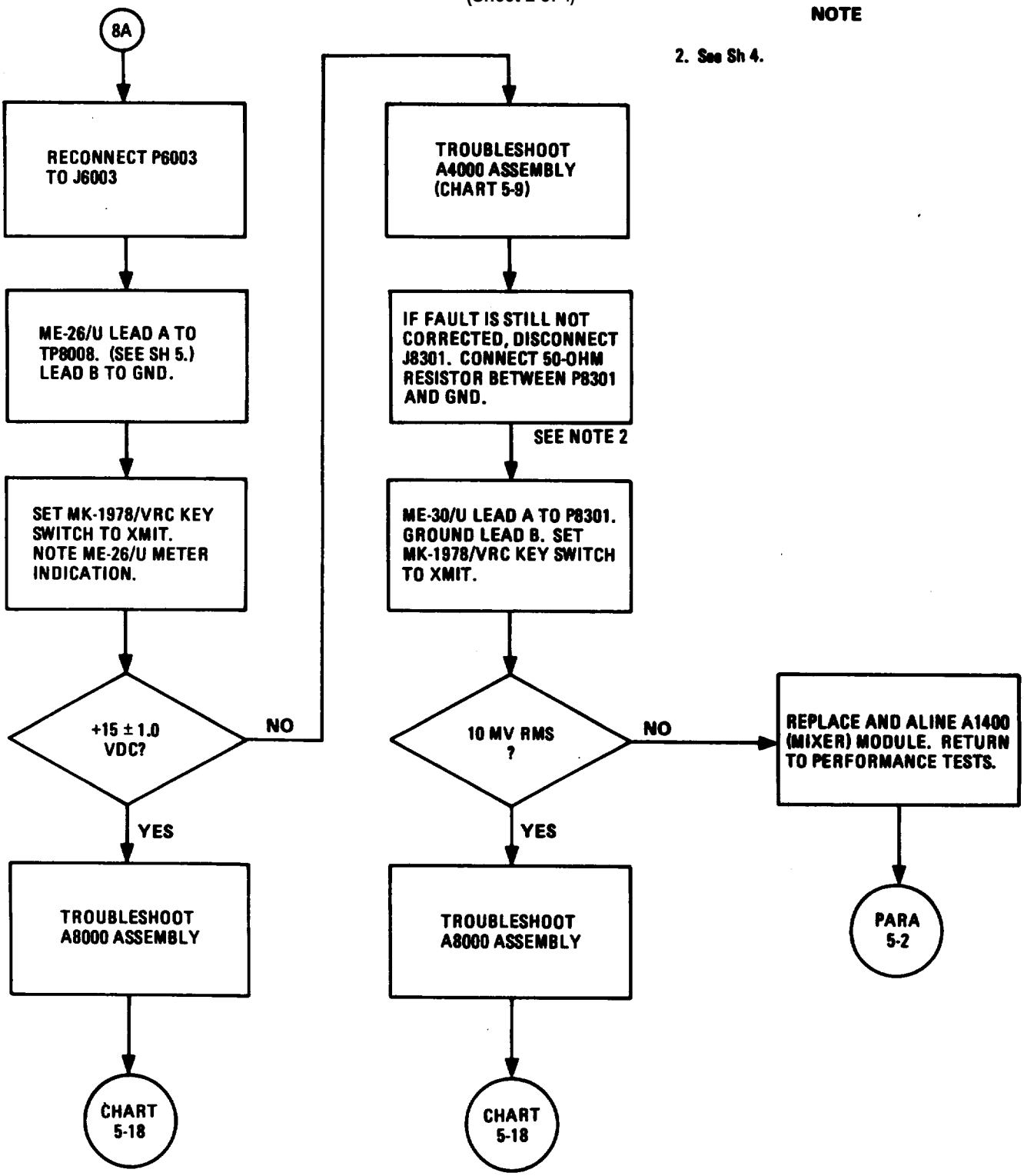
5-23 TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-11
Transmitter Frequency Accuracy Troubleshooting
(Sheet 1 of 4)



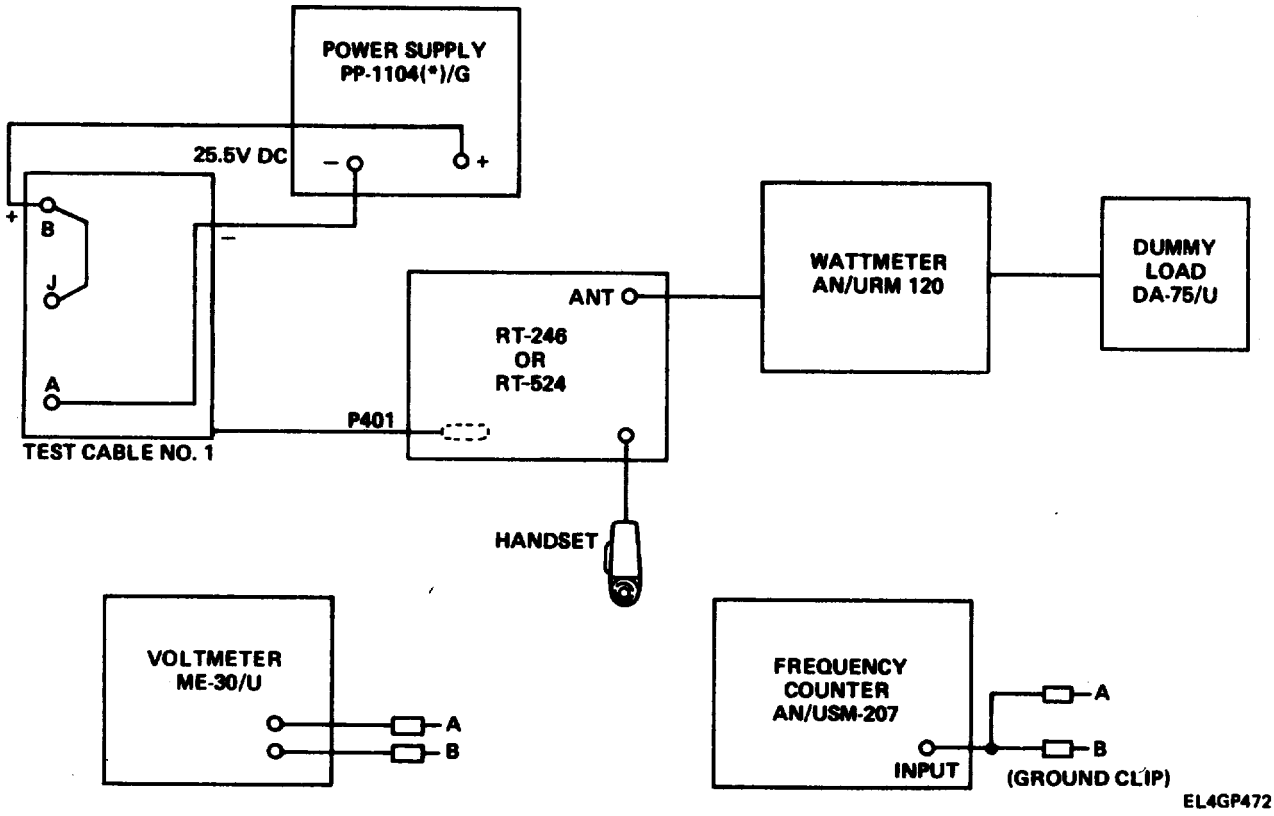
5-23. TROUBLESHOOTING FLOW CHARTS (CONT)

CHART 5-11
Transmitter Frequency Accuracy Troubleshooting
(Sheet 2 of 4)



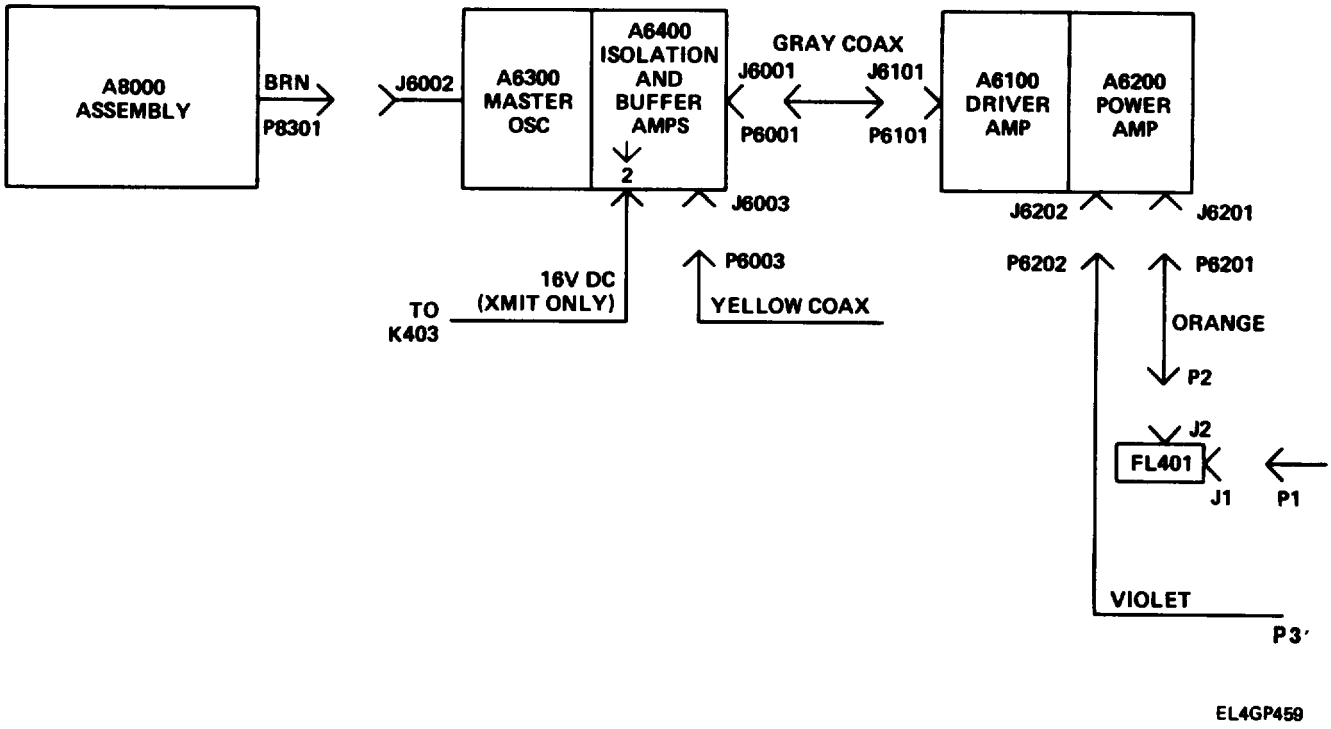
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 511
Transmitter Frequency Accuracy Troubleshooting
(Sheet 3 of 4)



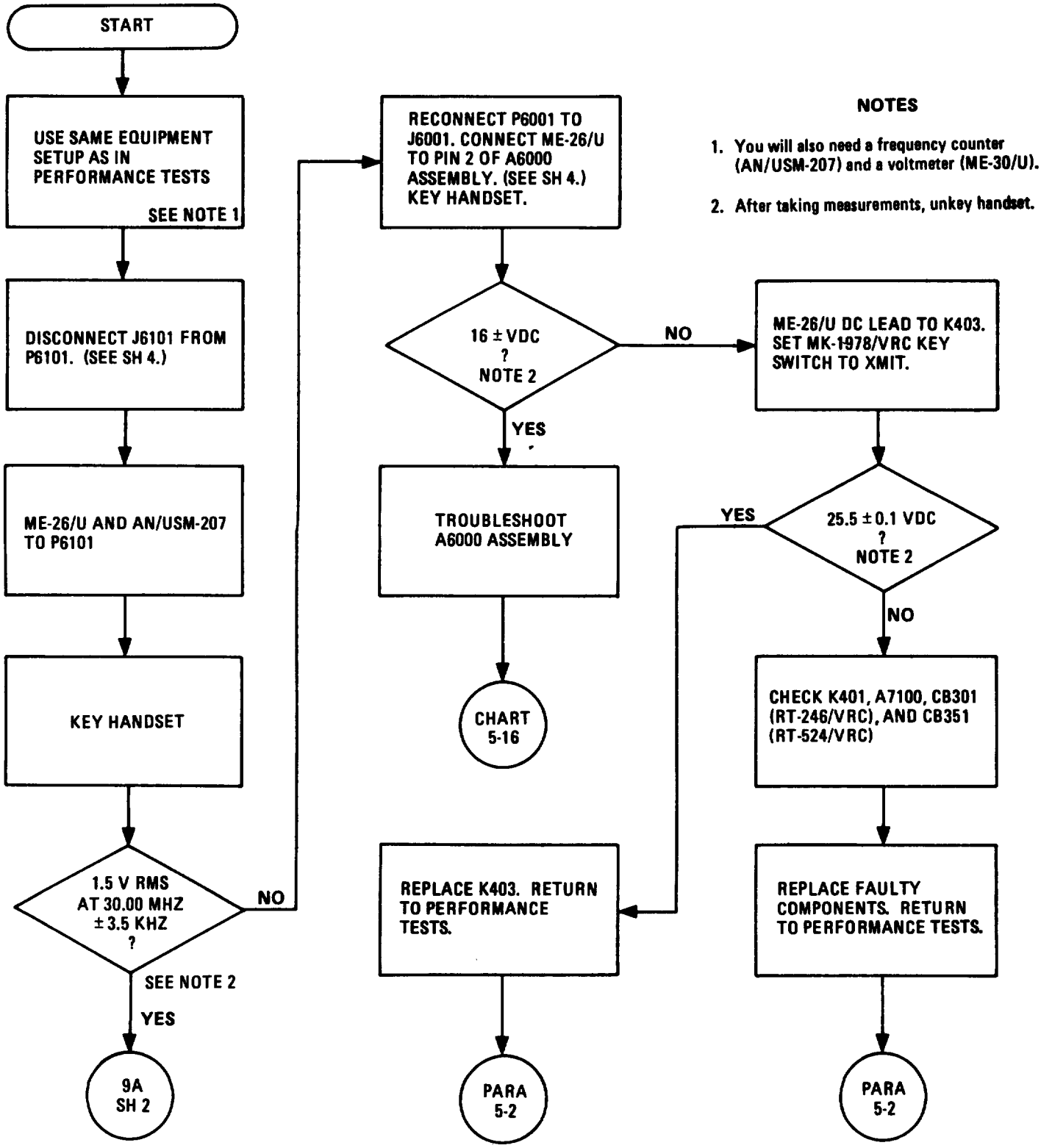
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-11
Transmitter Frequency Accuracy Troubleshooting
(Sheet 4 of 4)



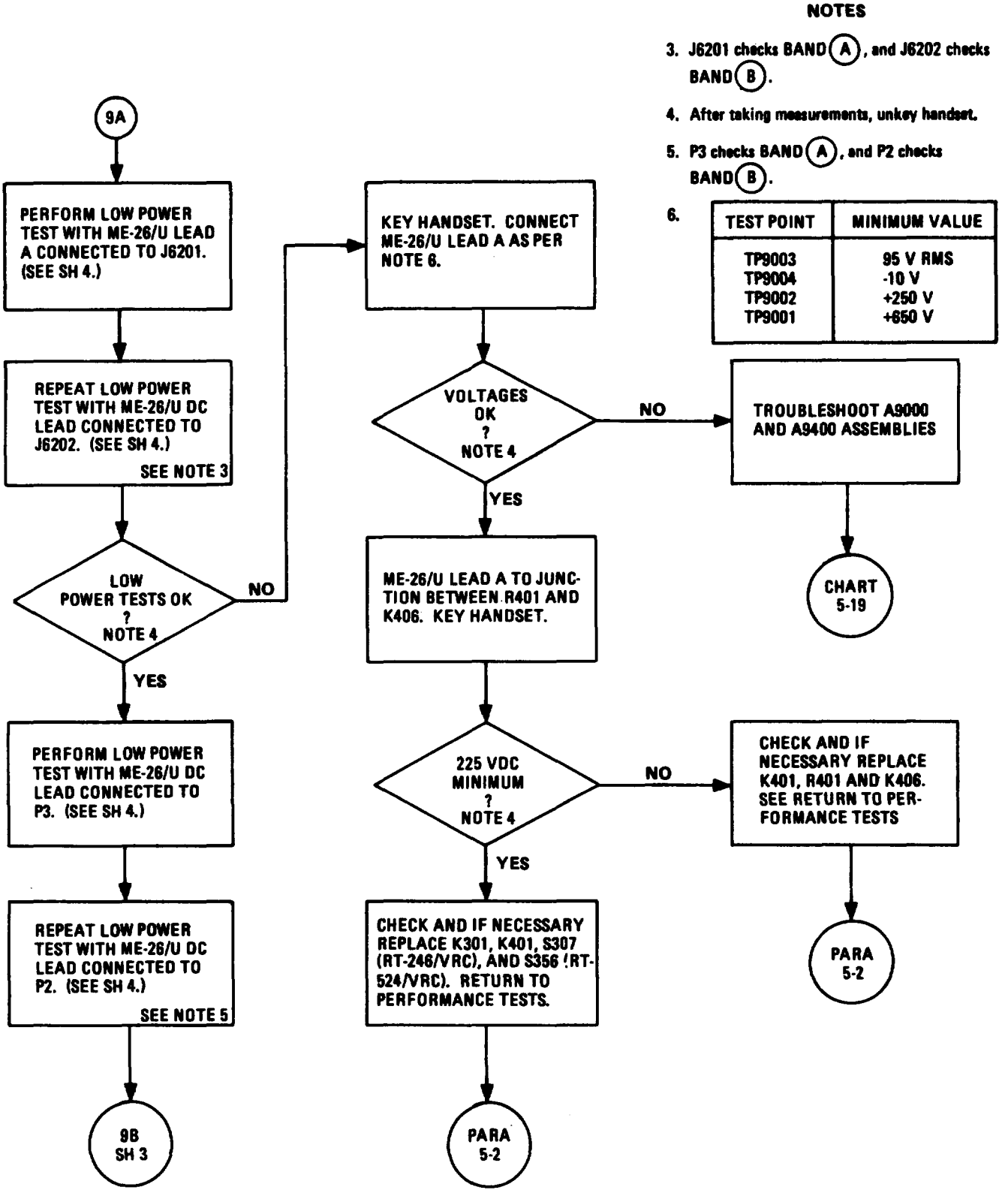
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-12
Transmitter Low and High Power Troubleshooting
(Sheet 1 of 4)



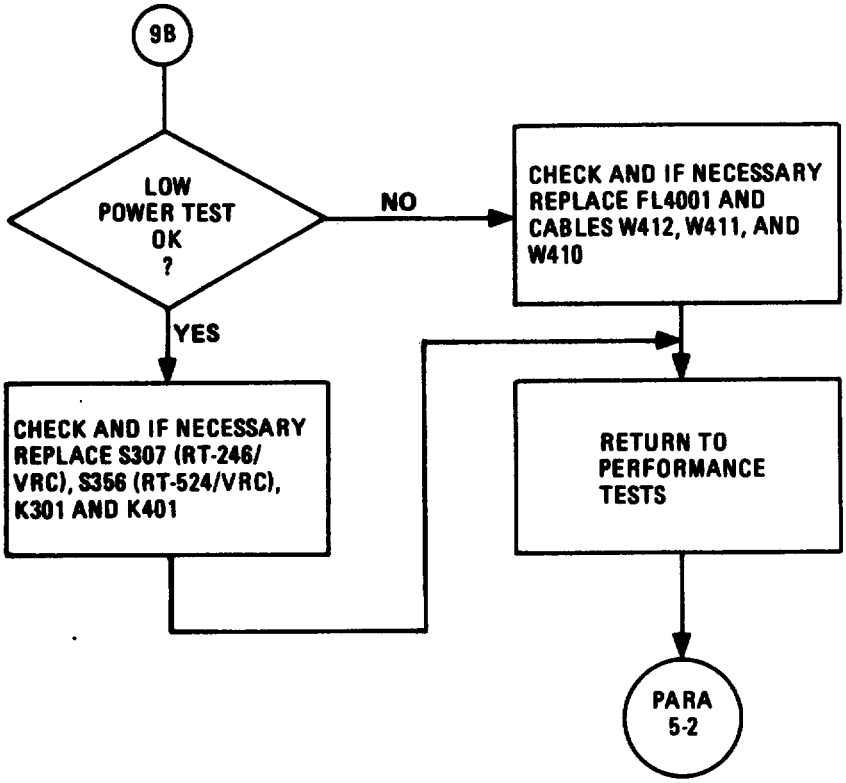
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-12
Transmitter Low and High Power Troubleshooting
(Sheet 2 of 4)



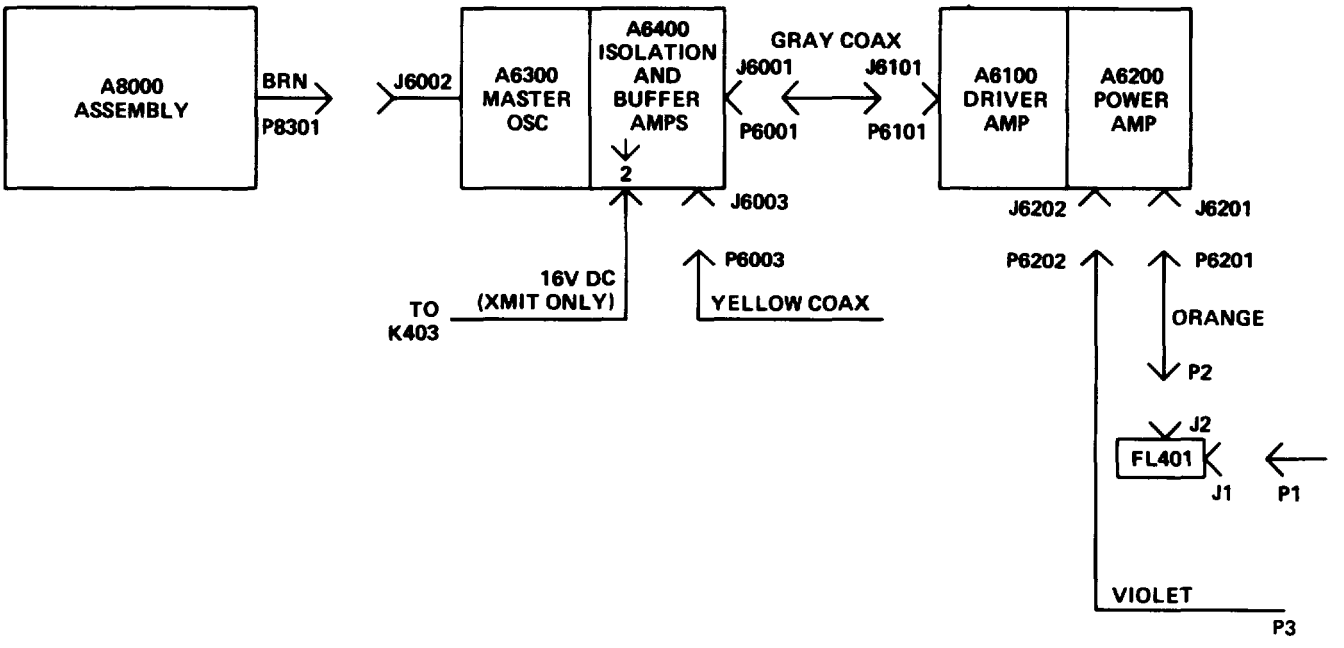
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-12
Transmitter Low and High Power Troubleshooting
(Sheet 3 of 4)



5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-12
Transmitter Low and High Power Troubleshooting
(Sheet 4 of 4)



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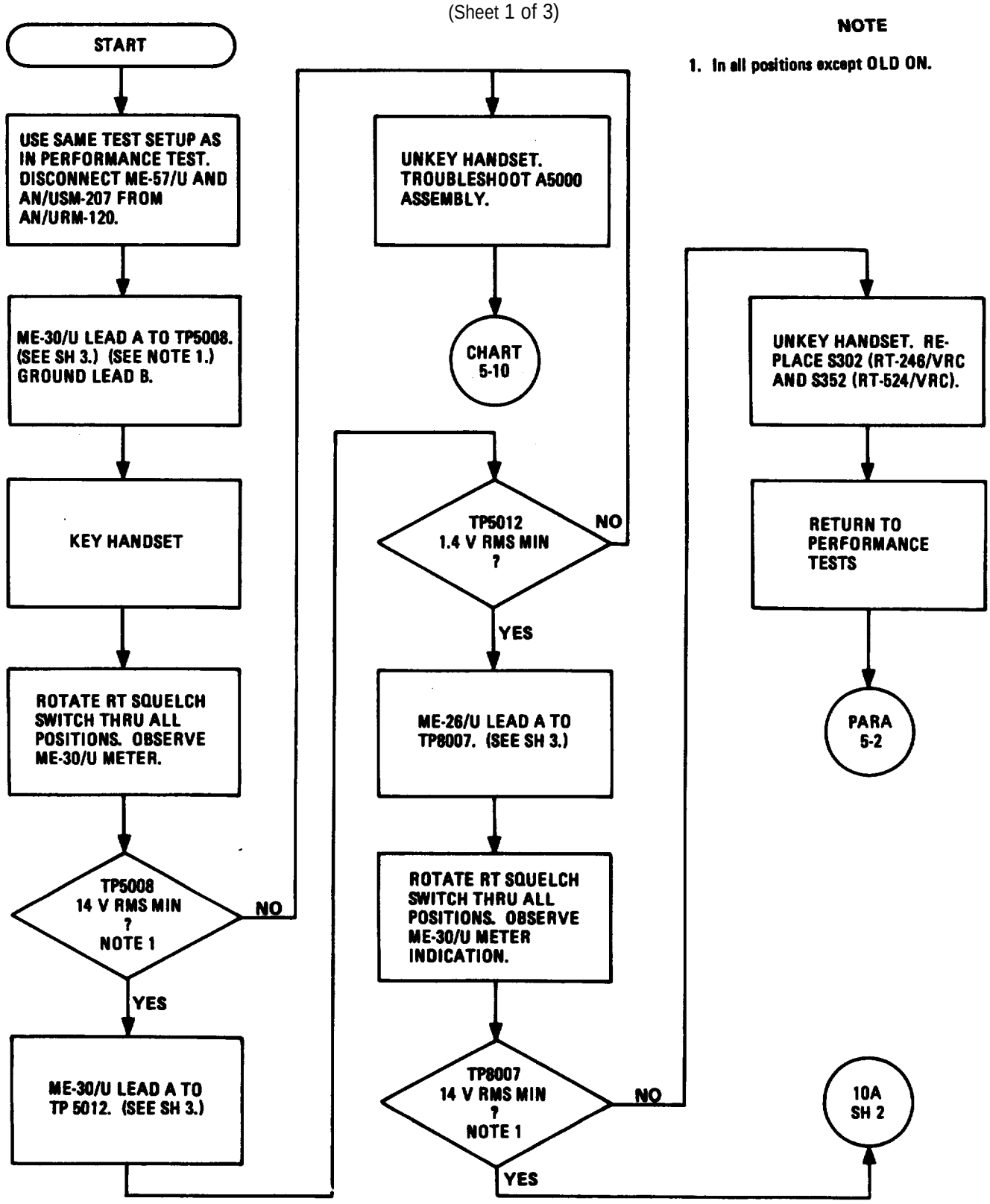
5-23 TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-13

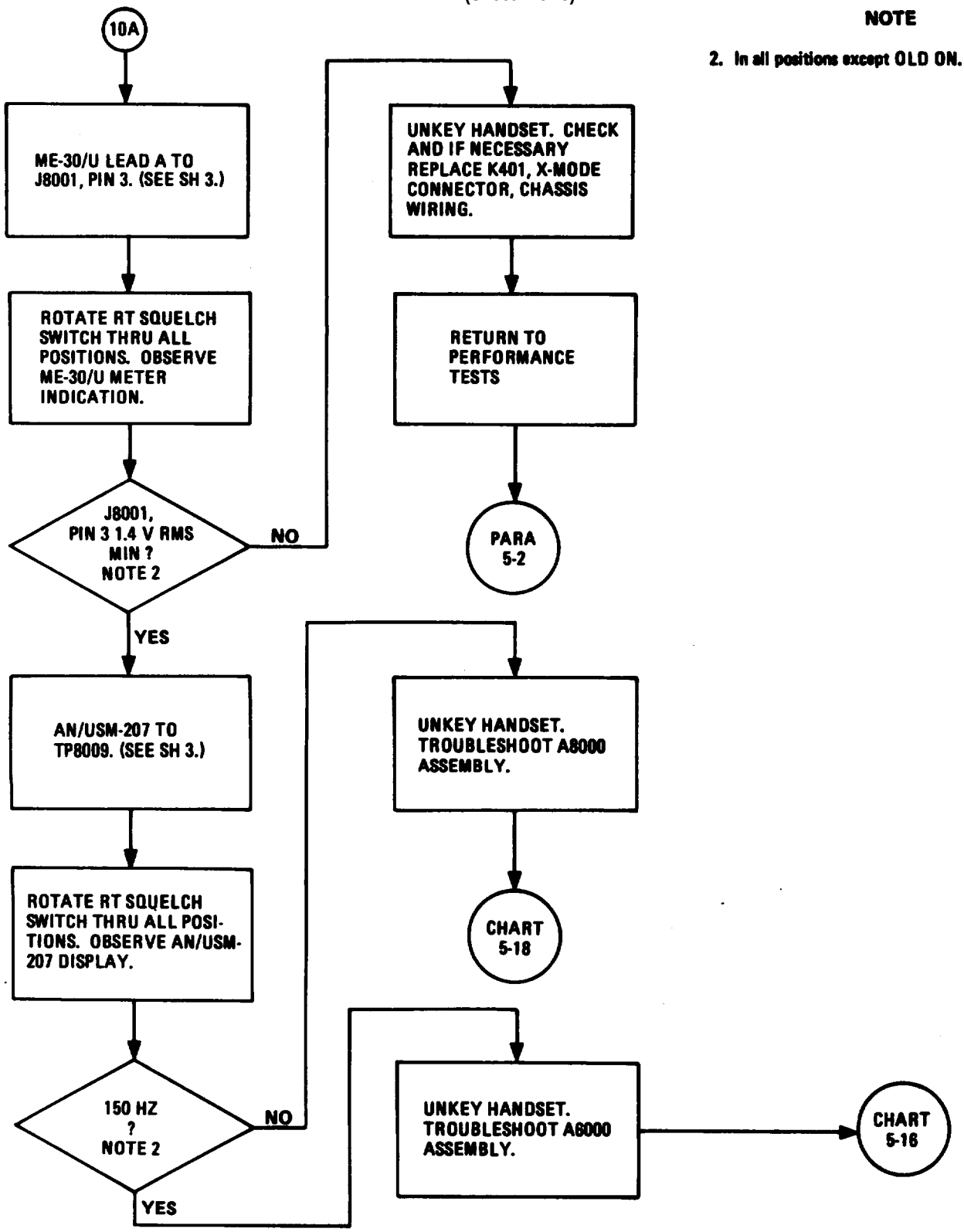
Transmitter Squelch Tone Stability Troubleshooting

(Sheet 1 of 3)



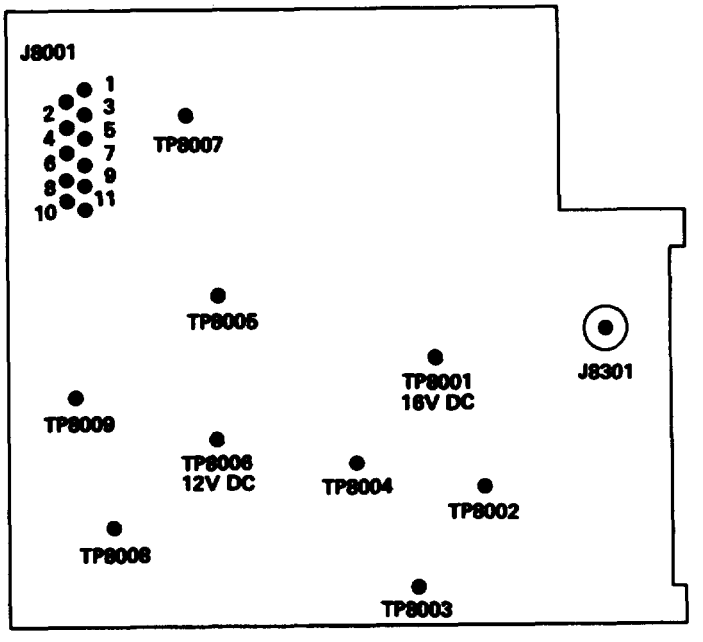
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

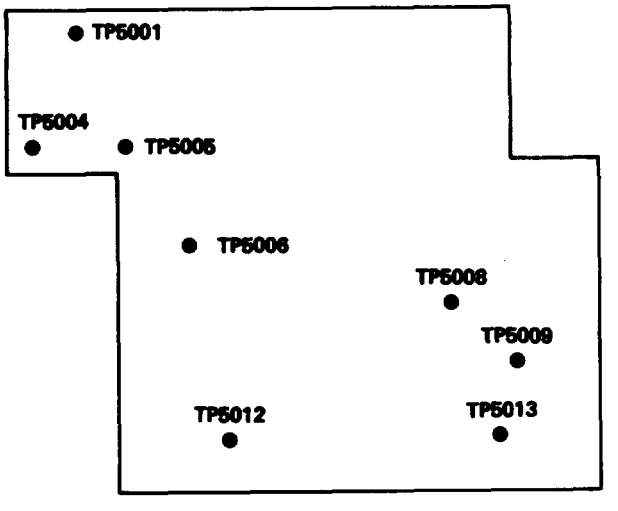
CHART 5-13
Transmitter Squelch Tone Stability Troubleshooting
(Sheet 2 of 3)



5-23 TROUBLESHOOTING FLOW CHARTS. (CONT)

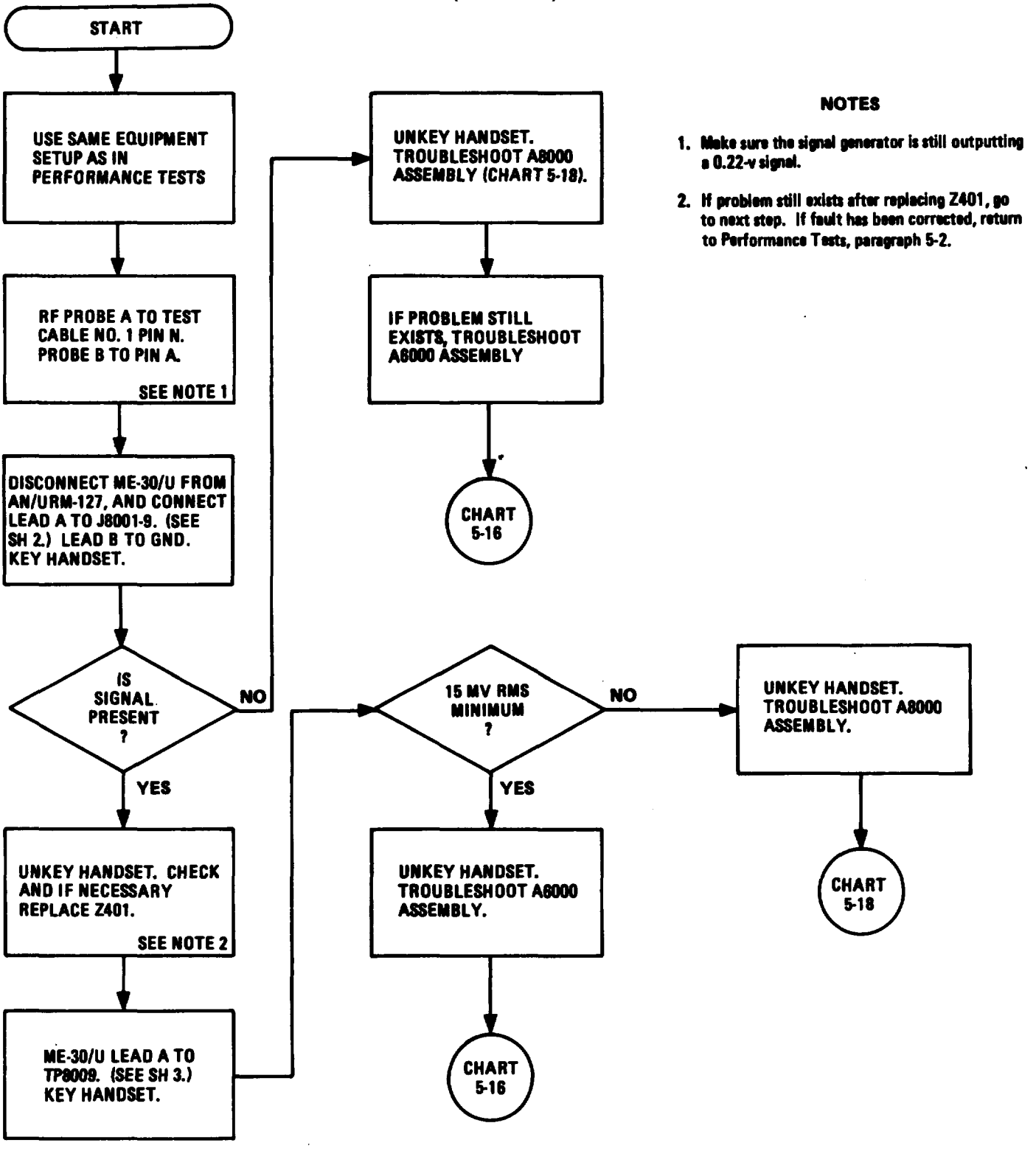
CHART 6-13
Transmitter Squelch Tone Stability Troubleshooting
(sheet 3 of 3)





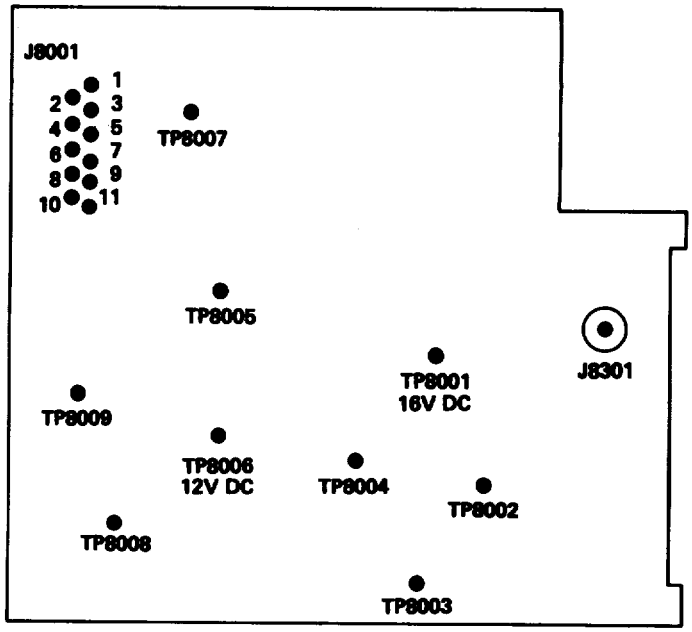
5-23 TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-14
Transmitter Deviation (Normal Mode) Troubleshooting
(sheet 1 of 2)



5-23 TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-14
Transmitter Deviation (Normal Mode) Troubleshooting
(sheet 2 of 2)



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5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-15
Antenna Information (Switching) Troubleshooting
(sheet 1 of 1)

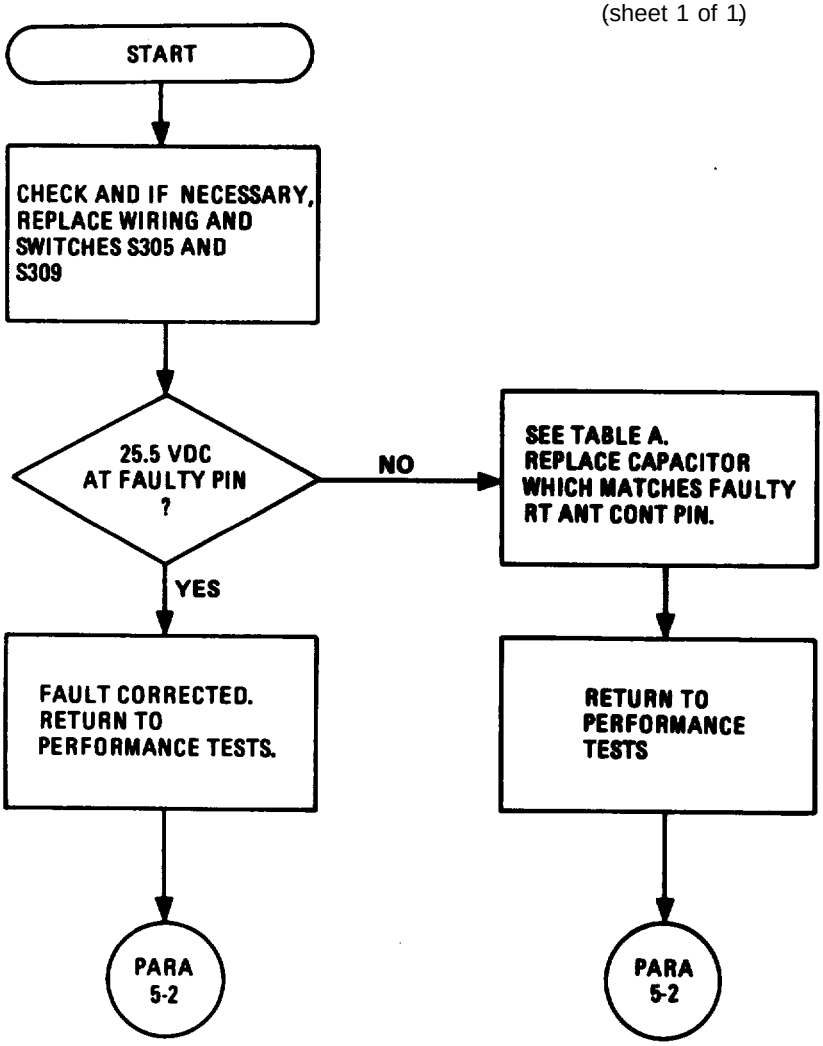
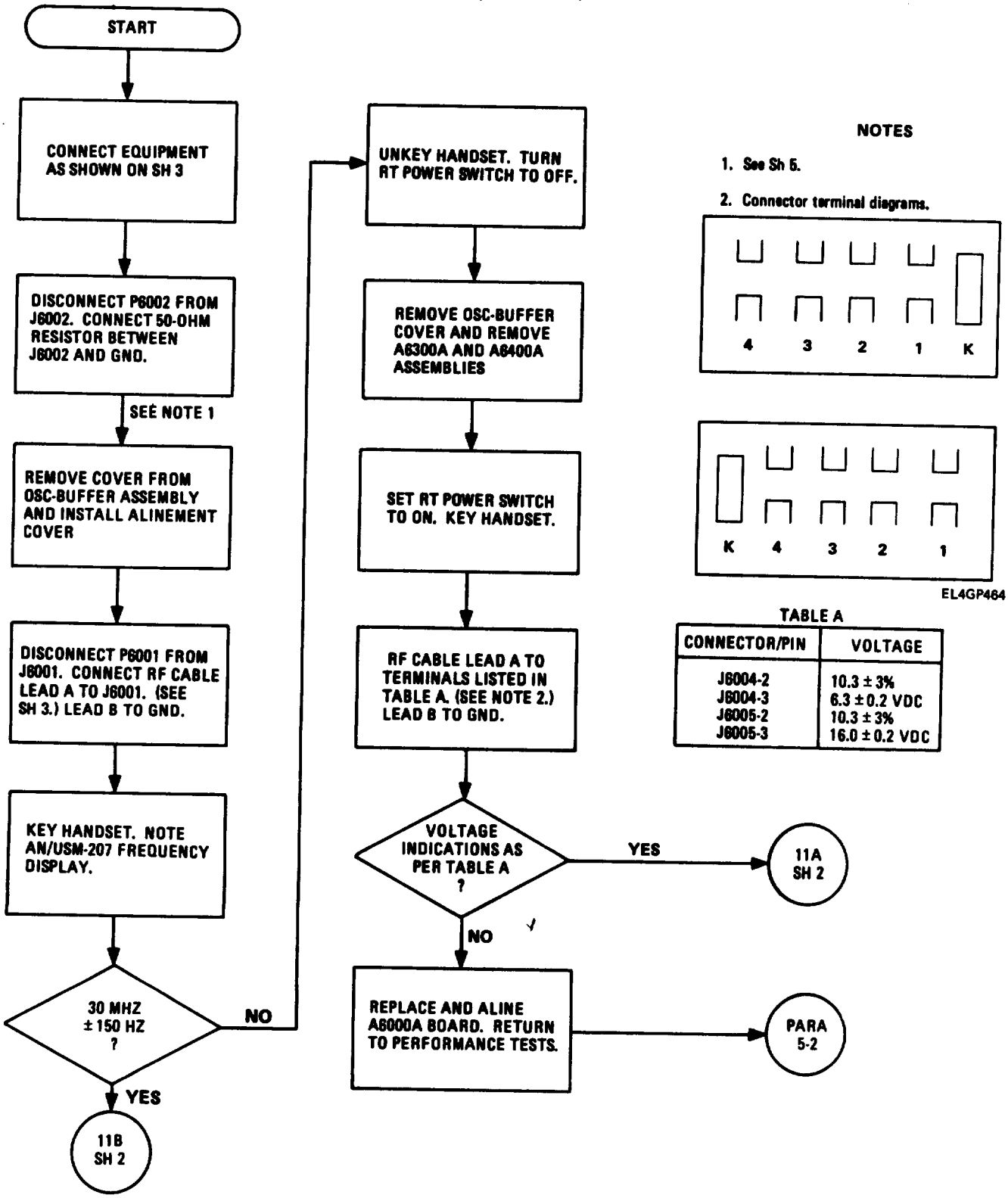


TABLE A

FAULTY RT ANT CONT PIN	MATCHING CAPACITOR
A	C321
B	C320
D	C319
E	C315
F	C318
H	C314
J	C317

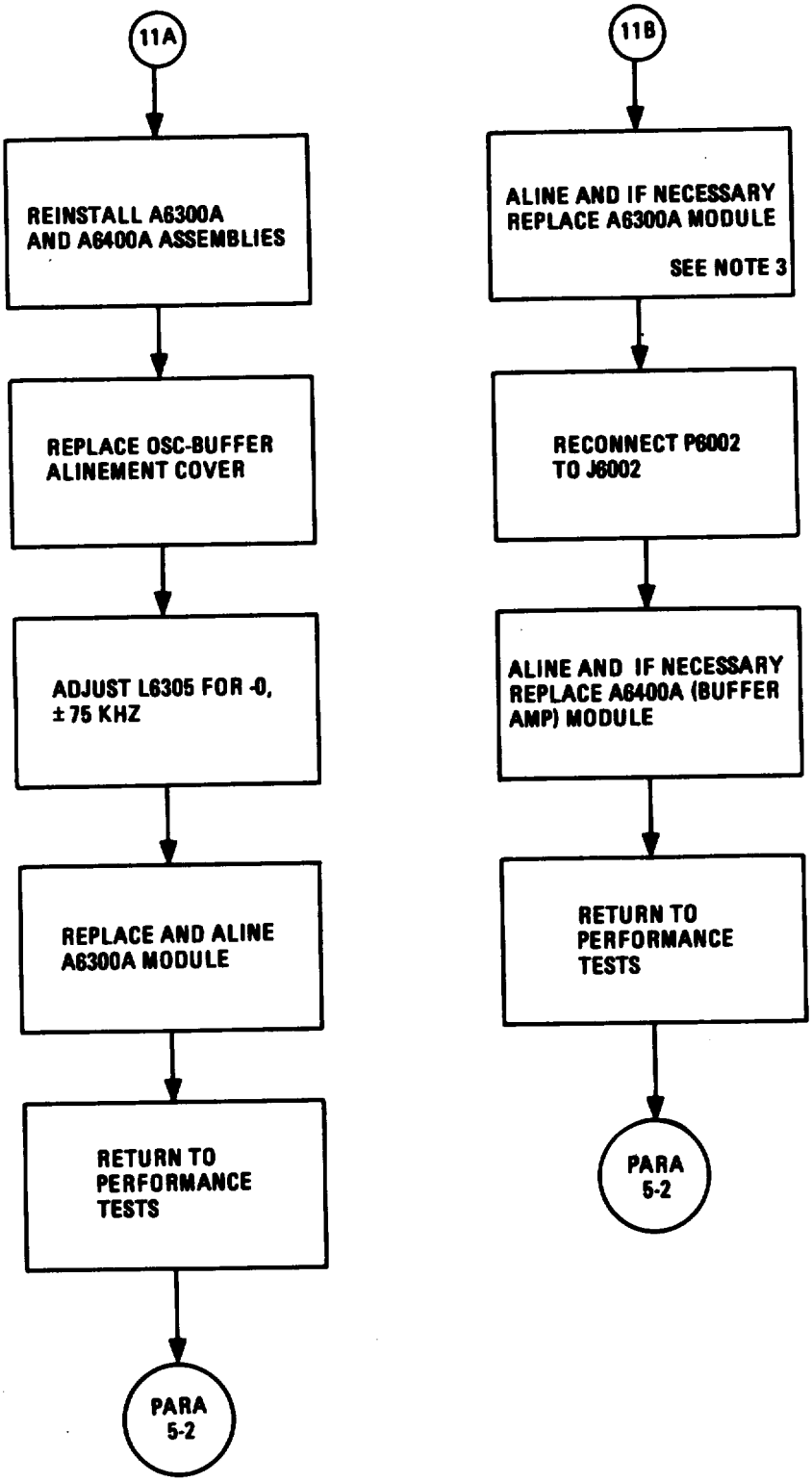
5-23 TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-16
Main Circuit Board Assembly A6OOOA, and Modules
A6300A and A6400A Troubleshooting
(sheet 1 of 5)



5-23 TROUBLESHOOTING FLOW CHARTS.(CONT)

CHART 5-16
Main Circuit Board Assembly A6000A, and Modules
A6300A and A6400A Troubleshooting
(sheet 2 of 5)

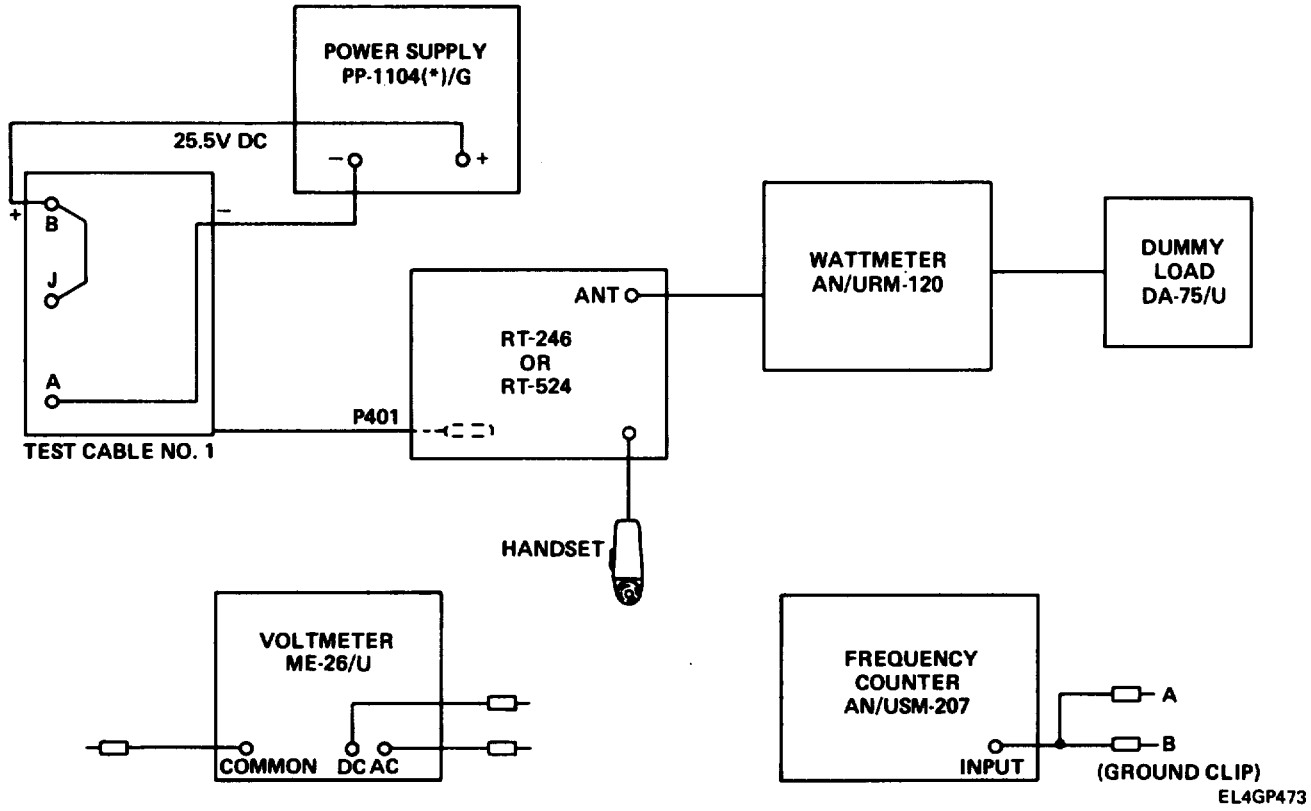


NOTE

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)

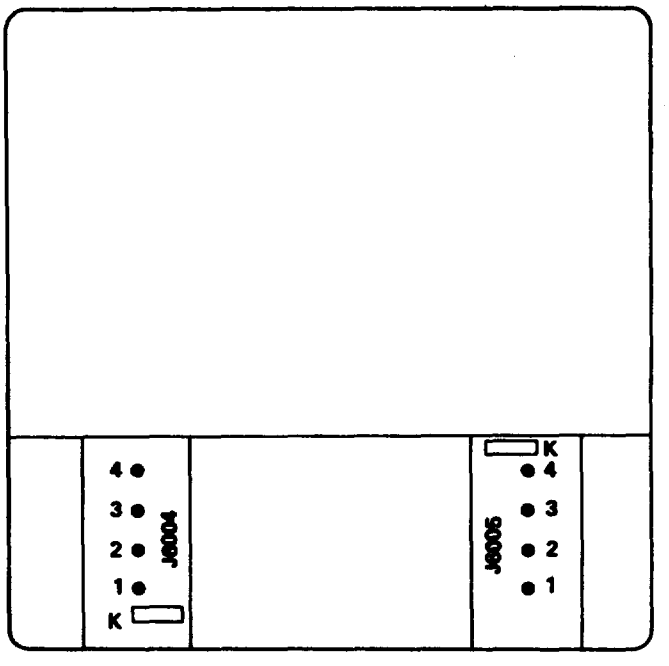
CHART 5-16
Main Circuit Board Assembly A6000A, and Modules
A6300A and A6400A Troubleshooting
(Sheet 3 of 5)



5-23 TROUSLESHOOTING FLOW CHARTS. (CONT)

CHART 5-16
Main Circuit Board Assembly A6000A, and Modules
A6300A and A6400A Troubleshooting
(sheet 4 of 5)

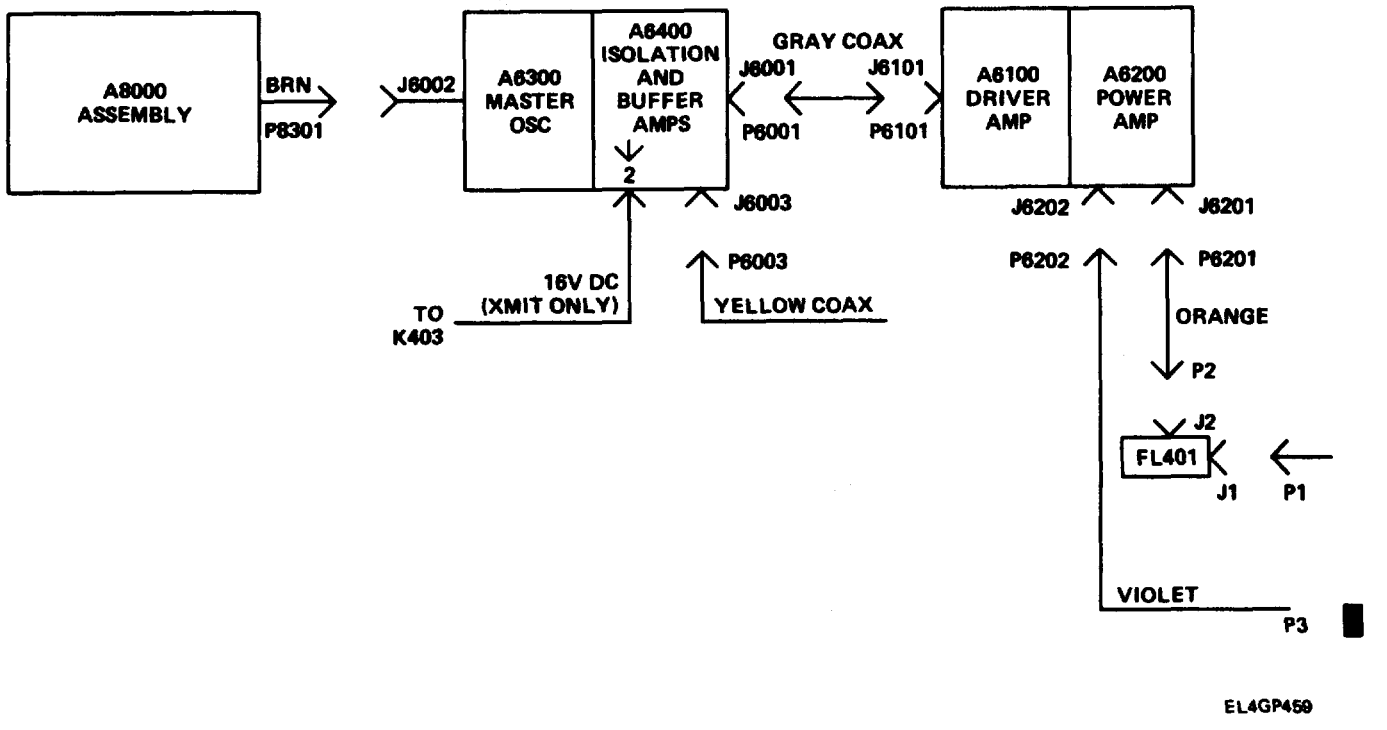
A6000 MAIN CIRCUIT BOARD PINS
(A6300AND A6400 REMOVED)



EL4GP466

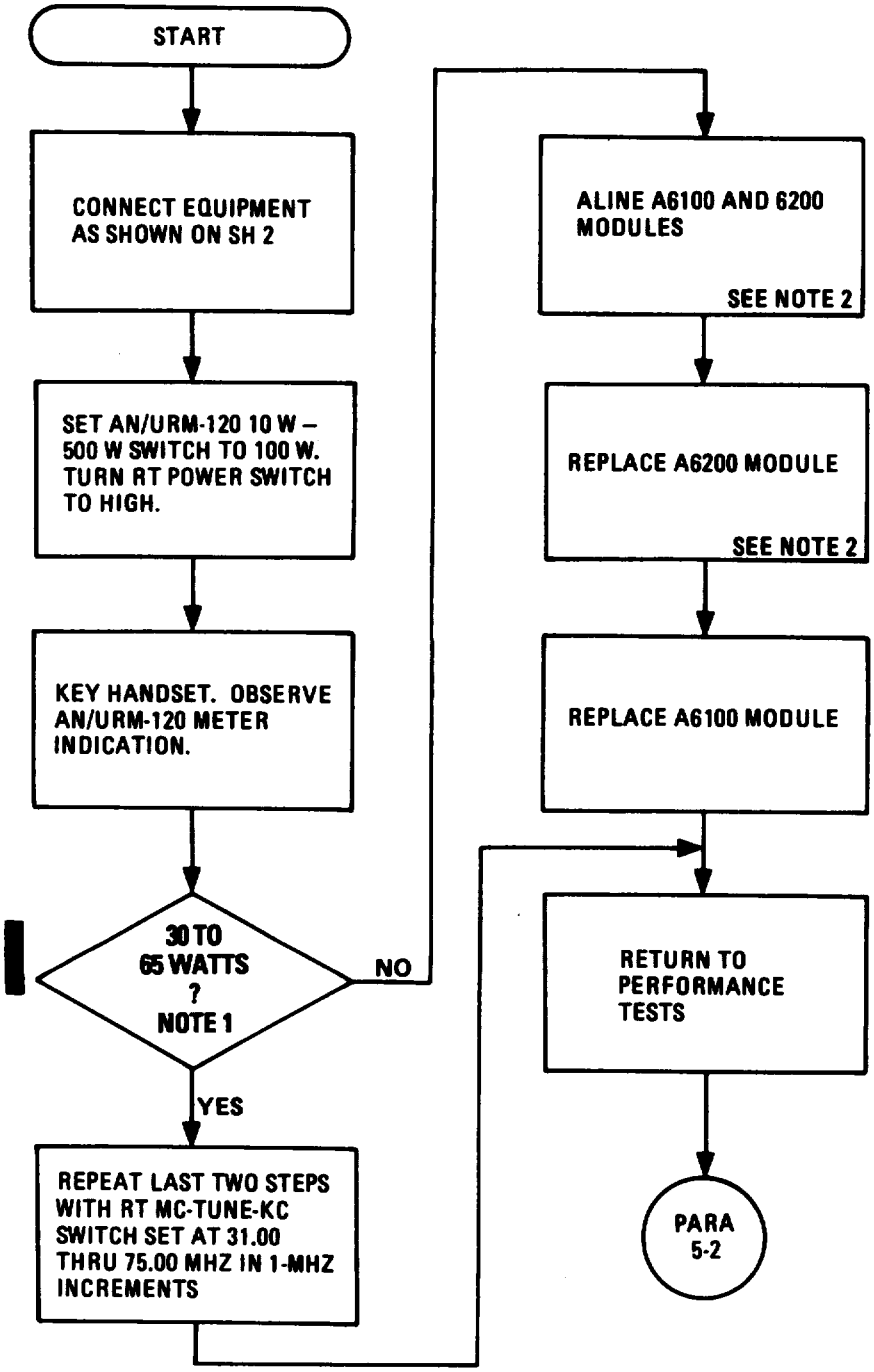
5-23. TROUBLESHOOTING FLOW CHARTS.(CONT)

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)

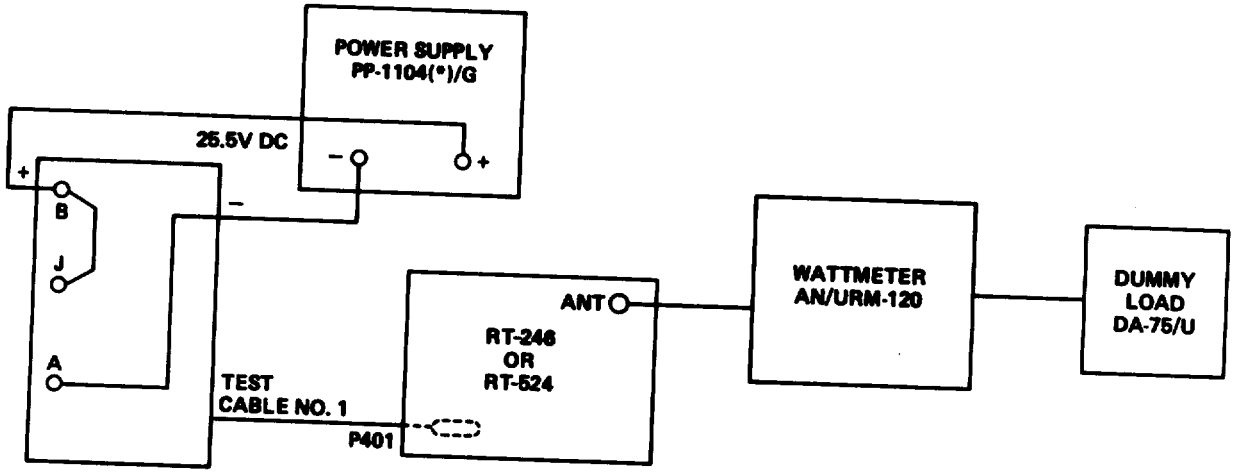


NOTES

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.

5-23 TROUBLESHOOTING FLOW CHART. (CONT)

CHART 5-17
A6100 and A6200 Assemblies Troubleshooting
(sheet 2 of 2)



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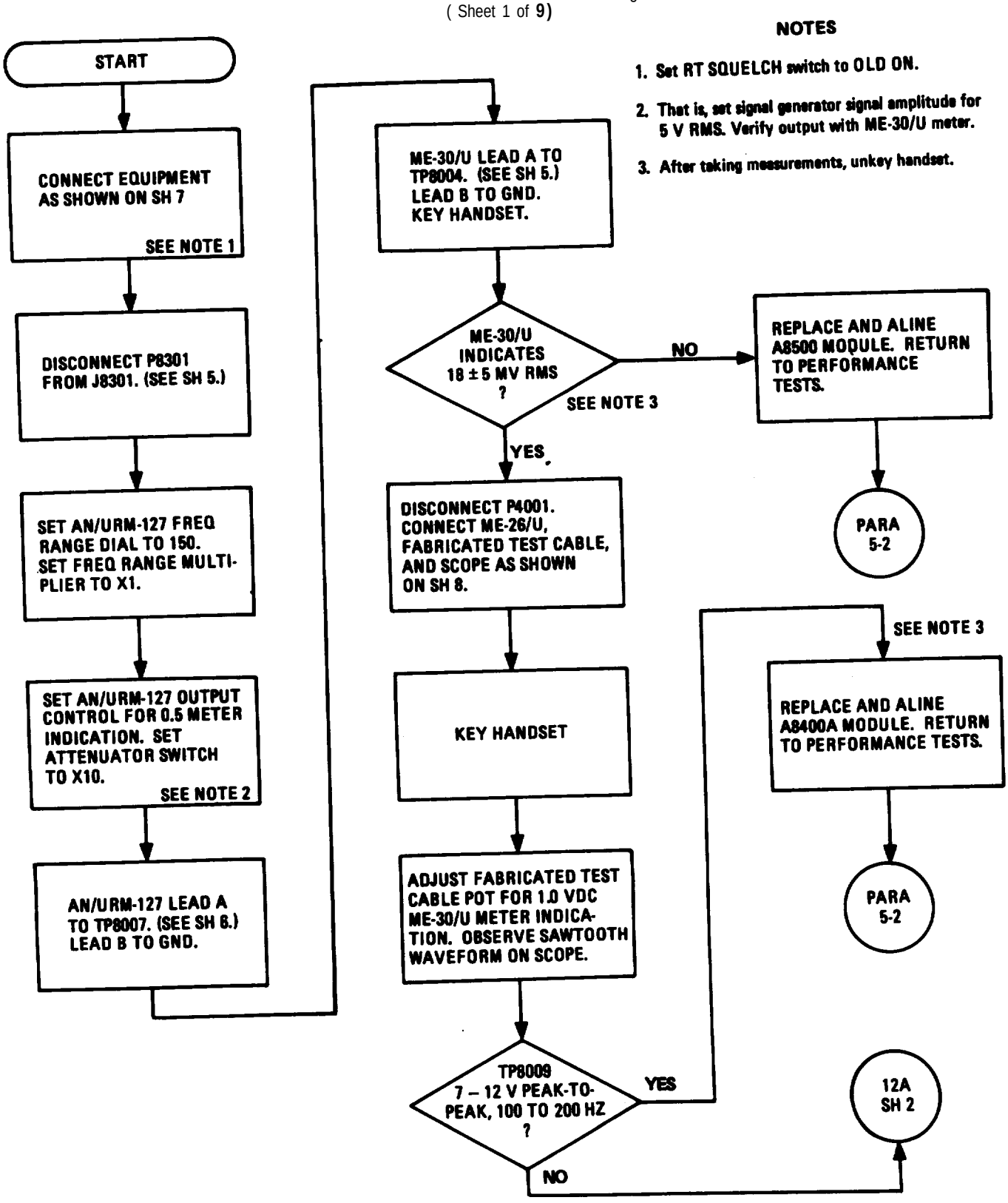
6-29. TROUBLEHOOTING FLOW CHARTS. (CONT

CHART 5-18

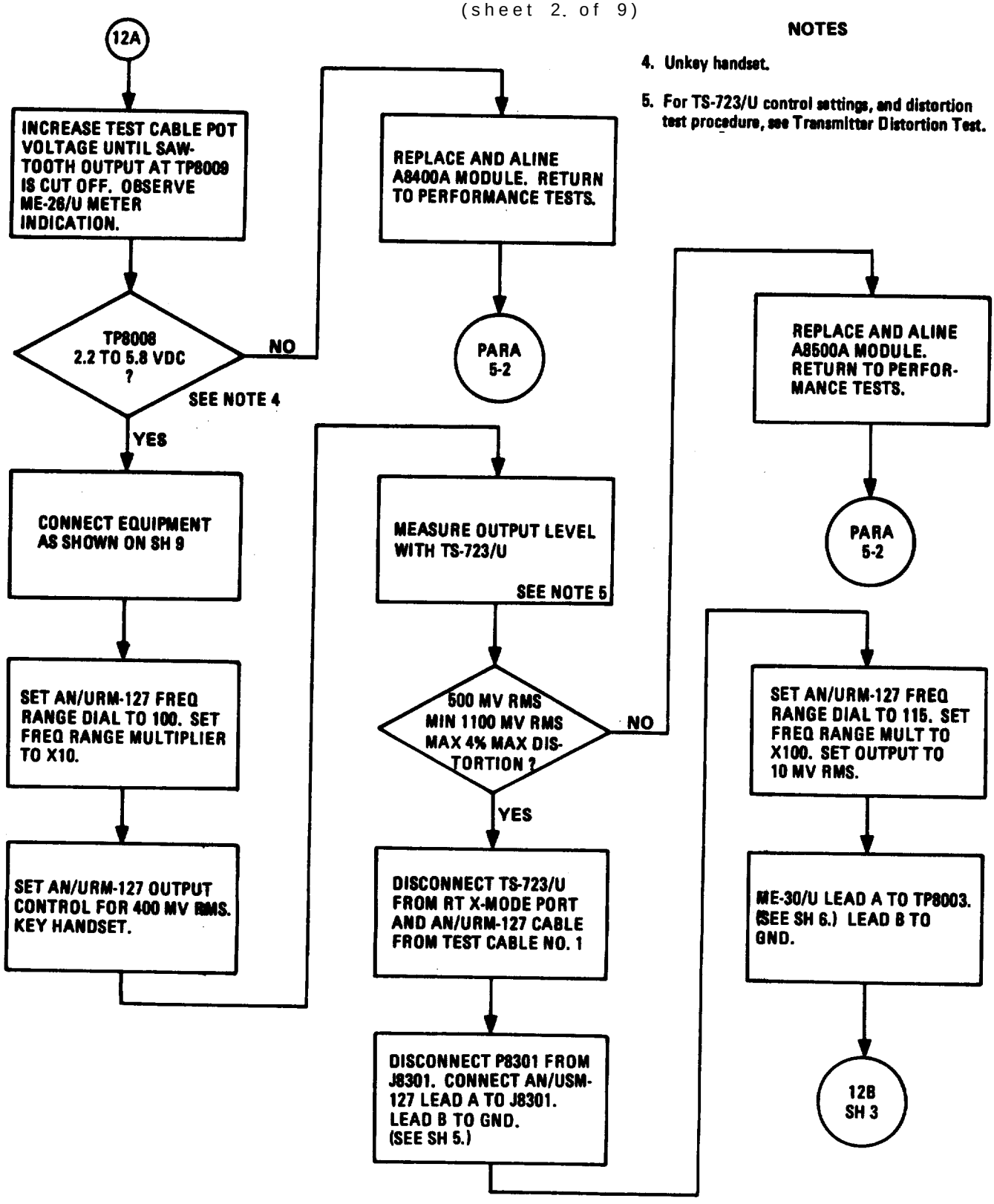
A8000A Assemblv Troubleshooting

(Sheet 1 of 9)



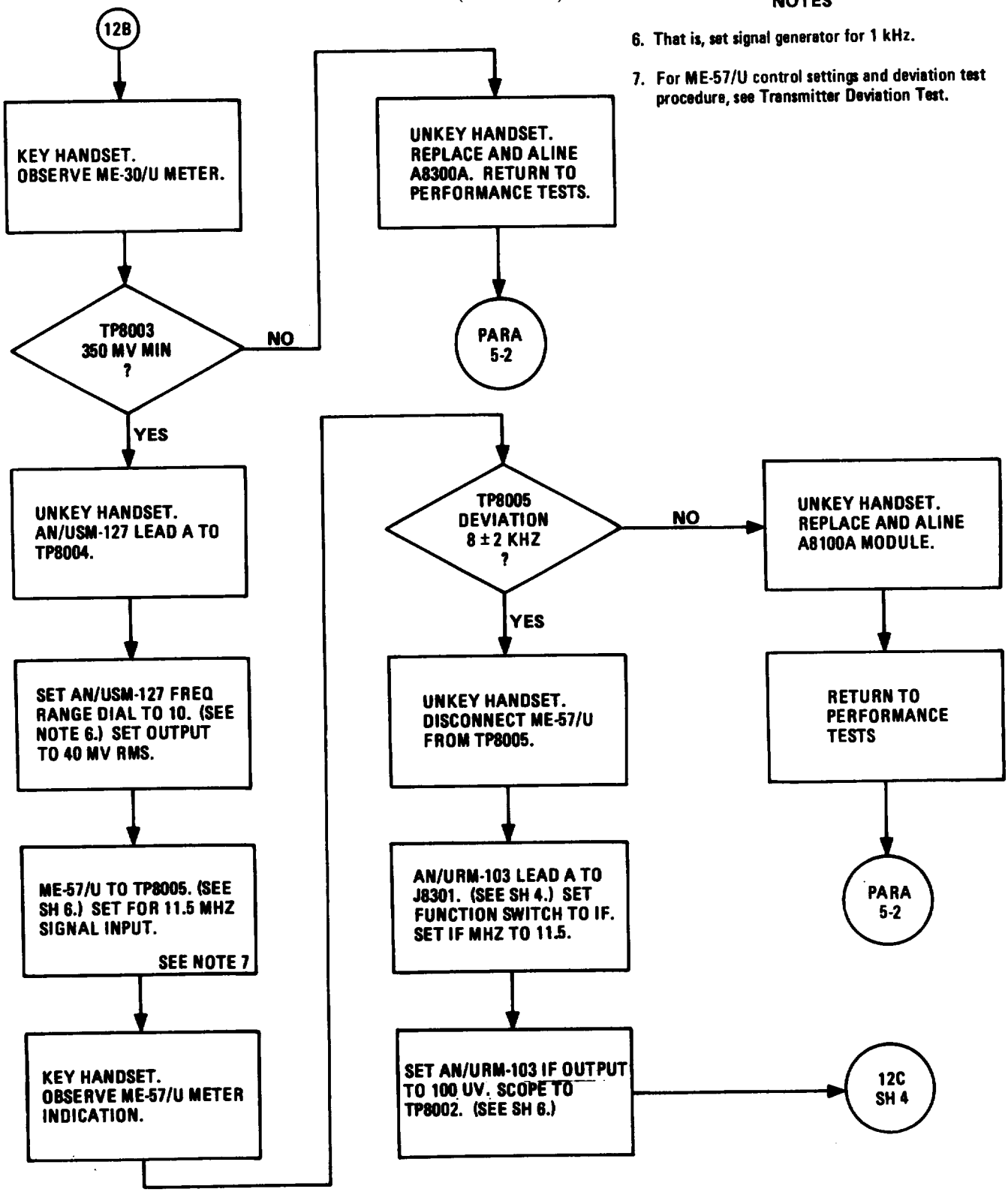
5-23 TROUBLESHOOTING FLOW CHARTS.(CONT)

CHART 6-18
A800OA Assembly Troubleshooting
(sheet 2. of 9)



5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 518
A8000A Assembly Troubleshooting
(sheet 3 of 9)

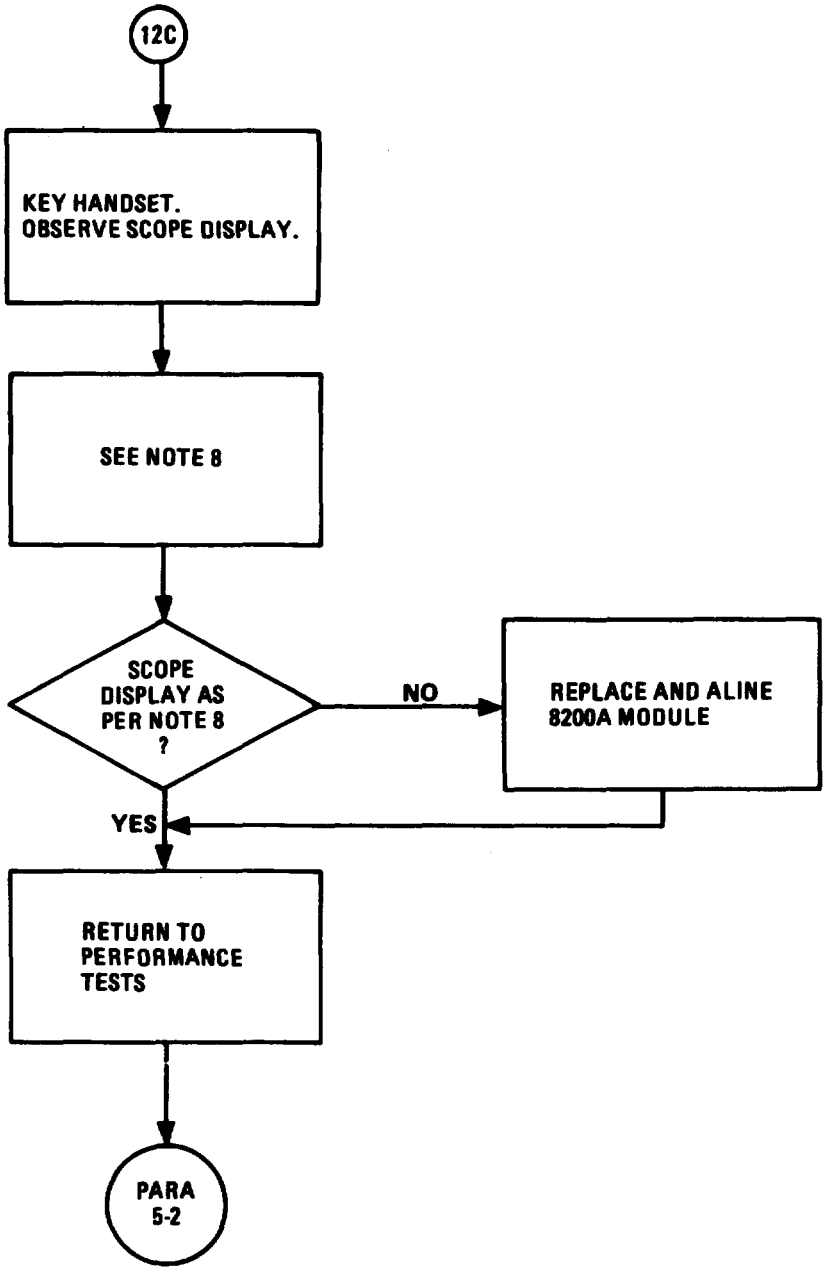


NOTES

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)

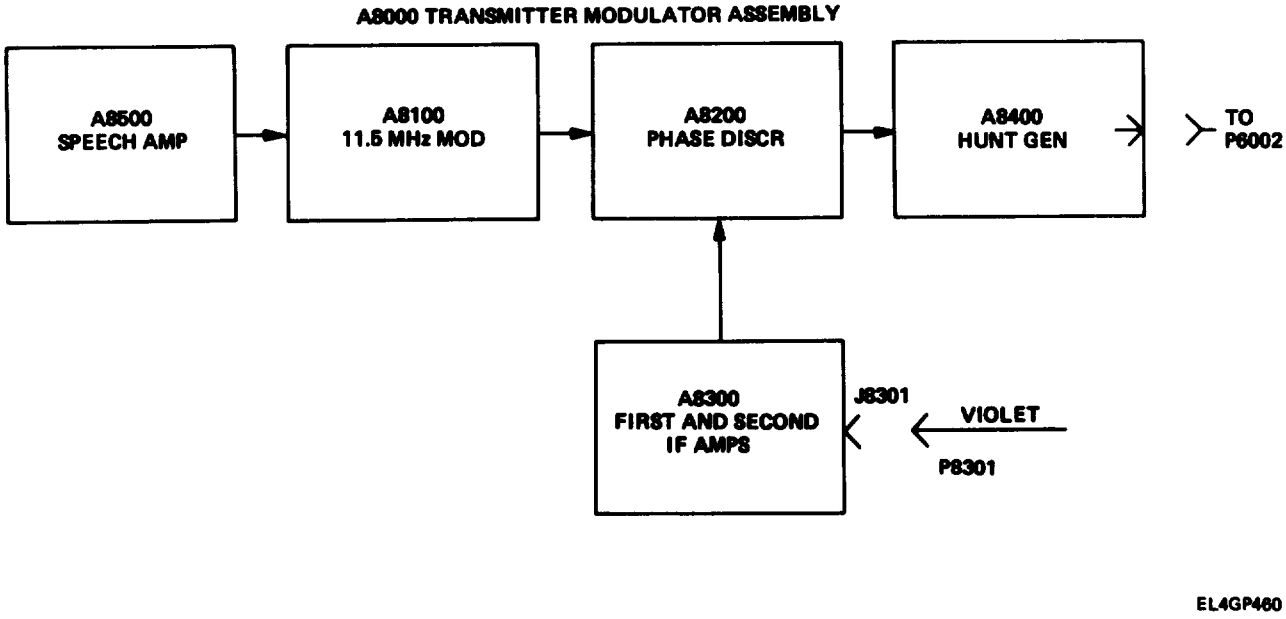


NOTE

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.

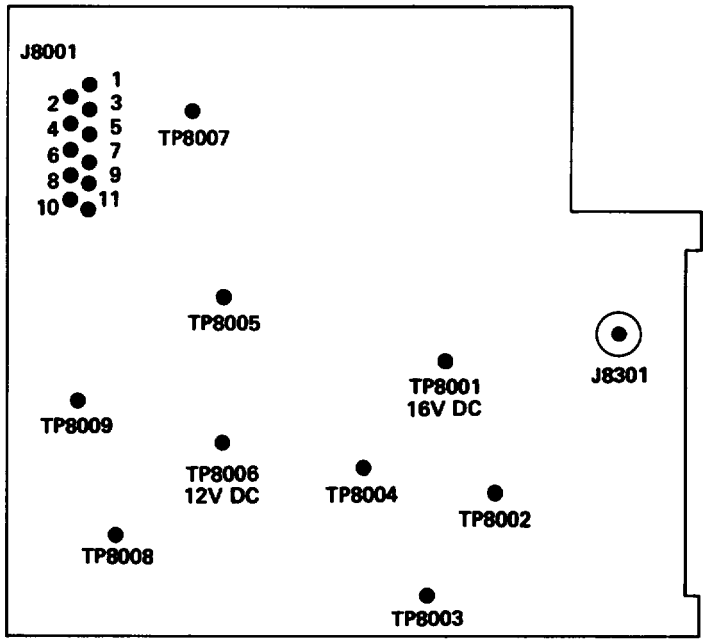
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

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)



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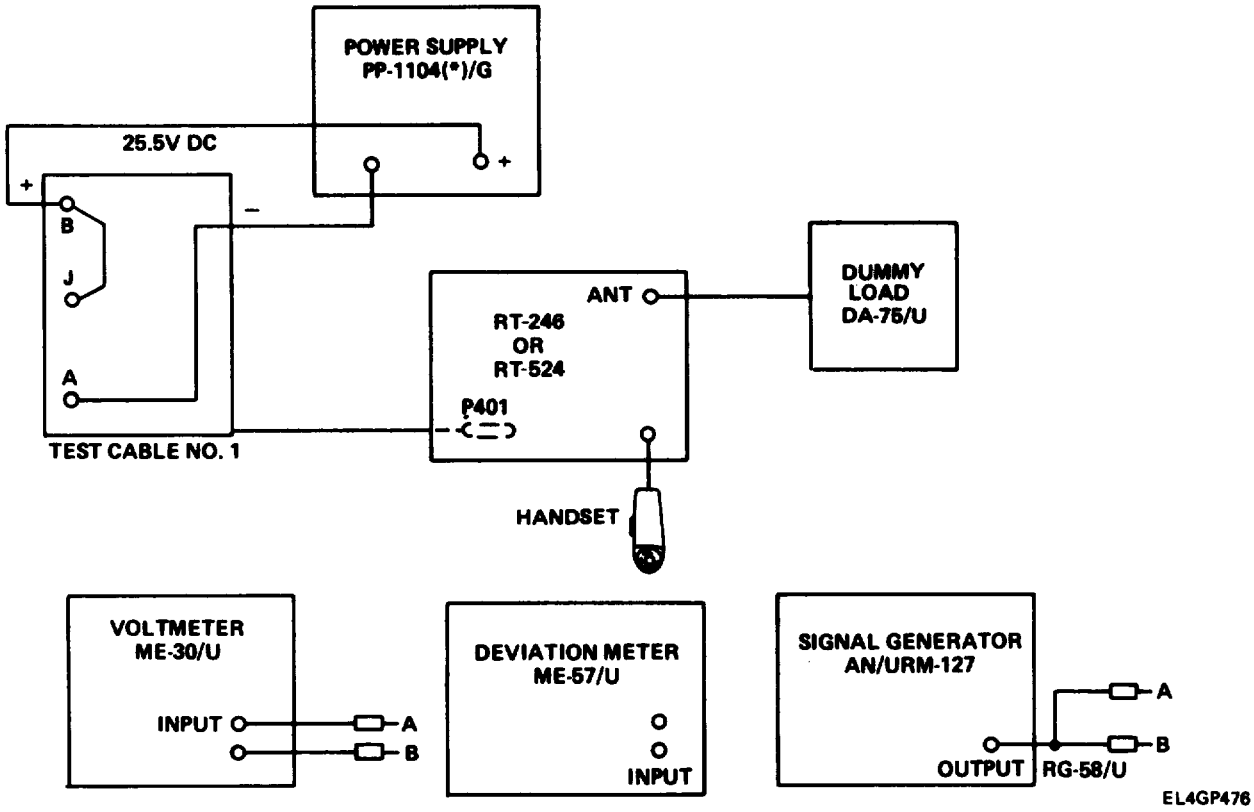
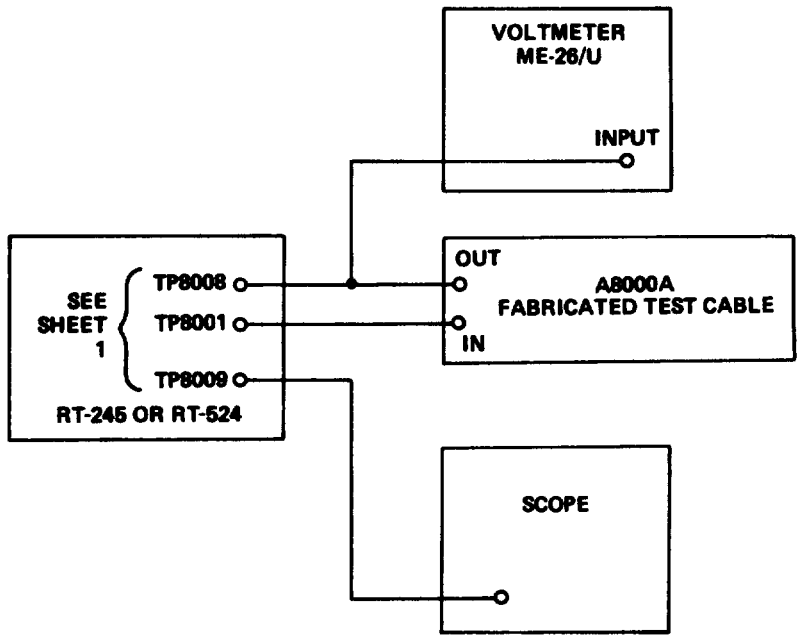
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

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)



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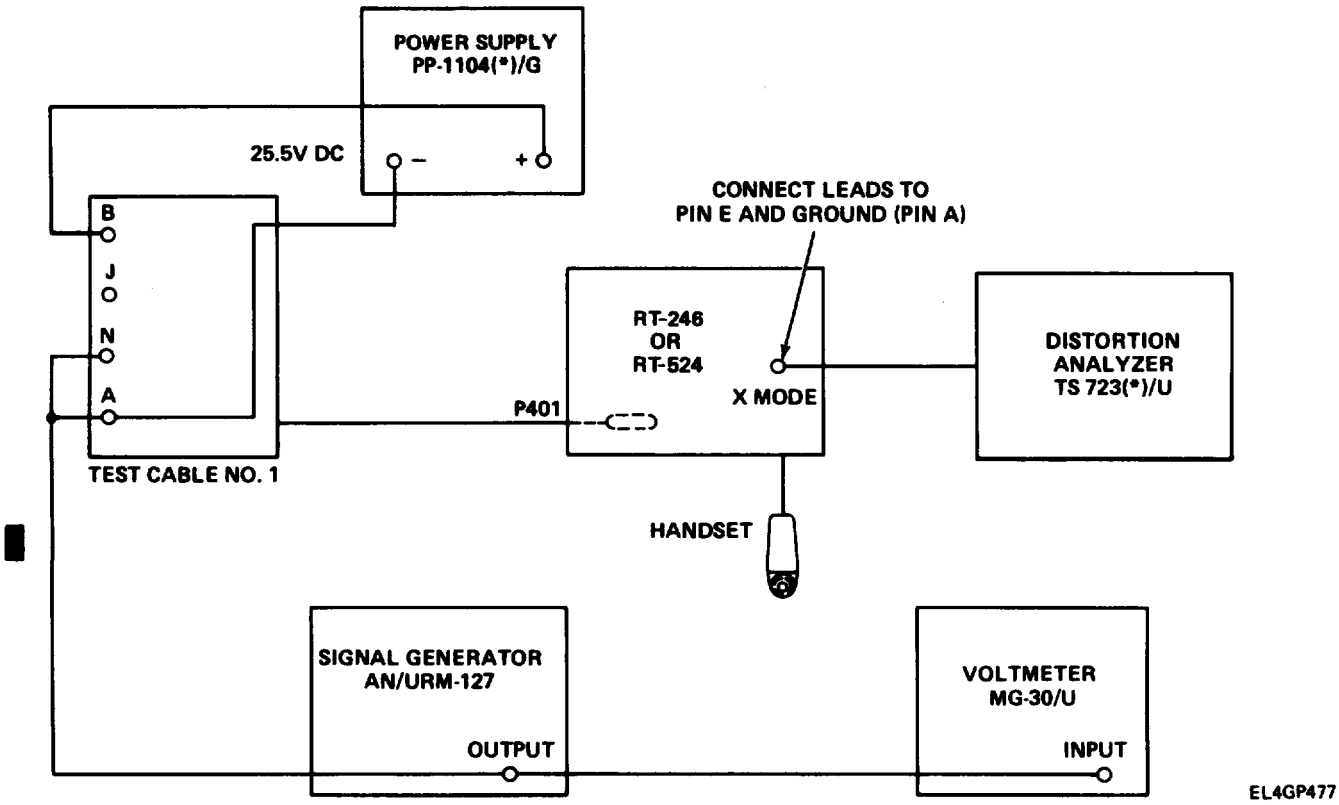
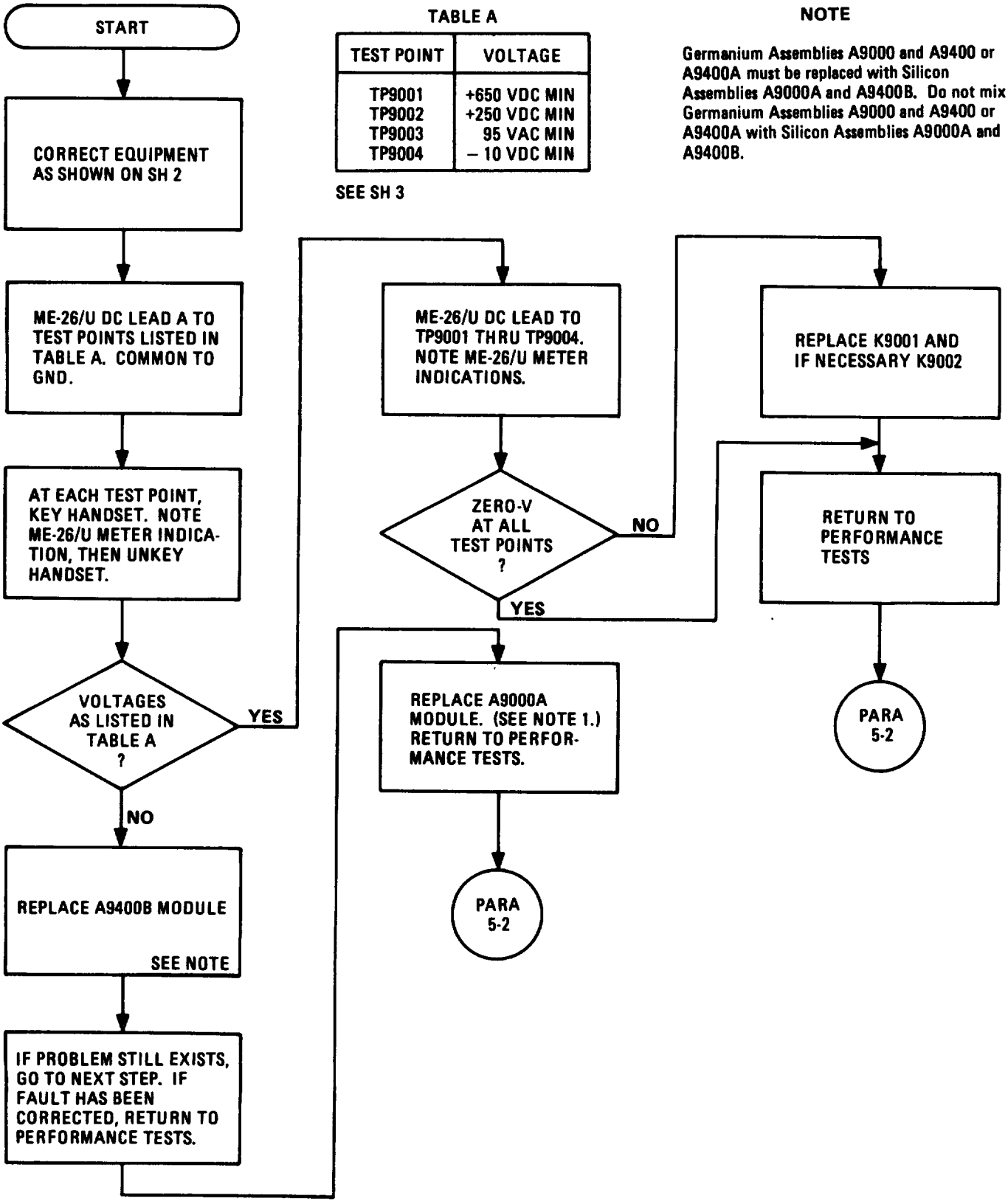
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-18
A8000A Assembly Troubleshooting
(Sheet 9 of 9)



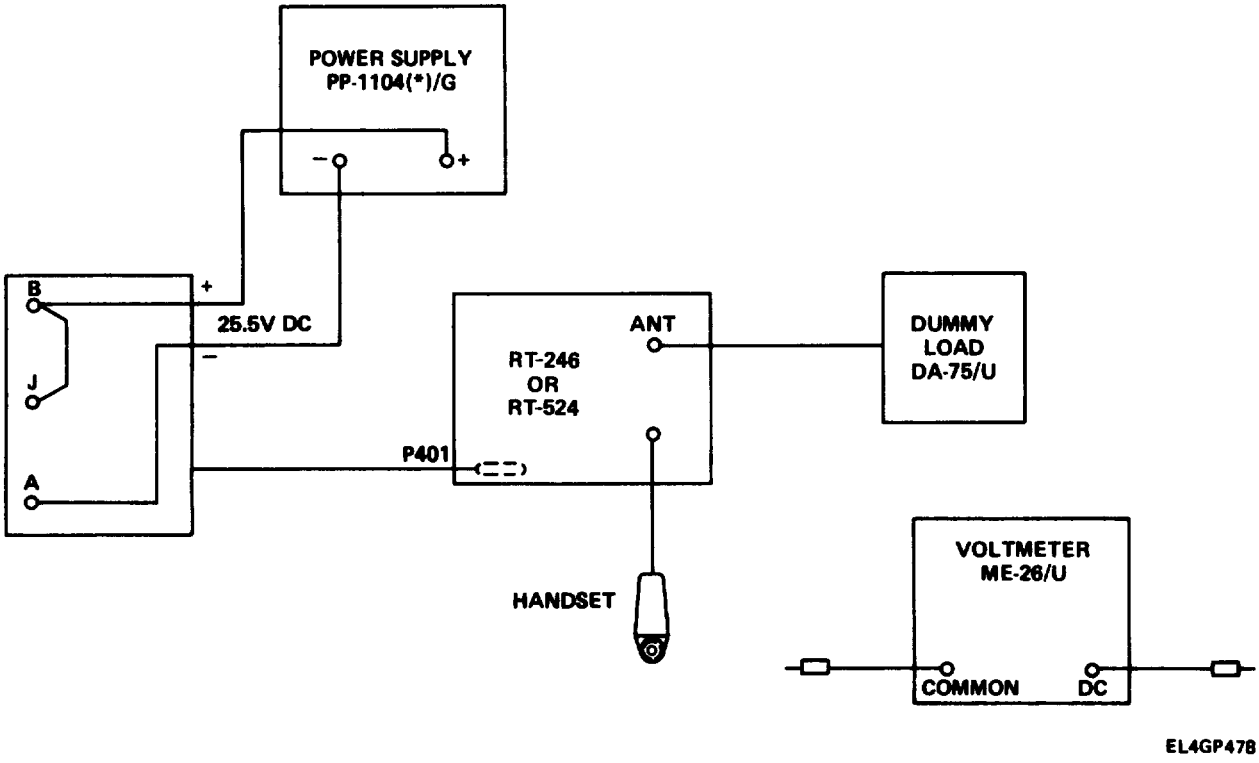
5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-19
A9000A and A9400B Assemblies Troubleshooting
(Sheet 1 of 3)



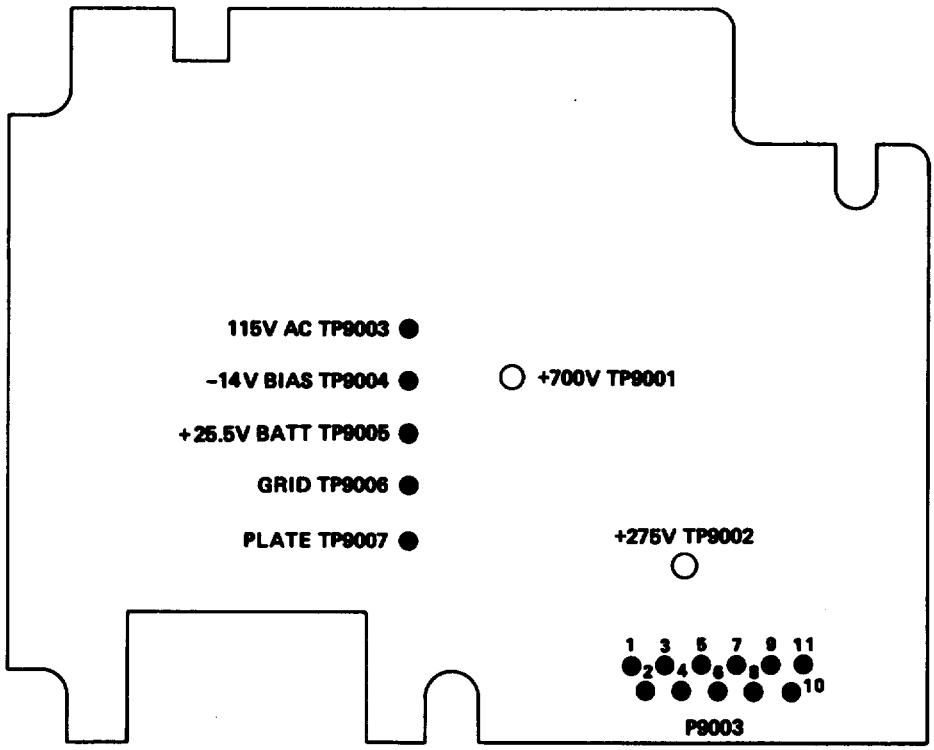
523. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-19
A9000A and A9400B Assemblies Troubleshooting
(Sheet 2 of 3)



5-23. TROUBLESHOOTING FLOW CHARTS. (CONT)

CHART 5-19
A9000A and A9400B Assemblies Troubleshooting
(Sheet 3 of 3)



EL4GP471

Section III ALINEMENT AND ADJUSTMENT PROCEDURES

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 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.

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.

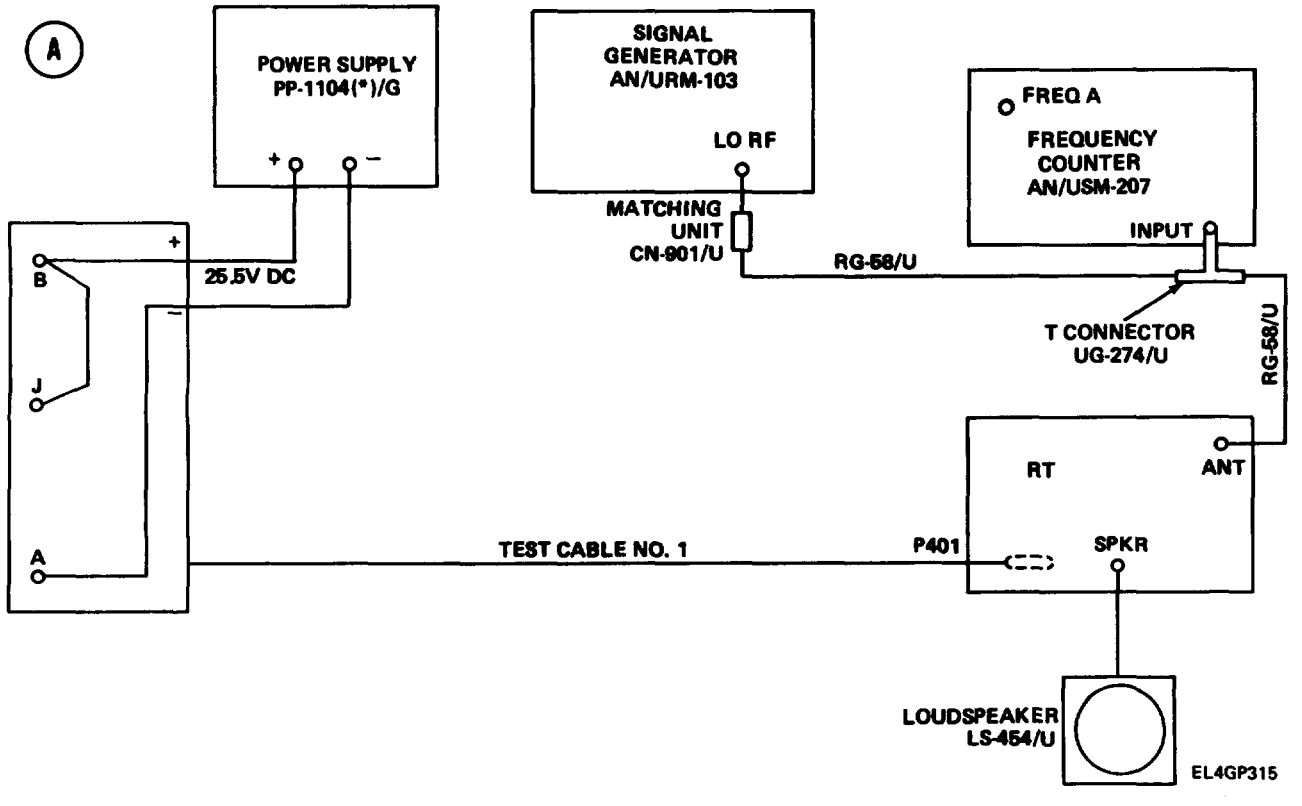
5-25. CRYSTAL REFERENCE SYSTEM (CRS) TEST

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	Matching Unit CN-901/U
Frequency Counter AN/USM-207	T-Connector UG-274/U
Power Supply PP-1104(*)/G	Loudspeaker LS-454/U
Test Cable No. 1	Multimeter ME-26(*)/U
Rf Cable RG-58/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

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	Ⓐ
	MC-TUNE-KC	30.00
	VOLUME	Clockwise one-third turn
	SQUELCH	NEW OFF
AN/URM-103	OPERATE/OFF/STAND BY	OPERATE (allow 15-minute warmup)
	FUNCTION	1000 Hz
	BAND SWITCH	Ⓑ
	RF TUNING	30.00
	DEVIATION RANGE KHZ	10
	RF OUTPUT	LO, 0-10 KUV
	DEVIATION	Fully counterclockwise
	RF SET TO LINE	Adjust until needle on IF UV RF SET TO LINE meter Is over red line
	LO RF UV	100 µv
AN/USM-207	POWER	Track (allow 5-minute warmup)
	DISPLAY	MIN (fully counterclockwise)
	SENSITIVITY	PLUG IN
	FUNCTION	FREQ
	GATE TIME	10^4 (black knob)
	DIRECT/HETERODYNE	DIRECT
	INPUT	0.3 V MAX (both switches to left)
	FREQUENCY TUNING-MC	100

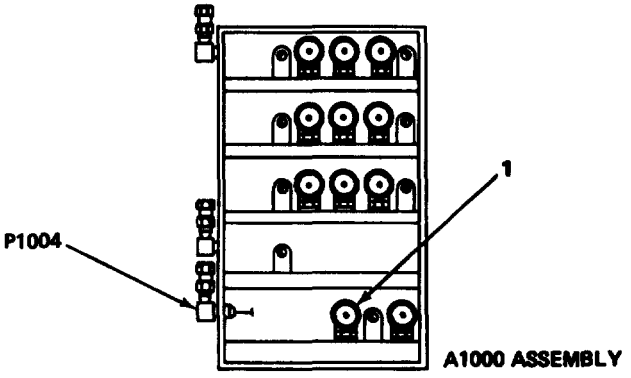
TEST PROCEDURE

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)

B



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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 frequencyto 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.

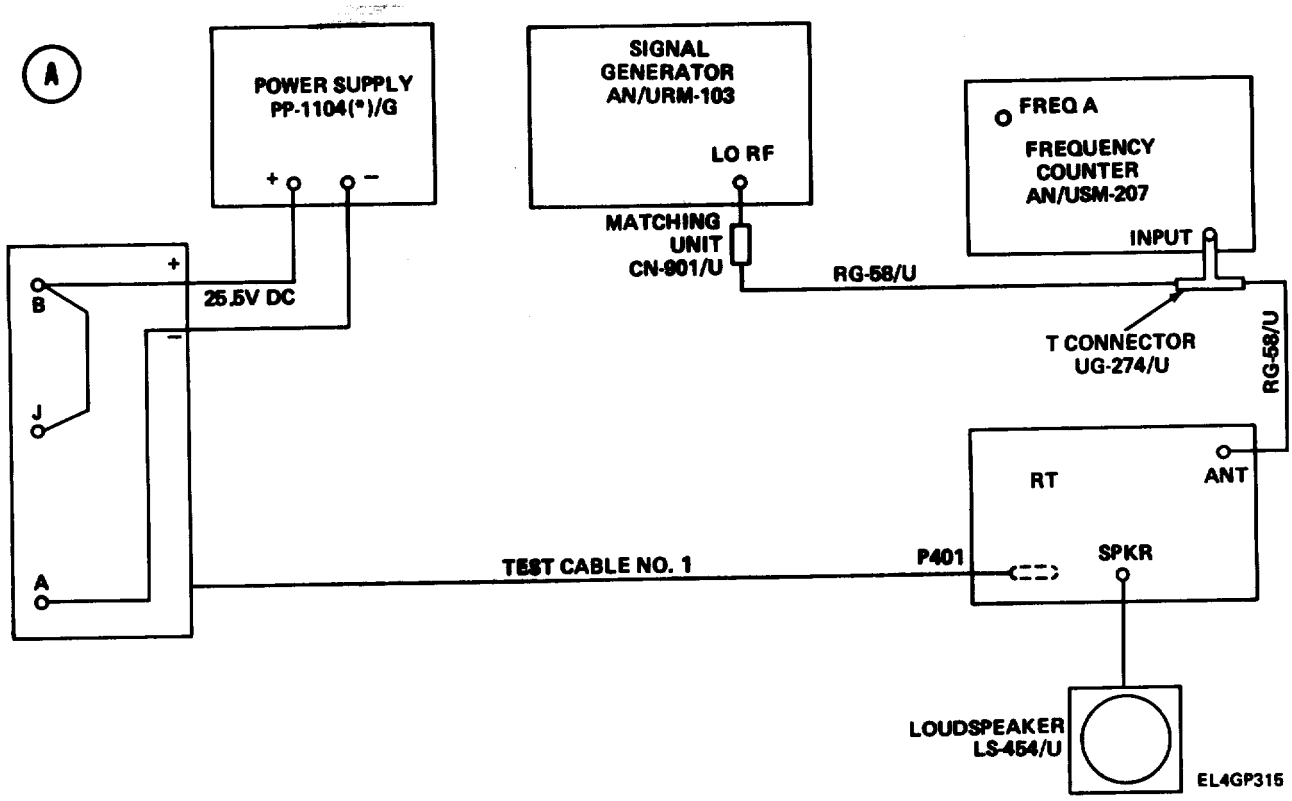
PURPOSE. If the local oscillator is operating at the correct frequency, the CRS will not output a dc error signal. This procedure alines the oscillator by tuning its circuits to bring the CRS error signal as close to zero as possible. The Crystal Reference System Test (paragraph 5-25) must be done prior to performing this alinement.

TEST EQUIPMENT AND MATERIALS

Signal Generator AN/URM-103	Matching Unit CN-901/U
Frequency Counter AN/USM-207	T-Connector UG-274/U
Power Supply PP-1104(*)/G	Loudspeaker LS-454/U
Test Cable No. 1	Multimeter ME-26(*)/U

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

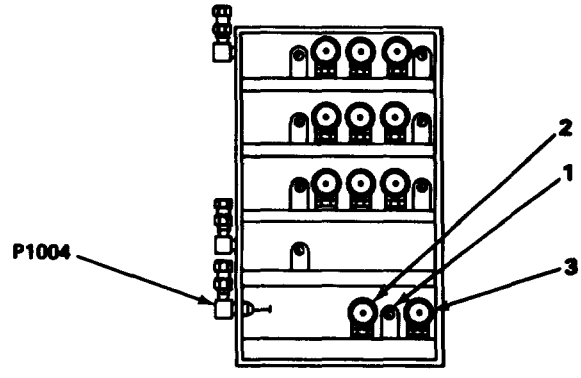
Cheek the frequency counter to make sure that the signal generator is outputting exactly 42 MHz. The rf level must be increased temporarily to enable the frequency counter to display. Adjust the AN/URM-103 RF TUNING Control as necessary, reset to 100-µv rf level, then disconnect the T-connector from 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 ALINEMENT. (CONT)

ALINEMENT PROCEDURE

Ⓑ



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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 Ⓑ.)
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 ALINEMENT PROCEDURE

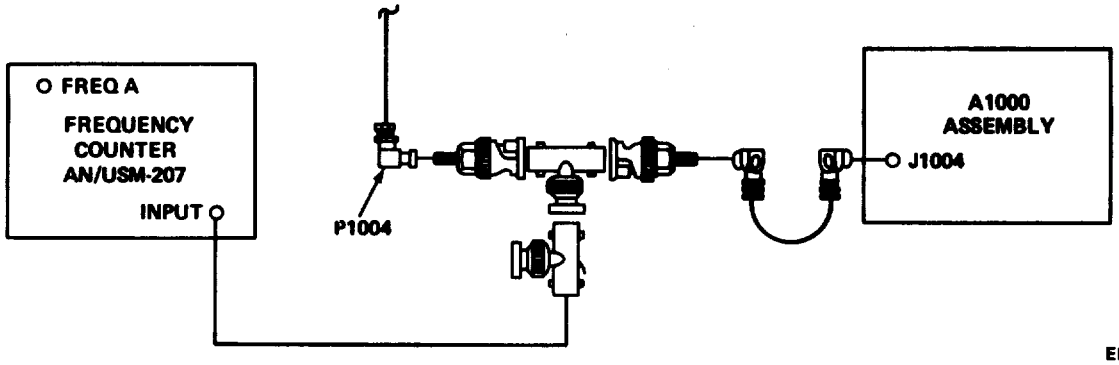
PURPOSE. This procedure permits alinement of the local oscillator without the use of a signal generator. The frequency of the local oscillator is checked directly with a counter; therefore, the presence of an audible audio tone is not important. Thus, alinement does not depend on the performance of the A4000 or A5000 sections of the receiver. The CRS Test must be done prior to performing this alinement (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).

(A)



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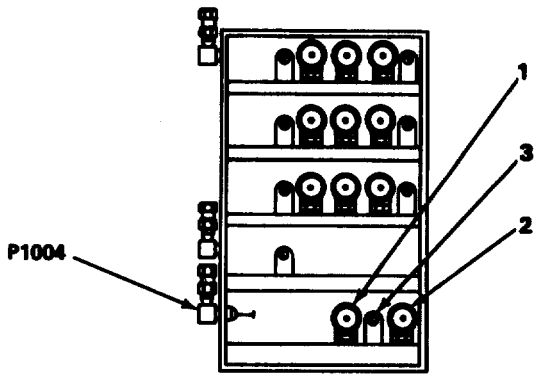
INITIAL EQUIPMENT CONTROL SETTINGS. Change the final settings used in the CRS Test as follows:

1. Set RT MC-TUNE-KC control to 30.00 MHz.
2. Set AN/USM-207 Sensitively switch as necessary to trigger frequency counter.

ALINEMENT PROCEDURE

(B)



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5-27. LOCAL OSCILLATOR A1500 ALTERNATE ALINEMENT 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 ALINEMENT.

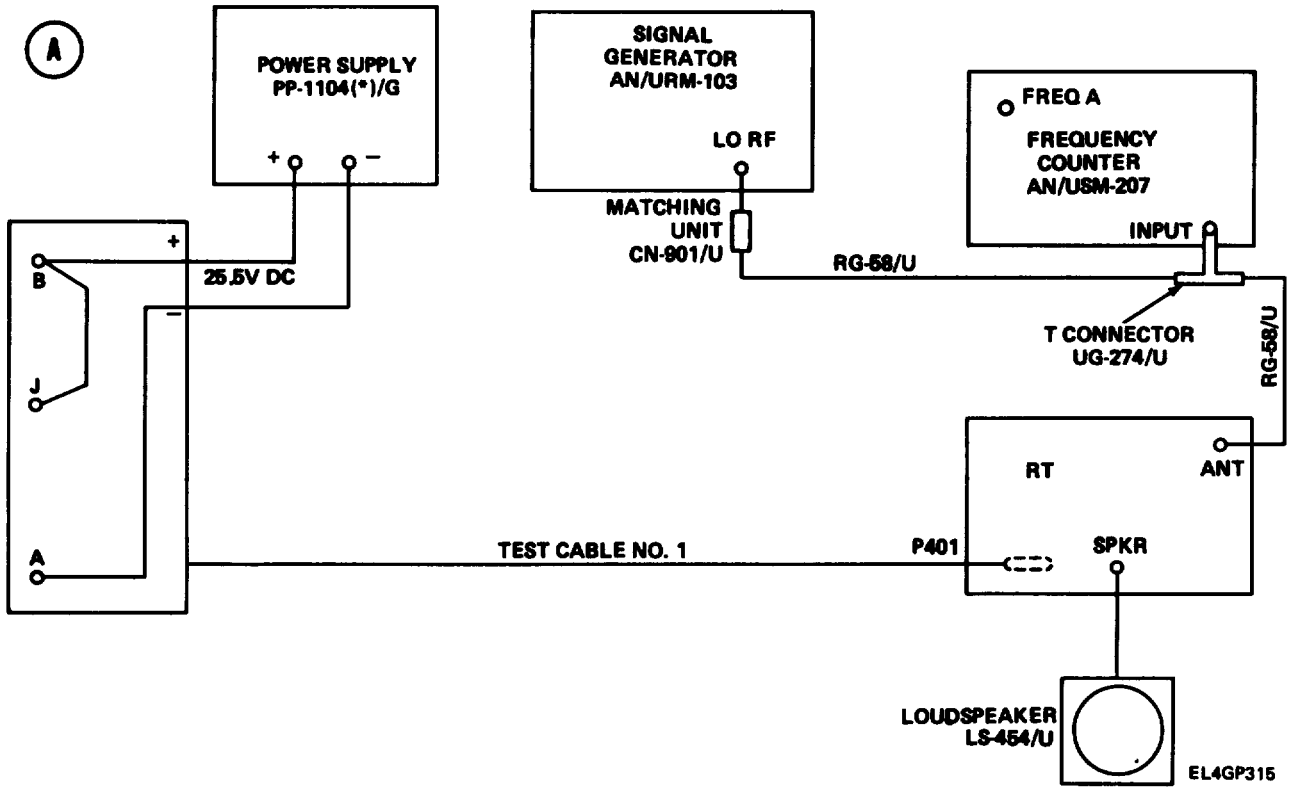
PURPOSE. This procedure tunes the A1000 assembly to produce maximum amplification of low-level signals and maximum attenuation of noise.

TEST EQUIPMENT AND MATERIALS

Signal Generator AN/URM-103	Matching Unit CN-901/U
Frequency Counter AN/USM-207	T-Connector UG-274/U
Power Supply PP-1104(*)/G	Loudspeaker LS-454/U
Test Cable No. 1	Voltmeter ME-30(*)/U

TEST SETUP. Connect equipment as shown in test setup diagram Ⓐ, page 5-159.

5-28. TUNER A1000 ALINEMENT. (CONT)



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 alinement requirements.

CONTROL AND SWITCH SETTINGS

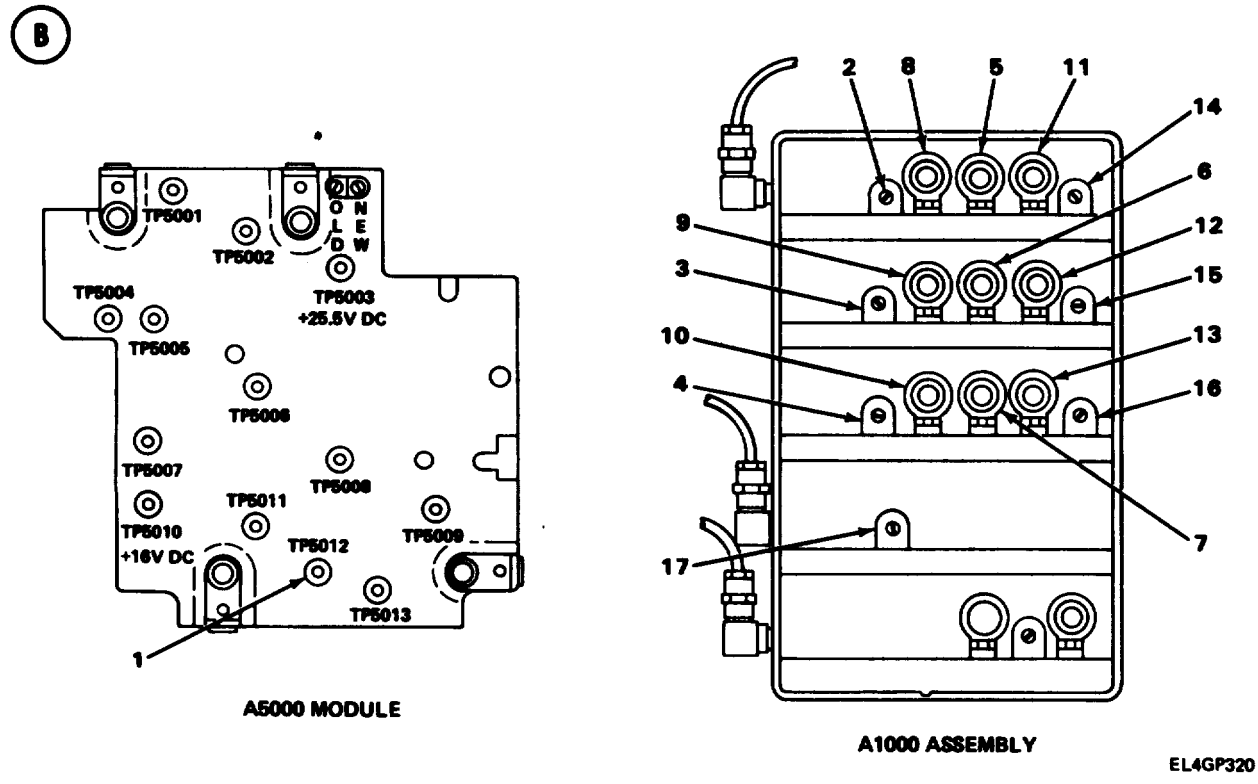
EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTiNG
RT	POWER	LOW
	BAND	(A)
	MC-TUNE-KC	30.00
	SQUELCH	NEW OFF
	VOLUME	Fully clockwise
AN/URM-103	FUNCTION	MOD OFF
	RF OUTPUT	LO, 0-10 KUV
	LO RF UV	Set to zero output
	BAND SWITCH	(B)
	RF TUNING	30.00
	OPERATE/OFF/STAND BY	OPERATE

5-28. TUNER A1000 ALINEMENT. (CONT)

CONTROL AND SWITCH SETTINGS (CONT)

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/USM-207	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	SENSITIVITY	PLUG IN
	FUNCTION	FREQ
	GATE TIME	10^3 (black knob)
	DIRECT/HETERODYNE	DIRECT
	INPUT	0.3 V MAX (both switches to left)
	FREQUENCY TUNING-MC	100

ALINEMENT 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 ALINEMENT. (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 ME30(*)/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 Ⓔ, 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 ME30(*)/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 minumum noise from speaker. (See test setup diagram Ⓔ.)

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 Ⓔ.)

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 Ⓔ.)

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 Ⓑ .)

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.

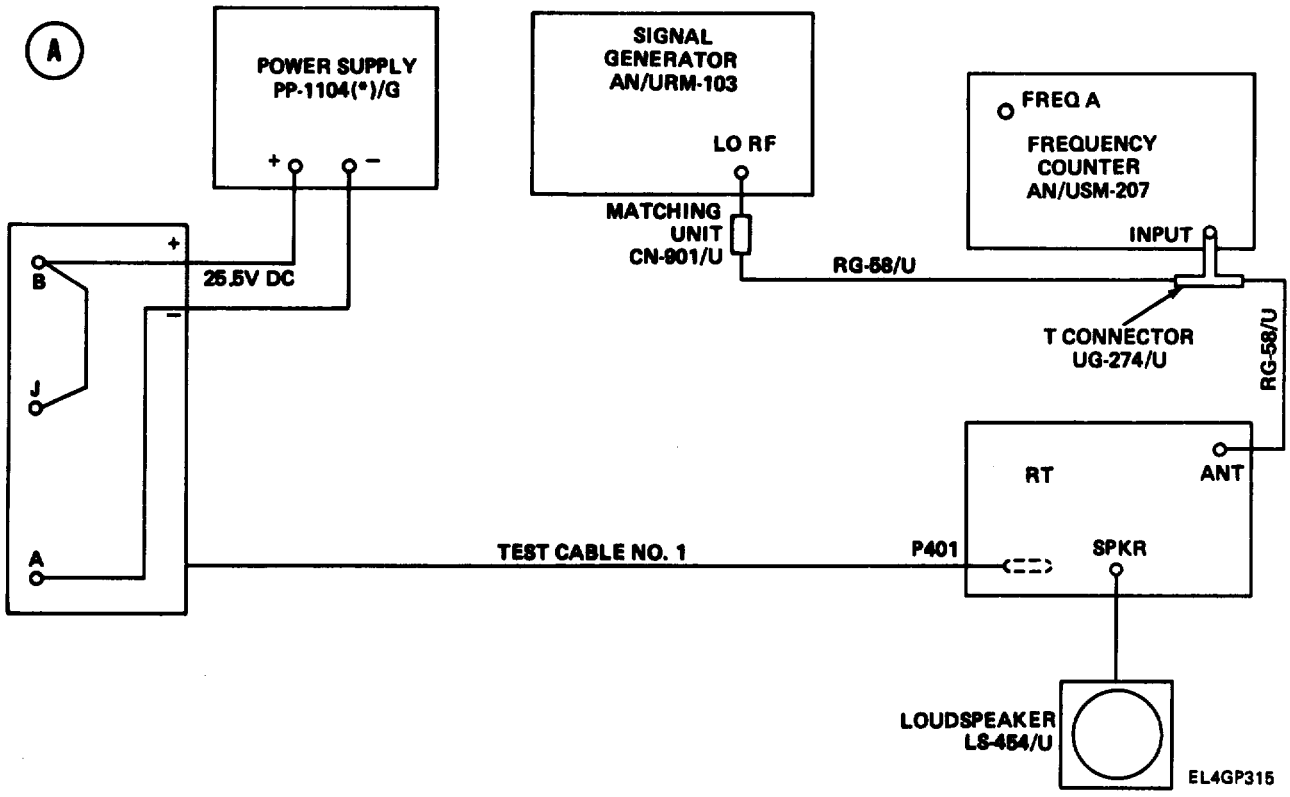
PURPOSE. This procedure enables the discriminator to provide maximum separation of the audio signal from the rf carrier. Adjusting for zero vdc at TP4003 ensures that TA206 and T4207 are conducting equally around the carrier frequency. Adjusting for maximum ac at TP4007 ensures that the discriminator is tuned exactly to the 11.5-MHz center frequency.

TEST EQUIPMENT AND MATERIALS

Signal Generator AN/URM-103
Frequency Counter AN/USM-207
Power Supply PP-1104(*)/G
Test Cable No. 1
Multimeter ME-26(*)/U
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 Ⓐ , page 5-163.

5-29. IF DISCRIMINATOR A4200 ALINEMENT. (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

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	(A)
	MC-TUNE-KC	30.00
	VOLUME	Fully clockwise
	SQUELCH	NEW OFF
AN/URM-103	OPERATE/OFF/STAND BY	OPERATE
	FUNCTION	1000 Hz
	BAND SWITCH	(B)
	RF TUNING	30.00
	DEVIATION RANGE KHZ	10
	RF OUTPUT	LO, 0-10 KUV
	DEVIATION	Fully counterclockwise
	RF SET TO LINE	Adjust until needle on IF UV RF SET TO LINE meter is over red line
	LO RF UV	20 µv

5-29. IF DISCRIMINATOR A4200 ALINEMENT. (CONT)

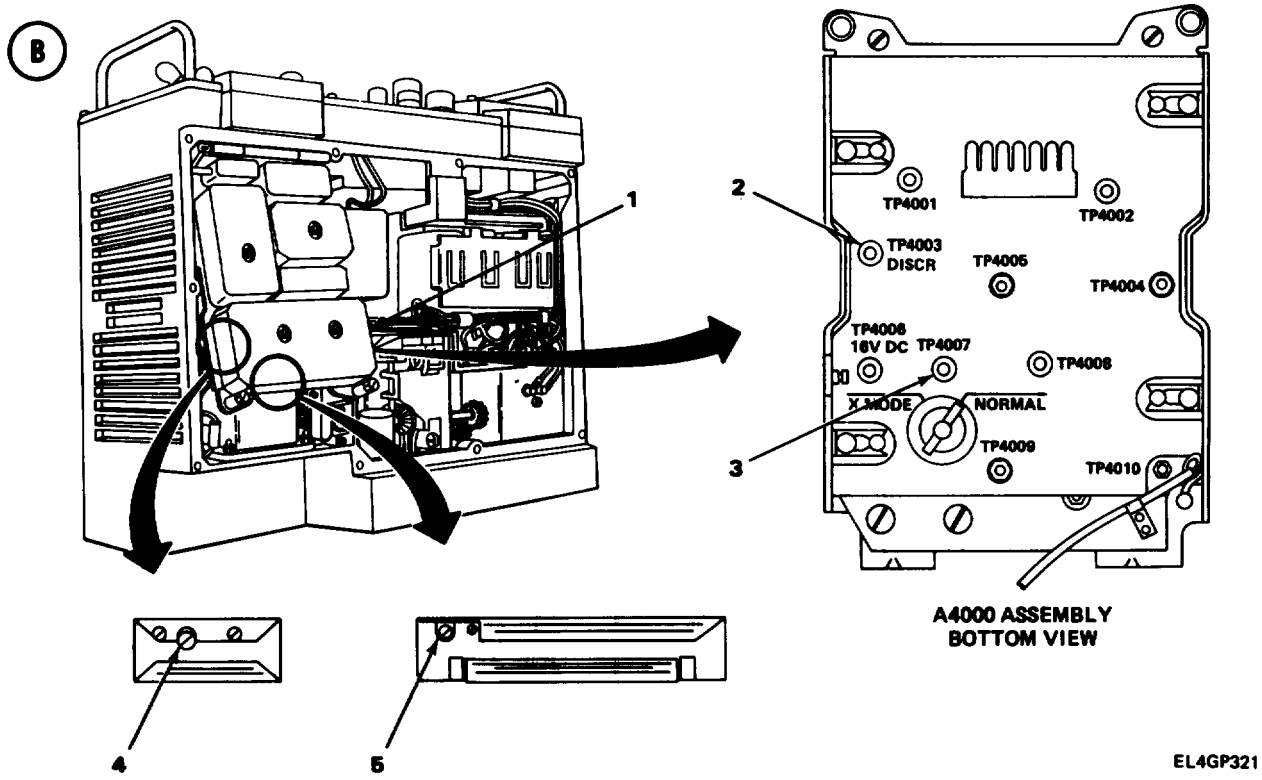
CONTROL AND SWITCH SETTINGS (CONT)

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/USM-207	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	SENSITIVITY	PLUG IN
	FUNCTION	FREQ
	GATE TIME	10^3 (black knob)
	DIRECT/HETERODYNE	DIRECT
	INPUT	0.3 V MAX (both switches to left)
	FREQUENCY TUNING-MC	100

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 ALINEMENT. (CONT)

1. Turn AN/URM-103 DEVIATION control clockwise until DEVIATION KHZ meter reads 8 kHz.
2. Set ME-26(*)/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.

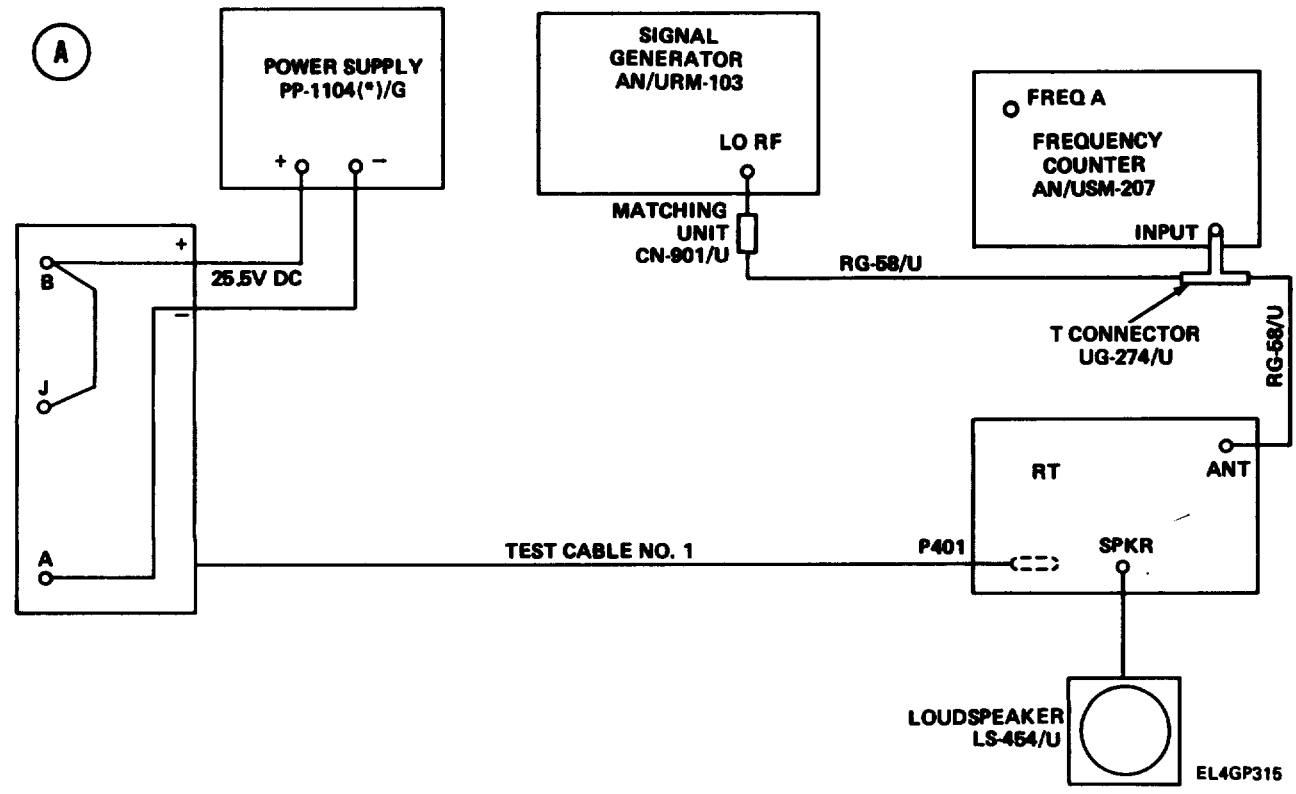
5-30. SILICON VERSION IF DISCRIMINATOR A4200A ALINEMENT.

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.

TEST EQUIPMENT AND MATERIALS

Signal Generator AN/URM-103	Matching Unit CN-901/U
Frequency Counter AN/USM-207	T-Connector UG-274/U
Power Supply PP-1104(*)/G	Loudspeaker LS-454/U
Test Cable No. 1	Voltmeter ME-30(*)/U

TEST SETUP. Connect the equipment as shown in test set up diagram (A).



5-30. SILICON VERSION IF DISCRIMINATOR A4200A ALINEMENT. (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

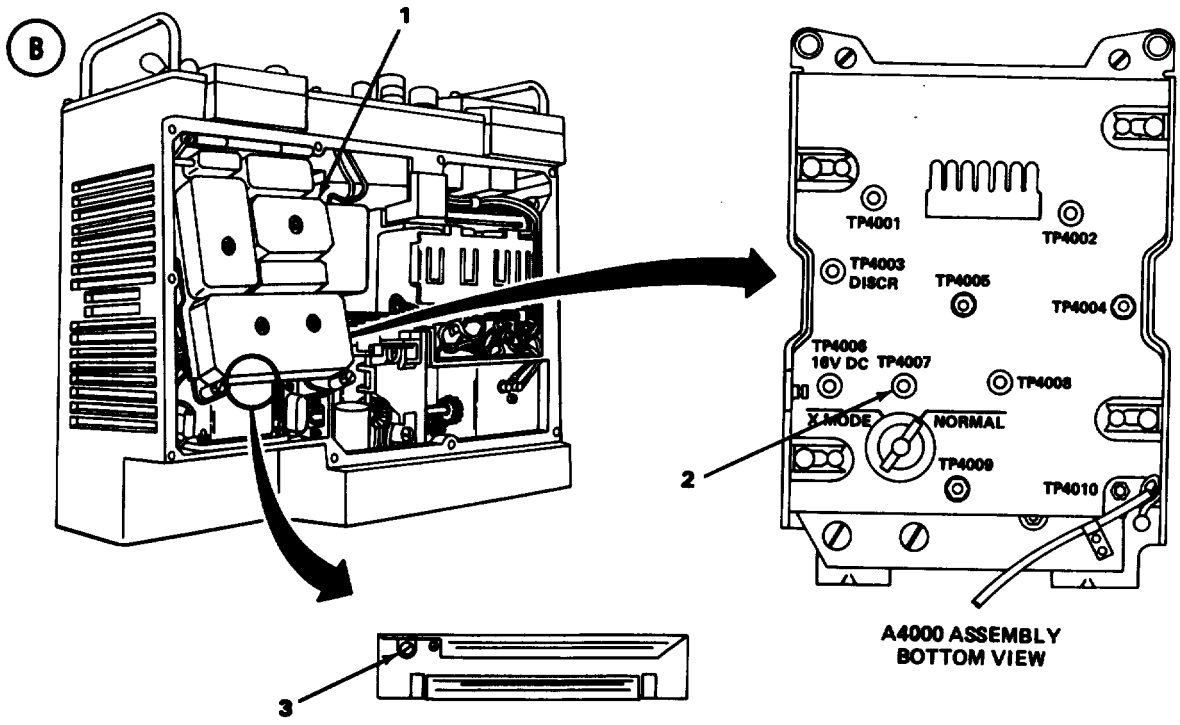
EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	Ⓐ
	MC-TUNE-KC	30.00
	VOLUME	Fully clockwise
	SQUELCH	NEW OFF
AN/URM-103	OPERATE/OFF/STAND BY	OPERATE
	FUNCTION	1000 Hz
	BAND SWITCH	Ⓐ
	RF TUNING	30.00
	DEVIATION RANGE KHZ	10
	RF OUTPUT	LO, 0-10 KUV
	DEVIATION	Fully counterclockwise
	RF SET TO LINE	Adjust until needle on IF UV RF SET TO LINE meter is over red line
	LO RF UV	20 μv
AN/USM-207	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	SENSITIVITY	PLUG IN
	FUNCTION	FREQ
	GATE TIME	10^3 (black knob)
	DIRECT/HETERODYNE	DIRECT
	INPUT	0.3 V MAX (both switches to left)
	FREQUENCY TUNING-MC	100

5-30. SILICON VERSION IF DISCRIMINATOR A4200A ALINEMENT. (CONT)

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.



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).)
   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.

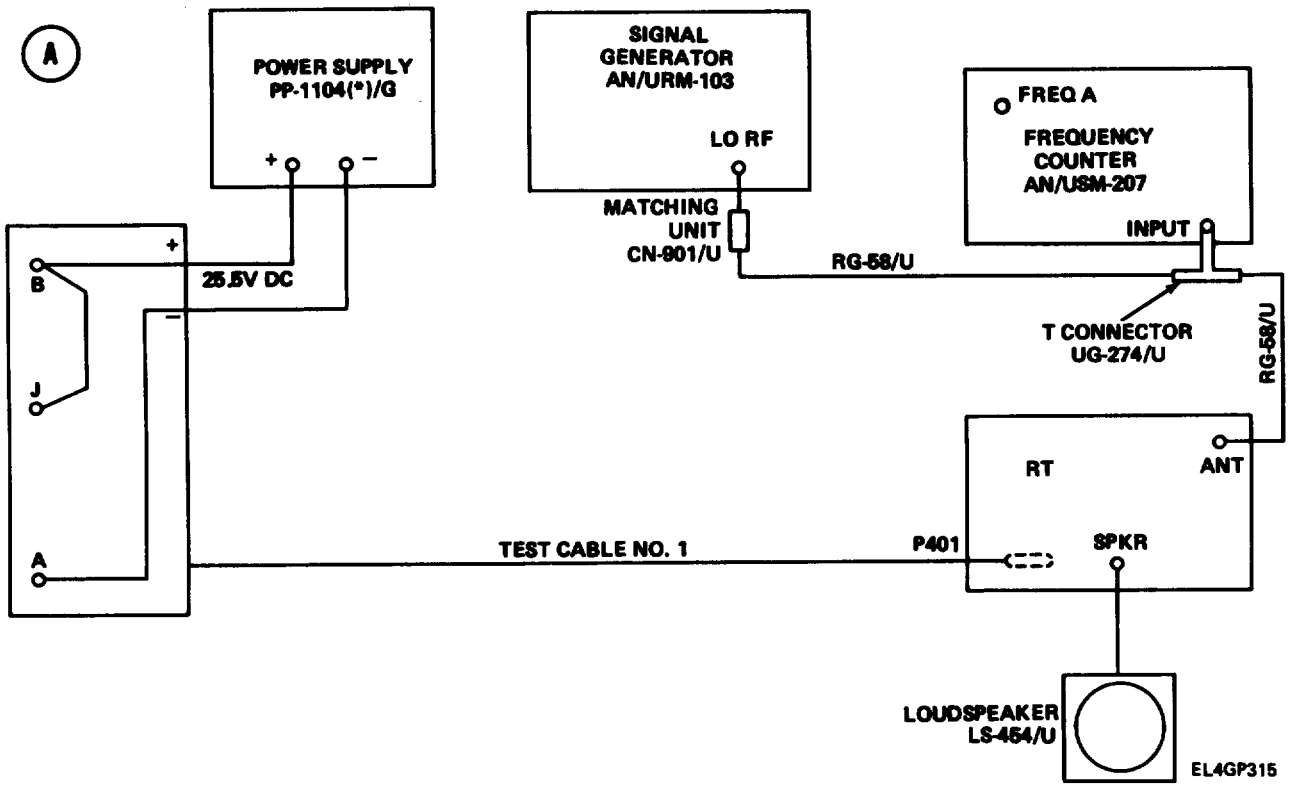
PURPOSE. This procedure adjusts the gain of the A4300 assembly.

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 ALINEMENT. (CONT)

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



5-31. AUDIO AND SQUELCH PREAMPLIFIER A4300 ALINEMENT. (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

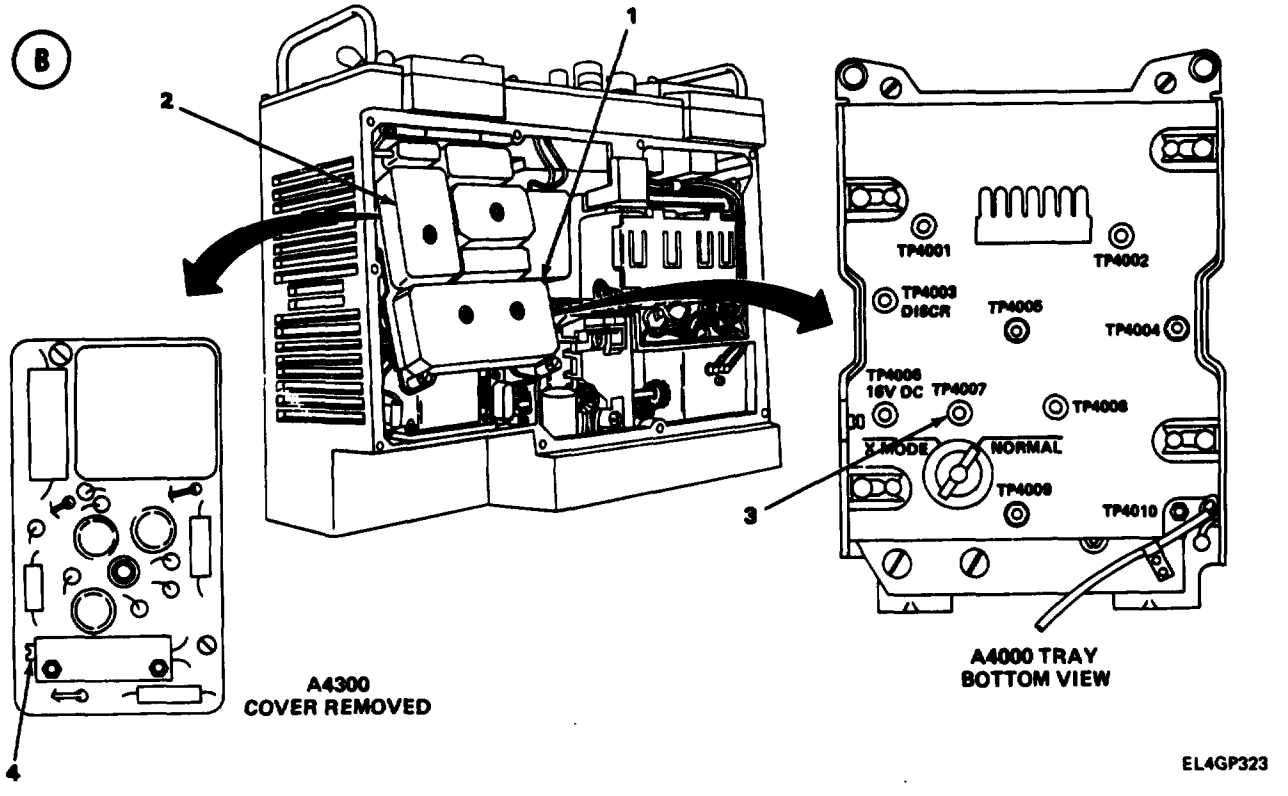
EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	(A)
	MC-TUNE-KC	30.00
	VOLUME	Fully clockwise
	SQUELCH	NEW OFF
AN/URM-103	OPERATE/OFF/STAND BY	OPERATE (allow 15-minute warmup)
	FUNCTION	1000 Hz
	BAND SWITCH	(B)
	RF TUNING	30.00
	DEVIATION RANGE KHZ	10
	RF OUTPUT	LO, 0-10 KUV
	DEVIATION	Fully counterclockwise
	RF SET TO LINE	Adjust until needle on IF UV RF SET TO LINE meter is over red line
	LO RF UV	20 µv
AN/USM-207	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	Sensitivity	PLUG IN
	FUNCTION	FREQ
	GATE TIME	10^3 (black knob)
	DIRECT/HETERODYNE	DIRECT
	INPUT	0.3 V MAX (both switches to left)
	FREQUENCY TUNING-MC	100

5-31. AUDIO AND SQUELCH PREAMPLIFIER A4300 ALINEMENT. (CONT)

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 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-voit scale.
3. Lift A4000 tray(1). (See test setup diagram Ⓑ .)
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 ALINEMENT.

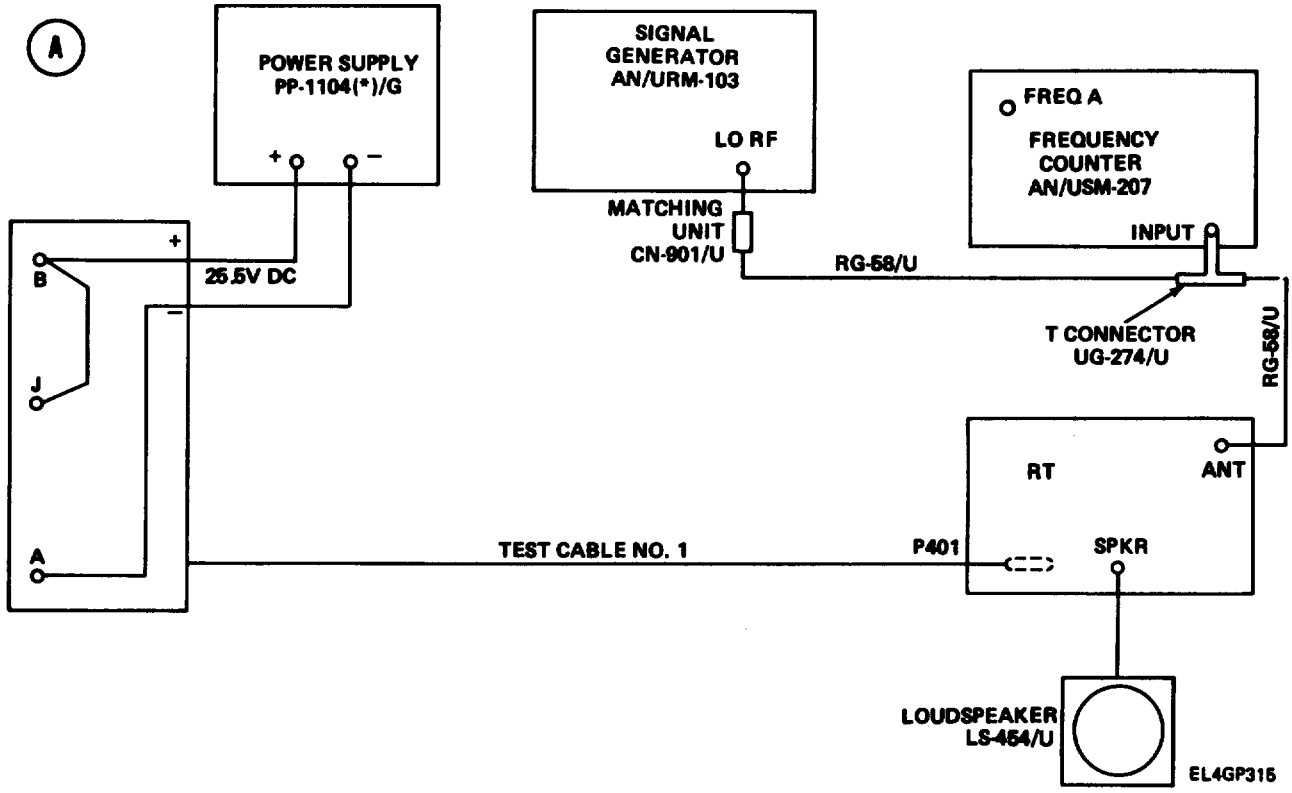
PURPOSE. This procedure adjusts the gain of the A4300A assembly.

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

5-32. 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

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	(B)
	MC-TUNE-KC	64.00
	VOLUME	Fully clockwise
	SQUELCH	NEW OFF
AN/USM-207	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	Sensitivity	PLUG IN
	FUNCTION	FREQ
	GATE TIME	10^3 (black knob)
	DIRECT/HETERODYNE	DIRECT
	INPUT	0.3 V MAX (both switches to left)
	FREQUENCY TUNING-MC	100

5-32. SILICON VERSION AUDIO AND SQUELCH PREAMPLIFIER A4300A ALINEMENT. (CONT)

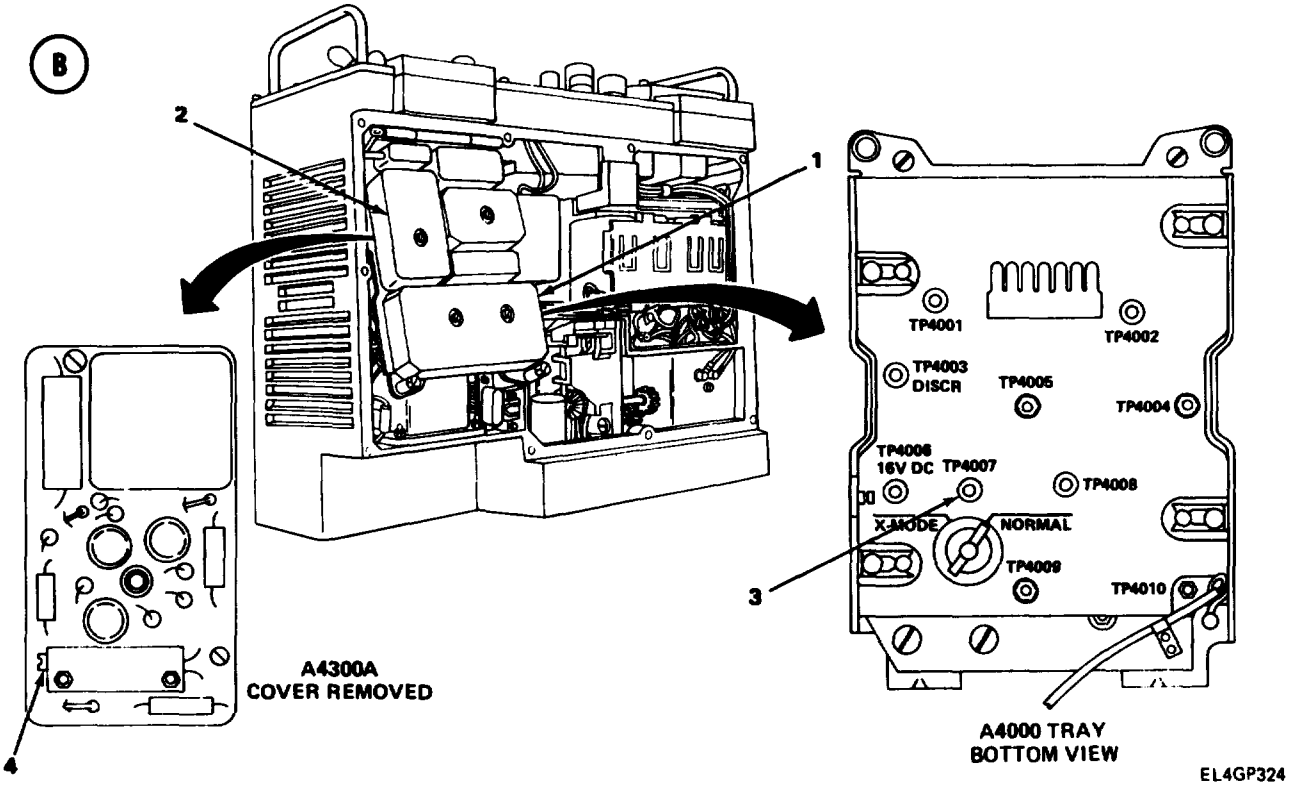
CONTROL AND SWITCH SETTINGS (CONT)

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/URM-103	OPERATE/OFF/STAND BY	OPERATE (allow 15-minute warmup)
	FUNCTION	1000 Hz
	BAND SWITCH	Ⓓ
	RF TUNING	64.00
	DEVIATION RANGE KHZ	10
	RF OUTPUT	LO, 0-10 KUV
	DEVIATION	Fully counterclockwise
	RF SET TO LINE	Adjust until needle on IF UV RF SET TO LINE meter is over red line
	LO RF UV	10 μv

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 10-μv rf level; then disconnect the T-connector from the counter.



5-32. SILICON VERSION AUDIO AND SQUELCH PREAMPLIFIER A4300A ALINEMENT. (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 Ⓑ , ,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. ALINEMENT OF A5300 SQUELCH FILTER FOR CORRECT TRANSMITTED SQUELCH TONE.

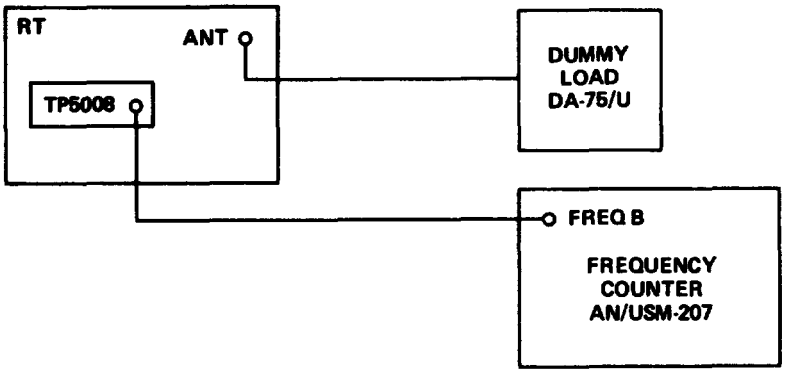
PURPOSE. This procedure adjusts Resistor R5301 in the squelch filter to ensure transmission of a 150-Hz NEW SQUELCH tone. Adjustment of R5301 during transmission also properly tunes the squelch filter for 150-Hz NEW SQUELCH tone reception.

TEST EQUIPMENT AND MATERIALS

Power Supply PP-1104(*)/G
Frequency Counter AN/USM-207
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 Ⓐ .

Ⓐ



EL4GP325

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

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	Ⓐ
	MC-TUNE-KC	30.00
	VOLUME	Fully counterclockwise
	SQUELCH	NEW ON

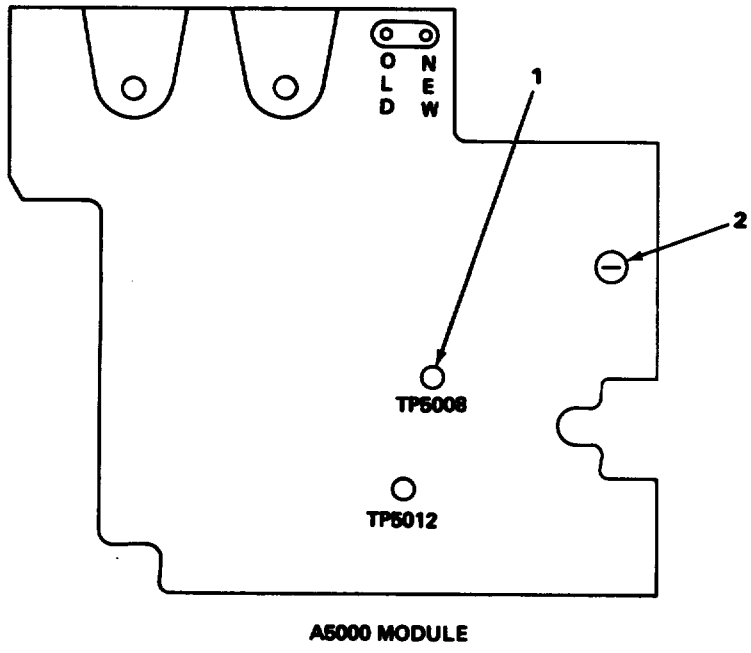
5-33. ALINEMENT OF A5300 SQUELCH FILTER FOR CORRECT TRANSMITTED SQUELCH TONE. (CONT)

CONTROL AND SWITCH SETTINGS (CONT)

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/USM-207	POWER DISPLAY SENSITIVITY GATE TIME FUNCTION	TRACK MIN (fully counterclockwise) 0.1 v 1 (black knob) FREQ

ALINEMENT PROCEDURE

Ⓑ



A5000 MODULE

EL4GP326

1. Connect frequency counter to TP5008 (1). (See test setup diagram Ⓑ .)
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 Ⓑ .)
5. Unkey transmitter.

5-34. ALINEMENT OF SILICON A5300A SQUELCH FILTER FOR CORRECT TRANSMITTED SQUELCH TONE

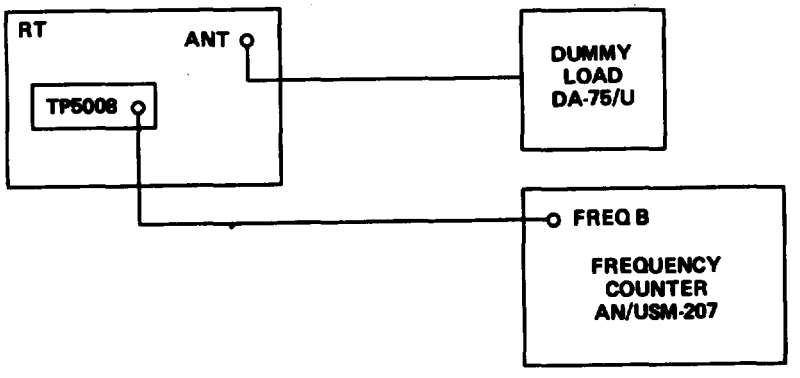
PURPOSE. This procedure adjusts Resistor R5303 in the squelch filter to ensure transmission of a 150-Hz NEW SQUELCH tone. Adjustment of R5303 during transmission also properly tunes the squelch filter for 150-Hz NEW SQUELCH tone reception.

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).

(A)



EL4GP325

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

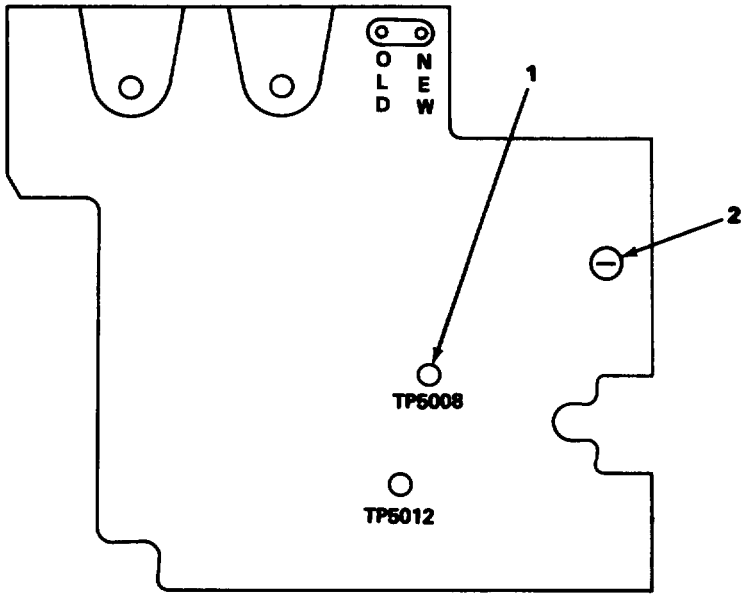
CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	(A)
	MC-TUNE-KC	30.00
	VOLUME	Fully counterclockwise
	SQUELCH	NEW ON
AN/USM-207	POWER	TRACK
	DISPLAY	MIN
	SENSITIVITY	0.1 v
	GATE TIME	1 (black knob)
	FUNCTION	FREQ

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 Ⓑ .)
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 Ⓑ.)
5. Unkey transmitter.

5-35. A5200 SQUELCH AMPLIFIER ALINEMENT, NEW SQUELCH LEVEL.

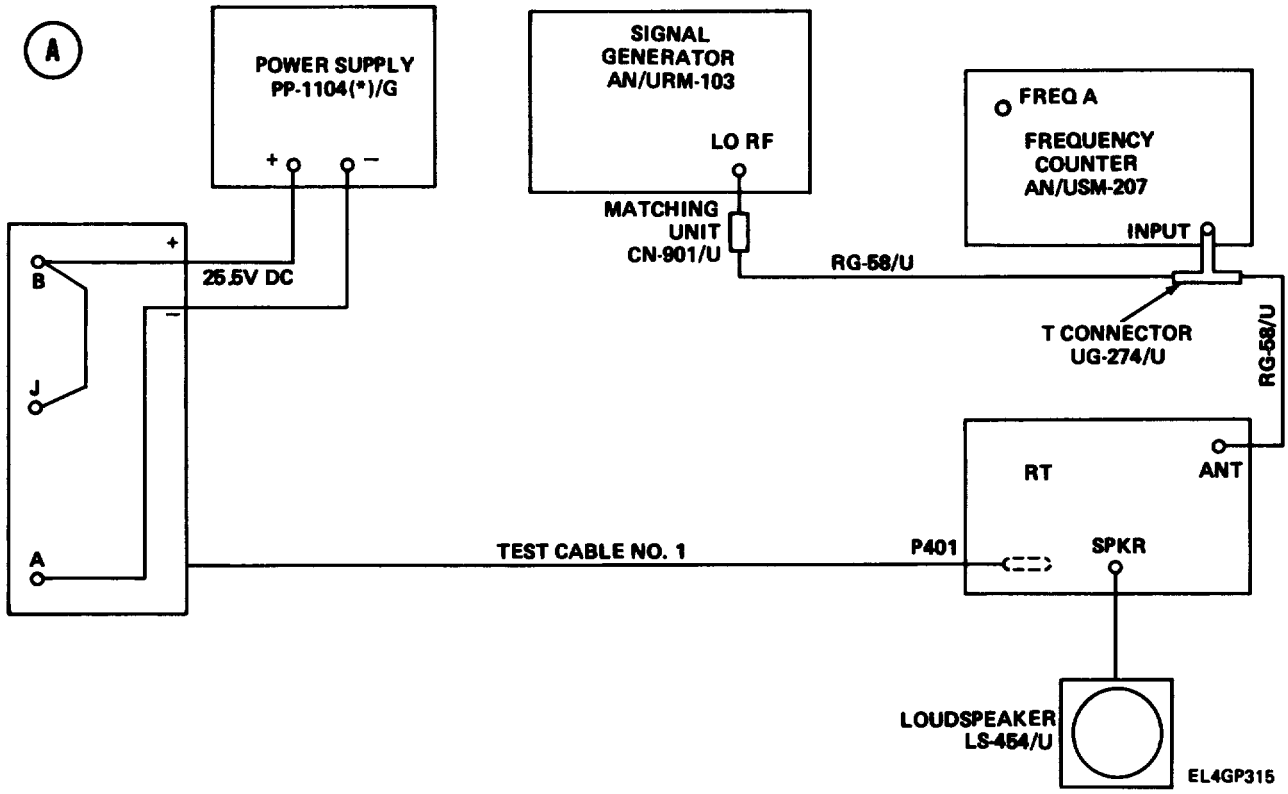
PURPOSE, This procedure adjusts the receiver sensitivity to the 150-Hz NEW SQUELCH tone.

TEST EQUIPMENT AND MATERIALS

Signal Generator AN/URM-103	Matching Unit CN-901/U
Frequency Counter AN/USM-207	T-Connector UG-274/U
Power Supply PP-1104(*)/G	Loudspeaker LS-454/U
Test Cable No. 1	Voltmeter ME-30(*~U

TEST SETUP. Connect the equipment as shown in test setup diagram Ⓐ , page 5-177.

5-35. A5200 SQUELCH AMPLIFIER ALAINEMENT, NEW SQUELCH LEVEL. (CONT)



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

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	(A)
	MC-TUNE-KC	30.00
	VOLUME	Fully clockwise
	SQUELCH	NEW ON
AN/URM-103	OPERATE/OFF/STAND BY	OPERATE
	FUNCTION	150 Hz
	BAND SWITCH	(B)
	RF TUNING	30.00
	DEVIATION RANGE KHZ	10
	RF OUTPUT	LO, 0-10 KUV
	DEVIATION	Fully counterclockwise
	RF SET TO LINE	Adjust until needle on IF UV RF SET TO LINE meter is over red line
	LO RF UV	20 µv

5-35. A5200 SQUELCH AMPLIFIER ALINEMENT, NEW SQUELCH LEVEL (CONT)

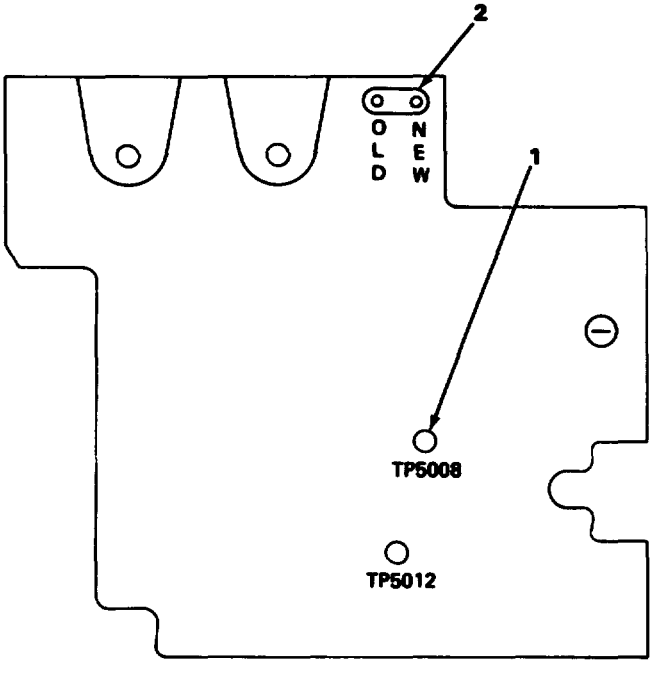
CONTROL AND SWITCH SETTINGS (CONT)

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/USM-207	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	SENSITIVITY	PLUG IN
	FUNCTION	FREQ
	GATE TIME	10^3 (black knob)
	DIRECT/HETERODYNE	DIRECT
	INPUT	0.3 V MAX (both switches to left)
	FREQUENCY TUNING-MC	100

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.



A5000 MODULE

EL4GP327

5-35. A5200 SQUELCH AMPLIFIER ALINEMENT, 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.

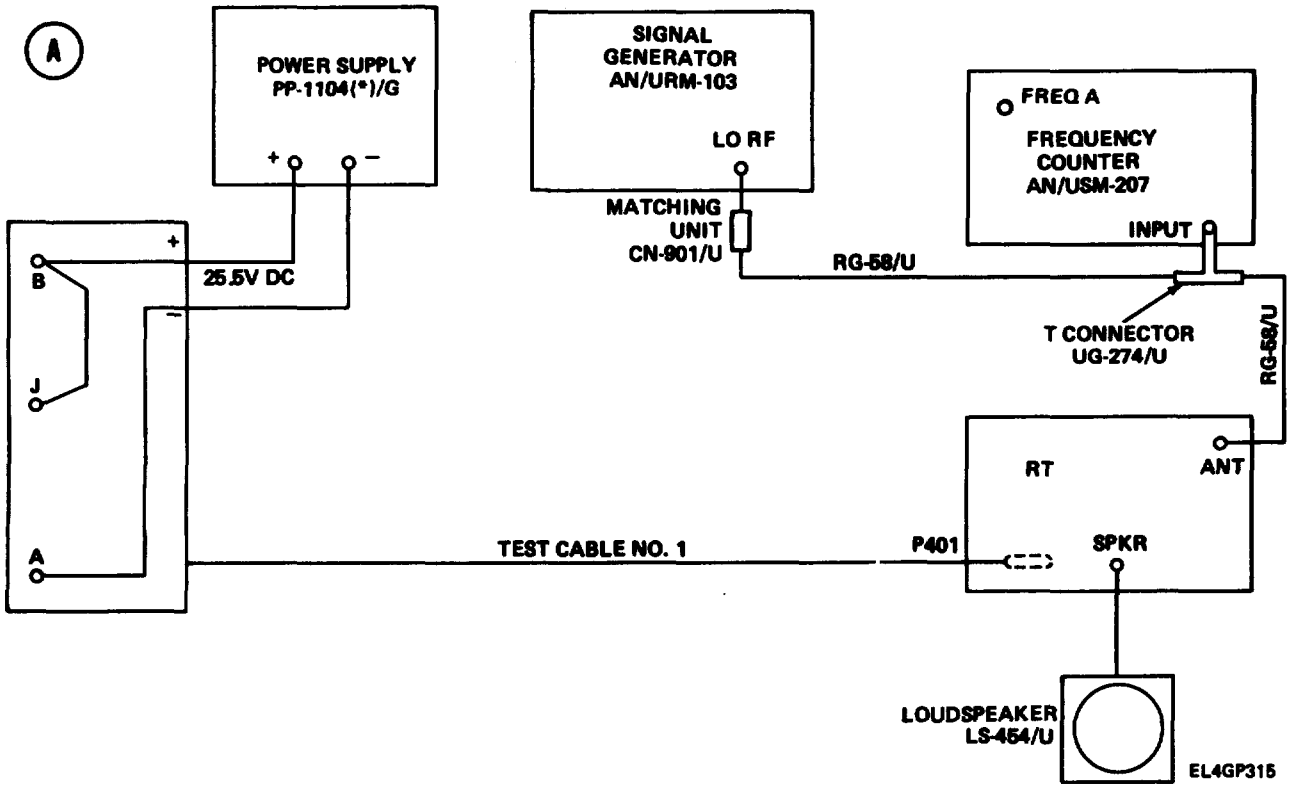
5-36. SILICON VERSION A5200A SQUELCH AMPLIFIER ALINEMENT, NEW SQUELCH LEVEL.

PURPOSE. This procedure adjusts the receiver sensitivity to the 150-Hz NEW SQUELCH tone.

TEST EQUIPMENT AND MATERIALS

Signal Generator AN/URM-103	Matching Unit CN-901/U
Frequency Counter AN/USM-207	T-Connector UG-274/U
Power Supply PP-1104(*)/G	Loudspeaker LS-454/U
Test Cable No. 1	Voltmeter ME-30(*)/U

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



5-36. SILICON VERSION A5200A SQUELCH AMPLIFIER ALINEMENT, 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 alinement requirements.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	(B)
	MC-TUNE-KC	64.00
	VOLUME	Fully clockwise
	SQUELCH	NEW ON
AN/URM-103	OPERATE/OFF/STAND BY	OPERATE
	FUNCTION	150 Hz
	BAND SWITCH	(D)
	RF TUNING	64.00
	DEVIATION RANGE KHZ	10
	RF OUTPUT	LO, 0-10 KUV
	DEVIATION	Fully counterclockwise
	RF SET TO LINE	Adjust until needle on IF UV RF SET TO LINE meter is over red line
	LO RF UV	2000 µv
AN/USM-207	POWER	TRACK
	DISPLAY	MIN
	SENSITIVITY	PLUG IN
	FUNCTION	FREQ
	GATE TIME	10^3 (black knob)
	DIRECT/HETERODYNE	DIRECT
	INPUT	0.3 V MAX (both switches to left)
	FREQUENCY TUNING-MC	100

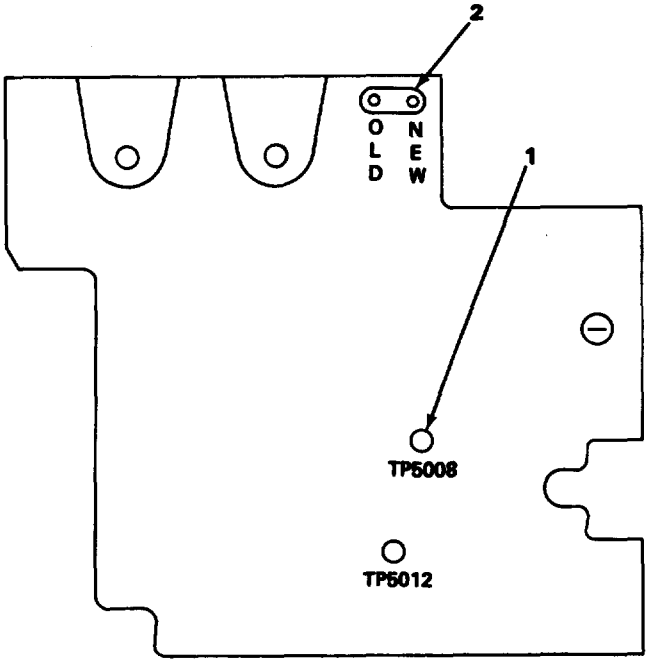
5-36. SILICON VERSION A5200A SQUELCH AMPLIFIER ALINEMENT, NEW SQUELCH LEVEL (CONT)

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.

Ⓑ



A5000 MODULE

EL4GP327

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 Ⓑ .)**
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.

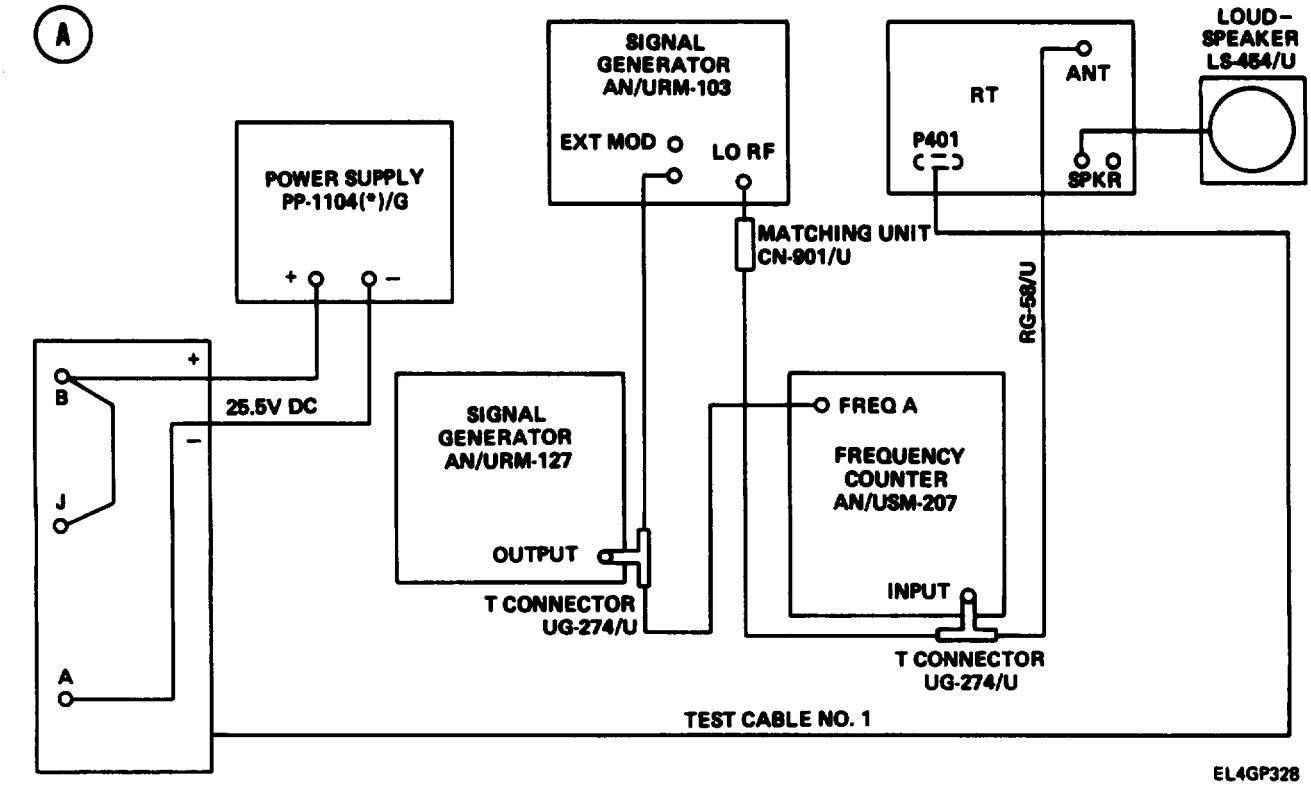
5-37. A5200 SQUELCH AMPLIFIER ALINEMENT, OLD SQUELCH LEVEL.

PURPOSE. This procedure adjusts the receiver sensitivity to the OLD SQUELCH signals which include internal noise and the received carrier.

TEST EQUIPMENT AND MATERIALS

Signal Generator AN/URM-103
Frequency Counter AN/USM-207
Power Supply PP-1104(*)K3
Test Cable No. 1
Signal Generator AN/URM-127
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).



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 ALINEMENT, OLD SQUELCH LEVEL. (CONT)

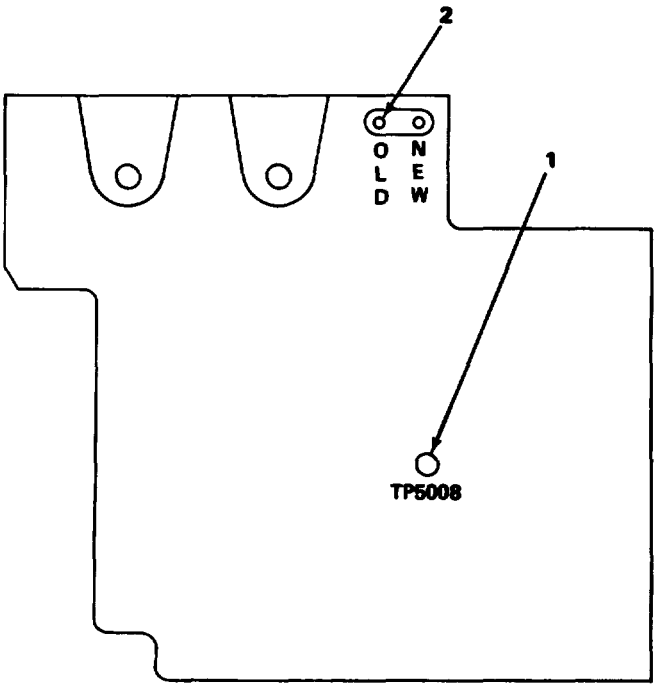
CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	Follow instructions in alinement procedure
	MC-TUNE-KC	Follow instructions in alinement procedure
	VOLUME	Fully clockwise
	SQUELCH	OLD ON
AN/URM-103	OPERATE/OFF/STAND BY	OPERATE
	FUNCTION	EXT MOD
	BAND SWITCH	Follow instructions in alinement procedure
	RF TUNING	Follow instructions in alinement procedure
	DEVIATION RANGE KHZ	10
	RF OUTPUT	LO, 0-10 KUV
	DEVIATION	Fully counterclockwise
	RF SET TO LINE	Adjust until needle on IF UV RF SET TO LINE meter is over red line
	LO RF UV	20 μv
AN/URM-127	POWER	ON
	FREQ RANGE MULTIPLIER	x100
	FREQ RANGE DIAL	73
	ATTENUATOR	x10
	OUTPUT CONTROL	Turn clockwise for 1.2-volt reading on panel voltmeter
AN/USM-207 (to verify AN/URM-127 low-frequency output)	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	SENSITIVITY	0.1 v
	GATE TIME	1 (black knob)
	FUNCTION	FREQ
AN/USM-207 (to verify AN/URM-103 high-frequency output)	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	SENSITIVITY	PLUG IN
	FUNCTION	FREQ
	GATE TIME	10^3 (black knob)
	DIRECT/HETERODYNE	DIRECT
	INPUT	0.3 V MAX (both switches to left)
	FREQUENCY TUNING-MC	100

5-37. A5200 SQUELCH AMPLIFIER ALINEMENT, OLD SQUELCH LEVEL (CONT)

ALINEMENT PROCEDURE

Ⓑ



EL4GP329

1. Disconnect rf cable from RT ANTENNA port.
2. Lift RT A3000 tray.
3. Set ME-30(*)/U to 10-volt scale.
4. Connect ME-30(*)/U to TP5008 (1). (See test setup diagram Ⓑ .)
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 ALINEMENT, 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.
19. Rotate FREQ RANGE DIAL fully counterclockwise.
20. Set FREQ RANGE MULTIPLIER to x100.
21. Rotate FREQ RANGE DIAL to 35 (3500 Hz). CALL Iight should stay on.

NOTE

If RT fails the OLD SQUELCH Final Test, replace the A5300 module and repeat the entire alinement procedure.

5-38. SILICON VERSION A5200A SQUELCH AMPLIFIER ALINEMENT, OLD SQUELCH LEVEL.

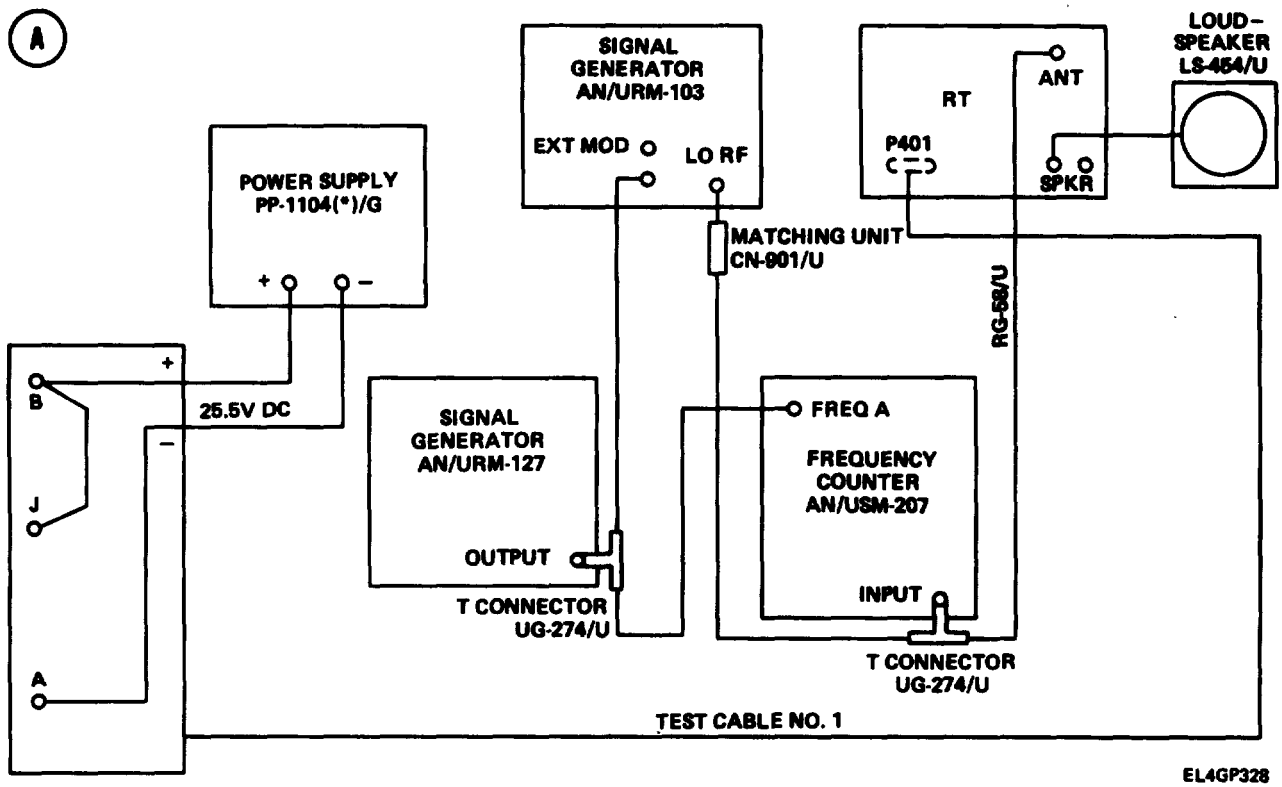
PURPOSE. This procedure adjusts the receiver sensitivity to the OLD SQUELCH signals which include internal noise and the received carrier.

TEST EQUIPMENT AND MATERIALS

Signal Generator AN/URM-103	Matching Unit CN-901/U
Frequency Counter AN/USM-207	T-Connector UG-274/U
Power Supply PP-1104(*)/G	Loudspeaker LS-454/U
Test Cable No. 1	Voltmeter ME-30(*)/U
Signal Generator AN/URM-127	

TEST SETUP. Connect the equipment as shown in test setup diagram Ⓐ, page 5-166.

5-38. SILICON VERSION A5200A SQUELCH AMPLIFIER ALINEMENT,OLD SQUELCH LEVEL (CONT)



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 alinement requirements.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	Follow instructions in alinement procedure
	MC-TUNE-KC	Follow instructions in alinement procedure
	VOLUME	Fully clockwise
	SQUELCH	OLD ON
AN/URM-103	OPERATE/OFF/STAND BY	OPERATE
	FUNCTION	EXT MOD
	BAND SWITCH	Ⓓ
	RF TUNING	64.00
	DEVIATION RANGE KHZ	10
	RF OUTPUT	LO, 0-10 KUV
	DEVIATION	Fully counterclockwise
	RF SET TO LINE	Adjust until needle on IF UV RF SET TO LINE meter is over red line
	LO RF UV	20 μv

5-38. SILICON VERSION A5200A SQUELCH AMPLIFIER ALINEMENT, OLD SQUELCH LEVEL (CONT)

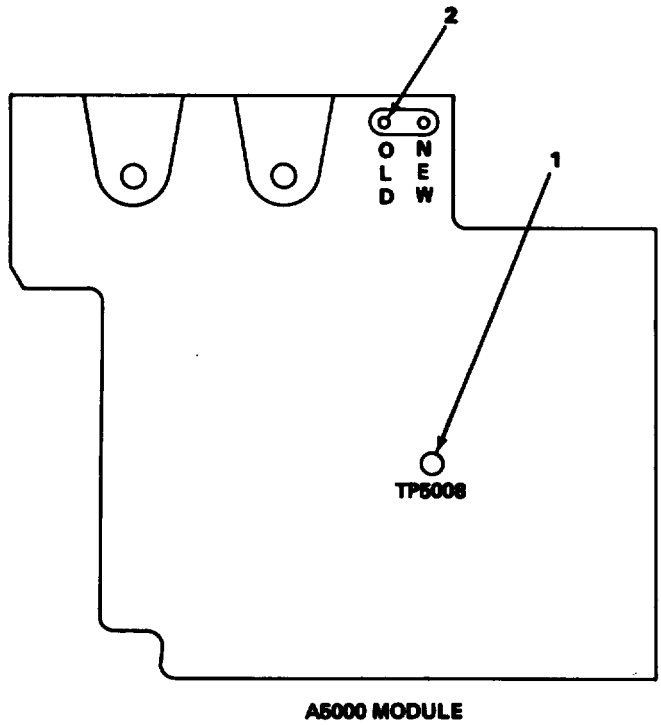
CONTROL AND SWITCH SETTINGS (CONT)

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/URM-127	POWER	ON
	FREQ RANGE MULTIPLIER	x100
	FREQ RANGE DIAL	73
	ATTENUATOR	x10
	OUTPUT CONTROL	Turn clockwise for 2.2-volt reading on panel voltmeter
	FREQ METER	ON
AN/USM-207 (to verify AN/URM-127 low-frequency output)	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	SENSITIVITY	0.1 v
	GATE TIME	1 (black knob)
	FUNCTION	FREQ
AN/USM-207 (to verify AN/URM-103 high-frequency output)	POWER	TRACK
	DISPLAY	MIN (fully counterclockwise)
	SENSITIVITY	PLUG IN
	FUNCTION	FREQ
	GATE TIME	10^3 (black knob)
	DIRECT/HETERODYNE	DIRECT
	INPUT	0.3 V MAX (both switches to left)
	FREQUENCY TUNING-MC	100

5-38. SILICON VERSION A5200A SQUELCH AMPLIFIER ALINEMENT, OLD SQUELCH LEVEL (CONT)

ALINEMENT PROCEDURE

Ⓑ



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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 Ⓑ.)
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.

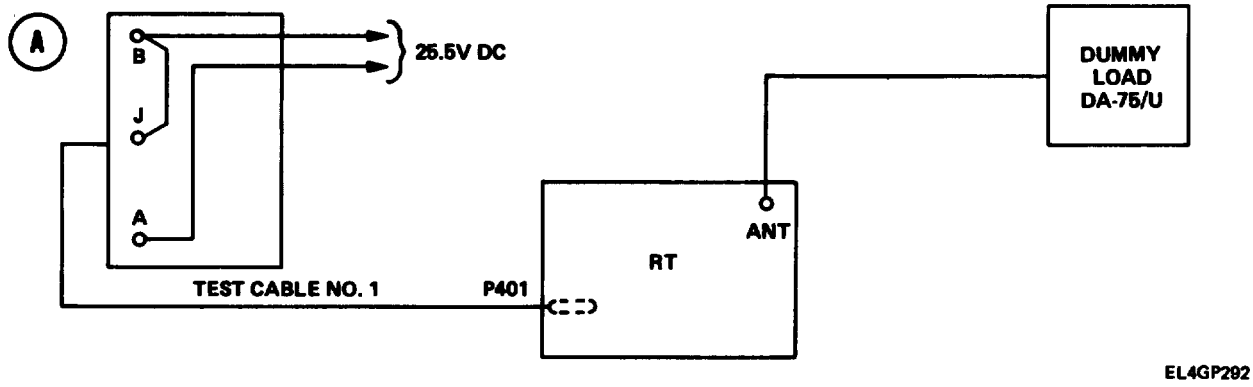
5-39. POWER SUPPLY A9000/A9400A (A9000A/A9400B) TESTS.

PURPOSE. This test verifies the availability of adequate power before the transmitter is alined.

TEST EQUIPMENT AND MATERIALS

Dummy Load DA-75/U
Multimeter ME-26(*)/U
Power Supply PP-1104(*)/G
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

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	BAND	(A)
	MC-TUNE-KC	30.00
	POWER	HIGH
	SQUELCH	NEW ON

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 alinement, 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.

Cheek 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)

A9000 TEST POINT	REQUIRED VOLTAGE
TP9005	25 vdc minimum
TP9001	640 to 700 vdc
TP9002	250 to 300 vdc
TP9003	90 vac minimum
TP9004	-20 vdc minimum (-14 vdc minimum; older units)

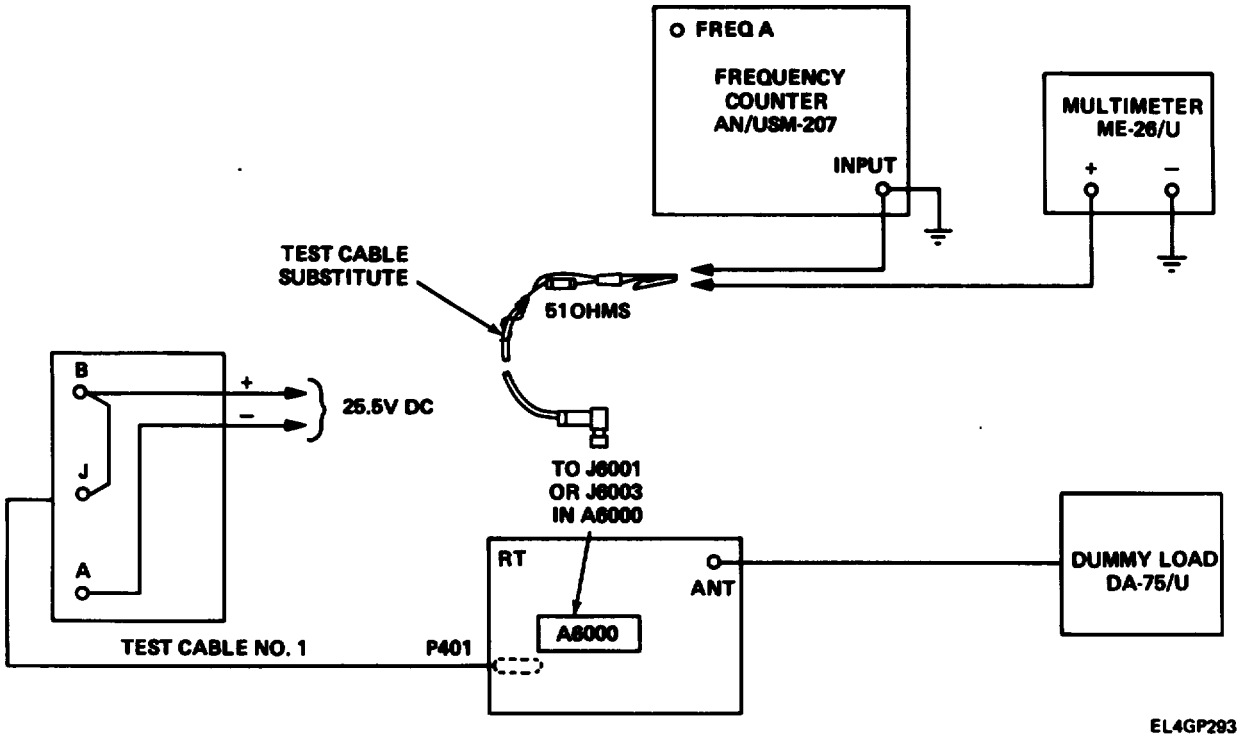
5-40. MASTER OSCILLATOR A6300 AND BUFFER AMPLIFIER A6400 ALINEMENT.

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-26(*)/U
Frequency Counter AN/USM-207
Test Cable No. 9 or substitute. (See test setup diagram Ⓐ for substitute.)

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



5-40. MASTER OSCILLATOR A6300 AND BUFFER AMPLIFIER A6400 ALINEMENT. (CONT)

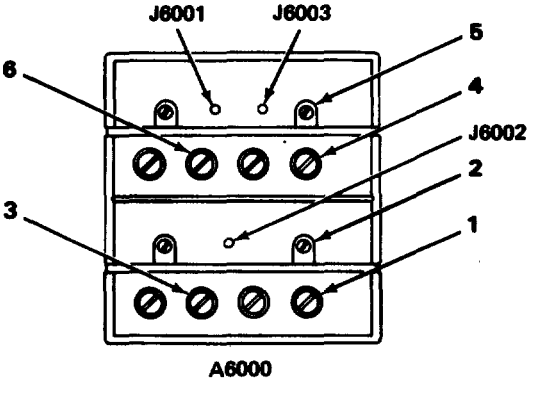
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	POWER	LOW
	BAND	(A)
	MC-TUNE-KC	30.00
AN/USM -207	POWER	TRACK
	DISPLAY	Fully counterclockwise
	SENSITIVITY	PLUG IN
	FUNCTION	FREQ
	GATE TIME	10^4 (black knob)
	DIRECT/HETERODYNE	DIRECT
	INPUT	0.3 V MAX (both switches to left)
	FREQUENCY TUNING-MC	100

ALINEMENT PROCEDURE

(B)



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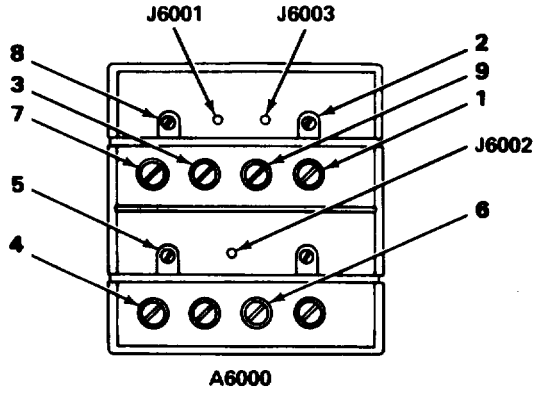
(A) BAND

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 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 ALINEMENT. (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 alinement 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 Ⓐ , 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.

Ⓒ



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20. Adjust L6405 (1) for maximum reading on ME-26(*)/U. (See test setup diagram Ⓒ .)
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.

Ⓑ BAND

31. Set RT BAND switch to Ⓑ 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 ALINEMENT. (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 Ⓐ .
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 Ⓒ .)
48. Unkey transmitter.
49. Set RT to 63.00 MHz.
50. Key transmitter.
51. Adjust C6406 (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

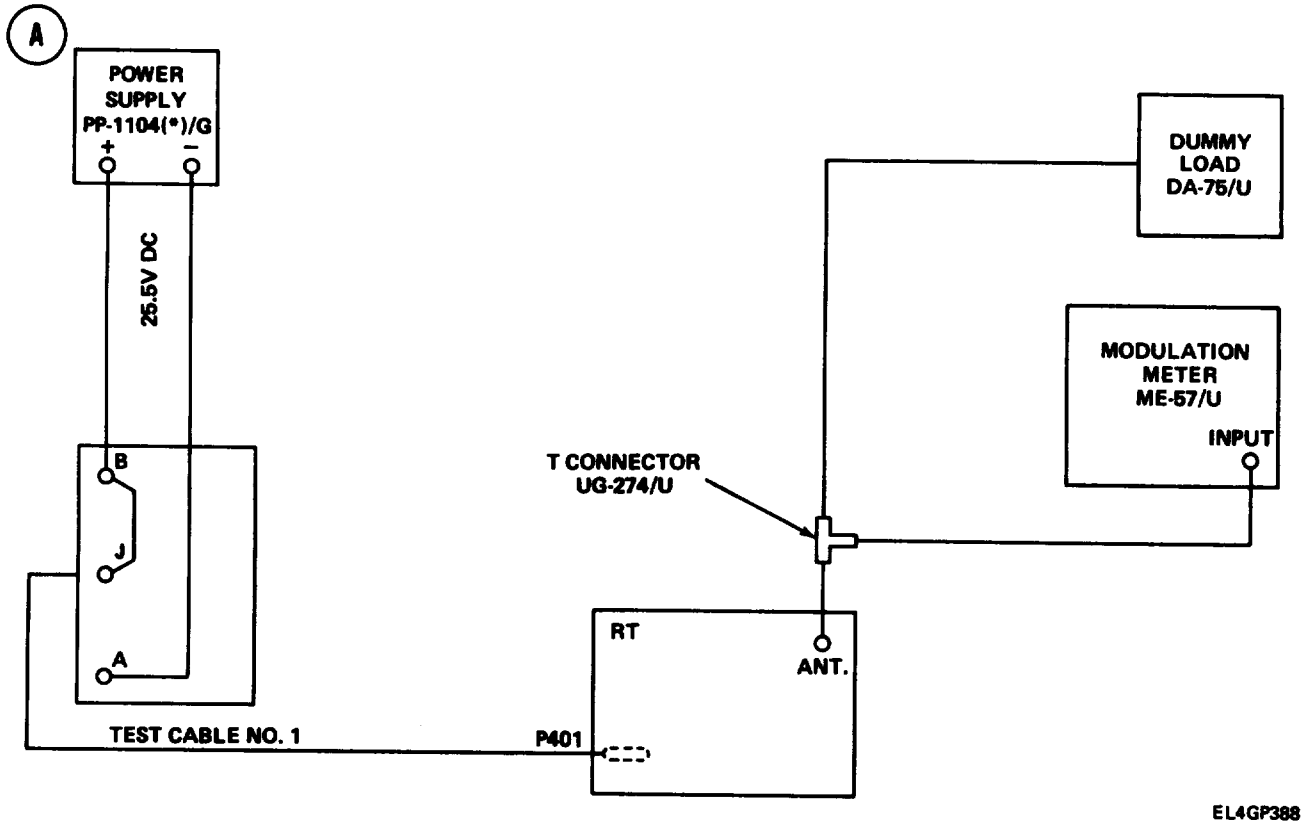
Dummy Load DA-75/U	Modulation Meter ME-57/U
Test Cable No. 1	Power Supply PP-1104(*)/G

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

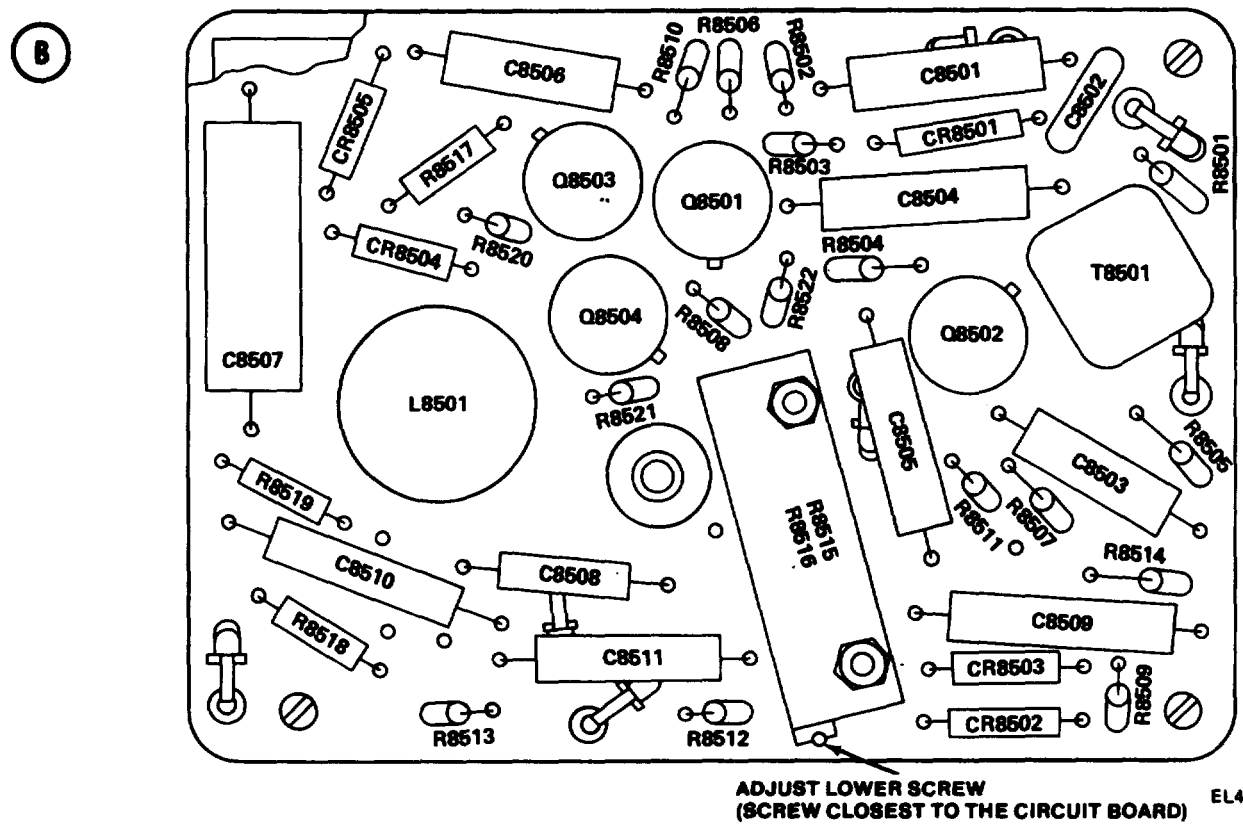
EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	BAND	(B)
	MC-TUNE-KC	64.00
	POWER	LOW
	SQUELCH	NEW ON
ME-57/U	FREQUENCY RANGE-MC	55-120
	DEVIATION RANGE-KC	1000 TUNE
	TUNE-FINE TUNE	TUNE
	TUNING KNOB	Adjust for 64.00 reading on FREQUENCY-MC

ADJUSTMENT PROCEDURE

1. Key transmitter.
2. 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.

5-41. ADJUSTMENT OF A8500 RESISTOR R8515 FOR TRANSMITTED NEW SQUELCH TONE DEVIATION. (CONT)

4. Set ME-57/U DEVIATION RANGE-KC knob to 20.
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, (B) .)
10. Unkey transmitter.

5-42. ADJUSTMENT OF A8500 RESISTOR R8516 FOR CORRECT TRANSMITTER NARROWBAND DEVIATION.

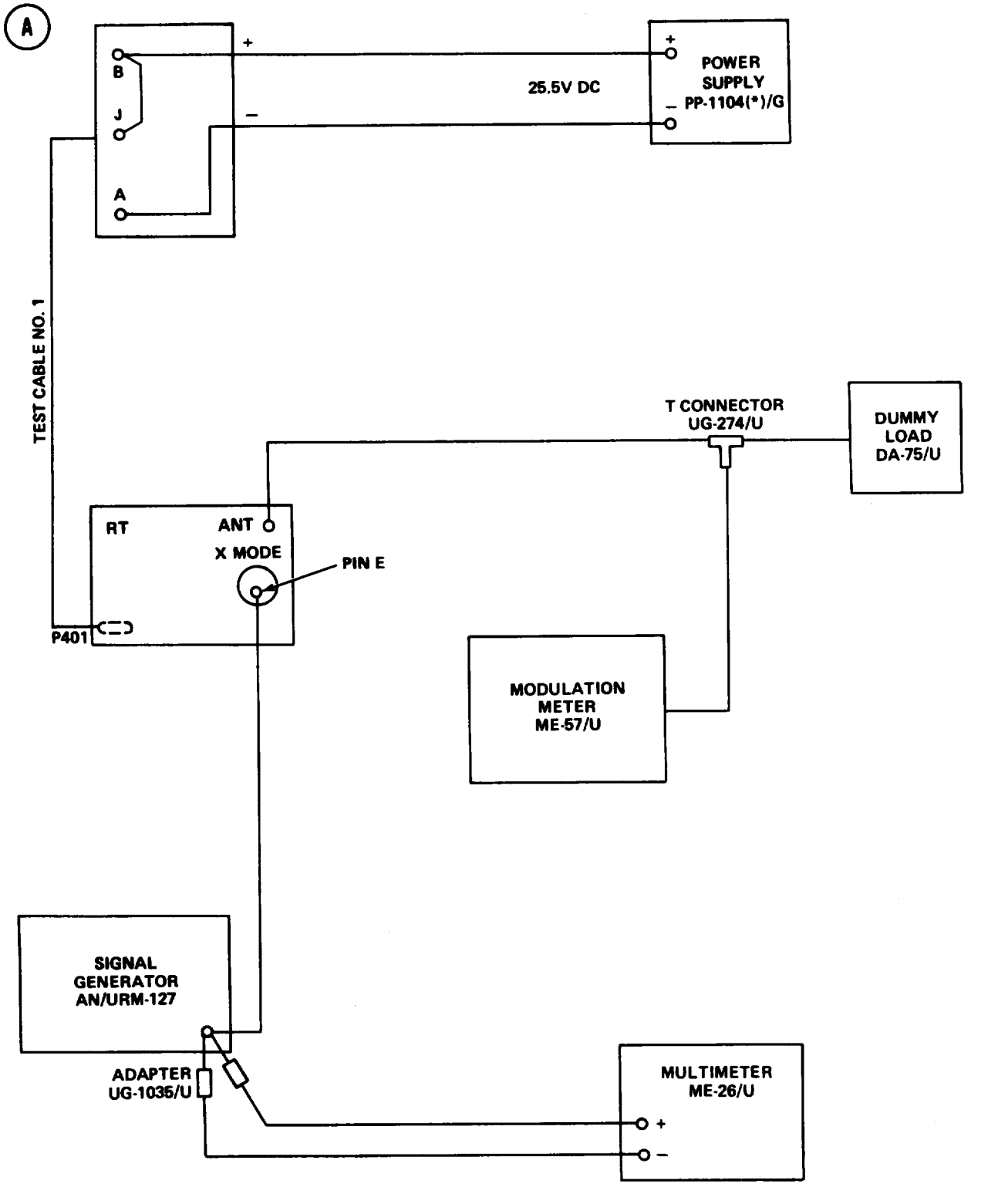
PURPOSE. This procedure adjusts the gain of the transmitter speech amplifier. Resistor R8516 must be adjusted so that a 0.78-vac audio signal Injected into the A81OO 11.5-MHz modulator through the resistor results in 8.0 ± 0.5-kHz deviation of the transmitted rf carrier.

TEST EQUIPMENT AND MATERIALS

Dummy Load DA-75/U
Multimeter ME-30(*)/U
Power Supply PP-1104(*)IG
Modulation Meter ME-57/U
Signal Generator AN/URM-127
Test Cable No. 1
Adapter UG-1035/U

TEST SETUP. Connect the equipment as shown in test setup diagram (A), page 5-196.

5-42. ADJUSTMENT OF A8500 RESISTOR R8516 FOR CORRECT TRANSMITTER NARROWBAND DEVIATION. (CONT)



5-42. ADJUSTMENT OF A8500 RESISTOR R8516 FOR CORRECT TRANSMITTER NARROWBAND DEVIATION. (CONT)

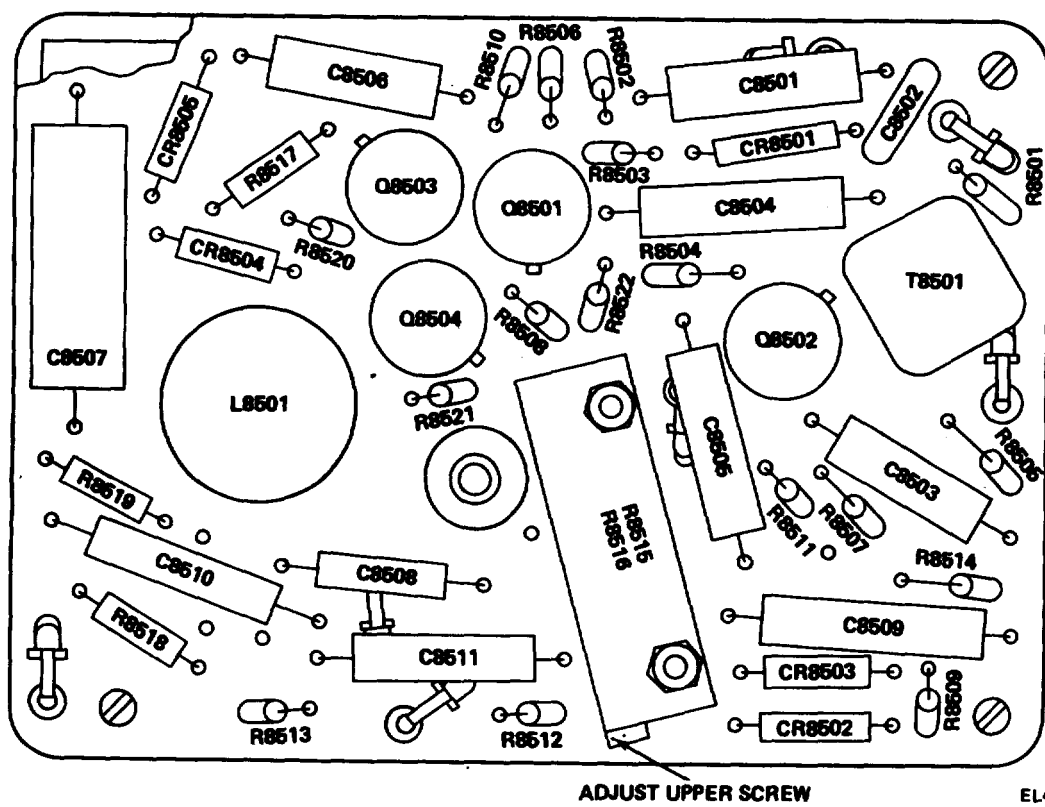
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as Indicated in the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
		(B)
RT	BAND	
	MC-TUNE-KC	64.00
	POWER	LOW
	SQUELCH	OLD ON
ME-57/U	TUNE-FINE TUNE	TUNE
	DEVIATION RANGE-KC	1000 TUNE
	FREQUENCY RANGE-MC	55-120
	TUNING	64-MHz Indication on FREQUENCY-MC meter with transmitter keyed
AN/URM-127	POWER	ON
	FREQ RANGE MULTIPLIER	xI00
	FREQ RANGE DIAL	10
	ATTENUATOR	x10
	OUTPUT CONTROL	Turn clookwise for 0.78-vac reading on multlmeter

ADJUSTMENT PROCEDURE

(B)



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(*)lU 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.
4. Set ME-57(*)/U DEVIATION RANGE-KC knob to 20.
5. Check reading on ME-57(*)IU. 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.O ±O.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 A81OO module.

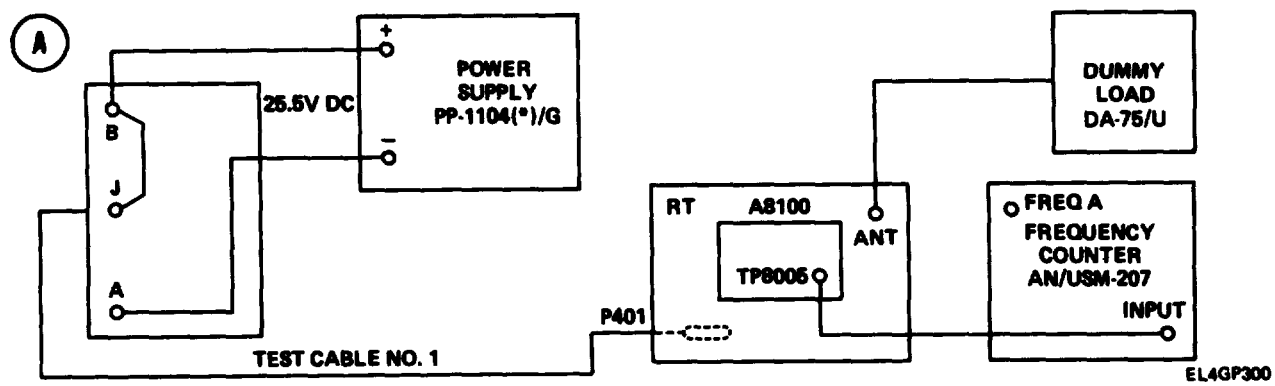
5-43. A8100 MODULATOR ALINEMENT.

PURPOSE. This procedure ensures that the A81OO 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	No. 24 or No. 28 AWG wire (single strand) (7-inch length)
Frequency Counter AN/USM-207	
Power Supply PP-1104(*)/G	Test Cable No. 1

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



5-43. A81OO MODULATOR ALINEMENT. (CONT)

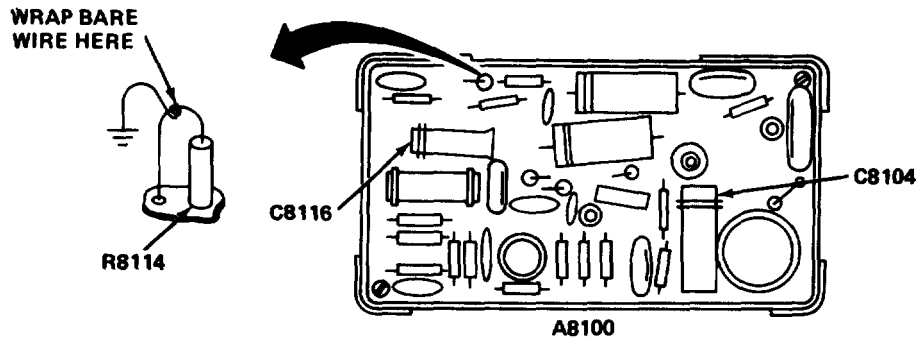
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	BAND	(A)
	MC-TUNE-KC	30.00
	POWER	LOW
	SQUELCH	OLD OFF
AN/USM-207	POWER	TRACK
	DISPLAY	Fully counterclockwise
	SENSITIVITY	PLUG IN
	FUNCTION	FREQ
	GATE TIME	10^3 (black knob)
	DIRECT/HETERODYNE	DIRECT
	INPUT	0.3 V MAX (both switches to left)
	FREQUENCY TUNING-MC	100

ALINEMENT PROCEDURE

(B)



EL4GP301

1. Remove A81OO cover.
2. **Wrap grounding wire around exposed terminal of R8114. (See test setup diagram (B) .)***
3. Reinstall A81OO 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 A81OO 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 grourrding wire hookup for A8100A rnodule. The alinement is the same, except for this difference.

5-43. A8100 MODULATOR ALINEMENT. (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 Ⓑ .)
18. Unkey transmitter.
19. Install A8400 HUNT GENERATOR module.

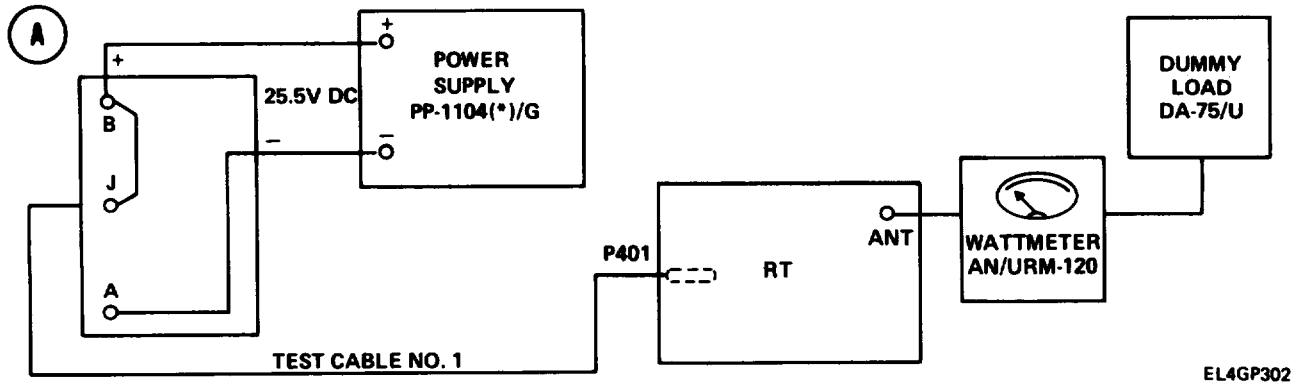
5-44. DRIVER A6100 AND POWER AMPLIFIER A6200 ALINEMENT.

PURPOSE. This procedure enables the transmitter to generate maximum rf power without over-driving the power stages. Correct alinement prolongs the life of Power Tube V6201 and Power Supply A9000/A9400.

TEST EQUIPMENT AND MATERIALS

Dummy Load DA-75/U
Tool Kit TK-105/G
T-Connector UG-274/U
Nonmetallic feeler gages, 0.073 and 0.078 inch
Wattmeter AN/URM-120
Multi meter ME-26(*)/U
Amphenol Adapter M-39012/16
Crocus cloth

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

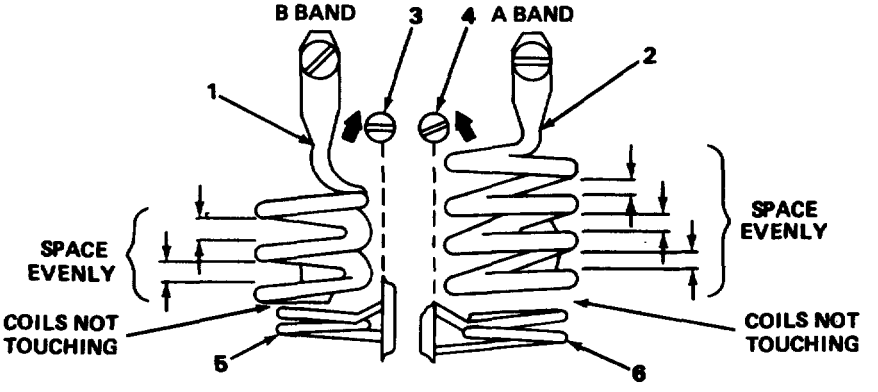
EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	MC-TUNE-KC POWER	30.00 HIGH

5-44. DRIVER A6100 AND POWER AMPLIFIER A6200 ALINEMENT. (CONT)

ALINEMENT PROCEDURE

Tuning Coil Adjustment

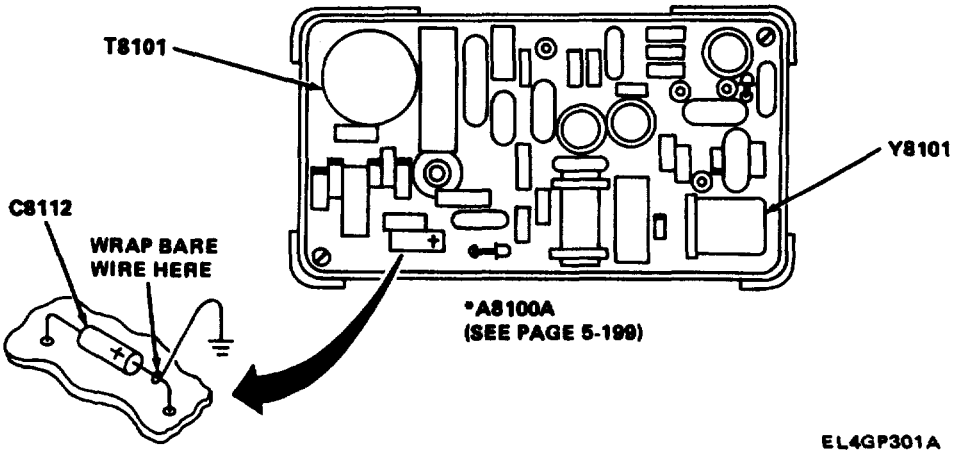
(B)



CAUTION

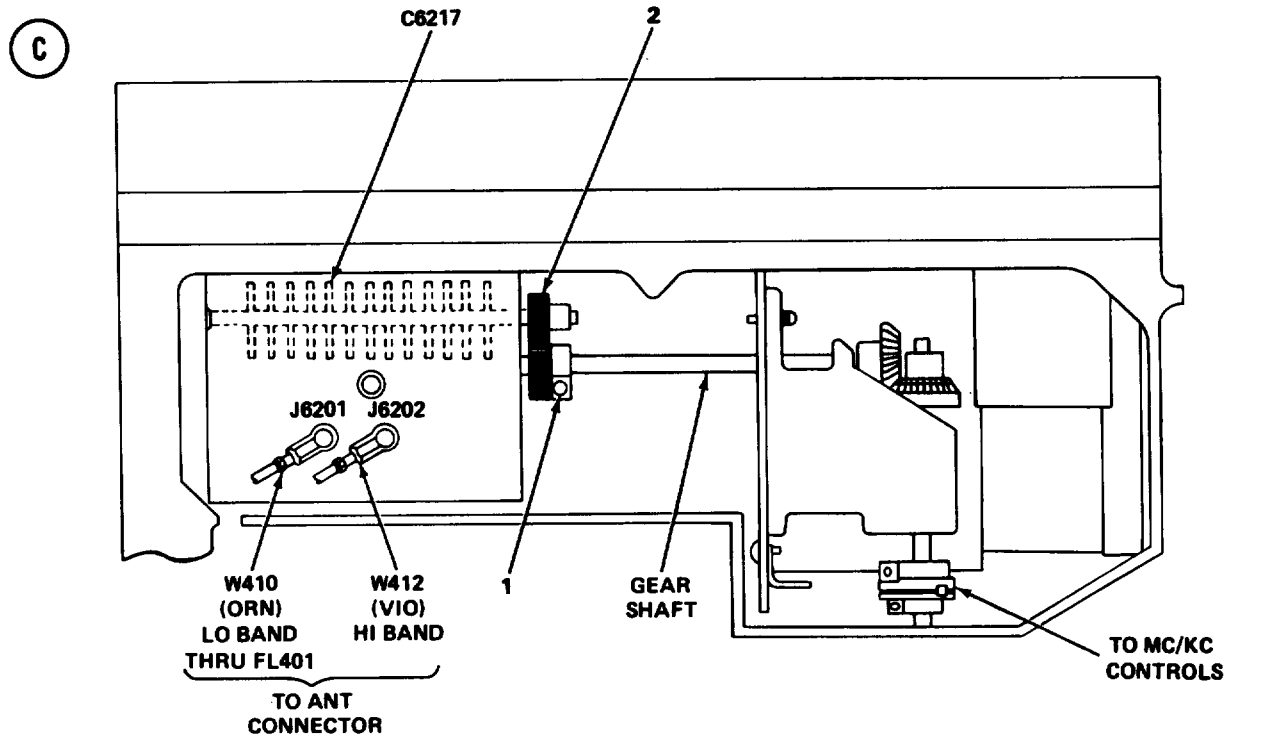
Do not use pliers or any metal tool to adjust Tuning Coils L6206 and L6203.

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.)



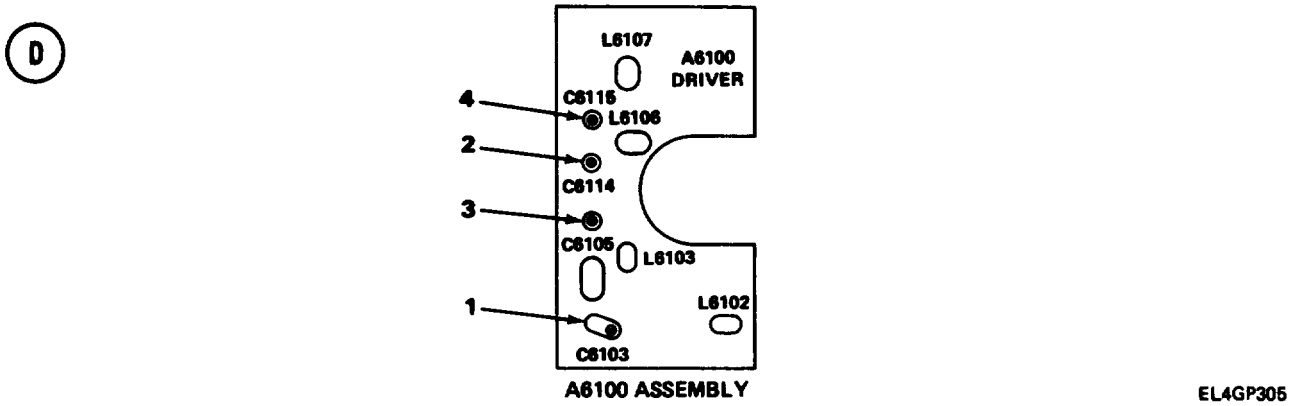
5-44. DRIVER A6100 AND POWER AMPLIFIER A6200 ALINEMENT. (CONT)

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 Ⓒ .)
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 ALINEMENT. (CONT)

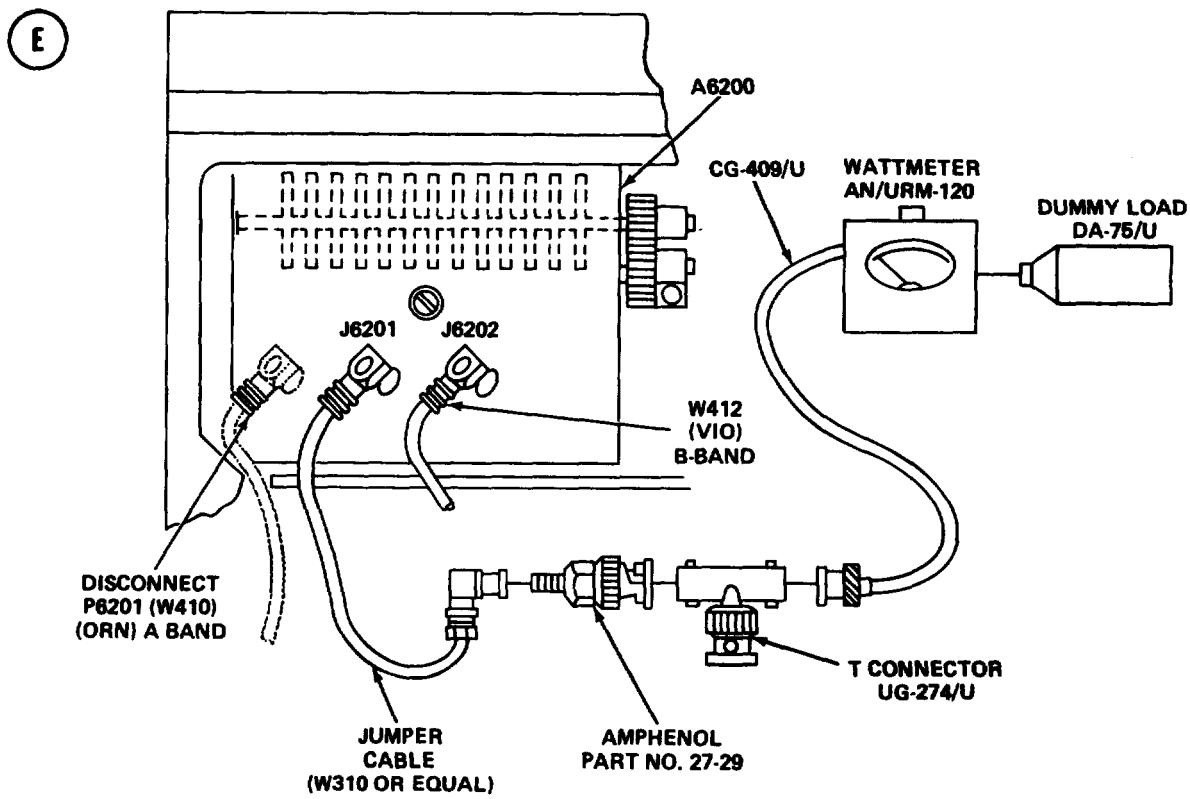
NOTE

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 (A) 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.
21. Key transmitter.
22. Adjust (B) 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)..



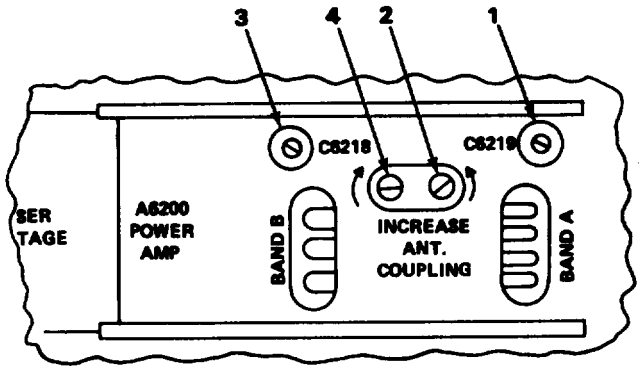
NOTE

See chapter 1, section Ill, Principles of Operation, for details covering use of Test Point TP9007.

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.

5-44. DRIVER A6100 AND POWER AMPLIFIER A6200 ALINEMENT. (CONT)

Ⓕ



EL4GP307

27. Adjust Capacitor C6219 (1) for minimum negative ME-26(*)/U indication. (See test setup diagram Ⓕ .)
28. Readjust 06219 to increase wattmeter indication by one watt.
28 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 ail 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.
36. Key transmitter.
39. Adjust C6103 ((1), test setup diagram Ⓓ, page 5-202) for minimum one-half watt indication.
40. Unkey the transmitter.
41. Reconnect P6201 to J6201. (See test setup diagram Ⓔ , 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.
46. 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 ALINEMENT. (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 Ⓕ , 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 Ⓕ) 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 Ⓕ) 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 Ⓓ) for at least one-half watt Indication on wattmeter.
73. Unkey transmitter.

5-45. ALINEMENT OF RT-246(*)VRC SERVOSYSTEM.

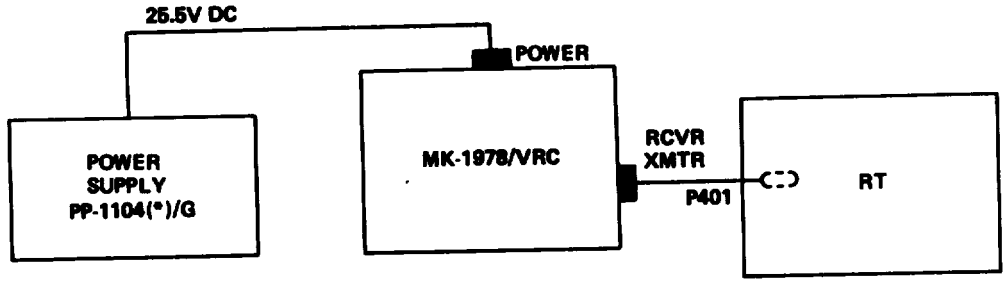
PURPOSE. This procedure adjusts the sensitivity of the servoamplifier to ensure correct frequency tuning in response to the preset pushbuttons.

TEST EQUIPMENT AND MATERIALS

Power Supply PP-1104(*)/G

TEST SETUP. Connect the equipment as shown in test setup diagram Ⓐ , page5-206.

5-45. ALINEMENT OF RT-246(*)/VRC SERVOSYSTEM. (CONT)



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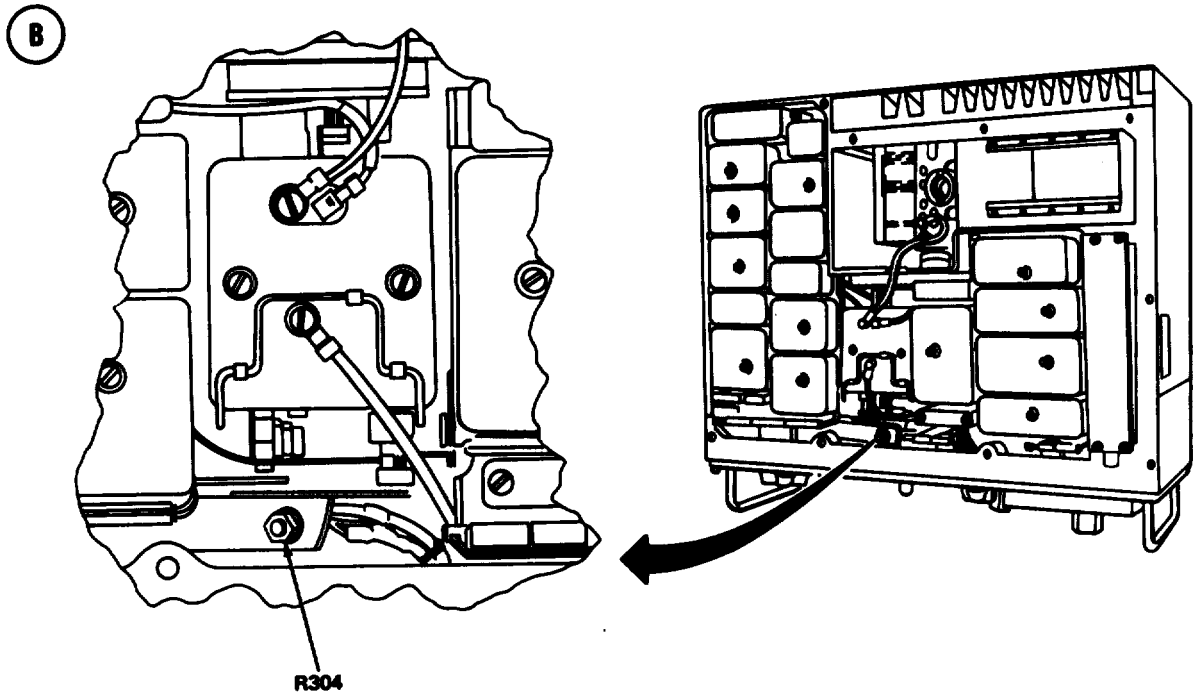
INITIAL EQUIPMENT CONTROL SETTINGS. Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT	BAND POWER	AUTO LOW

ALINEMENT PROCEDURE



EL4GP291

5-45. ALINEMENT OF RT-246(*)/VRC SERVOSYSTEM. (CONT)

1. Remove RT top cover.
2. Loosen locknut on R304. (See test setup diagram Ⓑ , 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.
7. Back off R304 shaft fully counterclockwise.
8. Press pushbutton ① . Before servomotor stops, press TUNE button. Servo will hunt (chattering sound). Keep TUNE button pressed.
9. Turn R304 shaft clockwise and stop at point where servomotor just stops hunting.
10. Press pushbutton ② . Wait for servomotor to stop.
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

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. Thetroubleshooting 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 forgermanium 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.

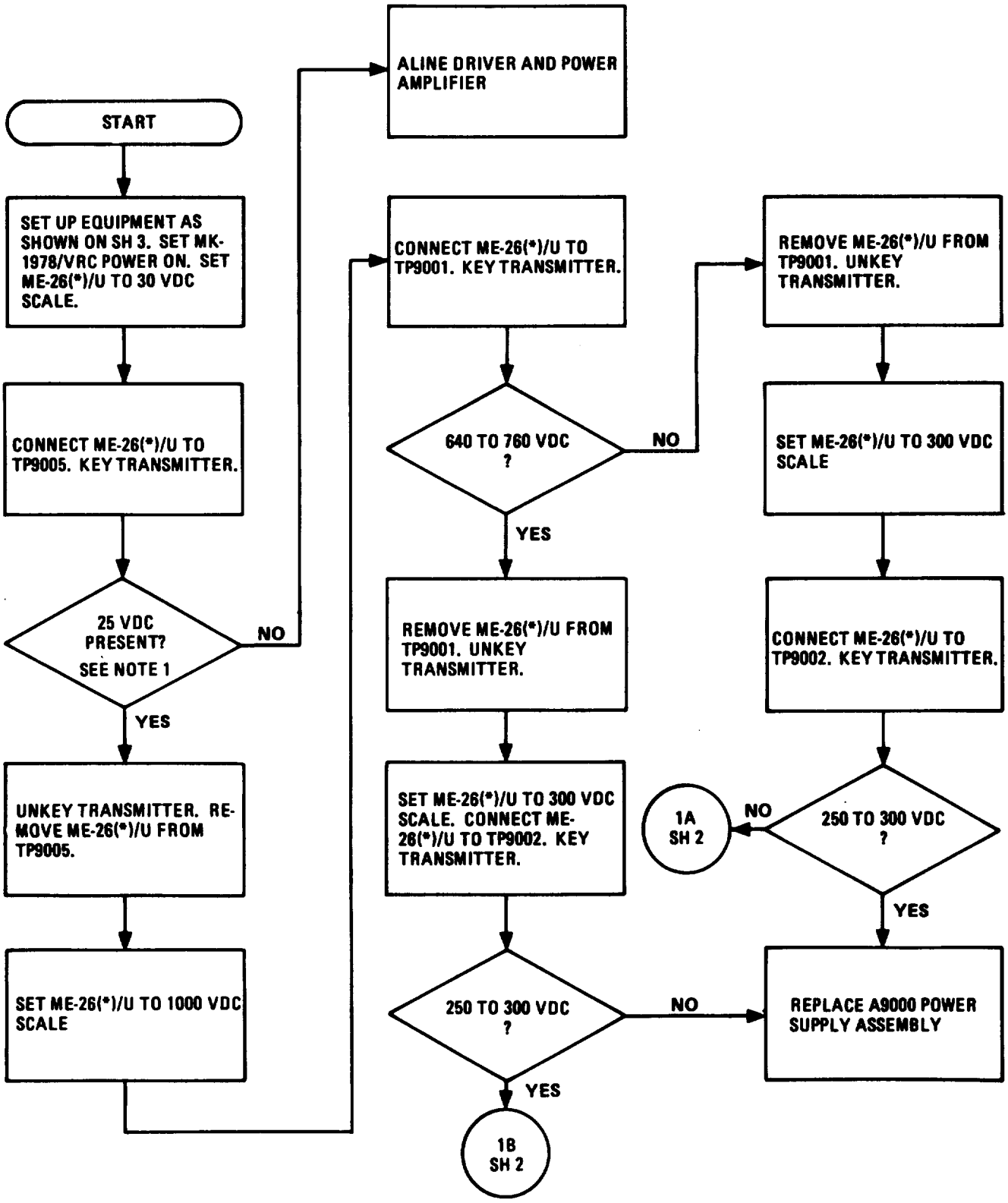
6-4. TROUBLESHOOTING CHART SELECTION.

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:

CHART NUMBER	TEST EQUIPMENT
6-1	Maintenance Kit MK-1978/VRC and discrete TMDE
6-2	Maintenance Kit MK-1978/VRC and Radio Test Set AN/GRM-114A
6-3	Test Cable No. 1 and discrete TMDE

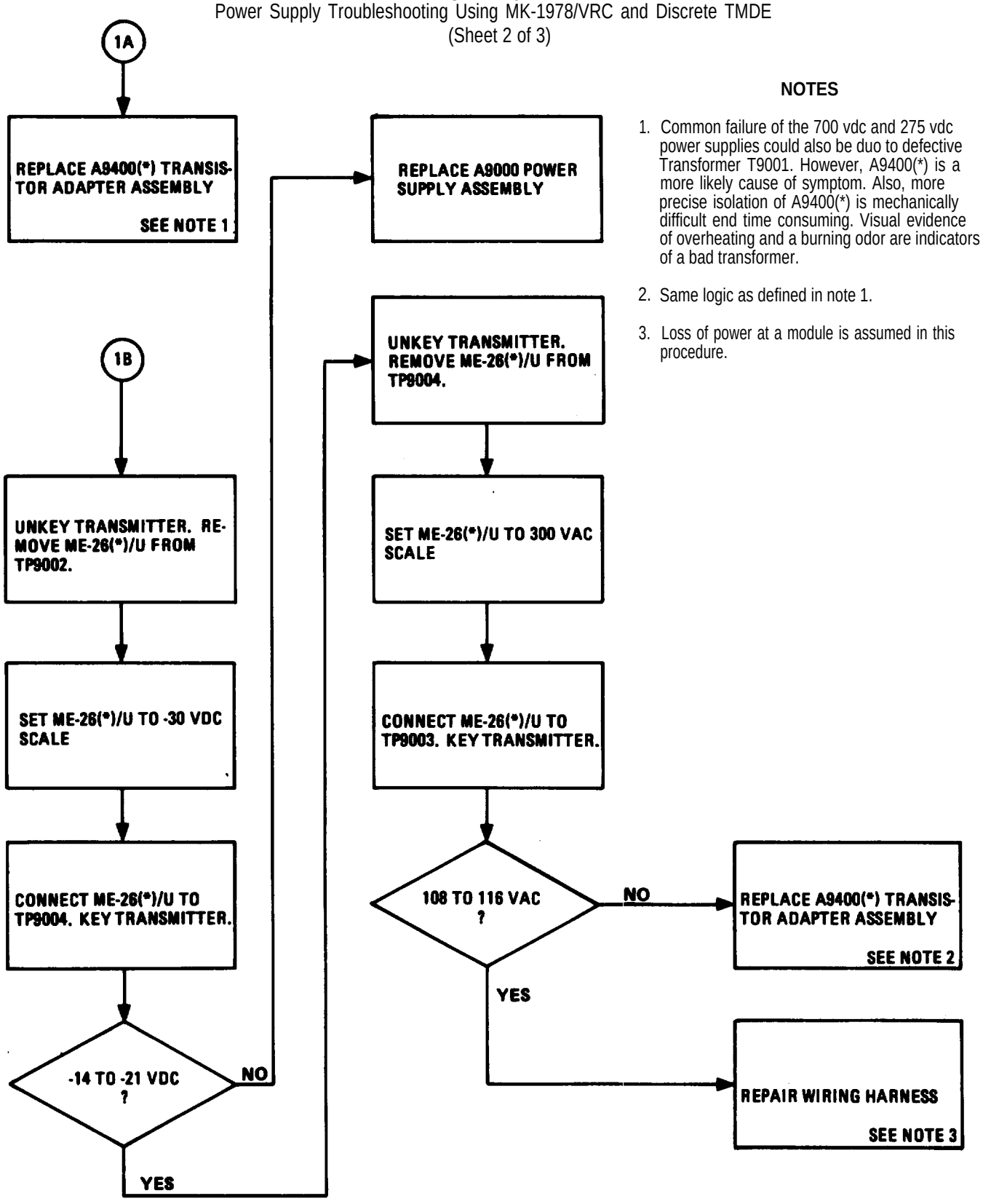
6-5. POWER SUPPLY TROUBLESHOOTING.

CHART 6-1
Power Supply Troubleshooting Using MK-1978/VRC and Discrete TMDE
(Sheet 1 of 3)



6-5. POWER SUPPLY TROUBLESHOOTING. (CONT)

CHART 6-1
Power Supply Troubleshooting Using MK-1978/VRC and Discrete TMDE
(Sheet 2 of 3)

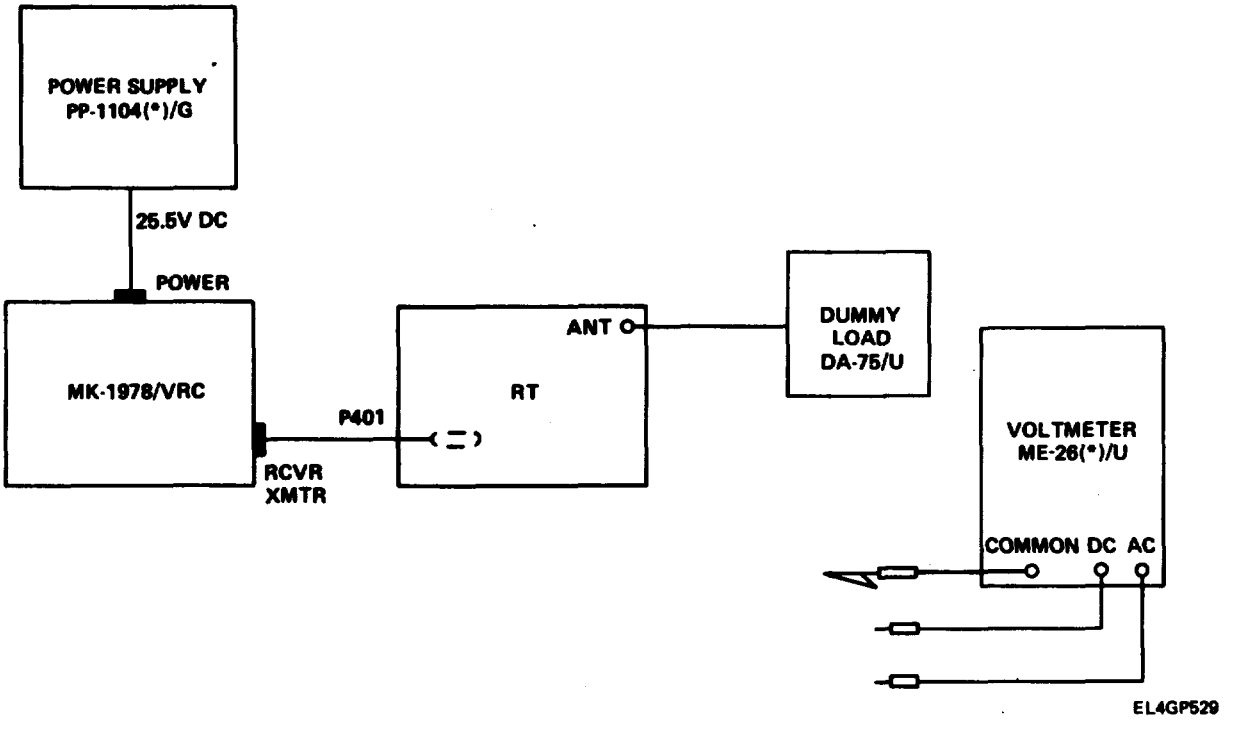


NOTES

1. Common failure of the 700 vdc and 275 vdc power supplies could also be duo to defective Transformer T9001. However, A9400(*) is a more likely cause of symptom. Also, more precise isolation of A9400(*) is mechanically difficult end 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.

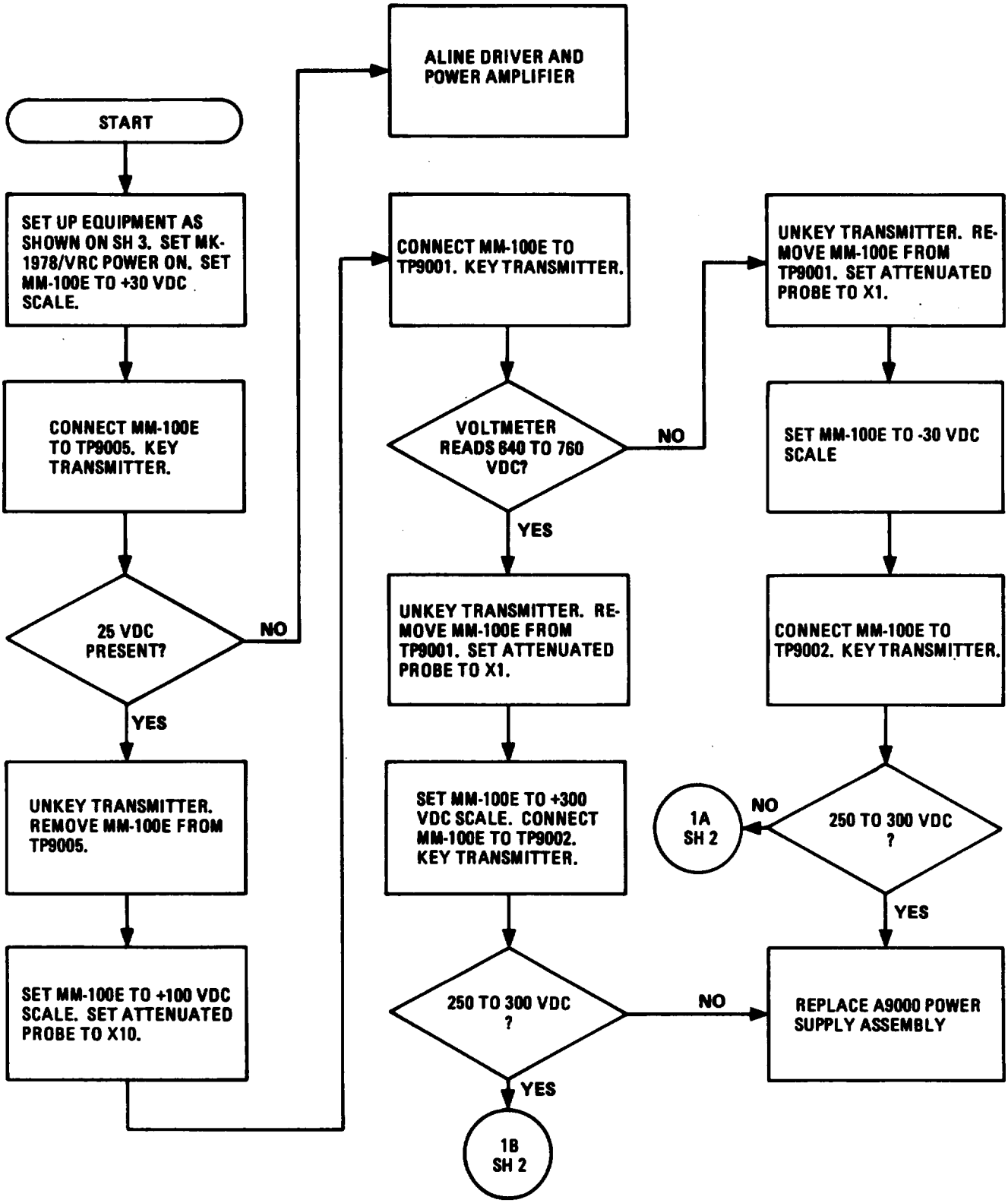
6-5. POWER SUPPLY TROUBLBSHOOTING. (CONT)

CHART 6-1
Power Supply Troubleshooting Using MK-1978/VRC and Discrete TMDE
(Sheet 3 of 3)



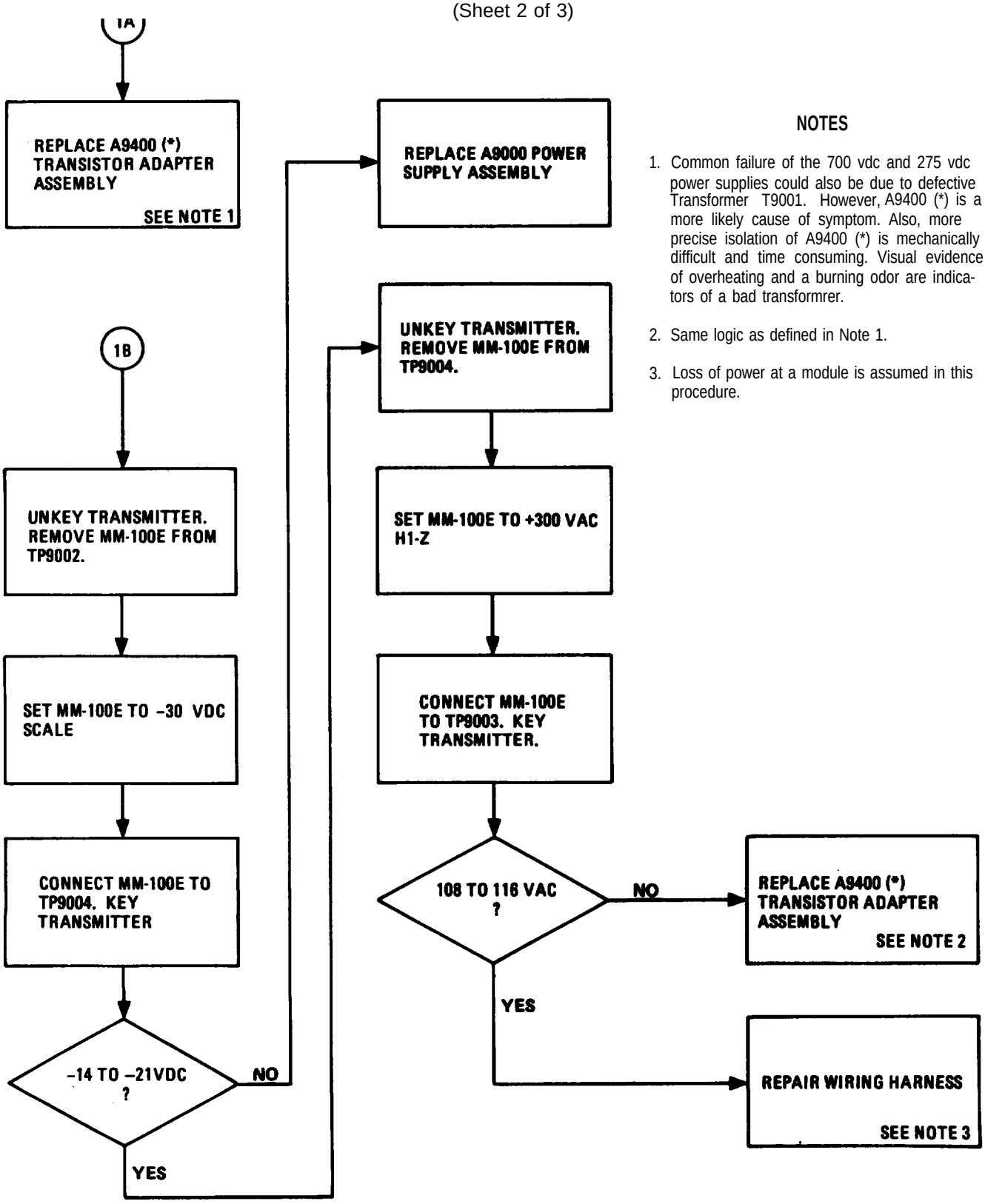
6-5. POWER SUPPLY TROUBLESHOOTING. (CONT)

CHART 6-2
Power Supply Troubleshooting Using MK-1978/VRC and AN/GRM-114A
(Sheet 1 of 3)



6-5. POWER SUPPLY TROUBLESHOOTING. (CONT)

CHART 6-2
Power Supply Troubleshooting Using MK-1978/VRC and AN/GRM-114A
(Sheet 2 of 3)

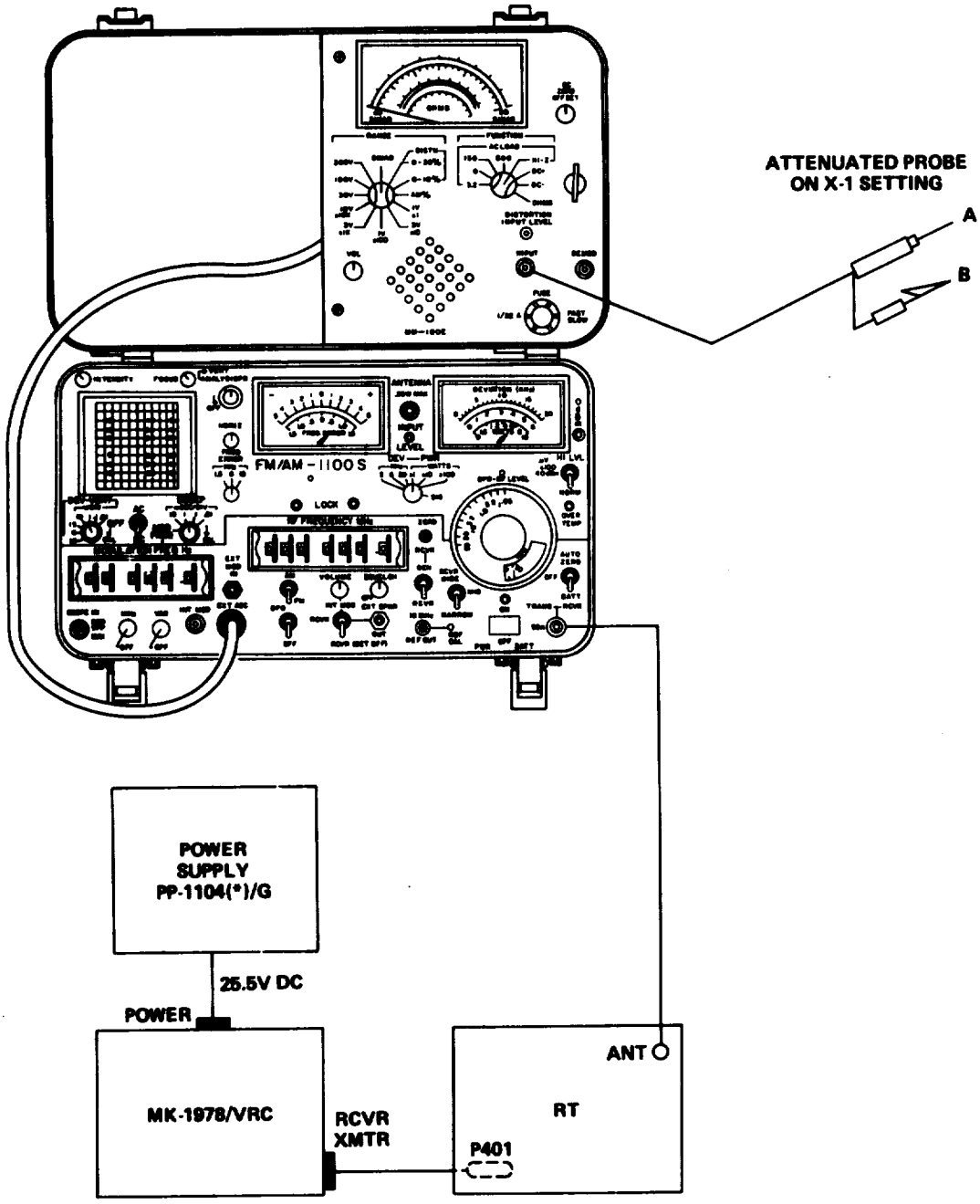


NOTES

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 transformrer.
2. Same logic as defined in Note 1.
3. Loss of power at a module is assumed in this procedure.

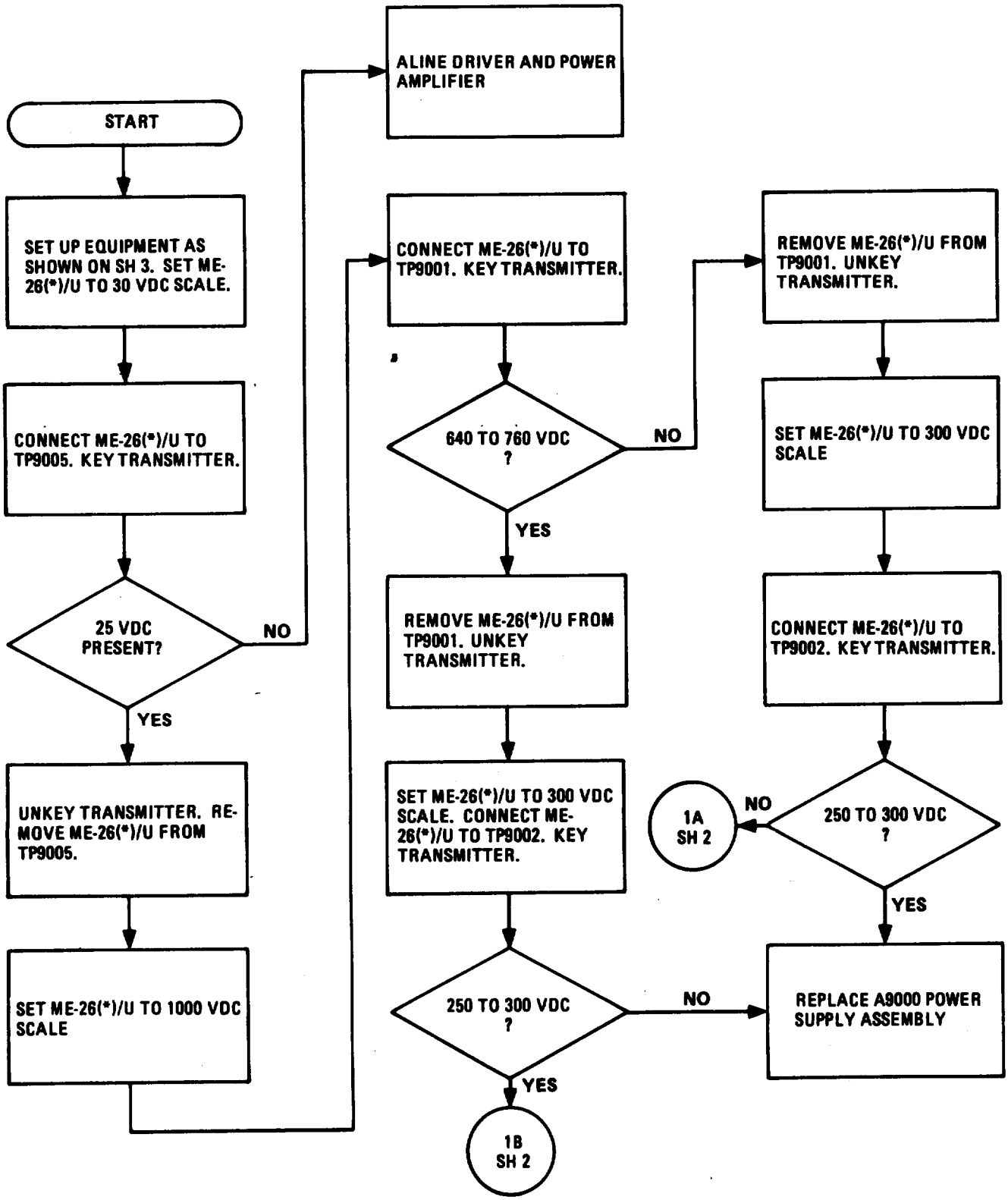
6-5. POWER SUPPLY TROUBLESHOOTING. (CONT)

CHART 6-2
Power Supply Troubleshooting Using MK-1978/VRC and AN/GRM-114A
(Sheet 3 of 3)



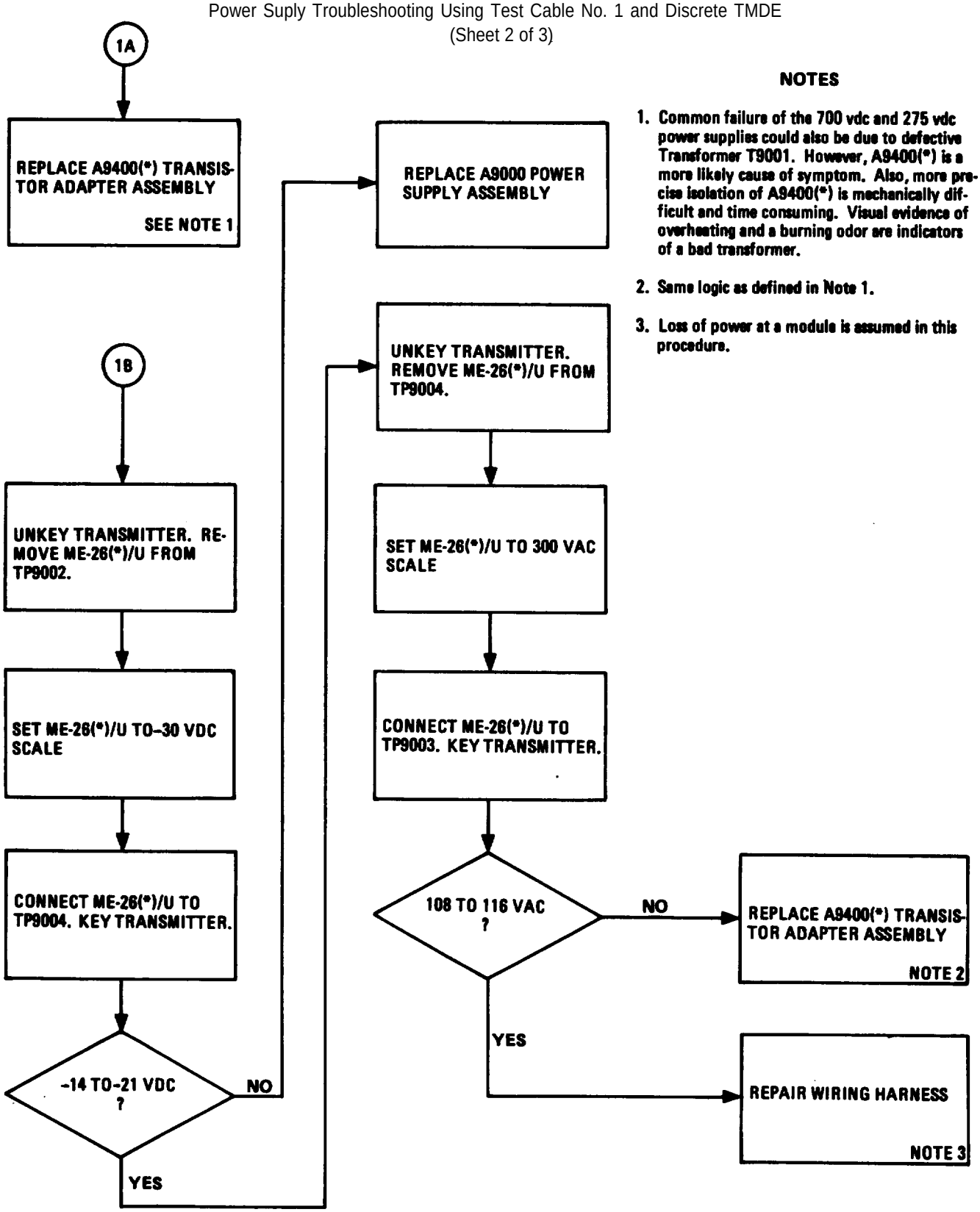
6-5. POWER SUPPLY TROUBLESHOOTING. (CONT)

CHART 6-3
Power Suppply 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)

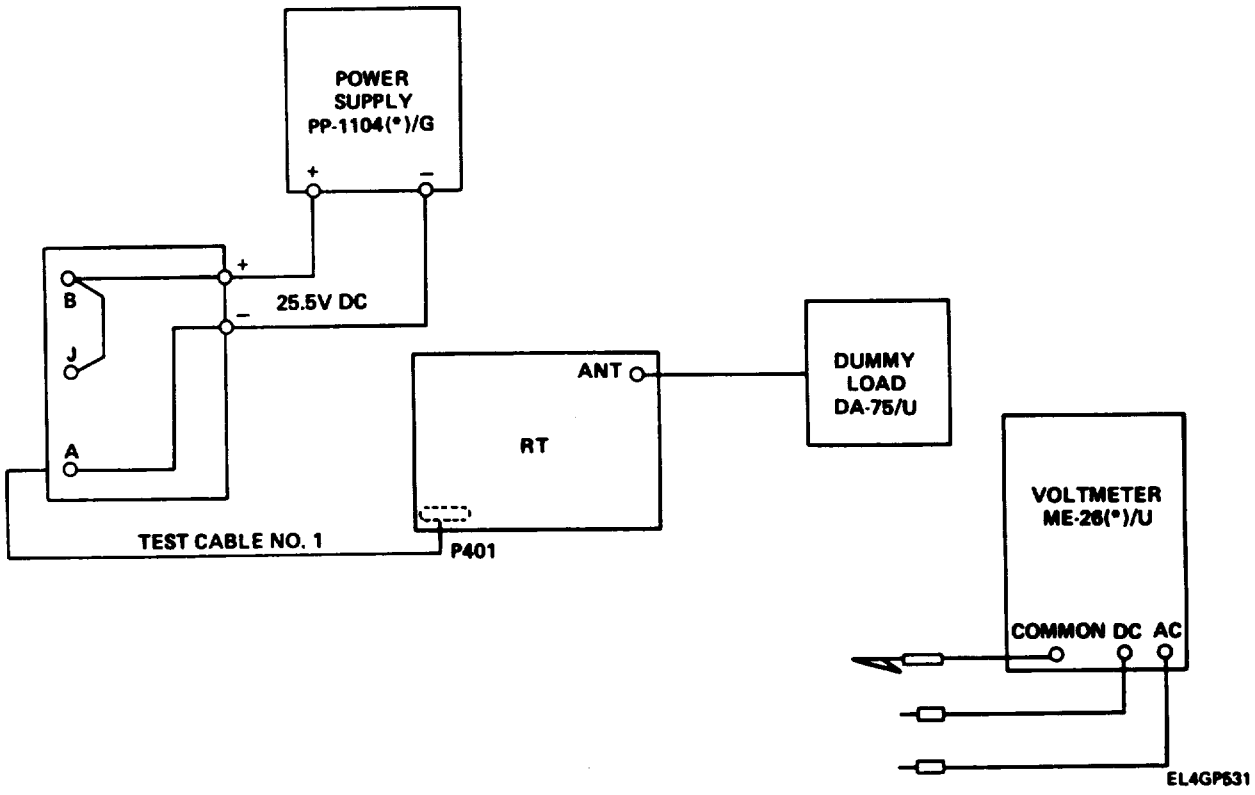


NOTES

1. Common failure of the 700 vdc and 275 vdc power supplies could also be due to defective Transformer T9001. However, 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 6-3
Power Supply Troubleshooting Using Test Cable No. 1 and Discrete TMDE
(Sheet 3 of 3)



Section Ill GENERAL SUPPORT MAINTENANCE PROCEDURES

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.

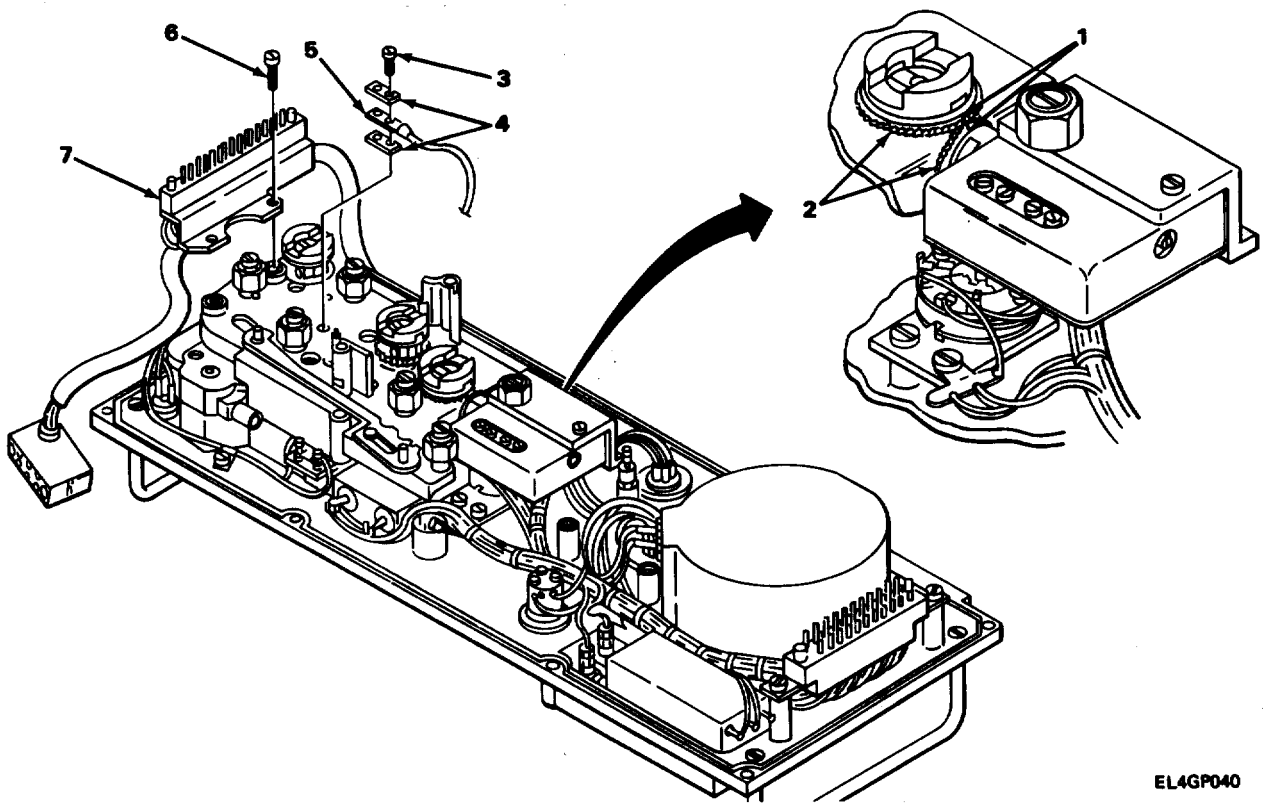
The normal equipment rendition to start a maintenance task is power off. Equipment Condition is not listed unless some other condition is required.

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 ald in installation.

1. Remove Switch S359. (See paragraph 2-32.)
2. Wrap rubberband around Switch S359 body and gear to prevent gear from turning.

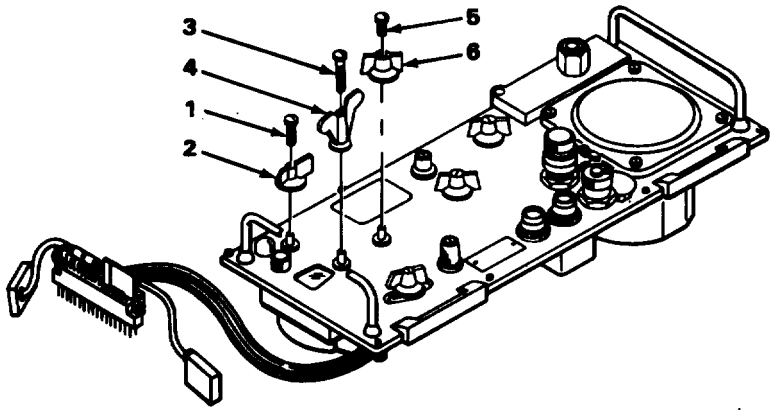
CAUTION

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.

6-7. FRONT PANEL GEAR TRAIN ASSEMBLY REPLACEMENT (RT-524(*)/VRC ONLY (CONT)

REMOVAL (CONT)



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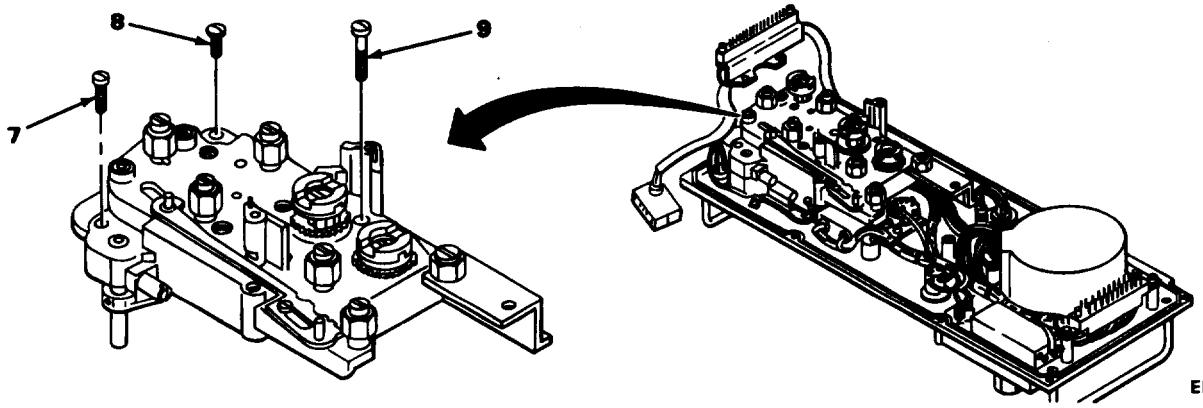
5. Using screwdriver, remove screw (1) and BAND switch knob (2).
6. Using screwdriver, remove screw (3) and MC-TUNE knob (4).
7. Using screwdriver, remove screw (5) and KC-TUNE knob (6).

NOTE

Before proceeding with next step, tag switches for Identification.

8. Remove Switches S356, S357 and S356. (See paragraph 2-29.)



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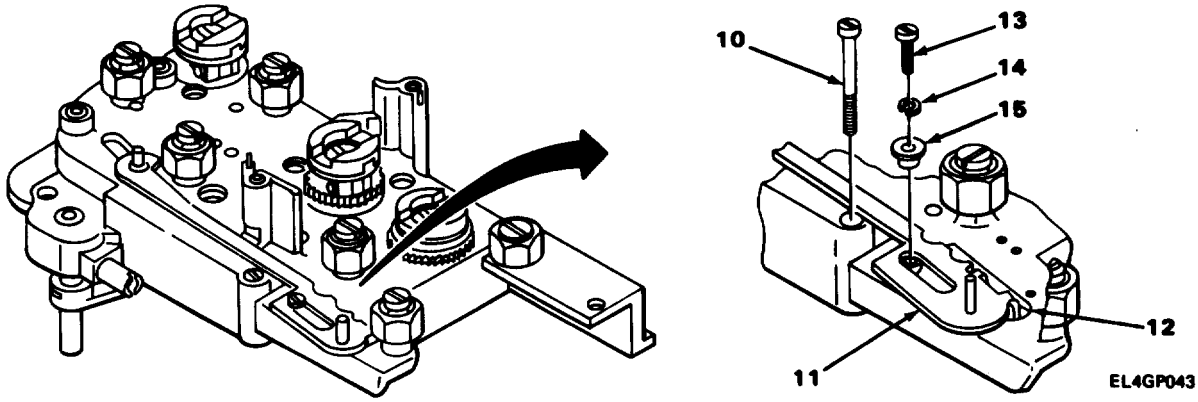
CAUTION

Note three different length screws used to secure gear train assembly.

9. Using screwdriver, remove 7/64-inch-long screw (7).
10. Using screwdriver, remove 5/16-inch-long screw (8).
11. Using screwdriver, remove 13/16-inch-long screw (9).

6-7. FRONT PANEL GEAR TRAIN ASSEMBLY REPLACEMENT (RT-524(*)/VRC ONLY). (CONT)



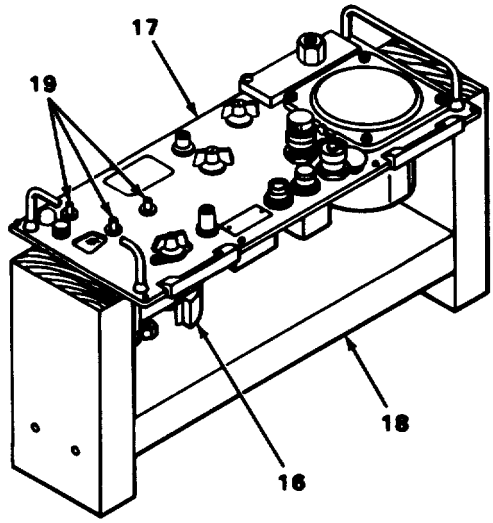
NOTE

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.
13. Using screwdriver, remove 13/16-inch-long screw (10).
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)

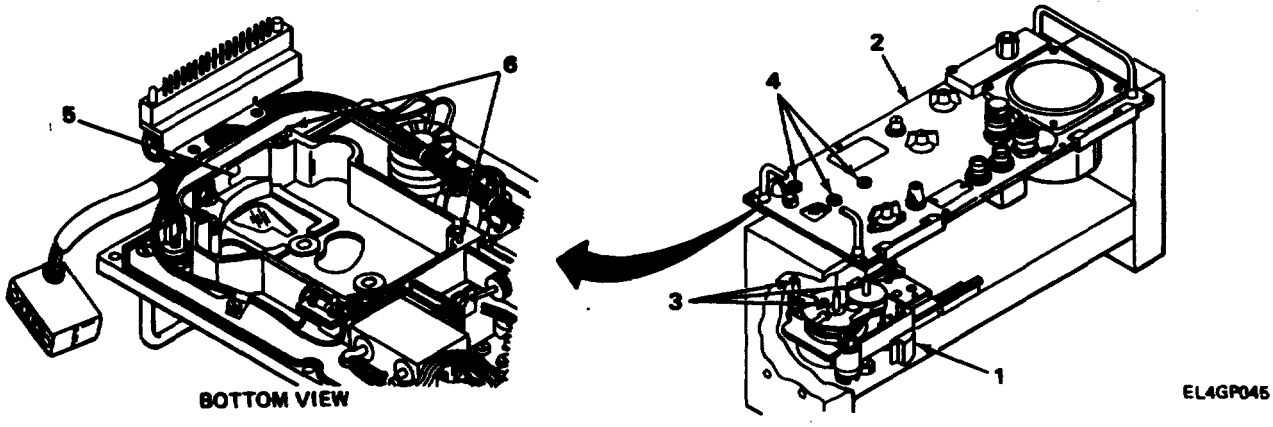
CAUTION

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



NOTE

Before proceeding to steps 1 and 2, place front panel face up on holding fixture.

Make sure inner knob stem shims, if used, are in place.

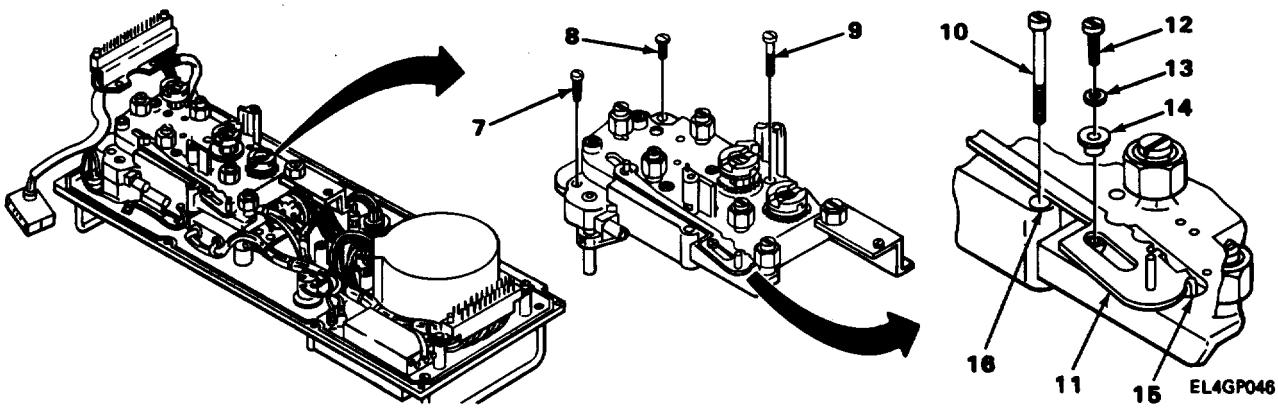
1. Position gear train assembly (1) under front panel (2) and aline knob stems (3) with knob stem holes (4).

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 alinement pins (6) on front panel.

6-7. FRONT PANEL GEAR TRAIN ASSEMBLY REPLACEMENT (RT-524(*)/VRC ONLY). (CONT)



NOTE

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).

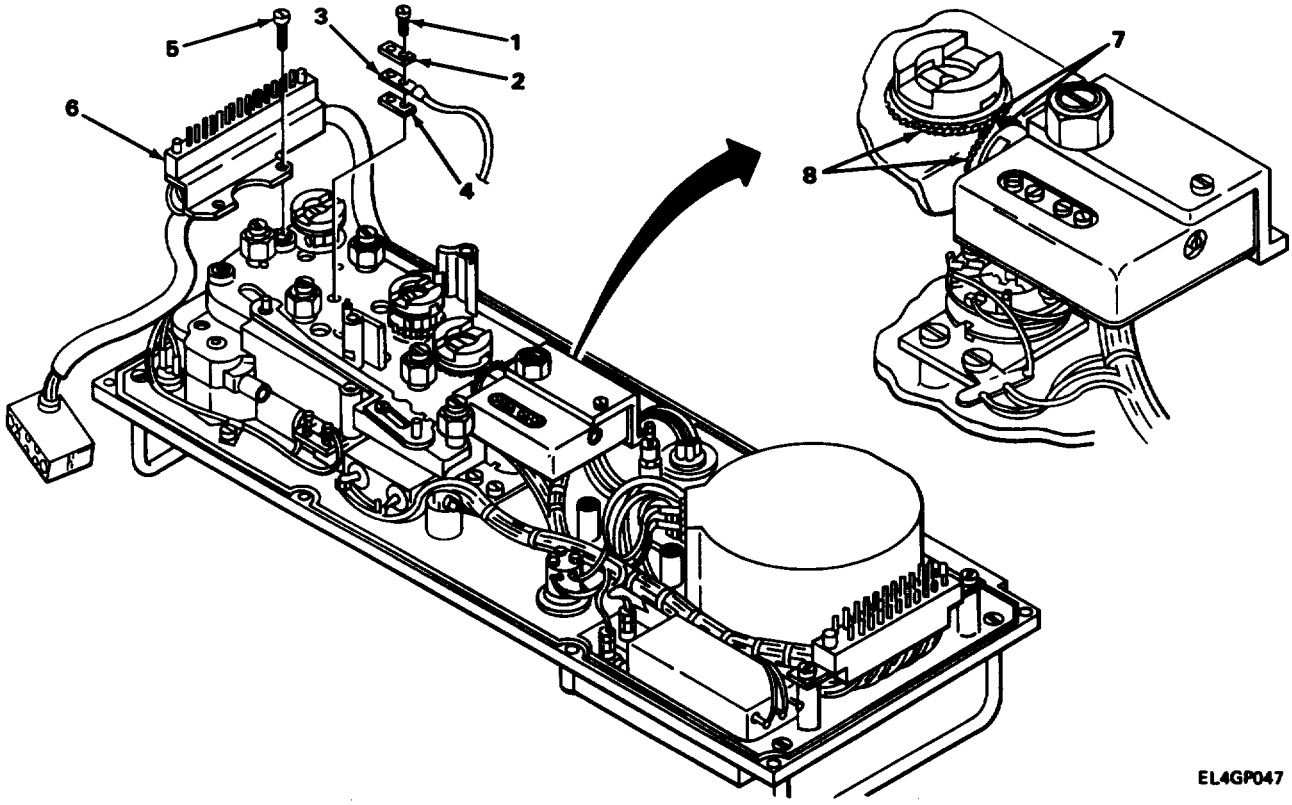
NOTE

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).
9. Using screwdriver, tighten screw (12).

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

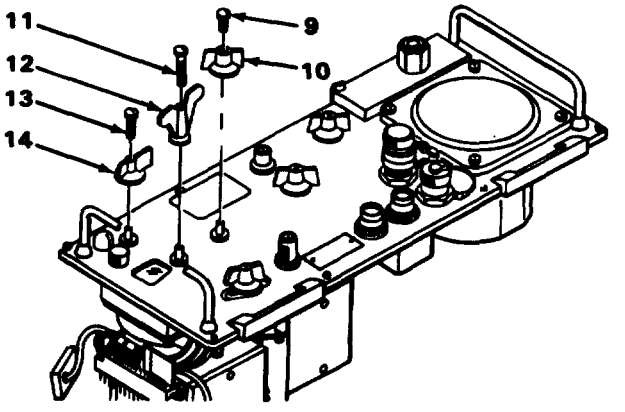
Before performing next step, remove rubberband and make sure scribe marks (7) on gears (8) are in alinement.

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.



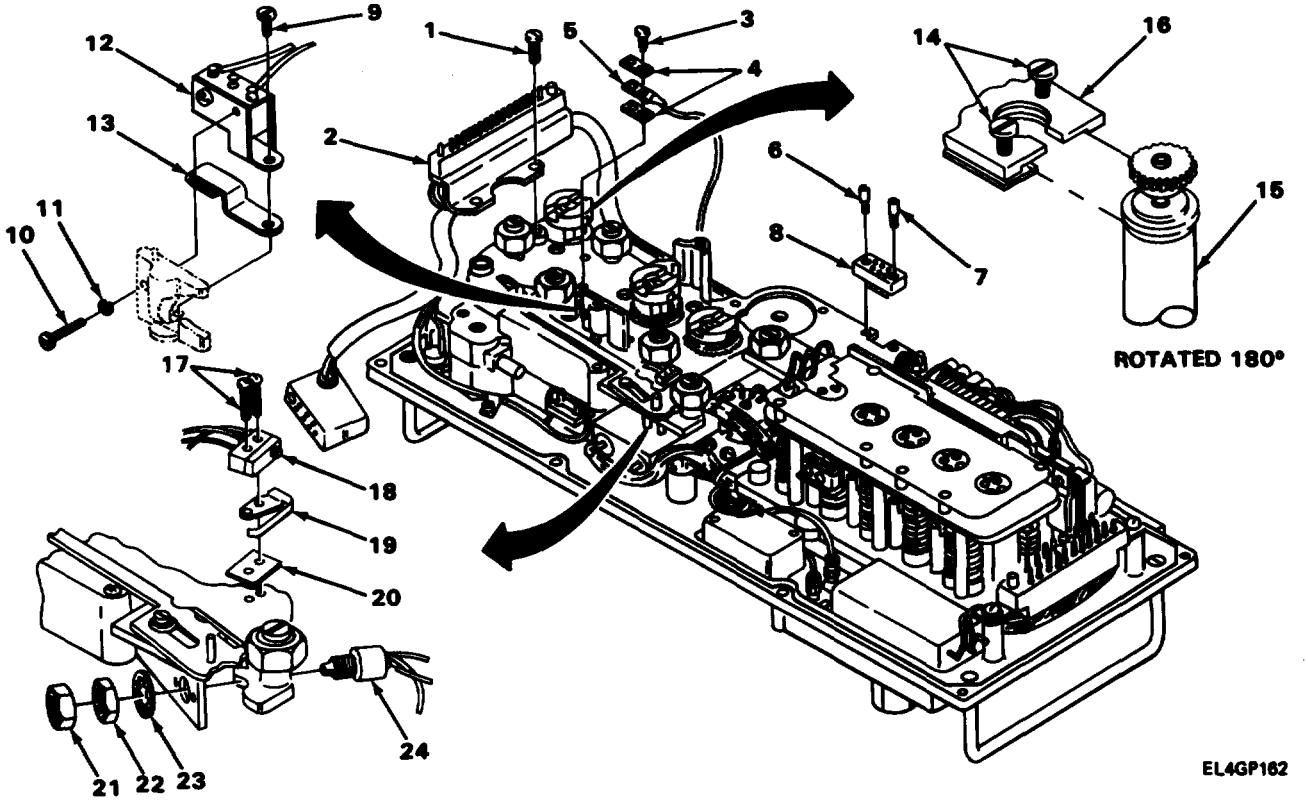
EL4GP048

14. Using screwdrlver, Install screw (9) and KC-TUNE knob (1O).
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. (Bee paragraph 2-12.)
Install A1000 assembly. (See paragraph 2-9.)

6-8. FRONT PANEL GEAR TRAIN ASSEMBLY REPLACEMENT (RT-246(*)/VRC ONLY

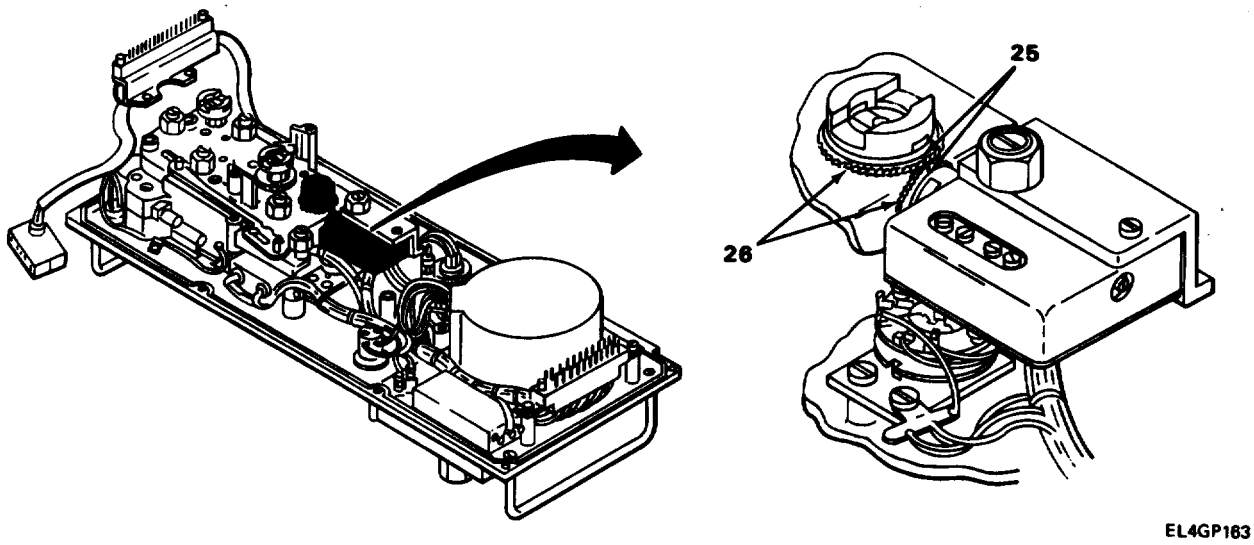
MATERIALS/PARTS: Matched Helical Gear Set
PRELIMINARY PROCEDURE: Remove A1000 assembly. (See paragraph 2-9.)
Remove A2000 assembly. (See paragraph 2-12.)
Remove A6000 assembly. (See paragraph 2-14.)
Remove Pushbutton Assembly A7100. (See paragraph 2-35.)
Remove A7200 assembly. (See paragraph 2-15.)
Remove 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.

6-8. FRONT PANEL GEAR TRAIN ASSEMBLY REPLACEMENT (RT-246(*)/VRC ONLY (CONT)

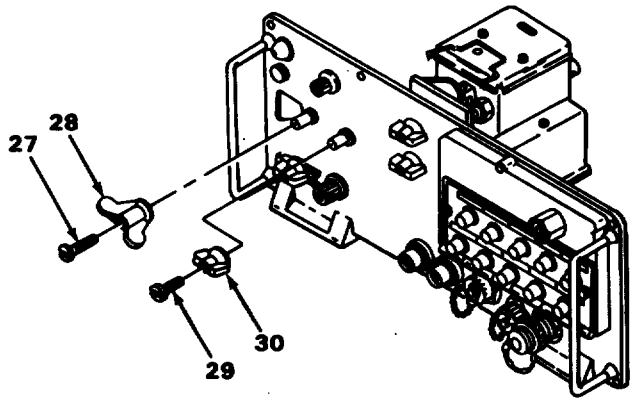


EL4GP163

NOTE

Before performing next step, scribe a mark (25) across gears (28) and switch body to aid In Installation.

8. Remove Switch S309. (Sea paragraph 2-32.)
9. Wrap rubberband around Switch S309 body and gear to prevent gear from turning.

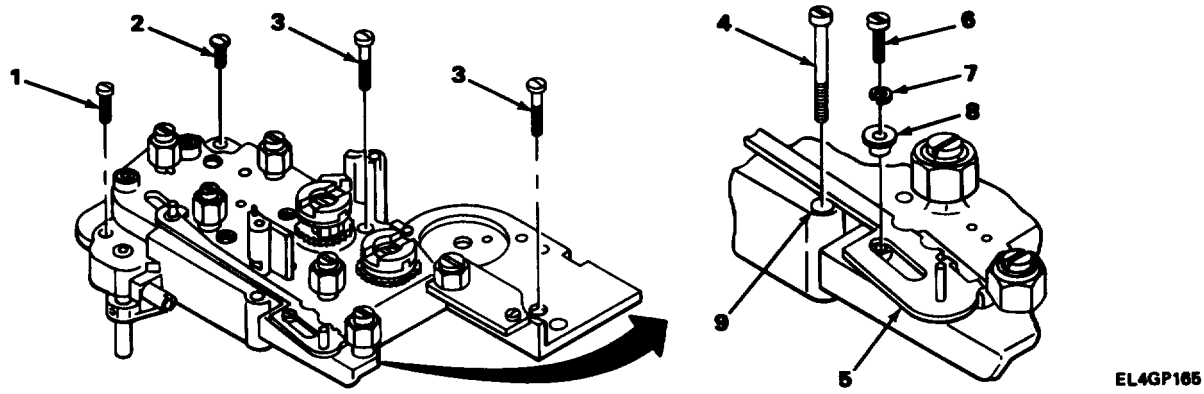


EL4GP164

10. Using screwdriver, remove screw (27) and MC-TUNE knob (28).
11. Using screwdriver, remove screw (29) and KC-TUNE knob (30).

6-8. FRONT PANEL GEAR TRAIN ASSEMBLY REPLACEMENT (RT-246(*)/VRC ONLY). (CONT)

REMOVAL (CONT)



NOTE

There are three different length screws used to secure the gear train assembly.

12. Using screwdriver, remove 7/16-inch-long screw (1).
13. Using screwdriver, remove 3/8-inch-long screw (2).
14. Using screwdriver, remove two 7/8-inch-long screws (3).

NOTE

To gain access to 7/8-inch-long screw (4) under lever (5), do steps 15 and 16.

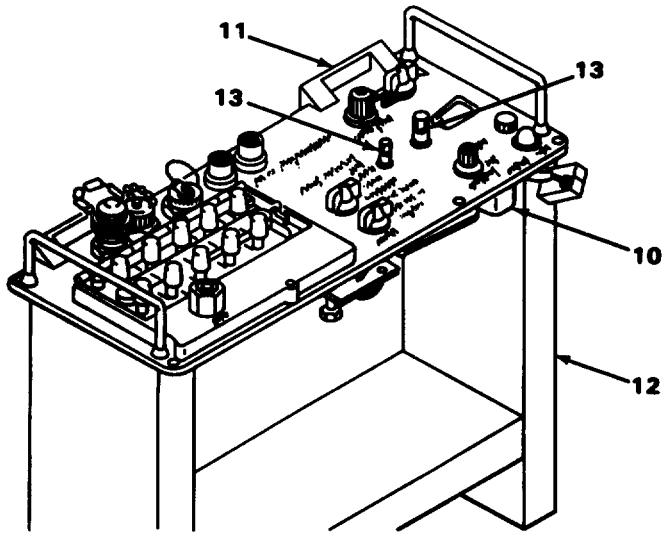
15. Using screwdriver, remove screw (8), lockwasher (7) and sleeve spacer (8).
10. Move lever (5) away from screw hole (9).
17. Using screwdriver, remove 7/8-inch-long screw (4).

NOTE

To prevent loss of hardware, do step 18.

18. Reposition lever (5) and install screw (6), lockwasher (7) and sleeve spacer (8).

6-8. FRONT PANEL GEAR TRAIN ASSEMBLY REPLACEMENT (RT-246(*)IVRC ONLY (CONT)



EL4GP166

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

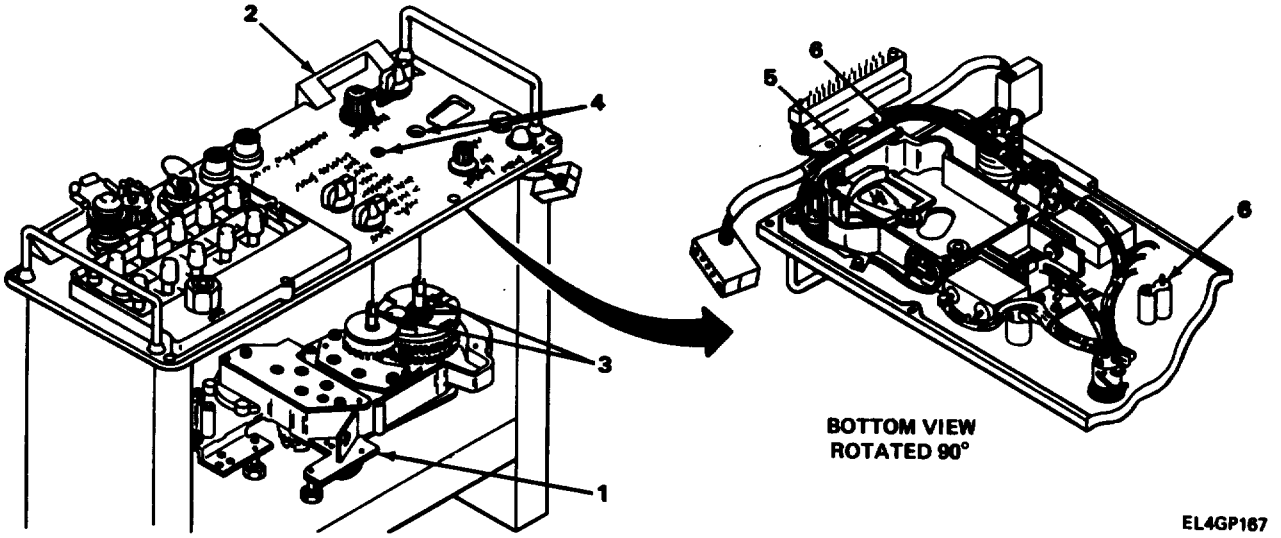
Do not turn gear train assembly upside down.

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 aline knob stems (3) with knob stem holes (4).

NOTE

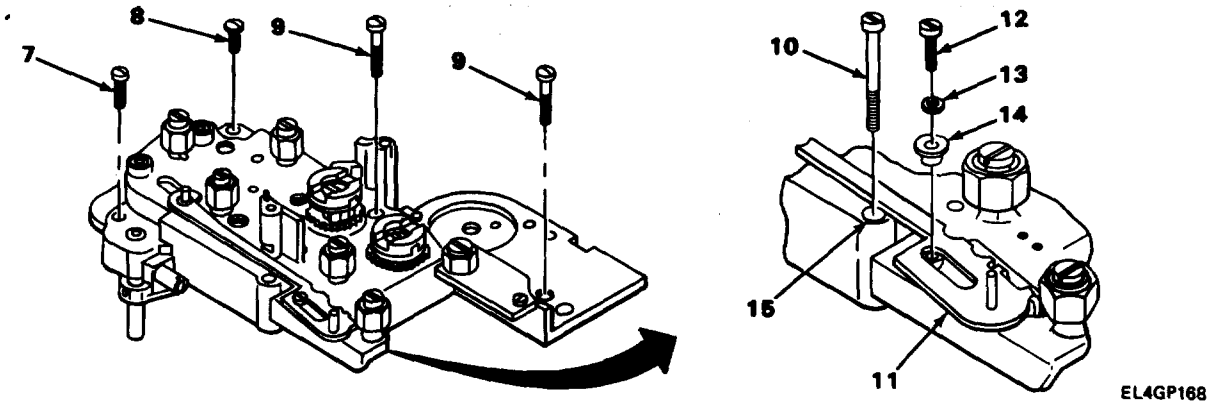
Make sure gear train assembly (1) fits flush against seat (5) and that no wires are pinched.

2. Carefully push gear train assembly (1) into place making sure it engages with alinement 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).

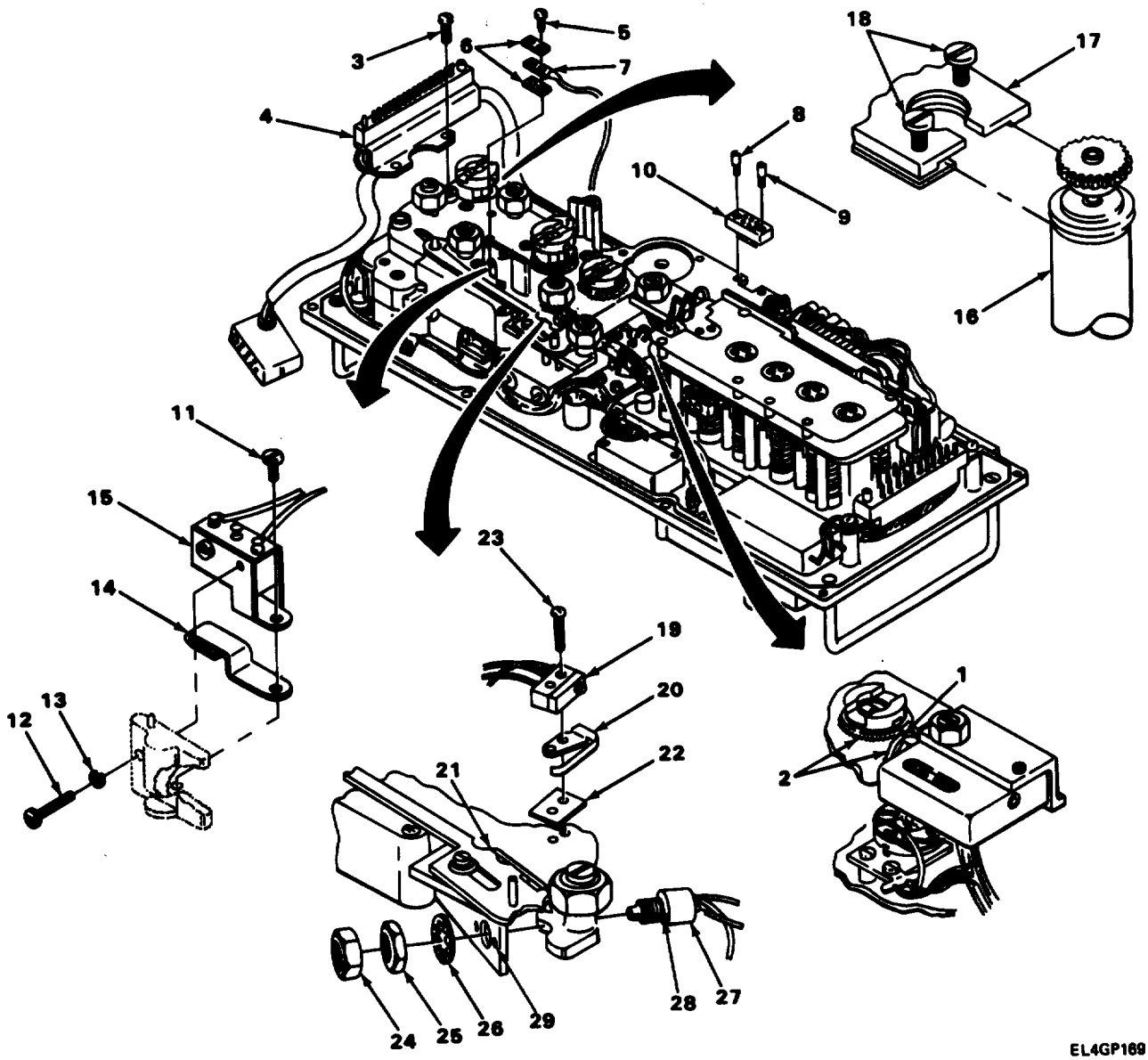
NOTE

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.
9. Using screwdriver, tighten screw (12).

6-8. FRONT PANEL GEAR TRAIN ASSEMBLY REPLACEMENT (RT-246(*)/VRC ONLY). (CONT)

INSTALLATION (CONT)



NOTE

Before performing next step, remove rubberband and make sure scribe marks (1) on gears (2) are in alinement.

10. Install Switch S309. (See paragraph 2-32.)
11. Using screwdriver, install two screws (3) and Connector P301 (4).

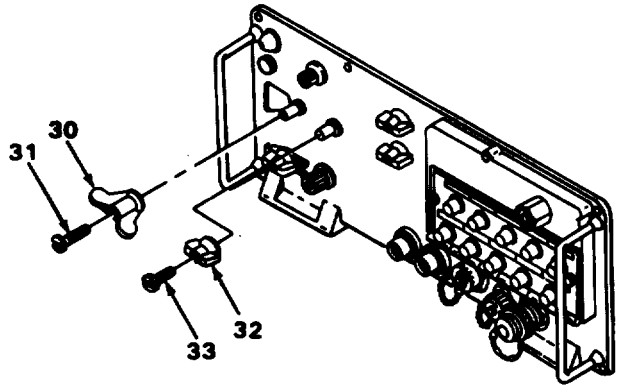
6-8. FRONT PANEL GEAR TRAIN ASSEMBLY REPLACEMENT (RT-246(")/VRC ONLY). (CONT)

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).
20. Using wrench, tighten 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.



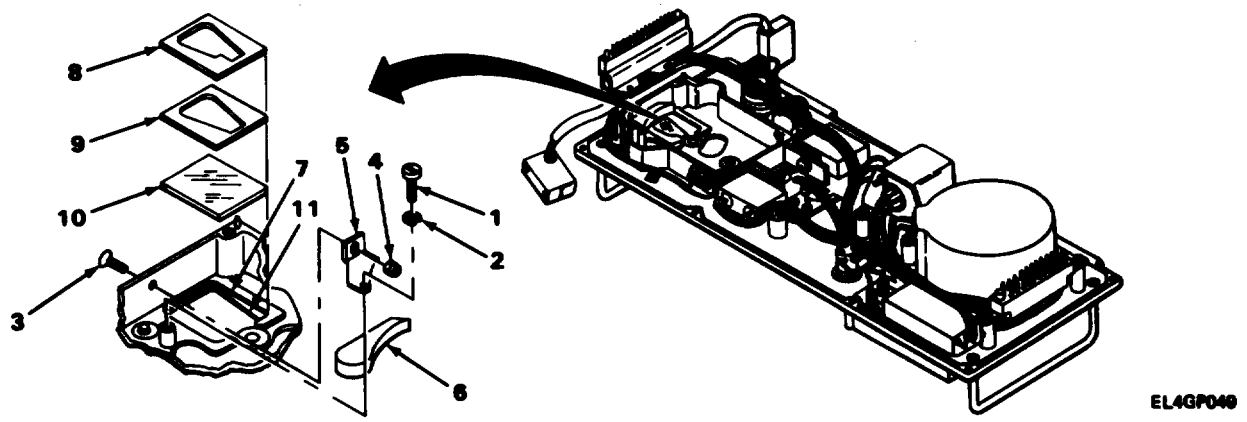
22. Install MC-TUNE knob (30), screw (31), KC-TUNE knob (32) and screw (33).
23. Using screwdriver, tighten screws (31) and (33).

FOLLOW-ON MAINTENANCE: Install Servomotor Generator MG301. (See paragraph 2-34.)
Install Solenoid L301. (See paragraph 2-33.)
Instaii A7200 assembly. (See paragraph 2-15.)
Install Pushbutton Assembly A71OO. (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 (1O).

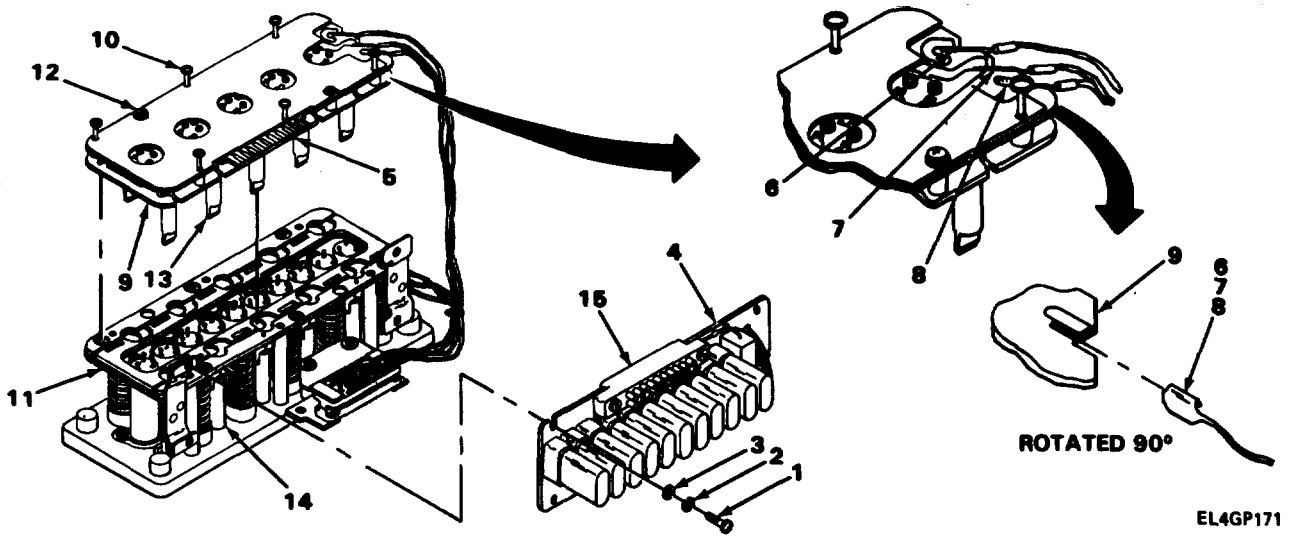
INSTALLATION

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 screwdrlver and 1/4-inch wrench, tighten screw (3) and nut (4).
8. Using screwdrlver, 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).

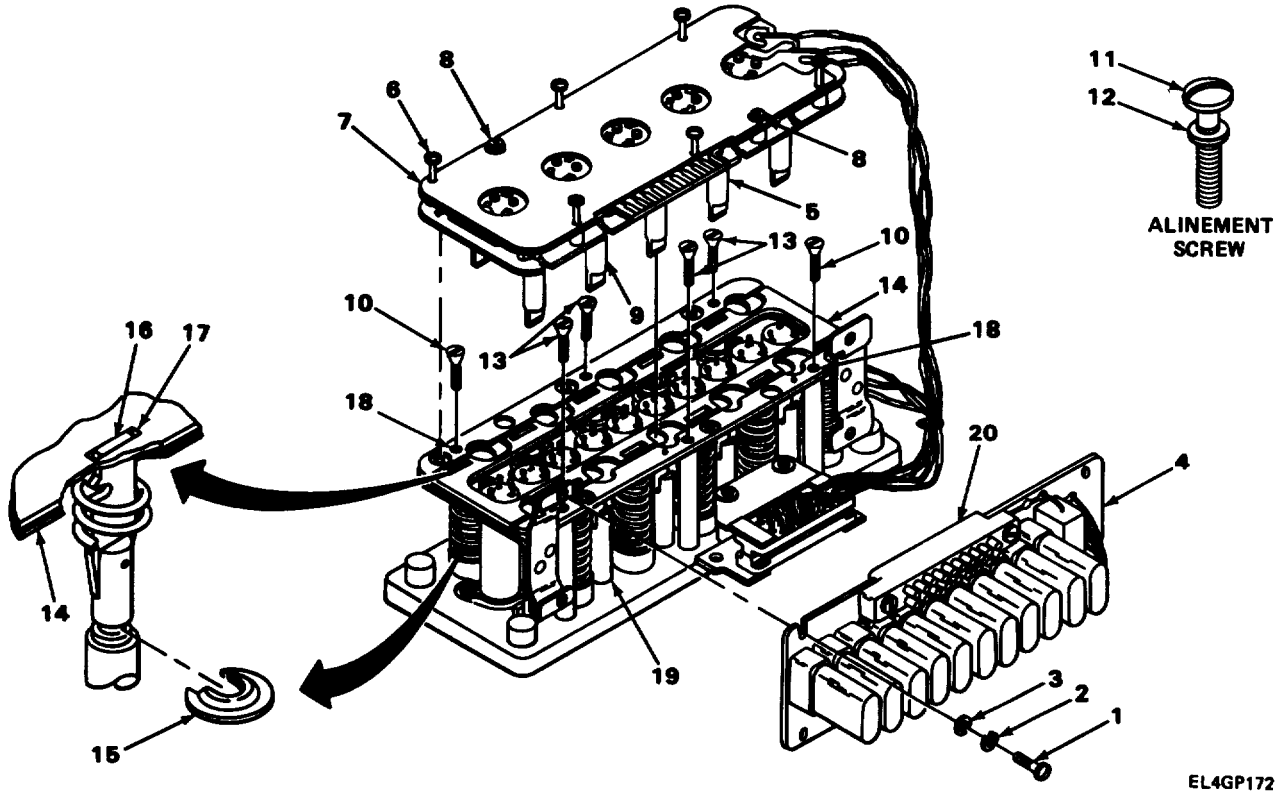
INSTALLATI0N

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 Pushbuton 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.

NOTE

Do not remove two cross-tip screws (8) from assembly.

Do not move plastic shafts (9),

3. Using screwdriver, remove two screws (10) on opposing comers and replace with two alinement screws (11) and fiat washers (12). Tighten until they stop.
4. Using screwdriver, remove four screws (13).

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

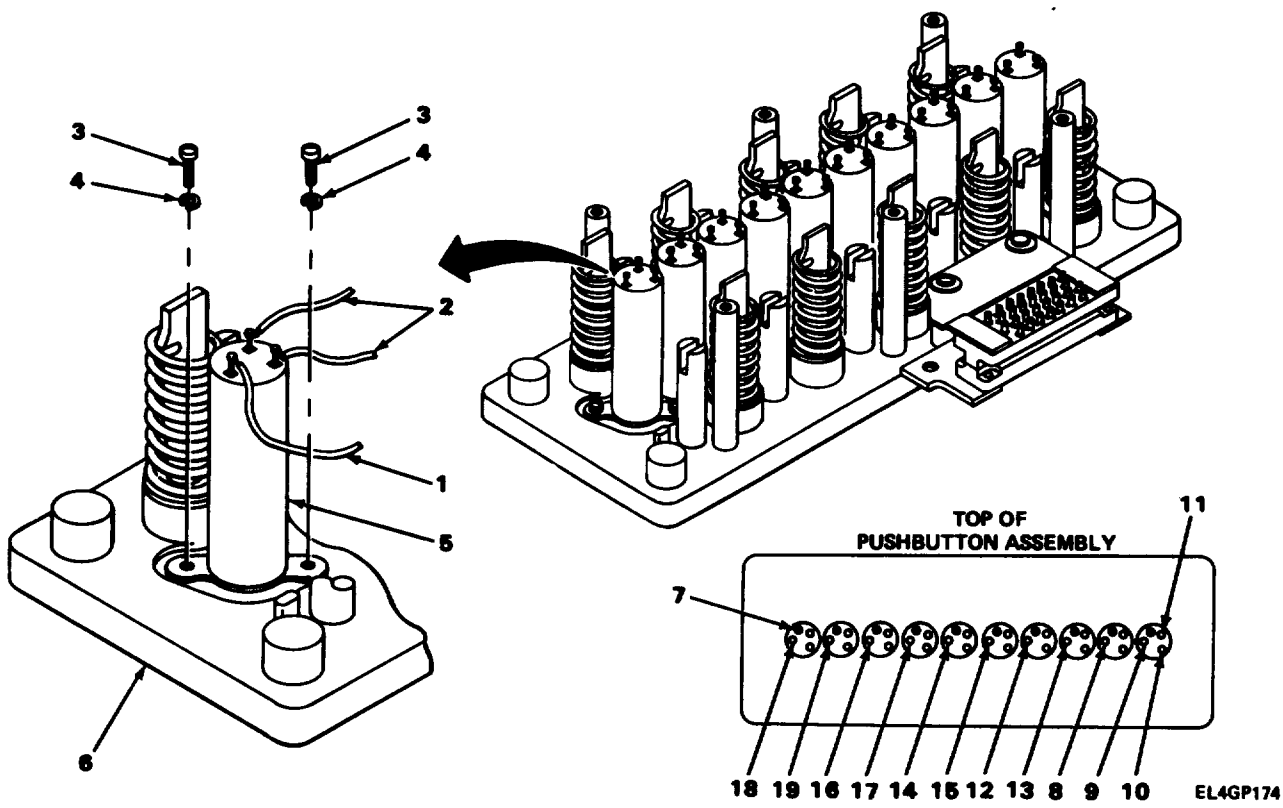
When performing steps 3,4, and 5, care must be taken to make sure all ten pushbutton shafts (16) enter control plate assembly slots (17).

3. Using screwdriver, alternate tightening of two alinement screws (11) until they stop. Do not overtlghten.
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).
9. Using screwdriver, tighten six captive screws (6).
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.)



REMOVAL

NOTE

Steps given are typical for all ten reslstors.

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.

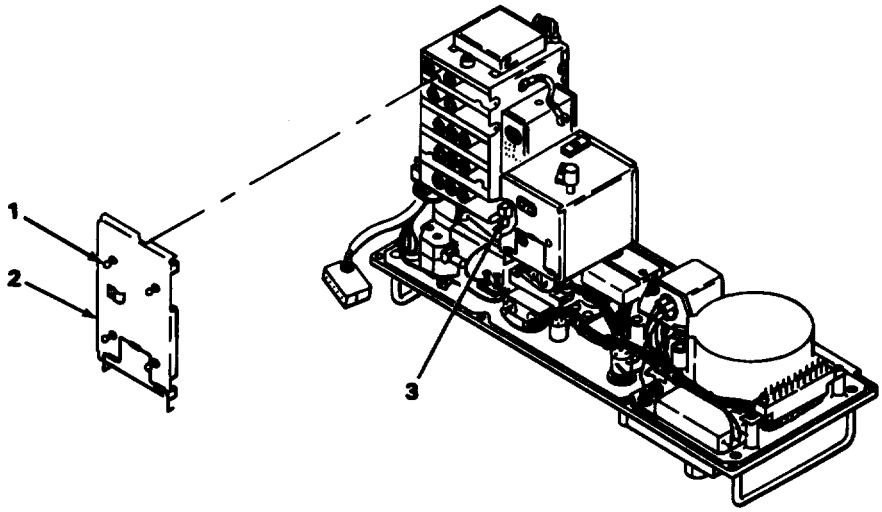
RESISTOR NO.	WIRE COLOR	INDEX NO,
R7101	BRN	8
R7102	BLU	9
R7102	YEL	10
R7102	WHT	11
R7103	RED	12
R7104	VIO	13

RESISTOR NO.	WIRE COLOR	INDEX NO
R7105	ORG	14
R7108	GRA	15
R7107	YEL	16
R7108	WHT	17
R7109	GRN	18
R711O	BLK	19

FOLLOW-ON MAINTENANCE: Install control plate assembly. (See paragraph 6-11.)

6-13. A1000 ASSEMBLY MAIN CIRCUIT BOARD VR1001 REPLACEMENT.

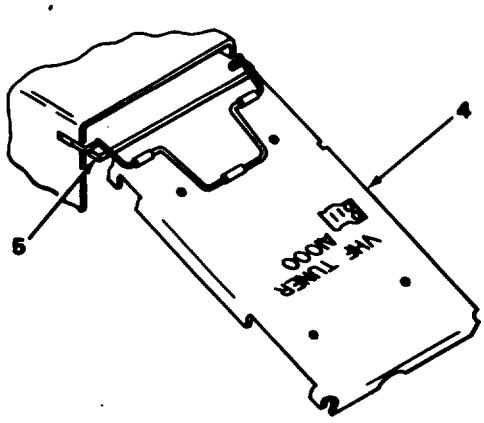
MATERIALS/PARTS: Regulator Assembly VR1001
PRELIMINARY PROCEDURE: Remove front panel. (See paragraph 2-8.)



EL4GP175

REMOVAL

1. Using screwdrlver, loosen four captive screws (1) and remove A1000 top cover (2).
2. Disconnect brown wire (W301) (3) from J1001.



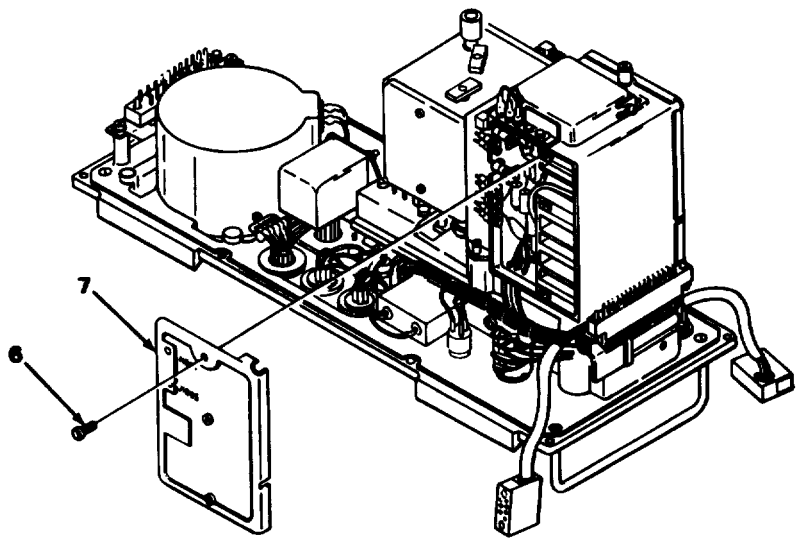
EL4GP176

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 VR1OO1 REPLACEMENT. (CONT)

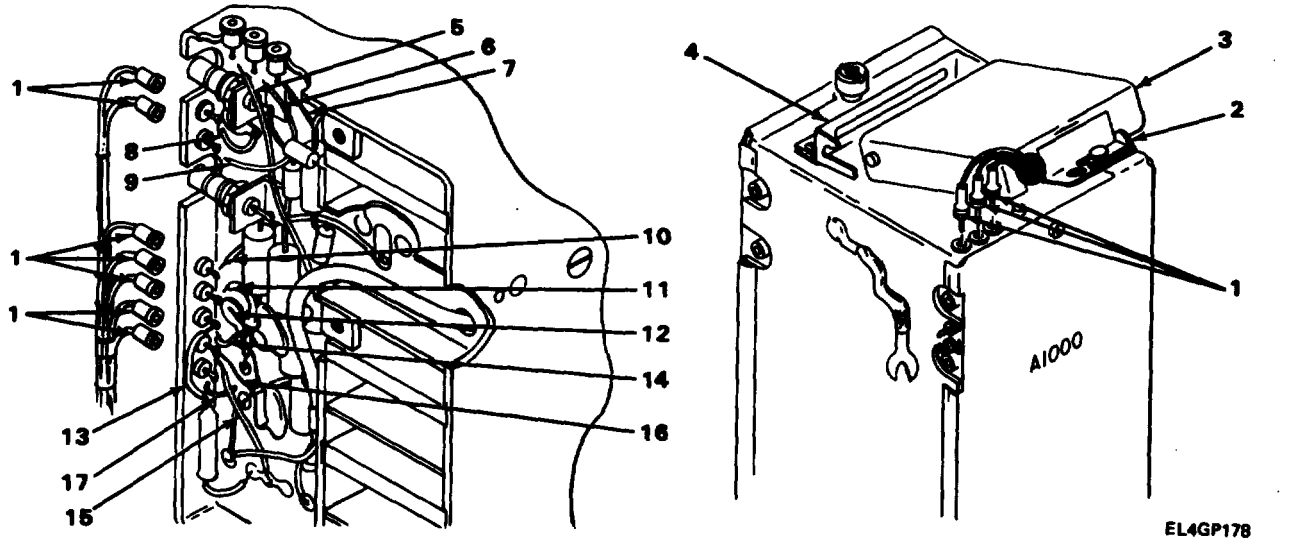


EL4GP177

4. Using screwdriver, remove two screws (6) and remove A1000 bottom cover (7).

6-13. A1000 ASSEMBLY MAIN CIRCUIT BOARD VR1001 REPLACEMENT. (CONT)

REMOVAL (CONT)



5. Unplug ten color-coded wire plugs (1).
6. Unfasten retalning 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.

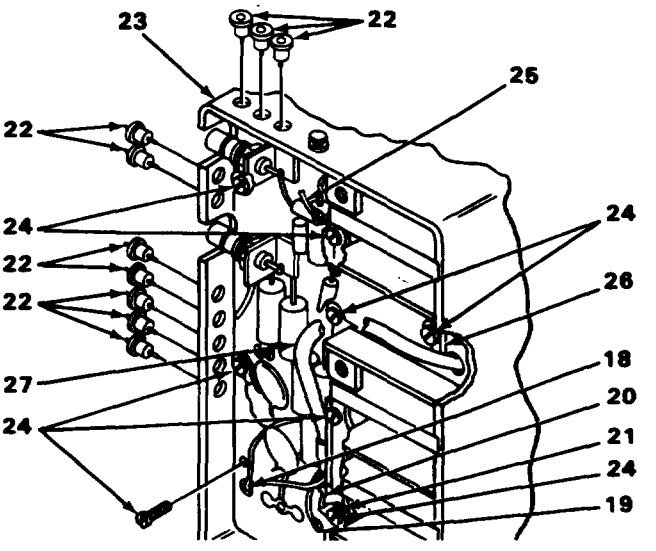
NOTE

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.

TOP OF A1000 ASSEMBLY			SIDE OF A1000 ASSEMBLY		
PLUG COLOR	WIRE COLOR	INDEX NO.	PLUG COLOR	WIRE COLOR	INDEX NO.
Brown	Brown	5	Black	Black	8
Purple	Purple	6	White	White	9
Black	Black	7	Yellow	Yellow/White	10
			Orange	Orange	11/12
			Violet	Violet/White	13114
			Red	Violet	15/16
			Brown	Red/White	17

6-13. A1000 ASSEMBLY MAIN CIRCUIT BOARD VR1OO1 REPLACEMENT. (CONT)



EL4GP179

CAUTION

Extreme care must be taken when performing next step to prevent damage to Circuit Board VR1OO1.

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 VR1OO1 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).

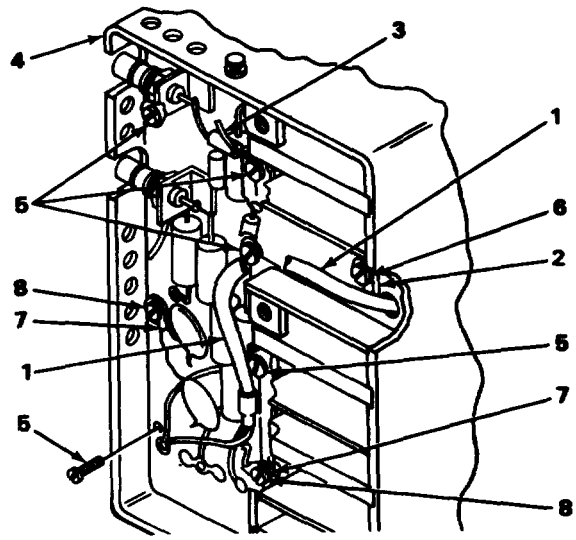
NOTE

Move ground wire (25) out of way before removing Circuit Board VR1001.

12. Carefully remove Clrcuit Board VR1001 (26). On A-models only, push Voltage Regulator FL1OO1 wiring harness (27) through hole In Circuit Board VR1OO1.

6-13. A1000 ASSEMBLY MAIN CIRCUIT BOARD VR1001 REPLACEMENT. (CONT)

INSTALLATION



EL4GP180

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 VR1OO1 (2).

CAUTION

To prevent breaking ground wire (3), move out of way before installing Circuit Board VR1OO1 (2).

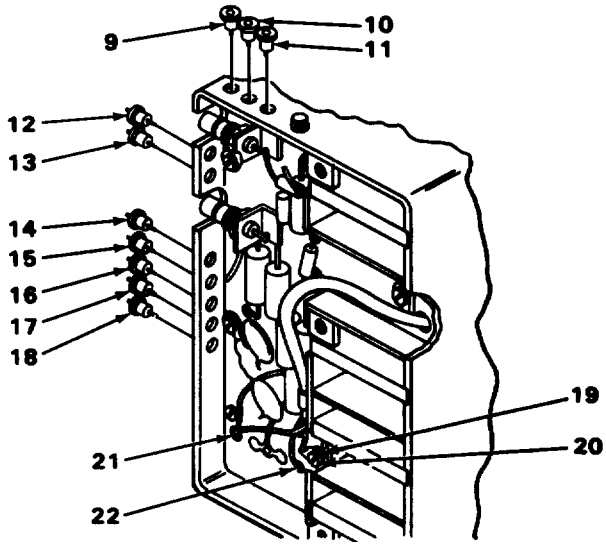
2. Position Circuit Board VR1OO1 (2) in case (4) and install five small screws (5) and one large screw (6).
3. Install ground lugs (7) and two small screws (8).

NOTE

Note positioning of ground lugs (7).

4. Using small screwdriver, carefully tighten eight screws (5), (6) and (8).

6-13. A1OOO ASSEMBLY MAIN CIRCUIT BOARD VR1001 REPLACEMENT. (CONT)



EL4GP181

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.

PLUG TYPE: MALE/FEMALE		PLUG TYPE: MALE/MALE	
PLUG COLOR	INDEX NO.	PLUG COLOR	INDEX NO.
Brown	9	Black	12
Purple	10	White	13
Black	11	Yellow	14
		Orange	15
		Purple	16
		Red	17
		Brown	18

CAUTION

Extreme care must be taken when performing next step to prevent damage to Circuit Board VR1OO1.

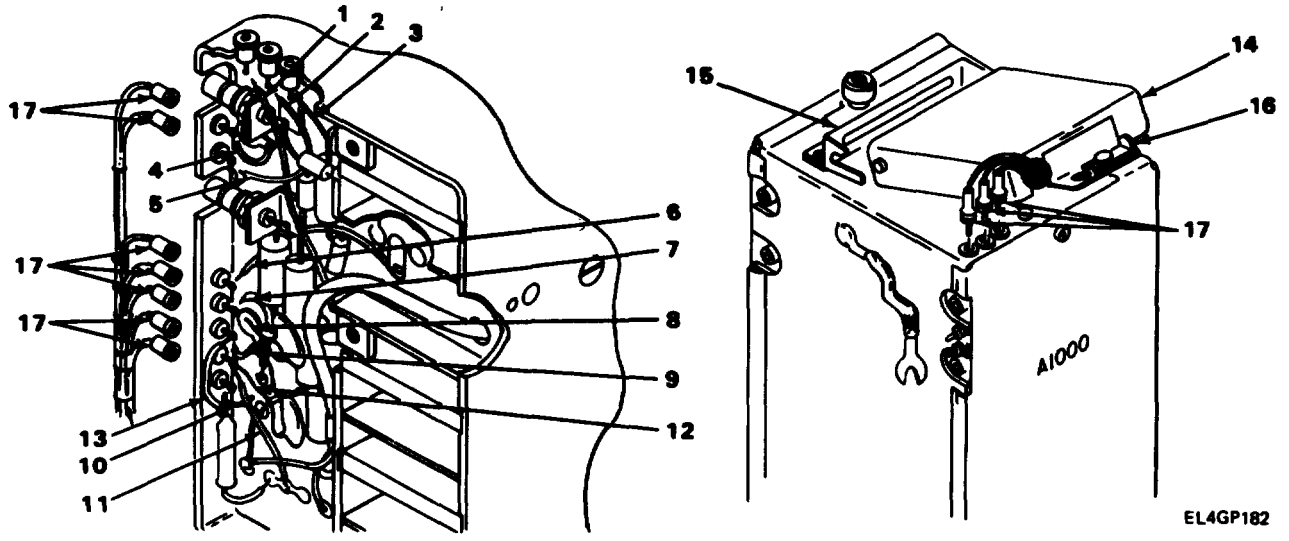
NOTE

Step 6 is for Circuit Board VR1OO1 with Voltage Regulator FL1OO1 which is used on A-models only, For plain models, proceed to step 7.

6. Using soldering iron, carefully solderground wire (19) to ground lug (20), and yellow wire (21) and blue wire (22) to Circuit Board VR1OO1.

6-13. A1OOO ASSEMBLY MAIN CIRCUIT BOARD VR1OO1 REPLACEMENT. (CONT)

INSTALLATION (CONT)



CAUTION

Extreme care must be taken when performing next step to prevent damage to Clrcuit Board VR1OO1 and color~coded wire plugs.

NOTE

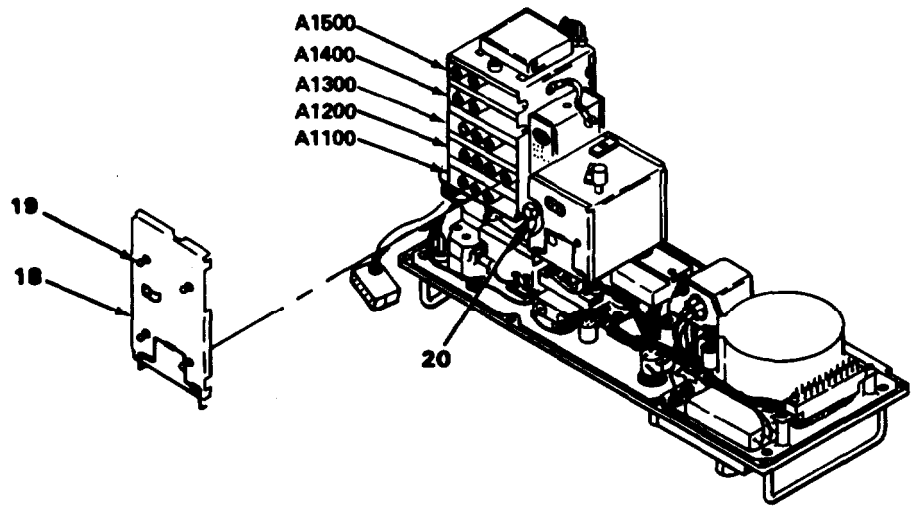
If color coding on unit varies from one shown, note corrected color coding before disasembly.

7. Using soldering iron, carefully solder wires to color-coated wire plugs. See table below.

TOP OF A1000 ASSEMBLY			SIDE OF A1000 ASSEMBLY		
PLUG COLOR	WIRE COLOR	INDEX NO.	PLUG COLOR	WIRE COLOR	INDEX NO.
Brown	Brown	1	Black	Black	4
Purple	Purple	2	White	White	5
Black	Black	3	Yellow	Yellow/White	6
			Orange	Orange	7/8
			Violet	Violet/White	9/10
			Red	Violet	11/12
			Brown	Red/White	13

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 - 1 3 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

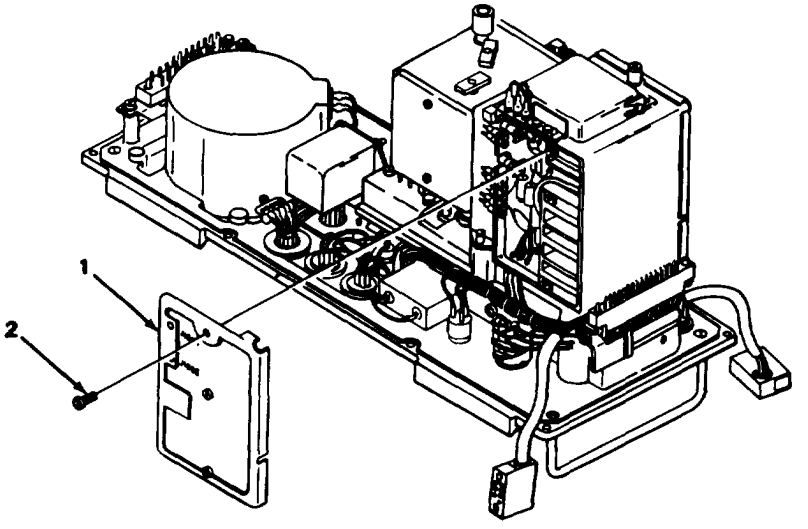
Module number is stamped on modules.

Note locations of different numbered modules.

11. Carefully install all five modules In A1000 assembly.
12. Install A1000 top cover (18).
13. Using screwdriver, tighten four captive screws (19).
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).
16. Using screwdriver, tighten three screws (2).

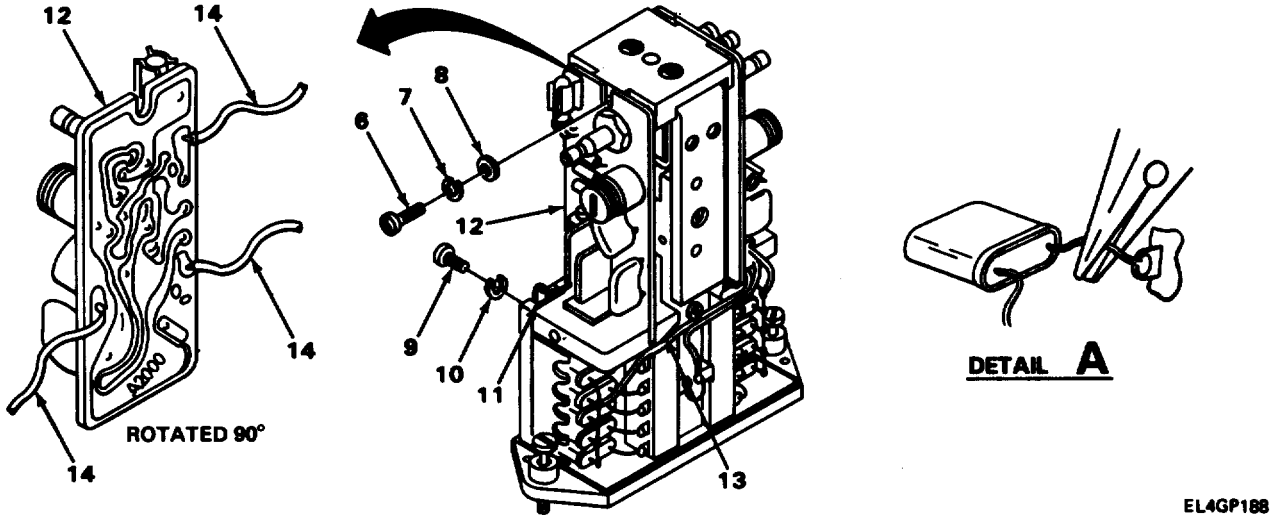
FOLLOW-ON MAINTENANCE: Install front panel. (See paragraph 2-8).

6-14. A2000 ASSEMBLY CIRCUIT BOARD Y2200 AND Y21OO 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).



NOTE

Steps 3 through 6 are for the removal of Circuit Board Y2200.

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.

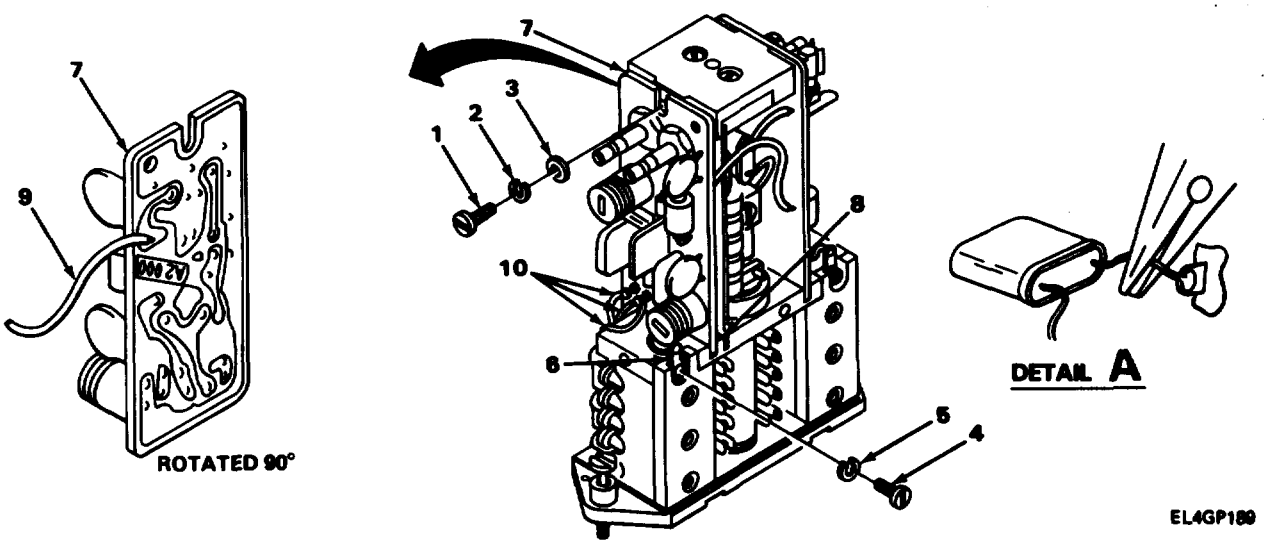
CAUTION

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.

6. Using soldering iron, carefully unsoider 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 Y21OO.

7. Using screwdriver, remove screw(l), 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.

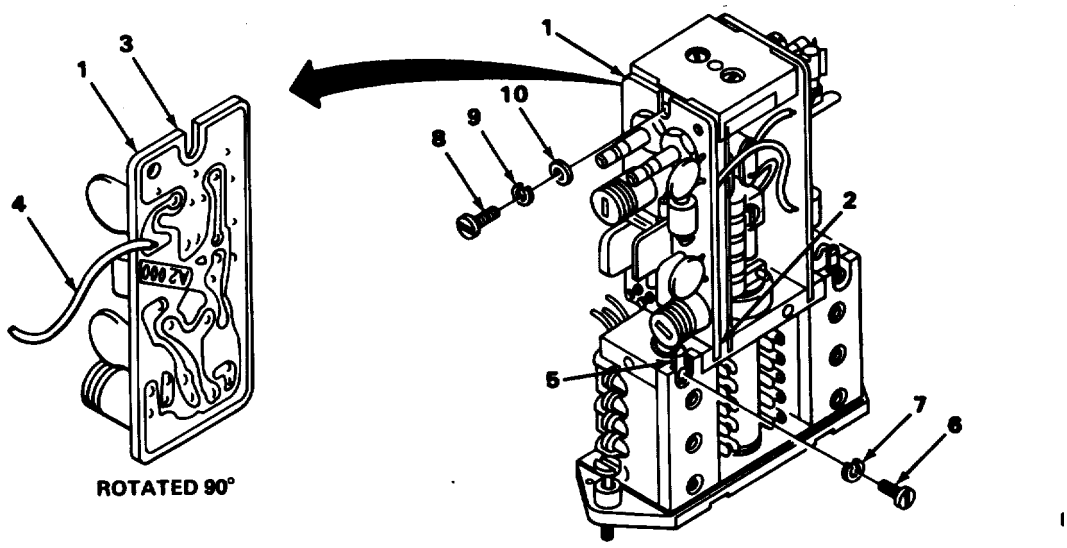
CAUTION

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 wlre (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.

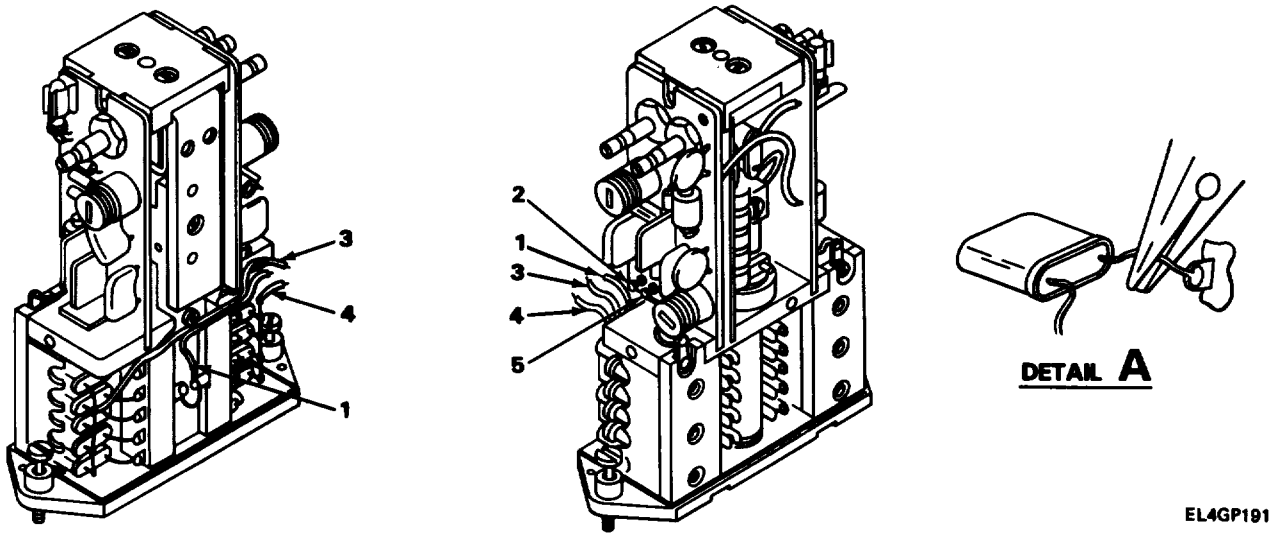
CAUTION

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).
4. Using screwdriver, tighten screw (6).
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 clrcult 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.

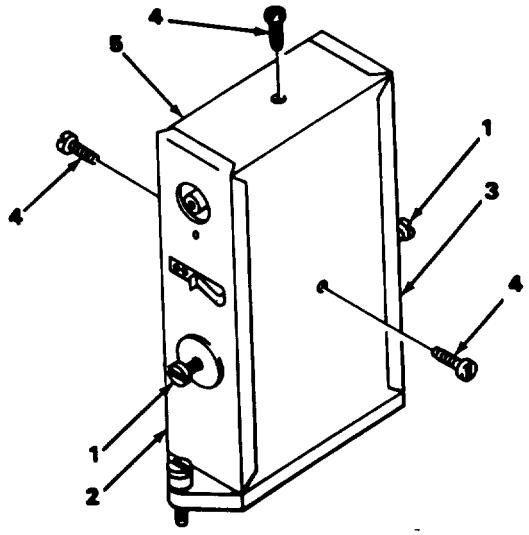
7. Using soldering Iron, carefully solder green wire (1) to pin (2), green wire (3) and clear wire (4) to pin (5).

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).

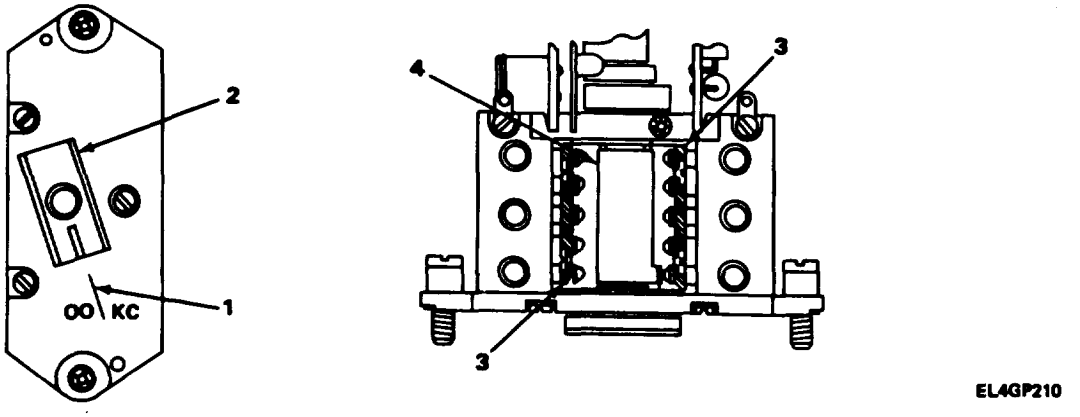


EL4GP186

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)

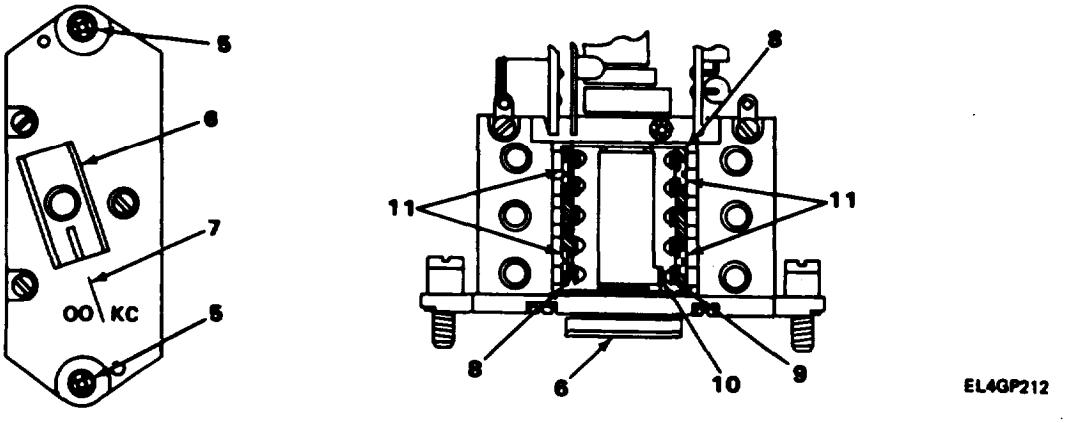


EL4GP210

ADJUSTMENT

NOTE

The OO/KC scribe mark (1) on assembly chassis is alined 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).



EL4GP212

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 hoies in template. (See FO-32.)
4. Aline scribe mark on A2000 coupier (6) and OO/KC mark (7) on template.

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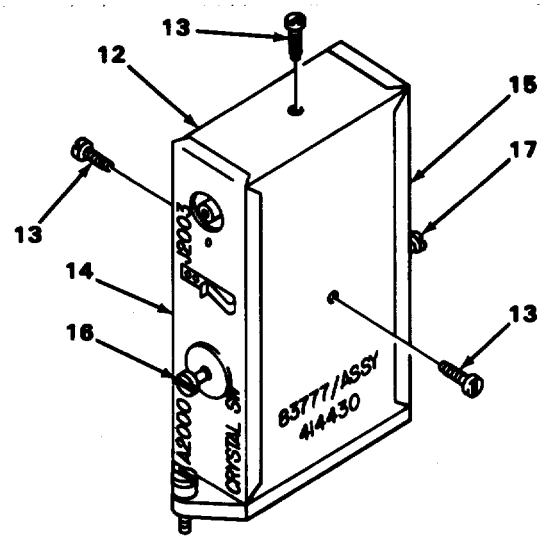
6-15. A2000 CRS ASSEMBLY MECHANICAL ADJUSTMENT. (CONT)

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 (l0).
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

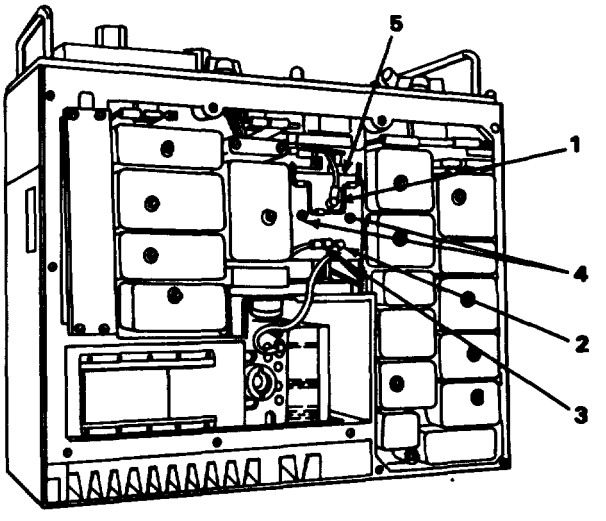


1. Position U-shaped cover (12) over assembly and Install three screws (13)
2. Position top cover (14) and bottom cover (15) on assembly.
3. Using screwdrlver, tlghten three screws (13) and two captlve screws (16) and (17).

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.)



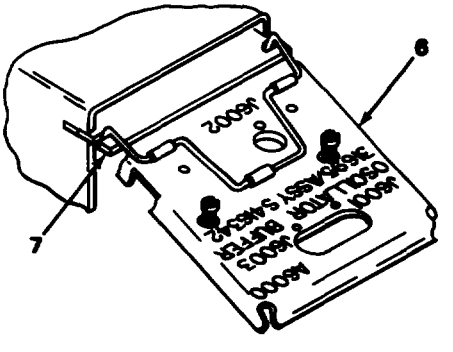
EL4GP193

REMOVAL

NOTE

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).



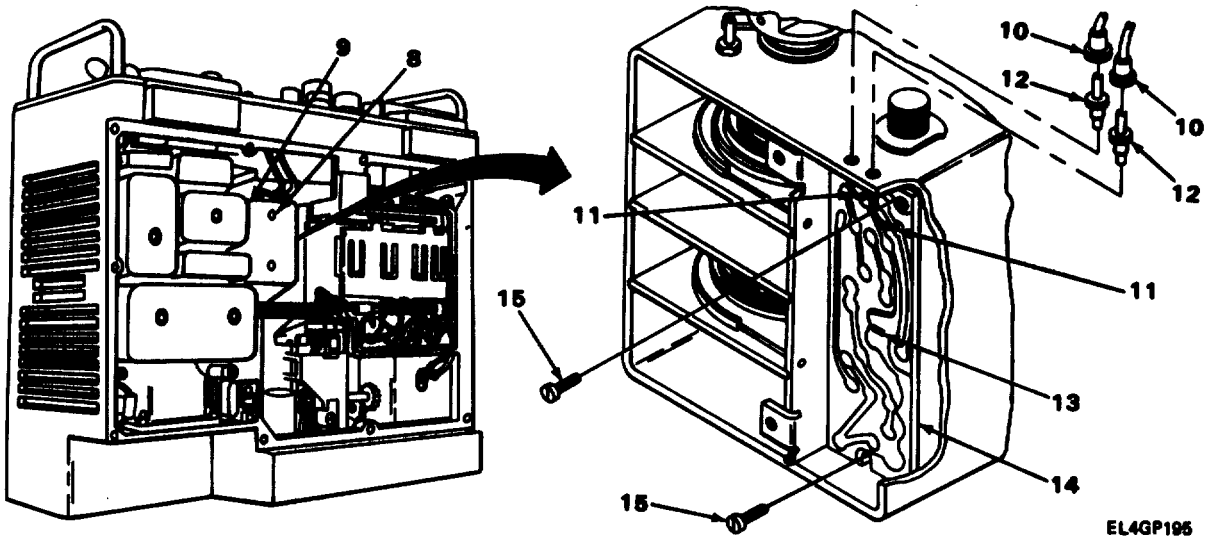
EL4GP194

6-16. A6000 ASSEMBLY MAIN CIRCUIT BOARD TB6001 REPLACEMENT. (CONT)

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).

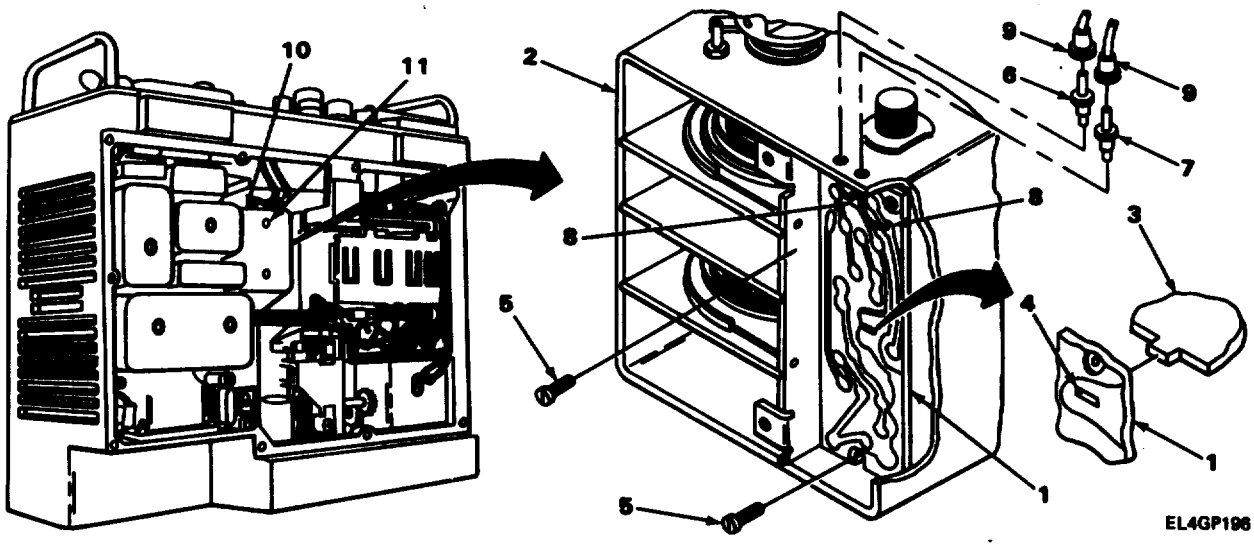
CAUTION

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

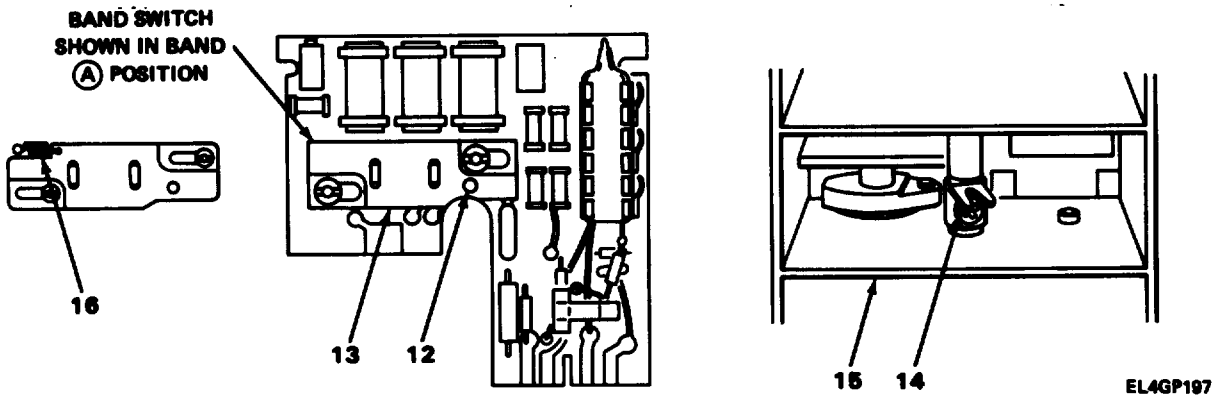


1. Install clrcuit board (1) In case(2) making sure ground tab (3)on case enters slot (4) on circuit board.
2. Install two screws (5) and, using flat-tip screwdriver, tighten two screws (5).
3. Push black color-coded wire plug (6) and orange color-coded wire plug (7) into case (2).

CAUTION

Care must be taken when performing next step to prevent damage to circuit board.

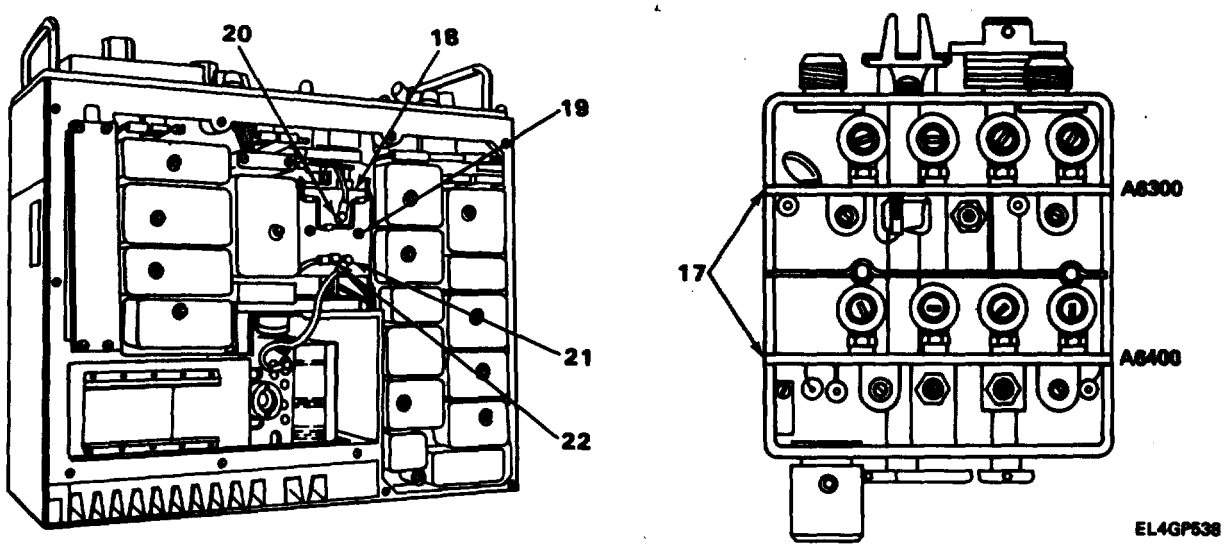
4. Using soldering iron, carefully solder two wire leads (8) to color-coded wire plugs (6) and (7), and ground tab (3) to circuit board(l).
5. Connect two color-coded wire plugs (9).
6. Install bottom cover (l0) and two screws(11).
7. Using screwdriver, tighten two screws(11).



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 wlth 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.



NOTE

Note locations of different numbered modules.

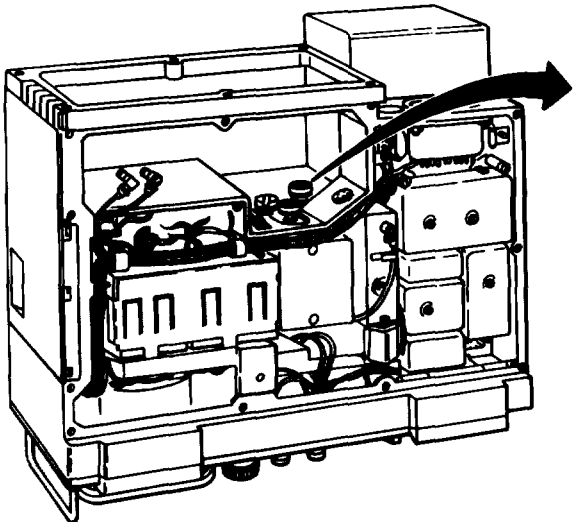
Make sure spring contacts on modules make contact with partitions between modules.

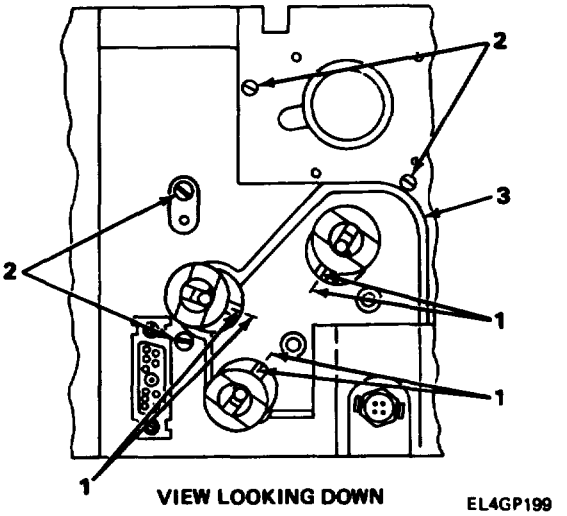
8. Carefully push modules (17) into place.
9. Install top cover (18).
10. Using screwdriver, tighten two captive screws.
11. Connect brown wire (W408) (20), grey wire (W407) (21) and yellow wire (W303) (22).

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. (Sea 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 Amplifler 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.

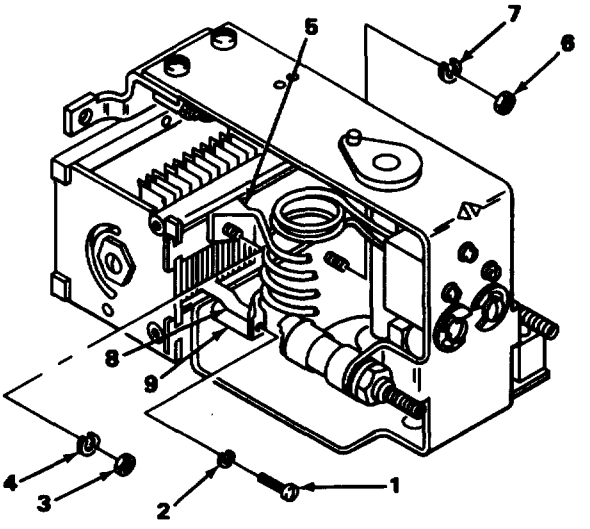
INSTALLATION

1. Carefully install assembly (3) into case and aline screw holes.
2. install four screws (2).
3. Using screwdriver, tighten 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.)



EL4GP090

REMOVAL

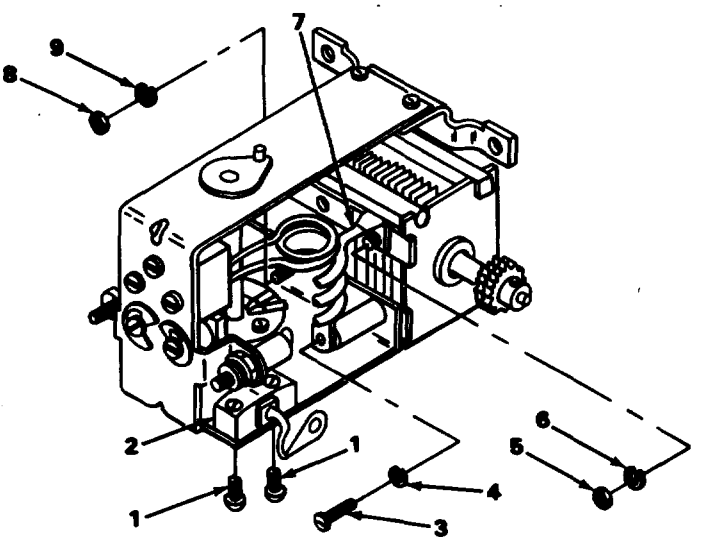
CAUTION

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 AMPLIPIER TUNING CAPACITOR C6217 REPLACEMENT. (CONT)

REMOVAL (CONT)



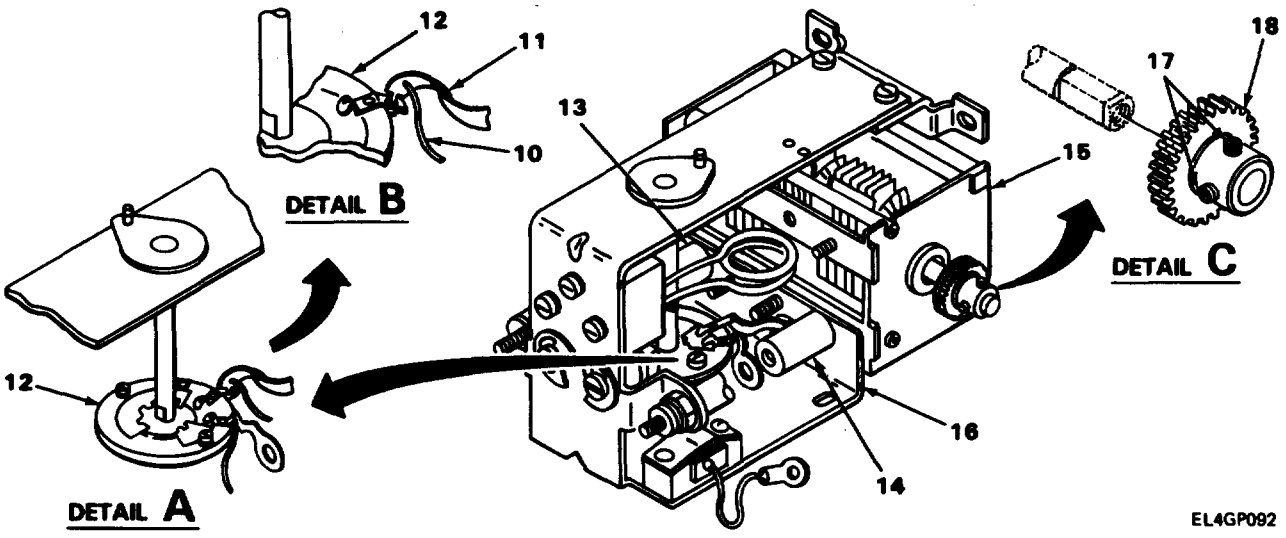
6. Using screwdriver, remove two plastic screws (1) and carefully move Capacitor C6215 (2) out of way.

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.

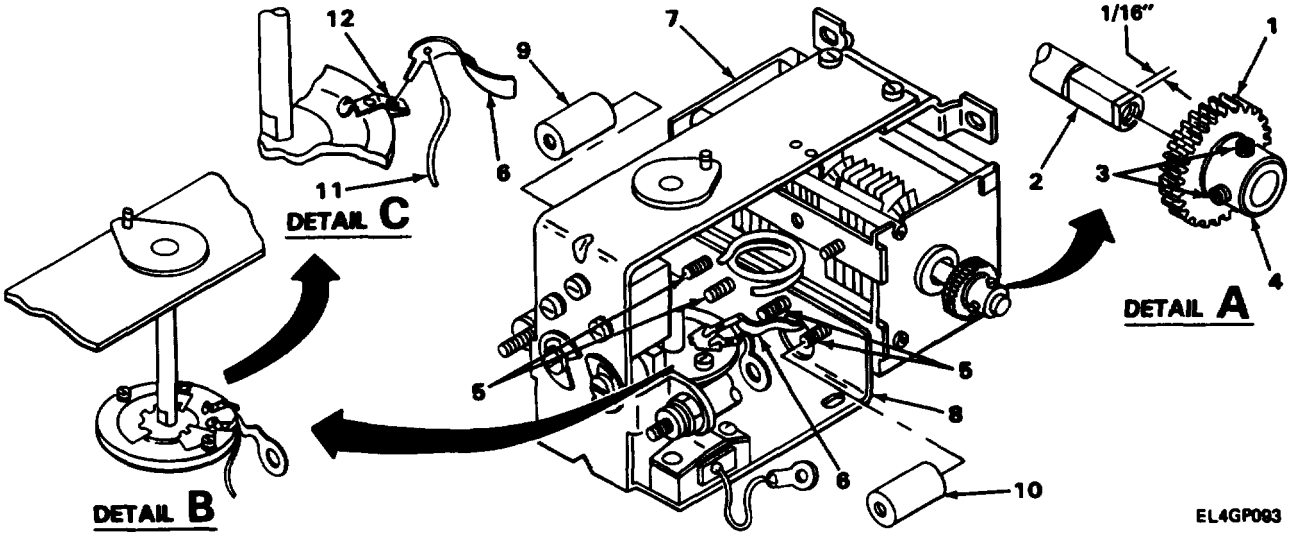
CAUTION

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 stlck 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.

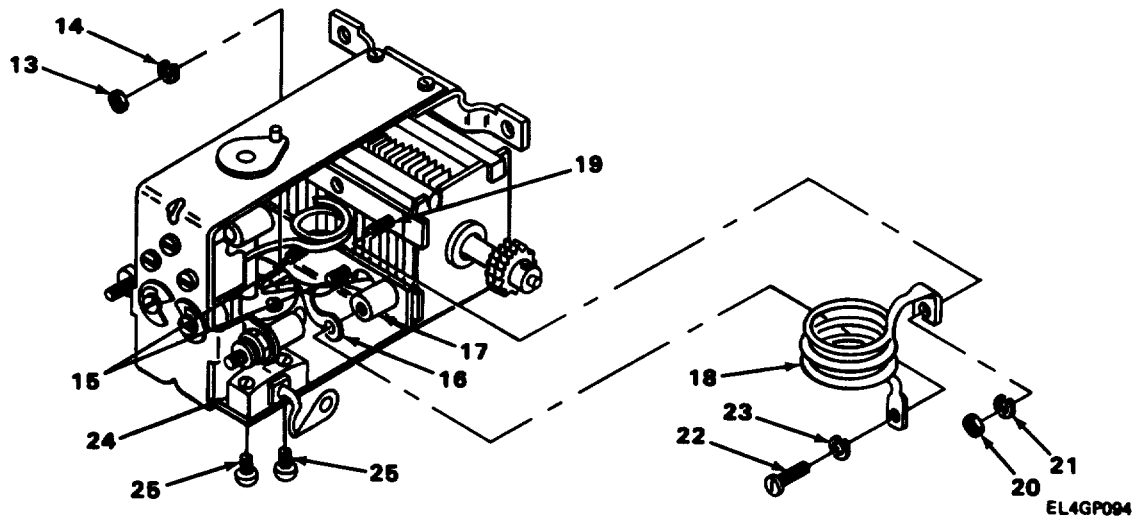
6. Position strap (6) and wire (11) In rotary switch terminal (12) as shown In detail C.

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).
9. Using wrench, tighten nuts (13).
10. Position strap (16) on 5/8-inch-long standoff (17).
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).
13. Using wrench, tighten nut (20).

CAUTION

Care must be taken when performing next step to prevent damage to nearby wiring.

14. Using screwdriver, tighten screw (22).
15. Carefully position Capacitor 08215 (24) on mount and Install two plastlc screws (25).

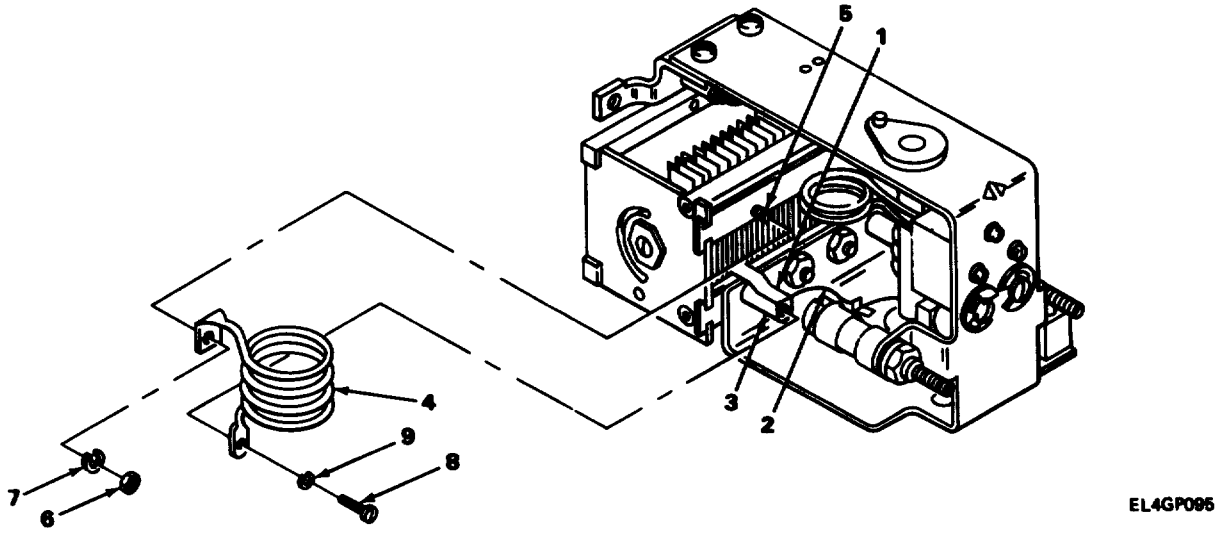
CAUTION

Care must be taken when performing next step to prevent damaging plastic screws. Do not overtlghten.

16. Using screwdriver, tighten two plastic screws (25).

6-18. POWER AMPLIFIER TUNING CAPACITOR C6217 REPLACEMENT. (CONT)

INSTALLATION (CONT)



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).
20. Using wrench, tighten nut (6).

CAUTION

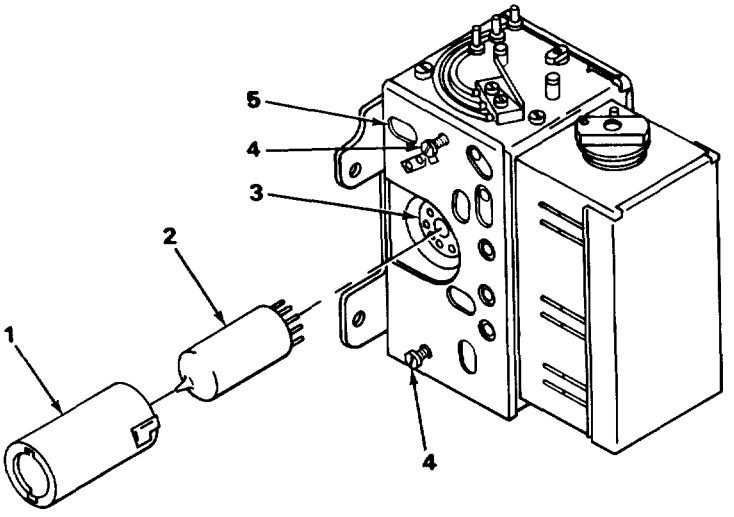
Care must be taken when performing next step to prevent damage to nearby wiring.

21. Using screwdriver, tighten screw (8).

FOLLOW-ON MAINTENANCE: Install Tank Clrcult 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.)



EL4GP200

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.

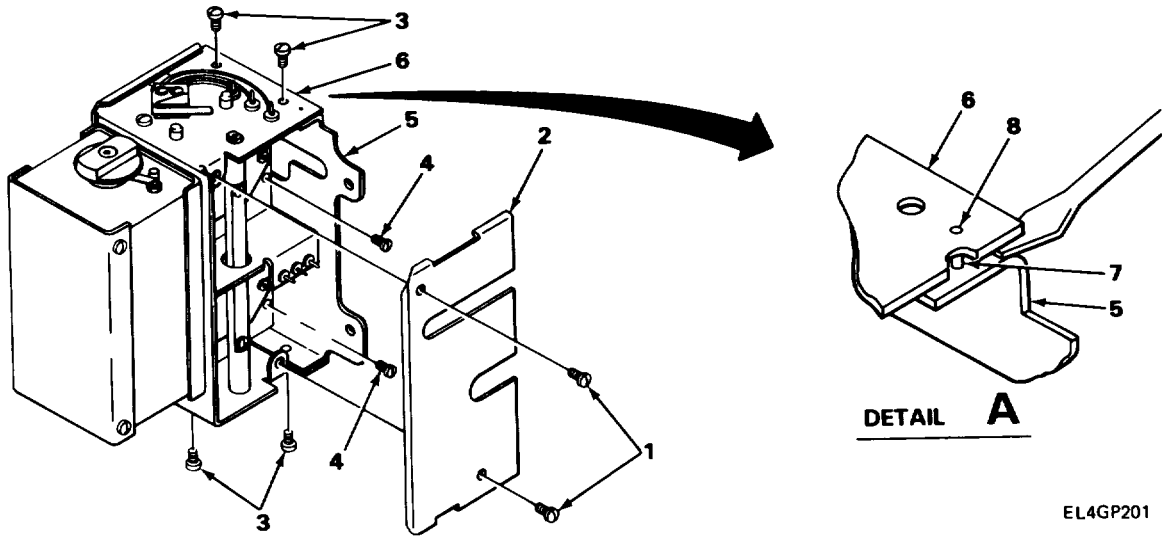
CAUTION

When performing next step, do not twist or angle tube to side. This will prevent bending or breaking pins.

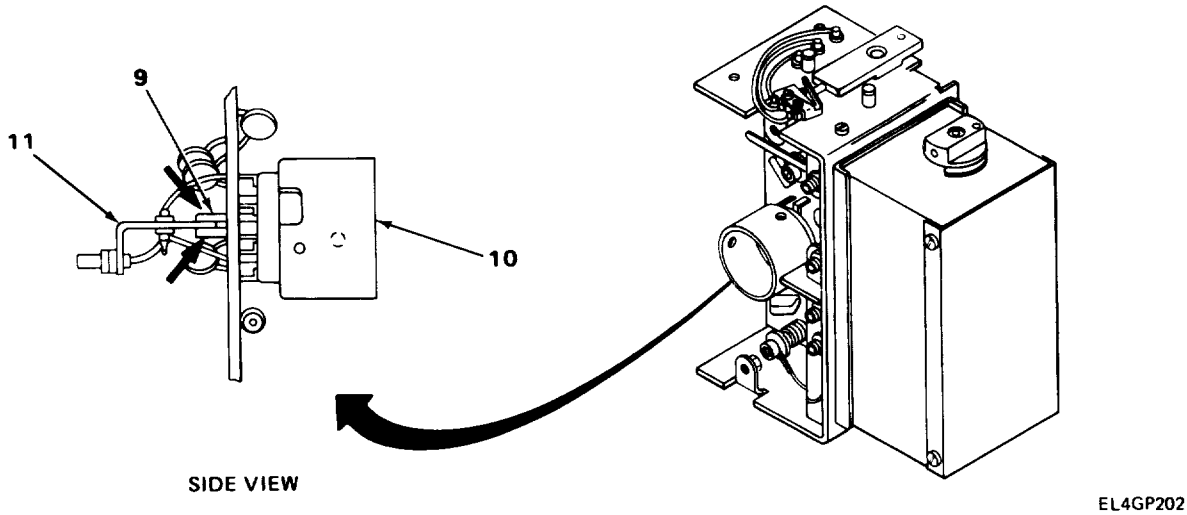
2. Using tube puller, carefully pull tube (2) straight out of socket (3).
3. Using screwdriver, loosen two captive screws (4) and remove cover (5).

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).

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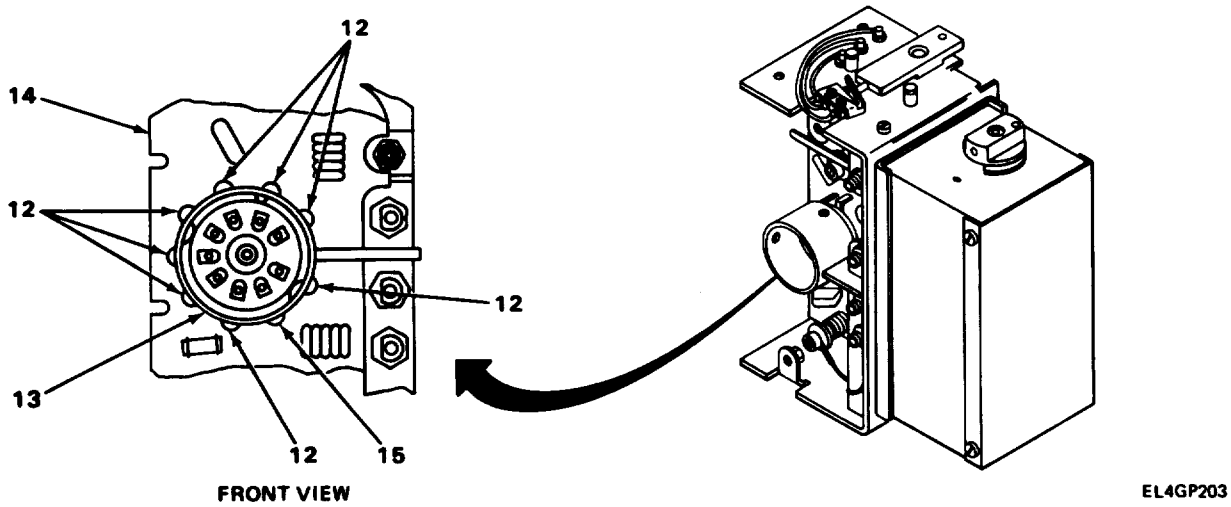
6-19. TUBE SOCKET XV6101 REPLACEMENT. (CONT)



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 clrcuit 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 pln (15).

1. Carefully place socket (13) in position shown, alining leads (12) with solder points on circuit board (14).

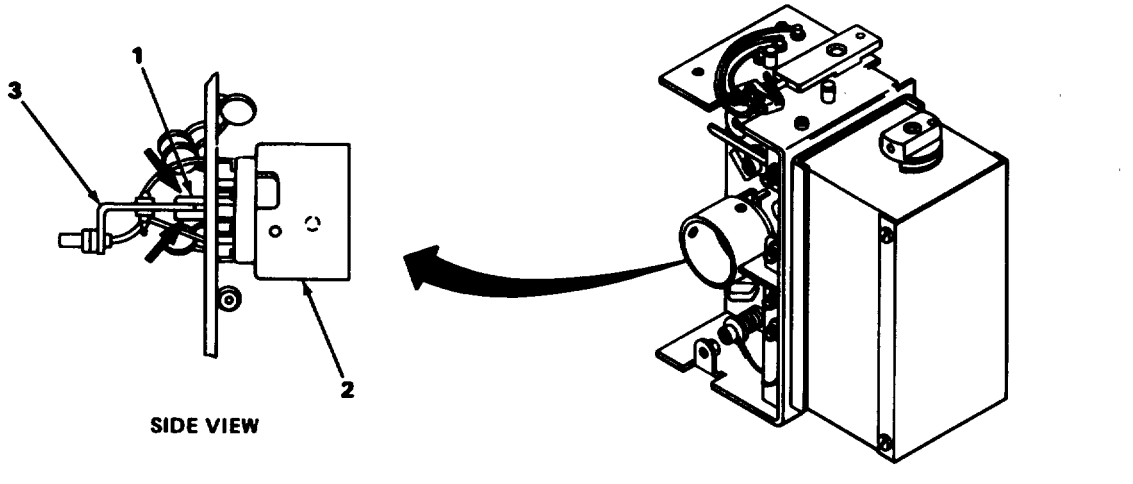
CAUTION

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)

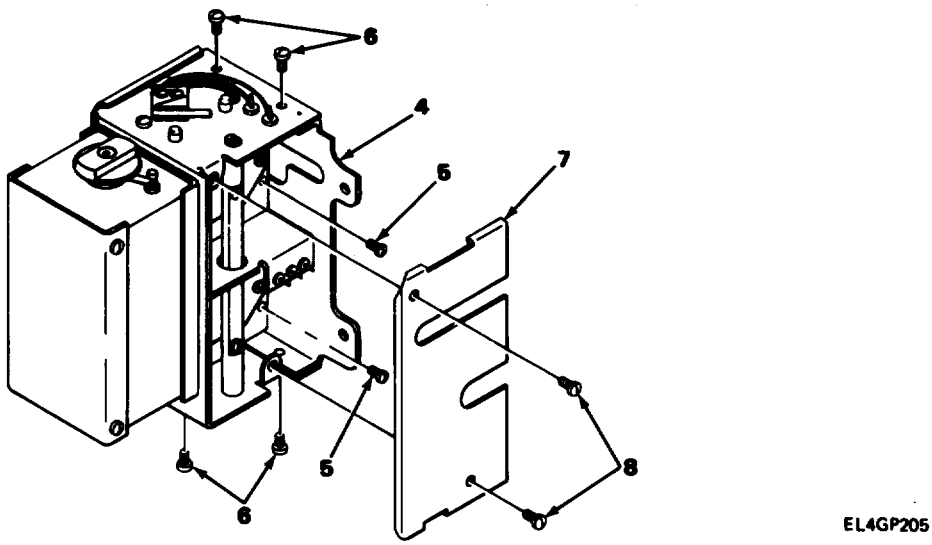


EL4GP204

CAUTION

Extreme care must be taken when performing next step to prevent damage to nearby components.

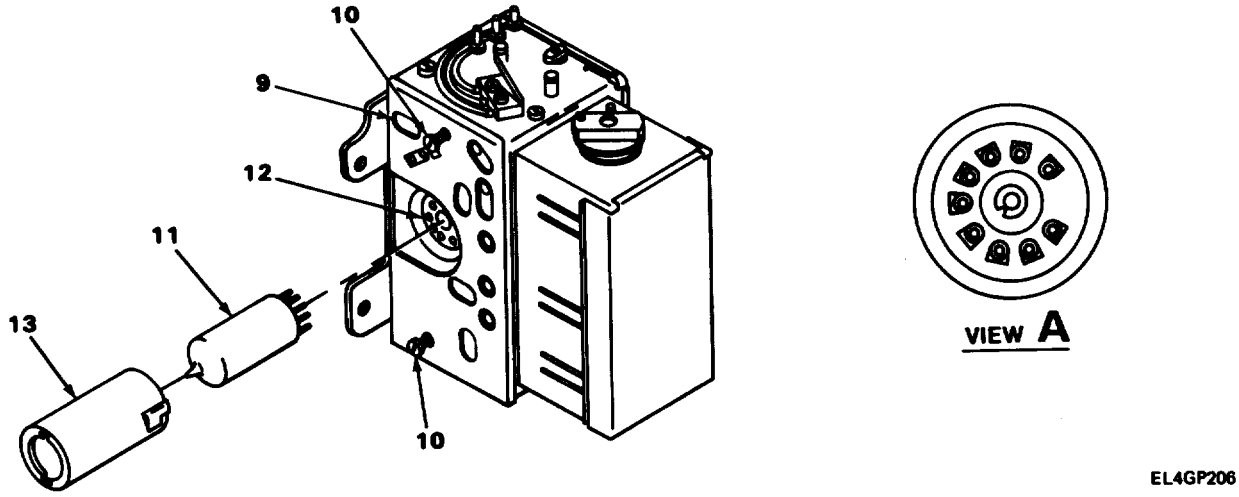
3. Using soldering iron, carefully solder center stem(1) of socket (2) on both sides of plate (3) (see arrows).



EL4GP205

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).

6-19. TUBE SOCKET XV6101 REPLACEMENT. (CONT)



8. Install cover (9).
9. Using screwdriver, tighten two captive screws (10).

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

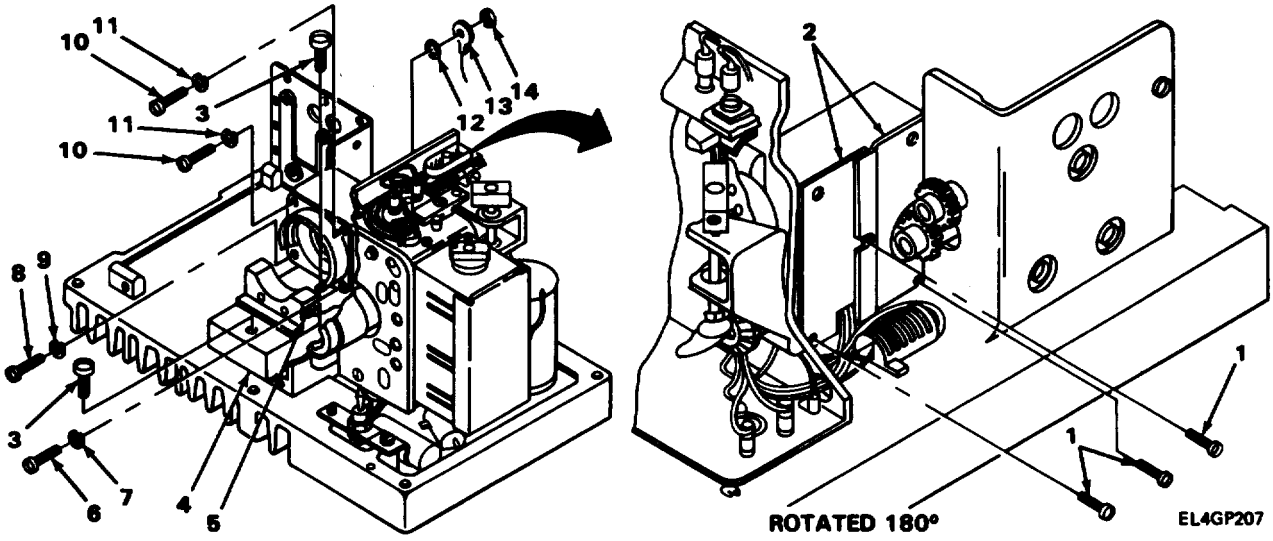
Make sure metal shield coil Is inside tube shield (13).

11. Install tube shield (13) by pushing In and turning clockwlse 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

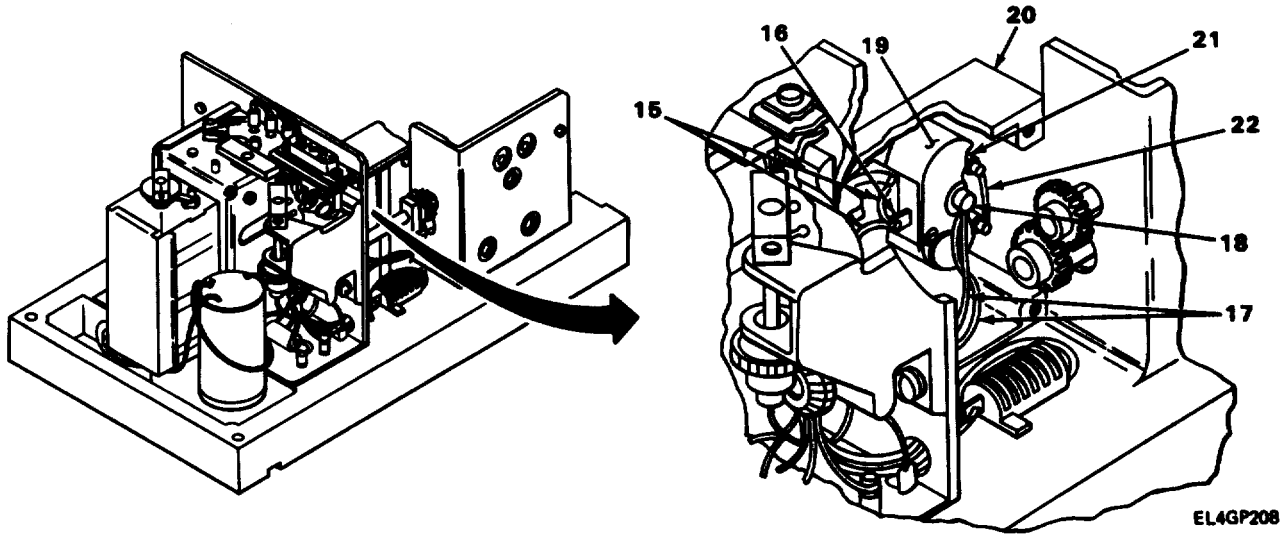
1. Using screwdriver, remove three screws (1) and two covers (2).
2. Using screwdriver, remove two screws (3) from standoff (4).

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, carefulliy 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.

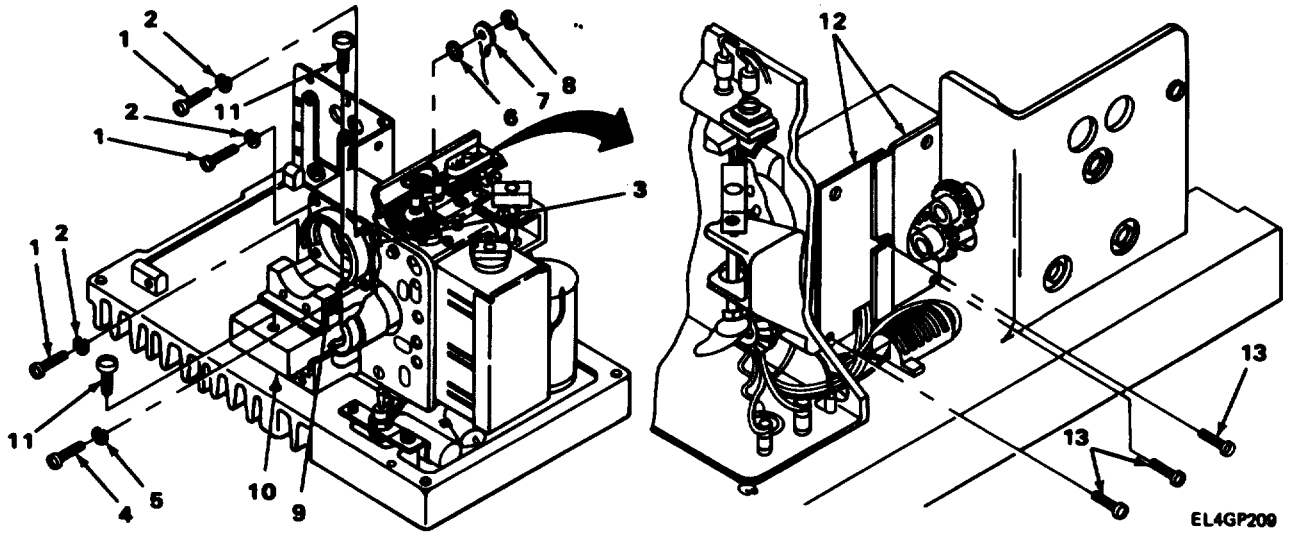
CAUTION

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).

6-20. TUBE SOCKET XV6201 REPLACEMENT. (CONT)

INSTALLATION (CONT)



5. Install three 5/16-inch-long screws (l) 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. Uslng screwdrlver, tighten three screws (1).
8. Using screwdriver and nut driver with 1/4-inch socket, tighten one screw(4)and nut (8).

CAUTION

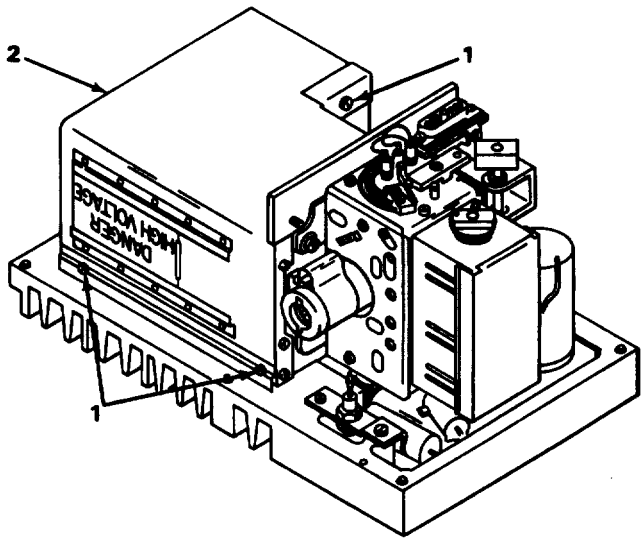
Care must be taken when performing next step to prevent breaking ground wire (9).

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.)



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REMOVAL

NOTE

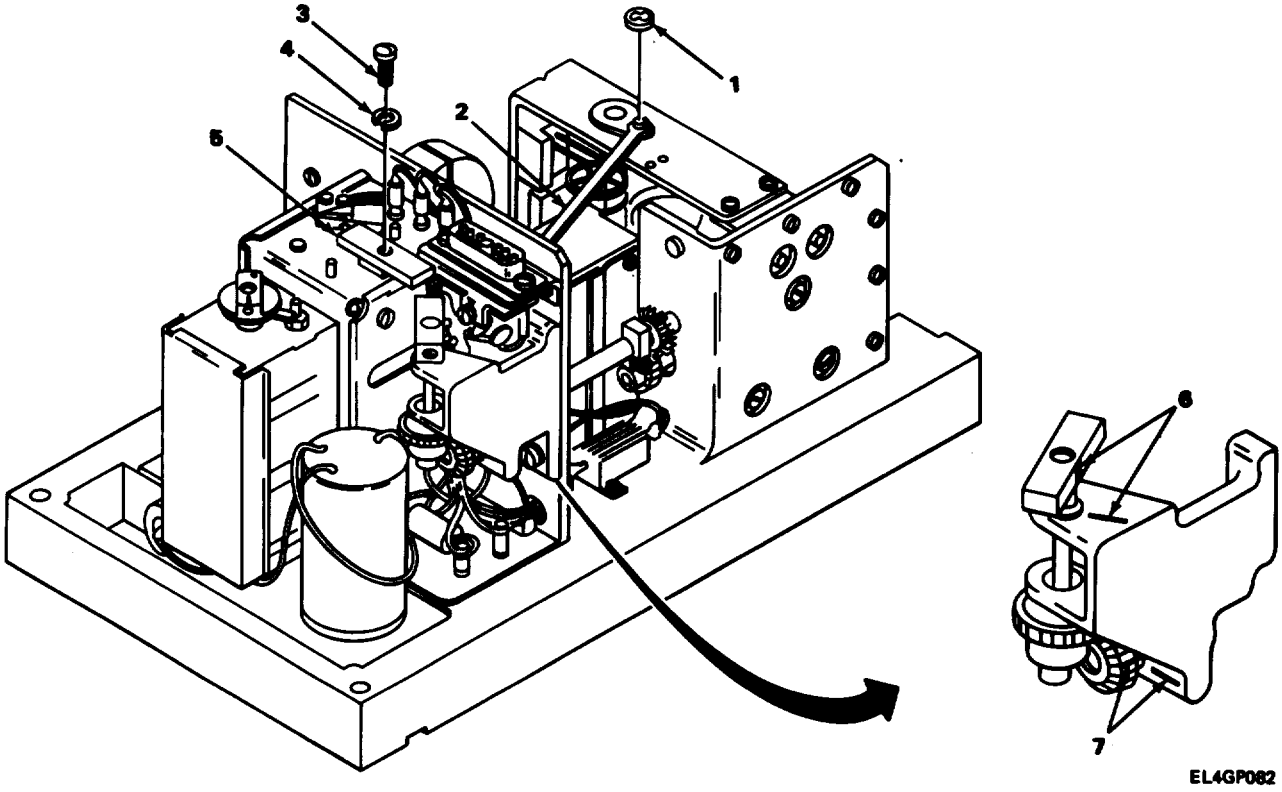
Cover configuration and number of screws will vary between plain and A-models. (A-model shown.)

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.

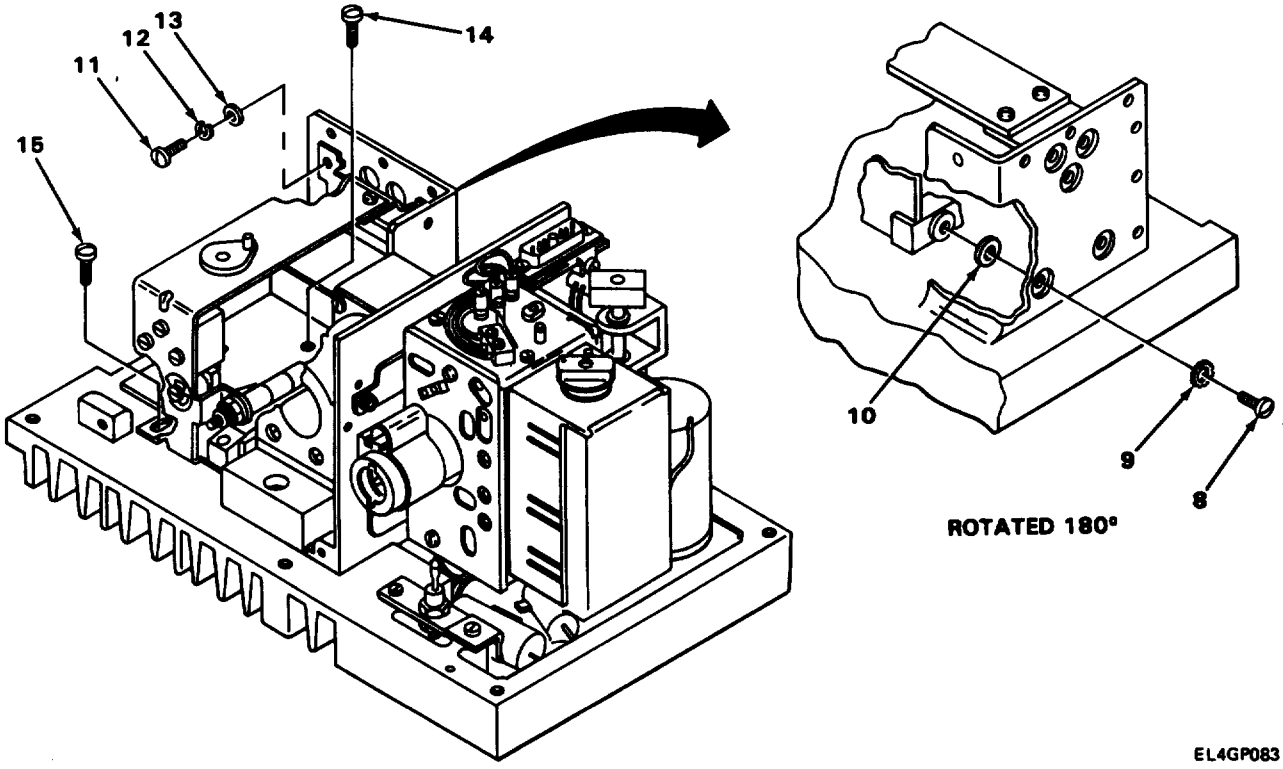
6-21. TANK CIRCUIT ASSEMBLY Z6201 REPLACEMENT. (CONT)

REMOVAL (CONT)



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. Inscribe 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.

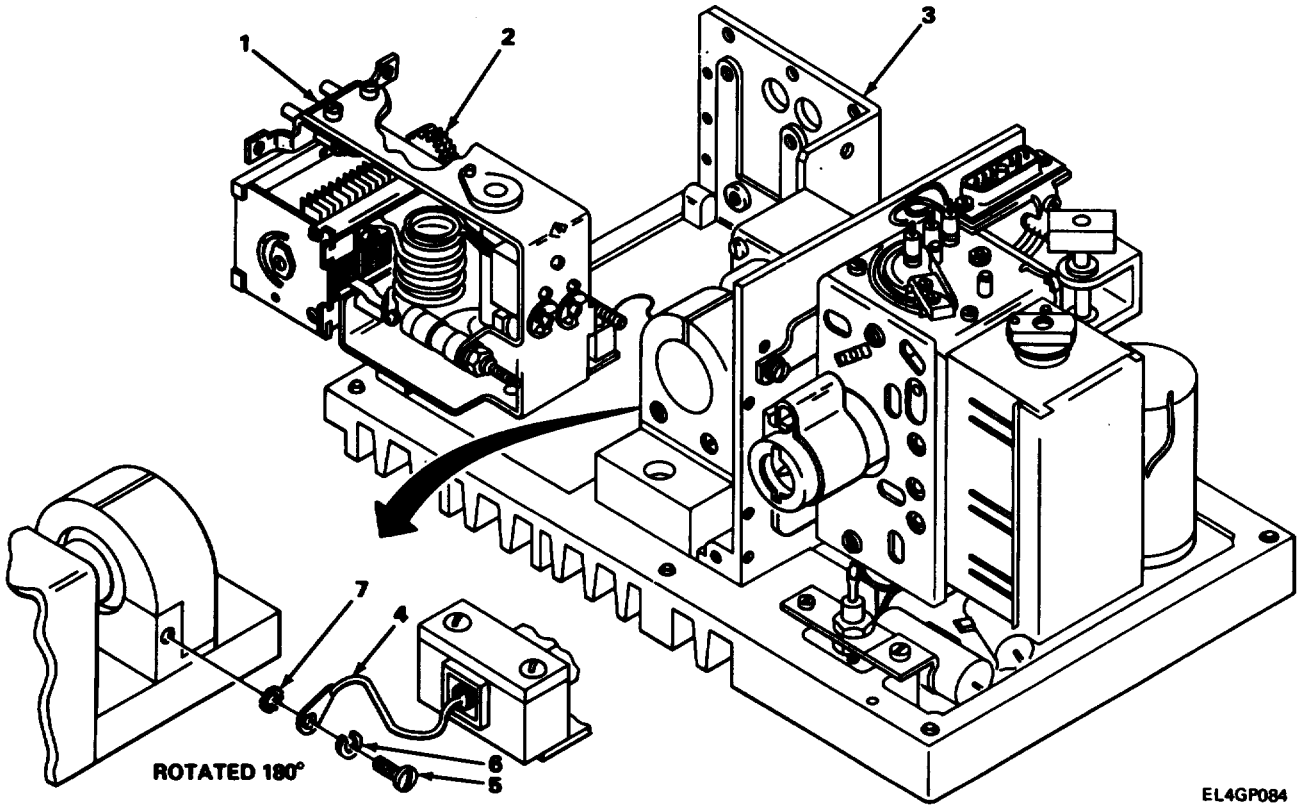
CAUTION

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)



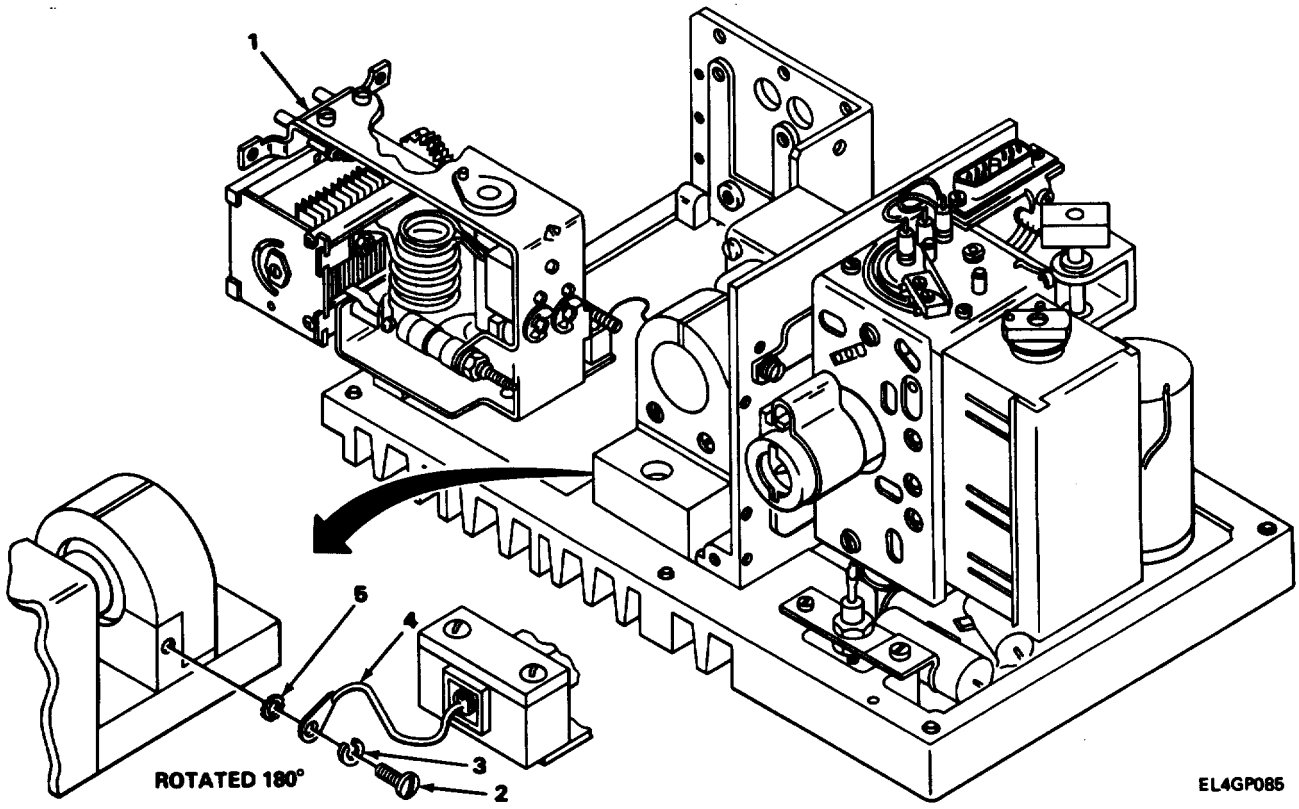
CAUTION

Extreme care must be taken when performing next step to prevent damage to gear (2) and ground wire (4).

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).

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).

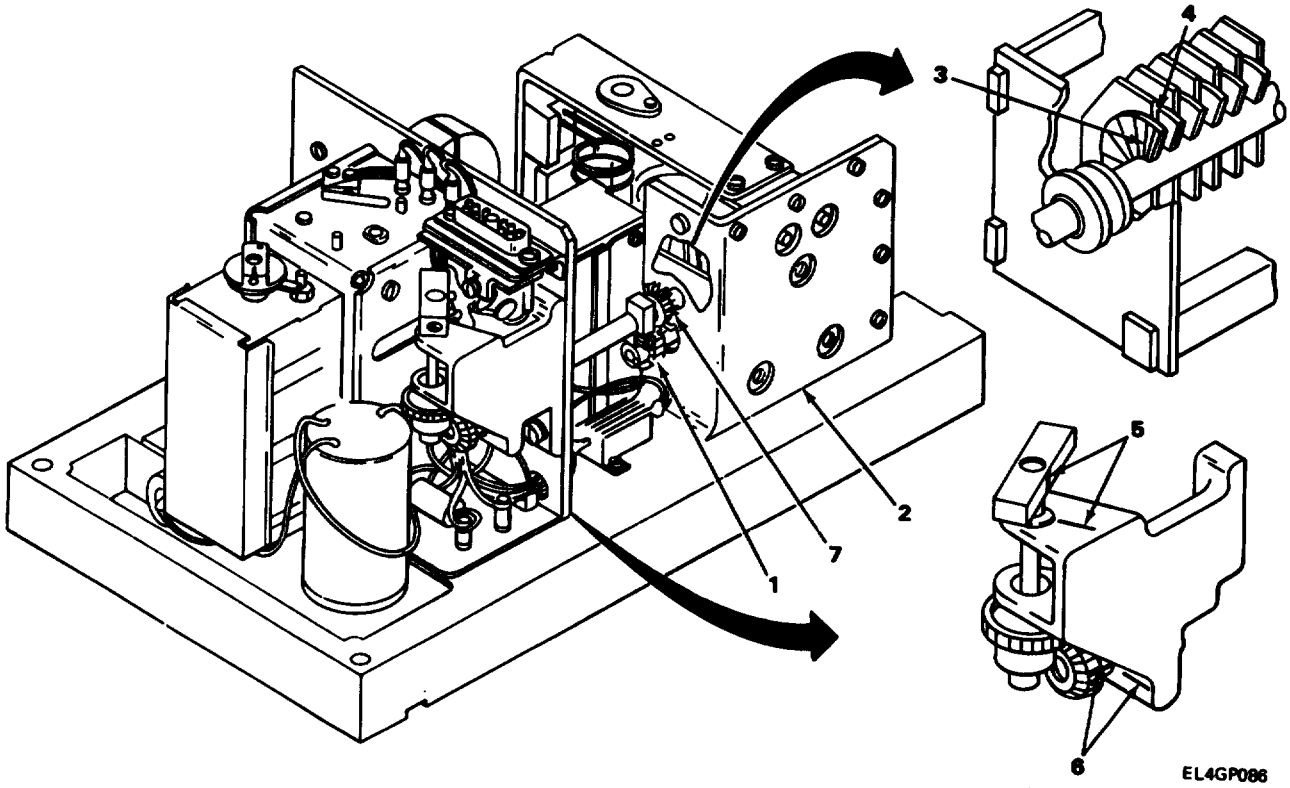
CAUTION

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)

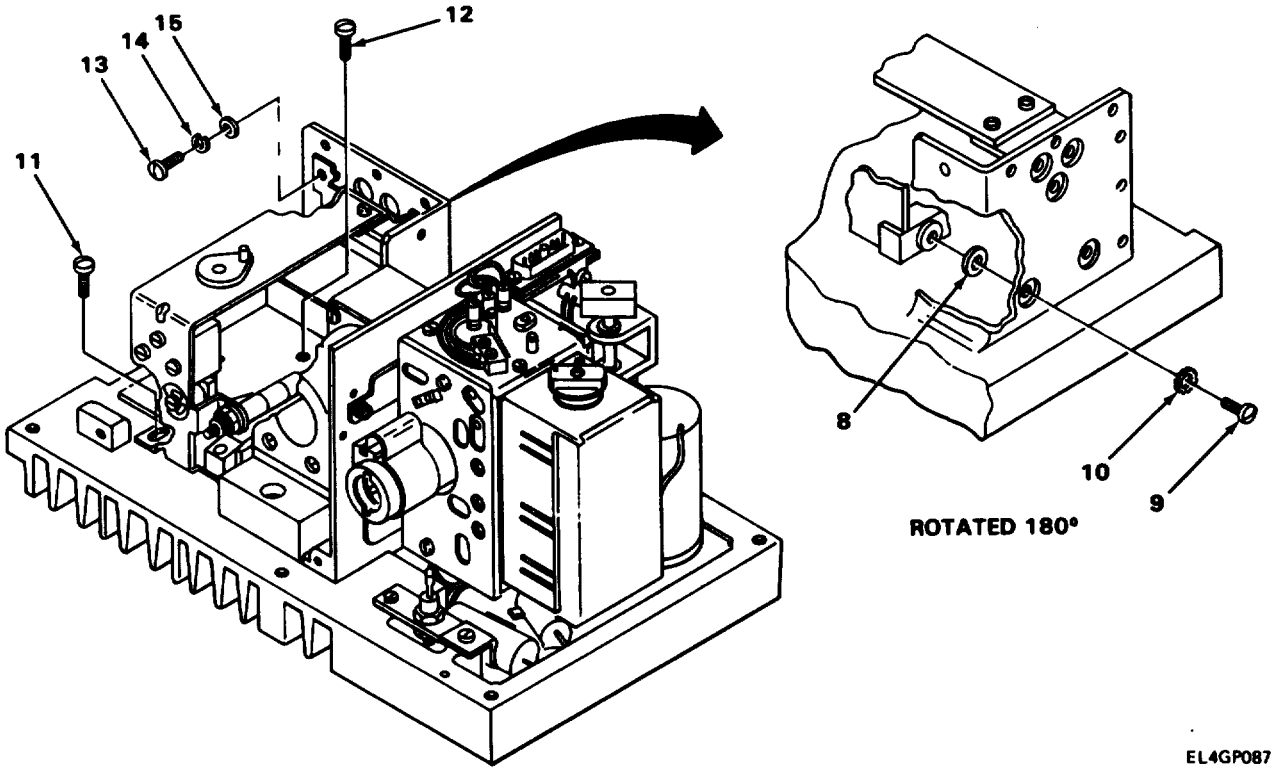


CAUTION

Care must be taken when performing next step to prevent damage to ground wires.

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 alinement has not been disturbed.

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).

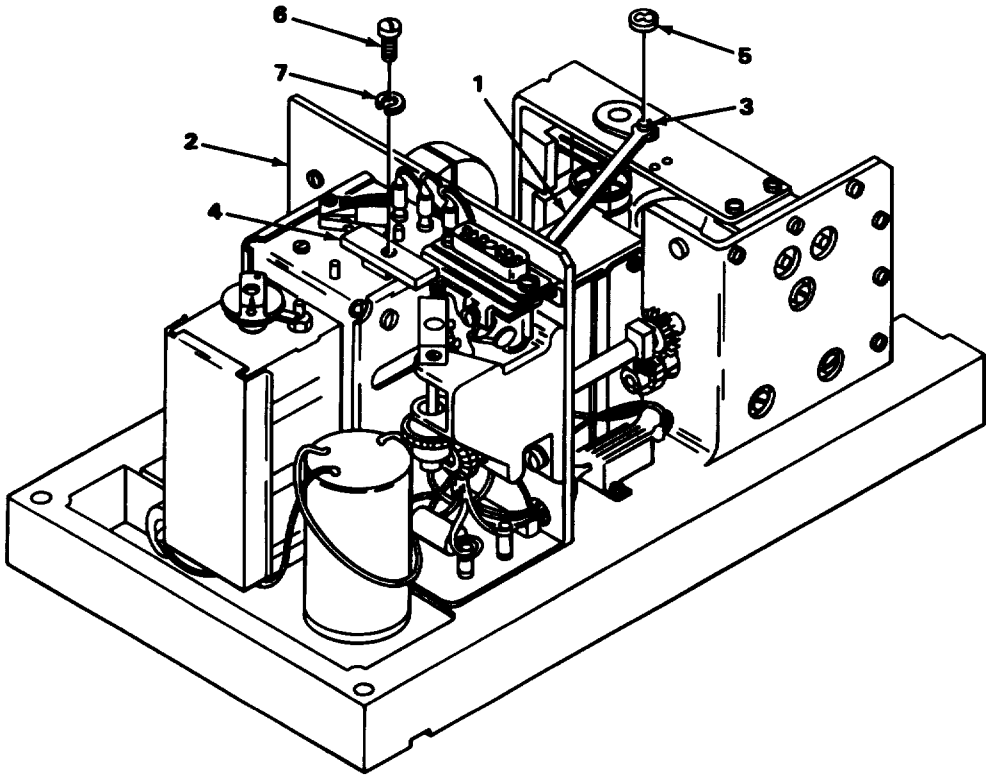
CAUTION

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 fiat washers (15).
12. Using screwdriver, tighten two screws (13).

6-21. TANK CIRCUIT ASSEMBLY Z6201 REPLACEMENT. (CONT)

INSTALLATION (CONT)



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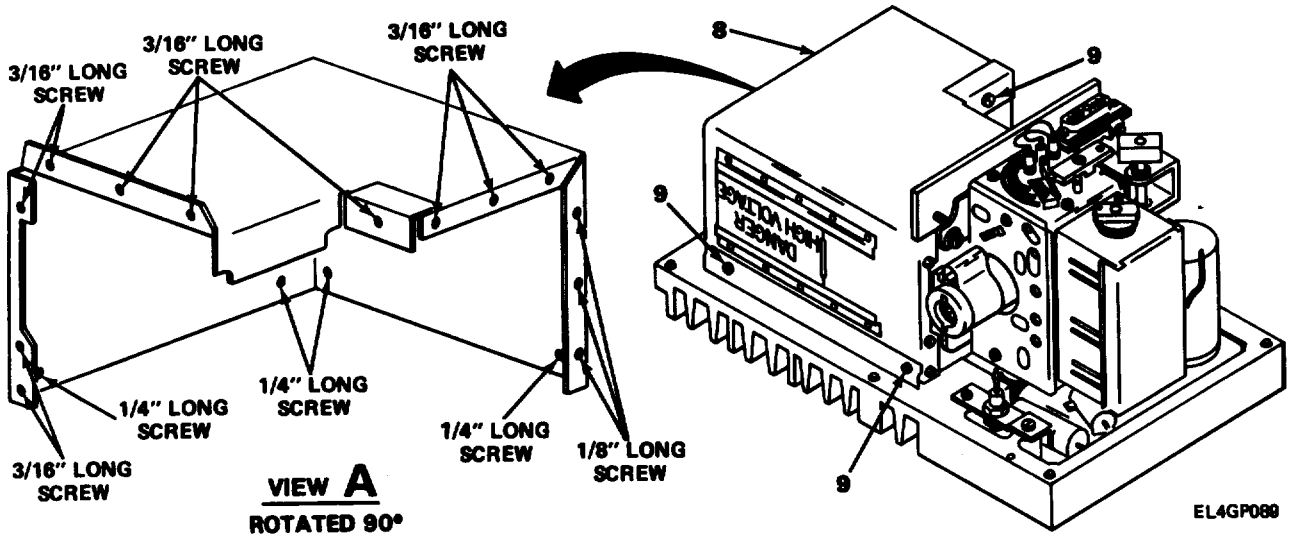
13. Push BAND switch actuator linkage (1) through hole In mounting plate (2) and position it on pin (3). Position drive assembly coupler (4) on shaft as shown.
14. Install C-clip (5) on pin (3), and screw (6) and lockwasher (7) in drive assembly coupler (4).
15. Using screwdriver, tighten screw (6).

6-21. TANK CIRCUIT ASSEMBLY Z6201 REPLACEMENT. (CONT)



NOTE

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 aline 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 bulletlns, 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 alinement procedures in chapters 3, 4, and 5.

A-2. PAMPHLETS.

Consolidated index of Army Publications and Blank Forms	DA PAM 310-1

A-3. FORMS.

Recommended Changes to Publications and Blank Forms..,	DA FORM 2028
Recommended Changes to Equipment Technical Manuals	DA FORM 2028-2
Equipment Inspection and Maintenance Worksheet	DA FORM 2404
Discrepancy in Shipment Report (DISREP)	SF-361
Report of Discrepancy (ROD)	SF-364
Quality Deficiency Report	SF-368

A-4. SERVICE CATALOGUES.

Tool Kit, Electronic Equipment TK-105/G (NSN 5180-00-610-8177)	SC 5180-91-CL-R07
Tool Kit, Electronic Equipment TK-101/G (NSN 5180-00-064-5178)	SC 5180-91-CL-R13
Tool Kit, Electronic Equipment TK-100/G (NSN 5180-00-605-0079)	SC 5180-91-CL-S21

A-5. SERVICE BULLETINS.

Vehicular Radio Sets and Authorized installations	SB 11-131
Painting and Preservation Supplies Available for Field Use for Electronic Equipment	SB 11-573

A-6. TECHNICAL BULLETIN.

Field Instructions for Painting and Preserving Electronics Command Equipment including Camouflage Pattern Painting of Electrical Equipment Shelters	TB 43-0118

A-7. TECHNICAL MANUALS.

Power Supplies PP-l104(A)/G and PP-1104(B)IG (NSN 6130-00-542-6385)	TM 11-5126
Operator's, Organizational, Direct Support, and General Support Maintenance Manual for installation Kits, Electronic Equipment TSEC/KY-38 and HYL3/TSEC	TM 11-5810-290-14&P

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 (COEI), 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), AN/VRC-49 (5820-00-223-7437) (Used without intercom system)	TM 11-5820-401-10-1-HR
Operator's 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
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/ (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)	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 (582@00-223-7417), AN/VRC-45 (5820-00-223-7418), AN/VRC-46 (5320-00-223-7433), 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 ANVIC-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, Organizatlonal, Field and Depot Maintenance Repair Parts and Special Tool Lists: Loudspeaker, Permanent Magnet LS-454/U	TM 11-5965-255-15P
Operator, Organizatlonal, Direct Support, General Support, and Depot Maintenance Manual (Including Repair Parts and Special Tools List): Handset H-189/GR (NSN 5965-00-069-8886)	TM 11-5965-280-15
Operator, Organizational, Direct Supped, General Support, and Depot Maintenance Multlmeter, 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, Organizatlonal, 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: Digltal 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
Organizatlonal, 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, Organizational, Direct Support, and General Support Maintenance Manual, Voltmeter Electronic, ME-30 F/U (NSN 6625-00-420-9354)	TM 11-6625-2745-14
Operator's, Organizatlonal, Direct Support, and General Support Maintenance Manual for Maintenance Kits, Electronic Equipment, MK-1978/VRC and MK-1978A/VRC (NSN 6825-01-078-5893)	TM 11-6625-2971-14*P
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 ofEquipment	TM 740-90-1
Procedures for Destruction of Electronlcs 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.

EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION (FSCM)	(5) U/M
1	F	6850-00-880-7616	Silicone Insulating Compound (MIL-S-86660) (DC-4 or equal)	tube (8 OZ)
2	F	9505-00-293-4208	Wire, Nonelectrical (Safety Wire)	lb
3	F	5970-00-816-6056	Insulation Tape, Electrical, Plastic	ft
4	F	7510-00-290-8036	Pressure Sensitive Tape, Filament Reinforced	yd (60)
5	F	685O-OO-1O5-3O84	Cleaning Compound, Freon TF (Trichlorotrifluoroethane)	oz (16)
6	F	6850-00-984-5853	Cleaning Compound, Freon PLA (TrichIorotrlfluoroethane)	gal. (5)
7	H	8040-00-843-0802	Adhesive/Sealer Silicon	tube (3 oz)

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.

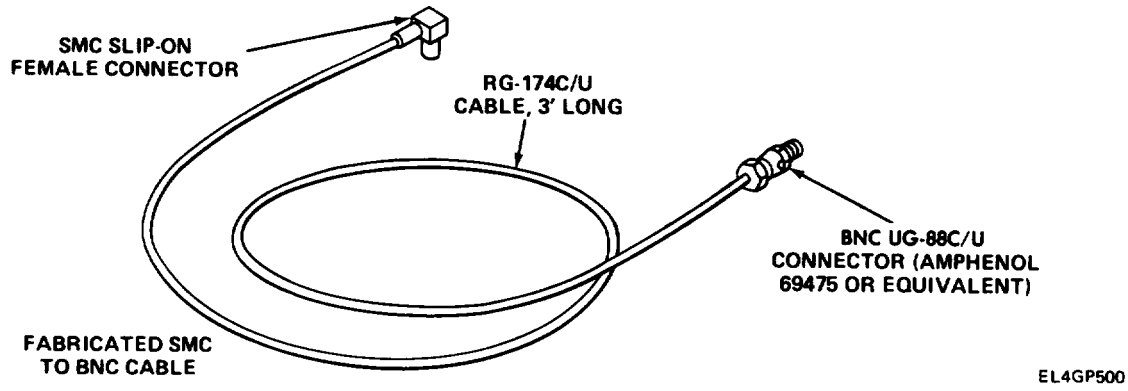
C-2. FABRICATED SMC TO BNC CABLE.

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.

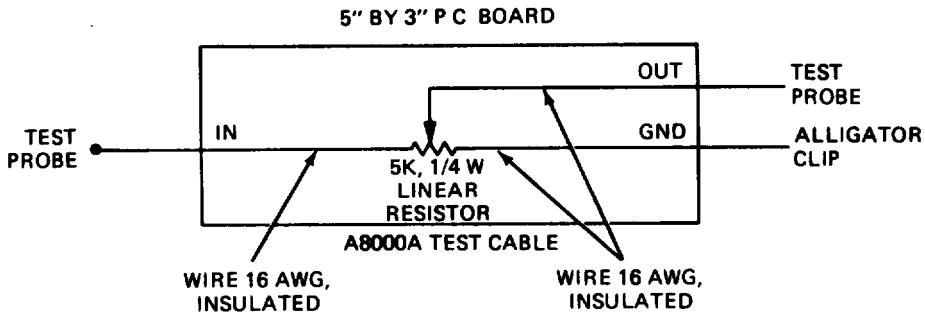
A fabricated test cable is required to perform the A8000A assembly troubleshooting in chapters 3 and 5, It is used In conjunction with a voltmeter to isolate faults between test points in the A8000 assembly.

Parts needed:

Alligator Clip
P.C. Board
Resistor, Linear, 5 k ohms, 1/4 watt
Test Probe

C-3. FABRICATED A800A TEST CABLE. (CONT)

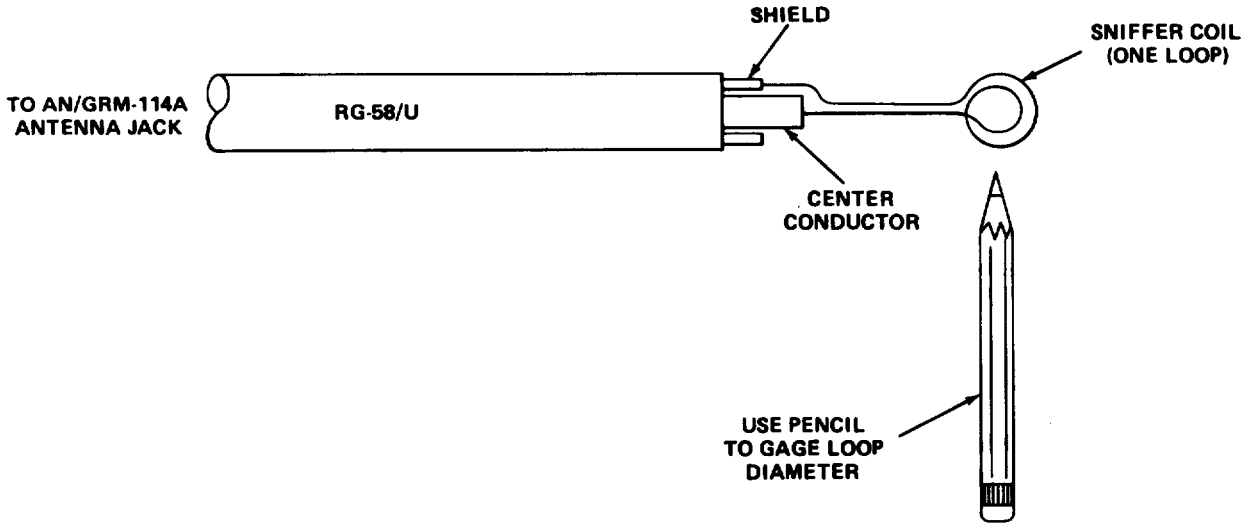
Connect parts as shown in the following diagram.



EL4GP501

C-4. FABRICATED A8100 SNIFFER COIL.

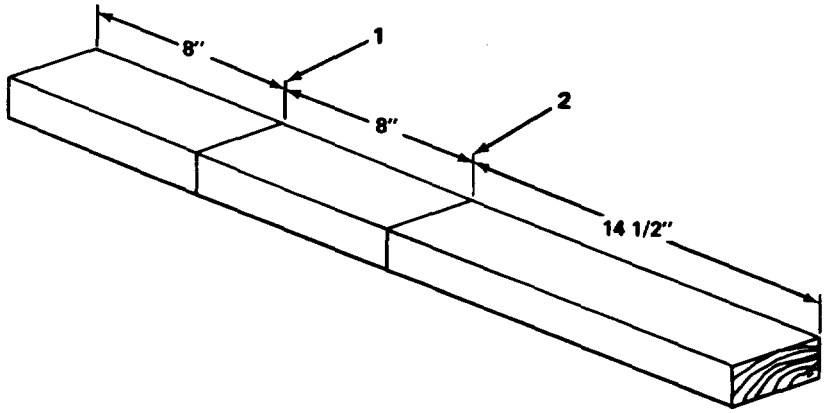
A fabricated sniffer coil is required to aline the A81OO module as described in chapter 4. Fabricate the sniffer as shown in the following diagram.



EL4GP536

C-5. CONSTRUCTION OF FRONT PANEL HOLDING FIXTURE

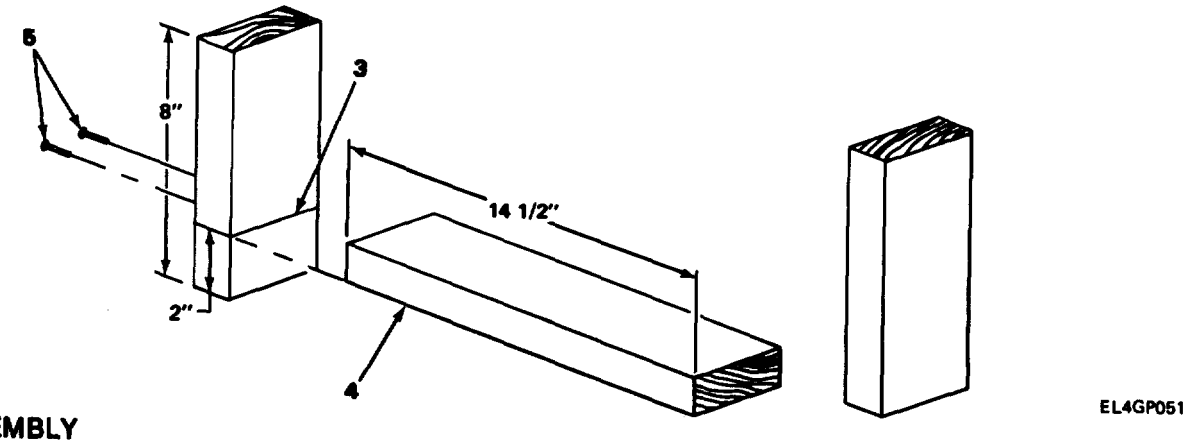
MATERIIALS/PARTS: Wood, 30 3/4"x 2"x 4"
Nails, 3-inch-long, four required
Tape measure
T-square
Saw



EL4GP050

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.



EL4GP051

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 l/2-inch-long piece of wood on line drawn and secure with two nails (5).
4. Do step 3 for remaining S-inch-long piece of wood.

APPENDIX D

MAINTENANCE INFORMATION INDEX

References are indexed by paragraph number unless otherwise indicated.

ASSEMBLY MODULE COMPONENT/ PART	ILLUSTRATION OR SCHEMATIC	TEST	TROUBLESHOOT (BY CHART NUMBER)	ALINE	REPAIR/ REPLACE
A300 (Front Panel Assy)	FO-2 and FO-3				2-8
CB301	2-30				2-30
CB302	2-31				2-31
CB351	2-30				2-30
CB352	2-31				2-31
J303, J304	2-27				2-27
J305	2-23				2-23
J306	2-21				2-21
J310	2-25				2-25
J353	2-24				2-24
J354	2-22				2-22
J356	2-26				2-26
J357	2-26				2-26
K301	2-28				2-28
L301	2-33				2-33
LS351	2-36				2-36
MG301 (Servomotor)	2-34				2-34
R301	2-18				2-18
R352	2-18				2-18
S302	2-17				2-17
S305	2-19				2-19
S309	2-32				2-32
S351	2-20				2-20
S352	2-19				2-19
S353	2-16				2-16
S354	2-17				2-17
S356	2-29				2-29
S357	2-29				2-29
S358	2-29				2-29
S359	2-32				2-32
A1000 (Vhf Tuner Assy)	FO-7	3-2,4-2,5-2	3-7,4-3,5-7	3-28,4-28, 5-28	2-9
A1100	1-20,2-10				2-10
A1200	1-21,2-10				2-10
A1300	1-22,2-10				2-10
A1400	1-23,2-10				2-10
A1500	1-24,2-10				2-10
A1600	2-11				2-11

MAINTENANCE INFORMATION INDEX (CONT)

ASSEMBLY MODULE COMPONENT/ PART	ILLUSTRATION OR SCHEMATIC	TEST	TROUBLESHOOT (BY CHART NUMBER)	ALINE	REPAIR/ REPLACE
VR1001	6-13				6-13
A2000 (Crystal Switch Assy)	FO-9,2-12	3-25,4-26, 5-25	3-8,4-4,5-8	3-25,4-26, 5-25	2-12
Y2100	6-14				6-14
Y2200	6-14				6-14
A3000 (CRS Assy)	FO-9,2-37	3-25,4-26, 5-25	3-8,4-4,5-8	3-25,4-26, 5-25	2-37
A3100 thru A3700	2-37				
A4000 (If Amplifier Assy)	FO-11,2-38	3-2,4-3,4-9, 4-10,5-2	3-9,4-2,4-9, 4-10,5-2		2-38
A4100 thru A4300	2-38			3-29,3-31, 4-29,4-31, 5-29,5-31	
A5000 (Audio and Squelch Assy)	FO-13,2-39	3-4,3-5,3-6, 3-8,4-4, 4-5,4-6, 4-8,5-4, 5-5,5-6, 5-8	3-10,4-5,4-6, 4-8,5-10		2-39
A5100 thru A5300	2-39			3-33,3-35, 3-37,4-33, 4-35,4-37, 5-33,5-35, 5-37	
A6000 (Power Amp Assy)	FO-15,2-14	3-11,3-12, 3-16,4-11, 4-12,5-11, 5-12,5-16	3-11,3-12,4-11, 4-12,5-11,5-12		2-14
A6100	1-40,2-48		3-17,5-17	3-44,4-45, 5-44	2-48
V6101	2-49				2-49
XV6101	6-19				6-19
A6200	1-41,2-46		3-17,5-17	3-44,4-45, 5-44	2-46
B6201 (Blower Motor)	2-47				2-47
C6202	2-53				2-53
C6203	2-52				2-52
C6217	6-18				6-18
CR6201	2-53				2-53

MAINTENANCE INFORMATION INDEX (CONT)

ASSEMBLY MODULE COMPONENT/ PART	ILLUSTRATION OR SCHEMATIC	TEST	TROUBLESHOOT (BY CHART NUMBER)	ALINE	REPAIR/ REPLACE
R6201	2-52				2-52
V6201	2-51				2-51
XV6201	6-20				6-20
Z6201	2-21				2-21
A6300	2-13		3-16,5-16	3-40,4-40, 5-40	2-13
A6400	2-13		3-16,5-16	3-40,4-40, 5-40	2-13
(Servosystem)	FO-18,1-44	3-20,4-21, 5-20		3-45,4-46, 5-45	
A7100 (Pushbutton Assy)	2-35				2-35
A7200 (Servoamp Assy)	2-15				2-15
A8000 (Transmitter Modulator Assy)	FO-20	3-11,4-11, 5-11	3-18,4-11,5-18		2-40
A8100 thru A8400	2-40			3-43,4-44, 5-43	2-40
A8500	2-40			3-41,3-42, 4-42,5-41, 5-42	2-40
A9000 (Power Supply Assy)	FO-23,1-46, 2-41	3-12,4-19, 5-12	3-19,4-16,5-19	3-39,4-39, 5-39	2-41
K9001	2-41				2-41
K9002	2-41				2-41
A9400	1-45,2-43	3-12,4-19, 5-12	3-19,4-16,5-19		2-43
B401 (Blower Motor)	2-45				2-45
Cover, Bottom	2-7				2-7
Cover, Top	2-7				2-7
CRS Mechanical Adjustment	6-15				6-15
Intermediate Gear Train Assy	6-7,6-8				6-7, 6-8

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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RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)
Commander
Stateside Army Depot
ATTN: AMSTA-US
Stateside, N.J. 07703

DATE SENT
10 July 1975

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 11-5840-340-12	23 Jan 74	Radar Set AN/PRC-76

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO
2-25	2-28		
3-10	3-3		3-1
5-6	5-8		
		F03	

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 "3db."

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.

SAMPLE

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
SSG I. M. DeSpiritof 999-1776

SIGN HERE
I. M. DeSpiritof

DA FORM 1 JUL 79 2028-2

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DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 11-5820-401-34-2-2/0967-LP-432-3030	16 Apr 84	Radio Sets, AN/VRC-12 Series; Receiver-Transmitters, RT-246(*)/VRC and RT-524(*)/VRC

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PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 11-5820-401-34-2-2/0967-LP-432-3030	16 Apr 84	Radio Sets, AN/VRC-12 Series; Receiver-Transmitters, RT-246(*)/VRC and RT-524(*)/VRC

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PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO

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PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

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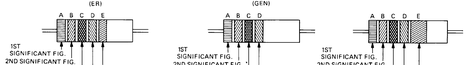


COLOR CODE MARKING FOR COMPOSITION TYPE RESISTORS.

COLOR-CODE MARKING FOR FILM-TYPE RESISTORS

TABLE 1

COLOR CODE FOR COMPOSITION TYPE AND FILM TYPE RESISTORS.

BAND A		BAND B		BAND C		BAND D		BAND E		
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)	COLOR	FAILURE RATE LEVEL	TERM.
BLACK	0	BLACK	0	BLACK	1			BROWN	M = 1.0	
BROWN	1	BROWN	1	BROWN	10			RED	P = 0.1	
RED	2	RED	2	RED	100			ORANGE	R = 0.01	
ORANGE	3	ORANGE	3	ORANGE	1,000			YELLOW	S = 0.001	
YELLOW	4	YELLOW	4	YELLOW	10,000	SILVER	±10 (COMP. TYPE ONLY*)	WHITE		SOLDERABLE
GREEN	5	GREEN	5	GREEN	100,000	GOLD	±5			
BLUE	6	BLUE	6	BLUE	1,000,000	RED	±2 (NOT APPLICABLE TO ESTABLISHED RELIABILITY)			
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7							
GRAY	8	GRAY	8	SILVER	0.01					
WHITE	9	WHITE	9	GOLD	0.1					

BAND A — THE FIRST SIGNIFICANT FIGURE OF THE RESISTANCE VALUE (BANDS A THRU D SHALL BE OF EQUAL WIDTH).

BAND B — THE SECOND SIGNIFICANT FIGURE OF THE RESISTANCE VALUE.

BAND C — THE MULTIPLIER (THE MULTIPLIER IS THE FACTOR BY WHICH THE TWO SIGNIFICANT FIGURES ARE MULTIPLIED TO YIELD THE NOMINAL VALUE.)

BAND D — THE RESISTANCE TOLERANCE.

BAND E — WHEN USED ON COMPOSITION RESISTORS, BAND E INDICATES ESTABLISHED RELIABILITY FAILURE RATE LEVEL (PERCENT FAILURE PER 1,000 HOURS). ON FILM RESISTORS, THIS BAND SHALL BE APPROXIMATELY 1½ TIMES THE WIDTH OF OTHER BANDS, AND INDICATES TYPE OF TERMINAL.

RESISTANCES IDENTIFIED BY NUMBERS AND LETTERS (THESE ARE NOT COLOR CODED)

SOME RESISTORS ARE IDENTIFIED BY THREE OR FOUR DIGIT ALPHANUMERIC DESIGNATORS. THE LETTER R IS USED IN PLACE OF A DECIMAL POINT WHEN FRACTIONAL VALUES OF AN OHM ARE EXPRESSED. FOR EXAMPLE:

2R7 = 2.7 OHMS 10R0 = 10.0 OHMS

FOR WIRE WOUND-TYPE RESISTORS COLOR CODING IS NOT USED, IDENTIFICATION MARKING IS SPECIFIED IN EACH OF THE APPLICABLE SPECIFICATIONS.

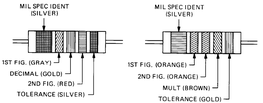
TABLE 2

COLOR CODING FOR TUBULAR ENCAPSULATED R.F. CHOKES.

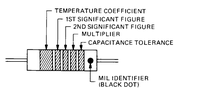
COLOR	SIGNIFICANT FIGURE	MULTIPLIER	INDUCTANCE TOLERANCE (PERCENT)
BLACK	0	1	
BROWN	1	10	1
RED	2	100	2
ORANGE	3	1,000	3
YELLOW	4		
GREEN	5		
BLUE	6		
VIOLET	7		
GRAY	8		
WHITE	9		
NONE			20
SILVER			10
GOLD	DECIMAL POINT		5

MULTIPLIER IS THE FACTOR BY WHICH THE TWO COLOR FIGURES ARE MULTIPLIED TO OBTAIN THE INDUCTANCE VALUE OF THE CHOKE COIL.

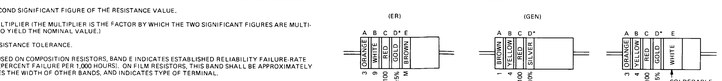
B. COLOR CODE MARKING FOR MILITARY STANDARD INDUCTORS.



COLOR CODING FOR TUBULAR ENCAPSULATED R.F. CHOKES. AT A, AN EXAMPLE OF THE CODING FOR AN 8.2UH CHOKE IS GIVEN. AT B, THE COLOR BANDS FOR A 330 UH INDUCTOR ARE ILLUSTRATED.



EXAMPLES OF COLOR CODING



*IF BAND D IS OMITTED, THE RESISTOR TOLERANCE IS ±20% AND THE RESISTOR IS NOT MIL STD.

A. COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS.

CAPACITORS, FIXED, VARIOUS DIELECTRICS, STYLES CM, CN, CY, AND CB.

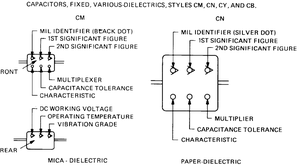


TABLE 3 — FOR USE WITH STYLES CM, CN, CY AND CB.

COLOR	MIL ID	1ST SIG FIG.	2ND SIG FIG.	MULTIPLIER[1]	CAPACITANCE TOLERANCE			CHARACTERISTIC			2 DC WORKING VOLTAGE	OPERATING TEMP. RANGE	VIBRATION GRADE
					CM	CN	CY	CB	CM	CN	CB	CM	CY, CM	CM
BLACK	CM, CY CB	0	0	1			±20%	±20%		A			−55° TO +70°C	10 – 55 Hz
BROWN		1	1	10					B	E	B			
RED		2	2	100	±2%		±2%	±2%	C				−55° TO +85°C	
ORANGE		3	3	1,000		±30%			D		D	300		
YELLOW		4	4	10,000					E				−55° TO +125°C	10 – 2,000 Hz
GREEN		5	5		±5%				F			500		
BLUE		6	6										−55° TO +150°C	
PURPLE (VIOLET)		7	7											
GRAY		8	8											
WHITE		9	9											
GOLD				0.1			±5%	±5%						
SILVER	CN			0.01	±10%	±10%	±10%	±10%						

TABLE 4 — TEMPERATURE COMPENSATING, STYLE CC.

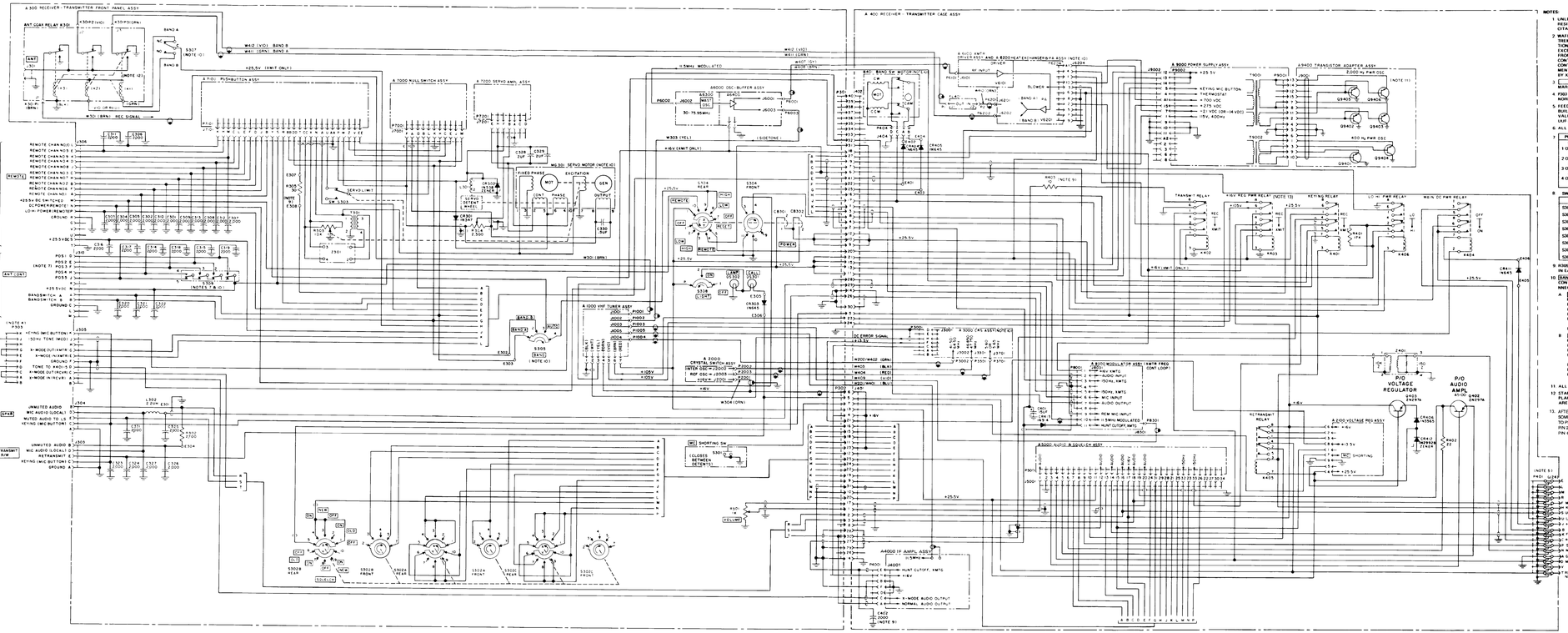
COLOR	TEMPERATURE COEFFICIENT[4]	1ST SIG FIG.	2ND SIG FIG.	MULTIPLIER[1]	CAPACITANCE TOLERANCE		MIL ID
					CAPACITANCES OVER 10 UUF	CAPACITANCES 10 UUF OR LESS	
BLACK	0	0	0	1		±2.0 UUF	CC
BROWN	−30	1	1	10	±1%		
RED	−80	2	2	100	±2%	±0.25 UUF	
ORANGE	−150	3	3	1,000			
YELLOW	−220	4	4				
GREEN	−330	5	5		±5%	±0.5 UUF	
BLUE	−470	6	6				
PURPLE (VIOLET)	−750	7	7				
GRAY		8	8	0.01*			
WHITE		9	9	0.1*	±10%		
GOLD	+100			0.1		±1.0 UUF	
SILVER				0.01			

1. THE MULTIPLIER IS THE NUMBER BY WHICH THE TWO SIGNIFICANT (SIG) FIGURES ARE MULTIPLIED TO OBTAIN THE CAPACITANCE IN UUF.
2. LETTERS INDICATE THE CHARACTERISTICS DESIGNATED IN APPLICABLE SPECIFICATIONS: MIL−C−5, MIL−C−25D, MIL−C−11272B, AND MIL−C−10950C RESPECTIVELY.
3. LETTERS INDICATE THE TEMPERATURE RANGE AND VOLTAGE-TEMPERATURE LIMITS DESIGNATED IN MIL−C−110150.
4. TEMPERATURE COEFFICIENT IN PARTS PER MILLION PER DEGREE CENTIGRADE.

* OPTIONAL CODING WHERE METALLIC PIGMENTS ARE UNDESIRABLE.

EL4GP502

FO-1. Resistor, Capacitor, and Inductor Color Code Diagram



NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UUF
2. WAFER SWITCHES SHOWN IN EXTREME COUNTERCLOCKWISE POSITION. SECTIONS SHOWN FRONT EXCEPT AS OTHERWISE INDICATED. FRONT OF WAFER IS SIDE TOWARD CONTROL KNOB. WAFER NEAREST CONTROL KNOB IS SECTION A. SEGMENTS OF WAFERS ARE IDENTIFIED BY X.
3. [ ] INDICATES EQUIPMENT MARKING.
4. P301 MUST BE IN POSITION FOR NORMAL OPERATION.
5. FEEDTHROUGH CAPACITORS ARE BUILT INTO CONNECTOR P401. THE VALUE OF EACH CAPACITOR IS 2,000 UUF.
6. ALL RELAYS SHOWN DEENERGIZED
7.

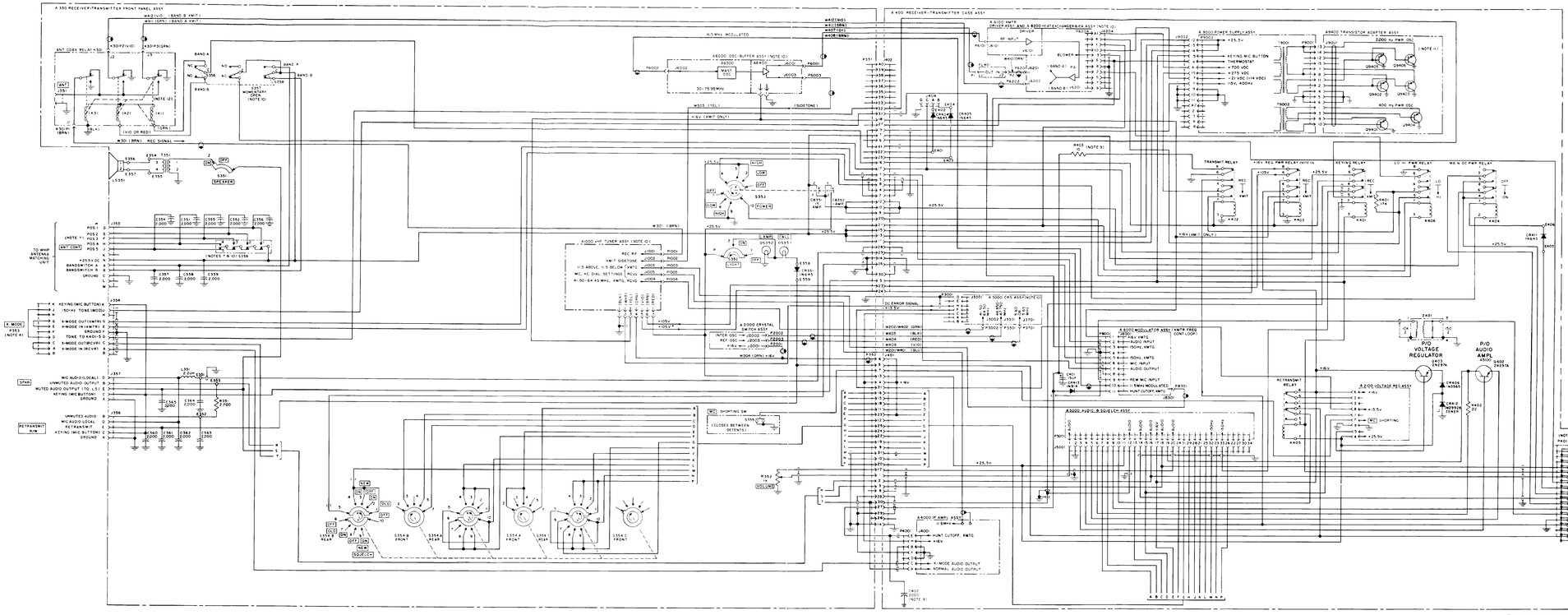
POS	BAND A	BAND B
1	30.00-32.70 MC	53.90-55.70 MC
1 OR 2	32.75-33.25 MC	55.75-56.25 MC
2	33.30-36.70 MC	56.30-59.70 MC
2 OR 3	36.75-37.25 MC	59.75-60.25 MC
3	37.30-41.60 MC	60.30-64.60 MC
3 OR 4	41.65-42.35 MC	64.65-70.10 MC
4	42.40-47.10 MC	70.15-70.85 MC
4 OR 5	47.15-47.85 MC	70.15-70.85 MC
5	47.90-52.95 MC	70.90-75.95 MC

8. SWITCHES ARE SHOWN AS FOLLOWS:

SWITCH	POSITION
S301	OPEN
S302 (SQUELCH)	FULLY OFF
S303	CLOSED
S304 (POWER)	OFF
S305 (BAND)	BAND A
S307	BAND A
S308 (LIGHT)	OFF
S309	S

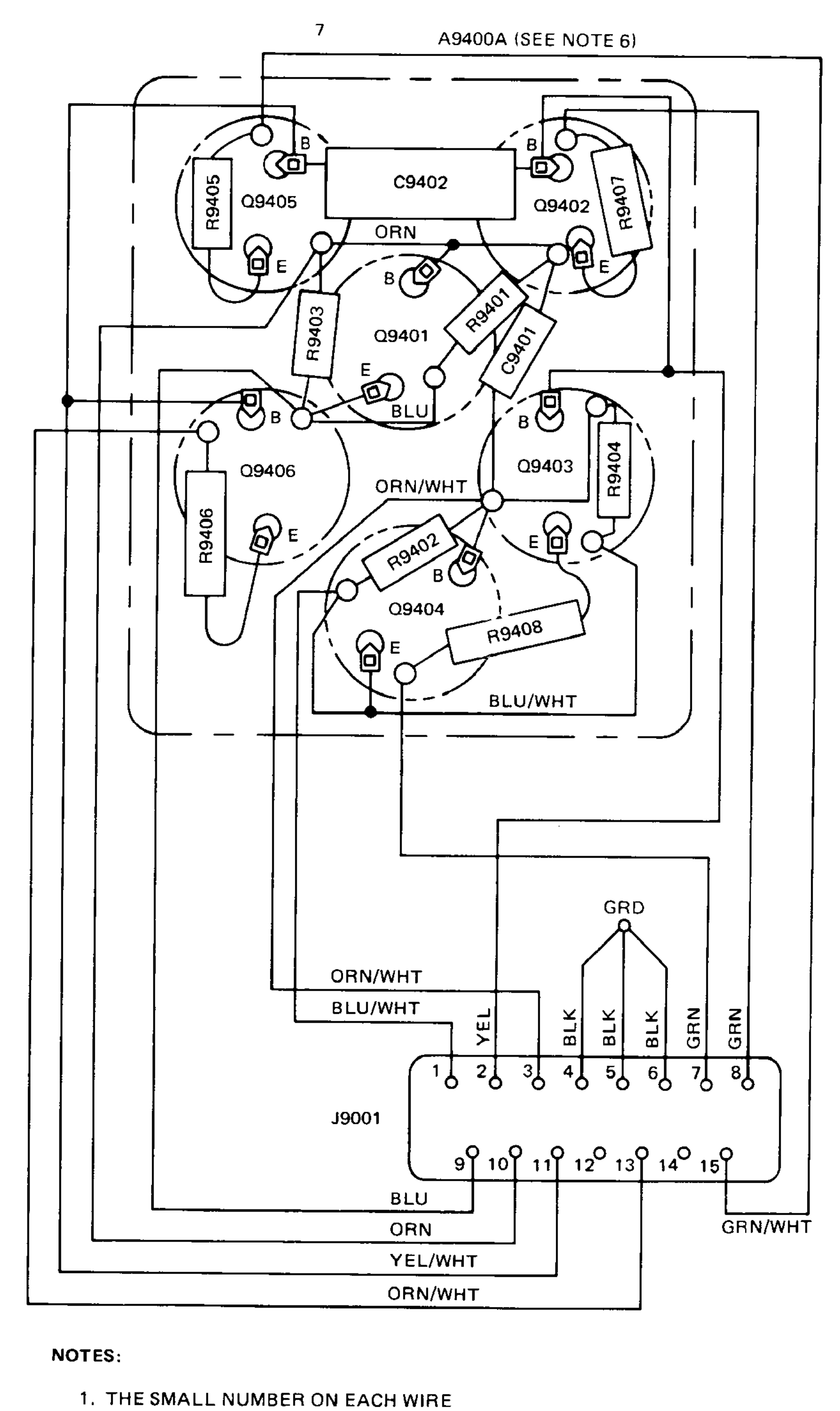
9. R305, R402, AND C402 NOT PROVIDED IN EARLY PRODUCTION UNITS
10. (BAND) SWITCH S305 AND (MC) AND (KK) CONTROLS ARE GEAR TRAIN COUPLED TO FOLLOWING ASSEMBLIES
    A. (BAND) SWITCH S305 IS GEARED TO FOLLOWING:
    (1) BAND SWITCH MOTOR B401
    (2) A6300 AND A6400 IN A6000
    (3) A1000 IN A1000
    (4) A1100, A1200, AND A1300 IN A1000
    (5) S307 (FOR K301)
    B. (MC) AND (KK) CONTROLS ARE GEARED TO FOLLOWING:
    (1) SERVOMOTOR MG301
    (2) A2000
    (3) A1100, A1200, A1300, AND A1000 IN A1000
    (4) A6300 AND A6400 IN A6000
    (5) A6100
    (6) ANTENNA CONTROL RELAY S308 (NOTE 7)
11. ALL PARTS NOT SHOWN
12. STARTING IN 1975, COIL K1 IS RE-PLACED BY WIRE AND K1 CONTACTS ARE CONNECTED TO K2 AND K3
13. AFTER 1982 RELAY K401 WAS MODIFIED IN SOME MODELS AS FOLLOWS: PIN 6 CONNECTED TO PIN 1 AND 3 (GND), PIN 2 CONNECTED TO PIN 3 J8204, PIN 5 CONNECTED TO D403, PIN 4 - A2100 AND PIN 8 - K400

FO-2. RT-246(*1)/VRC Front Panel and Case Assemblies Schematic Diagram



EL4GP504

FO-3. RT-524(*)/VRC Front Panel and Case Assemblies Schematic Diagram

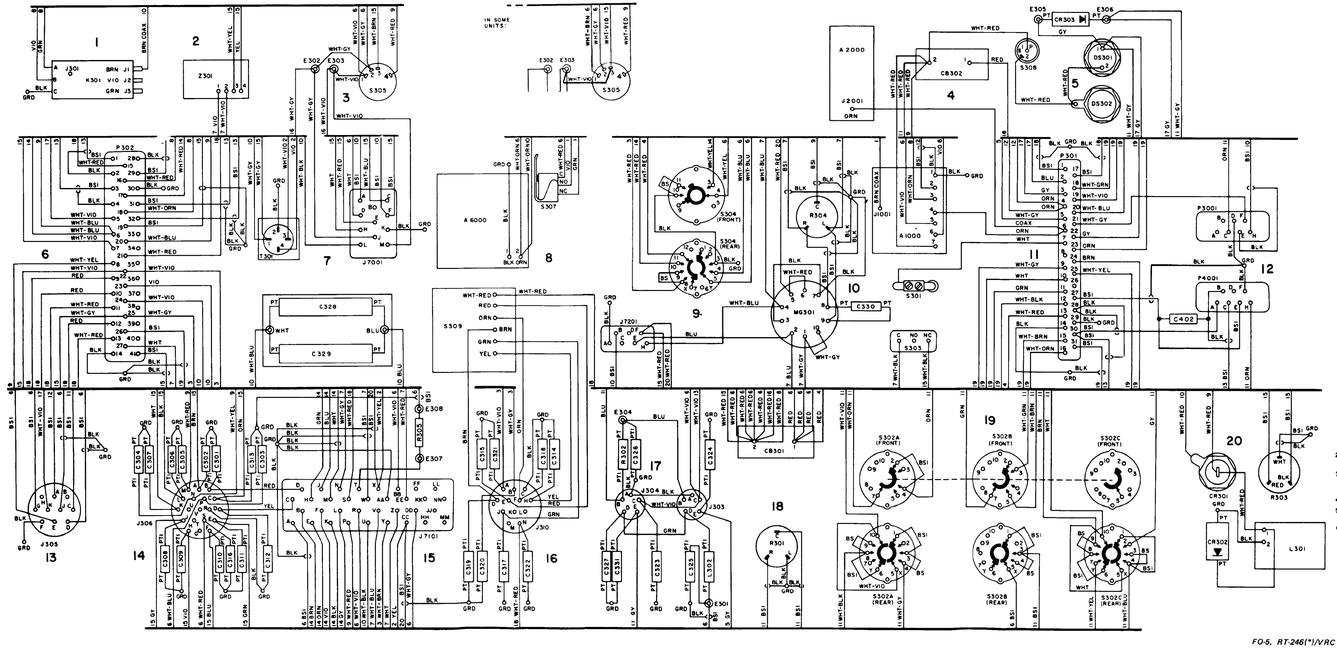


NOTES:

1. THE SMALL NUMBER ON EACH WIRE (ADJACENT TO THE COMMON OR BASE LINE) CORRESPONDS TO THE LARGE NUMBER ADJACENT TO THE STATION TO WHICH THE WIRE RUNS.
2. – – – DENOTES COMPONENT ON OPPOSITE SIDE OF ASSEMBLY.
3. BSI DENOTES TINNED, ANNEALED COPPER WIRING INSULATED WITH SLEEVING.
4. PT DENOTES PIGTAIL LEAD.
5. ( )- DENOTES SHIELDED CONNECTION.
6. A9400A ASSEMBLY REPLACES A9400.

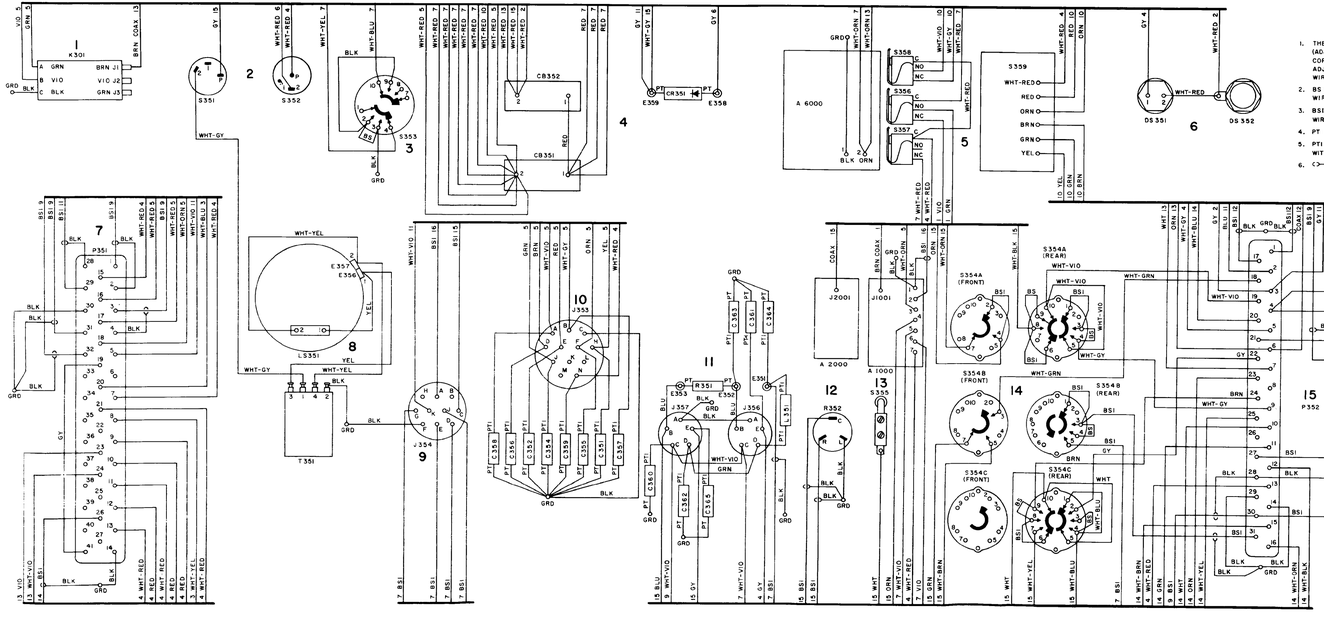
EL4GP505

FO-4. Receiver-transmitter Case Assembly Wiring Diagram



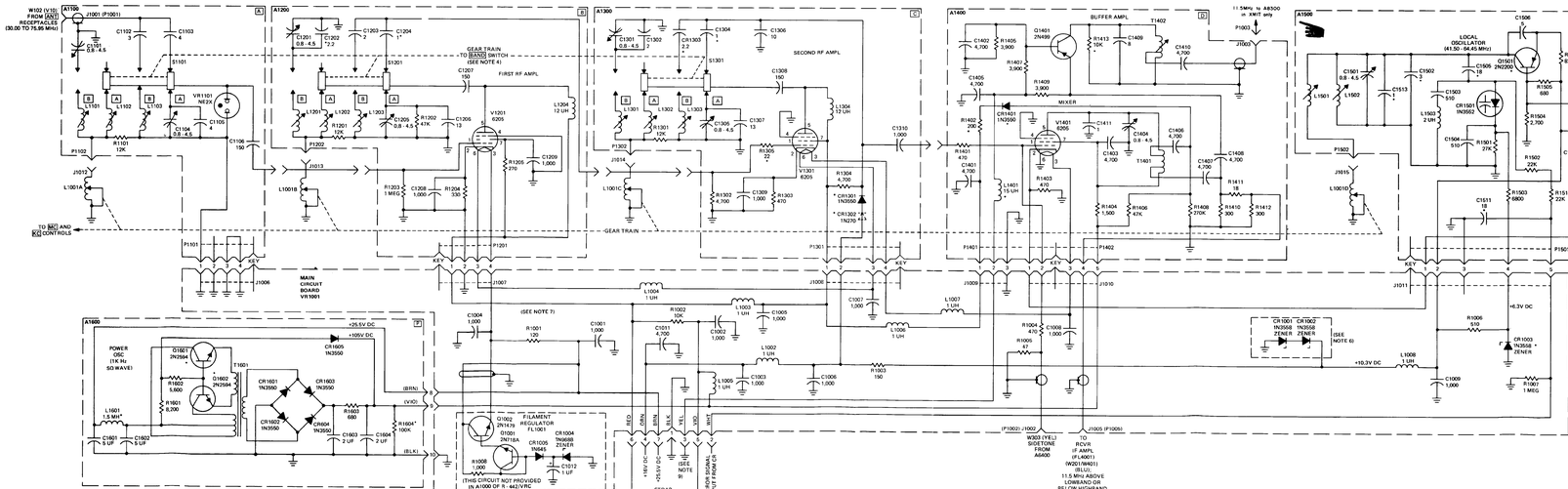
EL4GP506

FO-5. RT-246(*)/VRC Front Panel Wiring Diagram



EL4GP507

FO-6. RT-524(*)/VRC Front Panel Wiring Diagram

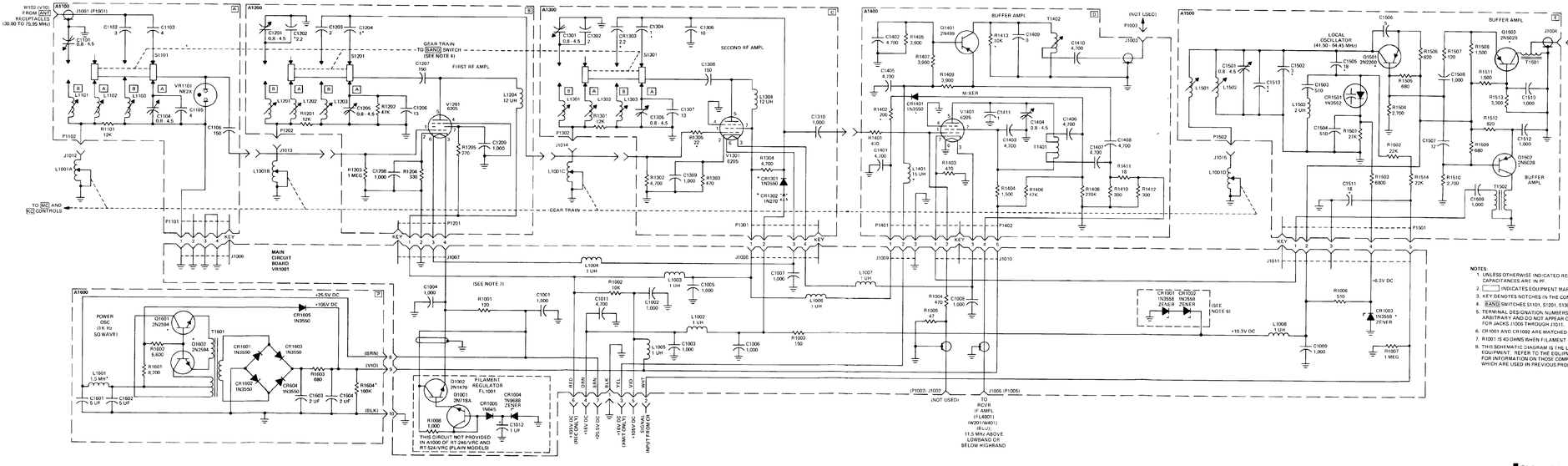


NOTES:

1. UNLESS OTHERWISE INDICATED RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN PF.
2. [ ] INDICATES EQUIPMENT MARKING.
3. KEY DENOTES NOTCHES IN THE CONNECTORS.
4. BAND SWITCHES S1101, S1201, S1301 SHOWN IN A.
5. TERMINAL DESIGNATION NUMBERS FOR CONNECTORS ARE ARBITRARY AND DO NOT APPEAR ON EQUIPMENT FOR JACKS J1006 THROUGH J1011.
6. CR1001 AND CR1002 ARE MATCHED PAIR OF 1N7511 IN SOME SETS.
7. R1001 (0.40 OHM) WHEN FILAMENT REGULATOR IS NOT PROVIDED.
8. THIS SCHEMATIC DIAGRAM IS THE LATEST CONFIGURATION OF THE EQUIPMENT. REFER TO THE EQUIPMENT DIFFERENCES PARAGRAPH FOR INFORMATION ON THOSE COMPONENTS MARKED WITH (*) WHICH ARE USED IN PREVIOUS PRODUCTIONS OF THE ASSEMBLY.

EL4GP50B

FO-7. VHF Tuner Assembly A1000 Schematic Diagram

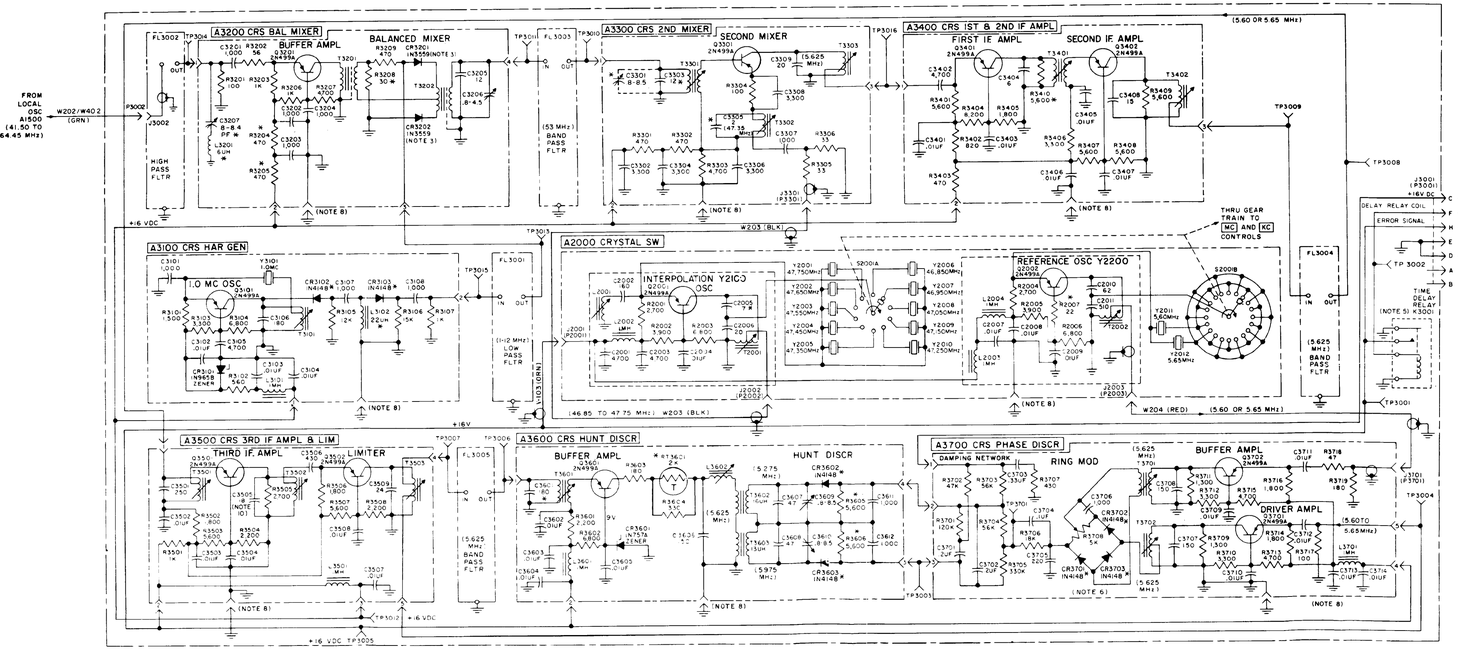


NOTES:

1. UNLESS OTHERWISE INDICATED RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN PF.
2. ▭ INDICATES EQUIPMENT MARKING.
3. KEY DENOTES NOTCHES IN THE CONNECTORS.
4. RANGE SWITCHES S1101, S1201, S1301 SHOWN IN A.
5. TERMINAL DESIGNATION NUMBERS FOR CONNECTORS ARE ARBITRARY AND DO NOT APPEAR ON EQUIPMENT FOR JACKS J1006 THROUGH J1011.
6. CR1001 AND CR1002 ARE MATCHED PAIR OF 1N751'S IN SOME SETS.
7. R1001 IS 40 OHMS WHEN FILAMENT REGULATOR IS NOT PROVIDED.
8. THIS SCHEMATIC DIAGRAM IS THE LATEST CONFIGURATION OF THE EQUIPMENT. REFER TO THE EQUIPMENT DIFFERENCES PARAGRAPH FOR INFORMATION ON THOSE COMPONENTS MARKED WITH (*), WHICH ARE USED IN PREVIOUS PRODUCTIONS OF THE ASSEMBLY.

EL4GP510

FO-8. VHF Tuner Assembly A1000A, Schematic Diagram

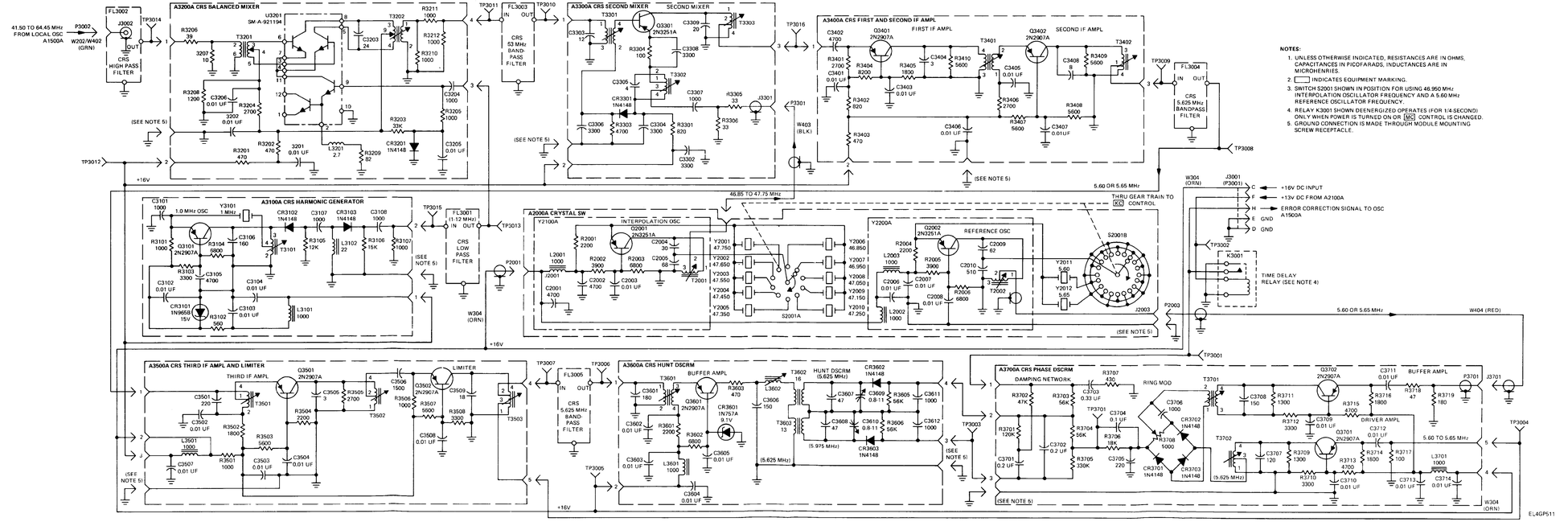


NOTES

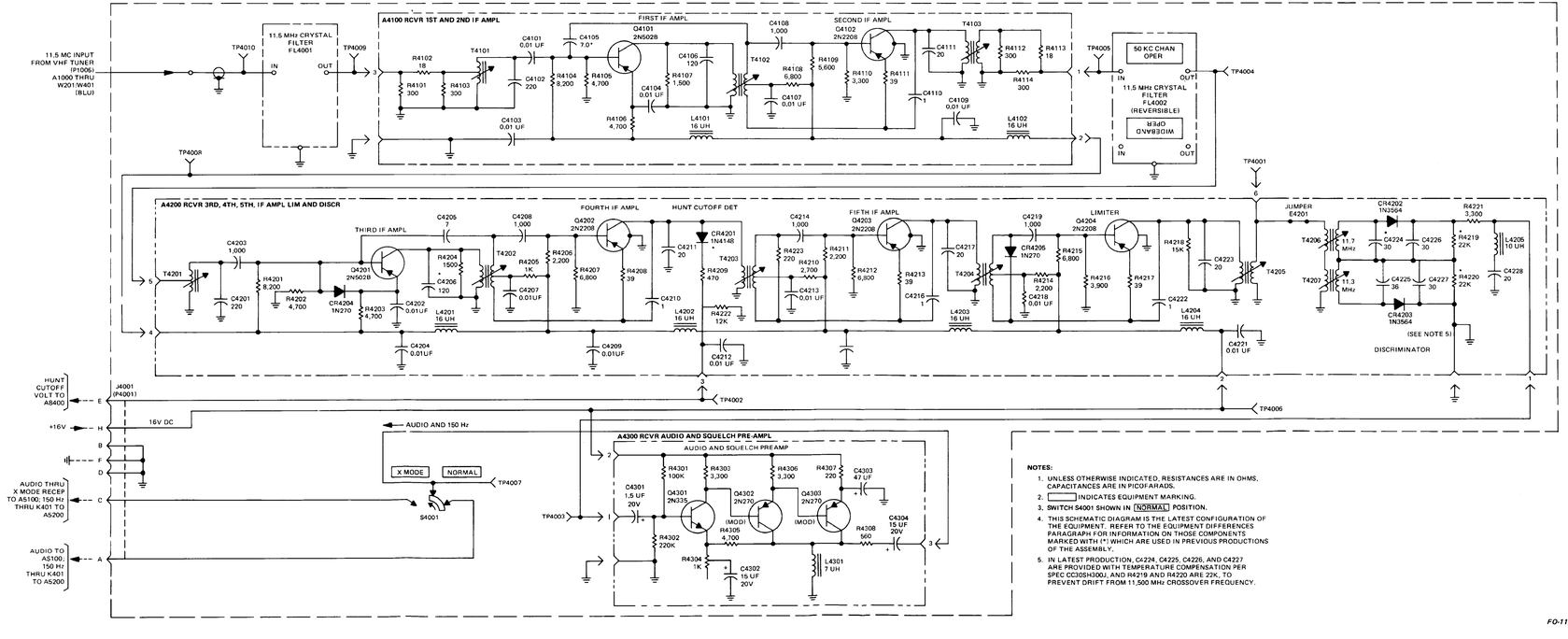
1. UNLESS OTHERWISE INDICATED ALL RESISTANCES ARE IN OHMS, ALL CAPACITANCES IN PF.
2. ☐ INDICATES EQUIPMENT MARKING.
3. DIODE IN3559 IS A MATCHED PAIR.
4. SWITCH S2001 SHOWN IN POSITION FOR USING 46.950-MHz INTERPOLATION OSCILLATOR FREQUENCY AND A 5.60-MHz REFERENCE OSCILLATOR FREQUENCY.
5. RELAY K3001 SHOWN DE-ENERGIZED OPERATES (FOR 1/4-SECOND) ONLY WHEN POWER IS TURNED ON OR KC CONTROL IS CHANGED.
6. DIODES ARE MATCHED
7. THIS SCHEMATIC DIAGRAM IS THE LATEST CONFIGURATION OF THE EQUIPMENT. REFER TO THE EQUIPMENT DIFFERENCES PARAGRAPH FOR INFORMATION ON THOSE COMPONENTS MARKED WITH (N) WHICH ARE USED IN PREVIOUS PRODUCTIONS OF THE ASSEMBLY.
8. GROUND CONNECTION IS MADE THROUGH MODULE MOUNTING SCREW RECEPTACLE.
9. TRANSISTOR TYPE 2N499A (GERMANIUM) HAS BEEN REPLACED BY TYPE 2N2907A (SILICON).
10. C3505 IS 8PF WHEN Q3501 IS TYPE 2N2907A

EL4GP509

FO-9. Crystal Reference System (CRS) Assemblies A2000 and A3000 Schematic Diagram



FO-10. Crystal Reference System (CRS) Assembly A3000A (Silicon) Schematic Diagram

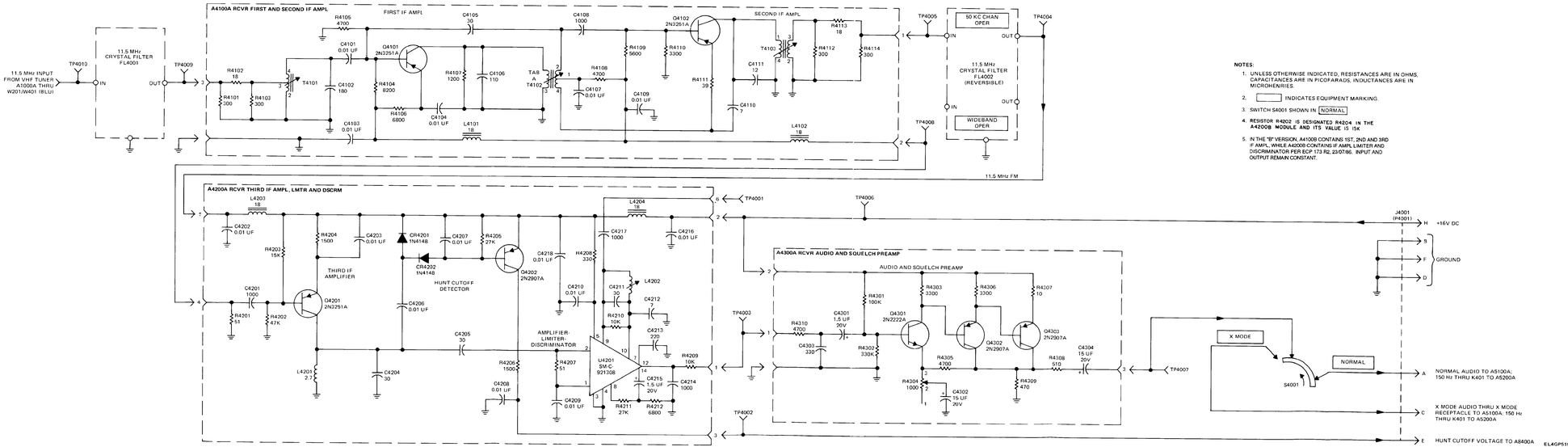


NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN PICOFARADS.
2. [ ] INDICATES EQUIPMENT MARKING.
3. SWITCH S4001 SHOWN IN [NORMAL] POSITION.
4. THIS SCHEMATIC DIAGRAM IS THE LATEST CONFIGURATION OF THE EQUIPMENT. REFER TO THE EQUIPMENT DIFFERENCES PARAGRAPH FOR INFORMATION ON THOSE COMPONENTS MARKED WITH (*) WHICH ARE USED IN PREVIOUS PRODUCTIONS OF THE ASSEMBLY.
5. IN LATEST PRODUCTION, C4224, C4225, C4226, AND C4227 ARE PROVIDED WITH TEMPERATURE COMPENSATION PER SPEC CC30SH300J, AND R4219 AND R4220 ARE 22K, TO PREVENT DRIFT FROM 11,500 MHz CROSSOVER FREQUENCY.

EL4GP514

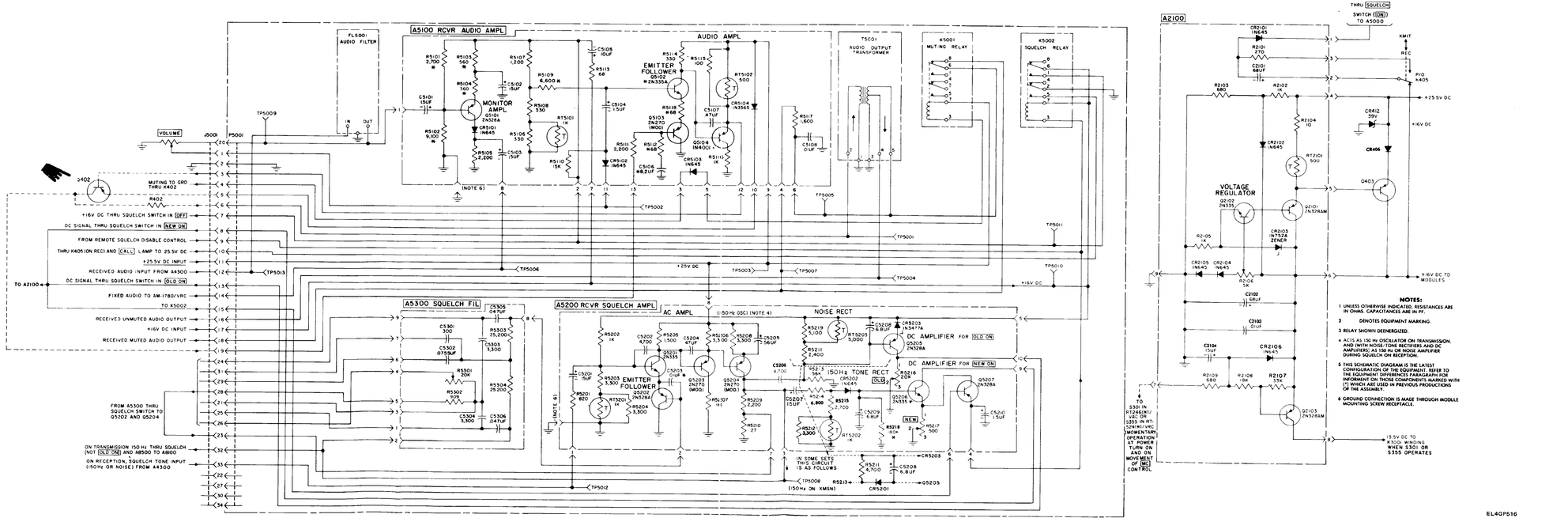
FO-11. IF Amplifier Assembly A4000 Schematic Diagram



NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN PICOFARADS, INDUCTANCES ARE IN MICROHENRIES.
2. ▭ INDICATES EQUIPMENT MARKING.
3. SWITCH S4001 SHOWN IN [NORMAL].
4. RESISTOR R4202 IS DESIGNATED R4204 IN THE A4200B MODULE AND ITS VALUE IS 15K
5. IN THE "B" VERSION, A4100B CONTAINS 1ST, 2ND AND 3RD IF AMPL, WHILE A4200B CONTAINS IF AMPL, LIMITER AND DISCRIMINATOR PER ECP 173 R2, 23/07/86. INPUT AND OUTPUT REMAIN CONSTANT.

FO-12. IF Amplifier Assembly A4000A (Silicon) Schematic Diagram



NOTES:

1 UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS. CAPACITANCES ARE IN PF.

2 DENOTES EQUIPMENT MARKING.

3 RELAY SHOWN DEENERGIZED.

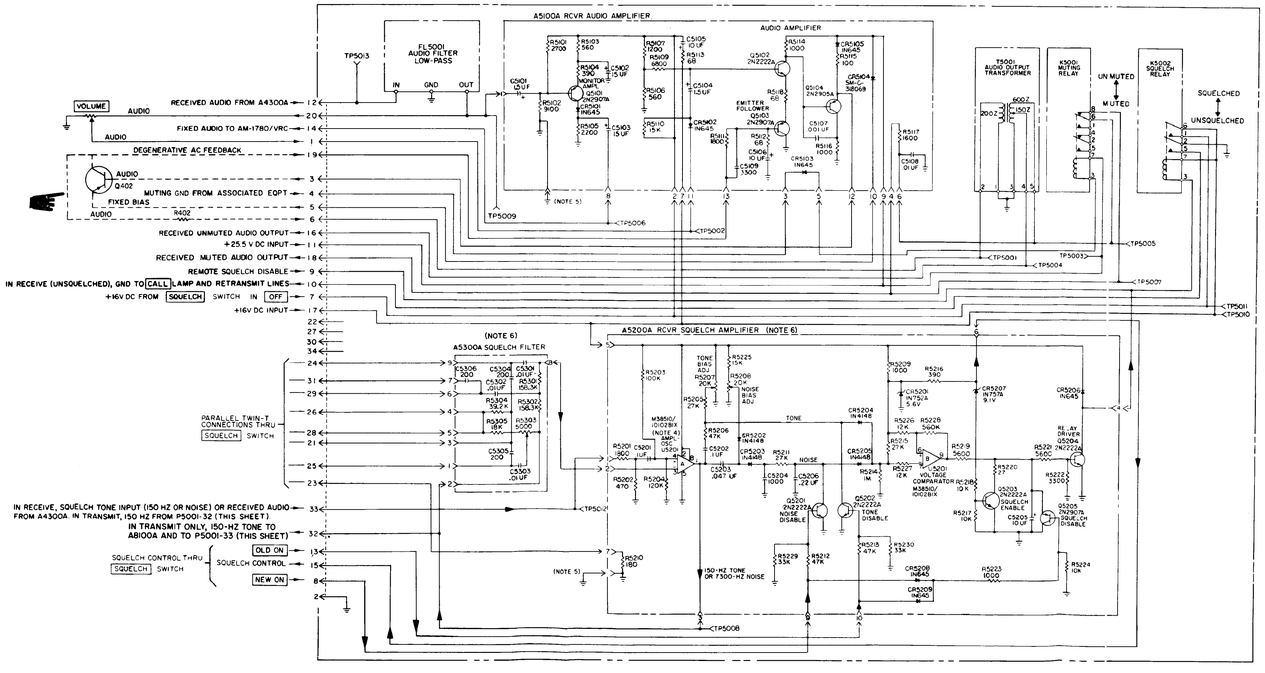
4 AC15 AS 150 Hz OSCILLATOR ON TRANSMISSION, AND (WITH NOISE-TONE RECTIFIERS AND DC AMPLIFIERS) AS 150 Hz OR NOISE AMPLIFIER DURING SQUELCH ON RECEPTION.

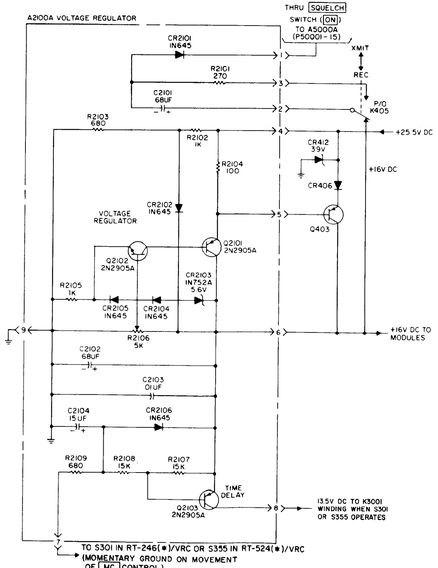
5 THIS SCHEMATIC DIAGRAM IS THE LATEST CONFIGURATION OF THE EQUIPMENT. REFER TO THE EQUIPMENT DIFFERENCES PARAGRAPH FOR INFORMATION ON THOSE COMPONENTS MARKED WITH AN ASTERISK USED IN PREVIOUS PRODUCTIONS OF THE ASSEMBLY.

6 GROUND CONNECTION IS MADE THROUGH MODULE MOUNTING SCREW RECEPTACLE.

EL4GPS16

FO-13. Audio and Squelch Assembly A5000 and Voltage Regulator Assembly A2100 Schematic Diagram





NOTES

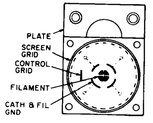
1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS CAPACITANCES ARE IN PICOFARADS.
2. ▭ DENOTES EQUIPMENT MARKING.
3. RELAYS ARE SHOWN DEENERGIZED.
4. U5201 IS A 150-HZ OSCILLATOR DURING TRANSMISSION AND AN AC AMPLIFIER DURING RECEPTION.
5. GROUND CONNECTION IS MADE THROUGH MODULE MOUNTING SCREW RECEPTACLE.
6. SILICON MODULE A5200A OR A5300A CANNOT BE INTERCHANGED WITH GERMANIUM MODULE A5200 OR A5300, RESPECTIVELY. BOTH MUST BE SILICON (A5200A WITH A5300A) OR GERMANIUM (A5200 WITH A5300).

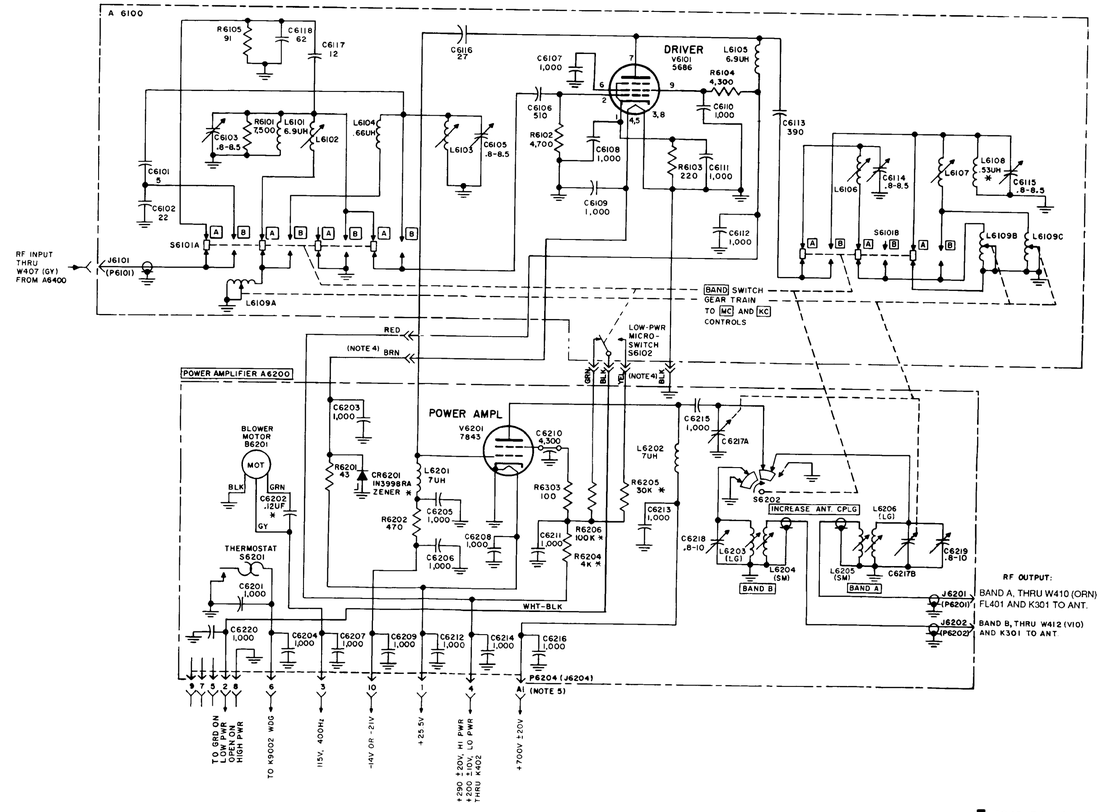
EL4GPS17

FO-14. Audio and Squelch Assembly A5000A (Silicon) and Voltage Regulator Assembly A2100A (Silicon) Schematic Diagram

NOTES:

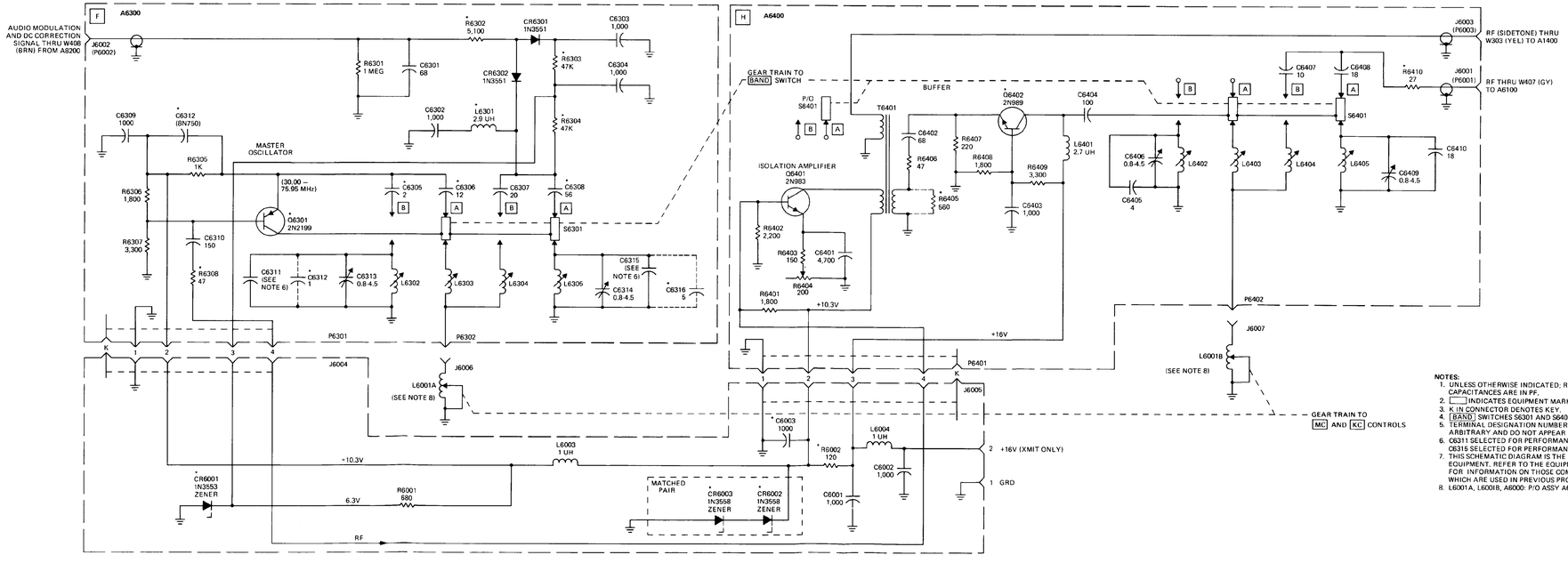
1. UNLESS OTHERWISE INDICATED; RESISTANCES ARE IN OHMS; CAPACITANCES ARE IN PF.
2. ▭ INDICATES EQUIPMENT MARKING
3. SWITCHES SHOWN IN [BAND A] POSITION
4. IN SOME SETS, 6 COLOR-CODED, TEFLON, PUSH-ON TERMINALS HAVE BEEN ADDED TO FACILITATE MAINTENANCE.
5. VOLTAGES SHOWN (EXCEPT +25.5V AND I15V) SUPPLIED BY POWER SUPPLY A9000 DURING TRANSMISSION.
6. THIS SCHEMATIC IS THE LATEST CONFIGURATION OF THE EQUIPMENT. REFER TO THE EQUIPMENT DIFFERENCES PARAGRAPH FOR INFORMATION ON THOSE COMPONENTS MARKED WITH (#) WHICH ARE USED IN PREVIOUS PRODUCTIONS OF THE ASSEMBLY.
7. XV6102 TUBE SOCKET:





EL4GP518

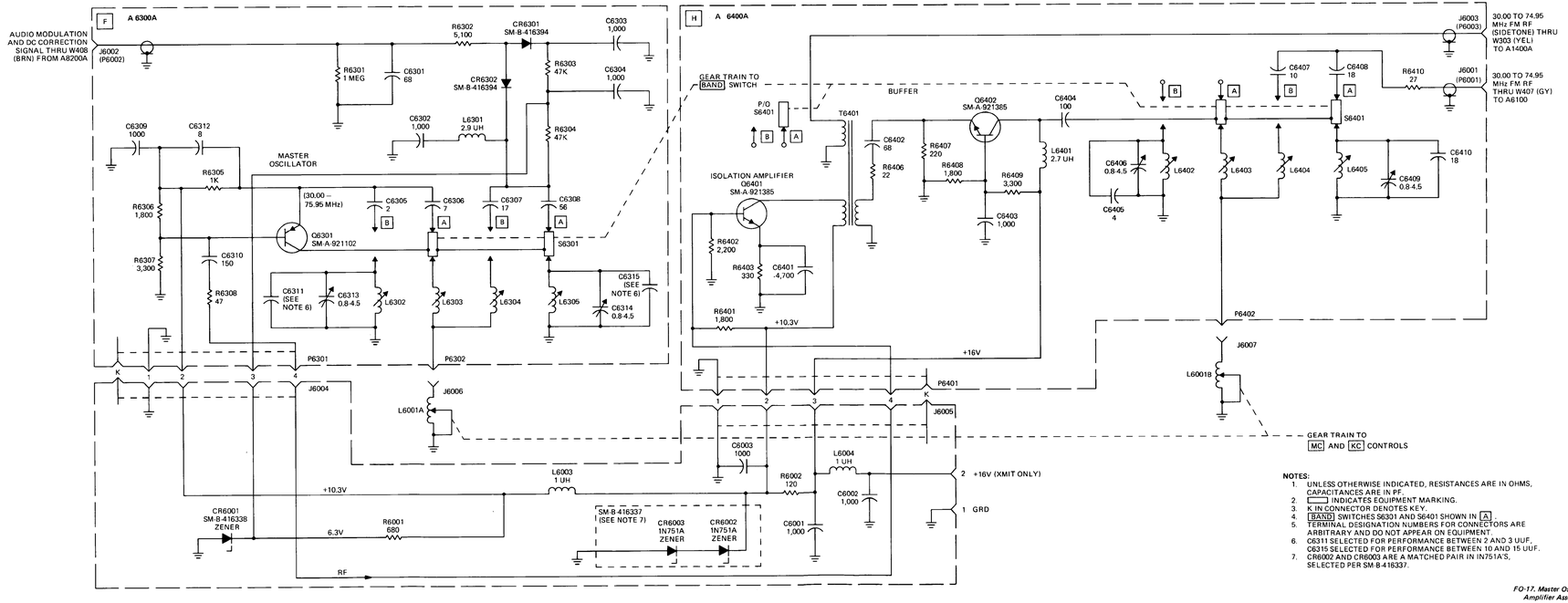
FO-15. Driver Assembly A6100 and Power Amplifier Assembly A6200 Schematic Diagram



NOTES:
1. UNLESS OTHERWISE INDICATED; RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN PF.
2. ☐ INDICATES EQUIPMENT MARKING.
3. K IN CONNECTOR DENOTES KEY.
4. BAND SWITCHES S6301 AND S6401 SHOWN IN A.
5. TERMINAL DESIGNATION NUMBERS FOR CONNECTORS ARE ARBITRARY AND DO NOT APPEAR ON EQUIPMENT.
6. C6311 SELECTED FOR PERFORMANCE BETWEEN 2 AND 3 UUF. C6315 SELECTED FOR PERFORMANCE BETWEEN 7.5 AND 15 UUF.
7. THIS SCHEMATIC DIAGRAM IS THE LATEST CONFIGURATION OF THE EQUIPMENT. REFER TO THE EQUIPMENT DIFFERENCES PARAGRAPH FOR INFORMATION ON THOSE COMPONENTS MARKED WITH (*) WHICH ARE USED IN PREVIOUS PRODUCTIONS OF THE ASSEMBLY.
8. L6001A, L6001B, A6000: P/O ASSY A6500.

EL4GP519

FO-16. Master Oscillator Assembly A6300 and Buffer Amplifier Assembly A6400 Schematic Diagram



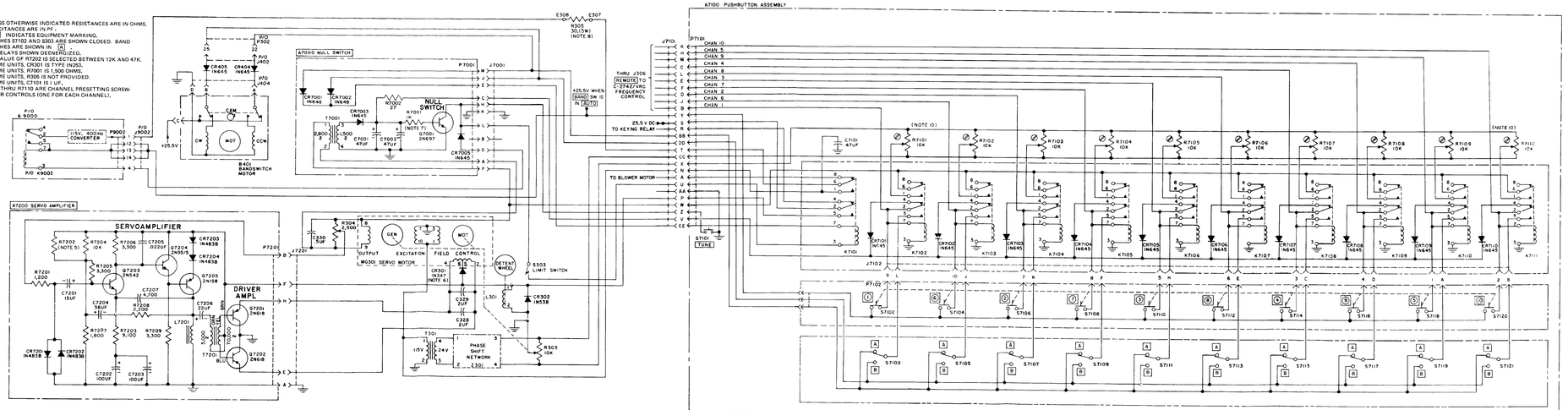
NOTES:
1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN PF.
2. ▭ INDICATES EQUIPMENT MARKING.
3. K IN CONNECTOR DENOTES KEY.
4. BAND SWITCHES S6301 AND S6401 SHOWN IN A.
5. TERMINAL DESIGNATION NUMBERS FOR CONNECTORS ARE ARBITRARY AND DO NOT APPEAR ON EQUIPMENT.
6. C6311 SELECTED FOR PERFORMANCE BETWEEN 2 AND 3 UUF. C6315 SELECTED FOR PERFORMANCE BETWEEN 10 AND 15 UUF.
7. CR6002 AND CR6003 ARE A MATCHED PAIR IN 1N751A'S, SELECTED PER SM-B-416337.

EL4GP520

FO-17, Master Oscillator Assembly A6300A (Silicon) and Buffer Amplifier Assembly A6400A (Silicon) Schematic Diagram

NOTES:

1. UNLESS OTHERWISE INDICATED RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN PF.
2. [ ] INDICATES EQUIPMENT MARKING.
3. SWITCHES S7102 AND S303 ARE SHOWN CLOSED. BAND SWITCHES ARE SHOWN IN [A].
4. ALL RELAYS SHOWN DEENERGIZED.
5. THE VALUE OF R7202 IS SELECTED BETWEEN 12K AND 47K.
6. IN SOME UNITS, CR301 IS TYPE IN253.
7. IN SOME UNITS, R7001 IS 1,500 OHMS.
8. IN SOME UNITS, R305 IS NOT PROVIDED.
9. IN SOME UNITS, C7101 IS 1 UF.
10. R7101 THRU R7110 ARE CHANNEL PRESETTING SCREW-DRIVER CONTROLS (ONE FOR EACH CHANNEL).

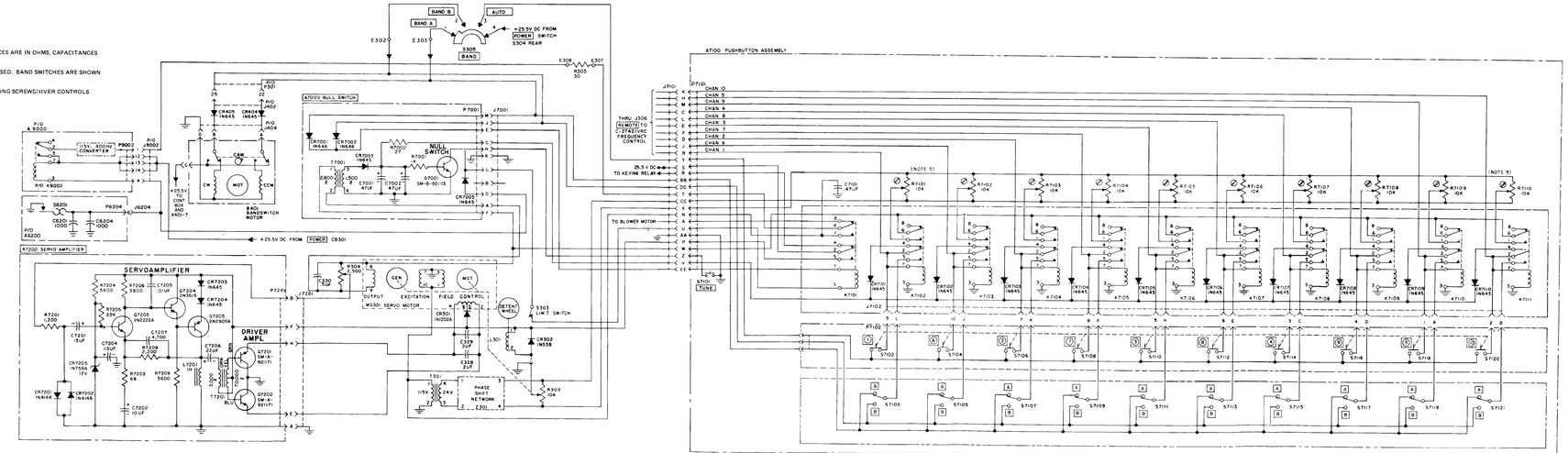


EL4GP523

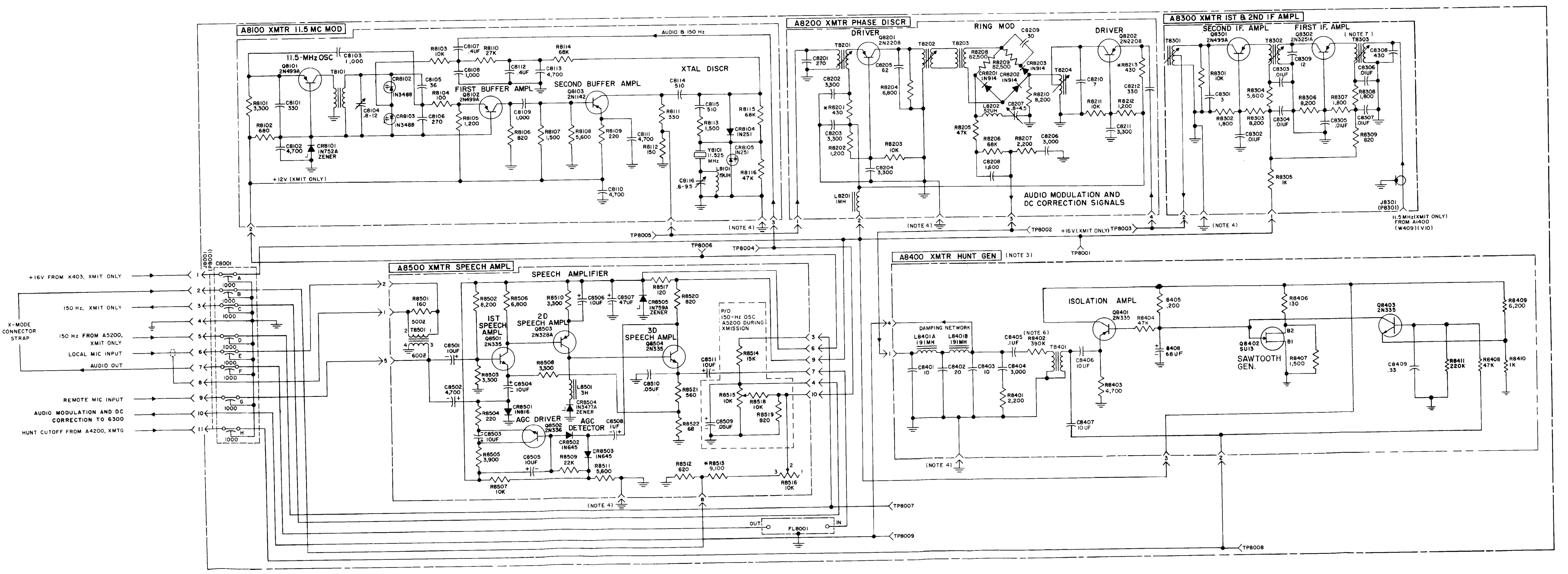
FO-18, RT-246(*)/VRC Servosystem A7000 Schematic Diagram

NOTES

1. UNLESS OTHERWISE INDICATED RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN PF.
2. [ ] INDICATES EQUIPMENT MARKING
3. SWITCHES S7102 AND S303 ARE SHOWN CLOSED. BAND SWITCHES ARE SHOWN IN [A]
4. ALL RELAYS SHOWN DEENERGIZED.
5. R7101 THRU R7110 ARE CHANNEL PRESETTING SCREWDRIVER CONTROLS (ONE FOR EACH CHANNEL).

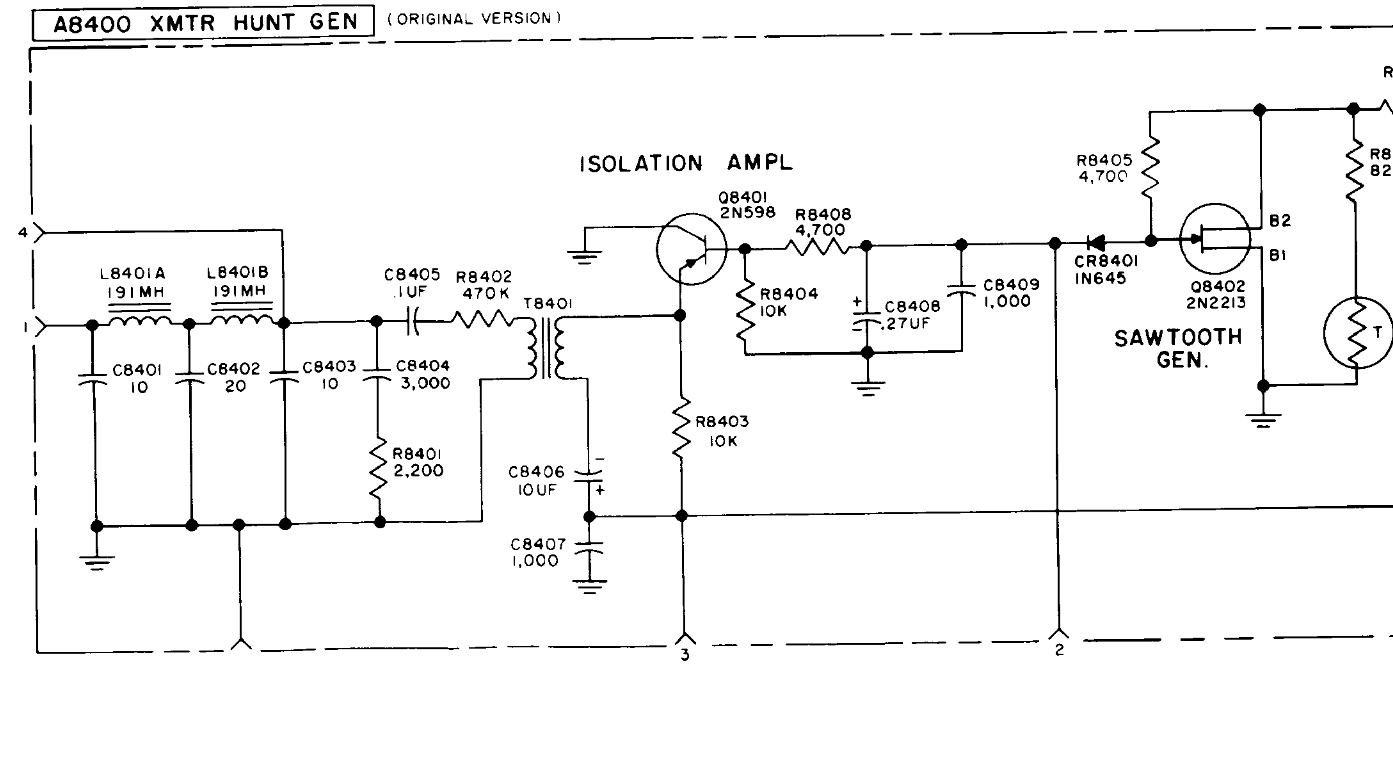


FO-19. RT-246(*)/VRC Servosystem A7000A (Silicon) Schematic Diagram



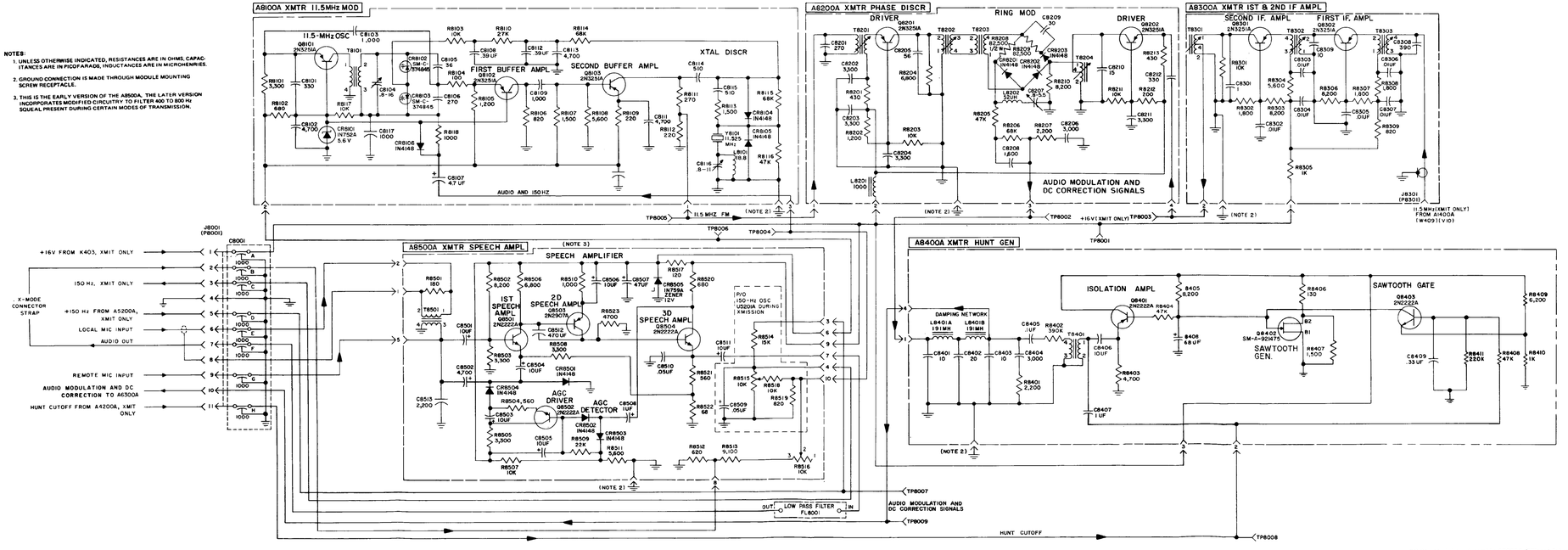
NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UUF.
2. ▭ INDICATES EQUIPMENT MARKING.
3. LATEST VERSION IS SHOWN. FOLLOWING IS ORIGINAL VERSION.
4. GROUND CONNECTION IS MADE THROUGH MODULE MOUNTING SCREW RECEPTACLE.
5. THIS SCHEMATIC DIAGRAM IS THE LATEST CONFIGURATION OF THE EQUIPMENT. REFER TO THE EQUIPMENT DIFFERENCES PARAGRAPH FOR INFORMATION ON THOSE COMPONENTS MARKED WITH (*) WHICH ARE USED IN PREVIOUS PRODUCTIONS OF THE ASSEMBLY.
6. R8402: 390K PREFERRED VALUE; 620K AND 470K IN SOME UNITS.
7. Q8302: TYPE 2N499A (GERMANIUM) IN SOME UNITS.



EL4GP521

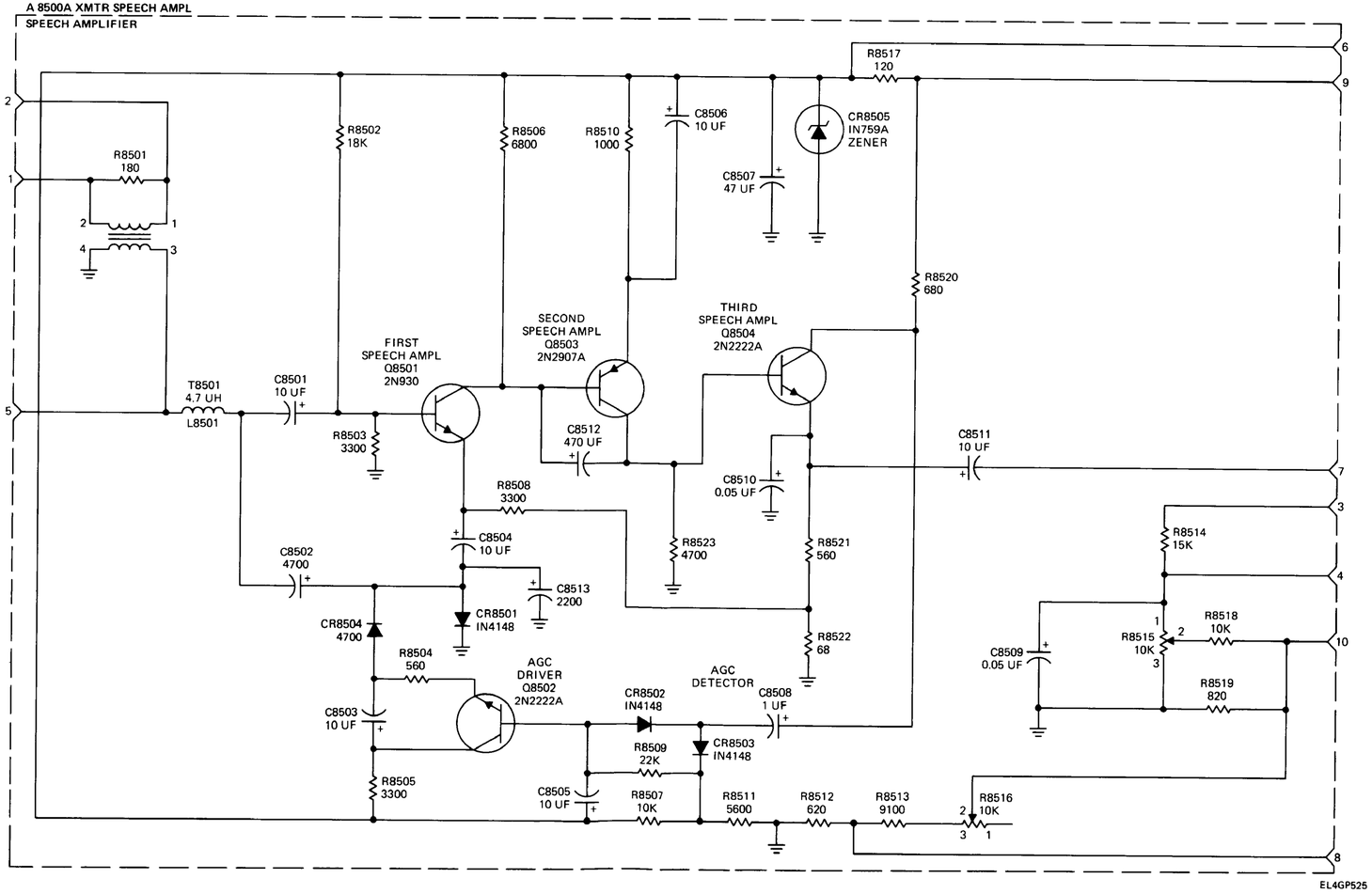
FO-20. Modulator Assembly A8000 Schematic Diagram



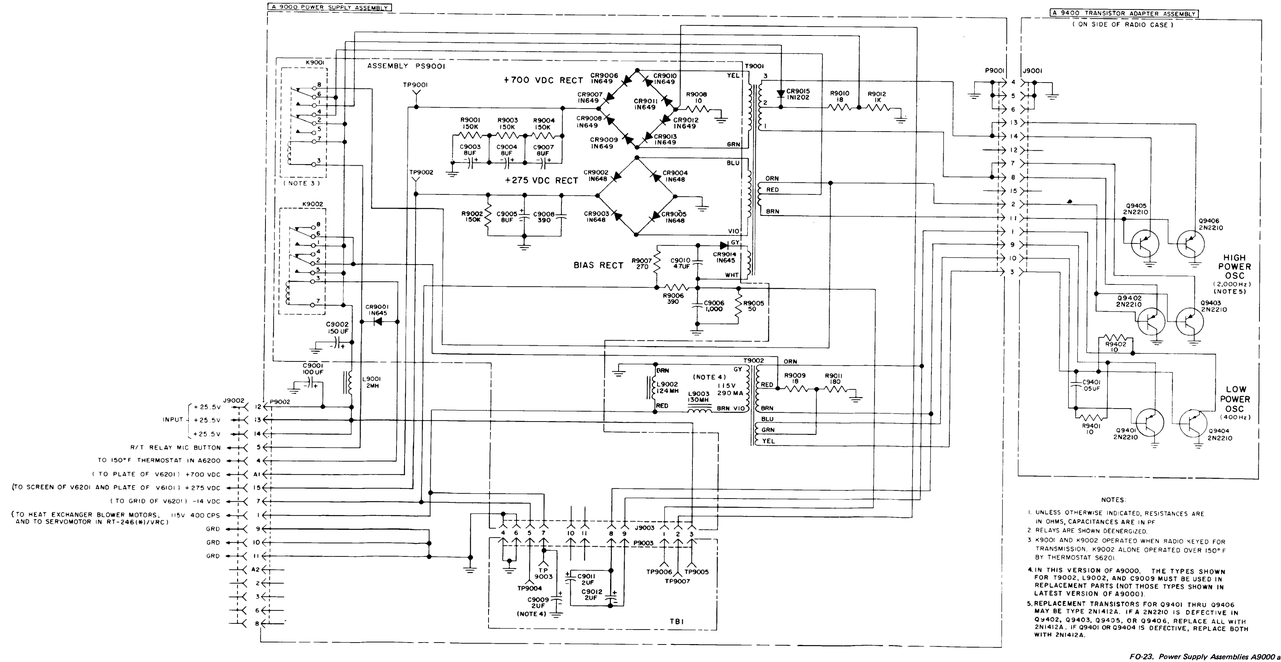
NOTES:
1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN PICOFARADS, INDUCTANCES ARE IN MICROHENRIES.
2. GROUND CONNECTION IS MADE THROUGH MODULE MOUNTING SCREW RECEPTACLE.
3. THIS IS THE EARLY VERSION OF THE A8500A. THE LATER VERSION INCORPORATES MODIFIED CIRCUITRY TO FILTER 400 TO 800 Hz SQUEAL PRESENT DURING CERTAIN MODES OF TRANSMISSION.

EL4GP522

FO-21. Modulator Assembly A8000A (Silicon) Schematic Diagram



FO-22. Speech Amplifier A8500A (Silicon) Schematic Diagram

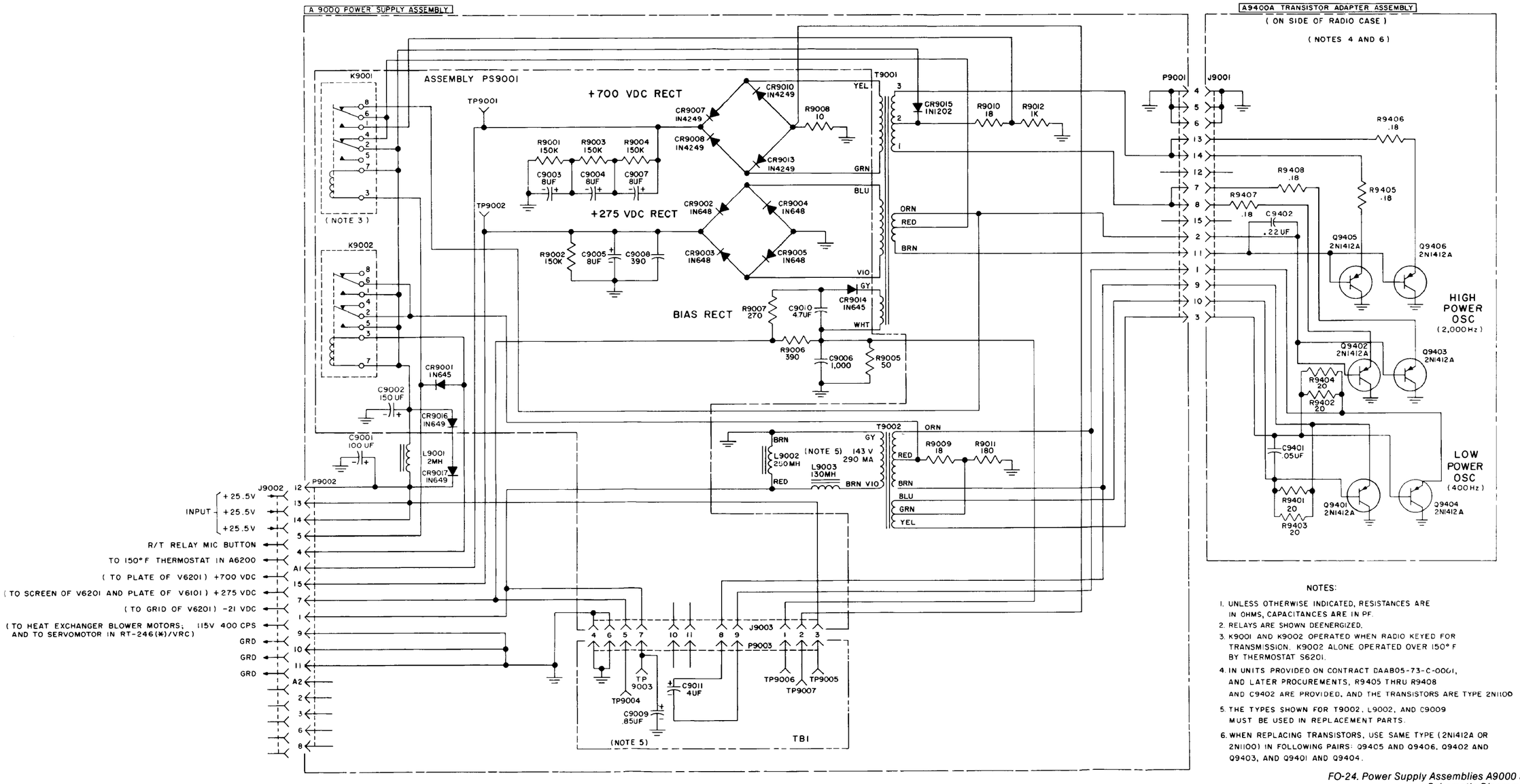


NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN PF.
2. RELAYS ARE SHOWN DEENERGIZED.
3. K9001 AND K9002 OPERATED WHEN RADIO KEYED FOR TRANSMISSION. K9002 ALONE OPERATED OVER 150°F BY THERMOSTAT 5620.
4. IN THIS VERSION OF A9000, THE TYPES SHOWN FOR T9002, L9002, AND C9009 MUST BE USED IN REPLACEMENT PARTS (NOT THOSE TYPES SHOWN IN LATEST VERSION OF A9000).
5. REPLACEMENT TRANSISTORS FOR Q9401 THRU Q9406 MAY BE TYPE 2N1412A, IF A 2N2210 IS DEFECTIVE IN Q9402, Q9403, Q9405, OR Q9406, REPLACE ALL WITH 2N1412A. IF Q9401 OR Q9404 IS DEFECTIVE, REPLACE BOTH WITH 2N1412A.

EL4GP526

FO-23. Power Supply Assemblies A9000 and A9400 Schematic Diagram



NOTES:

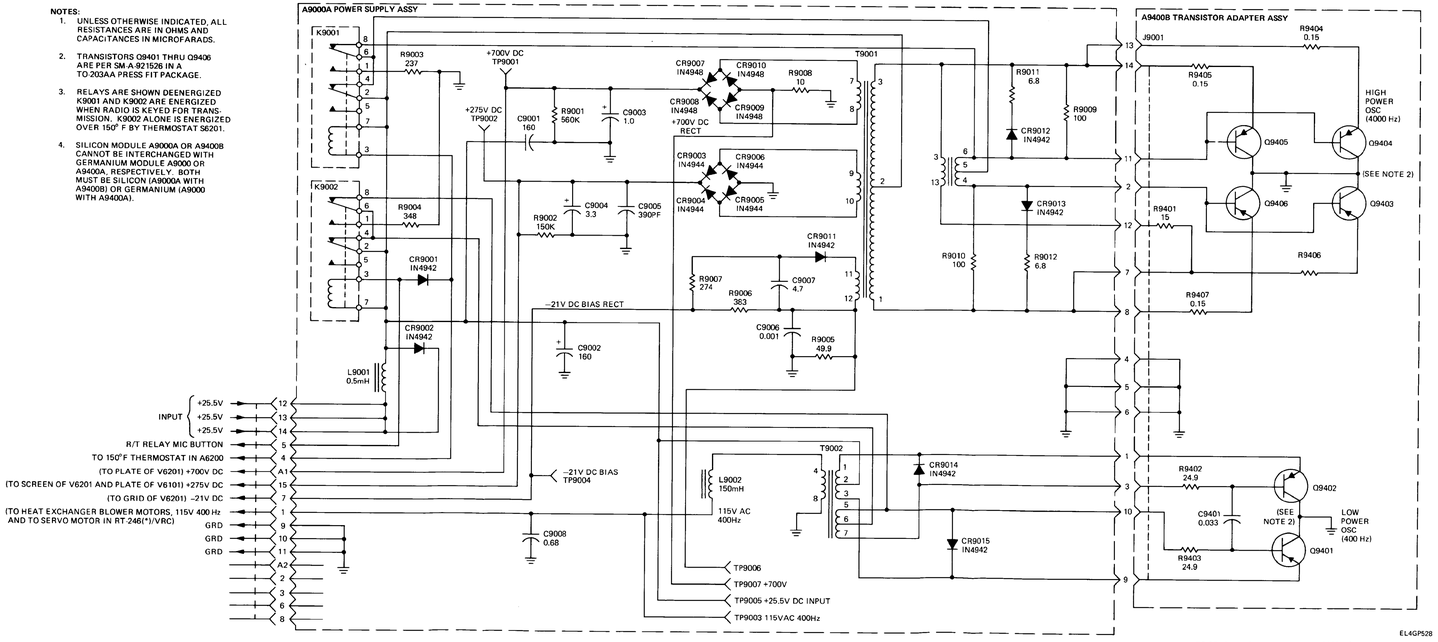
1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN PF.
2. RELAYS ARE SHOWN DEENERGIZED.
3. K9001 AND K9002 OPERATED WHEN RADIO KEYED FOR TRANSMISSION. K9002 ALONE OPERATED OVER 150° F BY THERMOSTAT S6201.
4. IN UNITS PROVIDED ON CONTRACT DAAB05-73-C-0001, AND LATER PROCUREMENTS, R9405 THRU R9408 AND C9402 ARE PROVIDED, AND THE TRANSISTORS ARE TYPE 2N1100
5. THE TYPES SHOWN FOR T9002, L9002, AND C9009 MUST BE USED IN REPLACEMENT PARTS.
6. WHEN REPLACING TRANSISTORS, USE SAME TYPE (2N1412A OR 2N1100) IN FOLLOWING PAIRS: Q9405 AND Q9406, Q9402 AND Q9403, AND Q9401 AND Q9404.

EL4GP527

FO-24. Power Supply Assemblies A9000 and A9400A (Silicon) Schematic Diagram

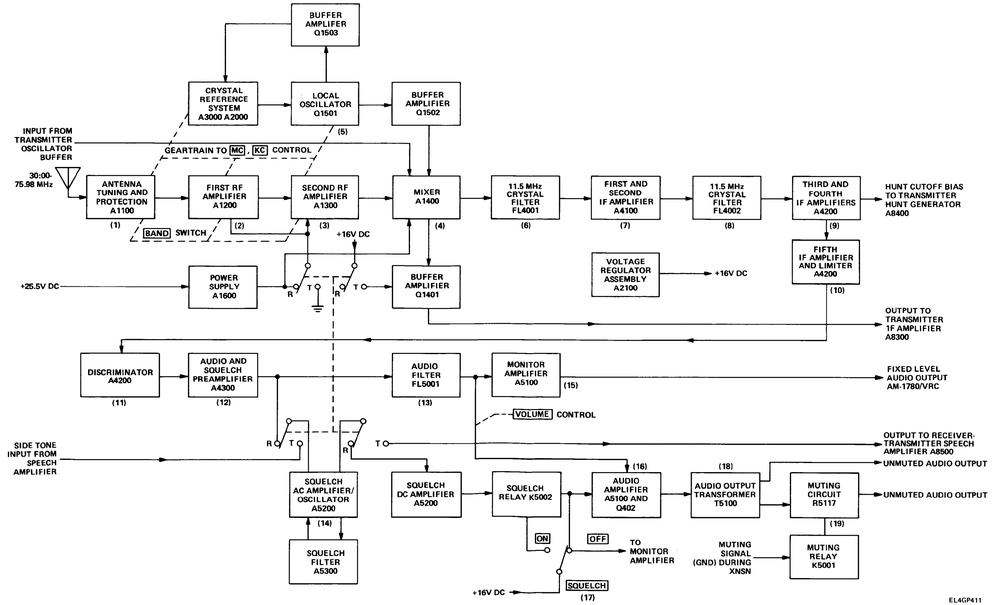
NOTES:

1. UNLESS OTHERWISE INDICATED, ALL RESISTANCES ARE IN OHMS AND CAPACITANCES IN MICROFARADS.
2. TRANSISTORS Q9401 THRU Q9406 ARE PER SM-A-921526 IN A TO-203AA PRESS FIT PACKAGE.
3. RELAYS ARE SHOWN DEENERGIZED K9001 AND K9002 ARE ENERGIZED WHEN RADIO IS KEYED FOR TRANSMISSION. K9002 ALONE IS ENERGIZED OVER 150° F BY THERMOSTAT S6201.
4. SILICON MODULE A9000A OR A9400B CANNOT BE INTERCHANGED WITH GERMANIUM MODULE A9000 OR A9400A, RESPECTIVELY. BOTH MUST BE SILICON (A9000A WITH A9400B) OR GERMANIUM (A9000 WITH A9400A).

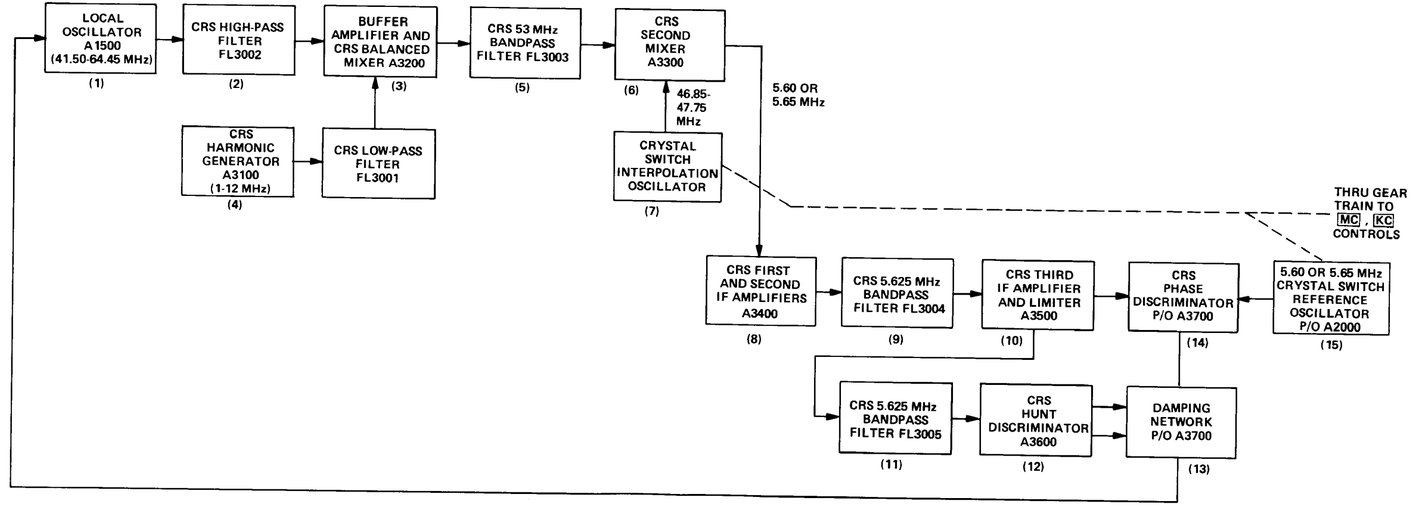


EL4GP528

FO-25. Power Supply Assemblies A9000A (Silicon) and A9400B (Silicon) Schematic Diagram

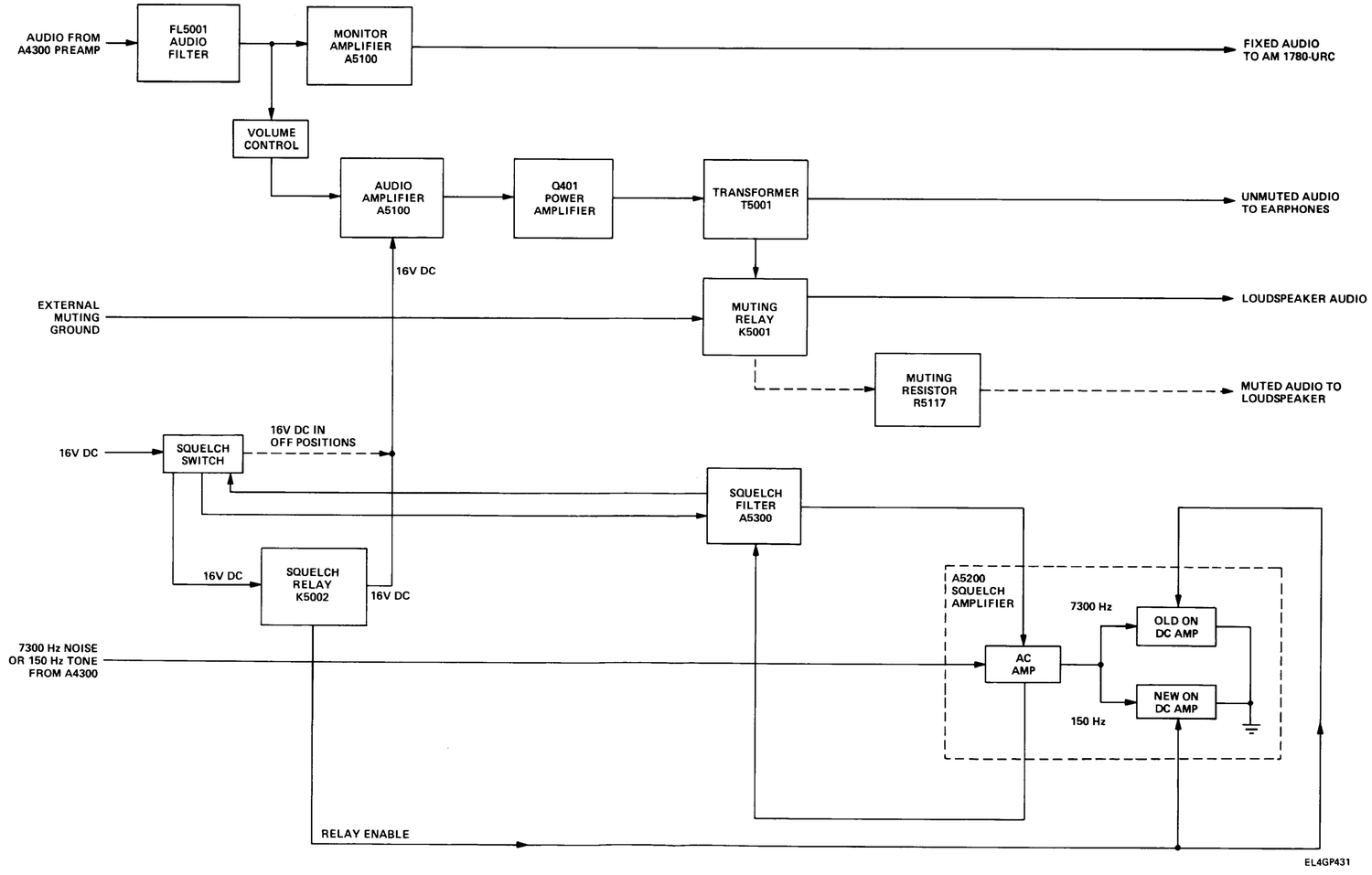


FO-26. Received Signal Path Simplified

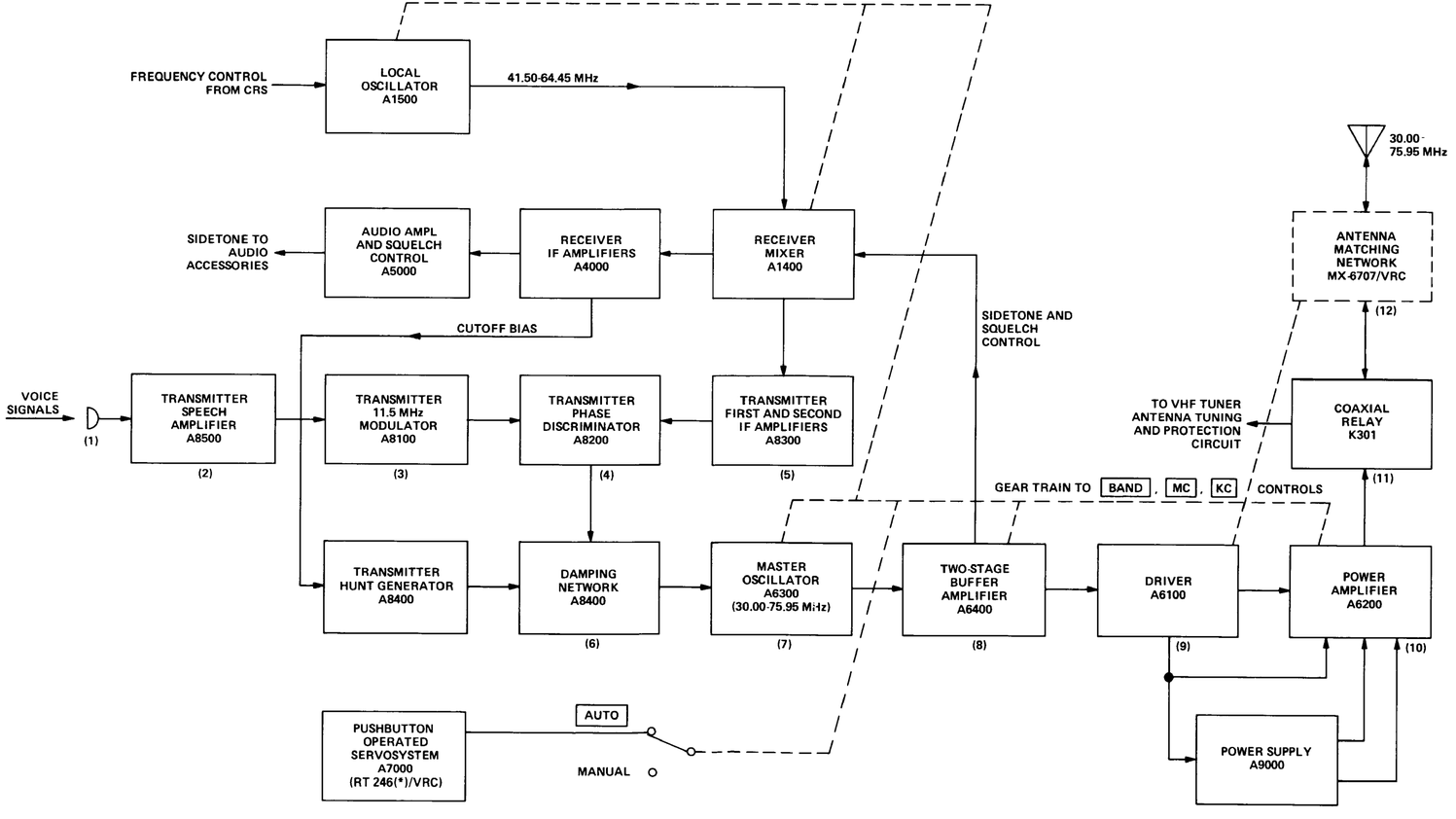


EL4GP412

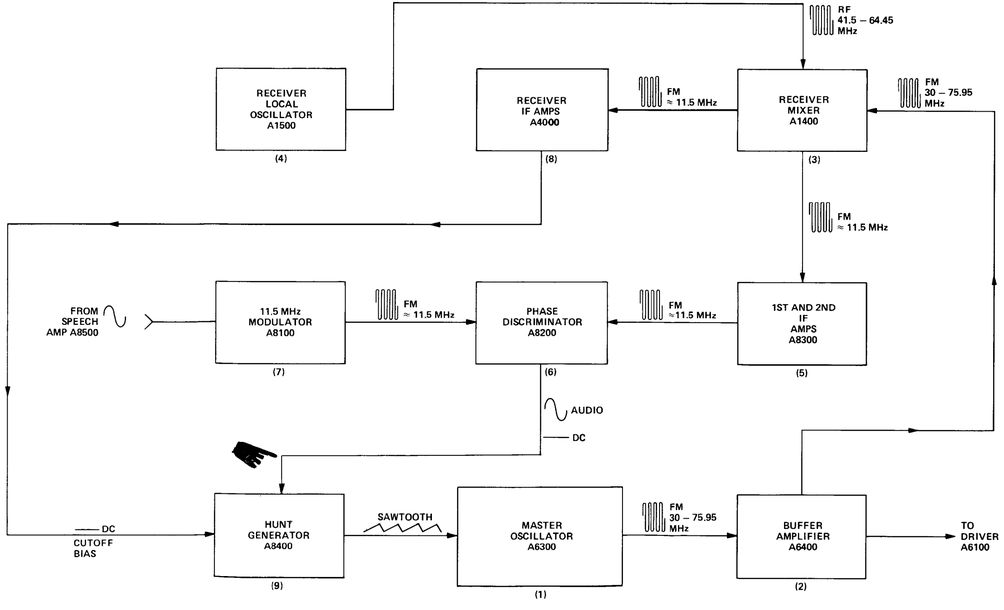
FO-27. Crystal Reference System (CRS) Functional Diagram



FO-28. Audio and Squelch Assembly A5000 Functional Diagram

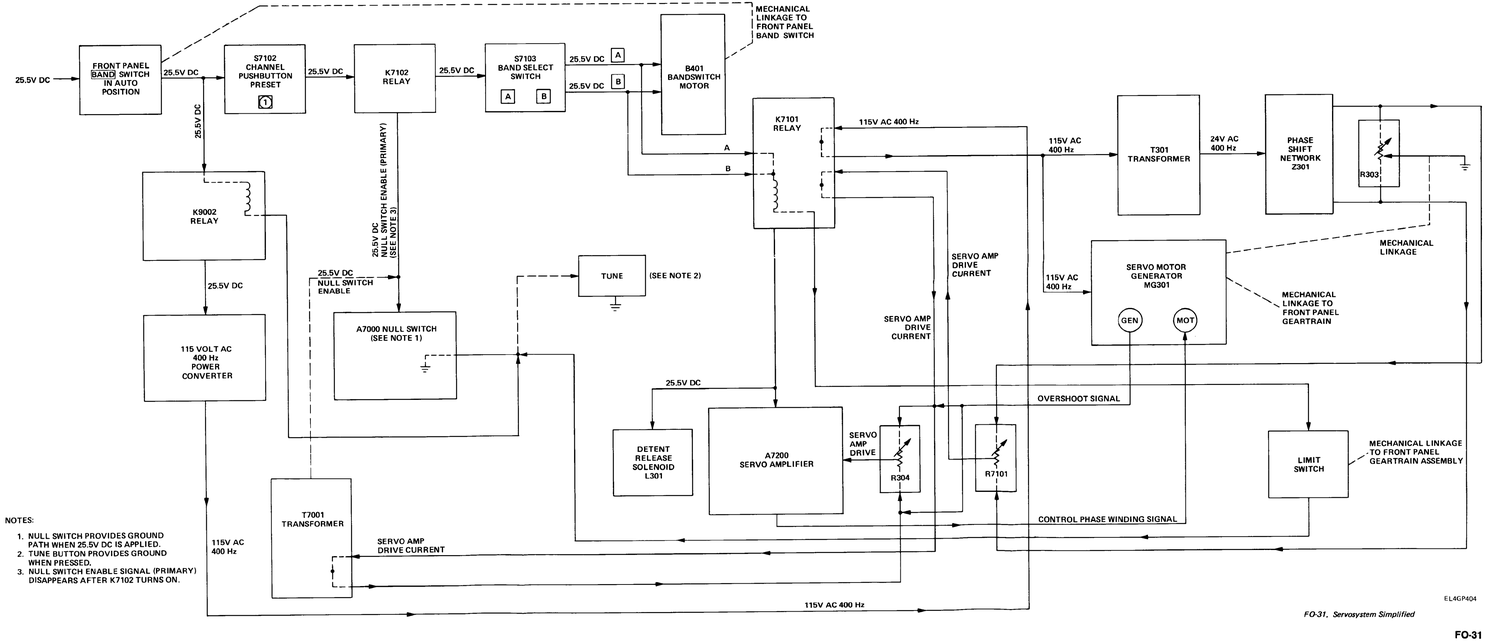


FO-29. Transmitted Signal Path Simplified

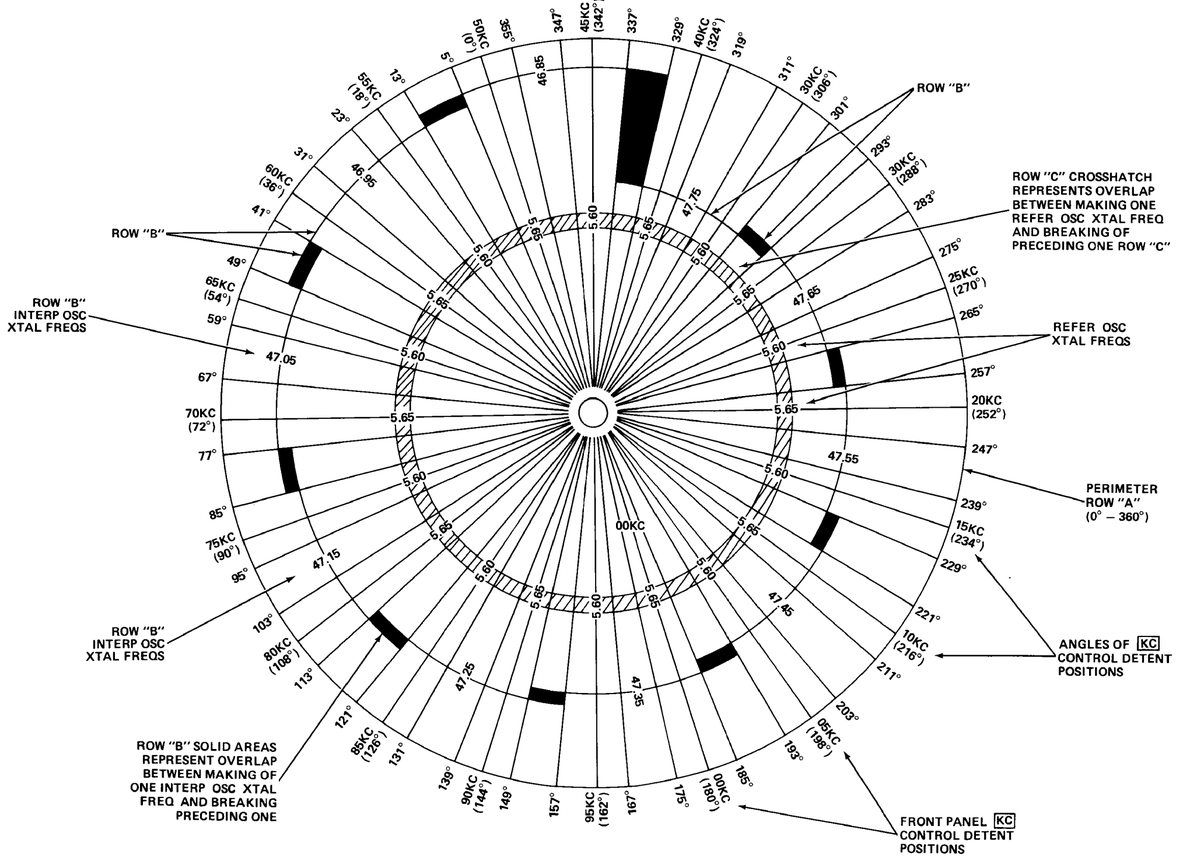


EL4GP393

FO-30. Transmitter Frequency Control Loop



FO-31, Servosystem Simplified



FO-32. Degree Wheel for Crystal Reference System (CRS) Adjustment

By Order of the Secretaries of the Army and the Navy:

JOHN A. WICKHAM JR.
General, United States Army
Chief of Staff

Official:

ROBERT M. JOYCE
Major General, United States Army
The Adjutant General

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