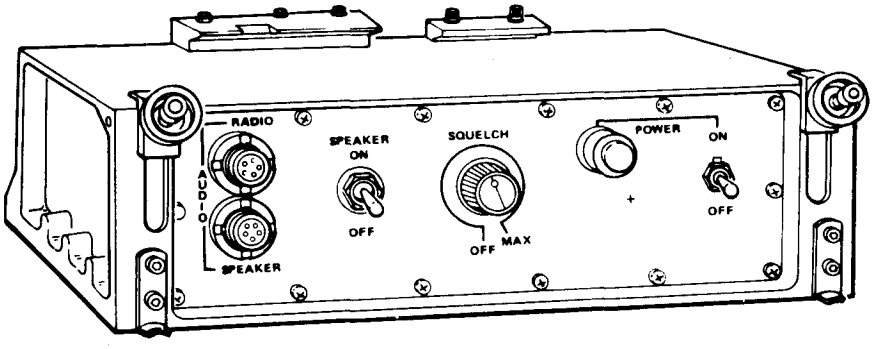
TECHNICAL MANUAL

GENERAL SUPPORT
MAINTENANCE MANUAL

AMPLIFIER-POWER SUPPLY
AM-7152/GRC-213
(NSN 5820-01-127-5855)

This copy is a reprint which includes current pages from Change 1.



HEADQUARTERS, DEPARTMENT OF THE ARMY
14 FEBRUARY 1986

Change
No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 1 November 1991

General Support Maintenance Manual

AMPLIFIER-POWER SUPPLY
AM-7152/GRC-213
(NSN 5820-01-127-5855) (EIC: N/A)

TM 11-5820-923-40, 14 February 1986, is changed as follows:

1. Title of manual is changed as shown above.

2. Remove old pages and insert new pages as indicated below. New or changed material is indicated by a vertical bar in the margin of the page. Added or revised illustrations are indicated by shading or byy miniature popinting hands adjacent to the revised pages.

Remove pages	*Insert pages*
i and ii	i and ii
1-1 through 1-9/(1-10 blank)	1-1 through 1-9/(1-10 blank)
2-1 through 2-8	2-1 through 2-8
2-11 through 2-14	2-11 through 2-14
2-17 and 2-18	2-17 and 2-18
3-1 and 3-2	3-1 and 3-2
3-7 through 3-16	3-7 through 3-16
3-95 through 3-103/(3-104 blank)	3=95 through 3-103/(3-104 blank)
A-1 and A-2	A-1 and A-2
C-1 and C-2	C-1 and C-2
Glossary 1 and Glossary 2	Glossary 1 and Glossary 2
FO-1/(FO-2 blank)	FO-1/(FO-2 blank)
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3. File this change sheet in front of the manual for reference purposes.

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:

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Administrative Assistant to the
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018866

DISTRIBUTION:

To be distributed in accordance with DA Form 12-51-E, block 0636, Direct Support/General Support Maintenance requirements for TM 11-5820-923-40.

WARNINGS AND FIRST AID DATA

WARNING

COMPRESSED AIR

When using a compressed airjet, use eyeshields.

WARNING

WORK AREA CHEMICAL AND FIRE HAZARDS

When using solvents, provide proper ventilation and avoid contact with skin. Do not smoke. Solvents must meet all specifications for flammability and allergic and poisonous effects. Make certain that maintenance work area is free from open flame and sparks.

For first aid, refer to FM 21-11.

Technical Manual

No. 11-5820-923-40

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 14 February 1986

General Support Maintenance Manual

AMPLIFIER-POWER SUPPLY
AM-7152/GRG-213
(NSN 5820-01-127-5855) (EIC: N/A)

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 2028-2 located in back of this manual direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-LM-LT, Fort Monmouth, New Jersey 07703-5007.

In either case a reply will be furnished direct to you.

HOW TO USE THIS MANUAL

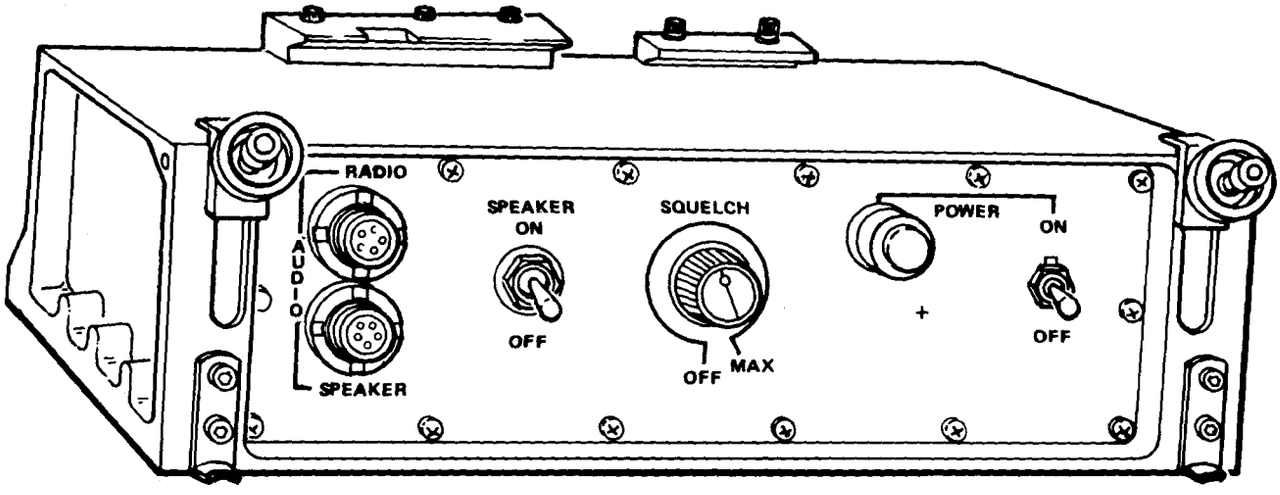
Pages are numbered consecutively within each chapter. Each page number is prefixed with the chapter number. For example, page 3 of chapter 2 is numbered 2-3. Each chapter is divided into sections. The section titles appear in the table of contents of the manual and provide an index for locating the sections in the manual. The page number at which the section starts is listed for each section title.

The first page of each section contains a section index. This index lists the paragraph titles within the section and gives the page numbers of the paragraphs. Also, an alphabetical index is provided in the back of the manual. This index contains important subject items you are likely to need.

A particular subject may be found in one of several ways. One way is to go to the table of contents. Then look for the title of the chapter and section that may cover the subject. Find the page number at which the section starts in the table of contents. Then go to the section index on that page. Find the paragraph and page number of the paragraph that may cover the subject. Another way is to scan the main paragraph titles within the section for the desired subject. Main paragraph titles are blocked. They usually appear at the top of pages to make scanning easier. A third way is to find the page number directly in the alphabetical index for a particular subject.

Main paragraph titles, including procedure titles, usually begin on a new page. Paragraphs are not numbered. Several short paragraphs or procedures may appear on the same page. When paragraphs or procedures with illustrations require more than one page, each page carries the same title in a block at the top of the page. Along with the title, the block contains the sheet number of the procedure. When the text refers you to a paragraph in another part of the manual, the reference includes the paragraph title and page number.

Where text requires supporting illustrations, the illustrations are on the same page as the text or on the facing page. The illustrations have no figure number or caption. Reference from text to an illustration is made by an item name and a key number and then the item referred to in the illustration is called out by that key number. When the text refers you to an illustration in another part of the manual, the reference also includes the page number.


RADIO
AUDIO
SPEAKER
SPEAKER
ON
OFF
SQUELCH
OFF
MAX
POWER
+
ON
OFF

CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION

SCOPE

This manual provides general support maintenance information for Amplifier-Power Supply AM-7152/GRC-213 (amplifier-power supply). The information includes principles of operation and general support maintenance instructions. In addition, a reference list, a repair parts and special tools list, an expendable/durable supplies and materials list, an illustrated list of manufactured items, a glossary, and an alphabetical index are provided. AN/PRC-104 refers to all models of the radio set unless otherwise indicated.

MAINTENANCE FORMS, RECORDS, AND REPORTS

REPORTS OF MAINTENANCE AND UNSATISFACTORY EQUIPMENT

Department of the Army forms and procedures used for equipment maintenance are be those prescribed by DA Pam 738-750 as contained in Maintenance Management Update.

REPORTING OF ITEM AND PACKAGING DISCREPANCIES

Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/SECNAVINST 4355.18/AFR 400-54/MCO 4430.3J.

TRANSPORTATION DISCREPANCY REPORT (TDR) (SF 361)

Fill out and forward TDR (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33C/AFR 75-18/MCO P4610.19/DLAR 4500.15.

CONSOLIDATED INDEX OF ARMY PUBLICATIONS AND BLANK FORMS

Refer to the latest issue of DA Pam 25-30 to determine if there are new editions, changes, or additional publications for the equipment.

DESTRUCTION OF ELECTRONICS MATERIEL

Destruction of electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

PREPARATION FOR STORAGE OR SHIPMENT

Disassembly and repacking of equipment for shipment or limited storage is covered in the Preparation for Storage or Shipment chapter in TM 11-5820-1047-12.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your equipment needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Product Quality Deficiency Report). Mail it to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-ED-PH, Fort Monmouth, New Jersey 07703–5007. We'll send you a reply.

CALIBRATION

No calibration is required.

NOMENCLATURE CROSS–REFERENCE

Common names will be used for the equipment listed in the following table throughout the rest of this manual. Refer to this table whenever official nomenclature is desired for a common name.

Common Name	Official Nomenclature
Amplifier/coupler	Amplifier, Radio Frequency AM-6874/PRC-104
Amplifier-power supply	Amplifer-Power Supply AM-7152/GRC-213
AN/GRC-213	Radio Set AN/GRC-213
AN/PRC-104	Radio Set AN/PRC-104
AN/PRC-104 power cable	Cable Assembly, Conditioned Power, 75500289019
AN/VIC-1(V)	Vehicle Intercommunication System AN/VIC-1(V)
Audio cable	Cable Assembly, Audio 75500289019
Battery power cable	Power Cable Assembly, CX-472- 10FT
Dummy load	Dummy Load 8085
Handset	Handset H-250A/U
Keying adapter	Audio Input/Keying Adapter 755002B9400
Loudspeaker	Speaker LS-454/U
Multimeter	DC Power Supply PP-2309C/U
RT	Receiver-Transmitter RT-1209A/URC
RF generator	RF Signal Generator SG-1144/U
Wattmeter	Test Set, Radio Frequency Power AN/USM-298

Section II. EQUIPMENT DESCRIPTION AND DATA

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

The amplifier-power supply, together with cables, provides connection and isolation between the HF SSB AN/PRC-104, loudspeaker, and, when available, the AN/VIC-1(V) and VHF FM radio set. The amplifier-power supply connection to the AN/VIC-1(V) and VHF FM radio set, when available, allows automatic retransmission. The automatic retransmission capability allows a remote HF SSB radio set or sets to transmit signals to and receive signals from remote VHF FM radio set or sets by way of the AN/GRC-213, VHF FM radio, and the AN/VIC-1(V).

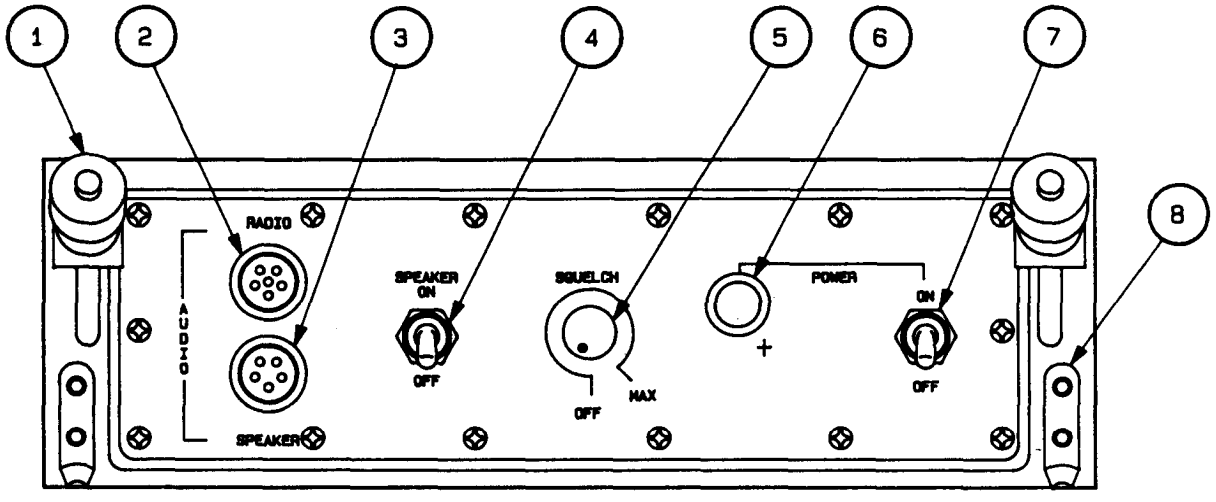
Automatic retransmission is performed by reception and change of signals transmitted by a remote HF SSB radio into signals transmitted from the vehicle for reception by a remote VHF FM radio; or by reception and change of signals transmitted by a remote VHF FM radio into signals transmitted from the vehicle for reception by a remote HF SSB radio.

Transmission and reception on vhf is often over much shorter distances than on hf due to scatter and reflection of the vhf radio waves. HF radio waves are affected less than vhf radio waves by scatter and reflection. The retransmission capability near a net of VHF FM radio sets, then, allows the net to operate at an increased distance from an HF SSB radio at a command communications center.

The amplifier-power supply also provides power for circuits within its housing and the AN/PRC-104. The amplifier-power supply receives input power from the vehicle power source. The amplifier-power supply fully conditions and filters the power. This protects the input power to the AN/PRC-104 from high voltage, low voltage, noise spikes, radio-frequency interference (rfi), and reverse connection. The conditioned and filtered power is sent to the amplifier/coupler of the AN/PRC-104. Power is sent from the amplifier/coupler to the RT.

The amplifier-power supply contains an audio amplifier for driving a separate loudspeaker with one watt of audio power. Squelch circuitry is also provided for loudspeaker or handset audio.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (1 of 3)



FRONT VIEW

1 **FASTENER** - Engages lip below front panel of AN/PRC-104, securing it to top of amplifier-power supply.

2 **RADIO AUDIO CONNECTOR** - Connects signals other than power between the amplifier-power supply and AN/PRC-104.

3 **SPEAKER AUDIO CONNECTOR** - Connects amplifier-power supply to loudspeaker (or handset).

4 **SPEAKER SWITCH S1** - Turns loudspeaker audio on or off.

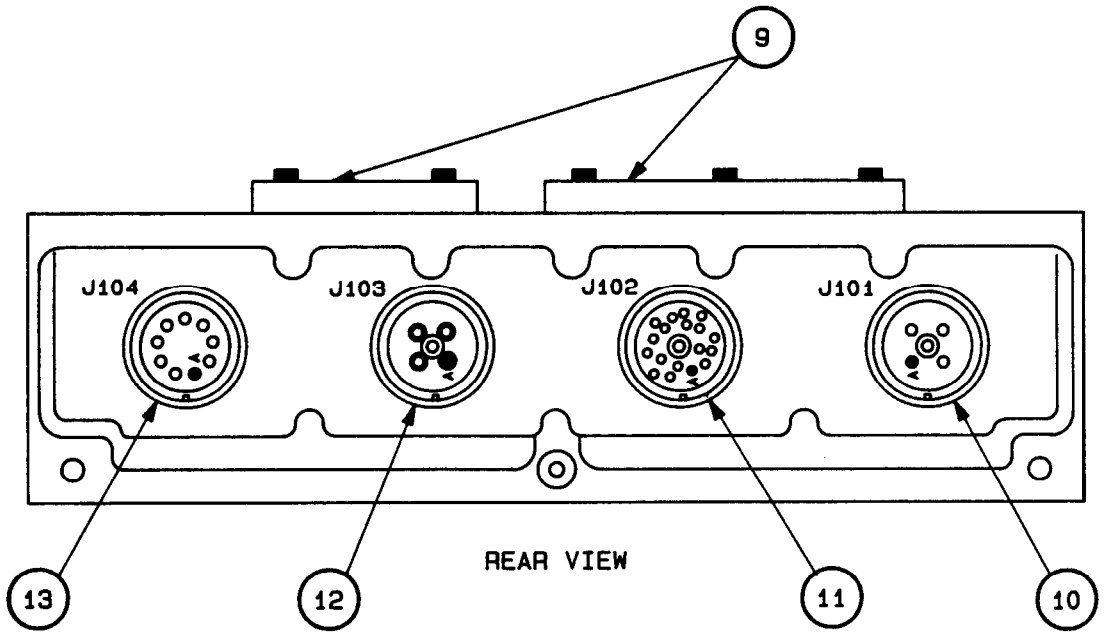
5 **SQUELCH CONTROL RS1** - Turns squelch on or off and sets level at which loudspeaker audio will be squelched or unsquelched.

6 **POWER SWITCHLIGHT XDS1/DS1** - Indicates conditioned power is present when indicator is lit (lens rotated counterclockwise brightens light; lens pressed fully brightens light).

7 **POWER CIRCUIT BREAKER CB1** - Turns power on or off and protects amplifier-power supply and AN/PRC-104 from high current conditions.

8 **HOOK** - Is engaged by fastener on front of electrical equipment mount.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (2 of 3)



9 RETAINER CLEATS - Engages with back of AN/PRC-104, securing it to top of amplifier-power supply.

10 J101 (POWER INPUT CONNECTOR) - Connects amplifier-power supply to vehicle power source.

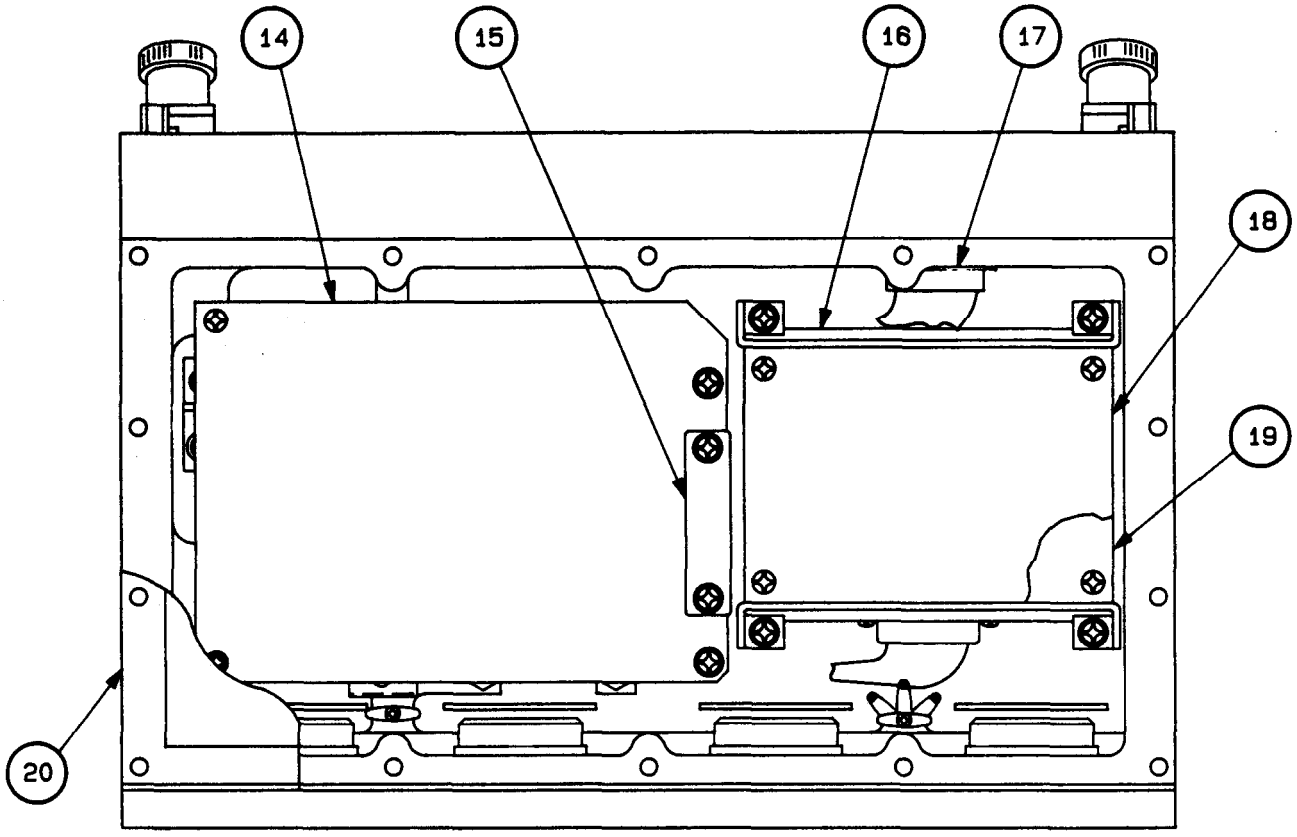
11 J102 (VIC-1 RETRANSMIT CONNECTOR) - Connects amplifier-power supply to AN/VIC-1(V).

12 J103 (EXTERNAL POWER CONNECTOR) - Connects another AN/GRC-213 in parallel with amplifier-power supply input power.

13 J104 (RADIO POWER CONNECTOR) - Connects conditioned power from amplifier-power supply to AN/PRC-104 input power connector.

14 AMPLIFIER-SQUELCH CARD A2 - Disables loudspeaker during transmit operation; provides squelching of received signal audio to handset; and provides one watt of audio amplification of squelched receive signal audio to drive the loudspeaker. Also uses input power to develop dc voltages to power internal circuitry of the amplifier-power supply.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (3 of 3)



BOTTOM VIEW

15 CARD EXTRACTOR - Is used to remove amplifier-squelch card from amplifier-power supply.

16 CARD CAGE ASSEMBLY - Contains vehicular intercommunication interface card A3 and power conditioner card A1.

17 J4 - Provides electrical connection to all control panel parts.

18 VEHICULAR INTERCOMMUNICATION INTERFACE CARD A3 - Is part of and mounts on the card cage assembly. Provides receive and sidetone audio to the AN/VIC-1(V) and reduced level transmit audio to the AN/PRC-104. This card also provides for retransmit operation.

19 POWER CONDITIONER CARD A1 - Is part of and mounts on the card cage assembly. This card, together with chassis mounted components, conditions the input voltage from the vehicle to provide power to internal amplifier-power supply circuits and to the AN/PRC-104.

20 COVER - Provides access to parts inside the housing by removal from bottom of amplifier-power supply.

DIFFERENCES BETWEEN MODELS

Only one model of the amplifier-power supply is available. There are no differences between amplifier-power supplies.

AMPLIFIER-POWER SUPPLY DATA

Refer to TM 11-5820-1047-12 for amplifier-power supply data used by the operator and organizational maintenance personnel.

Power protection	Reverse connection and short circuit
Conditioned current	5.5 amps maximum
Auxiliary current	10 amps maximum
Conditioned voltage	22 V dc minimum, with 26.5 V dc nominal input
Audio input power	2 mW minimum from RT-1209/URC into 500 ohms
Audio output power	1 W (300 to 3000 Hz) into 600 ohms, harmonic distortion 10% maximum
Unmuted audio output power	100 mW into 600 ohms
Monitor amplifier audio output power	0.16 V rms into 150 ohms
Audio frequency response	300 to 3000 Hz 3 dB (1W)
Audio output muting (squelched)	30 dB minimum
Squelch	
Sensitivity	Adjustable for 10 to 20 dB SINAD
Attack Time	30ms maximum
Release time	300 µs minimum
Hysteresis	After unsquelching, the unsquelched condition is maintained for up to 2-dB reduction in signal.

EQUIPMENT CONFIGURATION

There are no variations in the configuration of the amplifier-power supply.

SAFETY, CARE, AND HANDLING

There are no safety, care, and handling instructions for the amplifier-power supply other than the warnings, cautions, and notes in the maintenance instructions.

CHAPTER 2

THEORY OF OPERATION

Section I. AMPLIFIER-POWER SUPPLY GENERAL FUNCTIONAL DESCRIPTION

GENERAL FUNCTIONAL DESCRIPTION (1 of 4) (SEE DIAGRAM, PG FO-1)

The amplifier-power supply, together with cables, provides connection and isolation between the HF SSB AN/PRC-104, loudspeaker, and, when available, the AN/VIC-1(V) and VHF FM radio set. The amplifier-power supply also provides the following: squelch control; power conditioning; emi and rfi filtering; retransmit operation; protection from high voltage, low voltage, noise spikes, and reverse connection; and audio output for the loudspeaker. The amplifier-power supply contains the following cards, housing parts, and control panel A9 parts:

- emi filter cards: power input connector card A5, radio power connector card A7, external power connector card A6, VIC-1/retransmit connector card A8
- power conditioner card A1
- amplifier-squelch card A2
- vehicular intercommunication interface card A3
- housing components: pass transistor network Q1, C1, and C2; transorb Z1; and audio matching transformer T1
- control panel A9 components: POWER circuit breaker CB1, SQUELCH control RS1, SPEAKER switch S1, POWER switchlight XDS1/DS1, and audio filter circuit card A4.

The emi filter cards protect the power input lines, power output lines, and all interface lines from noise spikes and rfi. The cards have associated rear connectors J101 for A5, J104 for A7, J103 for A6, and J102 for A8.

GENERAL FUNCTIONAL DESCRIPTION (2 of 4) (SEE DIAGRAM, PG FO-1)

A **POWER INPUT CONNECTOR CARD A5.** Power input connector card A5 is an emi filter card. The card protects the + BATTERY input voltage from noise spikes and rfi before it is routed to internal amplifier-power supply circuitry and the parallel connected AN/GRC-213. The card has an associated connector J101 mounted on the rear of the housing.

B **POWER CIRCUIT BREAKER CB1.** POWER circuit breaker CB1 controls the + BATTERY input voltage and is mounted on control panel A9. Circuit breaker CB1, along with transorb Z1 and power conditioner card A1, functions to protect the amplifier-power supply and the AN/GRC-213 from reverse–connected + BATTERY voltage and overload or a short circuit in the + CONDITIONED POWER connected to the amplifier/coupler at J104 of radio power connector card A7.

C **PASS TRANSISTOR NETWORK Q1, C1, C2.** The pass transistor network parts are mounted on-the housing. The network works with power conditioner card A1 to condition the + BATTERY input voltage to provide + CONDITIONED POWER to internal amplifier-power supply circuits and the amplifier/coupler.

D **TRANSORB Z1.** Transorb Z1 is a part mounted on the housing. It provides high voltage protection for the + BATTERY voltage. It will permanently short if high voltage persists.

E **POWER CONDITIONER CARD A1.** Power conditioner card A1 is part of and is mounted on the card cage assembly. The card, together with the pass transistor network, conditions the + BATTERY input voltage to provide + CONDITIONED POWER output to internal amplifier-power supply circuits and the amplifier/coupler.

F **RADIO POWER CONNECTOR CARD A7.** Radio power connector card A7 is an emi filter card. The card protects the + CONDITIONED POWER from noise spikes and rfi, before routing it to the amplifier/coupler. The card has an associated connector J104 mounted on the rear of the housing.

G **POWER SWITCHLIGHT XDS1/DS1.** POWER switchlight XDS1/DS1 is mounted on control panel A9. It provides a visible indication that + CONDITIONED POWER is present.

H **SQUELCH CONTROL RS1.** SQUELCH control RS1 is mounted on control panel A9. It provides on/off switching of the SQUELCH ENABLE and RETRANSMIT ENABLE signals to +12 V dc. The same control also provides squelch threshold adjustment by picking off part of the SQUELCH CCW signal as the SQUELCH WIPER and SQUELCH CW signals.

GENERAL FUNCTIONAL DESCRIPTION (3 of 4) (SEE DIAGRAM, PG FO-1)

I **AMPLIFIER-SQUELCH CARD A2.** Amplifier-squelch card A2 is mounted directly on the amplifier-power supply housing. Amplifier-squelch card A2 uses circuits that detect the signal characteristics of the voice. A voice signal in the RCV/SIDESTONE AUDIO input will turn on circuits that compare the voice signal with a preset signal-to-noise ratio. The result of comparing is then used to squelch or unsquelch the received audio signal. The level or amount of noise needed to squelch the received audio signal varies and is controlled by SQUELCH control RS1. A 1 watt squelched AMPLIFIED RCV AUDIO output signal is developed to drive the loudspeaker. SQUELCHED AUDIO is provided for the input to the earpiece in a handset connected to the amplifier-power supply and the vehicular intercommunication interface card A3. An internal power supply develops +12 V dc for use by the A3 card and SQUELCH control RS1. During transmit operation amplifier-squelch card A2 mutes the loudspeaker. A sidetone can be heard in the headset during transmit operation.

J **SPEAKER SWITCH S1.** SPEAKER switch S1 is mounted on control panel A9. It provides control of the loudspeaker by turning the 1 watt AMPLIFIED RCV AUDIO signal from amplifier-squelch card A2 (which drives the loudspeaker) on or off, as desired.

K **AUDIO MATCHING TRANSFORMER T1.** Transformer T1 is a part mounted on the housing. It matches the 8-ohm AMPLIFIED RCV AUDIO output source impedance of amplifier-squelch card A2 to the 600-ohm load impedance of the loudspeaker. SPEAKER RTN is the return for this audio signal.

L **AUDIO FILTER CIRCUIT CARD A4.** Audio filter circuit card A4 is mounted on the control panel. It is a low-pass L-C filter circuit used to protect the audio signals (SQUELCHED AUDIO, XMT AUDIO), PTT (push-to-taik), and KY65 KEYLINE signals routed between the RT, loudspeaker, handset, amplifier–power supply, and the AN/VIC-1(V) from rfi, noise, and fast, high level power increases. The AMPLIFIED RCV AUDIO signal from the audio matching transformer is routed straight through the A4 card to the loudspeaker, without filtering. The RCV/SIDETONE AUDIO signal from the RT is routed through the A4 card, without filtering, to vehicular intercommunication interface card A3. Audio filter circuit card A4 is attached directly to the rear of connectors A4J2 and A4J1 of the amplifier- power supply control panel. SPEAKER RTN/MIC SHIELD is the return for the loudspeaker and handset.

M **VEHICULAR INTERCOMMUNICATION INTERFACE CARD A3.** Vehicular intercommunication interface card A3 is part of and is mounted on the card cage assembly. The card provides receive and sidetone audio to the AN/VIC-1(V) as UNMUTED AUDIO and MONITOR AMP signals. The card provides reduced level XMT AUDIO from the AN/VIC-1(V) AMPLIFIED XMT AUDIO to the RT by way of audio filter circuit card A4. The SQUELCH SENSE and RETRANSMIT ENABLE input signals, when present, provide the RETRANSMIT output signal. The RETRANSMIT signal is used by vehicular intercommunication interface card A3 to provide retransmit operation of the HF SSB AN/GRC-213. The PTT signal from the AN/VIC-1(V) is similarly used by the A3 card to provide retransmit operation of the VHF FM radio set. A PTT signal from the AN/VIC-1(V) or the handset will cause a MOMENTARY SQUELCH DISABLE signal to be routed to amplifier-squelch card A2.

GENERAL FUNCTIONAL DESCRIPTION (4 of 4) (SEE DIAGRAM, PG FO-1)

N **EXTERNAL POWER CONNECTOR CARD A6.** External power connector card A6 is an emi filter card. The card protects the + BATTERY (EXT PWR) voltage to the parallel connected AN/GRC-213, if used, from noise spikes and rfi. The card has an associated connector J103 mounted on the rear of the housing.

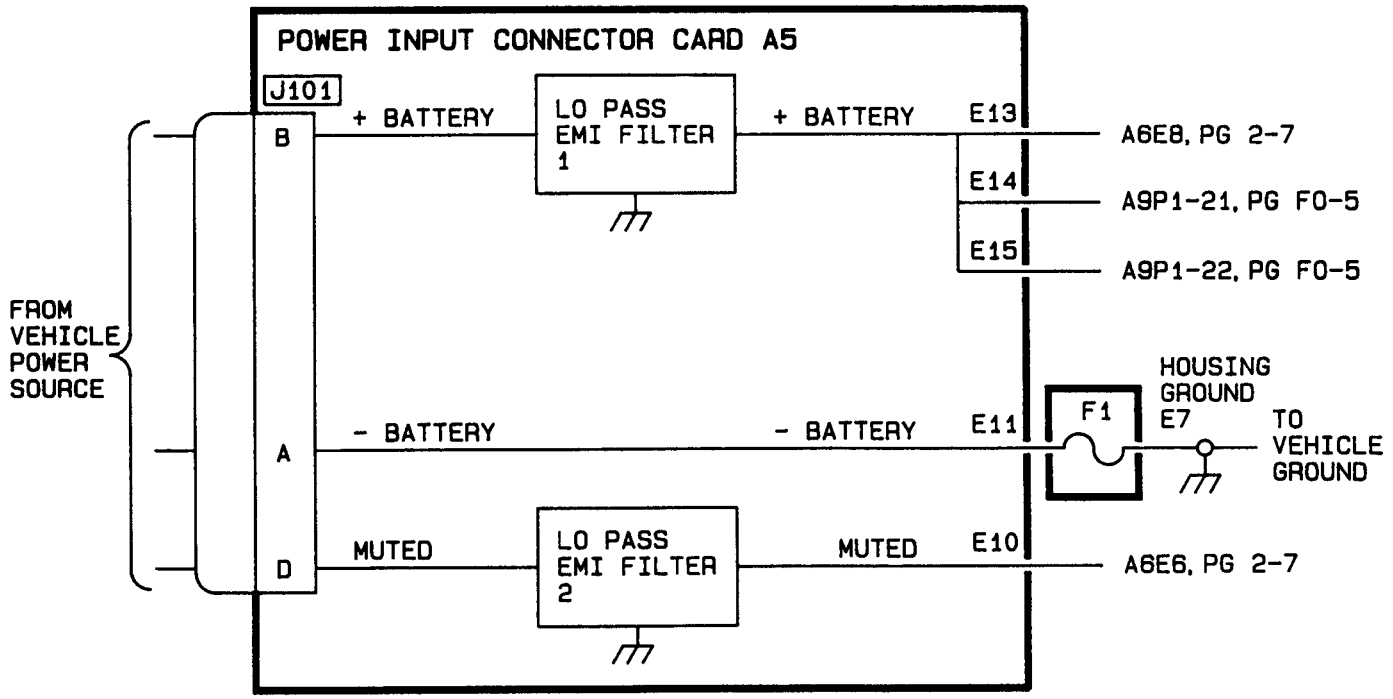
O **VC-1/Retransmit CONNECTOR CARD A8.** VIC-1/retransmit connector card A8 is an emi filter card. The card protects the VIC-1 interface from noise spikes and rfi. UNMUTED AUDIO, MONITOR AMP, and RETRANSMIT signals are routed from vehicular intercommunication interface card A3 through the A8 card to the AN/VIC-1(V). PTT and AMPLIFIED XMT AUDIO signals are routed from the AN/VIC-1(V) through the A8 card to the A3 card. The A8 card has an associated connector J102 mounted on the rear of the housing.

Section II. AMPLIFIER-POWER SUPPLY DETAILED FUNCTIONAL DESCRIPTION

DETAILED FUNCTIONAL DESCRIPTION (1 of 14)

POWER INPUT CONNECTOR CARD A5 AND FUSE F1 (SEE DIAGRAM, PG 2-5)

+ BATTERY VOLTAGE. When the amplifier-power supply is installed in a vehicle, the positive voltage of the vehicle battery is routed to power input connector J101 as + BATTERY. The nominal voltage available from the vehicle battery is +26.5 V dc. Lo pass emi filter 1 removes any transients and radio frequency interference (rfi) present. After filtering, the + BATTERY input is routed from parallel lines at E14 and E15 to POWER circuit breaker CB1 on control panel A9, and from E13 to external power connector card A6.



DETAILED FUNCTIONAL DESCRIPTION (2 of 14)

POWER INPUT CONNECTOR CARD A5 AND FUSE F1 (SEE DIAGRAM, PG 2-5) (cont)

- BATTERY GROUND. The negative voltage of the vehicle battery, which is at vehicle ground potential, is routed through the battery power cable to J101 as - BATTERY. This ground is routed through fuse F1 to amplifier-power supply housing ground E7. The amplifier-power supply housing is grounded to the vehicle through an external ground jumper on the back of the unit. Another parallel ground path, the primary path, exists between the negative terminal of the vehicle battery directly through its ground cable to the vehicle. Therefore, when the battery power cable to J101 is properly connected to the vehicle battery, very little current is routed through fuse F1. Instead, most of the current is routed through the primary ground path and the external ground jumper on the back of the unit. However, if the wires of the battery power cable connected to J101 are accidently connected in reverse to the vehicle battery, but the vehicle battery is still properly installed, - BATTERY will be at the potential of the positive vehicle battery voltage and will short to vehicle ground through fuse F1, causing fuse F1 to blow. This will protect the amplifier-power supply and AN/GRC-213 from damage due to reverse connection.

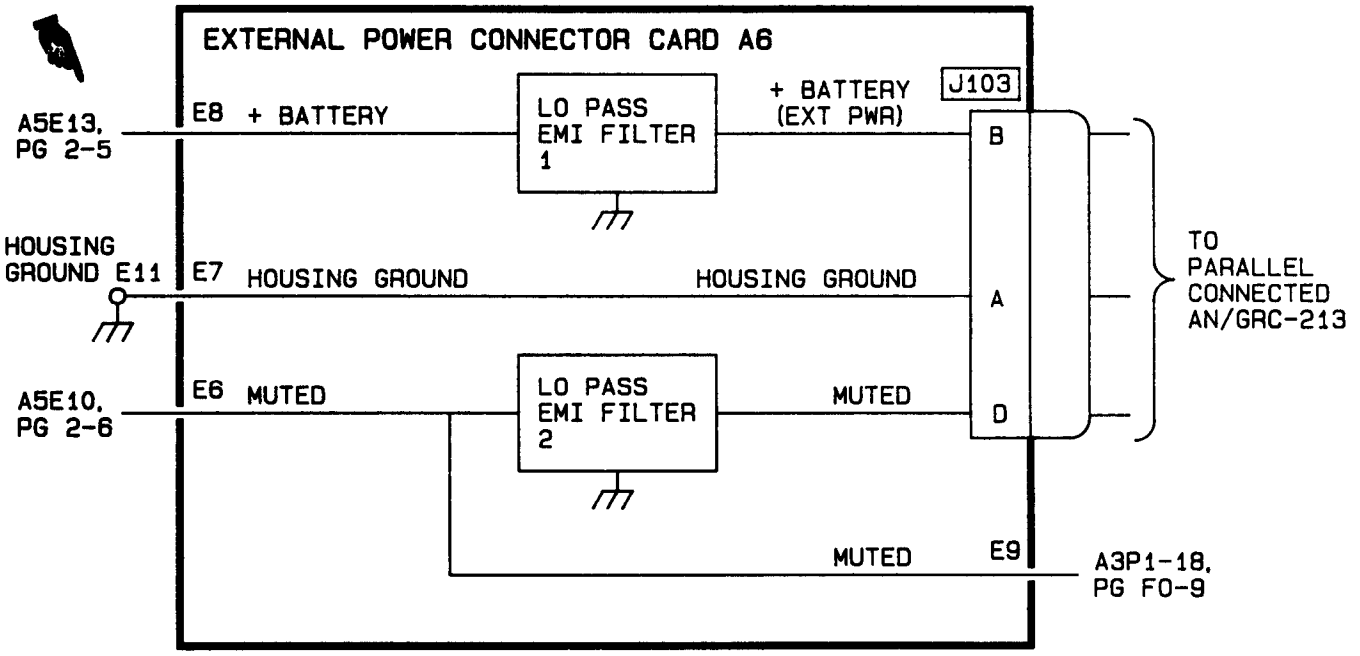
MUTED SIGNAL. In normal installations in a vehicle, the amplifier-power supply receives vehicle power directly from the vehicle battery. In this type of installation, no MUTED input is available at J101. The MUTED input is only available when the AN/GRC-213 is connected to receive vehicle power from the auxiliary power connector on a VHF radio set installed in the vehicle. When the VHF radio set transmits, a grounded MUTED input will then be routed from the VHF radio set to lo pass emi filter 2. Emi filter 2 removes any transients and rfi present. After filtering, the MUTED signal is routed to external power connector card A6, where it disables the audio to the loudspeaker of the parallel connected second AN/GRC-213, if used. From card A6 it is routed to the vehicular intercommunication interface card A3, where it is used to disable the audio to the loudspeaker of the AN/GRC-213.

DETAILED FUNCTIONAL DESCRIPTION (3 of 14)

EXTERNAL POWER CONNECTOR CARD A6 (SEE DIAGRAM, PG 2-7)

+ BATTERY VOLTAGE. The + BATTERY voltage from the power input connector card A5 is routed to lo pass emi filter 1, where any transients and rfi present are filtered. After filtering, + BATTERY (EXT PWR) is routed to a parallel connected second AN/GRC-213, if used, as its power input source. HOUSING GROUND is routed with + BATTERY (EXT PWR) as its return.

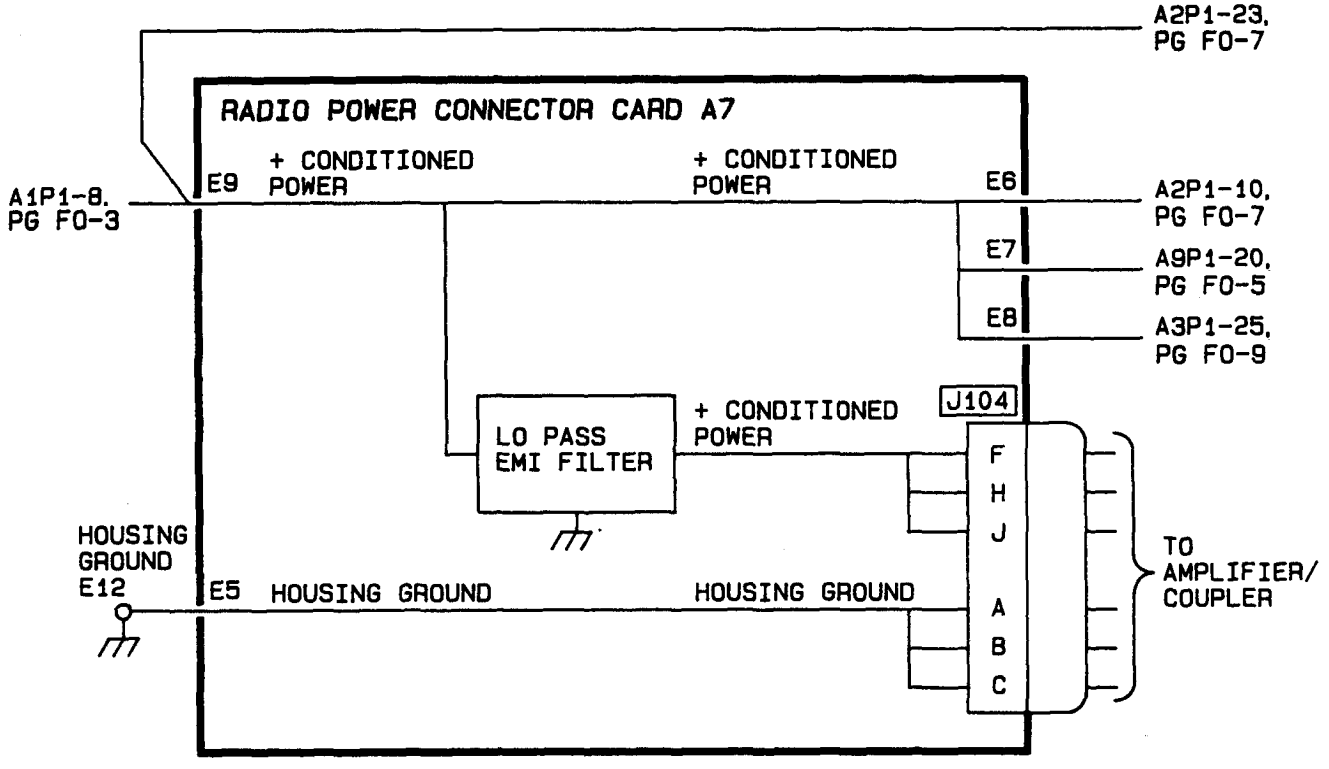
MUTED SIGNAL. The MUTED input, when present (refer to MUTED Signal description on page 2-6), is routed to lo pass emi filter 2 and vehicular intercommunication interface card A3. Emi filter 2 removes any transients and rfi present. After filtering, the MUTED signal is routed to the parallel connected second AN/GRC-213, if used, where it disables the audio to its loudspeaker. When the MUTED signal is routed to card A3, it is used to disable the audio to the loudspeaker of the AN/GRC-213.



DETAILED FUNCTIONAL DESCRIPTION (4 of 14)

RADIO POWER CONNECTOR CARD A7 (SEE DIAGRAM, PG 2-8)

+ CONDITIONED POWER. + CONDITIONED POWER from power conditioner card A1 is routed as the power input to amplifier-squelch card A2, control panel A9, vehicular intercommunication interface card A3, and the lo pass emi filter. The lo pass emi filter removes any transients and rfi present before + CONDITIONED POWER is routed to the amplifier/coupler in the AN/PRC-104. HOUSING GROUND is routed with + CONDITIONED POWER as its return.



DETAILED FUNCTIONAL DESCRIPTION (5 of 14)

VIC-1/RETRANSMIT CONNECTOR CARD A8 (SEE DIAGRAM, PG 2-10)

UNMUTED AUDIO SIGNAL. The UNMUTED AUDIO signal from the vehicular intercommunication interface card A3 is routed to lo pass emi filter 1, where any transients and rfi present are filtered. After filtering, the UNMUTED AUDIO signal is routed to the AN/VIC-1(V) system, if used, as the VHF XMT AUDIO modulating signal for the VHF FM radio set during retransmit operation.

MONITOR AMP SIGNAL. The MONITOR AMP signal from the vehicular intercommunication interface card A3 is routed to lo pass emi filter 2, where any transients and rfi present are filtered. After filtering, the MONITOR AMP signal is routed to the remote handset in the AN/VIC-1(V) system, if used, as the SIDETONE AUDIO signal during transmit operation, and as the RCV AUDIO signal during receive operation.

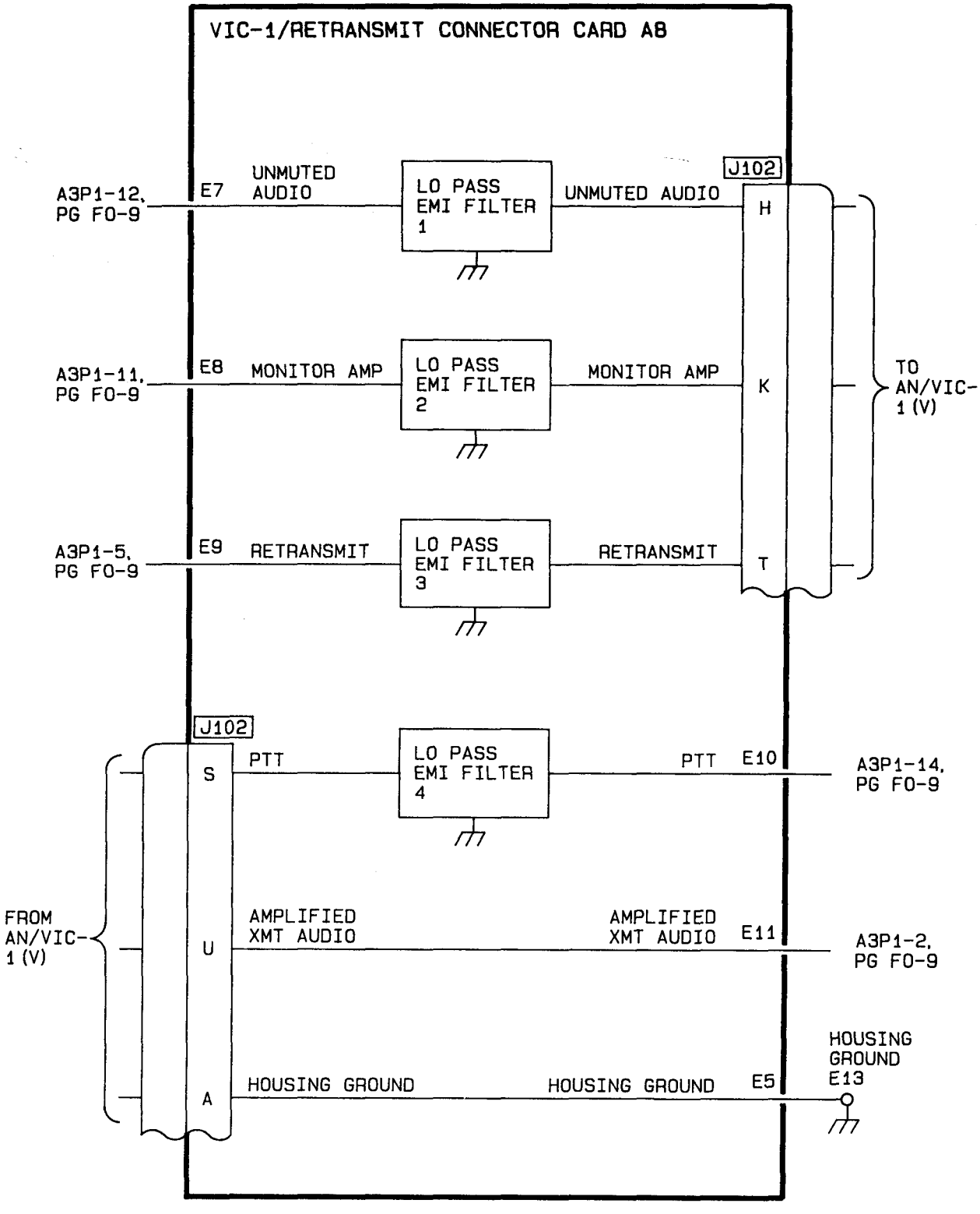
RETRANSMIT SIGNAL. The RETRANSMIT signal from the vehicular intercommunication interface card A3 is routed to lo pass emi filter 3, where any transients and rfi present are filtered. After filtering, the RETRANSMIT signal is routed to the AN/VIC-1(V) system, if used, as the VHF PTT signal. There the VHF PTT signal initiates the retransmit operation of the VHF FM radio set.

PTT SIGNAL. When the AN/VIC-1(V) system is used for AN/GRC-213 remote handset operation and the PTT switch on the remote handset in the AN/VIC-1(V) system is pressed, a ground potential PTT signal is routed through the AN/VIC-1(V) system to emi filter 4. When the AN/VIC-1(V) system is used for retransmission of VHF FM signals by the AN/GRC-213, a ground potential VHF RETRANSMIT signal is routed through the AN/VIC-1(V) system as the PTT signal to emi filter 4. Emi filter 4 removes any transients and rfi present. After filtering, the PTT signal is routed to vehicular intercommunication interface card A3, where it disables the RETRANSMIT signal and is further routed to the amplifier-squelch card A2 and control panel A9.

AMPLIFIED XMT AUDIO SIGNAL. When the AN/VIC-1(V) system is used for AN/GRC-213 remote handset operation, the remote handset in the AN/VIC-1(V) system routes an XMT AUDIO signal from the AN/VIC-1(V) system to VIC-1/retransmit connector card A8 as the AMPLIFIED XMT AUDIO signal. When the AN/VIC-1(V) system is used for retransmission of VHF FM signals by the AN/GRC-213, the VHF FM radio routes a VHF AMPLIFIED UNMUTED AUDIO signal through the AN/VIC-1 (V) system to VIC-1/retransmit connector card A8 as the AMPLIFIED XMT AUDIO signal. The AMPLIFIED XMT AUDIO signal is then routed to the vehicular intercommunication interface card A3, where it is attenuated and becomes the XMT AUDIO modulating signal for the AN/GRC-213 during retransmit operation.

HOUSING GROUND. HOUSING GROUND is routed with all of the above voltages and signals as their return.

DETAILED FUNCTIONAL DESCRIPTION (6 of 14)



DETAILED FUNCTIONAL DESCRIPTION (7 of 14)

TRANSORB Z1, POWER CONDITIONER CARD A1, AND PASS TRANSISTOR NETWORK Q1, C1, C2 (SEE DIAGRAM, PG F0-3)

OVERVOLTAGE PROTECTION (TRANSORB Z1). Under normal operating conditions, transorb Z1 acts like a Zener diode to provide overvoltage protection by absorbing overvoltage transients in the + BATTERY input of up to 48 to 50 V dc, or higher voltage transients that last 100 microseconds or less, without being damaged. If the overvoltage or transients increase to 51 V dc or more for longer than 100 microseconds, Z1 will permanently short, causing the current to increase through POWER circuit breaker CB1 on control panel A9. The increased current through CB1 will cause it to open, removing the + BATTERY input from power conditioner card A1 and pass transistor Q1. The + CONDITIONED POWER output from Q1 is thereby shut off.

CONDITIONING FOR LOAD VARIATIONS (POWER CONDITIONER CARD A1 AND PASS TRANSISTOR NETWORK Q1, C1, C2). Transistor Q1 receives the + BATTERY input and furnishes the + CONDITIONED POWER output to radio power connector card A7. Capacitors C1 and C2 of the pass transistor network bypass any noise, rfi, or audio appearing at the base and emitter of Q1 to the housing ground. An increased load current flowing to the A7 card, (for example, when the AN/PRC–104A is transmitting) will temporarily lower the voltage of the + CONDITIONED POWER output. This lower output voltage is routed through the lo pass emi filter in power conditioner card A1 for removing rfi and noise. It is then applied to the inverting input of the voltage comparator from the voltage divider/regulator R3, R4, VR2. Zener diode VR2 series-regulates the voltage at the junction of R4 and R5 to 4.3 V dc. Therefore, the lower output voltage will cause the voltage at the junction of R4 and R3, which is applied to the inverting input of the voltage comparator, to decrease. Because the inverted input decreases, its output will increase and furnish a higher input to and output from the amplifier. The higher BIAS voltage output of the amplifier across R2 is applied to Q1. The higher BIAS voltage will cause the + CONDITIONED POWER output to increase just enough to compensate for the decrease resulting from the increased load. If the load current flowing to the A7 card decreases, causing an increase of the voltage of the + CONDITIONED POWER output, the BIAS will be caused to decrease, thereby lowering the + CONDITIONED POWER output voltage. Therefore, all changes in the load current flowing to the A7 card are sensed and applied to the inverting input of the voltage comparator. The inversely related output of the voltage comparator is amplified by the amplifier and applied as the BIAS voltage across R2, thereby holding the + CONDITIONED POWER output voltage constant.

DETAILED FUNCTIONAL DESCRIPTION (8 of 14)

TRANSORB Z1, POWER CONDITIONER CARD A1, AND PASS TRANSISTOR NETWORK Q1, C1, C2 (SEE DIAGRAM, PG F0-3) (cont)

CONDITIONING FOR INPUT POWER VARIATIONS (POWER CONDITIONER CARD A1 AND PASS TRANSISTOR NETWORK Q1, C1, C2). The + BATTERY input is routed through the reverse connection protection circuit and applied to the noninverting input of the voltage comparator from the voltage divider/regulator R1, R6, R5, VR1. Because VR1 is a 33 volt Zener diode, it is open during normal conditions of + BATTERY input. If the + BATTERY input increases above 33 V dc, VR1 will regulate the voltage at the junction of R1 and R6 to 33 V dc. Therefore, VR1 limits the voltage applied to voltage divider R5, R6 to 33 V dc, providing over-voltage protection to the noninverting input of the voltage comparator. If the + BATTERY input voltage decreases due to battery drain or any other cause, VR1 will be open and the voltage at the noninverting input of the comparator will be decreased. Because the noninverting input voltage is decreased, the comparator output voltage will decrease and furnish a lower input voltage to and output voltage from the amplifier as the BIAS voltage for Q1. The lower BIAS voltage will cause the + CONDITIONED POWER output voltage to decrease. If the + BATTERY input voltage increases, the BIAS voltage will increase, thereby increasing the + CONDITIONED POWER output voltage of Q1. Therefore, all changes in the + BATTERY input are sensed and applied to the noninverting input of the voltage comparator. The related output of the voltage comparator is amplified by the amplifier and applied as the BIAS voltage across R2, thereby causing the + CONDITIONED POWER voltage output to follow the + BATTERY input voltage through Q1. The + CONDITIONED POWER output will always be approximately 3 V dc lower than the + BATTERY input, unless the + BATTERY input rises above 51 V dc.

REVERSE POLARITY PROTECTION (POWER CONDITIONER CARD A1). If the + BATTERY input is reverse connected, the reverse connection protection circuit will short to the housing ground, causing the current to increase through POWER circuit breaker CB1 on control panel A9. The increased current through CB1 will cause it to open, removing the + BATTERY input from power conditioner card A1 and pass transistor Q1. The + CONDITIONED POWER output is thereby shut off. Protection from transients of up to +250 or -250 V dc for up to 100 micro-seconds is also provided by the reverse connection protection circuit.

DETAILED FUNCTIONAL DESCRIPTION (9 of 14)

CONTROL PANEL A9 AND AUDIO MATCHING TRANSFORMER T1 (SEE DIAGRAM, PG F0-5)

POWER CIRCUIT BREAKER CB1. POWER circuit breaker CB1 with its magnetic-overload device, together with fuse F1 (pg 2-5), transorb Z1 (pg FO-3), and the reverse connection protection circuit on power conditioner card A1 (pg FO-3), functions to protect the amplifier-power supply and AN/PRC-104 from the following effects: reverse connection, overvoltage and transients of the + BATTERY input voltage, and overloading or short circuit of the + CONDITIONED POWER. This protection is accomplished by removing the + BATTERY input voltage. CB1 may also be used to manually turn the + BATTERY input voltage on and off, except to external power connector card A6 for a parallel connected AN/GRC-213. In this way the + CONDITIONED POWER output from pass transistor Q1 is manually turned on and off. Parallel lines route the + BATTERY input voltage to CB1. Parallel lines route the + BATTERY input voltage from CB1 to transorb Z1 (+).

POWER SWITCHLIGHT XDS1/DS1. The + CONDITIONED POWER input from radio power connector card A7 is routed to the POWER switchlight. When not pressed, the POWER switchlight provides an adjustable visual indication that + CONDITIONED POWER is present for the amplifier-power supply and AN/PRC-104 circuits. The POWER switchlight also provides a nonadjustable press to test visual indication that + CONDITIONED POWER is present.

SQUELCH CONTROL RS1. SQUELCH control RS1 provides two functions combined into one control. Turning the variable resistor clockwise from OFF will close the switch, routing a SQUELCH ENABLE signal to amplifier-squelch card A2 and a RETRANSMIT ENABLE signal to vehicular intercommunication interface card A3. As the variable resistor is turned further clockwise, the level at which the amplifier-power supply will squelch (squelch/unsquelch threshold level) is increased. When the variable resistor is turned fully clockwise to MAX, the maximum squelch level is set.

AUDIO MATCHING TRANSFORMER T1 AND SPEAKER SWITCH S1. Audio matching transformer T1 provides impedance matching of the 8-ohm AMPLIFIED RCV AUDIO output source impedance of amplifier-squelch card A2, through SPEAKER switch S1, to the 600-ohm load impedance of the loudspeaker. S1, therefore, provides on and off control of the loudspeaker.

AUDIO FILTER CIRCUIT CARD A4. Audio filter circuit card A4 contains lo pass emi filters 1 thru 4. These filters protect the SQUELCHED AUDIO, PTT, XMT AUDIO, and KY65 KEYLINE signals routed between the RT, amplifier-power supply, handset, and the AN/ VIC-1(V) system from rfi, noise, and transients. The AMPLIFIED RCV AUDIO input from the A2 card is routed to SPEAKER switch S1 and then to the 8-ohm primary winding of T1. The SPEAKER RTN input from the A2 card is routed to the other primary winding of T1. AMPLIFIED RCV AUDIO with SPEAKER RTN/MIC SHIELD is routed from T1 to the A4 card and then to the loudspeaker or the earpiece of the handset, if connected to the SPEAKER AUDIO connector. SPEAKER RTN/MIC SHIELD is also connected to the RADIO AUDIO connector to serve as the return for MIC SHIELD from the lower AUDIO connector on the RT, when the handset is connected to the SPEAKER AUDIO connector on the amplifier-power supply. MIC SHIELD is also routed from vehicular intercommunication interface card A3 to the A4 card as a shield and return for XMT AUDIO. SPEAKER RTN/MIC SHIELD also serves as a return for the low pass emi filters on the A4 card. C1 provides dc isolation between SPEAKER RTN/MIC SHIELD and the panel ground (a floating ground) to prevent transmitted rf from interacting with the XMT AUDIO and PTT signal lines.

DETAILED FUNCTIONAL DESCRIPTION (10 of 14)

CONTROL PANEL A9 AND AUDIO MATCHING TRANSFORMER T1 (SEE DIAGRAM, PG F0-5) (cont)

When the loudspeaker is connected to the SPEAKER AUDIO connector, the only signals used at this connector are the AMPLIFIED RCV AUDIO and the SPEAKER RTN/MIC SHIELD, which drive the loudspeaker. When the handset is connected to the SPEAKER AUDIO connector, the AMPLIFIED RCV AUDIO signal is not used at the handset. The SQUELCHED AUDIO signal, routed from the A3 card through lo pass emi filters 1 on the A4 card, together with SPEAKER RTN/MIC SHIELD, drives the earphone in the earpiece. The mouthpiece microphone provides modulating XMT AUDIO and SPEAKER RTN/MIC SHIELD. When the PTT switch on the handset is pressed, a housing ground is furnished as the PTT signal. The KY65 voice encryption device, when used, is connected between the lower AUDIO connector on the RT and the RADIO AUDIO connector. The handset connects directly to the KY65. When the KY65 is used, the KY65 KEYLINE signal at the RADIO AUDIO connector performs the same functions as PTT does when the KY65 is not used. When the RT is receiving, it routes RCV AUDIO to the A4 card for distribution to the A3 card. When the RT is transmitting, it routes SIDETONE AUDIO to the A4 card for distribution to the A3 card.

DETAILED FUNCTIONAL DESCRIPTION (11 of 14)

AMPLIFIER-SQUELCH CARD A2 (SEE DIAGRAM, PG F0-7)

VOICE-OPERATED GAIN AMPLIFIER, CLIPPER, AND AMPLIFIER. When SQUELCH control RS1 on control panel A9 is turned clockwise from OFF (squelch turned on), RCV/SIDETONE AUDIO from vehicular intercommunication interface card A3 is applied to the voice-operated gain amplifier. This amplifier maintains a gain-controlled audio output of approximately 100 millivolts regardless of the level of RCV/SIDETONE AUDIO. The clipper circuit removes any high-level transients from the voice-operated gain amplifier audio output. The amplifier boosts the audio output from the clipper to an operating output level of approximately 4.5 V peak-to-peak.

SIGNAL DETECTOR AND SIGNAL COMPENSATOR. The output of the amplifier is applied to the signal detector and to the envelope detector. The output of the signal detector contains the positive-going portion of the signal-plus-noise voltage from the amplifier. The output of the signal detector is applied through resistor R1 to the inverting input of the voice gate or subtractor. The output of the signal detector is also routed through the signal compensator to the inverting input of the voice gate or subtractor. If the signal level drops by 2 dB or less, the signal compensator, turned on by the output of the voice gate control, will boost the fading signal. Therefore, if a weak signal is received which barely breaks squelch, the strength of the received signal can decrease 2 dB, due to fading, and still break squelch.

ENVELOPE DETECTOR AND LO PASS FILTER. The envelope detector detects and rectifies the amplifier output to produce a negative-going audio envelope that is applied to the active lo pass filter. The lo pass filter removes noise and continuous tone audio signals. The amplitude of the SQUELCH CCW output from the lo pass filter varies according to the syllabic rate of the voice energy in the audio envelope. The SQUELCH CCW output from the lo pass filter is routed to SQUELCH control RS1 on control panel A9.

VARIABLE GAIN AMPLIFIER AND PEAK DETECTOR. When SQUELCH control RS1 on control panel A9 is turned clockwise, past OFF, and adjusted, a portion of the syllabic rate audio signal from RS1 is applied to the variable gain amplifier as the SQUELCH WIPER and SQUELCH CW signals. The gain of the variable gain amplifier is variable, as determined by the setting of RS1. The output of the variable gain amplifier is detected by the peak detector and applied to the noninverting input of the voice gate or subtractor.

VOICE GATE OR SUBTRACTOR. If the peak detector output syllabic rate routed to the noninverting input of the voice gate or subtractor is greater than the signal detector signal-plus-noise output level at the inverting input of the voice gate or subtractor, the output will be a positive level. The magnitude of the positive level is proportional to the voltage difference between the inputs to the voice gate or subtractor. If the signal-plus-noise level at the inverting input to the voice gate or subtractor is greater than the syllabic rate at the noninverting input to the voice gate or subtractor, the output will drop to zero.

DETAILED FUNCTIONAL DESCRIPTION (12 of 14)

AMPLIFIER-SQUELCH CARD A2 (SEE DIAGRAM, PG F0-7) (cont)

VOICE GATE CONTROL AND AUDIO GATE. The output from the voice gate or subtractor, together with the SQUELCH ENABLE signal from SQUELCH control RS1 on control panel A9 is applied to the voice gate control, which develops a SQUELCH SENSE signal. The SQUELCH SENSE signal is used to control the audio gate. SQUELCH control RS1 prevents the voice gate control from routing the SQUELCH SENSE signal to the audio gate when it is turned counter-clockwise to OFF, because the SQUELCH ENABLE signal is absent (pg FO-5) at the inverting input of the voice gate control. RCV/SIDETONE AUDIO is then routed around the audio gate through the -30 dB attenuator and hi pass filter. If the syllabic rate audio signal input to the voice gate or subtractor (noninverting input) is larger than the signal-plus-noise input (inverting input), the voice gate will turn on the voice gate control which outputs a high SQUELCH SENSE signal to the vehicular intercommunication interface card A3. The high SQUELCH SENSE signal gates on the audio gate. RCV/SIDETONE AUDIO is then routed through the audio gate and is output as SQUELCHED AUDIO. If the syllabic rate audio signal input to the voice gate or subtractor is smaller than the signal-plus-noise input, the voice gate output is low, the SQUELCH SENSE signal is low, and the audio gate is cut off. In this condition, RCV/SIDETONE AUDIO is not passed through the audio gate. Instead, it is routed around the audio gate, through the -30 dB attenuator and hi pass filter. The -30 dB attenuator and hi pass filter remove the audio and send attenuated noise (slight hiss) to the loudspeaker or handset. The hiss assures the operator that the equipment is turned on and operating. When no RCV/SIDETONE AUDIO is present and the squelch is on, only noise is received. The noise is routed around the audio gate, through the -30 dB attenuator and hi pass filter. The -30 dB attenuator and hi pass filter sends the slight hiss to the loudspeaker or handset.

IMPEDANCE BUFFER. If transmit operation is initiated, a PTT signal is routed from the vehicular intercommunication interface card A3 to the audio gate, cutting it off. At the same time, the PTT signal causes MOMENTARY SQUELCH DISABLE signals (A2P1 pins 20, 15) from the A3 card to cut off the variable gain amplifier and the signal compensator. A small portion of the RCV/SIDETONE AUDIO is routed through the audio gate and impedance buffer as sidetone SQUELCHED AUDIO to the handset.

OPERATIONAL AMPLIFIER, PUSH-PULL AMPLIFIER, AND RELAY K1. During normal receive operation, SQUELCHED AUDIO is routed to the operational amplifier. The output of the operational amplifier is approximately 10 milliamperes and not large enough to drive the loud-speaker. The squelched audio output of the operational amplifier is routed to the push-pull amplifier. The push-pull amplifier outputs the AMPLIFIED RCV AUDIO signal at 1 watt. Because the PTT and MUTED signals are absent during normal receive operation, the AMPLIFIED RCV AUDIO signal is routed through normally closed contacts of relay K1 to SPEAKER switch S1 on control panel A9. The KY65 KEYLINE signal to control panel A9 is also ungrounded.

DC LIMITER AND POWER SUPPLY. + CONDITIONED POWER from radio power connector card A7 is routed to the dc limiter. The dc limiter protects amplifier-squelch card A2 from overvoltage, transients, and reverse polarity of the input voltage. The + CONDITIONED AND PROTECTED POWER output from the dc limiter is routed to the power supply. The power supply outputs +6.4 and +12 V, which are used throughout the A2 card. The + CONDITIONED AND PROTECTED POWER is also used in other circuits within the A2 card.

DETAILED FUNCTIONAL DESCRIPTION (13 of 14)

VEHICULAR INTERCOMMUNICATION INTERFACE CARD A3 (SEE DIAGRAM, PG F0-9)

AMPLIFIER AR1, AUDIO POWER AMPLIFIER, AND LO PASS EMI FILTERS 1, 3, AND 7. During normal receive operation, with SQUELCH control RS1 turned clockwise from OFF, RCV AUDIO from the RT is routed to lo pass emi filter 3 from control panel A9. Lo pass emi filter 3 protects RCV AUDIO from rfi, noise, and transients. RCV AUDIO is then routed to amplifier-squelch card A2. After RCV/SIDETONE AUDIO is processed in the A2 card, it is routed back to the A3 card as SQUELCHED AUDIO, to the inverting input of amplifier AR1. At this input to AR1 is receive SQUELCHED AUDIO during receive operation and sidetone SQUELCHED AUDIO during transmit operation. + CONDITIONED POWER from radio power connector card A7 (used to power circuits throughout the A3 card after being filtered by lo pass emi filter) is applied to the noninverting input of AR1 through resistor R1. The output of amplifier AR1 is routed to the audio power amplifier. Variable resistor R2 provides a feedback path to AR1 and allows for adjustment of the level of the UNMUTED AUDIO output. UNMUTED AUDIO is routed to lo pass emi filter 1. Lo pass emi filter 1 protects UNMUTED AUDIO from rfi, noise, and transients. UNMUTED AUDIO is then routed to the AN/VIC-1(V) via the A8 card.

LO PASS EMI FILTER 2. A portion of UNMUTED AUDIO is routed through dropping resistor R5, providing the MONITOR AMP signal at lo pass emi filter 2. Lo pass emi filter 2 protects the MONITOR AMP signal from rfi, noise, and transients. The MONITOR AMP signal is then routed to the AN/VIC-1(V) via the A8 card.

AMPLIFIER AR2, DRIVERS 1 AND 2, RELAYS K1 AND K2, AND LO PASS EMI FILTER 4. The SQUELCH SENSE signal is applied to the inverting input of amplifier AR2. The SQUELCH SENSE signal activates AR2, thereby turning on driver 1. SQUELCH control RS1 routes the RETRANSMIT ENABLE signal to driver 2, turning it on. Because drivers 1 and 2 are turned on, relay K1 is energized, applying housing ground through the normally open K1 contacts to the normally closed contacts of relay K2. As long as the PTT signal is not present from the AN/VIC-1(V), the RT, or control panel A9, relay K2 is not energized and the normally closed contacts of K2 route the housing ground from K1 to lo pass emi filter 4. Lo pass emi filter 4 protects the RETRANSMIT output from rfi, noise, and transients. The housing ground is then routed to the AN/VIC-1(V) as the RETRANSMIT signal. The RETRANSMIT signal serves as a VHF PTT input to activate the vehicular VHF FM radio set for retransmission of the HF SSB signals received by the RT.

SQUELCH DISABLE TIMER, LO PASS EMI FILTER 6, AND DIODE CR1. The squelch disable timer is activated by the PTT signal, sending MOMENTARY SQUELCH DISABLE signals to amplifier-squelch card A2. +12 V from the A2 card powers the squelch disable timer. The PTT signal, if originating as a VHF RETRANSMIT signal at the AN/VIC-1(V) when the PTT switch on the remote handset or the VHF FM radio set is pressed, is routed through the AN/VIC-1(V) to lo pass emi filter 6. Lo pass emi filter 6 protects the PTT signal from rfi, noise, and transients. The PTT signal is then routed through diode CR1 to energize relay K2, opening the normally closed contacts and removing the RETRANSMIT signal from the AN/VIC-1(V). This prevents vhf retransmission. The PTT signal is also routed from diode CR1 to control panel A9 to activate the RT for retransmission of the signals received by the VHF FM radio set or transmission of audio from the remote handset. The PTT signal is also routed to amplifier-squelch card A2 to disable squelch circuits and allow sidetone SQUELCHED AUDIO to be routed to amplifier AR1 and the audio power amplifier. PTT from the RT handset or the handset connected to control panel A9 will also energize K2, activate the RT for transmission, disable squelch circuits on the A2 card, and allow sidetone SQUELCHED AUDIO to be routed to amplifier AR1.

DETAILED FUNCTIONAL DESCRITION (14 of 14)

VEHICULAR INTERCOMMUNICATION INTERFACE CARD A3 (SEE DIAGRAM, PG F0-9) (cont)

AUDIO ATTENUATOR. AMPLIFIED XMT AUDIO from the AN/VIC-1(V) is routed to an audio attenuator. The audio attenuator attenuates the AMPLIFIED XMT AUDIO to a level usable by the RT. The XMT AUDIO from the audio attenuator is routed to the RT as the modulating signal during transmit operation. MIC SHIELD is the return for XMT AUDIO. MIC SHIELD is dc isolated from housing ground by capacitor C1 on audio filter circuit card A4 on control panel A9. This reduces rfi and transients.

LO PASS EMI FILTER 5. A grounded MUTED signal, if used, is routed from external power connector card A6 through lo pass emi filter 5 to amplifier-squelch card A2, where the loud-speaker is muted. This signal is only available if the AN/GRC-213 is installed to receive power from the external power connector of the VHF FM radio.

CHAPTER 3

GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS; SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); SUPPORT EQUIPMENT; AND MATERIALS

INTRODUCTION

This section lists test equipment and refers to lists of the repair parts, materials, special tools, TMDE, and support equipment used in performing general support maintenance tasks on the amplifier-power supply.

COMMON TOOLS AND EQUIPMENT

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

Test equipment required for general support maintenance is as follows:

- Dummy Load, 8085
- Electrical Group Kit, OA-9161/GRC-213
- Multimeter, AN/PSM-45
- Power Supply, PP-2309C/U
- RF Signal Generator, SG-1144( )/U
- Wattmeter, AN/USM-298

For a list of the special tools used in general support maintenance of the amplifier-power supply, refer to the repair parts and special tools list in TM 11-5820-923-40P. For a list of the tools and test equipment used in general support maintenance of the amplifier-power supply, refer to the Maintenance Allocation Chart in appendix B of the AN/GRC-213 system manual, TM 11-5820-1047-12.

MATERIALS

Materials required for general support maintenance are listed in appendix C, Expendable/ Durable Supplies and Materials List.

REPAIR PARTS

Repair parts are listed and illustrated in the repair parts and special tools list in TM 11-5820-923-40P, covering general support maintenance for the amplifier-power supply.

Section II. SERVICE

INTRODUCTION

Service of the amplifier-power supply and control panel consists of cleaning. Cleaning procedures include cleaning, corrosion removal, and touchup painting. Cleaning of amplifier-power supply external surfaces and connectors and internal surfaces and parts should be accomplished before troubleshooting.

AMPLIFIER-POWER SUPPLY CLEANING INSTRUCTIONS (1 of 2)

This task covers:

CLEANING

INITIAL SETUP

Tools:

Compressed air cleaning system

Materials/Parts:

Approved solvent (item 6, Appx B), or detergent (item 7, Appx B)
Brush, paint (item 2, Appx B)
Brush, stiff (item 3, Appx B)
Denatured alcohol (item 1, Appx B)
Lint-free cloth (item 5, Appx B)
Paint, epoxy (item 8, Appx B)
Primer (item 9, Appx B)
Wire brush (item 4, Appx B)

Personnel Required

1

CLEANING

WARNING

- When using a compressed airjet, use eyeshields.
- When using solvents, provide proper ventilation and avoid contact with skin. Do not smoke. Solvents must meet all specifications for flammability and allergic and poisonous effects. Make certain that maintenance work area is free from open flame and sparks caused by high voltage, high current, machining operations, welding, etc.
- For first aid, refer to FM 21-11.

CAUTION

- Compressed air must be clean, dry, and at a maximum pressure of 28 psi. Do not overlook force of airjet when cleaning delicate parts.
- Certain solvents will damage insulation. Do not use solvents similar to Chlorothene or Glyptal to clean electrical connectors. Use only denatured alcohol for this purpose.

AMPLIFIER-POWER SUPPLY CLEANING INSTRUCTIONS (2 of 2)

CLEANING (Cont)

EXTERNAL SURFACES

1. Clean all exterior surfaces of amplifier-power supply by using an airjet. If dirt cannot be removed by airjet alone, use a stiff brush to aid airjet action.
2. If necessary, an approved solvent or detergent may be used to remove grease, oil, or other contaminants, provided it is not allowed to run into insulated sleeving of internal wiring or onto nonmetallic parts.
3. Remove any rust and chipped paint with a wire brush.
4. Apply primer and paint with paint brush to all treated areas immediately upon removal of corrosion.

EXTERNAL CONNECTORS

1. Clean all exterior connectors of amplifier-power supply by using airjet. If dirt cannot be removed by airjet alone, use a stiff brush to aid airjet action.
2. If necessary, denatured alcohol may be used to remove grease, oil, or other contaminants.

INTERNAL SURFACES AND PARTS

1. Clean all interior surfaces and parts of amplifier-power supply by using a clean, dry, lint-free cloth. If dirt cannot be removed by a lint-free cloth alone, use an airjet, and if necessary, a stiff brush to aid airjet action.
2. If necessary, an approved solvent or detergent may be used to remove grease, oil, or other contaminants on mechanical parts, provided it is not allowed to run into insulated sleeving of internal wiring or onto nonmetallic parts. Denatured alcohol may be used for this purpose on nonmetallic parts.
3. Remove any rust with a wire brush.

Section III. TROUBLESHOOTING

INTRODUCTION

Amplifier-power supply troubleshooting is performed using the Test Setup shown on page 3-9. Troubleshooting is presented in chart form. Upon completion of amplifier-power supply troubleshooting, the faulty part is removed and repaired, if applicable, in accordance with Maintenance Instructions starting on page 3-23. The repaired or a replacement part is then installed. Upon installing a repaired or replacement part, the Amplifier-Power Supply Minimum Performance Test on page 3-100 is run to verify proper operation.

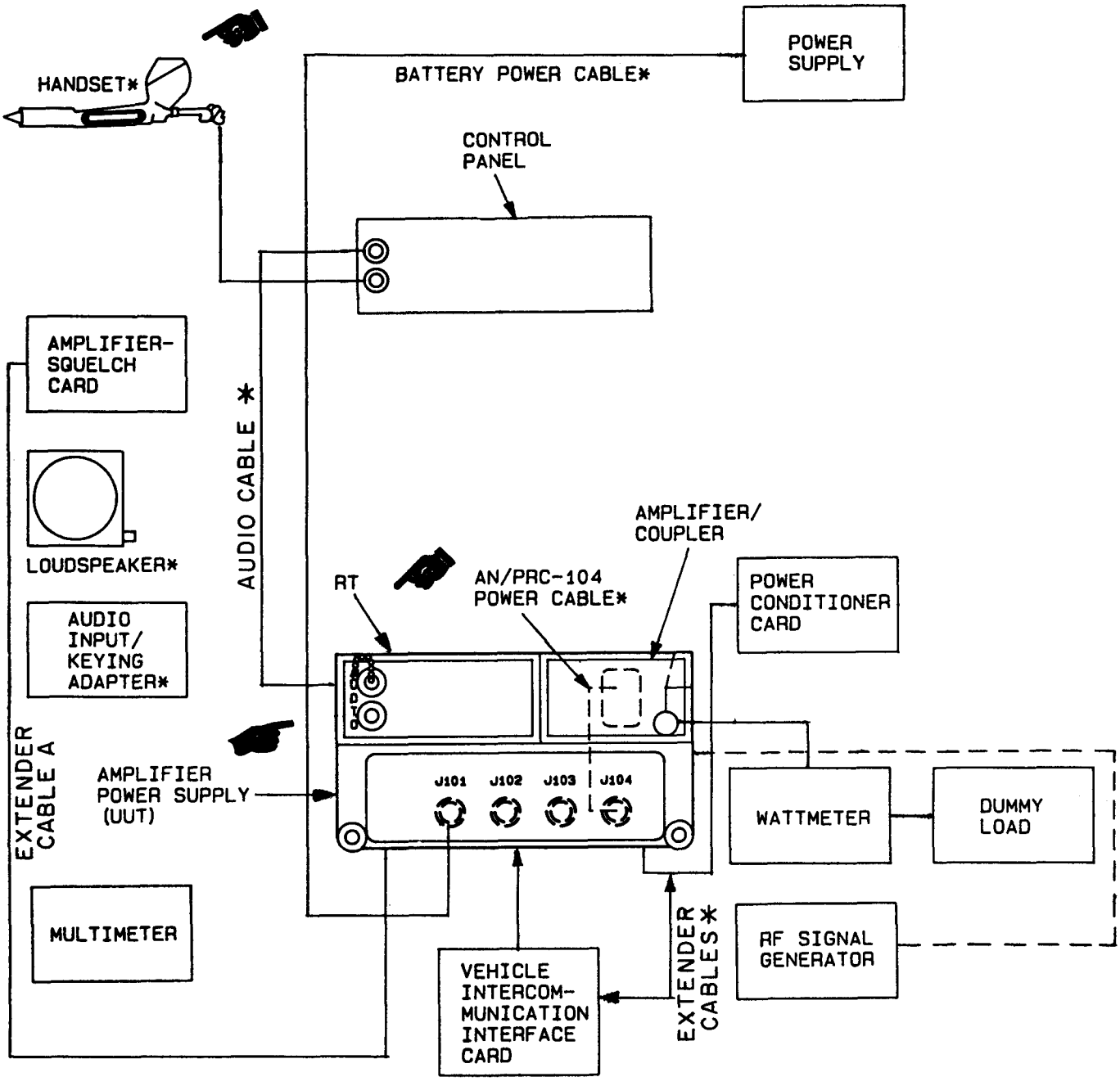
If performance of Amplifier-Power Supply Troubleshooting on page 3-10 isolates a faulty control panel, perform troubleshooting of faulty control panel in accordance with the Control Panel Troubleshooting Chart on page 3-18. No test setup is required for control panel troubleshooting. Upon completion of control panel troubleshooting, remove the faulty part and install a replacement part in accordance with applicable Maintenance Instructions on pages 3-23 thru 3-29. After installing a replacement part, run the Control Panel Test on page 3-96 to verify proper repair. Install repaired control panel in amplifier-power supply in accordance with Control Panel A9 Maintenance Instructions on page 3-24. Perform Amplifier-Power Supply Minimum Performance Test on page 3-100.

TEST SETUP (1 of 2)

Amplifier-power supply troubleshooting is performed with a fault-free RT and amplifier/coupler mounted on the amplifier-power supply. The three attached units are positioned upside down. Internal circuit cards and the control panel are removed and the cards are reconnected with extender cables so that voltage measurements are easy to make during troubleshooting. The Test Setup for amplifier-power supply troubleshooting is shown on page 3-9. Detailed setup instructions and initial control settings are discussed in the Amplifier-Power Supply Trouble-shooting Chart shown on page 3-10. Voltage measurements taken with a multimeter will aid you in isolating the faulty part.

Control panel troubleshooting is performed on a control panel that has already been removed from a faulty amplifier-power supply. No test setup is required for troubleshooting the control panel. Resistance measurements taken with a multimeter will aid you in isolating a faulty panel part.

TEST SETUP (2 of 2)

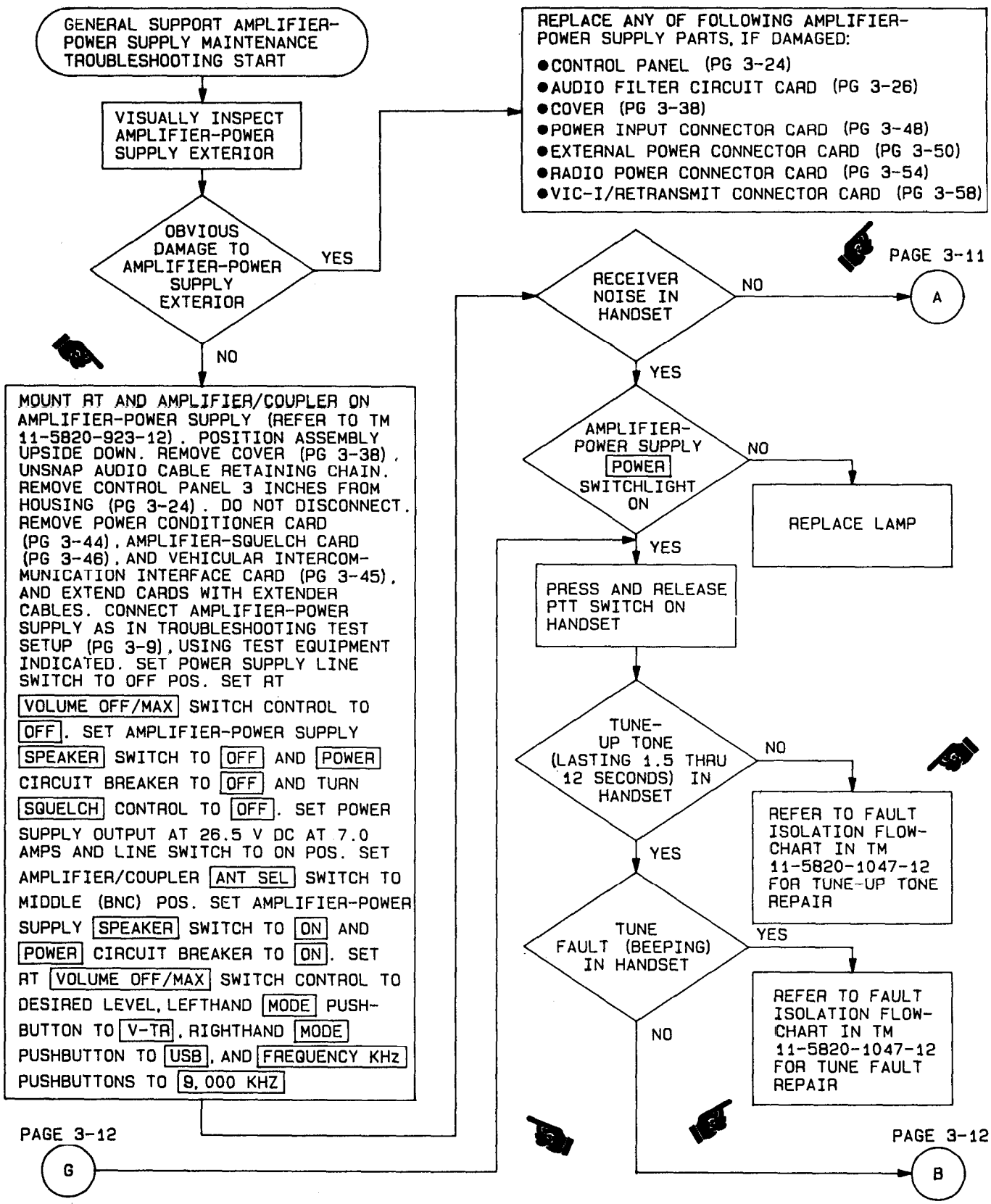


TEST EQUIPMENT REQUIRED:

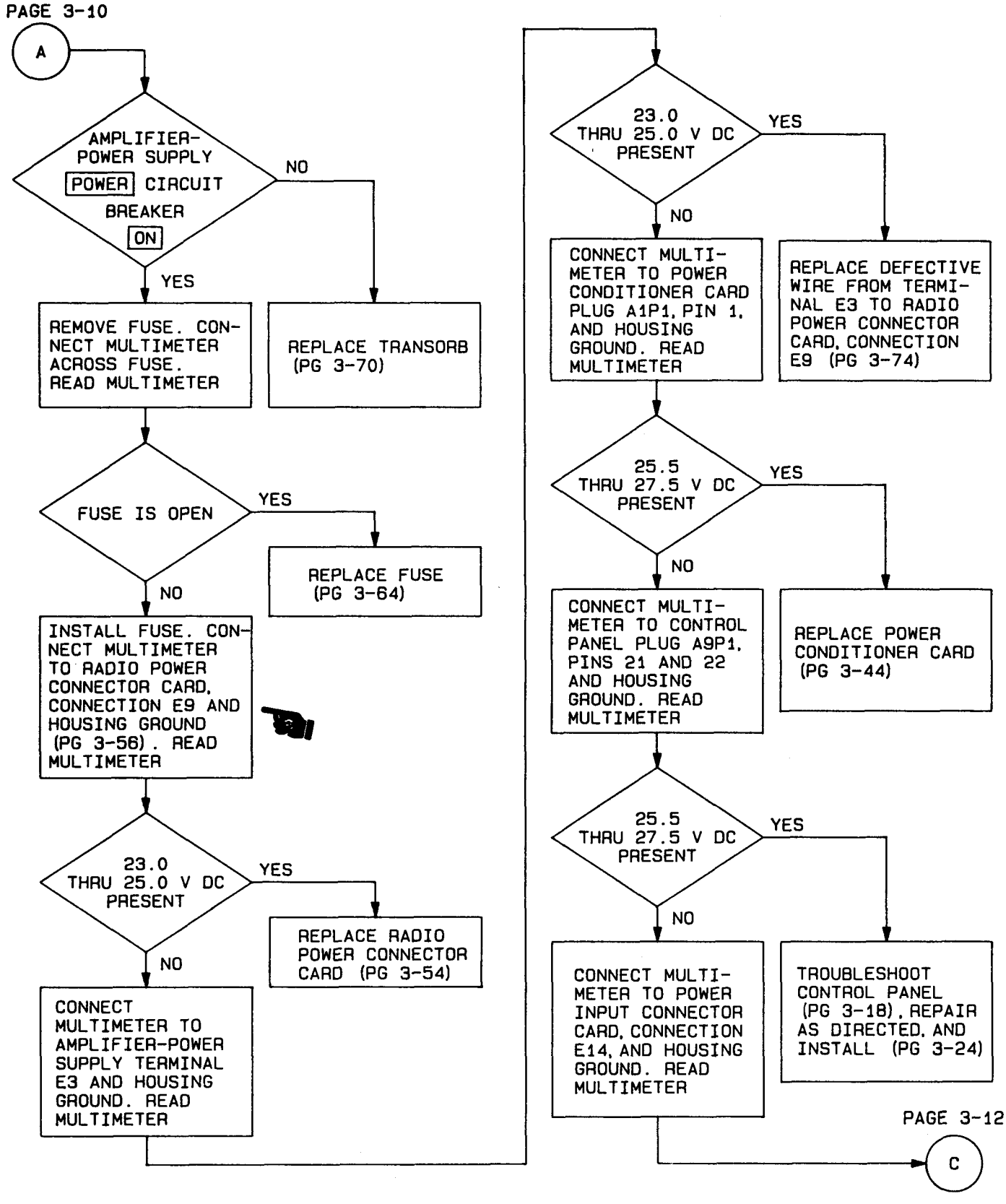
- DUMMY LOAD, 8085
- ELECTRICAL GROUP KIT, OA-9161/GRC-213
- MULTIMETER, AN/PSM-45
- POWER SUPPLY, PP-2309C/U
- RF SIGNAL GENERATOR, SG-1144/U
- WATTMETER, AN/USM-298

* PART OF ELECTRICAL GROUP KIT, OA-9161/GRC-213

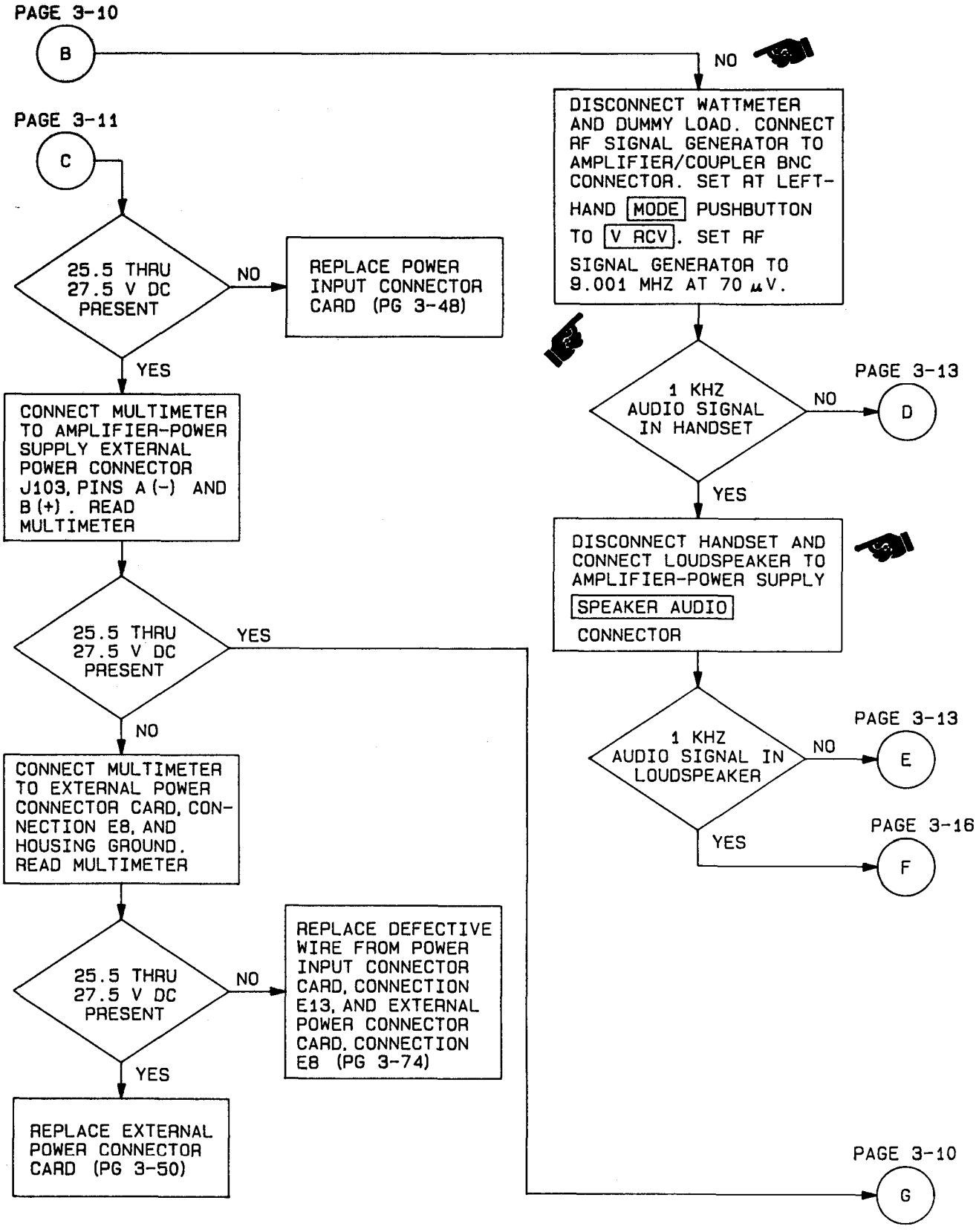
AMPLIFIER-POWER SUPPLY TROUBLESHOOTING CHART (1 of 7)



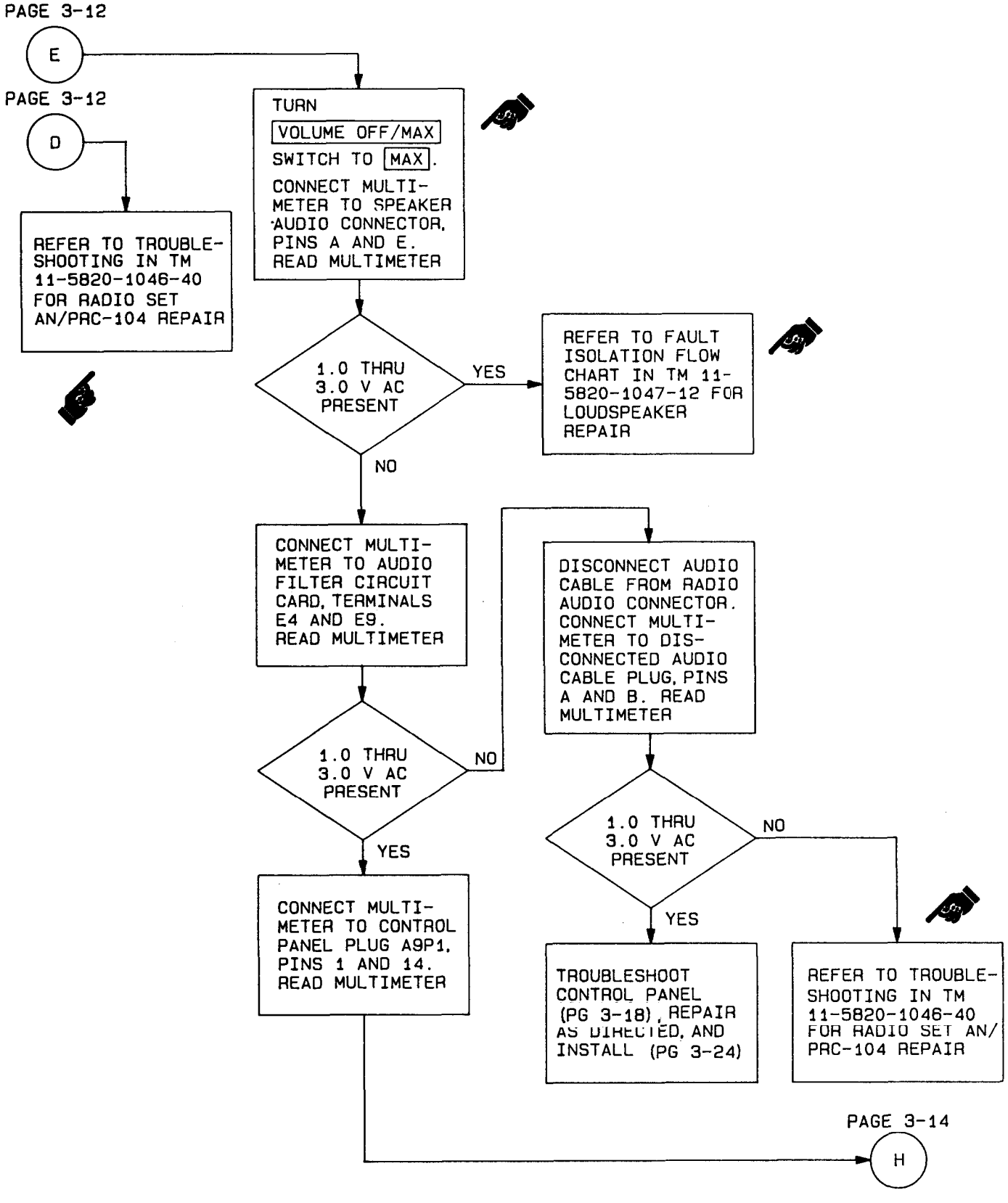
AMPLIFIER-POWER SUPPLY TROUBLESHOOTING CHART (2 of 7)



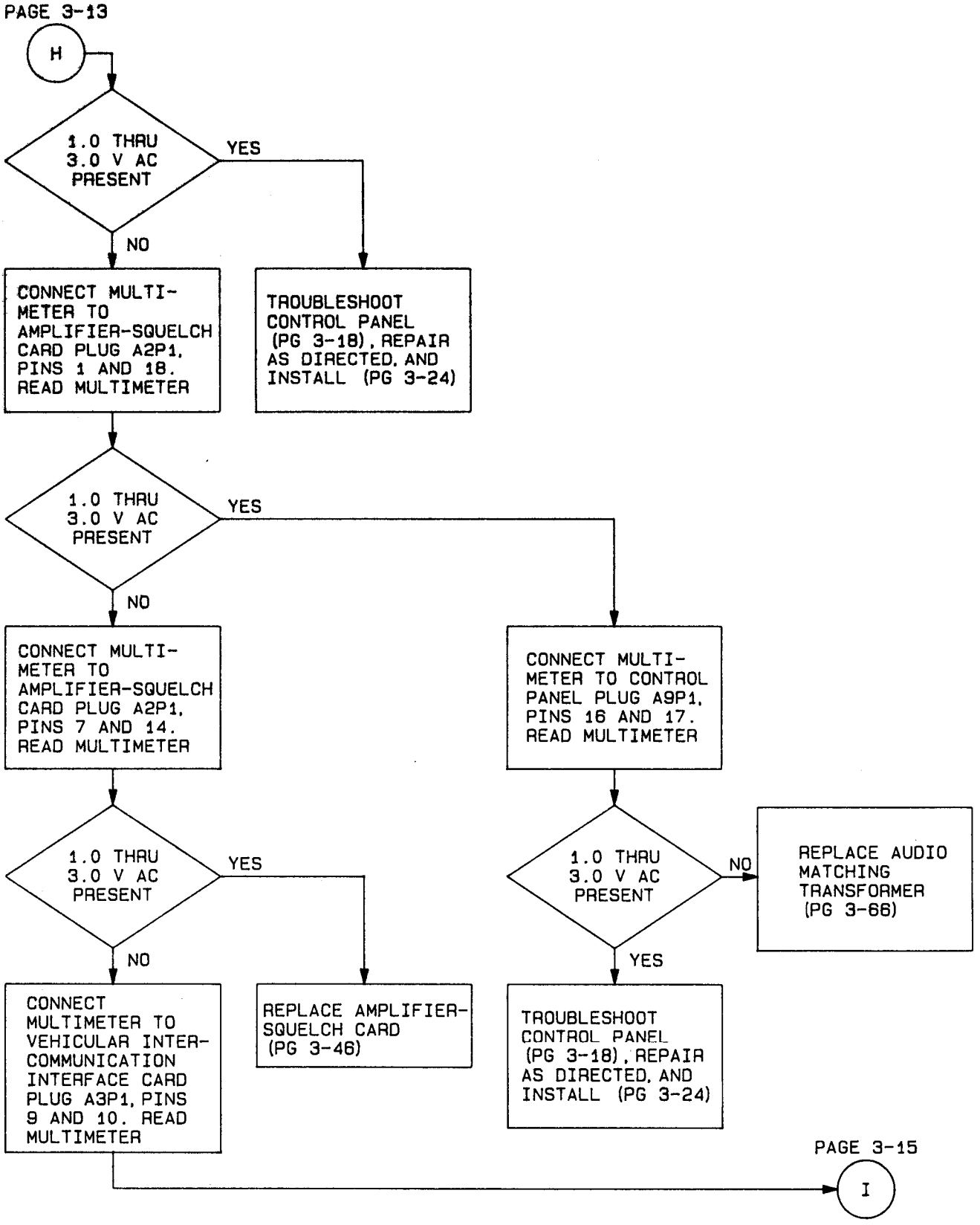
AMPLIFIER-POWER SUPPLY TROUBLESHOOTING CHART (3 of 7)



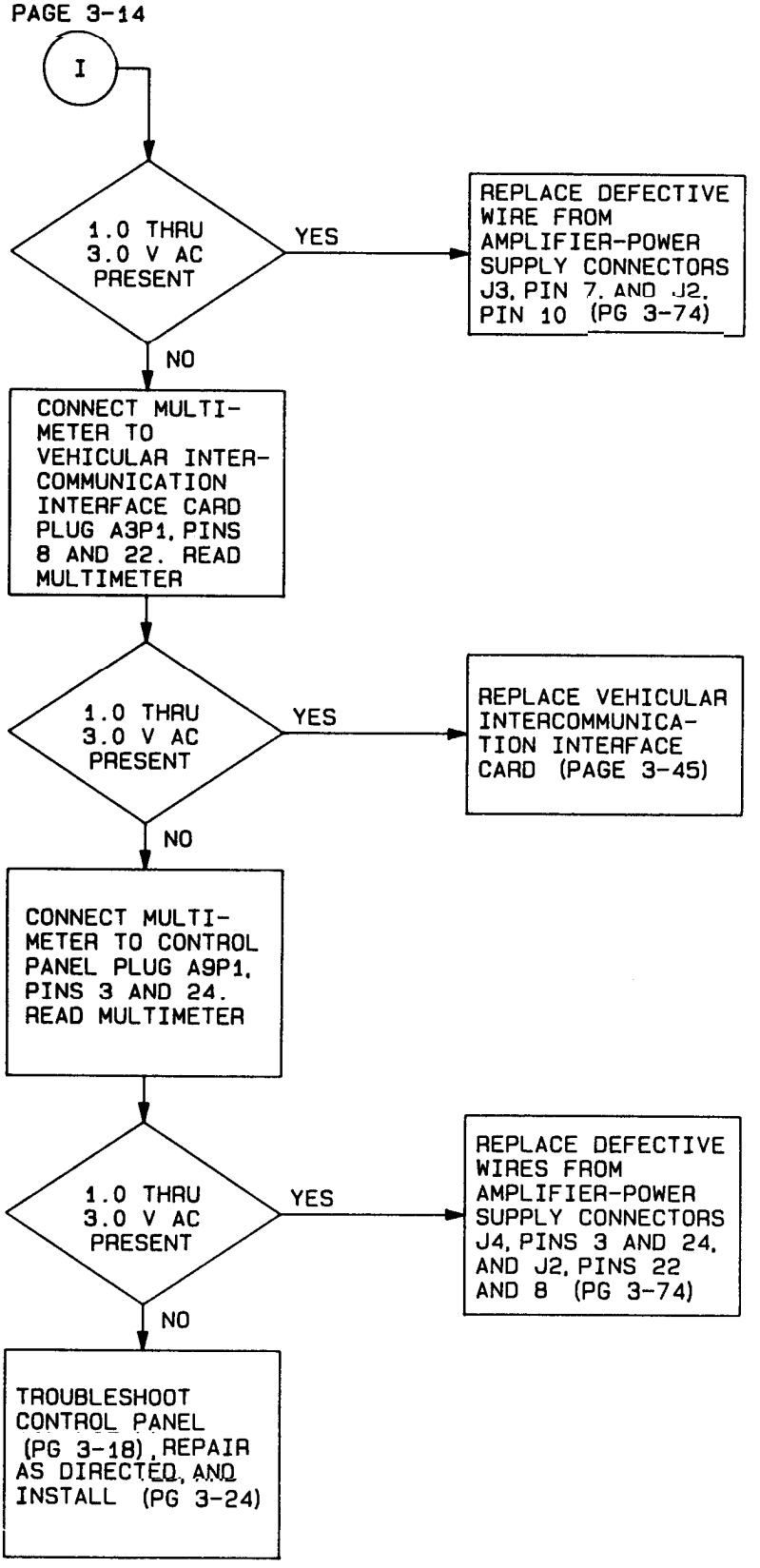
AMPLIFIER-POWER SUPPLY TROUBLESHOOTING CHART (4 of 7)



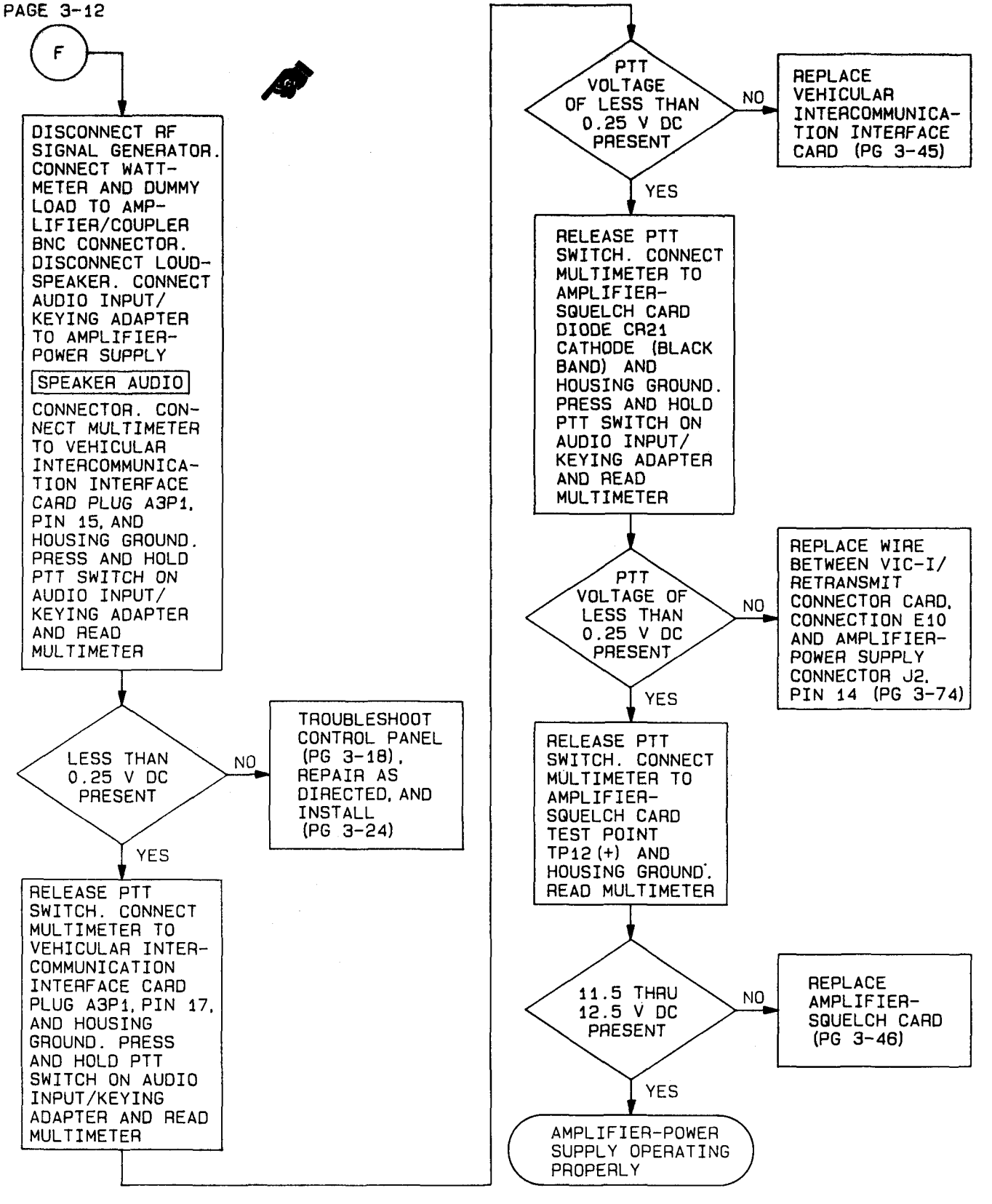
AMPLIFIER-POWER SUPPLY TROUBLESHOOTING CHART (5 of 7)



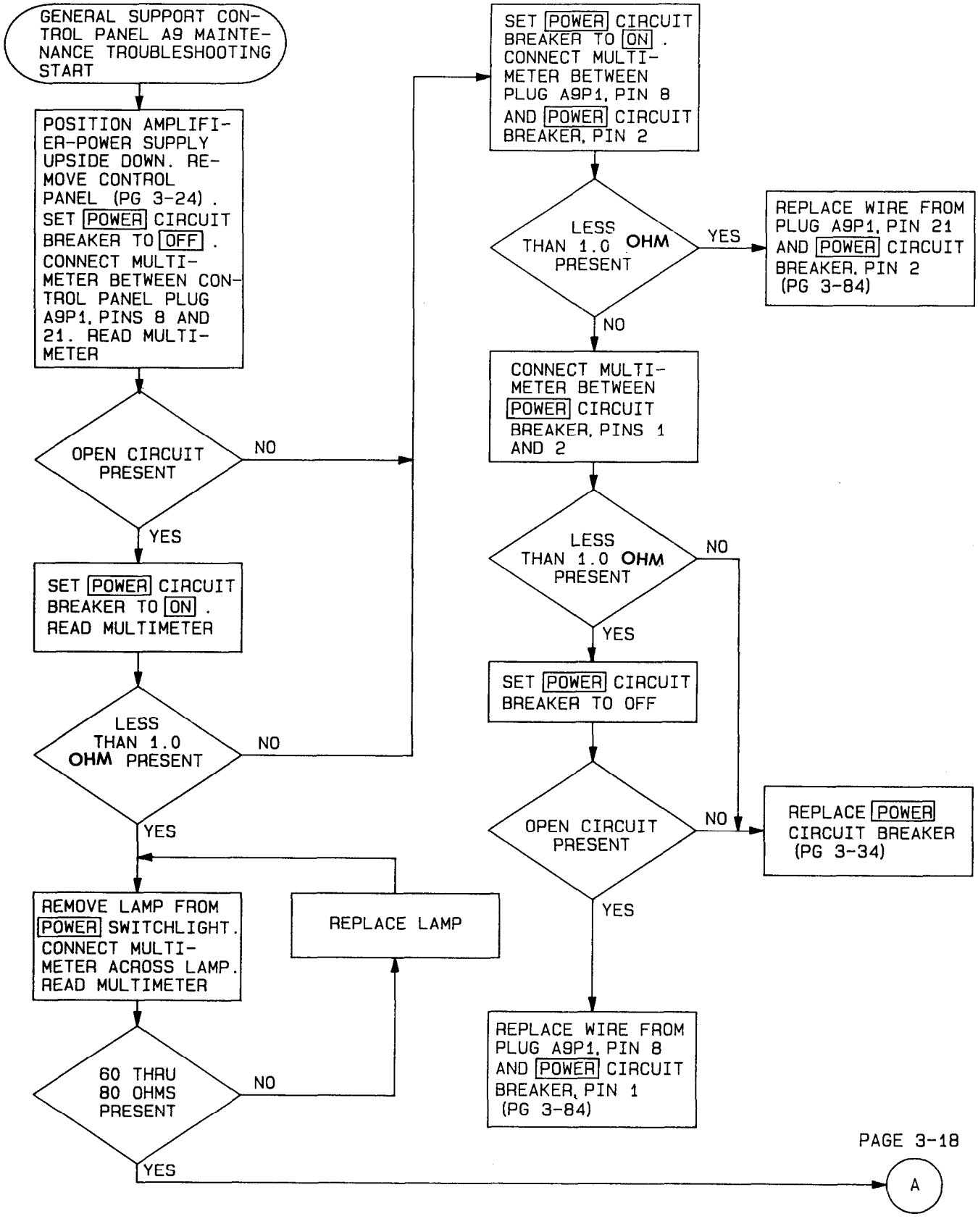
AMPLIFIER-POWER SUPPLY TROUBLESHOOTING CHART (6 of 7)



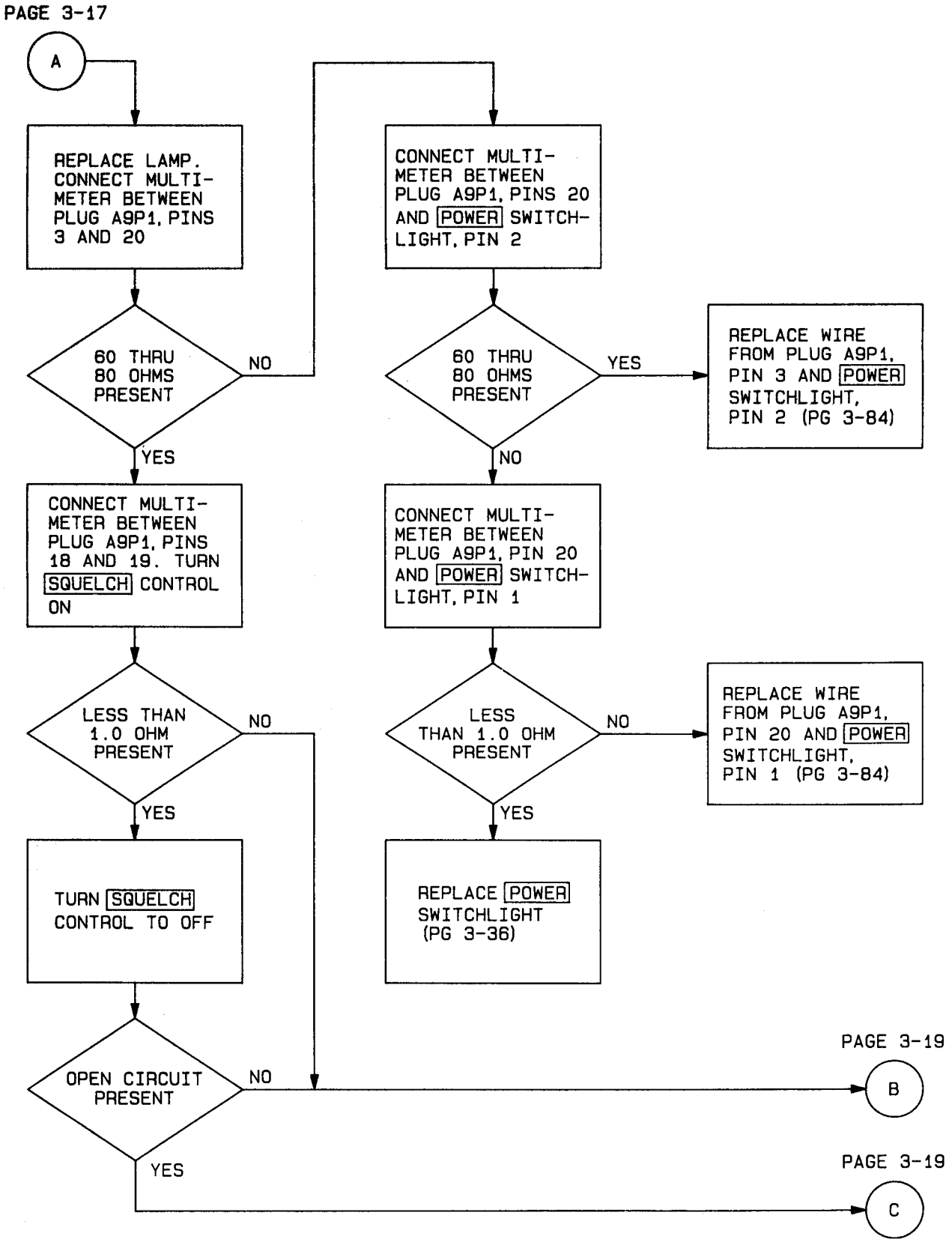
AMPLIFIER-POWER SUPPLY TROUBLESHOOTING CHART (7 of 7)



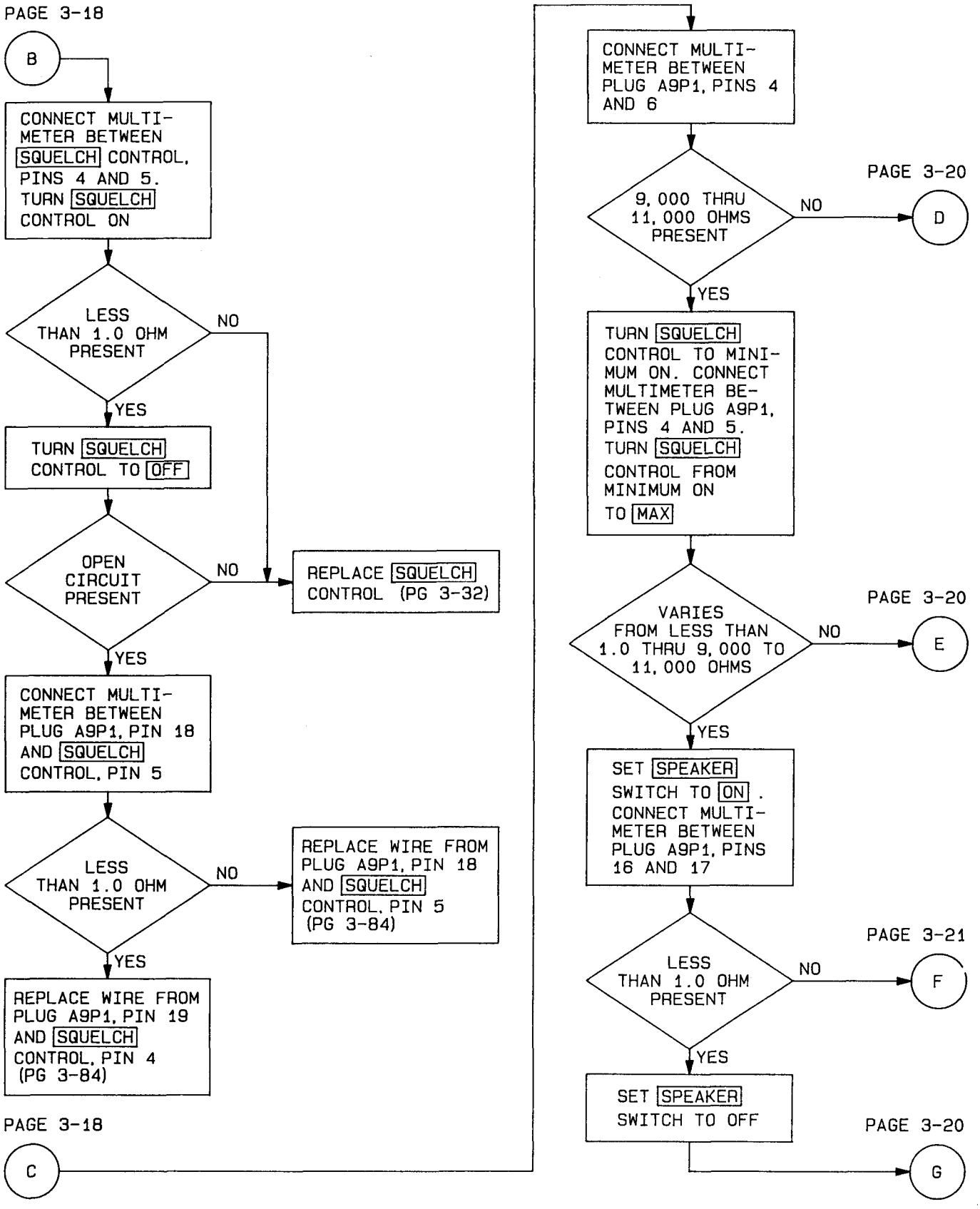
CONTROL PANEL TROUBLESHOOTING CHART (1 OF 6)



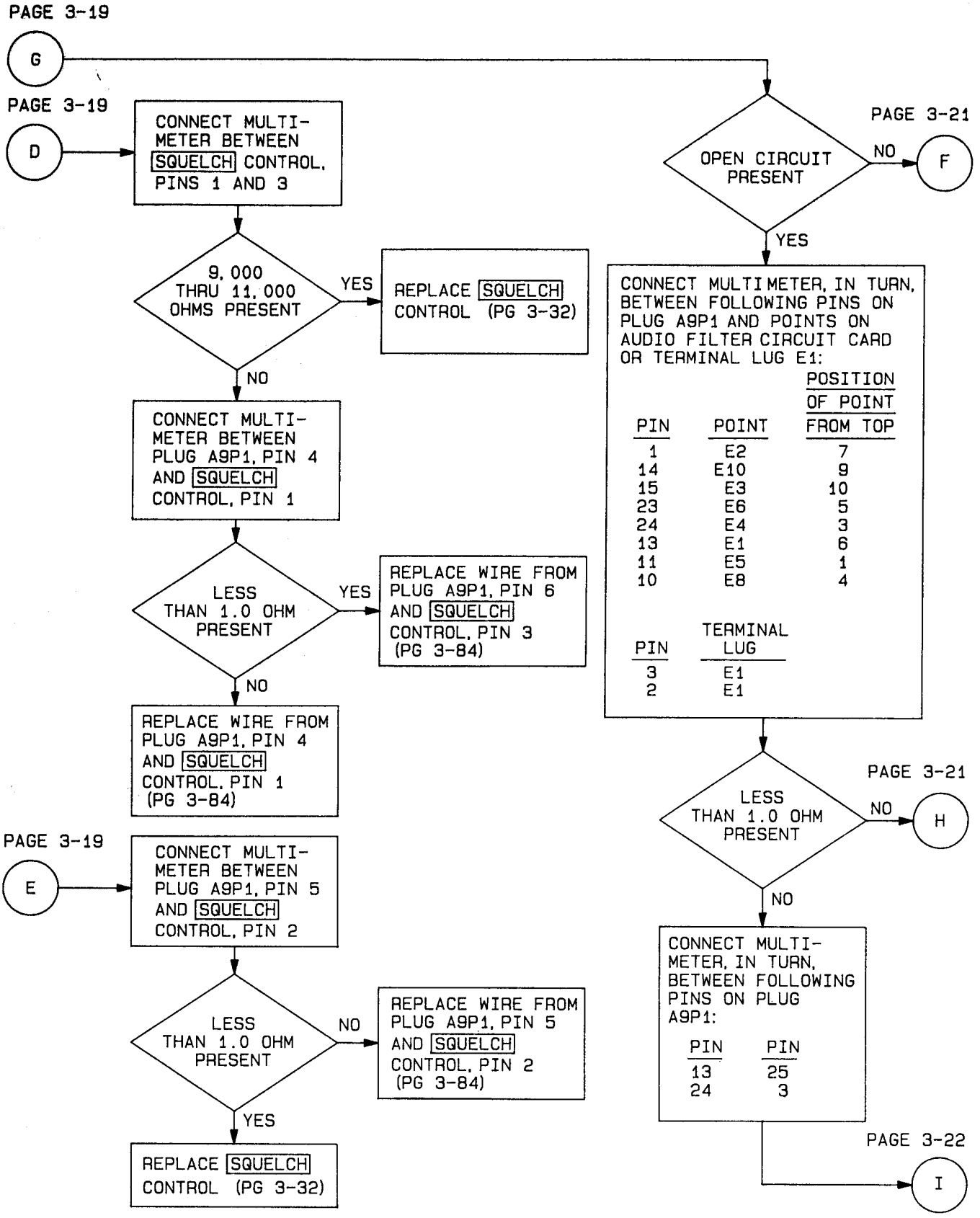
CONTROL PANEL TROUBLESHOOTING CHART (2 OF 6)



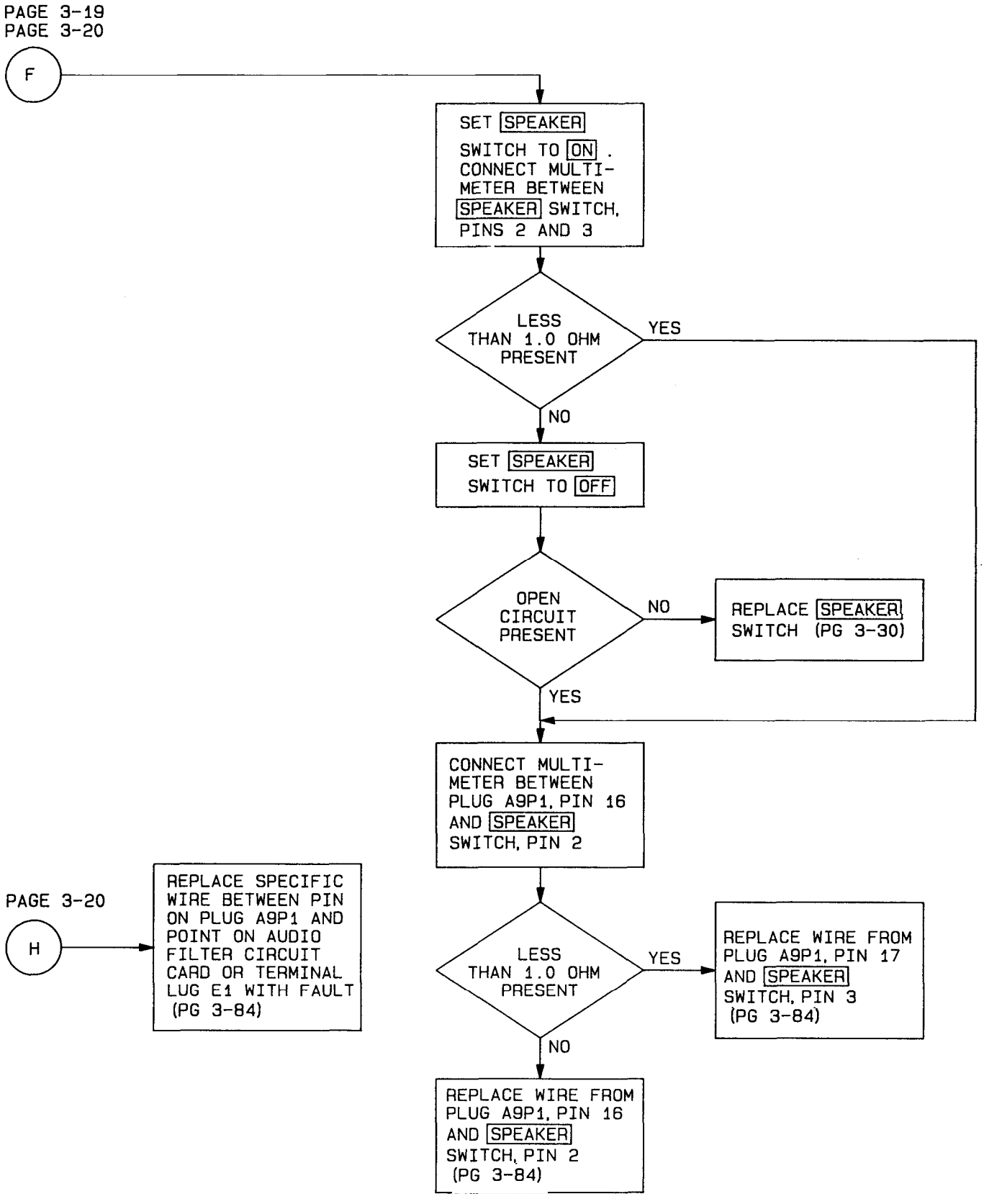
CONTROL PANEL TROUBLESHOOTING CHART (3 OF 6)



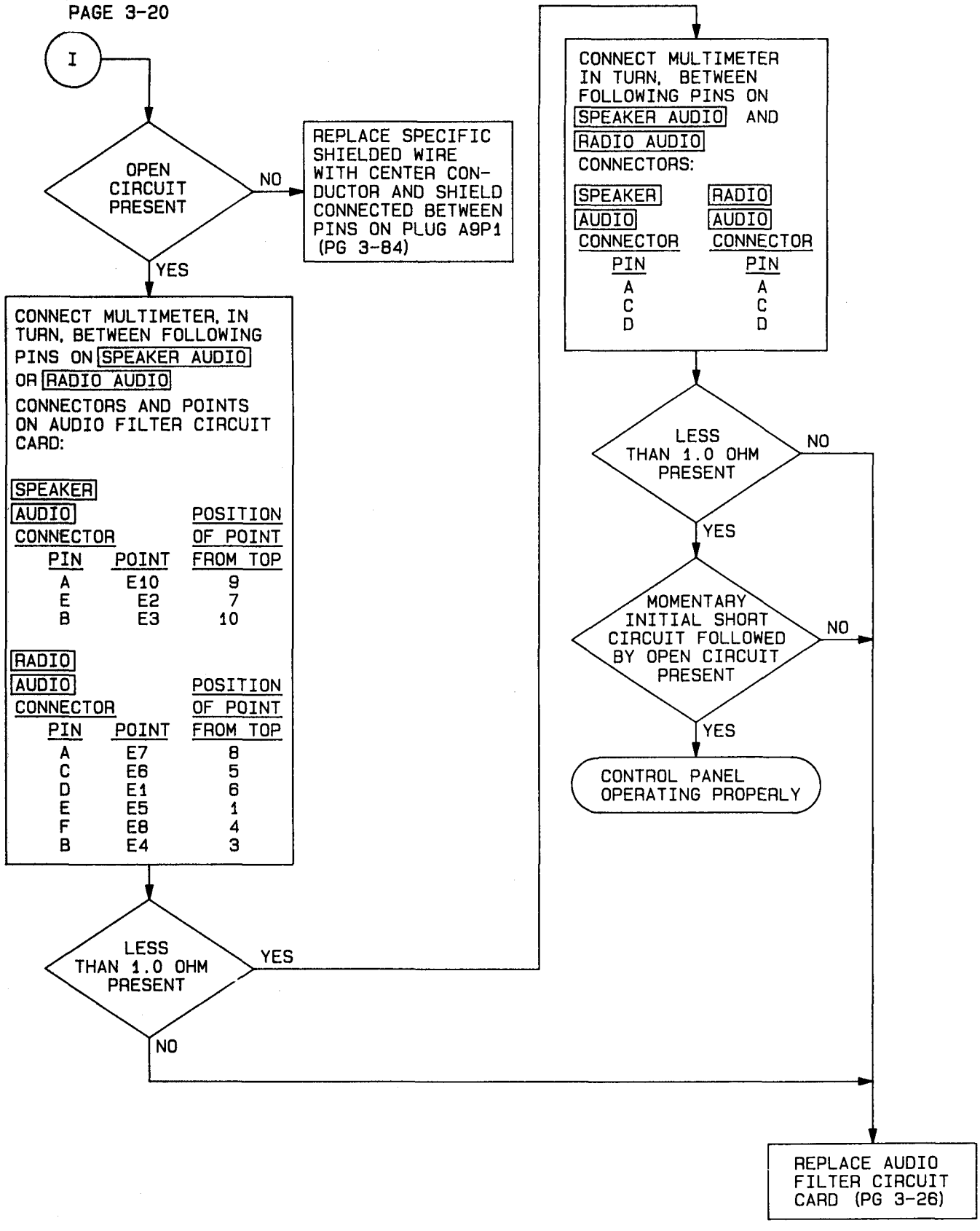
CONTROL PANEL TROUBLESHOOTING CHART (4 OF 6)



CONTROL PANEL TROUBLESHOOTING CHART (5 OF 6)



CONTROL PANEL TROUBLESHOOTING CHART (6 OF 6)



Section IV. MAINTENANCE INSTRUCTIONS

INTRODUCTION

These procedures contain instructions for removal, applicable repairs, and installation to be performed after troubleshooting has isolated the faulty part. Applicable referenced steps of the control panel test should be run on the control panel, when a replacement part is installed, to verify proper repair. The control panel should then be installed in the amplifier-power supply. The amplifier-power supply minimum performance test should be run on the amplifier-power supply when a repaired and tested control panel or replacement part is installed, to verify proper operation.

CONTROL PANEL A9 MAINTENANCE INSTRUCTIONS (1 of 2)

This task covers:

REMOVAL **INSTALLATION** **TEST**

INITIAL SETUP

Tools:

Tool Kit, Electronic Equipment
TK-105/G

Materials/Parts:

None

Personnel Required:

1

REMOVAL

1. Position amplifier-power supply so that control panel (2) is facing you.
2. **Loosen** 14 captive **screws** (1) that secure control panel (2) to housing (3).
3. **Pull control panel** (2) about 3 inches from housing (3), tilt it down, and locate connector J4 (4).
4. **Loosen** two captive **screws** that secure connector J4 (4) of housing (3) to plug A9P1 **and separate J4 from A9P1.**
5. **Remove control panel** (2).
   Inspect seal (5) in accordance with Inspection instructions on page 3-92.

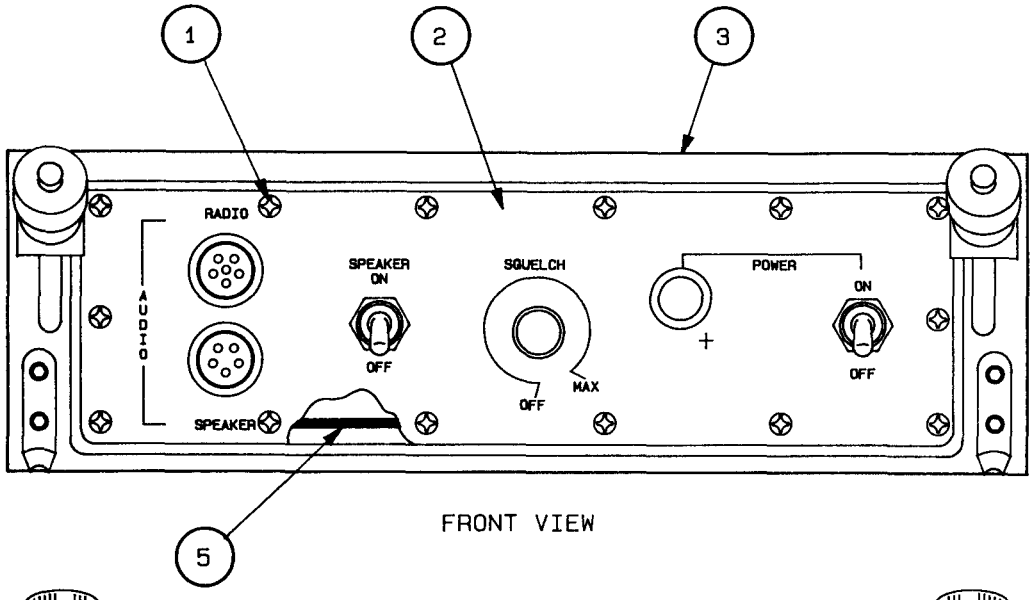
INSTALLATION

1. Position amplifier-power supply so that control panel (2) may be installed facing you.
2. Position control panel (2) within about 3 inches of housing (3) to connect connector J4 (4) of housing to plug A9P1.
3. **Connect** connector **J4** (4) of housing (3) **to** plug **A9P1 and tighten two captive screws.**
4. Position control panel (2) on housing (3).
5. **Tighten** 14 captive **screws** (1), securing control panel (2) to housing (3).

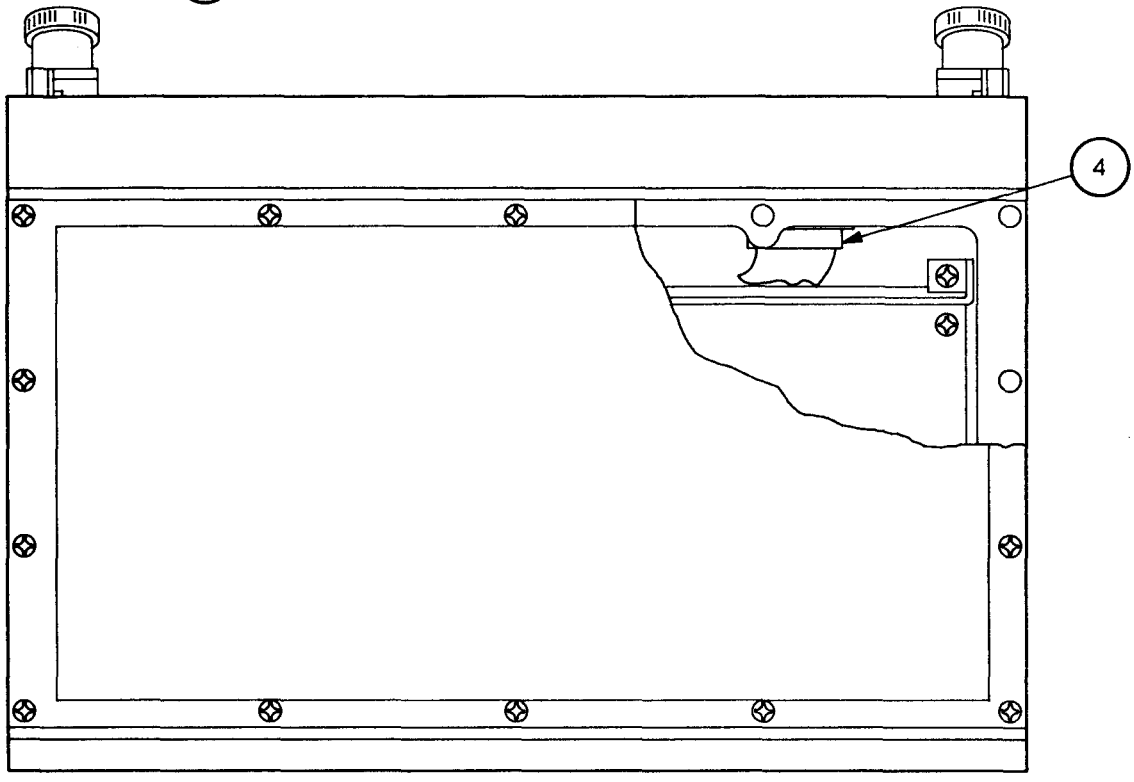
TEST

Perform Amplifier-Power Supply Minimum Performance Test on page 3-100.

CONTROL PANEL A9 MAINTENANCE INSTRUCTIONS (2 of 2)



FRONT VIEW



BOTTOM VIEW

AUDIO FILTER CIRCUIT A4 MAINTENANCE INSTRUCTIONS (1 of 4)

This task covers:

REMOVAL **INSTALLATION** **TEST**

INITIAL SETUP

Tools:

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts:

Masking tape (item 10, Appx B)

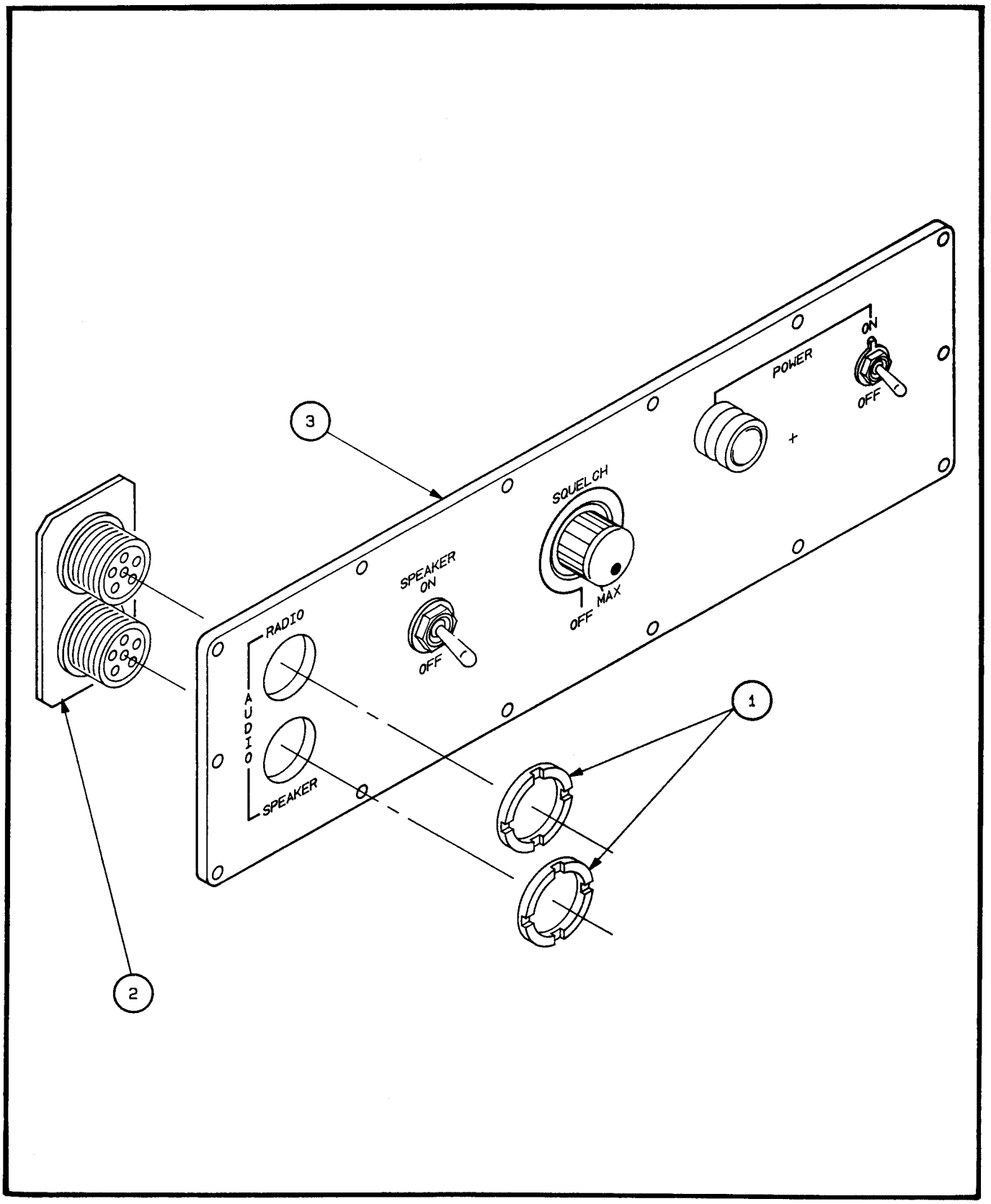
Personnel Required:

1

REMOVAL

1. Remove control panel in accordance with Removal instructions on page 3-24.
2. **Remove** outside **retaining rings** (1) with spanner wrench which secure audio filter circuit card (2) to control panel (3).
3. Carefully **separate audio filter circuit card (2) from control panel** (3).
4. **Tag** all **wires** attached to audio filter circuit card (2) with masking tape **and mark** correct **location** on card. Verify that all wires are tagged and marked correctly.
5. **Unsolder** and remove all **wires** that attach audio filter circuit card (2) to wiring harness **and remove card** from harness.

AUDIO FILTER CIRCUIT CARD A4 MAINTENANCE INSTRUCTIONS (2 of 4)



AUDIO FILTER CIRCUIT CARD A4 MAINTENANCE INSTRUCTIONS (3 of 4)

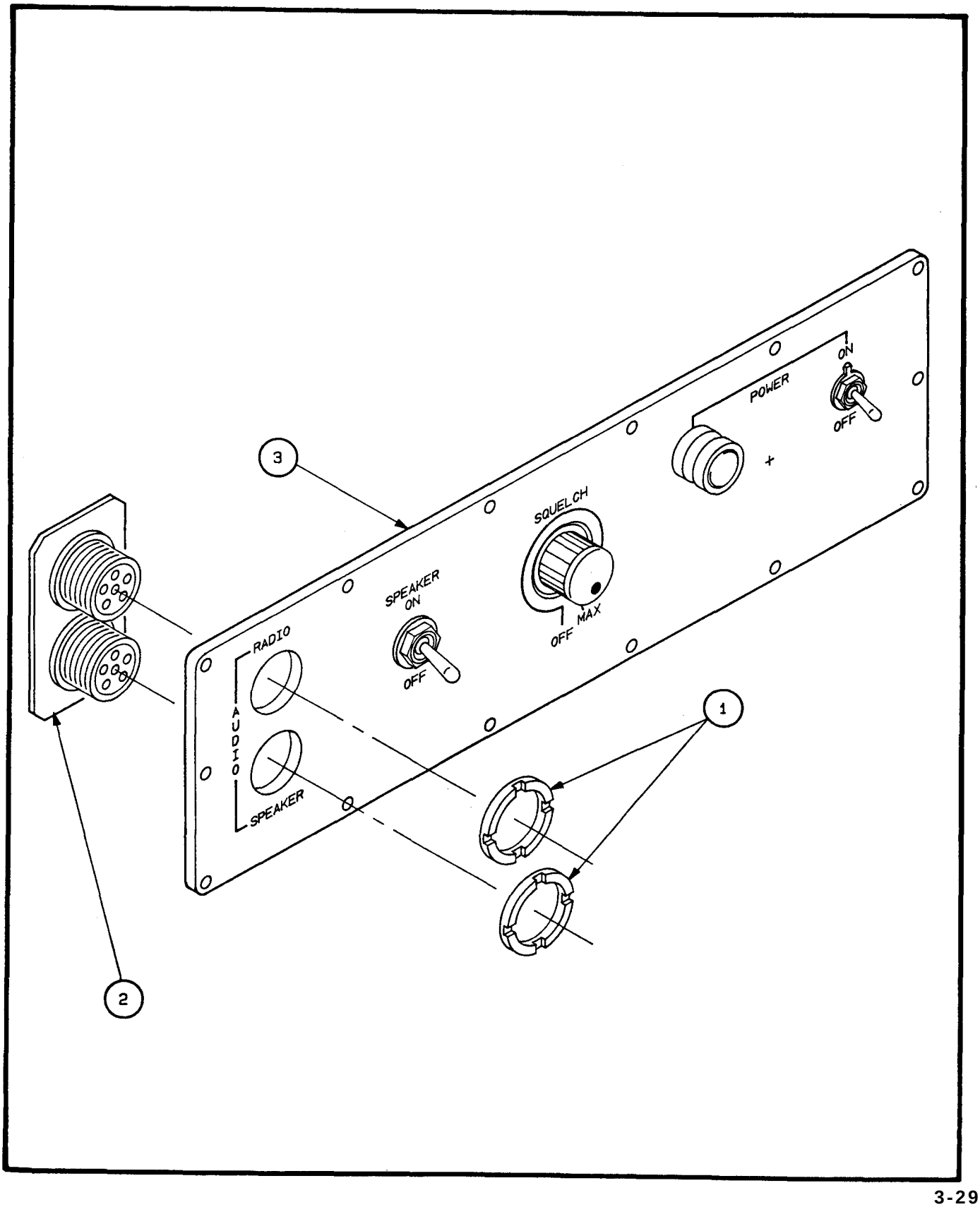
INSTALLATION

1. Position each wire on terminal on audio filter circuit card (2) in accordance with marked locations on tags. **Attach wires by soldering.**
2. Position audio filter circuit card (2) on control panel (3) and seat in holes in control panel.
3. Place outside retaining rings (1) on audio filter circuit card (2). **Tighten rings** with spanner wrench.
4. **Remove** all **tags** from wires.

TEST

1. Perform steps 14 thru 27 of Control Panel Test on page 3-96.
2. Install control panel in accordance with Installation instructions on page 3-24.
3. Perform Amplifier-Power Supply Minimum Performance Test on page 3-100.

AUDIO FILTER CIRCUIT CARD A4 MAINTENANCE INSTRUCTIONS (4 of 4)



SPEAKER SWITCH S1 MAINTENANCE INSTRUCTIONS (1 of 2)

This task covers:

REMOVAL **INSTALLATION** **TEST**

INITIAL SETUP

Tools:

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts:

Masking tape (item 10, Appx B)

Personnel Required:

1

REMOVAL

1. Remove control panel in accordance with Removal instructions on page 3-24.
2. **Remove nut** (1), **lockwasher** (2), **key washer** (3), **rubber seal** (4), **and nut** (5), which secure switch (6) to panel (7).
3. **Tag** two **wires** attached to switch (6) with masking tape **and mark** correct **location** on device. Verify that both wires are tagged and marked correctly.
4. **Unsolder** and remove both **wires** that attach to switch (6) **and remove switch** from panel (7).

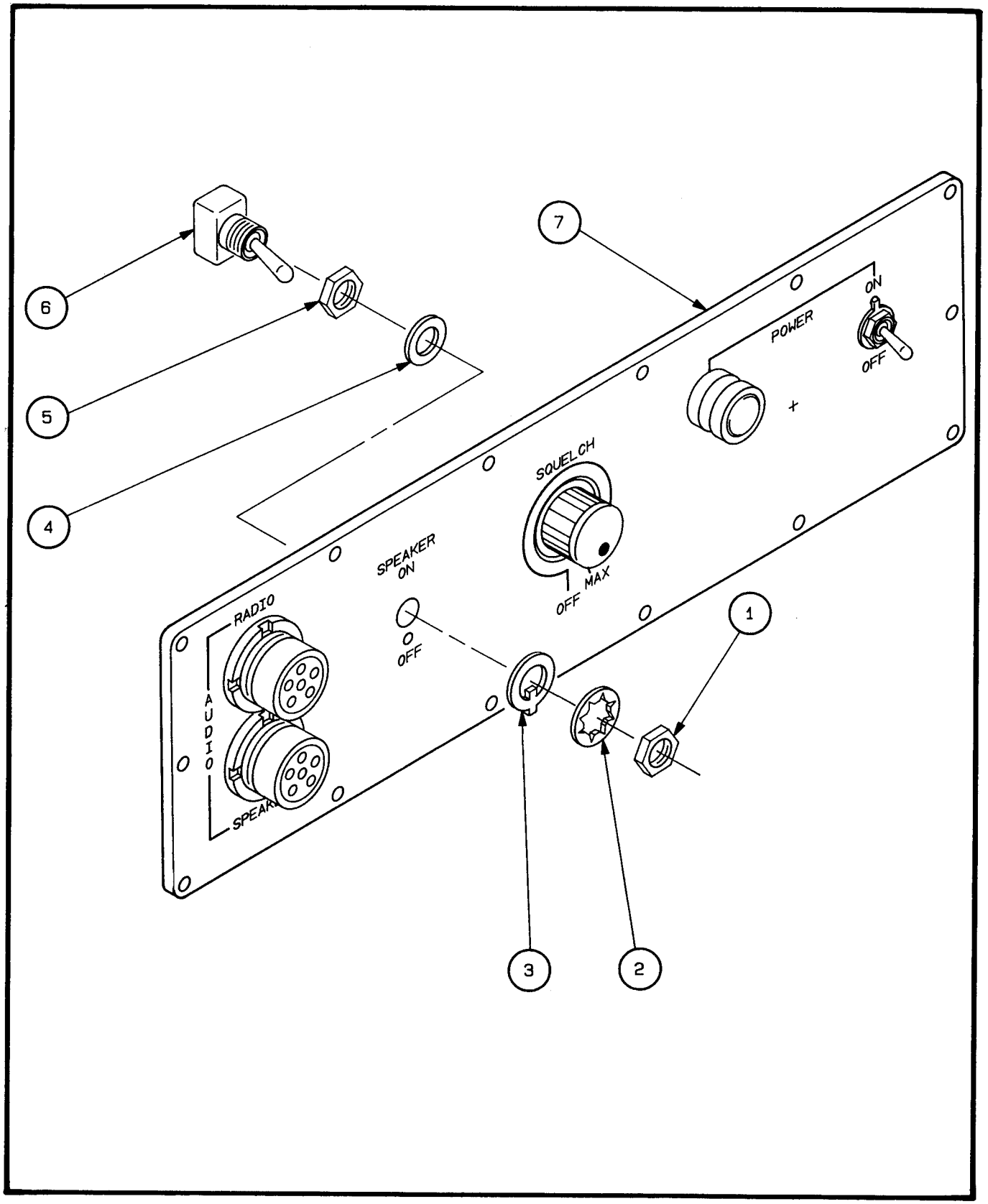
INSTALLATION

1. Position both wires on terminals on switch (2) in accordance with marked locations on tags. **Attach wires by soldering.**
2. **Position switch** (6) **with nut** (5) and **rubber seal** (4) on panel (7) and seat in hole in panel.
3. **Place** outside **nut** (1), **lockwasher** (2), and **key washer** (3) **on switch** (6). Insure key washer inside tab is seated in slot in switch threads. Seat key washer outside tab in recess in panel (7). **Tighten** outside **nut.**
4. **Remove** both **tags** from wires.

TEST

1. Perform steps 10 thru 12 of Control Panel Test on page 3-96.
2. Install control panel in accordance with Installation instructions on page 3-24.
3. Perform Amplifier-Power Supply Minimum Performance Test on page 3-100.

SPEAKER SWITCH S1 MAINTENANCE INSTRUCTIONS (2 of 2)



SQUELCH CONTROL RS1 MAINTENANCE INSTRTUCTIONS (1 of 2)

This task covers:

REMOVAL **INSTALLATION** **TEST**

INITIAL SETUP

Tools:

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts:

Masking tape (item 10, Appx B)

Personnel Required:

1

REMOVAL

1. Remove control panel in accordance with Removal instructions on page 3-24.
2. **Loosen** two **set screws** (1) which secure knob (2) to control (3) **and remove knob.**
3. **Remove nut** (4), **lockwasher** (5), **rubber seal** (6), **and recessed spacer** (7) which secure control (3) to panel (8).
4. **Tag** all **wires** attached to control (3) with masking tape **and mark** correct **location** on control. Verify that all wires are tagged and marked correctly.
5. **Unsolder** and remove all **wires** that attach to control (3) **and remove control** (3) from panel (8).

INSTALLATION

1. Position all wires on terminals on control (3) in accordance with marked locations on tags. **Attach wires by soldering.**

NOTE

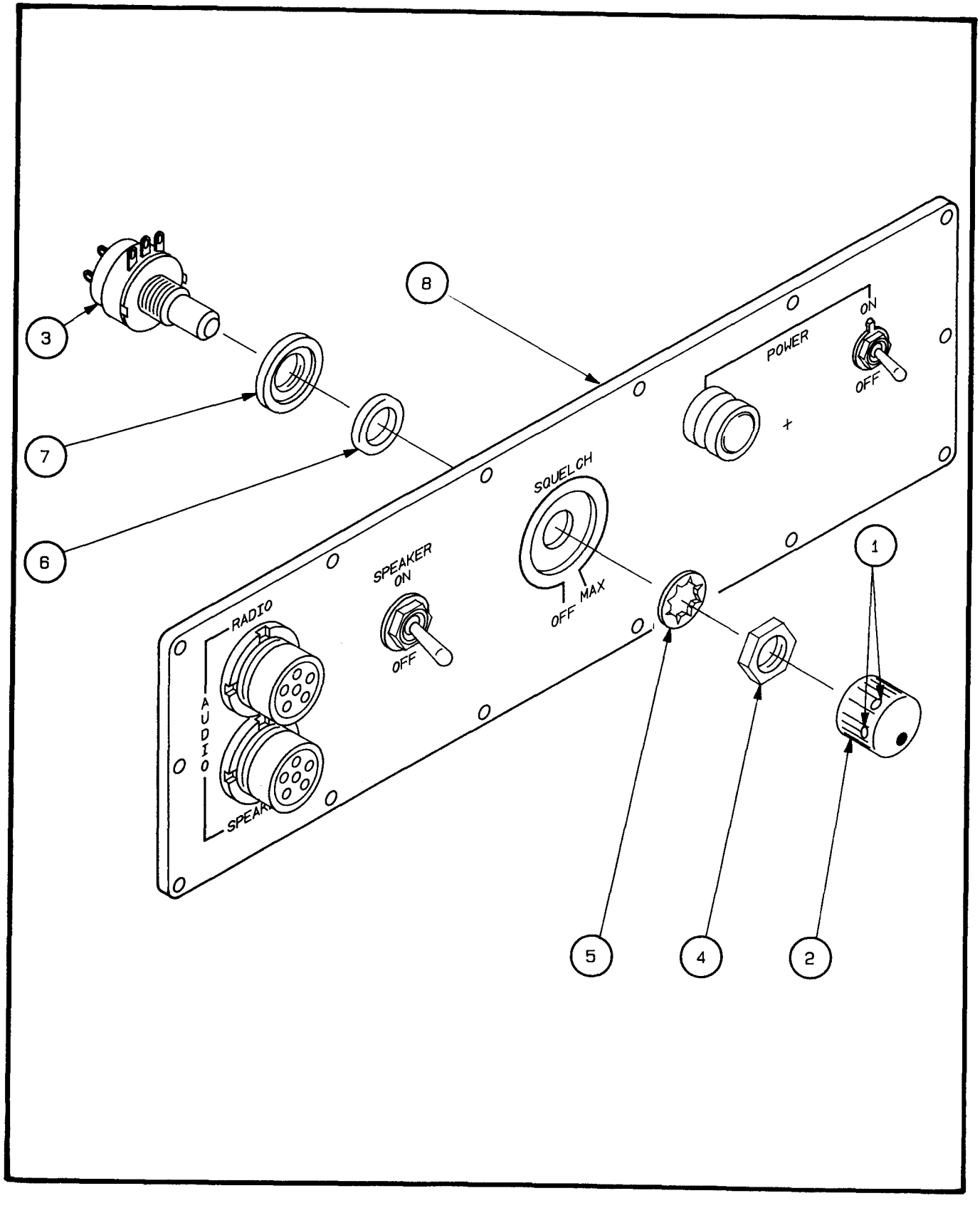
The recessed spacer (7) must be turned so that rubber seal (6) will seat in recess when installed.

2. Position control (3) with recessed spacer (7) and rubber seal (6) on panel (8) and seat in hole in panel. Insure keying tabs on control are in recesses in panel.
3. Place nut (4) and lockwasher (5) on control (3). **Tighten nut.**
4. **Remove** all **tags** from wires.
5. **Turn** control (3) **to OFF.**
6. Position knob (2) on control (3) and **aline white dot with OFF** on panel (8).
7. **Tighten** two **set screws** (1) securing knob to control (3).

TEST

1. Perform steps 4 thru 9 of Control Panel Test on page 3-96.
2. Install control panel in accordance with Installation instructions on page 3-24.
3. Perform Amplifier-Power Supply Minimum Performance Test on page 3-100.

SQUELCH CONTROL RS1 MAINTENANCE INSRUCTIONS (2 of 2)



POWER CIRCUIT BREAKER CB1 MAINTENANCE INSTRUCTIONS (1 of 2)

This task covers:

REMOVAL **INSTALLATION** **TEST**

Tools:

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts:

Masking tape (item 10, Appx B)

Personnel Required:

1

REMOVAL

1. Remove control panel in accordance with Removal instructions on page 3-24.
2. **Remove nut** (1), **lockwasher** (2), **key washer** (3), **and** rubber seal (4), which secure circuit breaker (5) to panel (6).
3. **Tag** all **wires** attached to circuit breaker (5) with masking tape **and mark** correct **location** on circuit breaker. Verify that all wires are tagged and marked correctly.
4. **Unsolder** and remove all **wires** that attach to circuit breaker (5) **and remove circuit breaker** from panel (6).

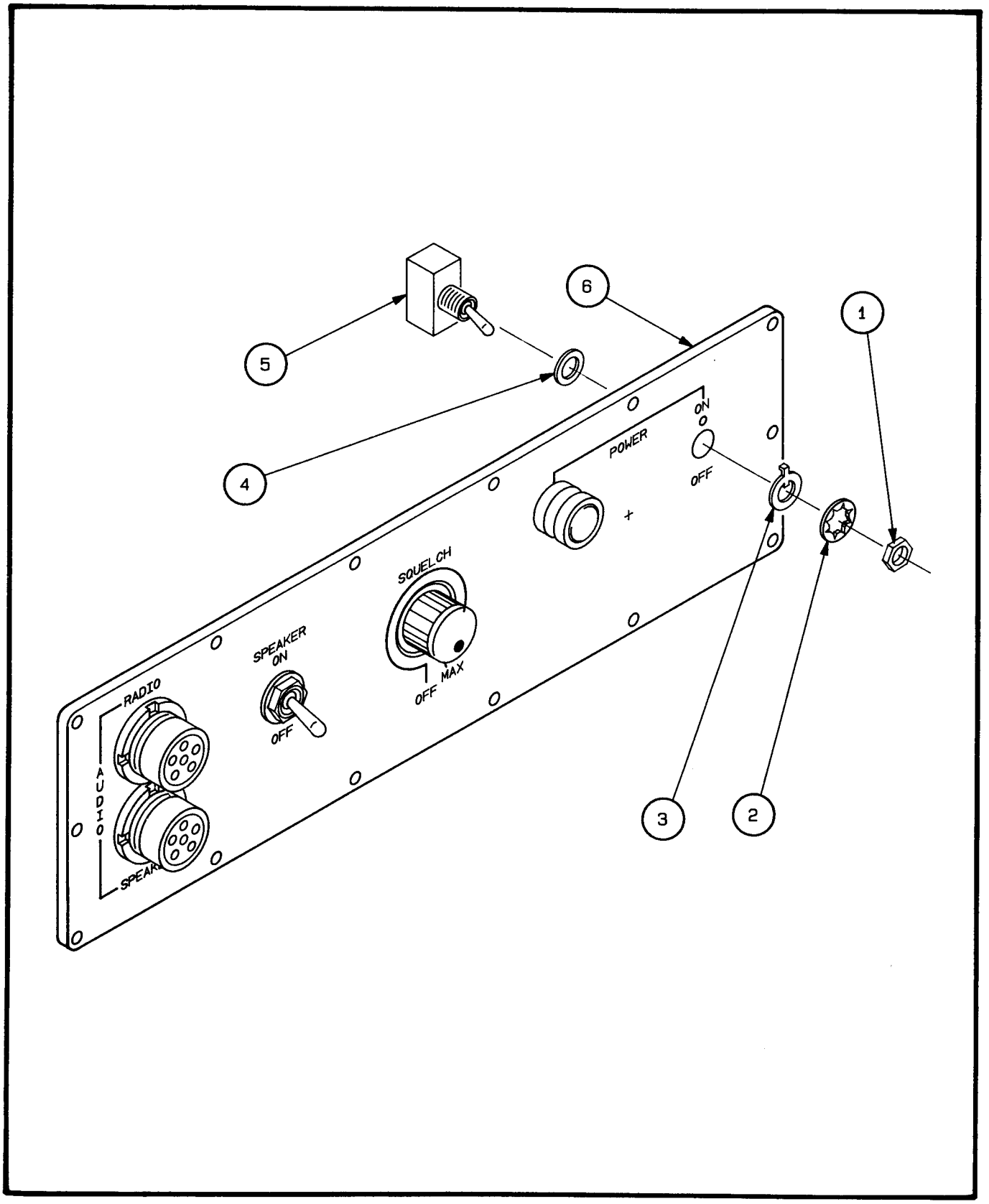
INSTALLATION

1. Position all wires on terminals on circuit breaker (5) in accordance with marked locations on tags. **Attach wires by soldering.**
2. Position circuit breaker (5) with rubber seal (4) on panel (6) and seat in hole in panel.
3. Place nut (1), lockwasher (2), and key washer (3) on circuit breaker (5). Insure key washer inside tab is seated in slot in circuit breaker threads. Seat key washer outside tab in recess in panel (6). **Tighten nut.**
4. **Remove** all **tags** from wires.

TEST

1. Perform steps 1 thru 3 of Control Panel Test on page 3-96.
2. Install control panel in accordance with Installation instructions on page 3-24.
3. Perform Amplifier-Power Supply Minimum Performance Test on page 3-100.

POWER CIRCUIT BREAKER CB1 MAINTENANCE INSTRUCTIONS (2 of 2)



POWER SWITCHLIGHT XDS1/DS1 MAINTENANCE INSTRUCTIONS (1 of 2)

This task covers:

REMOVAL **INSTALLATION** **TEST**

INITIAL SETUP

Tools:

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts:

Masking tape (item 10, Appx B)

Personnel Required:

1

REMOVAL

1. Remove control panel in accordance with Removal instructions on page 3-24.
2. **Remove lens** (1) **and lamp** (2) from base (3).
3. **Remove recessed round nut** (4), **rubber seal** (5), **rubber seal** (6), **lockwasher** (7), **and nut** (8) which secure base (3) to panel (9).
4. **Tag** all **wires** attached to base (3) with masking tape **and mark** correct **location** on base (3). Verify that all wires are tagged and marked correctly.
5. **Unsolder** and remove all **wires** that attach to base (3) **and remove base** from panel (9).

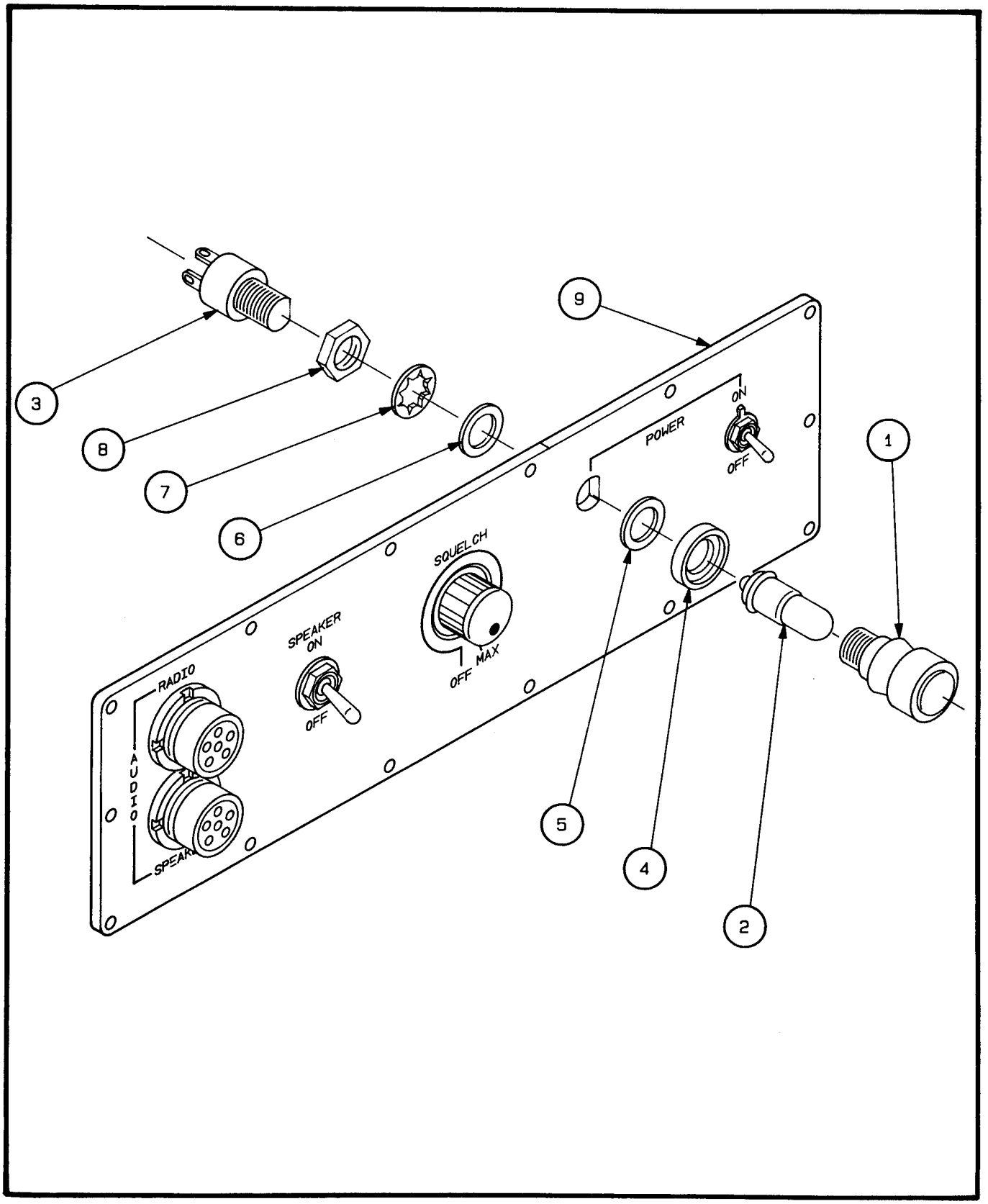
INSTALLATION

1. Position all wires on terminals on base (3) in accordance with marked locations on tags. **Attach wires by soldering.**
2. Screw nut (8) far enough onto base (3) so that recessed round nut (4) will secure base to panel (9).
3. Position base (3) with nut (8), lockwasher (7), and rubber seal (6) on panel (9) and seat in hole in panel.
4. Place recessed round nut (4) and rubber seal (5) on base (3). Insure recessed side of recessed round nut faces outward. **Tighten** recessed round nut.
5. **Remove** both **tags** from wires.
6. Place lens (1) and lamp (2) onto base (3). **Tighten lens.**

TEST

1. Perform step 13 of Control Panel Test on page 3-96.
2. Install control panel in accordance Installation instructions on page 3-24.
3. Perform Amplifier-Power Supply Minimum Performance Test on page 3-100.

POWER SWITCH LIGHT XDS1/DS1 MAINTENANCE INSTRUCTIONS (2 of 2)



COVER MAINTENANCE INSTRUCTIONS (1 of 2)

This task covers:

REMOVAL **INSTALLATION**

INITIAL SETUP

Tools:

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts:

None

Personnel Required:

1

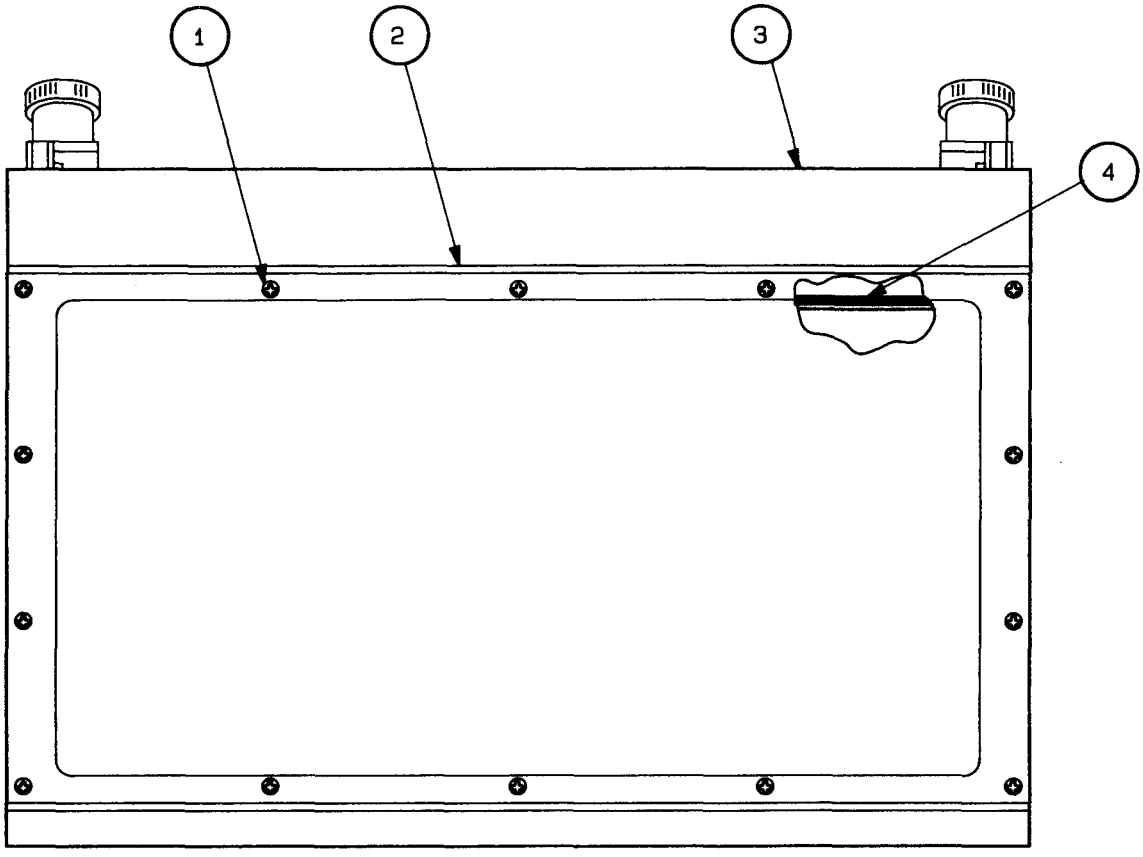
REMOVAL

1. Position amplifier-power supply upside down so that cover (2) is facing up.
2. **Loosen** 14 captive **screws** (1) which secure cover (2) to housing (3) **and remove cover.**
3. Inspect seal (4) in accordance with Inspection instructions on page 3-92.

INSTALLATION

1. Position amplifier-power supply upside down so that cover (2) may be installed facing up.
2. Position cover (2) on housing (3).
3. **Tighten** 14 captive **screws** (1), securing cover (2) to housing (3).

COVER MAINTENANCE INSTRUCTIONS (2 of 2)



BOTTOM VIEW

CARD CAGE ASSEMBLY REMOVAL AND INSTALLATION INSTRUCTIONS (1 of 4)

This task covers:

REMOVAL **INSTALLATION** **TEST**

INITIAL SETUP

Tools:

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts:

None

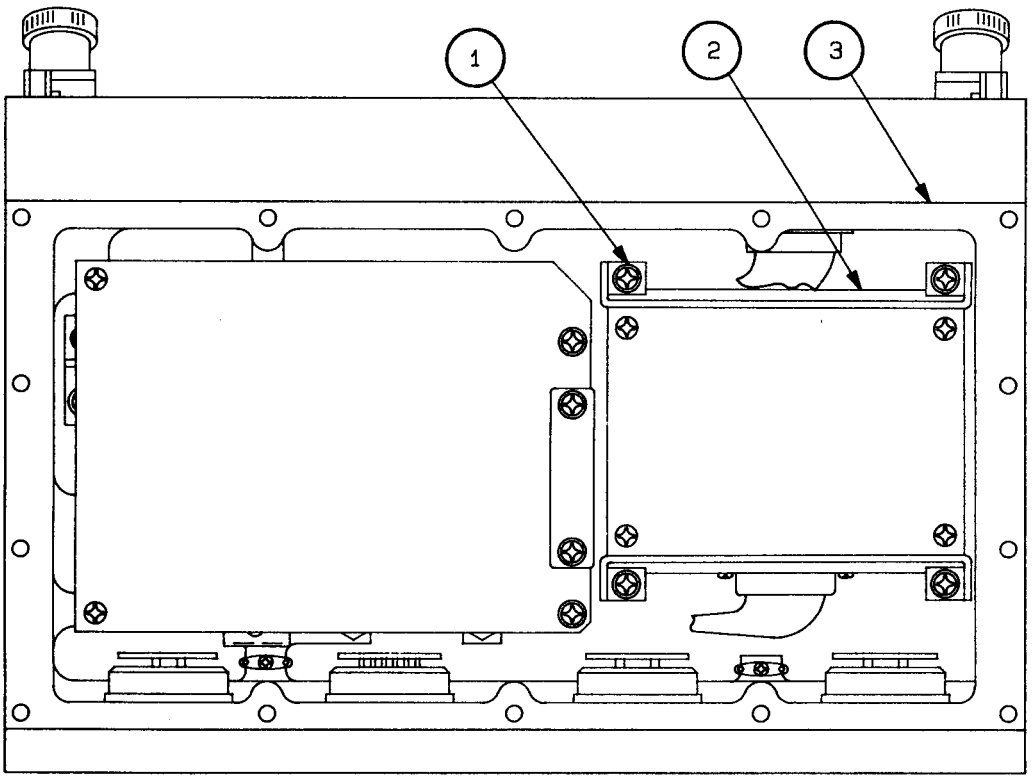
Personnel Required:

1

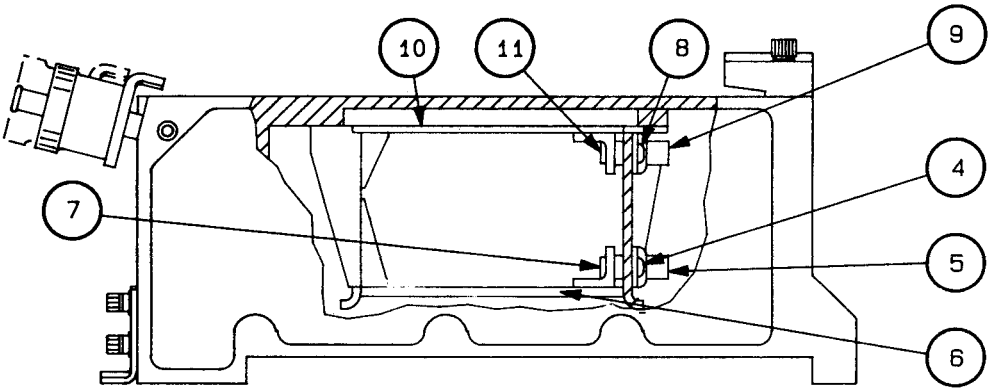
REMOVAL

1. Remove cover in accordance with Removal instructions on page 3-38.
2. Remove amplifier-squelch card in accordance with Removal instructions on page 3-46.
3. **Loosen** four captive **screws** (1) which secure card cage assembly (2) to housing (3).
4. **Lift back end** of card cage assembly (2) about **1 inch out of housing** (3).
5. **Loosen** two captive **screws** (4) which secure connector J2 (5) to plug A3P1 (7) on vehicular intercommunication interface card (6) **and disconnect J2 from A3P1.**
6. Lift entire card cage assembly (2) 2 inches toward left end of housing (3).
7. **Loosen** two captive **screws** (8) which secure connector J1 (9) to plug A1P1 (11) on power conditioner card (10) **and disconnect** J1 (9) **from A1P1** (11).
8. **Remove card cage assembly** (2) from housing (3).

CARD CAGE ASSEMBLY REMOVAL AND INSTALLATION INSTRUCTIONS (2 of 4)



BOTTOM VIEW



RIGHT SIDE VIEW

CARD CAGE ASSEMBLY REMOVAL AND INSTALLATION INSTRUCTIONS (3 of 4)

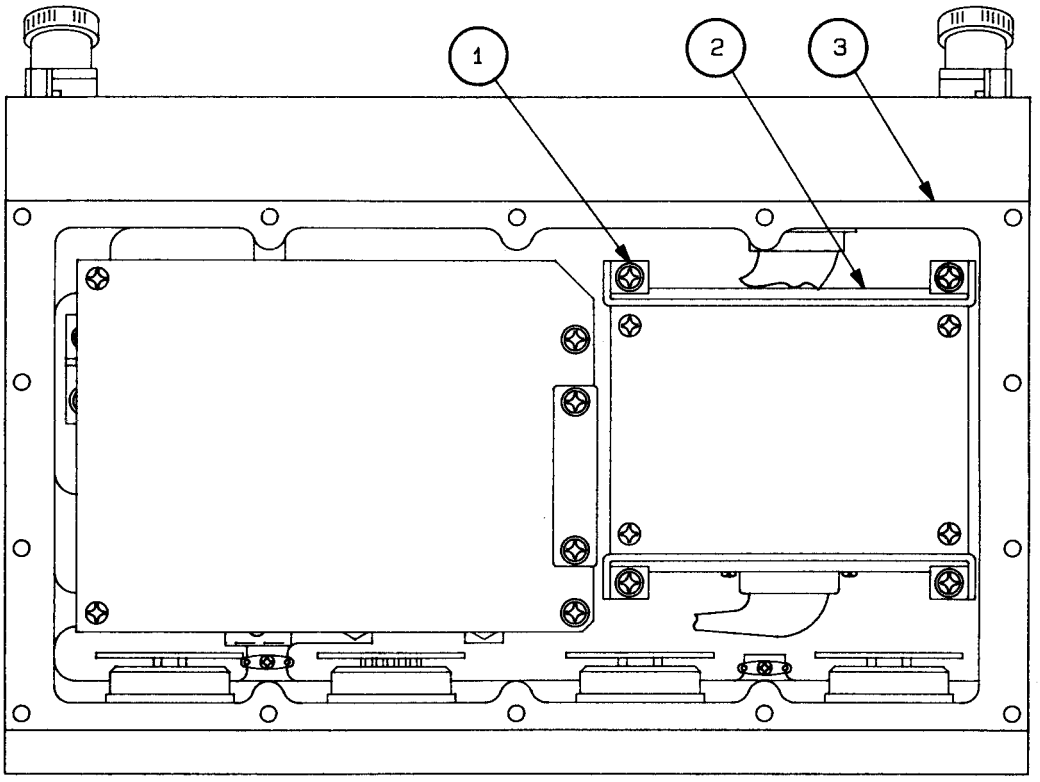
INSTALLATION

1. **Position** card cage assembly (2) about **1 inch out of housing** and 2 inches left of its installed position.
2. **Connect** connector **J1** (9) **to** plug **A1P1** (11) on power conditioner card (10) **and tighten** two captive **screws** (8), securing J1 to A1P1.
3. **Put** card cage assembly (2) back into housing (3) so that assembly is about **1 inch out of housing,** directly over installed position.
4. Connect connector **J2** (5) to plug **A3P1** (7) on vehicular intercommunication interface card (6) **and tighten** two captive **screws** (4), securing J2 to A3P1.
5. **Tighten** four captive **screws** (1), securing card cage assembly (2) to housing (3).
6. Install amplifier-squelch card in accordance with Installation instructions on page 3-46.
7. Install cover in accordance with Installation instructions on page 3-38.

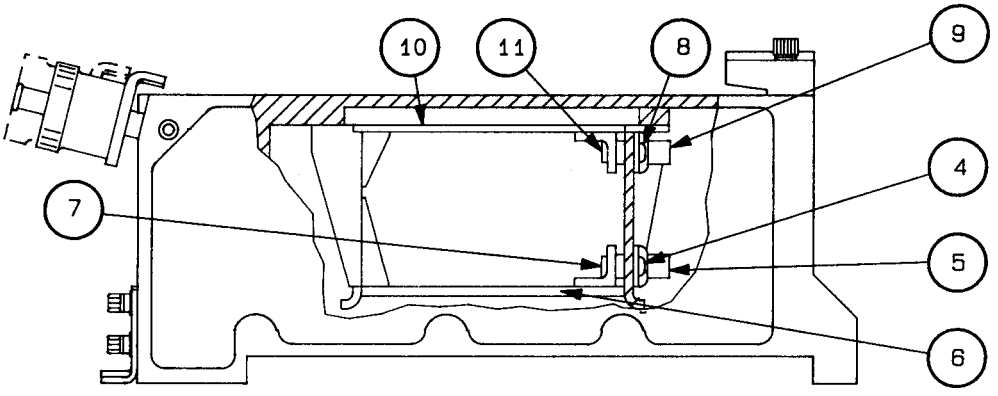
TEST

Perform Amplifier-Power Supply Minimum Performance Test on page 3-100.

CARD CAGE ASSEMBLY REMOVAL AND INSTALLATION INSTRUCTIONS (4 of 4)



BOTTOM VIEW



RIGHT SIDE VIEW

POWER CONDITIONER CARD A1 MAINTENANCE INSTRUCTIONS

This task covers:

REMOVAL **INSTALLATION** **TEST**

INITIAL SETUP

Tools:

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts:

None

Personnel Required:

1

REMOVAL

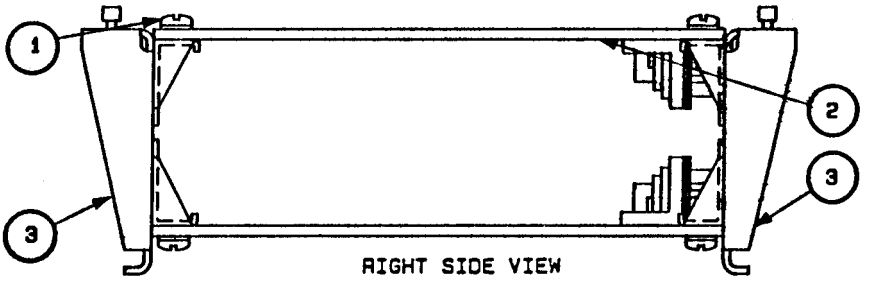
1. Remove cover in accordance with Removal instructions on page 3-38.
2. Remove card cage assembly in accordance with Removal instructions on page 3-40.
3. **Remove** four attaching **screws** (1) which secure power conditioner card (2) to card cage assembly mounting brackets (3) **and remove power conditioner card** from brackets.

INSTALLATION

1. Position power conditioner card (2) on card cage assembly mounting brackets (3).
2. **Secure power conditioner card** (2) to card cage assembly mounting brackets (3) **with** four attaching **screws** (1).
3. Install card cage assembly in accordance with card cage assembly installation instructions on page 3-42.
4. Install cover in accordance with cover installation instructions on page 3-38.

TEST

Perform Amplifier-Power Supply Minimum Performance Test on page 3-100.



RIGHT SIDE VIEW

VEHICULAR INTERCOMMUNICATION INTERFACE CARD A3 MAINTENANCE INSTRUCTIONS

This task covers:

REMOVAL **INSTALLATION** **TEST**

Tools:

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts:

None

Personnel Required:

1

REMOVAL

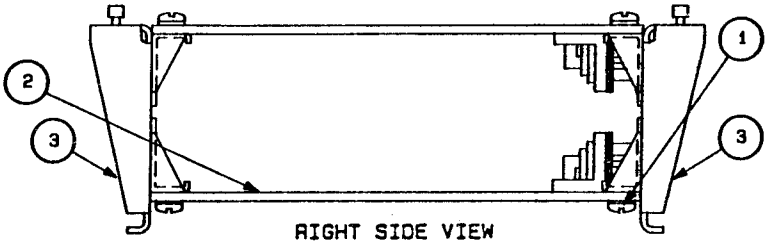
1. Remove cover in accordance with Removal instructions on page 3-38.
2. Remove card cage assembly in accordance with Removal instructions on page 3-40.
3. **Remove** four attaching **screws** (1) which secure vehicular intercommunication interface card (2) to card cage assembly mounting brackets (3) **and remove vehicular intercommunication interface card** from brackets.

INSTALLATION

1. Position vehicular intercommunication interface card (2) on card cage assembly mounting brackets (3).
2. **Secure vehicular intercommunication interface card** (2) to card cage assembly mounting bracket (3) **with** four attaching **screws** (1).
3. Install card cage assembly in accordance with Installation instructions on page 3-42.
4. Install cover in accordance with Installation instructions on page 3-38.

TEST

Perform Amplifier-Power Supply Minimum Performance Test on page 3-100.



RIGHT SIDE VIEW

AMPLIFIER-SQUELCH CARD A2 MAINTENANCE INSTRUCTIONS (1 of 2)

This task covers:

REMOVAL **INSTALLATION** **TEST**

INITIAL SETUP

Tools:

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts:

None

Personnel Required:

1

REMOVAL

1. Remove cover in accordance with Removal instructions on page 3-38.
2. **Loosen** four captive **screws** (1) which secure amplifier-squelch card (2) to housing (3).
3. **Pull amplifier-squelch card** (2) straight up until plug A2P1 (4) disconnects from connector J3 (5) and lift card from housing (3).

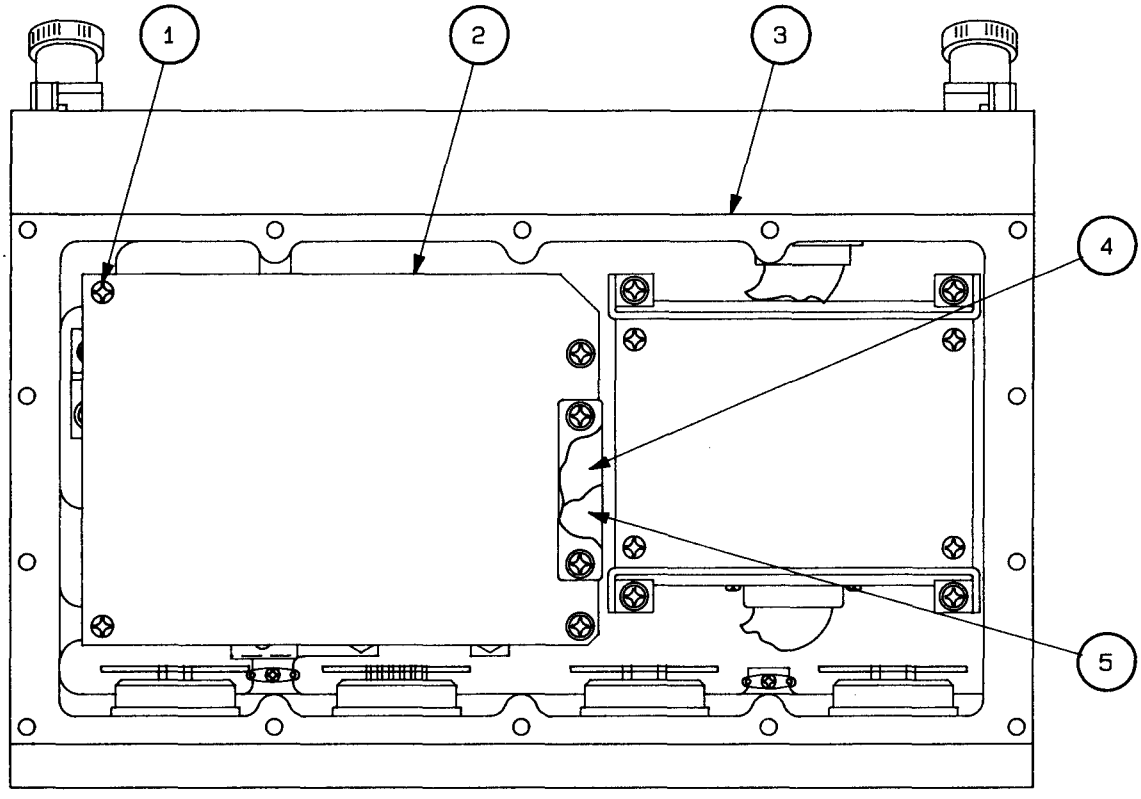
INSTALLATION

1. Position amplifier-squelch card (2) over connector J3 (5).
2. Correctly aline plug A2P1 (4) with connector J3 (5). **Connect** plug **A2P1** with connector **J3** and **seat amplifier-squelch card** (2) on housing (3).
3. **Tighten** four captive **screws** (1) securing amplifier-squelch card (2) to housing (3).
4. Install cover in accordance with Installation instructions on page 3-38.

TEST

Perform Amplifier-Power Supply Minimum Performance Test on page 3-100.

AMPLIFIER-SQUELCH CARD A2 MAINTENANCE INSTRUCTIONS (2 of 2)



BOTTOM VIEW

POWER INPUT CONNECTOR CARD A5 MAINTENANCE INSTRUCTIONS (1 of 2)

This task covers:

REMOVAL **INSTALLATION** **TEST**

INITIAL SETUP

Tools:

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts:

Masking tape (item 10, Appx B)

Personnel Required:

1

REMOVAL

1. Remove cover in accordance with Removal instructions on page 3-38.
2. Remove amplifier-squelch card (1) in accordance with Removal instructions on page 3-46.
3. Remove two attaching screws and washers which secure transorb to housing, in accordance with Removal instructions on page 3-70.
4. Position rear of amplifier-power supply housing (2) so that it faces you and **remove** outside **retaining ring** (3) with spanner wrench which secures power input connector card (4) to housing.
5. **Push power input card** completely **into housing** (2). Position card (4) so that component side faces down, away from you.
6. **Tag and mark** all **wires** attached to power input connector card (4) with masking tape and mark correct location on card (4). Verify that all wires are tagged and marked correctly.
7. **Unsolder** and remove all **wires** that attach power input connector card (4) to wiring harness **and remove card** from housing (2).

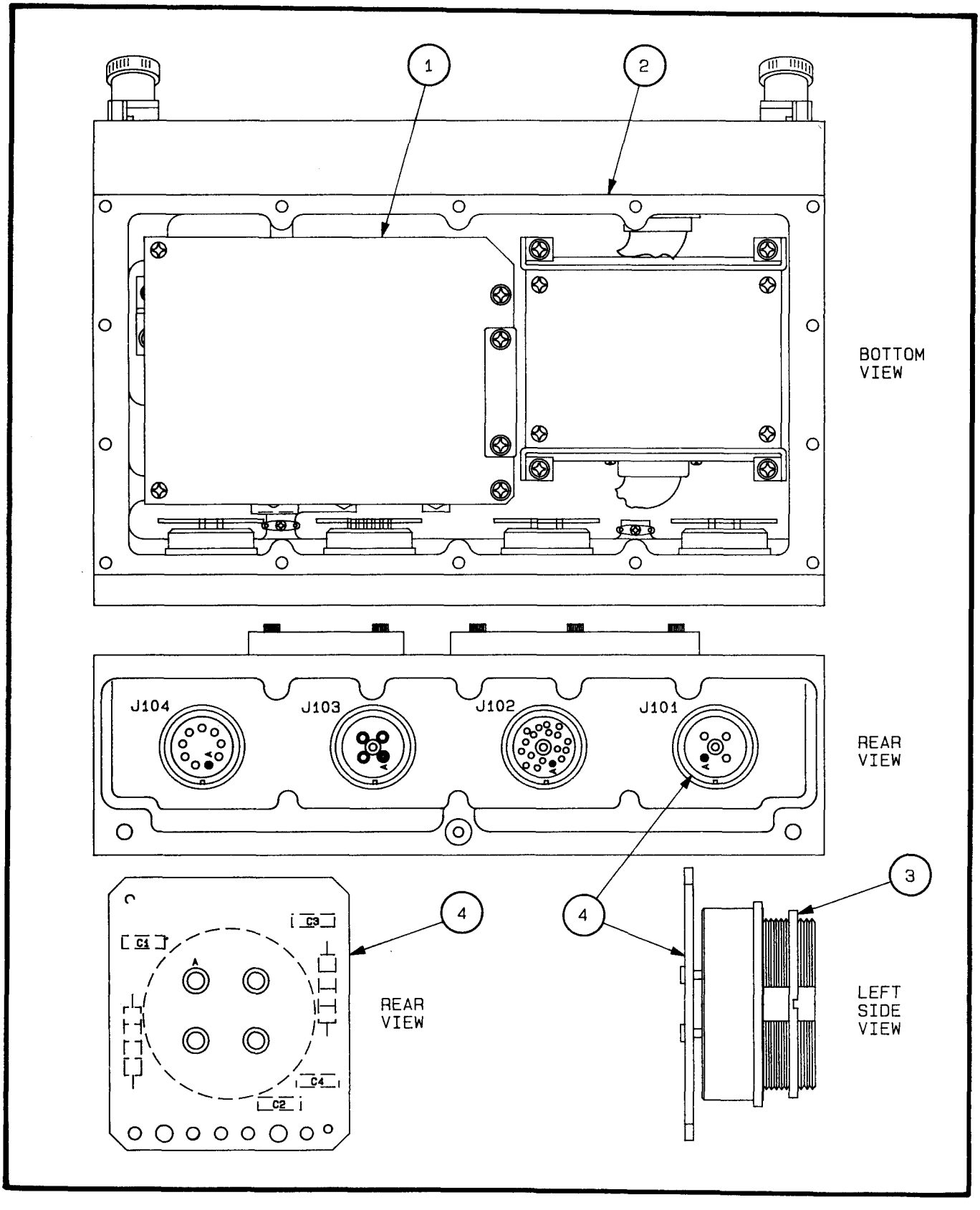
INSTALLATION

1. Position each wire on terminal on power input connector card (4) in accordance with marked locations on tags. **Attach wires by soldering.**
2. Position power input connector card (4) within housing (2) and seat in hole in housing.
3. Place outside retaining ring (3) on power input connector card (4). **Tighten ring** with spanner wrench.
4. **Remove** all **tags** from wires.
5. Install transorb with two attaching screws and washers in accordance with Installation instructions on page 3-72.
6. Install amplifier-squelch card (1) in accordance with Installation instructions on page 3-46.
7. Install cover in accordance with Installation instructions on page 3-38.

TEST

Perform AmplifiePower Supply Minimum Performance Test on page 3-100.

POWER INPUT CONNECTOR CARD A5 MAINTENANCE INSTRUCTIONS (2 of 2)



EXTERNAL POWER CONNECTOR CARD A6 MAINTENANCE INSTRUCTIONS (1 of 4)

This task covers:

REMOVAL **INSTALLATION** **TEST**

INITIAL SETUP

Tools:

Tool Kit, Electronic Equipment TK-105/G

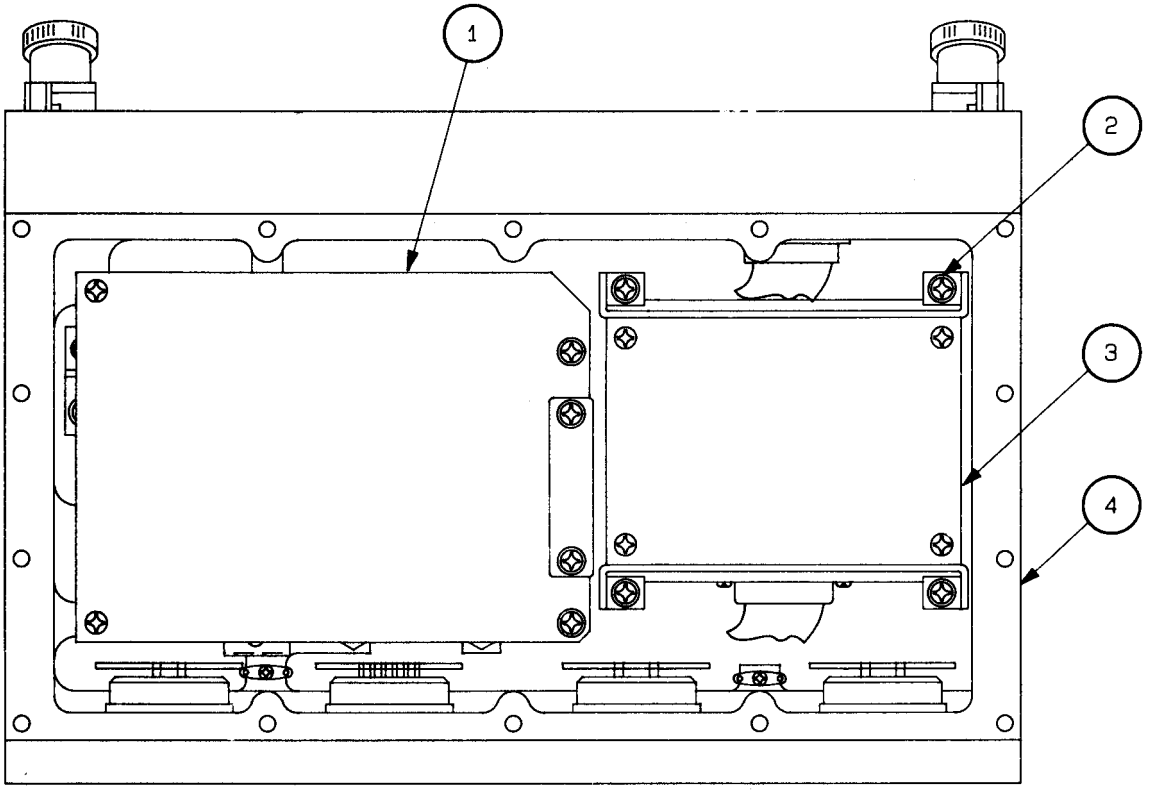
Materials/Parts:

Masking tape (item 10, Appx B)

Personnel Required:

1

1. Remove cover in accordance with Removal instructions on page 3-38.
2. Remove amplifier-squelch card (1) in accordance with Removal instructions on page 3-46.
3. **Loosen** four captive **screws** (2) which secure card cage assembly (3) to housing (4).
4. Lift card cage assembly (3) out of housing (4) and turn it over so that back end faces down, away from you. Position card cage assembly (3) outside end of housing (4).

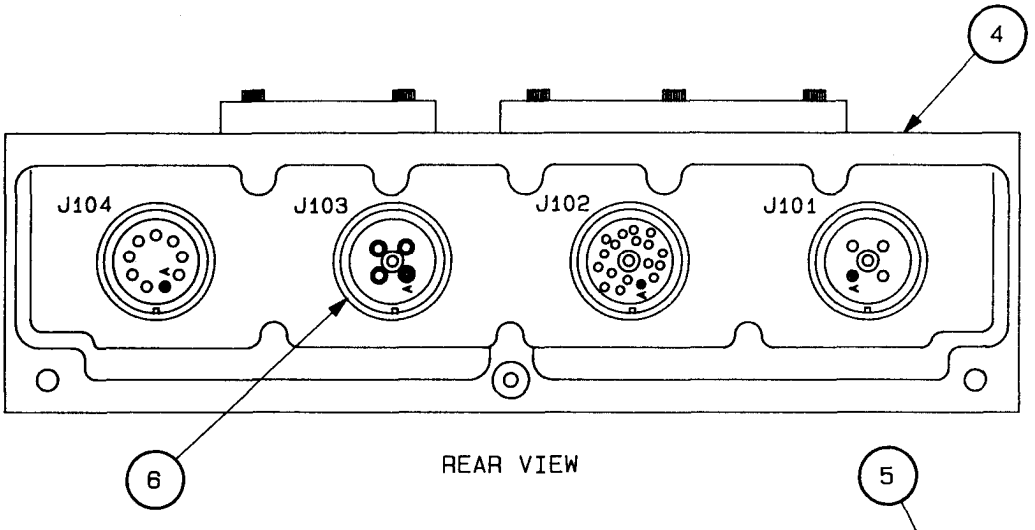


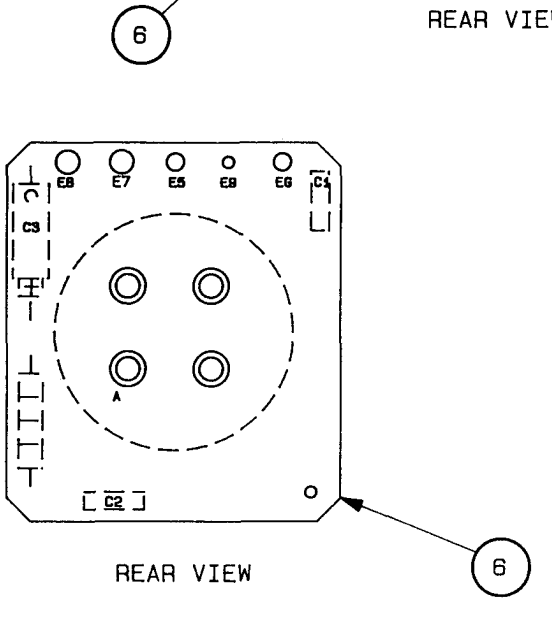
BOTTOM VIEW

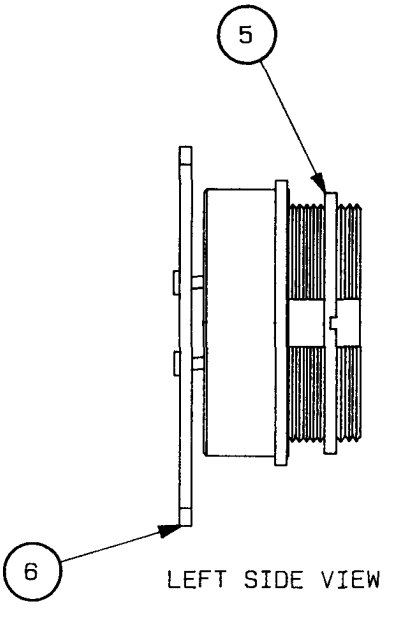
EXTERNAL POWER CONNECTOR CARD A6 MAINTENANCE INSTRUCTIONS (2 of 4)

REMOVAL (Cont)

5. Position rear of housing (4) so that it faces you and **remove** outside **retaining ring** (5) with spanner wrench which secures external power connector card (6) to housing.
6. Push external power connector card (6) completely **into housing** (4). Position card so that component side faces top of housing.
7. Tag all **wires** attached to external power connector card (6) with masking tape and mark with correct location on card. Verify that all wires are tagged and marked correctly.
8. **Unsolder** and remove all **wires** that attach external power connector card (6) to wiring harness **and remove card** from housing (4).



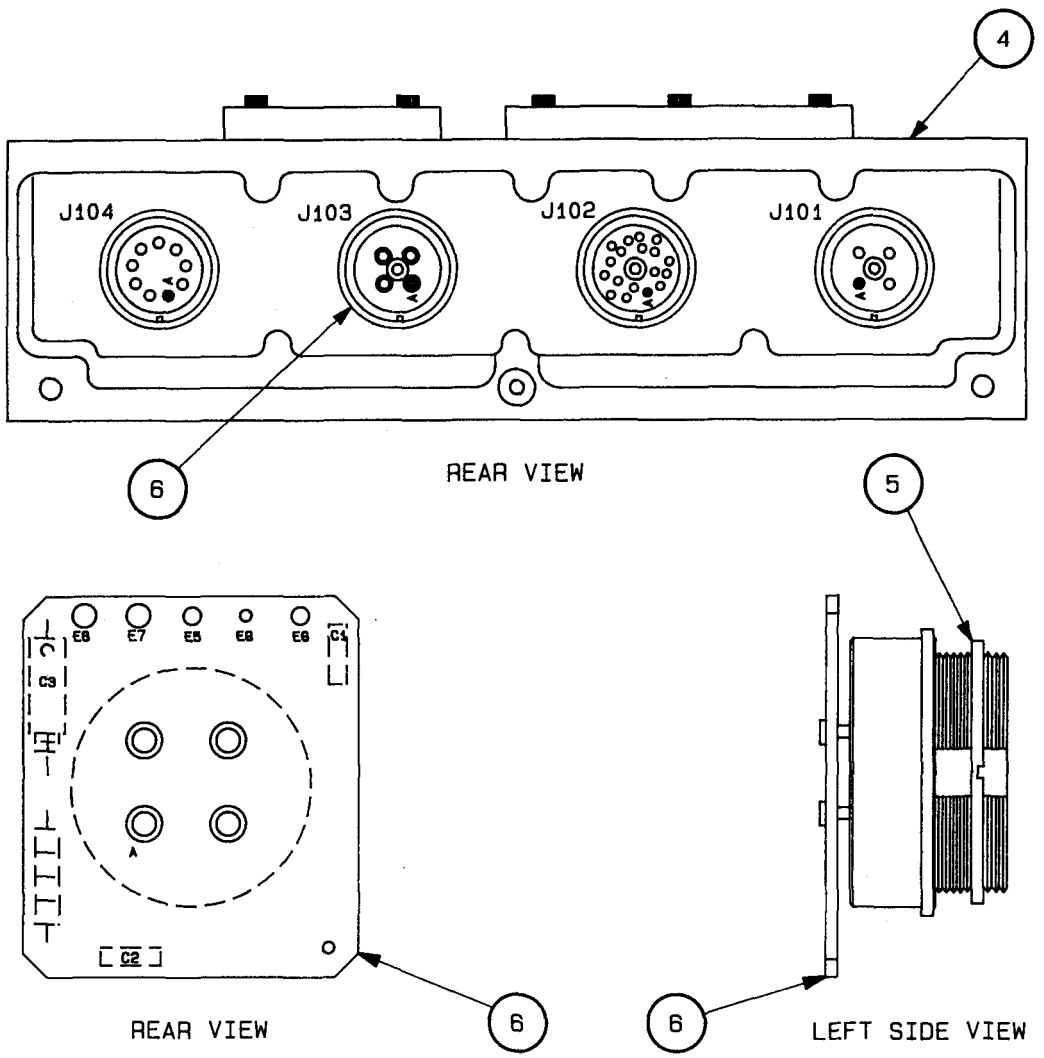




EXTERNAL POWER CONNECTOR CARD A6 MAINTENANCE INSTRUCTIONS (3 of 4)

INSTALLATION

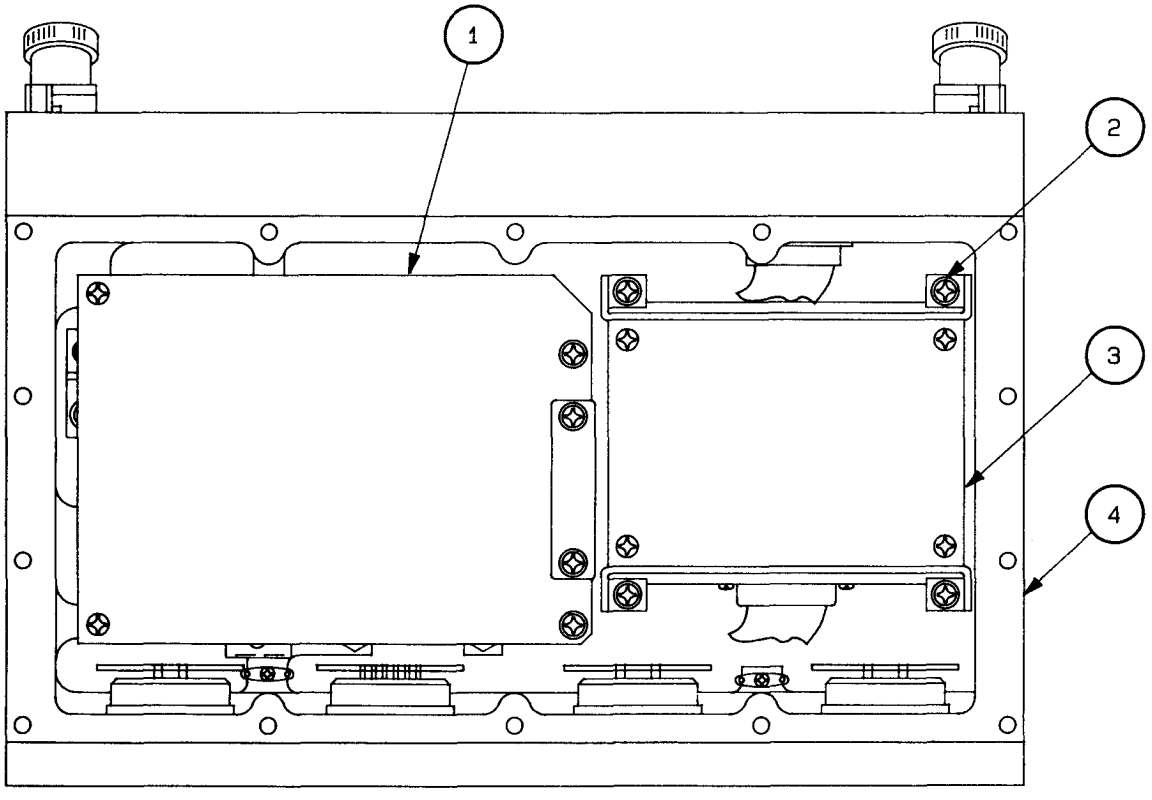
1. Position each wire on terminal on external power connector card (6), in accordance with marked locations on tags. **Attach wires by soldering.**
2. Position external power connector card (6) within housing (4) and seat in hole in housing.
3. Place outside retaining ring (5) on external power connector card (6). **Tighten ring** with spanner wrench.
4. **Remove** all **tags** from wires.



EXTERNAL POWER CONNECTOR CARD A6 MAINTENANCE INSTRUCTIONS (4 of 4)

INSTALLATION (Cont)

5. **Tighten** four captive **screws** (2), securing card cage assembly (3) to housing (4).
6. Install amplifier-squelch card (1) in accordance with Installation instructions on page 3-46.
7. Install cover in accordance with Installation instructions on page 3-38.



BOTTOM VIEW

TEST

Perform Amplifier-Power Supply Minimum Performance Test on page 3-100.

RADIO POWER CONNECTOR CARD A7 MAINTENANCE INSTRUCTIONS (1 of 4)

This task covers:

REMOVAL **INSTALLATION** **TEST**

INITIAL SETUP

Tools:

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts:

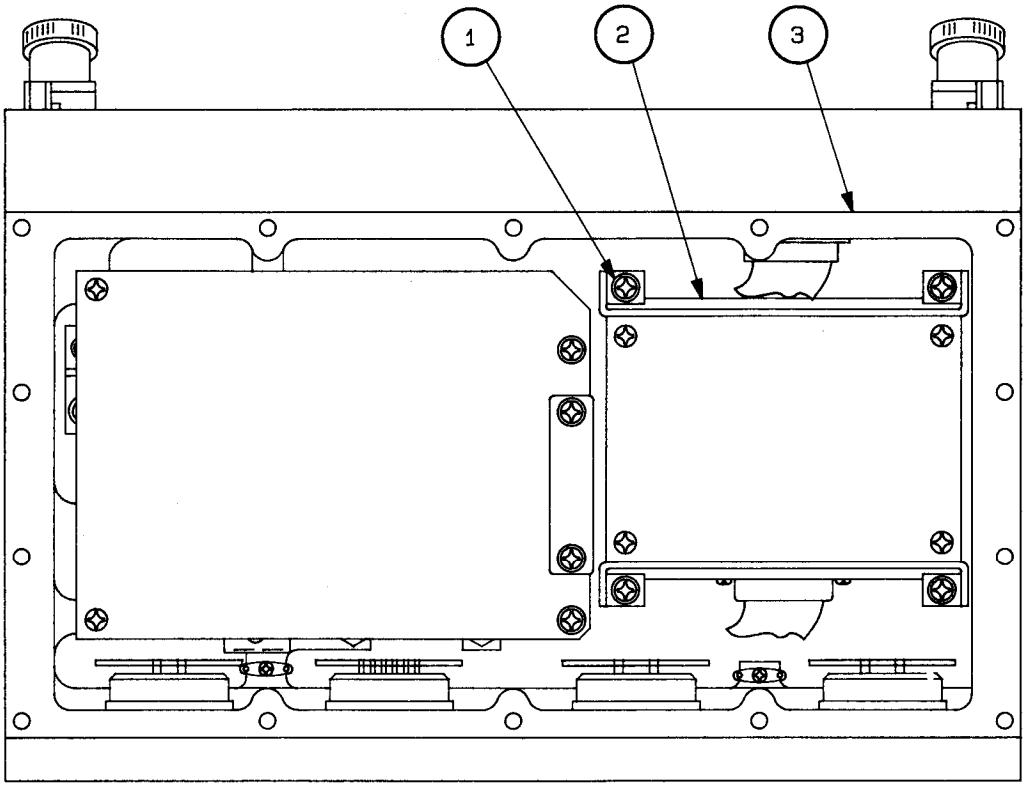
Masking tape (item 10, Appx B)

Personnel Required:

1

REMOVAL

1. Remove cover in accordance with Removal instructions on page 3-38.
2. **Loosen** four captive **screws** (1) which secure card cage assembly (2) to housing (3).
3. Lift card cage assembly (2) out of housing (3) and turn it over so that back end faces down, away from you. Position card cage assembly outside front of housing (3).

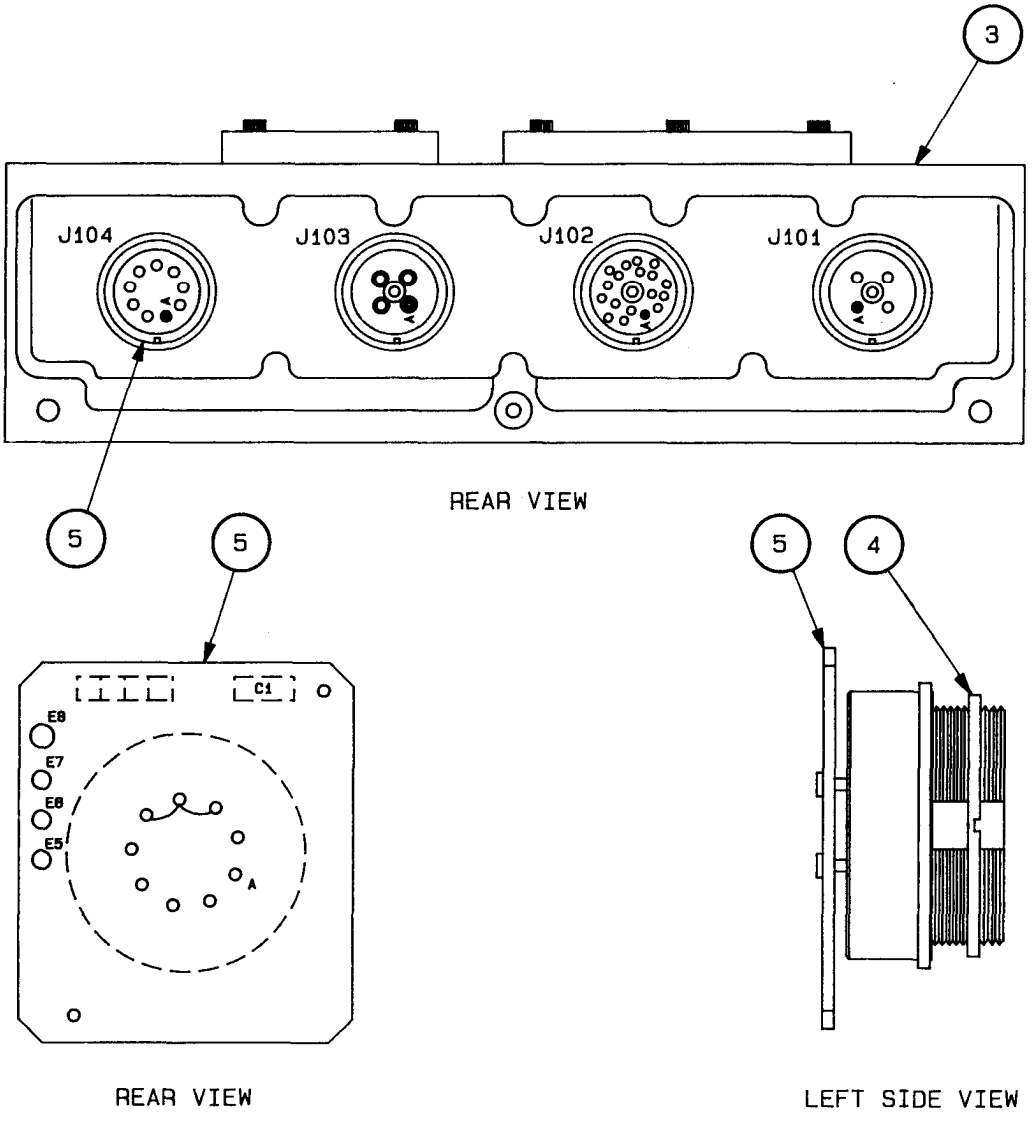


BOTTOM VIEW

RADIO POWER CONNECTOR CARD A7 MAINTENANCE INSTRUCTIONS (2 of 4)

REMOVAL (Cont)

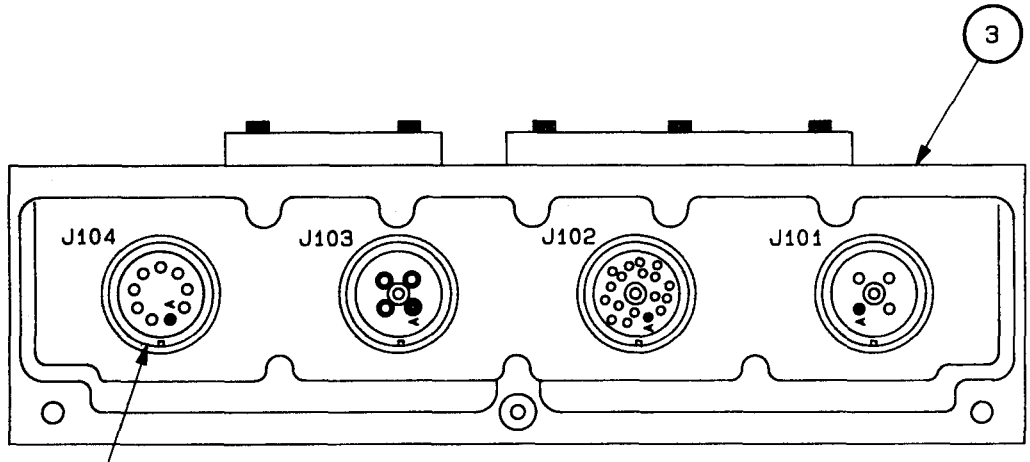
4. Position rear of housing (3) so that it faces you and **remove** outside **retaining ring** (4) with spanner wrench which secures radio power connector card (5) to housing (3).
5. **Push radio power connector card** (5) completely **into housing** (3). Position card so that component side faces top of housing.
6. **Tag** all **wires** attached to radio power connector card (5) with masking tape and mark correct location on card. Verify that all wires are tagged and marked correctly.
7. **Unsolder** and remove all **wires** that attach radio power connector card (5) to wiring harness **and remove card** from housing (3).



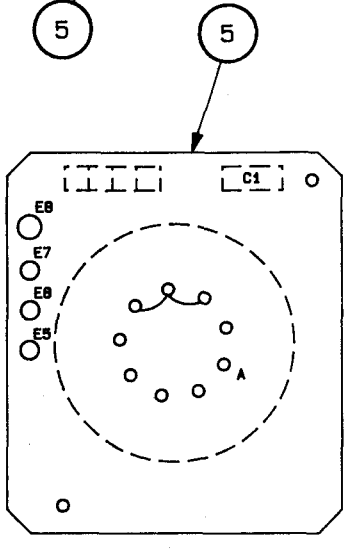
RADIO POWER CONNECTOR CARD A7 MAINTENANCE INSTRUCTIONS (3 of 4)

INSTALLATION

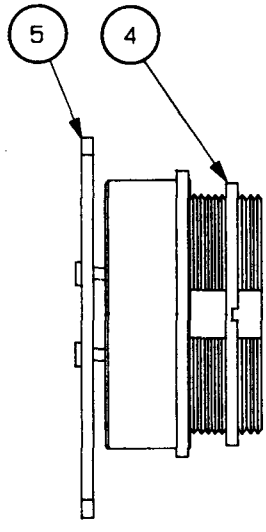
1. Position each wire on terminal on radio power connector card (5) in accordance with marked locations on tags. **Attach wires by soldering.**
2. Position radio power connector card (5) within housing (3) and seat in hole in housing.
3. Place outside retaining ring (4) on radio power connector card (5). **Tighten ring** with spanner wrench.
4. **Remove** all **tags** from wires.



REAR VIEW



REAR VIEW

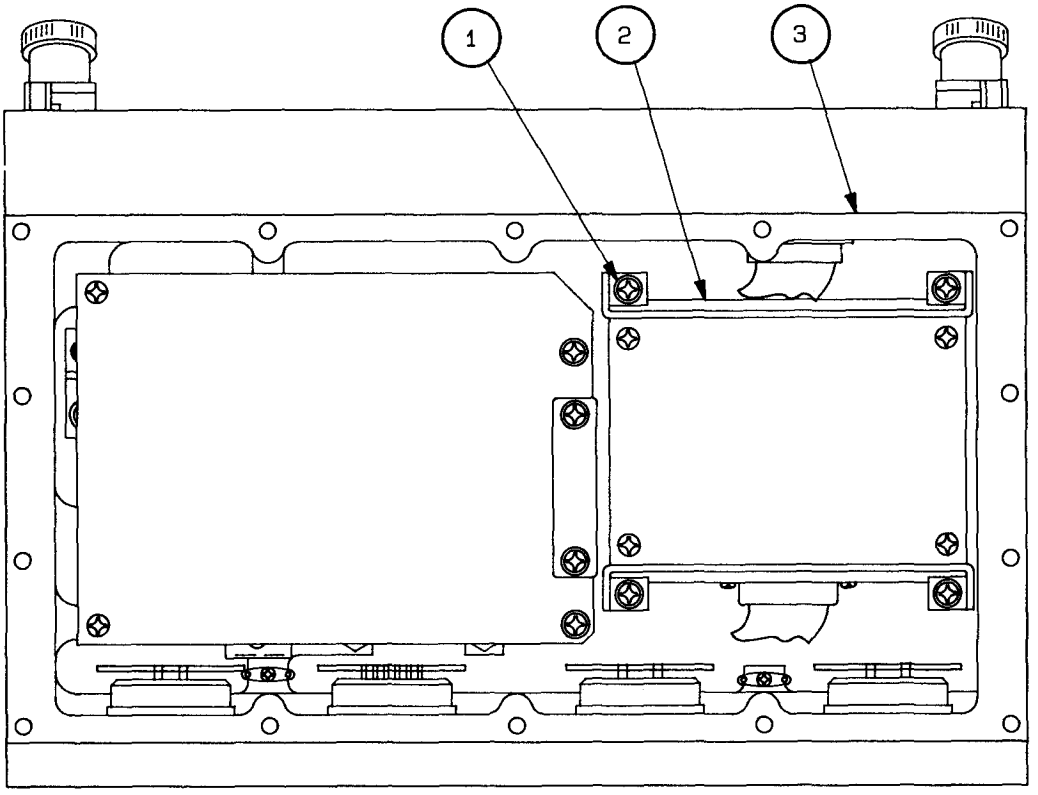


LEFT SIDE VIEW

RADIO POWER CONNECTOR CARD A7 MAINTENANCE INSTRUCTIONS (4 of 4)

INSTALLATION (Cont)

5. **Tighten** four captive **screws** (1), securing card cage assembly (2) to housing (3).
6. Install cover in accordance with Installation instructions on page 3-38.



BOTTOM VIEW

TEST

Perform Amplifier-Power Supply Minimum Performance Test on page 3-100.

VIC-1/RETRANSMIT CONNECTOR CARD A8 MAINTENANCE INSTRUCTIONS (1 of 2)

This task covers:

REMOVAL **INSTALLATION** **TEST**

INITIAL SETUP

Tools:

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts:

Masking tape (item 10, Appx B)

Personnel Required:

1

REMOVAL

1. Remove cover in accordance with Removal instructions on page 3-38.
2. Remove amplifier-squelch card (1) in accordance with Removal instructions on page 3-46.
3. Position rear of amplifier-power supply housing (2) so that it faces you and **remove** outside **retaining ring** (3) with spanner wrench which secures V1C-1/retransmit connector card (4) to housing.
4. **Push VIC-1/retransmit connector card (4)** completely **into housing** (2). Pull card straight, part way out of housing.
5. **Tag** all **wires** attached to VIC-1/retransmit connector card (4) with masking tape and mark correct locations on card. Verify that all wires are tagged and marked correctly.
6. **Unsolder** and remove all **wires** that attach VIC-1/retransmit connector card (4) to wiring harness **and remove card** from housing (2).

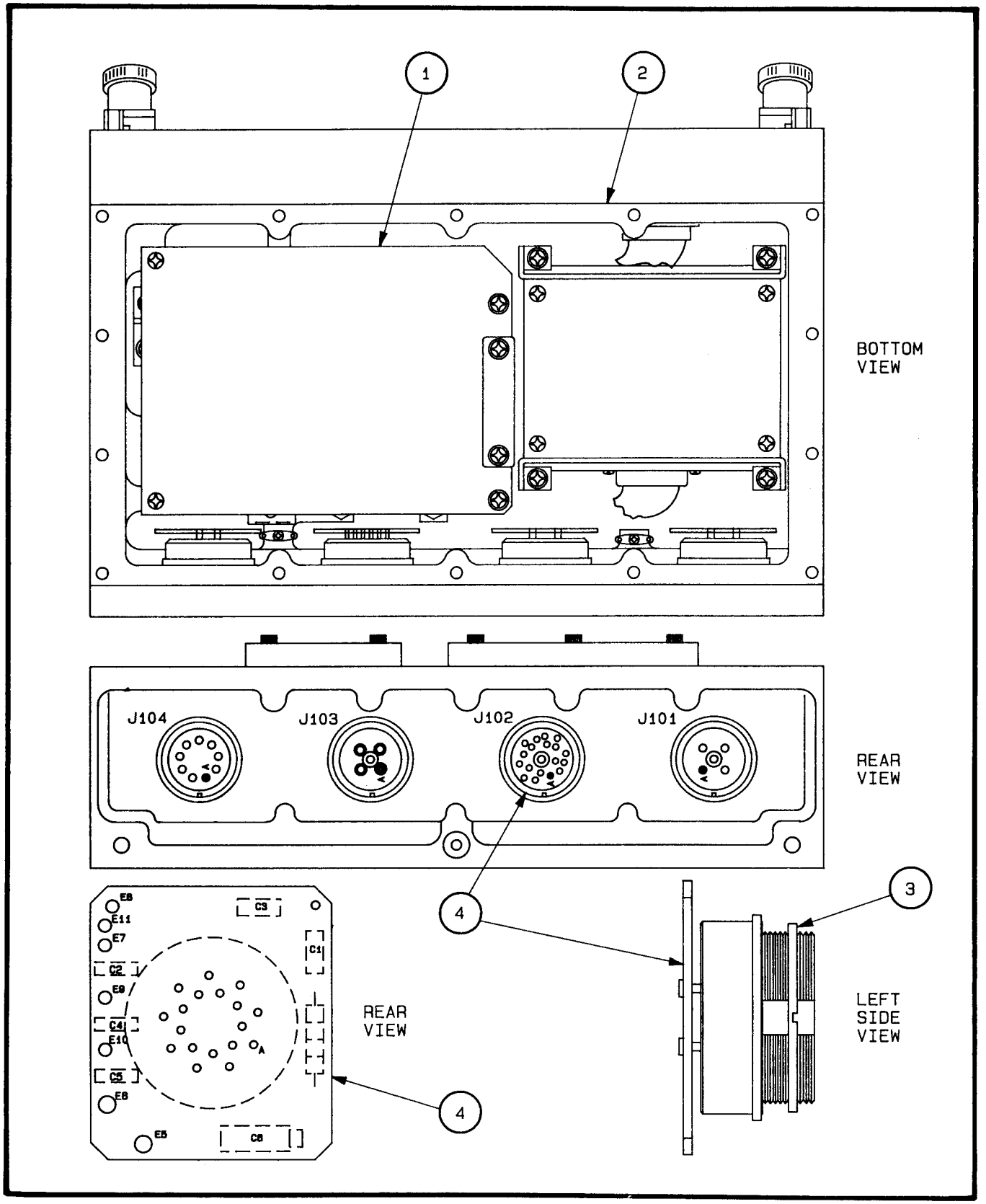
INSTALLATION

1. Position each wire on terminal on VIC-1/retransmit connector card (4), in accordance with marked locations on tags. **Attach wires by soldering.**
2. Position VIC-1/retransmit connector card (4) within housing (2) and seat in hole in housing.
3. Place outside retaining ring (3) on VIC-1/retransmit connector card (4). **Tighten ring** with spanner wrench.
4. **Remove** all **tags** from wires.
5. Install amplifier-squelch card (1) in accordance with Installation instructions on page 3-46.
6. Install cover in accordance with Installation instructions on page 3-38.

TEST

Perform Amplifier-Power Supply Minimum Performance Test on page 3-100.

VIC-1/RETRANSMIT CONNECTOR CARD A8 MAINTENANCE INSTRUCTIONS (2 of 2)



PASS TRANSISTOR Q1, C1, C2 MAINTENANCE INSTRUCTIONS (1 of 4)

This task covers:

REMOVAL **INSTALLATION** **TEST**

INITIAL SETUP

Tools:

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts:

Masking tape (item 10, Appx B)
Heat shrink tubing (item 12, Appx B)

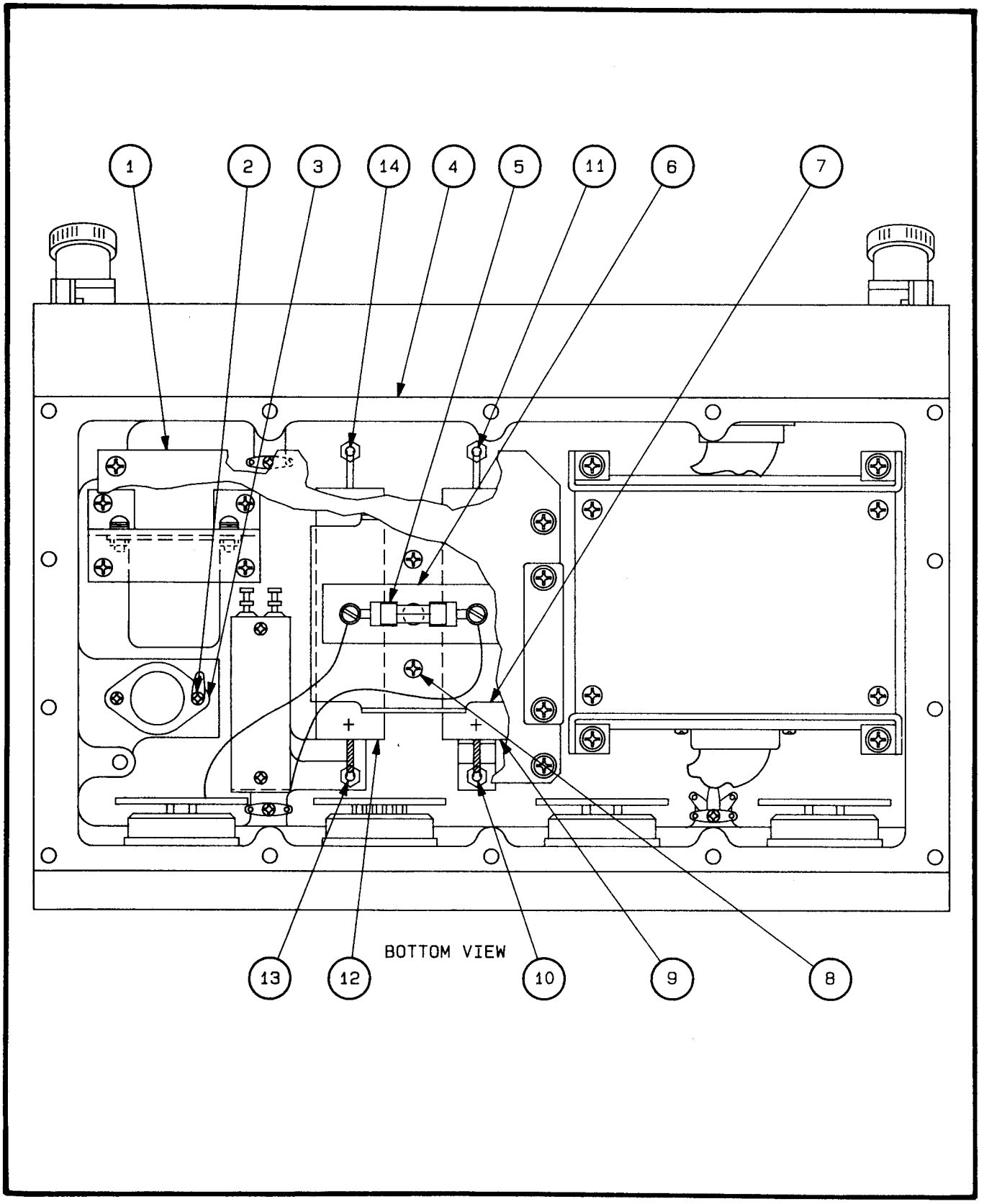
Personnel Required:

1

REMOVAL

1. Remove cover in accordance with Removal instructions on page 3-38.
2. Remove amplifier-squelch card (1) in accordance with Removal instructions on page 3-46.
3. **Remove** two attaching **screws, washers, insulating shouldered washers, terminal lug with attached wire, and transistor insulator** (2) **which secure transistor** (3) to housing (4).
4. **Tag** two **wires** attached to transistor (3) with masking tape **and mark** correct **location** on transistor. Verify that both wires are tagged and marked correctly.
5. **Unsolder** and remove both **wires** that attach to transistor (3) **and remove transistor** (3) from housing (4).
6. **Remove** two attaching **screws and washers** (8) **which secure filter mounting bracket** (7) **and attached fuseholder** (6) **and fuse** (5) to housing (4). Put bracket at back of housing.
7. **Unsolder** and remove capacitor C2 (9) leads which attach to terminals E3 (10) and E4 (11) **and remove C2** from housing (4).
8. **Unsolder** and remove capacitor C1 (12) leads which attach to terminals E1 (13) and E2 (14) **and remove C1** (12) from housing (4).

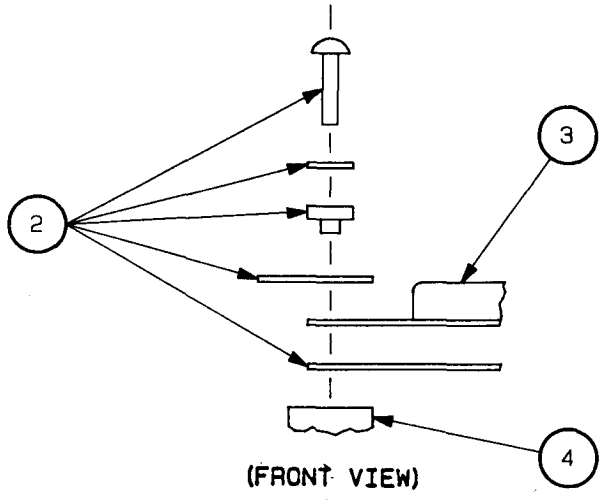
PASS TRANSISTOR NETWORK Q1, C1, C2 MAINTENANCE INSTRUCTIONS (2 of 4)



PASS TRANSISTOR NETWORK Q1, C1, C2 MAINTENANCE INSTRUCTIONS (3 of 4)

INSTALLATION

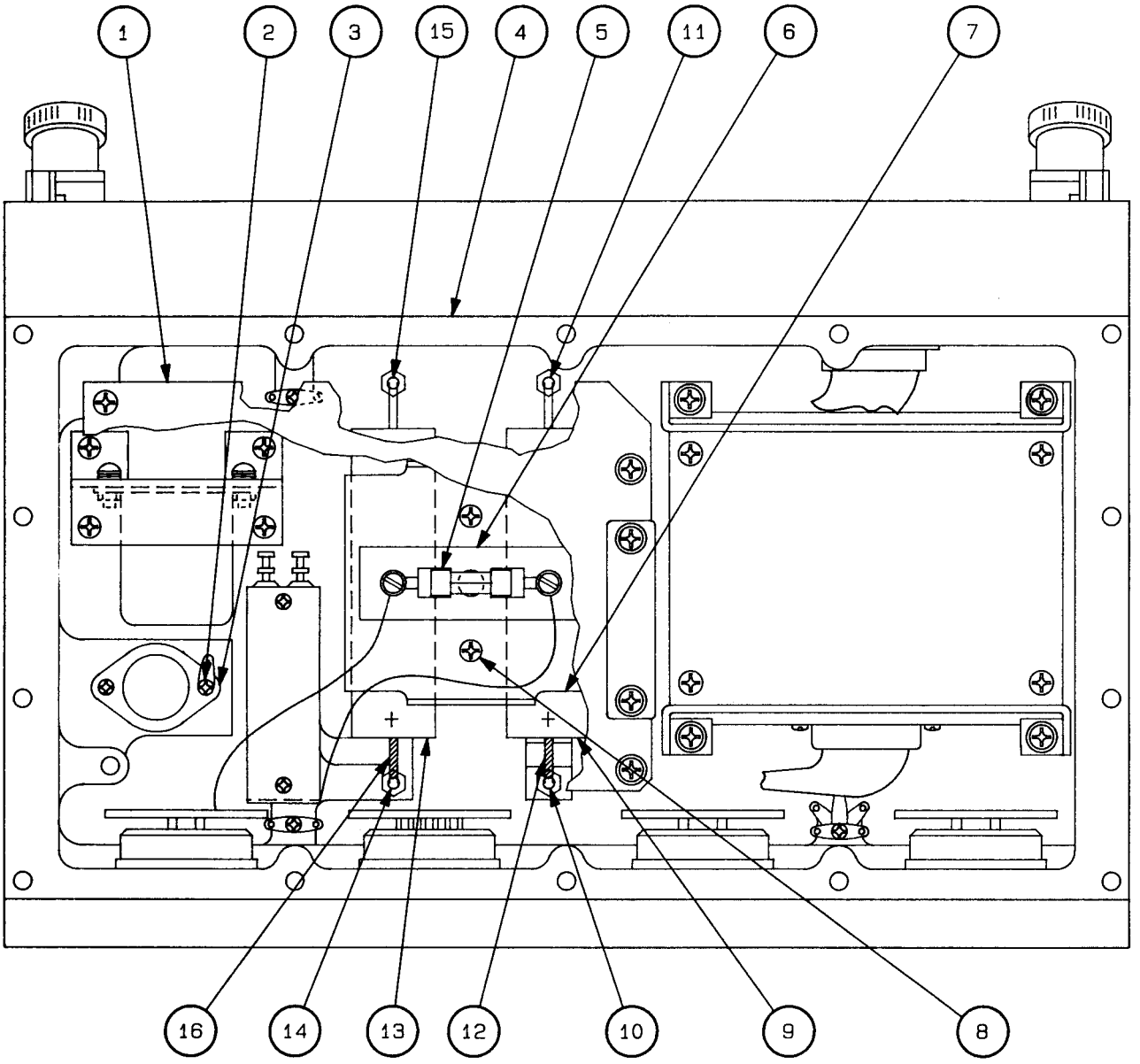
1. **Insert leads of** capacitor **C1** (13) **through** heat shrink **tubing** (16). Shrink tubing.
2. Position positive lead of capacitor C1 (13) on terminal E1 (14) and negative lead on terminal E2 (15). **Attach leads by soldering.**
3. **Insert leads of** capacitor **C2** (9) **through** heat shrink **tubing** (12). Shrink tubing.
4. Position positive lead of capacitor C2 (9) on terminal E3 (10) and negative lead on terminal E4 (11). **Attach leads by soldering.**
5. Position filter mounting bracket (7) with attached fuse (5) and fuseholder (6) within housing (4).
6. **Secure filter mounting bracket** (7) **with attached fuse** (5) **and fuseholder** (6) to housing (4) **with** two attaching **screws and washers** (8).
7. **Position** both wires on terminals on transistor (3) in accordance with marked locations on tags. **Attach wires by soldering.**
8. Position transistor (3) within housing (4).
9. **Secure** transistor (3) to housing (4) **with** two attaching **screws, washers, insulating shouldered washers, terminal lug, and transistor insulator** (2). The terminal lug should be on side of transistor (3) closest to capacitors (9) and (13).



(FRONT VIEW)

PASS TRANSISTOR NETWORK Q1, C1, C2 MAINTENANCE INSTRUCTIONS (4 of 4)

INSTALLATION (Cont)



10. **Remove tags** from both wires.
11. Install amplifier-squelch card (1) in accordance with Installation instructions on page 3-46.
12. Install cover in accordance with Installation instructions on page 3-38.

TEST

Perform Amplifier-Power Supply Minimum Performance Test on page 3-100.

FUSE F1 MAINTENANCE INSTRUCTIONS (1 of 2)

This task covers:

REMOVAL **INSTALLATION** **TEST**

INITIAL SETUP

Tools:

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts:

None

Personnel Required:

1

REMOVAL

1. Remove cover in accordance with Removal instructions on page 3-38.
2. Remove amplifier-squelch card (1) in accordance with Removal instructions on page 3-46.
3. **Remove fuse** (2) from fuseholder (3).

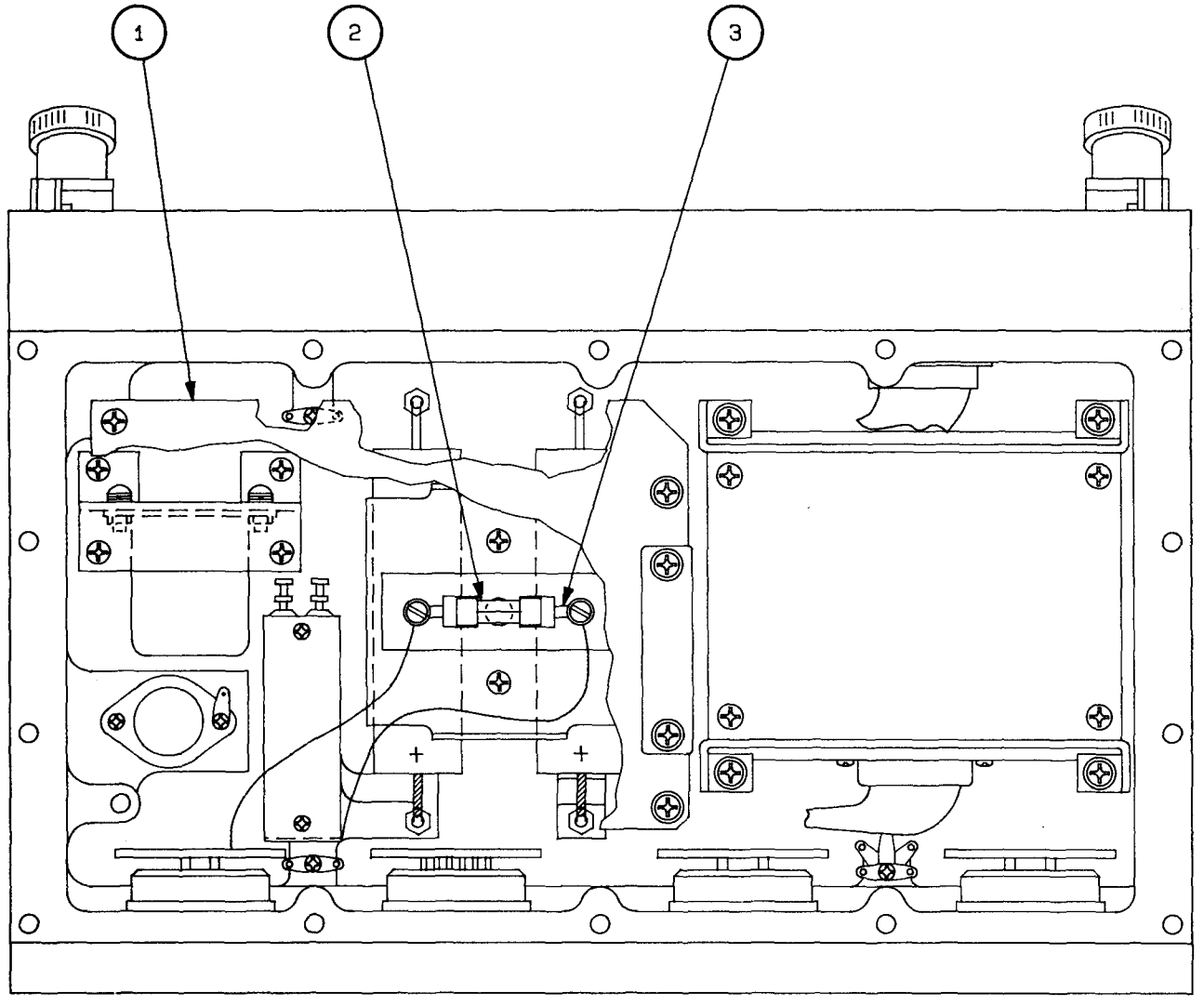
INSTALLATION

1. **Insert fuse** (2) in fuseholder (3).
2. Install amplifier-squelch card (1) in accordance with Installation instructions on page 3-46.
3. Install cover in accordance with Installation instructions on page 3-38.

TEST

Perform Amplifier-Power Supply Minimum Performance Test on page 3-100.

FUSE F1 MAINTENANCE INSTRUCTIONS (2 of 2)



BOTTOM VIEW

AUDIO MATCHING TRANSFORMER T1 MAINTENANCE INSTRUCTIONS (1 of 4)

This task covers:

REMOVAL **INSTALLATION** **TEST**

INITIAL SETUP

Tools:

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts:

Masking tape (item 10, Appx B)

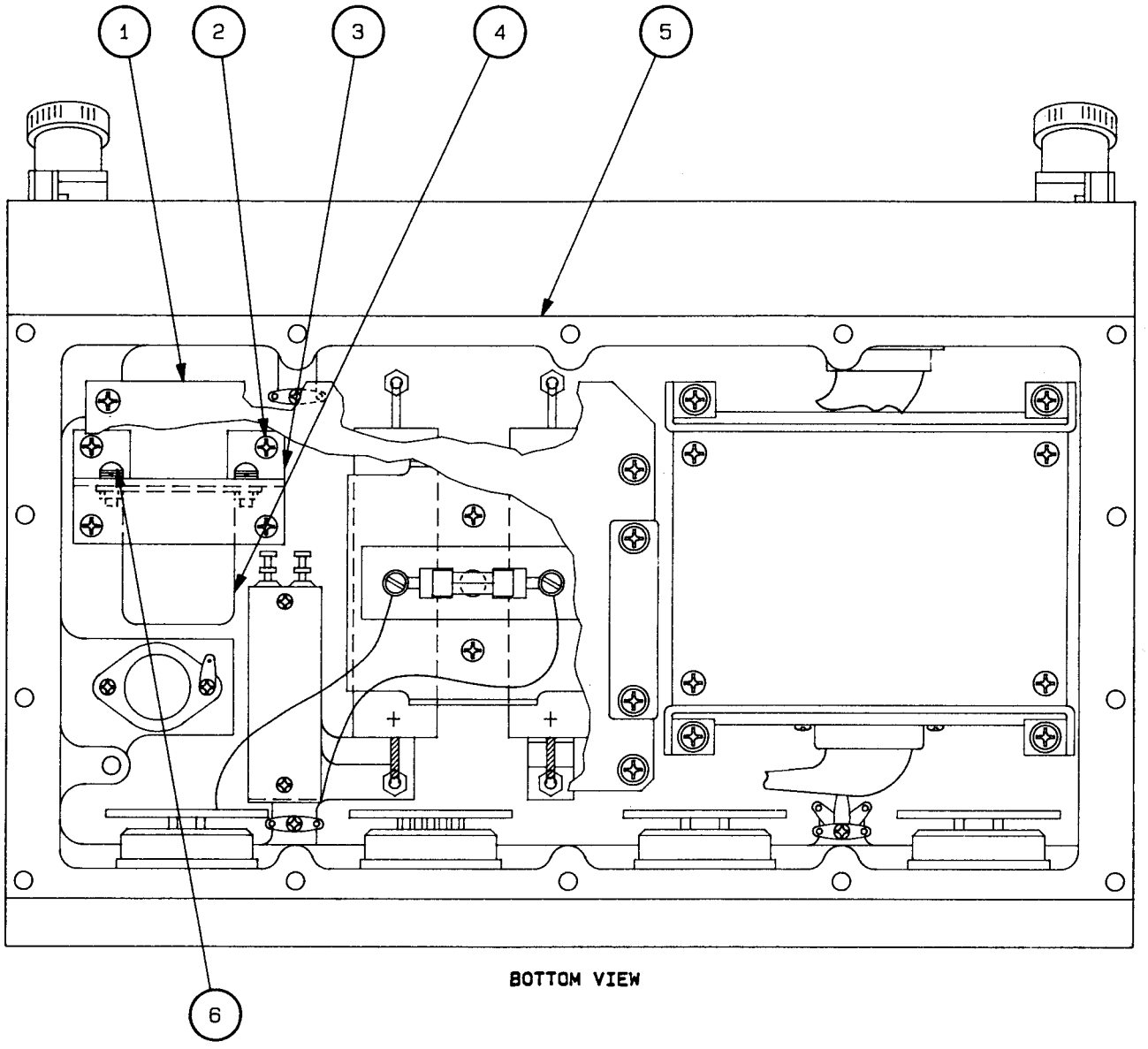
Personnel Required:

1

REMOVAL

1. Remove cover in accordance with Removal instructions on page 3-38.
2. Remove amplifier-squelch card (1) in accordance with Removal instructions on page 3-46.
3. **Remove** four attaching **screws and washers** (2) **which secure transformer mounting bracket (3)/audio matching transformer** (4) **assembly** to housing (5).
4. **Remove** two attaching **nuts, screws, lockwashers, and** four attaching **flat washers** (6) **which secure audio matching transformer** (4) to transformer mounting bracket (3).
5. **Tag** all **wires** attached to audio matching transformer (4) with masking tape and **mark** correct **location** on transformer (4). Verify that all wires are tagged and marked correctly.
6. **Unsolder** and remove all **wires** that attach to audio matching transformer (4) **and remove transformer** (4) from housing (5).

AUDIO MATCHING TRANSFORMER T1 MAINTENANCE INSTRUCTIONS (2 of 4)



BOTTOM VIEW

AUDIO MATCHING T1 MAINTENANCE INSTRUCTIONS (3 of 4)

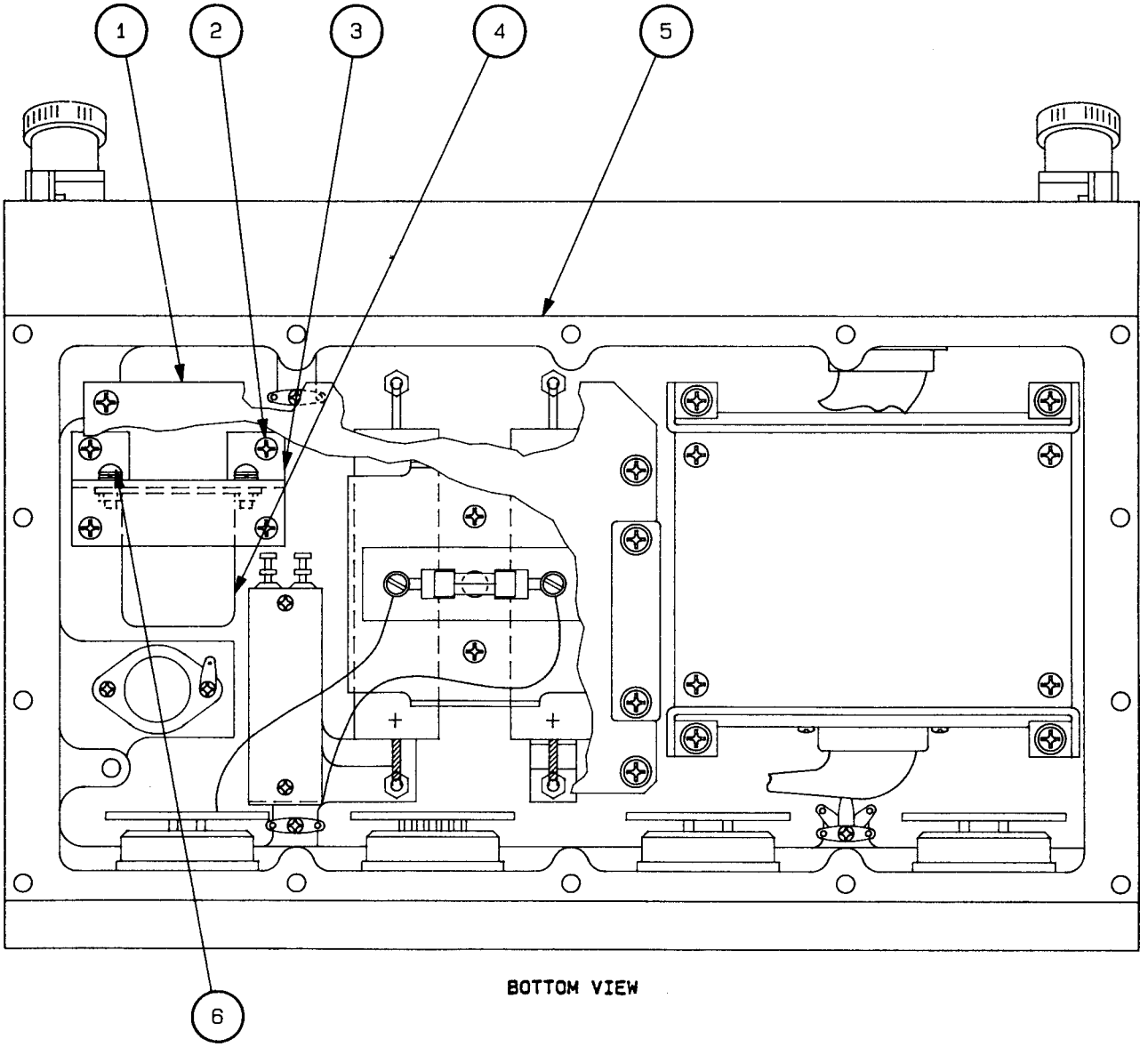
INSTALLATION

1. Position each wire on terminal on audio matching transformer (4) in accordance with marked locations on tags. **Attach wires by soldering.**
2. Position audio matching transformer (4) on transformer mounting bracket (3).
3. **Secure audio matching transformer** (4) to transformer mounting bracket (3) **with** two attaching **nuts, screws, lockwashers, and** four attaching flat **washers** (6).
4. Secure transformer mounting bracket (3)/audio matching transformer (4) assembly to housing (5) with four attaching screws and washers (2).
5. **Remove** all **tags** from wires.
6. Install amplifier-squelch card (1) in accordance with Installation instructions on page 3-46.
7. Install cover in accordance with Installation instructions on page 3-38.

TEST

Perform Amplifier-Power Supply Minimum Performance Test on page 3-100.

AUDIO MATCHING TRANSFORMER T1 MAINTENANCE INSTRUCTIONS (4 of 4)



BOTTOM VIEW

TRANSORB Z1 MAINTENANCE INSTRUCTIONS (1 of 4)

This task covers:

REMOVAL **INSTALLATION** **TEST**

INITIAL SETUP

Tools:

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts:

Masking tape (item 10, Appx B)

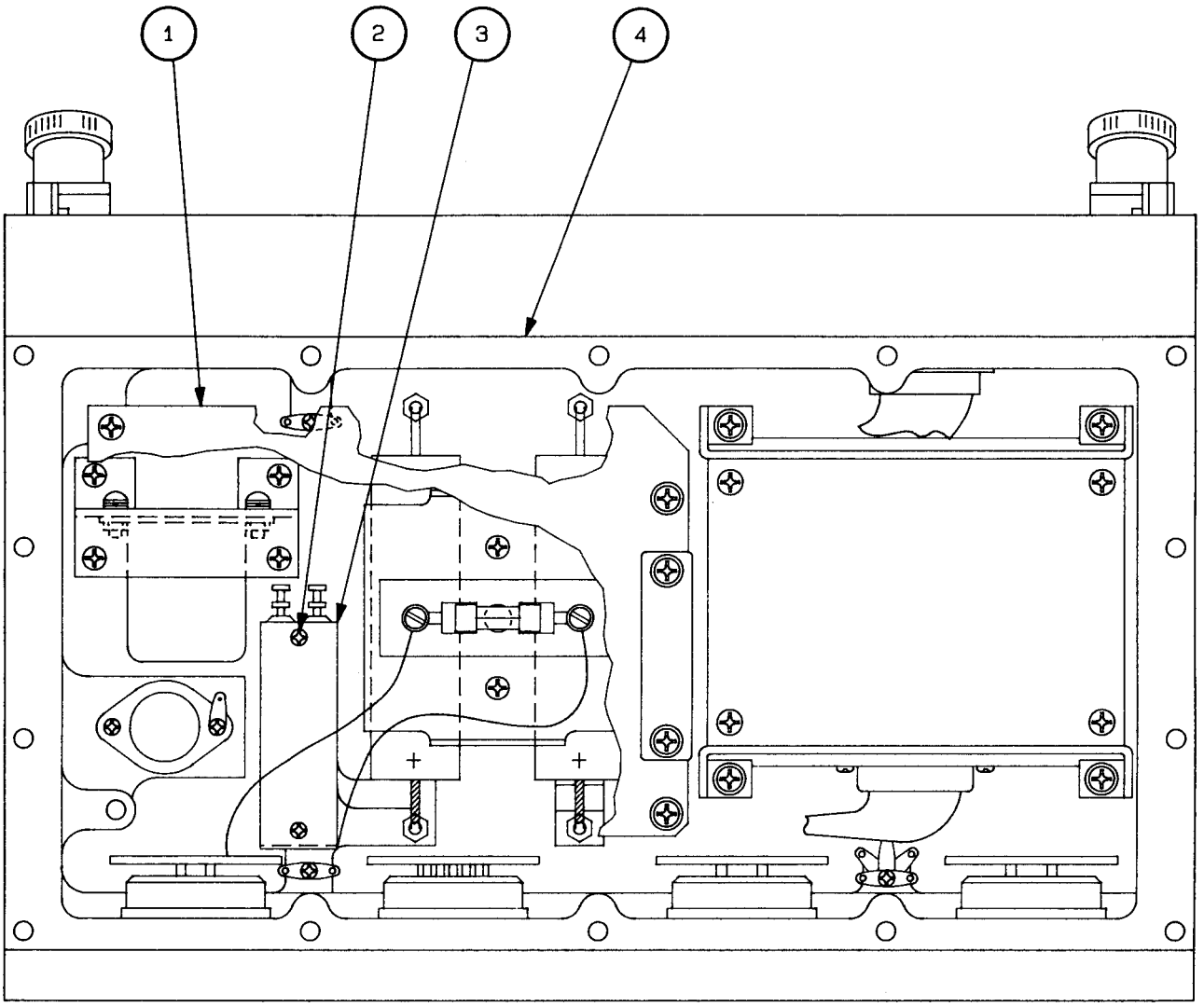
Personnel Required:

1

REMOVAL

1. Remove cover in accordance with Removal instructions on page 3-38.
2. Remove amplifier-squelch card (1) in accordance with Removal instructions on page 3-46.
3. **Remove** two attaching **screws and washers** (2) which secure transorb (3) to housing (4).
4. **Tag** all **wires** attached to transorb (3) with masking tape **and mark** correct **location** on transorb. Verify that all wires are tagged and marked correctly.
5. **Unsolder** and remove all **wires** which attach to transorb (3) **and remove transorb** from housing (4).

TRANSORB Z1 MAINTENANCE INSTRUCTIONS (2 of 4)



BOTTOM VIEW

TRANSORB Z1 MAINTENANCE INSTRUCTIONS (3 of 4)

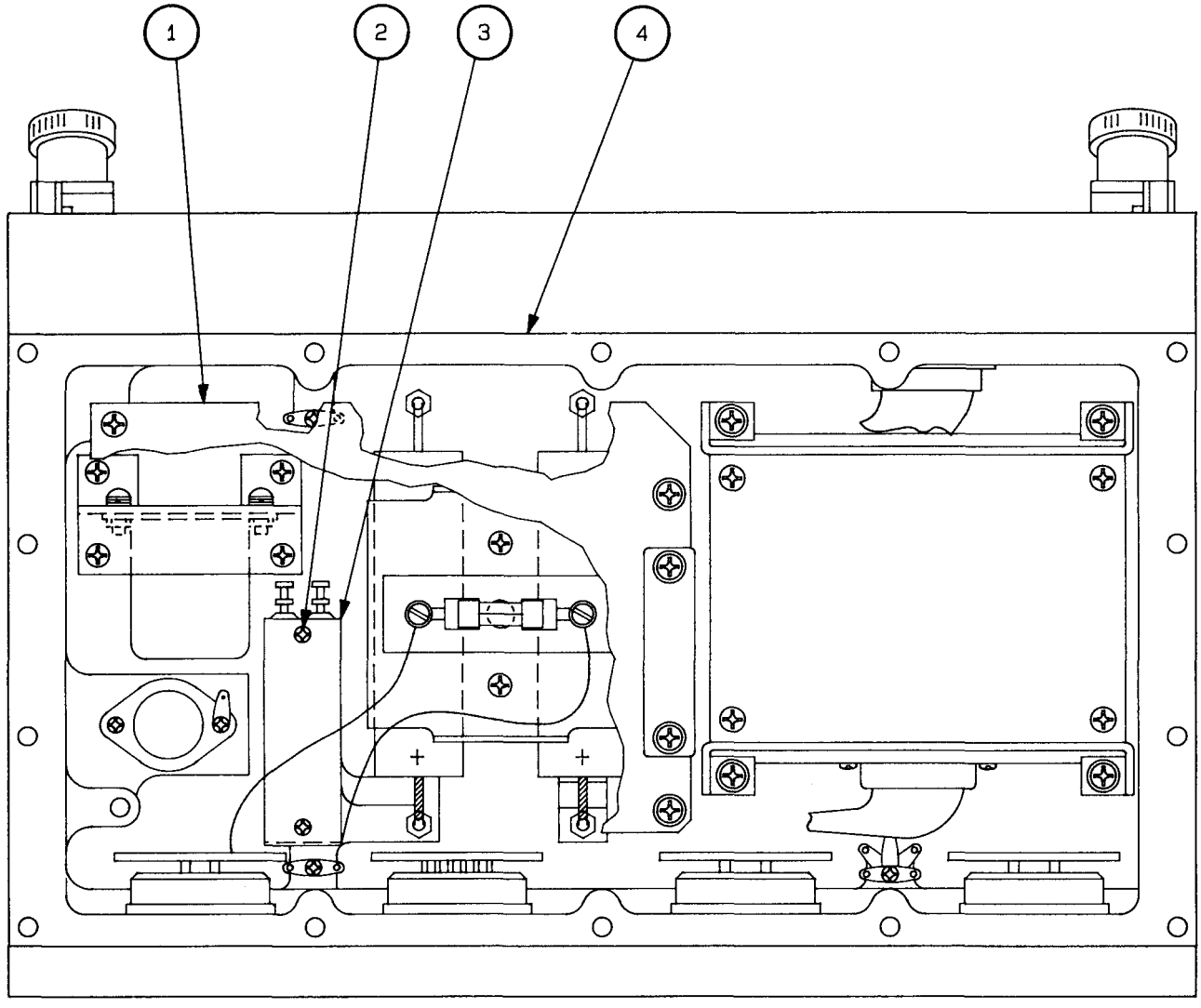
INSTALLATION

1. Position each wire on terminal on transorb (3) in accordance with marked locations on tags. **Attach wires by soldering.**
2. Position transorb (3) within housing (4), so that dot is visible.
3. **Secure** transorb (3) to housing (4) **with** two attaching **screws and washers** (2).
4. **Remove tags** from all wires.
5. Install amplifier-squelch card (1) in accordance with Installation instructions on page 3-46.
6. Install cover in accordance with Installation instructions on page 3-38.

TEST

Perform Amplifier-Power Supply Minimum Performance Test on page 3-100.

TRANSORB Z1 MAINTENANCE INSTRUCTIONS (4 of 4)



BOTTOM VIEW

HOUSING WIRING AND CARD CONNECTORS MAINTENANCE INSTRUCTIONS (1 of 10)

This task covers:

REMOVAL **INSTALLATION** **TEST**

INITIAL SETUP

Tools:

Tool Kit, Electronic Equipment TK-105/G
Wiring harness tie tool

Materials/Parts:

Masking tape (item 10, Appx B)
Heat shrink tubing (item 12, Appx B)
Wire, electrical (item 13, Appx B)
Wiring harness ties (item 11, Appx B)

Personnel Required:

1

REMOVAL

1. **Remove wires** soldered to parts, **as follows:**

   a. **Find wire** to be removed **in** wire removal **chart** (From and To columns).

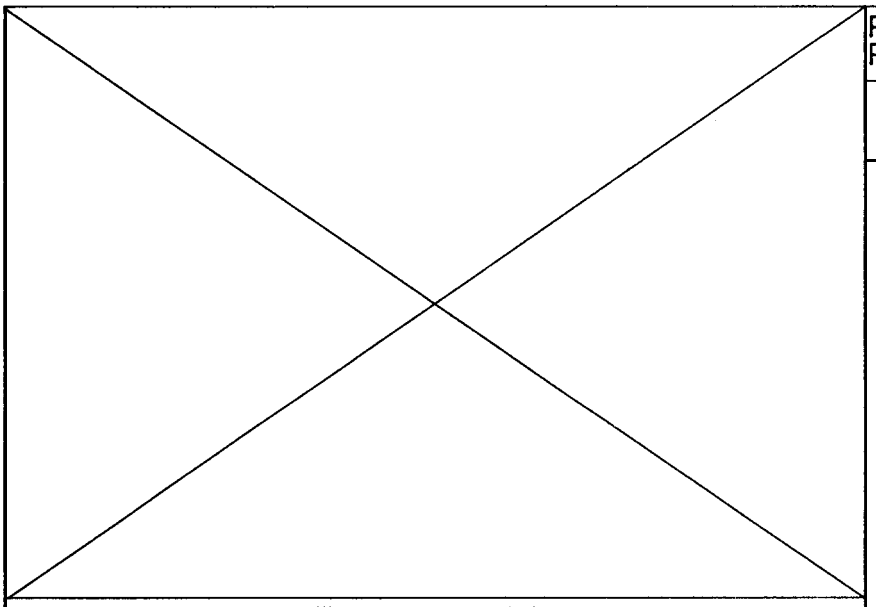
   NOTE

   Screw and washer that secure terminal lugs to housing should be removed before wires soldered to them are unsoldered.

   b. **Remove parts** indicated **in order shown** in lower section of Procedures column in chart to gain access to entire length of wires.
   c. **Tag** each end of each **wire** that is to be removed with masking tape **and mark** correct **location** on parts. Verify that all wires to be removed are tagged and marked correctly on both ends.
   d. **Cut and remove** all **wiring harness ties** along entire length of each wire that is to be removed from harness.
   e. **Unsolder** each end of each wire that is to be removed **and remove wire.**

HOUSING WIRING AND CARD CONNECTORS MAINTENANCE INSTRUCTIONS (2 of 10)

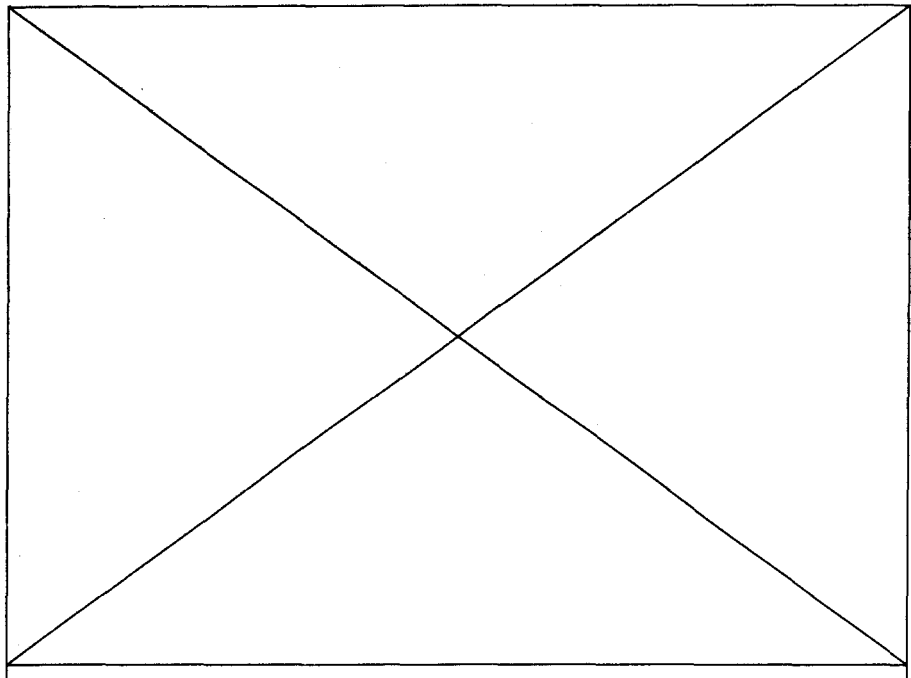
WIRE REMOVAL CHART



To Remove Wires		Remove These Parts Per Procedures on Pages									
		3-24	3-38	3-40	3-46	3-54	3-50	3-58	3-48	3-60	3-78
From	To	Control Panel (1)	Cover (2)	Card Cage Assembly (3)	Amplifier-Squelch Card (4)	Radio Power Connector Card (5)	External Power Connector Card (6)	VIC-1/Retransmit Connector Card (7)	Power Input Connector Card (8)	Transistor Q1 (9)	Connector J3 (10)
Radio Power Connector Card (5)	Terminal Lug E12 (15)		1	2		3					
Radio Power Connector Card (5)	Stud Terminal E3 (16)		1	2	3	4	*5				
External Power Connector Card (6)	Terminal Lug E11 (15)		1	2	3		4				
VIC-1/Retransmit Connector Card (7)	Terminal Lug E13 (19)		1		2			3			
Power Input Connector Card (8)	External Power Connector Card (6)		1	2	3		4	*5	6		
Power Input Connector Card (8)	Terminal Lug E7 (19)		1		2				3		
Power Input Connector Card (8)	Fuse F1 (17)		1		2			*3	4		
Power Input Connector Card (8)	VIC-1/Retransmit Connector Card (7)		1		2			3	4		
Transistor Q1 (9)	Stud Terminal E3 (16)		1		2			*3	*4	5	
Transistor Q1 (9)	Stud Terminal E1 (18)		1		2				*3	4	
Transistor Q1 (9)	Transorb Z1 (20)		1		2					3	
Connector J3 (10)	Radio Power Connector Card (5)		1	2	3	4	*5				6
Connector J3 (10)	Terminal Lug E10 (15)		1	2	3						4
Connector J3 (10)	Transformer T1 (22)		1		2						3
Connector J4 (12)	Connector J2 (14)	1	2	3	4	*5					
Connector J4 (12)	Terminal Lug E5 (23)	1	2	3	4						
Connector J4 (12)	Transformer T1 (22)	1	2	3	4						
Connector J4 (12)	Transorb Z1 (20)	1	2	3	4						

HOUSING WIRING AND CARD CONNECTORS MAINTENANCE INSTRUCTIONS (3 of 10)

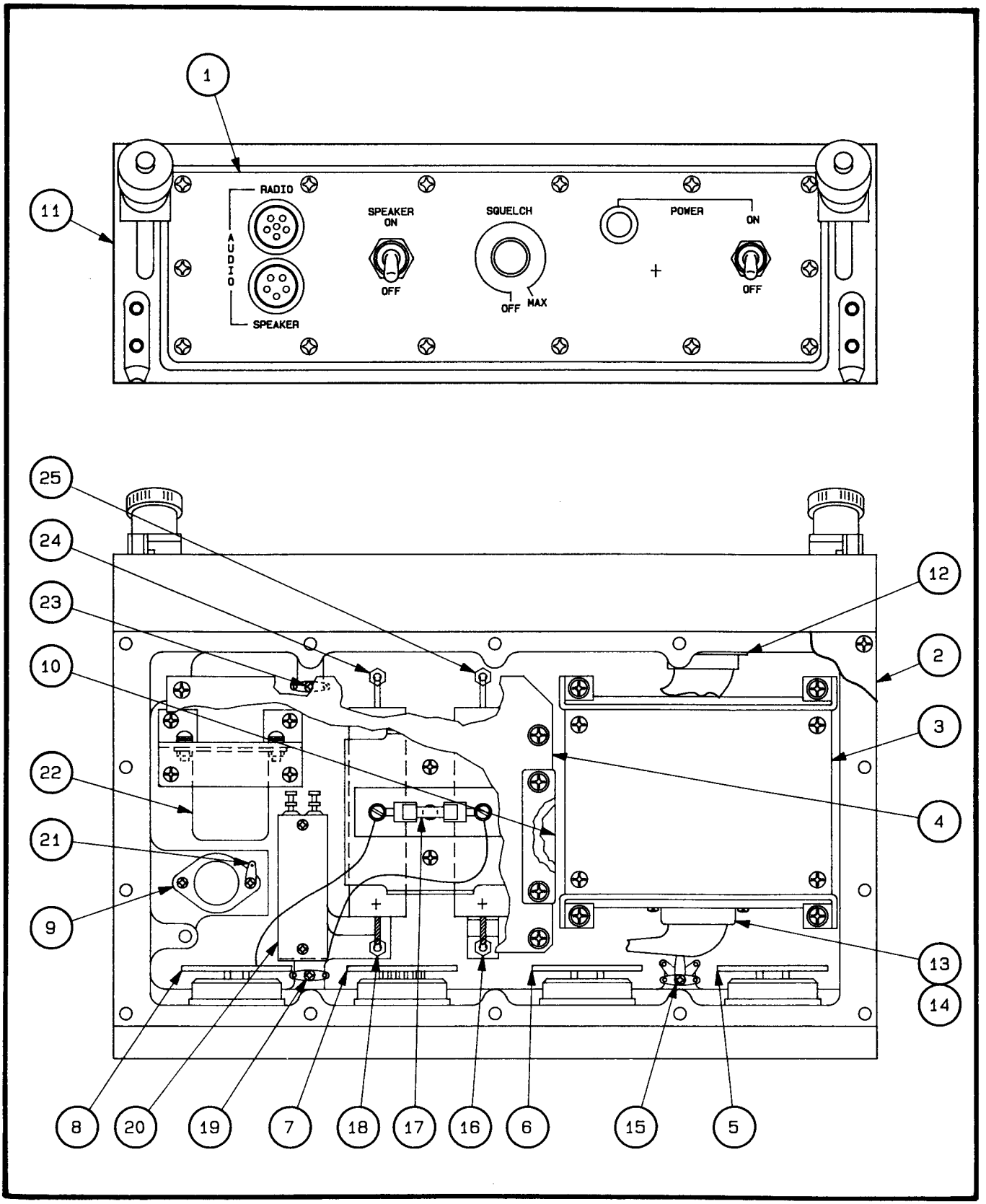
WIRE REMOVAL CHART (CONT)



To Remove Wires		Remove These Parts Per Procedures on Pages									
From	To	Control Panel (1) 3-24	Cover (2) 3-38	Card Cage Assembly (3) 3-40	Amplifier-Squelch Card (4) 3-46	Radio Power Connector Card (5) 3-54	External Power Connector Card (6) 3-50	VIC-1/Retransmit Connector Card (7) 3-58	Power Input Connector Card (8) 3-48	Transistor Q1 (9) 3-60	Connector J3 (10) 3-78
Connector J4 (12)	Connector J3 (10)	1	2	3	4						5
Connector J4 (12)	Power Input Connector Card (8)	1	2	3	4	5		*6			*7
Connector J4 (12)	Radio Power Connector Card (5)	1	2	3	4	5	*6				*7
Connector J4 (12)	Stud Terminal E3 (16)	1	2	3	4						*5
Connector J1 (13)	Terminal Lug E9 (15)		1	2							
Connector J1 (13)	Stud Terminal E1 (18)		1	2	3		*4	*5			
Connector J1 (13)	Transorb Z1 (20)		1	2	3		*4	*5			
Connector J2 (14)	Terminal Lug E6 (15)		1	2							
Connector J2 (14)	Connector J3 (10)		1	2	3		*4				5
Connector J2 (14)	External Power Connector Card (6)		1	2	3		4				
Connector J2 (14)	Radio Power Connector Card (5)		1	2		3					
Connector J2 (14)	VIC-1/Retransmit Connector Card (7)		1	2	3		*4	5			
Connector J2 (14)	Shield		1	2							
Fuse F1 (17)	Terminal Lug E7 (19)		1		2				*3		
Transorb Z1 (20)	Terminal Lug E14 (23)		1		2						
Transorb Z1 (20)	Terminal Lug E8 (21)		1		2						
Stud Terminal E2 (24)	Terminal Lug E14 (23)		1		2						
Stud Terminal E4 (25)	Terminal Lug E14 (23)		1		2						

*Do not unsolder wires attached to part listed in column heading. Gain access by removing part with wires attached.

HOUSING WIRING AND CARD CONNECTORS MAINTENANCE INSTRUCTIONS (4 of 10)



HOUSING WIRING AND CARD CONNECTORS MAINTENANCE INSTRUCTIONS (5 of 10)

REMOVAL (Cont)

2. **Remove connectors** J1 (13), J3 (10), J2 (14), or J4 (12), **as** follows:

   a. **Find connector** to be removed **in** connector removal **chart** (To Remove Connectors column).
   b. **Remove parts** indicated **in order shown** in chart in order to gain access to connector.
   c. **Tag** all **wires** attached to connector with masking tape **and mark** correct **location** on connector. Verify that all wires are tagged and marked correctly.
   d. **Unsolder** and remove all **wires** that attach connector to wiring harness **and remove connector** from housing (11).

Connector Removal Chart

To Remove Connectors	Remove These Parts Per Procedures on Pages				
	3-24	3-38	3-40	3-46	3-78
	Control Panel (1)	Cover (2)	Card Cage Assembly (3)	Amplifier-Squelch Card (4)	Connector J3 (10)
J1 (13)		1	2		
J3 (10)		1		2	3
J2 (14)		1	2		
J4 (12)	1				

HOUSING WIRING AND CARD CONNECTORS MAINTENANCE INSTRUCTIONS (6 of 10)

INSTALLATION

1. **Install connectors** J1 (13), J3 (10), J2 (14), or J4 (12), **as follows:**

   a. Run each wire through heat shrink tubing, as applicable.
   b. Position each wire on connector in accordance with marked locations on tags. **Attach wires by soldering.** Shrink tubing.
   c. **Remove** all **tags** from wires.
   d. **Find connector** installed **in** connector installation **chart** (To Install Connectors column).
   e. **Install parts** indicated **in order shown** in chart.

Connector Installation Chart

To Install Connectors	Install These Parts Per Procedures on Pages				
	3-78	3-46	3-40	3-38	3-24
	Connector J3 (10)	Amplifier-Squelch Card (4)	Card Cage Assembly (3)	Cover (2)	Control Panel (1)
J1 (13)			1	2	
J3 (10)	1	2		3	
J2 (14)			1	2	
J4 (12)					1

HOUSING WIRING AND CARD CONNECTORS MAINTENANCE INSTRUCTIONS (7 of 10)

INSTALLATION (Cont)

2. **Install wires** to parts, **as follows:**

a. Run wires through heat shrink tubing, as applicable.
b. Position one end of wires on parts in accordance with marked locations on tags. **Attach wires by soldering.** Shrink tubing.
c. **Route soldered wires along wiring harness,** through tubing, as applicable, and position free end on other parts in accordance with marked locations on tags. **Attach** free end of **wires by soldering.** Shrink tubing.
d. **Remove** all **tags** from wires.
e. Attach wiring harness ties along entire length of each wire that was installed in harness.

NOTE

Terminal lugs removed during Removal must be secured to housing with attaching screw and washer after wires are soldered to them.

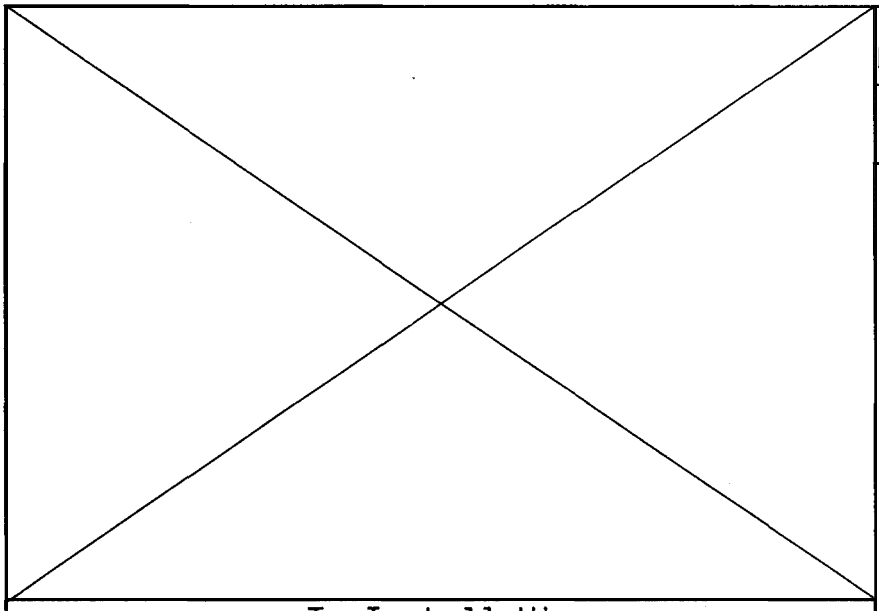
f. **Find** each **wire installed in** wire installation **chart** (From and To column).
g. **Install parts** indicated **in order shown** in chart.

TEST

Perform Amplifier-Power Supply Minimum Performance Test on page 3-100.

HOUSING WIRING AND CARD CONNECTORS MAINTENANCE INSTRUCTIONS (8 of 10)

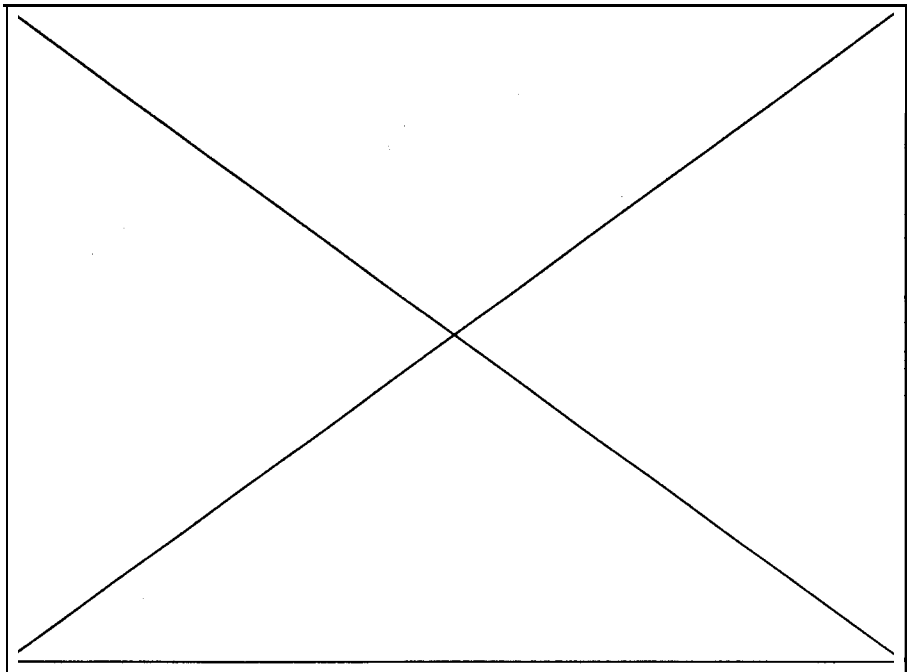
WIRE INSTALLATION CHART



To Install Wires		Install These Parts Per Procedures on Pages									
From	To	3-78 Connector J3 (10)	3-60 Transistor Q1 (9)	3-48 Power Input Connector Card (8)	3-58 VIC-1/Retransmit Connector Card (7)	3-50 External Power Connector Card (6)	3-54 Radio Power Connector Card (5)	3-46 Amplifier-Squelch Card (4)	3-40 Card Cage Assembly (3)	3-38 Cover (2)	3-24 Control Panel (1)
Radio Power Connector Card (5)	Terminal Lug E12 (15)						1		2	3	
Radio Power Connector Card (5)	Stud Terminal E3 (16)					1	2	3	4	5	
External Power Connector Card (6)	Terminal Lug E11 (15)					1		2	3	4	
VIC-1/Retransmit Connector Card (7)	Terminal Lug E13 (19)				1			2		3	
Power Input Connector Card (8)	External Power Connector Card (6)			1	2	3		4	5	6	
Power Input Connector Card (8)	Terminal Lug E7 (19)			1				2		3	
Power Input Connector Card (8)	Fuse F1 (17)			1	2			3		4	
Power Input Connector	VIC-1/Retransmit Connector Card (7)			1	2			3		4	
Transistor Q1 (9)	Stud Terminal E3 (16)		1	2	3			4		5	
Transistor Q1 (9)	Stud Terminal E1 (18)		1	2				3		4	
Transistor Q1 (9)	Transorb Z1 (20)		1					2		3	
Connector J3 (10)	Radio Power Connector Card (5)	1				2	3	4	5	6	
Connector J3 (10)	Terminal Lug E10 (15)	1						2	3	4	
Connector J3 (10)	Transformer T1 (22)	1						2		3	
Connector J4 (12)	Connector J2 (14)						1	2	3	4	5
Connector J4 (12)	Terminal Lug E5 (23)							1	2	3	4
Connector J4 (12)	Transformer T1 (22)							1	2	3	4
Connector J4 (12)	Transorb Z1 (20)							1	2	3	4

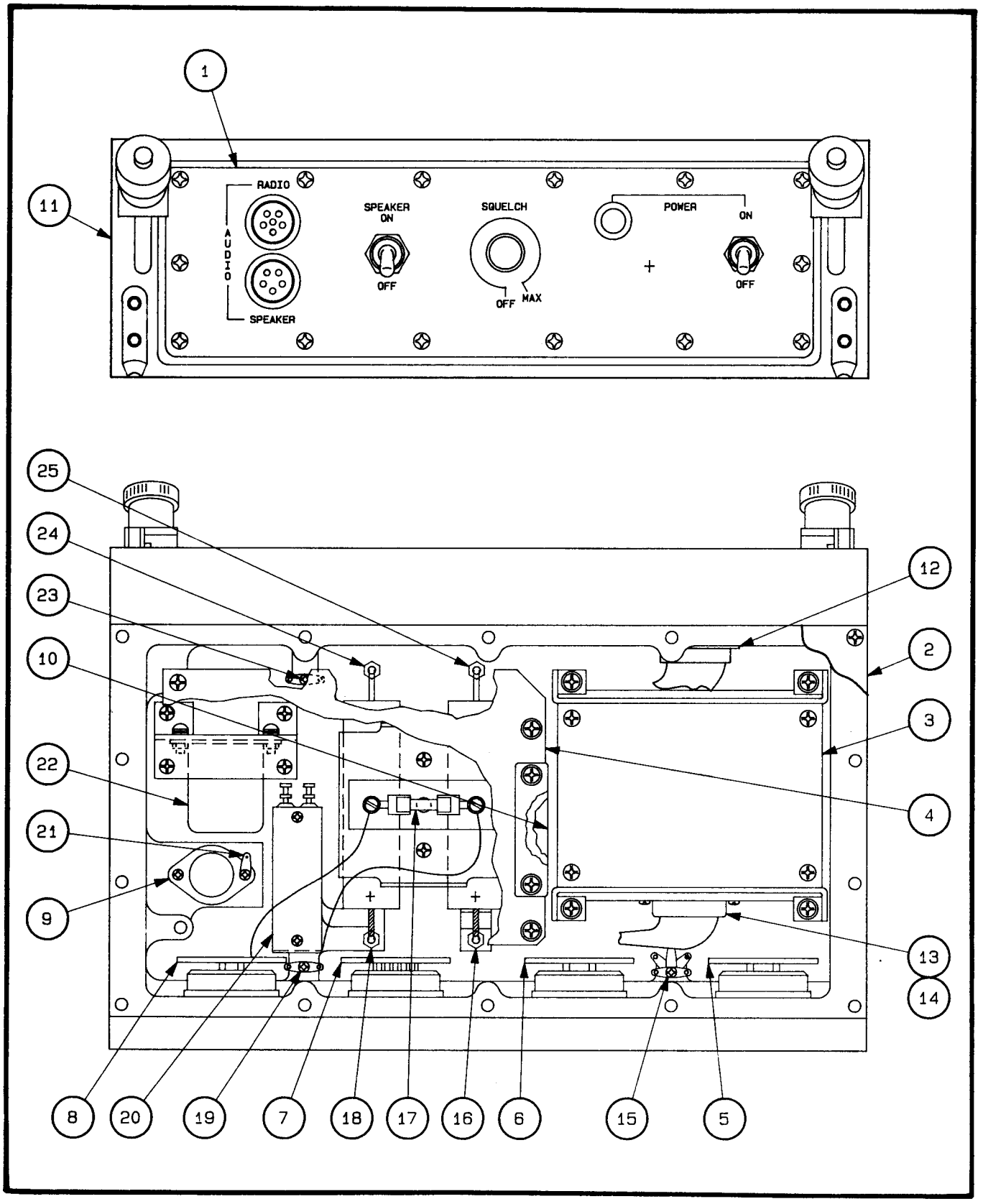
HOUSING WIRING AND CARD CONNECTORS MAINTENANCE INSTRUCTINS (9 of 10)

WIRE INSTALLATION CHART (CONT)



To Install Wires		Install These Parts Per Procedures on Pages									
From	To	Connector J3 (10) 3-78	Transistor Q1 (9) 3-60	Power Input Connector Card (8) 3-48	VIC-1/Retransmit Connector Card (7) 3-58	External Power Connector Card (6) 3-50	Radio Power Connector Card (5) 3-54	Amplifier-Squelch Card (4) 3-46	Card Cage Assembly (3) 3-40	Cover (2) 3-38	Control Panel (1) 3-24
Connector J4 (12)	Connector J3 (10)	1						2	3	4	5
Connector J4 (12)	Power Input Connector Card (8)	1			2		3	4	5	6	7
Connector J4 (12)	Radio Power Connector Card (5)	1				2	3	4	5	6	7
Connector J4 (12)	Stud Terminal E3 (16)	1						2	3	4	5
Connector J1 (13)	Terminal Lug E9 (15)								1	2	
Connector J1 (13)	Stud Terminal E1 (18)				1	2		3	4	5	
Connector J1 (13)	Transorb Z1 (20)				1	2		3	4	5	
Connector J2 (14)	Terminal Lug E6 (15)								1	2	
Connector J2 (14)	Connector J3 (10)	1				2		3	4	5	
Connector J2 (14)	External Power Connector Card (6)					1		2	3	4	
Connector J2 (14)	Radio Power Connector Card (5)						1		2	3	
Connector J2 (14)	VIC-1/Retransmit Connector Card (7)				1	2		3	4	5	
Connector J2 (14)	Shield								1	2	
Fuse F1 (17)	Terminal Lug E7 (19)			1				2		3	
Transorb Z1 (20)	Terminal Lug E14 (23)							1		2	
Transorb Z1 (20)	Terminal Lug E8 (21)							1		2	
Stud Terminal E2 (24)	Terminal Lug E14 (23)							1		2	
Stud Terminal E4 (25)	Terminal Lug E14 (23)							1		2	

HOUSING WIRING AND CARD CONNECTORS MAINTENANCE INSTRUCTIONS (10 of 10)



CONTROL PANEL WIRING AND CONNECTOR MAINTENANCE INSTRUCTIONS (1 of 4)

This task covers:

REMOVAL INSTALLATION TEST

INITIAL SETUP

Tools:

Tool Kit, Electronic Equipment

Wiring harness tie tool

Materials/Parts:

Masking tape (item 10, Appx B)
Heat shrink tubing (item 12, Appx B)
Wire, electrical (item 13, Appx B)
Wiring harness ties (item 11, Appx B)

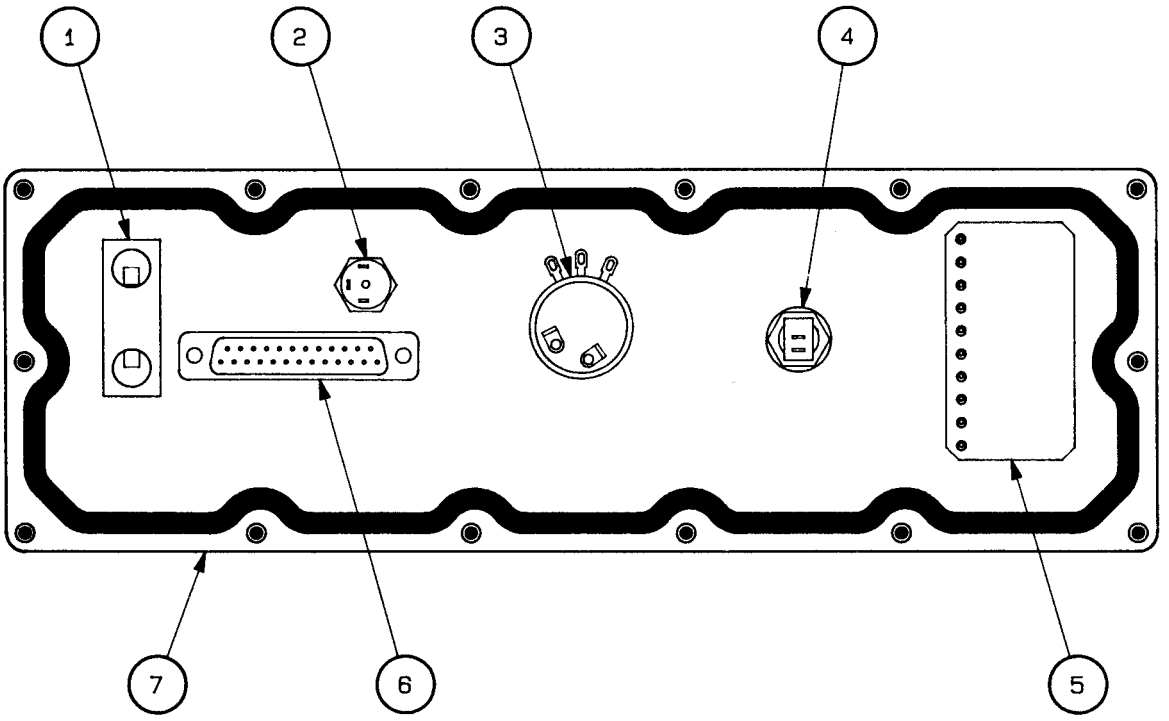
Personnel Required:

1

REMOVAL

1. Remove control panel in accordance with Removal instructions on page 3-24.
2. **Remove wires** soldered to POWER circuit breaker (1), POWER switchlight (2), SQUELCH control (3), SPEAKER switch (4), audio filter circuit card (5), or plug A9P1 (6), **as follows:**
   a. **Tag** each end of each **wire** that is to be removed with masking tape **and mark** correct **location** on parts. Verify that all wires to be removed are tagged and marked correctly on both ends.
   b. **Cut and remove** all **wiring harness ties** along entire length of each wire that is to be removed from harness.
   c. **Unsolder** each end of each wire that is to be removed **and remove wire** from panel (7).
3. **Remove** plug **A9P1** (6), **as follows:**
   a. **Tag** all **wires** attached to plug A9P1 (6) with masking tape **and mark** correct **location** on plug A9P1 (6). Verify that all wires are tagged and marked correctly.
   b. **Unsolder** and remove all **wires** that attach plug A9P1 (6) to wiring harness **and remove** plug **A9P1** (6) from panel (7).

CONTROL PANEL WIRING AND CONNECTOR MAINTENANCE INSTRUCTIONS (2 of 4)



CONTROL PANEL WIRING AND CONNECTOR MAINTENANCE INSTRUCTIONS (3 of 4)

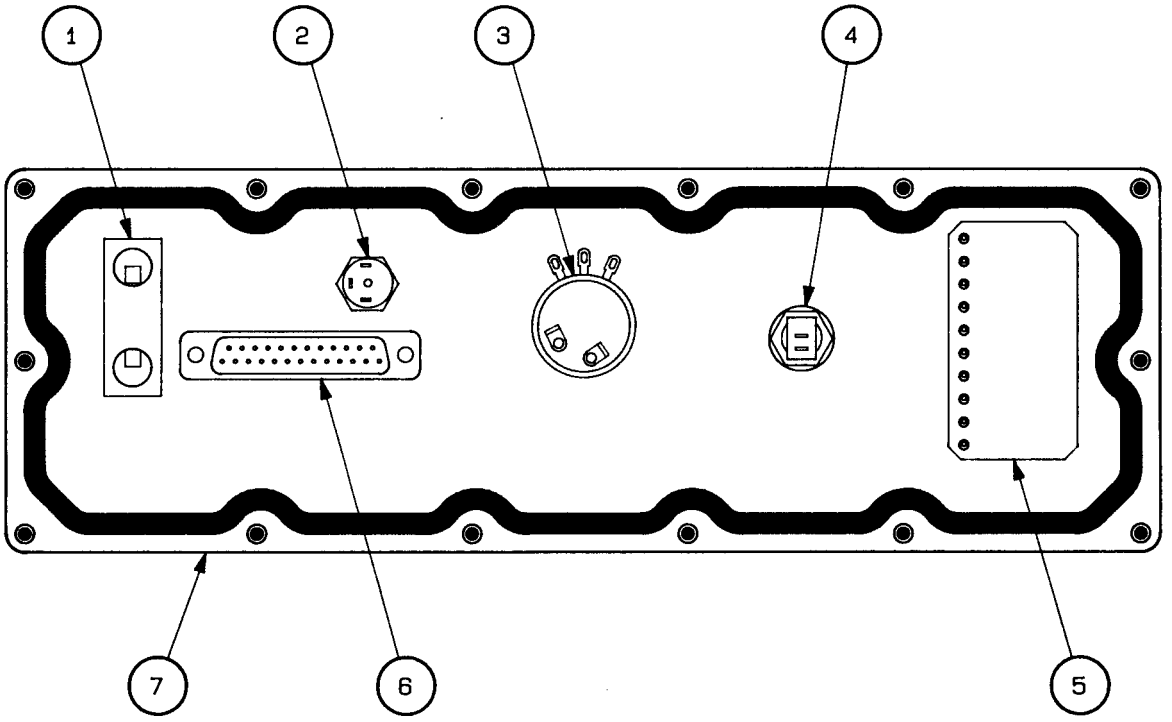
INSTALLATION

1. **Install** plug **A9P1** (6), **as follows:**
   a. Run each wire through a 5/16-inch length of heat shrink tubing.
   b. Position each wire on plug A9P1 (6) in accordance with marked locations on tags. **Attach wires by soldering.** Shrink tubing.
   c. **Remove** all **tags** from wires.
2. **Install wires** to POWER circuit breaker (1), POWER switchlight (2), SQUELCH control (3), SPEAKER switch (4), audio filter circuit card (5), or plug A9P1 (6) on panel (7), **as follows:**
   a. Run each applicable wire through a 5/16-inch length of heat shrink tubing. Position one end of wires on parts in accordance with marked locations on tags. **Attach wires by soldering.** Shrink tubing.
   c. **Route soldered wires along wiring harness** through tubing, as applicable, and position free end on other parts in accordance with marked locations on tags. **Attach free end of wires by soldering.** Shrink tubing.
   d. **Remove** all **tags** from wires.
   e. **Attach wiring harness ties** along entire length of each wire that was installed in harness.
3. Install control panel in accordance with Installation instructions on page 3-24.

TEST

Perform Control Panel Test on page 3-96.

CONTROL PANEL WIRING AND CONNECTOR MAINTENANCE INSTRUCTIONS (4 of 4)



PANEL MAINTENANCE INSTRUCTIONS (1 OF 4)

This task covers:

REMOVAL INSTALLATION TEST

INITIAL SETUP

Tools:

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts:

Masking tape (item 10, Appx B)

Personnel Required:

1

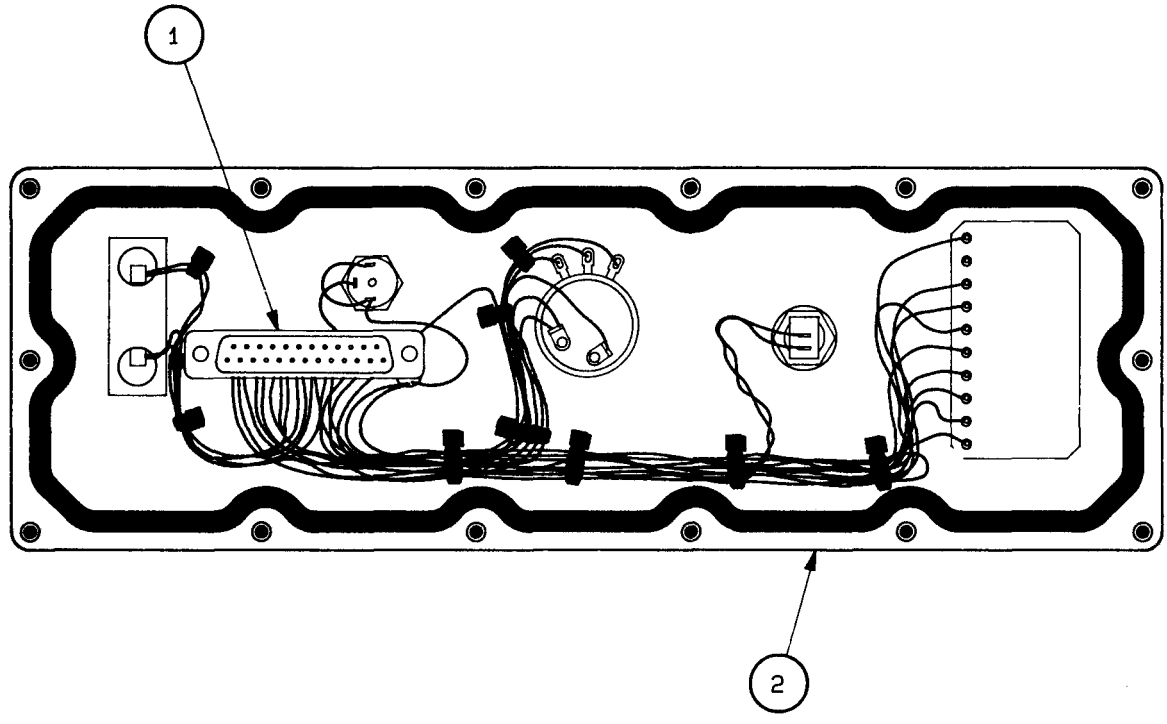
REMOVAL

NOTE

It is not necessary to unsolder wires attached to parts when performing referenced removal instructions in steps 1 thru 6.

1. Remove control panel in accordance with Removal instructions on page 3-24.
2. Remove POWER circuit breaker in accordance with Removal instructions on page 3-34.
3. Remove POWER switchlight in accordance with Removal instructions on page 3-36.
4. Remove SQUELCH control in accordance with Removal instructions on page 3-32.
5. Remove SPEAKER switch in accordance with Removal instructions on page 3-30.
6. Remove audio filter circuit card in accordance with Removal instructions on page 3-26.
7. Remove plug A9P1 and wire harness with attached parts (1) from panel (2).
8. Remove seal in accordance with Removal instructions on page 3-92.

PANEL MAINTENANCE INSTRUCTIONS (2 OF 4)



PANEL MAINTENANCE INSTRUCTIONS (3 OF 4)

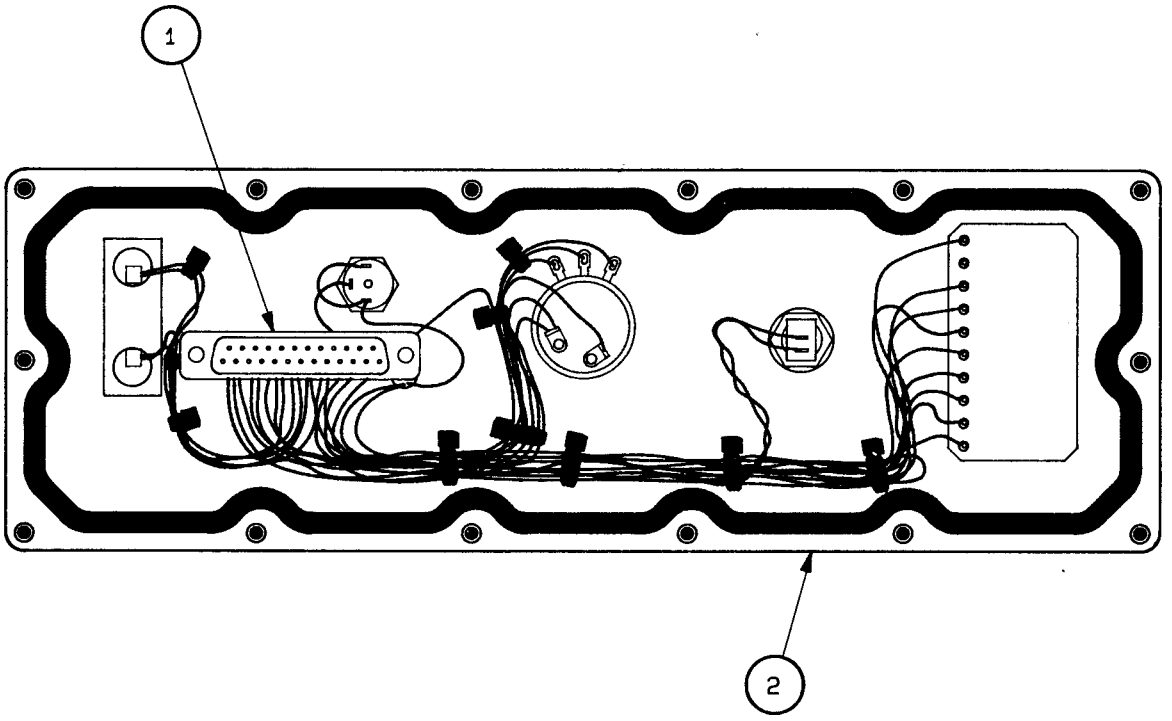
INSTALLATION

1. Install seal in accordance with installation instructions on page 3-92.
2. Position plug A9P1 and wire harness with attached parts on panel (1).
3. Install audio filter circuit card in accordance with Installation instructions on page 3-26.
4. Install SPEAKER switch in accordance with Installation instructions on page 3-30.
5. Install SQUELCH control in accordance with Installation instructions on page 3-32.
6. Install POWER switchlight in accordance with Installation instructions on page 3-36.
7. Install POWER circuit breaker in accordance with Installation instructions on page 3-34.
8. Install control panel in accordance with installation instructions on page 3-24.

TEST

Perform Control Panel Test on page 3-96.

PANEL MAINTENANCE INSTRUCTIONS (4 OF 4)



SEAL MAINTENANCE INSTRUCTIONS (1 OF 2)

This task covers:

INSPECTION REMOVAL INSTALLATION

INITIAL SETUP

Tools:

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts:

None

Personnel Required:

1

INSPECTION

1. **Inspect seal** (1) or (3), as applicable, **for cracks or damage.**
2. **Inspect areas around seal** (1) or (3) and on back of control panel (2) or inside of cover (4) **for indications of leaks through seal** (1) or (3) onto control panel (2) or into cover (4).
3. If any cracks, damage, or indications of leakage are present, replace seal (1) or (3).

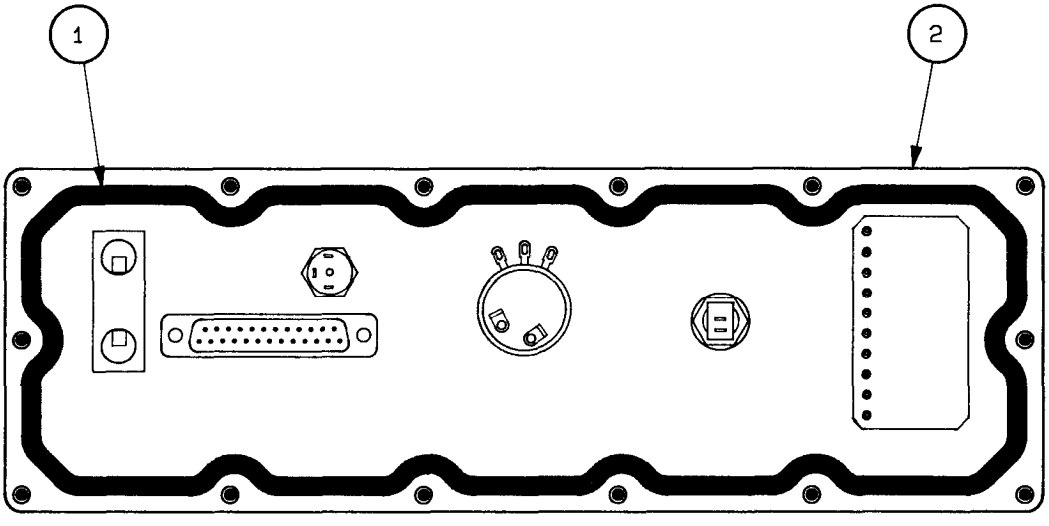
REMOVAL

1. **Remove seal** (1) or (3), as applicable, from groove in control panel (2) or cover (4).

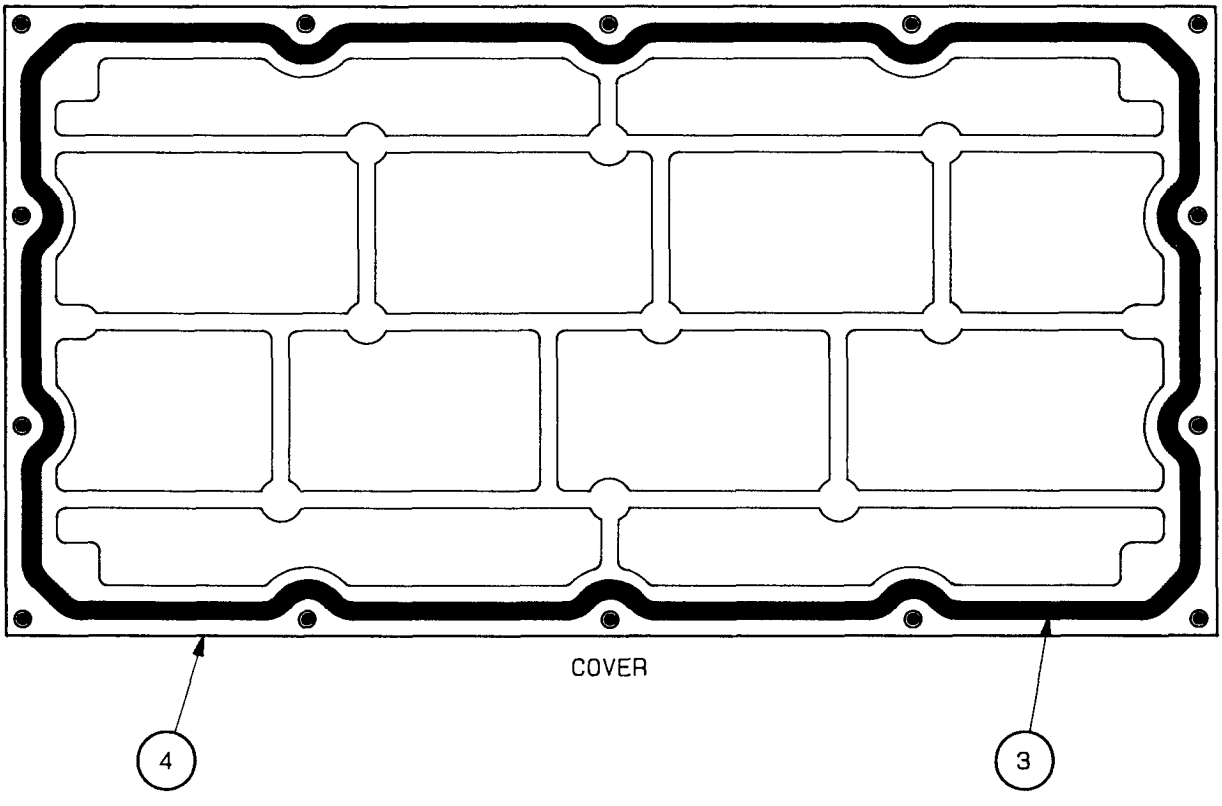
INSTALLATION

1. **Install seal** (1) or (3), as applicable, into groove in control panel (2) or cover (4).

SEAL MAINTENANCE INSTRUCTIONS (2 OF 2)



CONTROL PANEL



COVER

Section V. TESTING

INTRODUCTION

Applicable referenced steps of the control panel test should be run on the control panel when a replacement part is installed, to verify proper repair. The control panel should be installed in the amplifier-power supply. The amplifier-power supply minimum performance test should then be run on the amplifier-power supply when a repaired control panel or replacement part is installed, to verify proper operation. If any of the amplifier-power supply minimum performance test requirements are not attained, refer to amplifier-power supply troubleshooting on page 3-10. If any of the control panel test requirements are not attained, refer to control panel troubleshooting on page 3-17.

CONTROL PANEL TEST (1 of 2)

This task covers:

TEST

INITIAL SETUP

Test Equipment:

Multimeter, AN/PSM-45

Materials/Parts:

None

Personnel Required

1

TEST

1. Set POWER circuit breaker to OFF.
2. Connect multimeter between plug A9P1, pins 8 and 21. Multimeter should indicate an open circuit.
3. Set POWER circuit breaker to ON. Multimeter should indicate less than 1.0 ohms.
4. Turn SQUELCH control on.
5. Connect multimeter between plug A9P1, pins 18 and 19. Multimeter should indicate less than 1.0 ohm.
6. Connect multimeter between plug A9P1, pins 4 and 6. Multimeter should indicate between 9,000 and 11,000 ohms.
7. Turn SQUELCH control to minimum on.
8. Connect multimeter between plug A9P1, pins 4 and 5. Multimeter should indicate less than 1.0 ohm.
9. Turn SQUELCH control from minimum on to MAX. Multimeter indication should increase from less than 1.0 thru 9,000 to 11,000 ohms maximum.
10. Set SPEAKER switch to ON.
11. Connect multimeter between plug A9P1, pins 16 and 17. Multimeter should indicate less than 1.0 ohm.
12. Set SPEAKER switch to OFF. Multimeter should indicate an open circuit.
13. Connect multimeter between plug A9P1, pins 2 and 20. Multimeter should indicate between 60 and 80 ohms.
14. Connect multimeter between plug A9P1, pin 1 and SPEAKER AUDIO connector, pin E. Multimeter should indicate less than 1.0 ohm.
15. Connect multimeter between plug A9P1, pin 14 and SPEAKER AUDIO connector, pin A. Multimeter should indicate less than 1.0 ohm.
16. Connect multimeter between plug A9P1, pin 14 and RADIO AUDIO connector, pin A. Multimeter should indicate less than 1.0 ohm.
17. Connect multimeter between plug A9P1, pin 15 and SPEAKER AUDIO connector, pin B. Multimeter should indicate less than 1.0 ohm.
18. Connect multimeter between plug A9P1, pin 23 and RADIO AUDIO connector, pin C. Multimeter should indicate less than 1.0 ohm.

CONTROL PANEL TEST (2 of 2)

TEST (cont)

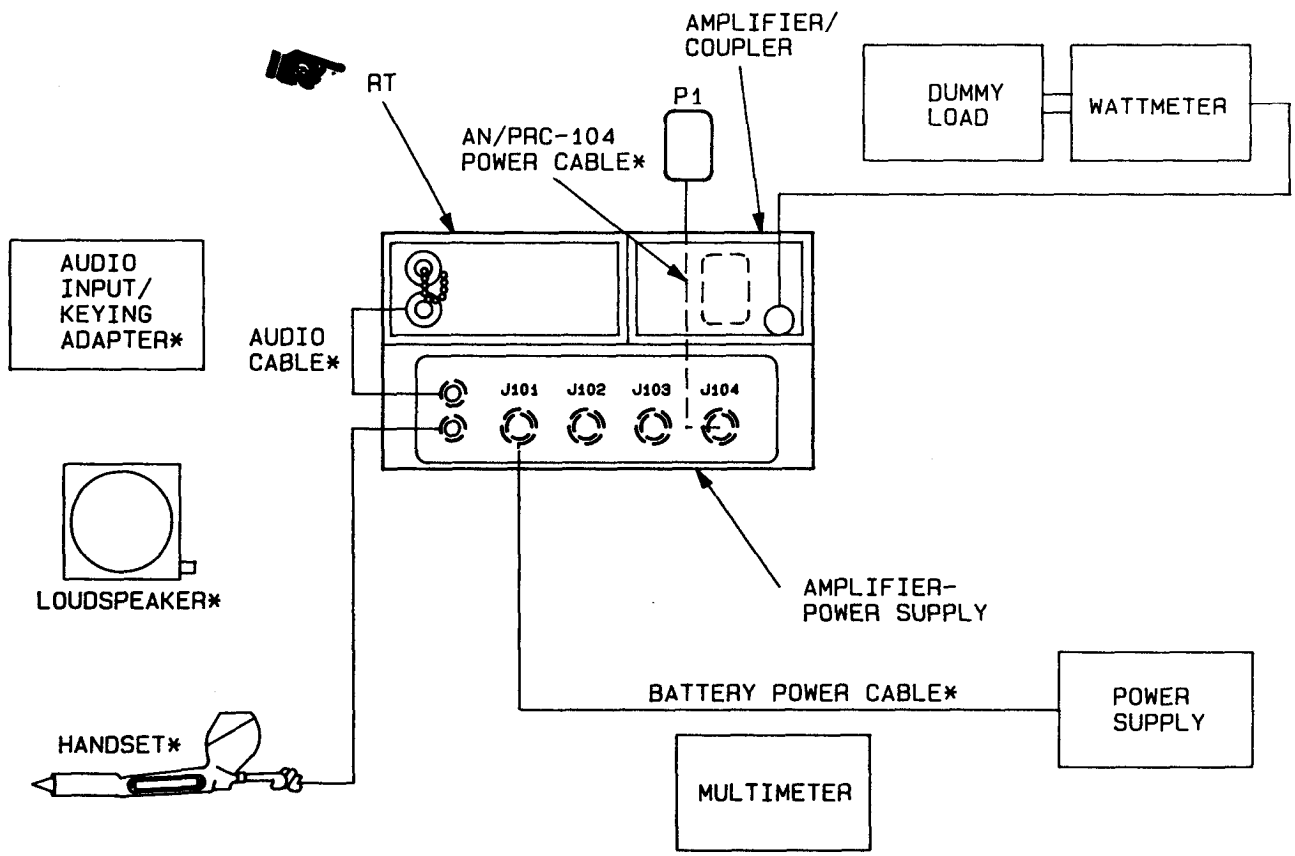
19. Connect multimeter between plug A9P1, pin 23 and SPEAKER AUDIO connector, pin C. Multimeter should indicate less than 1.0 ohm.
20. Connect multimeter between plug A9P1, pin 24 and RADIO AUDIO connector, pin B. Multimeter should indicate less than 1.0 ohm.
21. Connect multimeter between plug A9P1, pins 3 and 24. Multimeter should indicate an open circuit.
22. Connect multimeter between plug A9P1, pins 2 and 3. Multimeter should indicate less than 1.0 ohm.
23. Connect multimeter between plug A9P1, pin 13 and RADIO AUDIO connector, pin D. Multimeter should indicate less than 1.0 ohm.
24. Connect multimeter between plug A9P1, pin 13 and SPEAKER AUDIO connector, pin D. Muitimeter should indicate less than 1.0 ohm.
25. Connect multimeter between plug A9P1, pins 13 and 25. Multimeter should indicate an open circuit.
26. Connect multimeter between plug A9P1, pin 11 and RADIO AUDIO connector, pin E. Multimeter should indicate less than 1.0 ohm.
27. Connect multimeter between plug A9P1, pin 10 and RADIO AUDIO connector, pin F. Multimeter should indicate less than 1.0 ohm.

TEST SETUP (1 of 2)

The amplifier-power supply minimum performance test is performed with a working RT and amplifier/coupler mounted on the amplifier-power supply. The test setup is shown on page 3-99. Detailed setup instructions and initial control settings are discussed in the test procedure starting on page 3-100. Voltage measurements taken with a multimeter are used to indicate proper operation.

No test setup is required for the control panel test. Resistance measurements taken with a multimeter are used to indicate proper operation.

TEST SETUP (2 of 2)



TEST EQUIPMENT REQUIRED:

- DUMMY LOAD, 8085
- ELECTRICAL GROUP KIT, OA-9161/GRC-213
- MULTIMETER, AN/PSM-45
- POWER SUPPLY, PP-2309C/U
- WATTMETER, AN/USM-298

*PART OF ELECTRICAL GROUP KIT, OA-9161/GRC-213

AMPLIFIER-POWER SUPPLY MINIMUM PERFORMANCE TEST (1 of 2)

This task covers:

TEST

INITIAL SETUP

Test Equipment:

Dummy Load, 8085
Electrical Group
Kit, OA-9161/GRC-213
Multimeter, AN/PSM-45
Power Supply, PP-2309C/U
Wattmeter, AN/USM-298

Materials/Parts:

None

Personnel Required:

1

TEST

1. Visually inspect exterior of amplifier-power supply for obvious damage that will affect performance.
2. Attach amplifier/coupler and RT units together, using latches.
3. Place latched RT and amplifier/coupler on top of amplifier-power supply.
4. Slide latched RT and amplifier/coupler toward rear of amplifier-power supply. Verify that RT and amplifier/coupler fully engage retaining cleats on rear of amplifier-power supply. If necessary, push RT and amplifier/coupler back until they fully engage retaining cleats.
5. Tighten two fasteners over hooks, located on front of RT and amplifier/coupler, until RT and amplifier/coupler are securely attached to top of amplifier-power supply.
6. Set power supply line switch to off position.
   Set RT VOLUME OFF/MAX switch control to OFF.
7. Set amplifier-power supply SPEAKER switch to OFF and POWER circuit breaker to
8. OFF and turn SQUELCH control to OFF.
9. Connect battery power cable from power supply to power input connector J101 on amplifier-power supply.
10. Connect audio cable from lower AUDIO connector on RT to RADIO AUDIO connector on amplifier-power supply.
11. Connect wattmeter to BNC connector on amplifier/coupler.
12. Connect dummy load to wattmeter.
13. Connect handset to SPEAKER AUDIO connector on amplifier-power supply.
14. Connect AN/PRC-104 power cable to connector J104 on amplifier-power supply.
15. Set amplifier/coupler ANT SEL switch to middle (BNC) position.
16. Set RT lefthand MODE switch to V-TR, righthand MODE switch to USB, and FREQUENCY KHz switches to 9,000 KHz.

AMPLIFIER-POWER SUPPLY MINIMUM PERFORMANCE TEST (2 of 2)

17. Set amplifier-power supply SPEAKER switch to ON and turn SQUELCH control to OFF.
18. Set power supply output at 26.5 V dc at 7.0 amps.
19. Set power supply line switch to on position.
20. Set amplifier-power supply POWER circuit breaker to ON. The POWER switchlight should come on and remain on. The POWER circuit breaker should remain at ON.
21. Connect multimeter between AN/PRC-104 power cable connector P1, pins 1(-) and 2(+). Multimeter should indicate 22 V dc, minimum.
22. Set power supply line switch to off position.
23. Connect AN/PRC-104 power cable to amplifier/coupler.
24. Set power supply line switch to on position.
25. Turn RT VOLUME OFF/MAX switch control on and adjust for desired listening level of received noise in handset. POWER switchlight should come on and remain on. POWER circuit breaker should remain at ON.
26. Press and release PTT switch on handset to begin automatic tuning of AN/PRC-104 to dummy load.
27. Verify that a continuous 1-KHz tone (tuning indicator) is heard in handset receiver for a period of 3 seconds, typical, depending on frequency of operation selected. If no tone is heard, press and release PTT switch again. Also verify that no tune fault, consisting of a series of beeps, is heard after tuning stops. POWER switchlight should remain on. POWER circuit breaker should remain at ON.
28. Press and hold PTT switch on handset and speak a short test count into handset microphone. Microphone audio should be heard in handset as sidetone.
29. Release PTT switch.
30. Disconnect handset from amplifier-power supply.
31. Connect audio input/keying adapter to SPEAKER AUDIO connector on amplifier-power supply.
32. Connect multimeter between amplifier-power supply housing and VIC-1 retransmit connector J102, pin T.
33. Press and hold PTT switch on audio input/keying adapter. Multimeter should indicate less than 0.25 V dc.
34. Release PTT switch.
35. Connect multimeter between amplifier-power supply housing and VIC-1 retransmit connector J102, pin B. Multimeter should indicate between 26.0 and 27.0 V dc.
36. Connect multimeter between amplifier-power supply housing and external power connector J103, pin B. Multimeter should indicate between 26.0 and 27.0 V dc.

Section VI. PREPARATION FOR STORAGE OR SHIPMENT

Disassembly and repacking of equipment for shipment or limited storage is covered in the Preparation for Storage or Shipment chapter in TM 11-5820-1047-12.

APPENDIX A

REFERENCES

SCOPE

This appendix lists all forms, field manuals, technical manuals, and miscellaneous publications in this manual.

FORMS

DA Form 2028	Recommended Changes to Publications and Blank Forms
DA Form 2028-2	Recommended Changes to Equipment Technical Publications
SF 361	Transportation Discrepancy Report (TDR)
SF 368	Product Quality Deficiency Report

FIELD MANUALS

FM 21-11	First Aid for Soldiers
FM 21-26	Map Reading

TECHNICAL MANUALS

TM 07748B-12/1, TM 11-5820-1046-12	Operator's and Organizational Maintenance Manual for Radio Set AN/PRC-104
TM 07748B-45/2, TM 11-5820-1046-40	Field & Depot Maintenance Instructions for Radio Set AN/PRC-104
TM 11-5820-1046-40P	General Support Maintenance Repair Parts and Special Tools List for Radio Set AN/PRC-104
TM 09179A-12/1, TM 11-5820-1047-12	Operator's and Organizational Maintenance Manual for Radio Set AN/GRC-213
TM 11-5820-923-12-HR	Technical Manual Hand Receipt Covering Contents of Components of End Item (COEI), Basic Issue Items (Bll), and Additional Authorization List (AAL) for Radio Set AN/GRC-213
TM 11-5820-1047-20P	Organizational Maintenance Repair Parts and Special Tools List for Radio Set AN/GRC-213
TM 11-5820-1047-40P	General Support Maintenance Repair Parts and Special Tools (Including Depot Maintenance Repair Parts and Special Tools) for Amplifier-Power Supply AM-7152/GRC-213
TM 11-5850-923-40	Operator's, Organizational, Direct Support, and General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Electrical Group Kit, OA-9161/GRC-213

TECHNICAL MANUALS (Cont)

TM 11-2300-476-14&P	Operator's, Organizational, Direct Support, and General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Installation Kits, Electrical Equipment: MK-2447/GRC-213 for General Purpose Wheeled or Tracked Vehicles, MK-2446/GRC-213 for Truck-M882 or M1008A1 CUCV, MK-2445/GRC-213 for Carrier Command Post-M577A1, MK-2444/ GRC-213 for Cargo Truck-M561, MK-2443/GRC-213 for Utility Truck-M151A1, MK-2442/GRC-213 for Armored Personnel Carrier-M113A1
TM 11-5820-467-15	Operator's, Organizational, Field, and Depot Maintenance Manual, Antenna Group AN/GRA-50
TM 11-5985-379-14&P	Operator's, Organizational, Direct Support, and General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Antenna AS-2259/GR and Adapter, Antenna to Antenna Base MX-9313/GR
TM 750-244-2	Procedures for Destruction of Army Electronic Materiel to Prevent Enemy Use (Electronic Command)

MISCELLANEOUS PUBLICATIONS

AMDF	(AR708-1) IAW Packaging Segment of Army Master Data File AMDF by NSN
AR 735-11-2	Reporting of Item and Packaging Discrepancies
AR 750-244-2	Destruction of Army Materiel
CTA 8-100	Army Medical Department Expendable/Durable Items
CTA 50-970	Expendable/Durabie Items (Except Medical, Class V, Repair Parts, and Heraldic Items)
DA Pam 25-30	Consolidated Index of Army Publications and Blank Forms
DA Pam 738-750	The Army Maintenance-Management System (TAMMS)
MCO 4430.3J	Report of Discrepancy (ROD)
MCO P4610.19	Transportation and Travel Record of Transportation Discrepancies
SB 11-573	Painting and Preserving of Supplies Availabie for Field Use for Electronics Command Equipment
SB 11-614	Caution Notice for Antenna Bases, Towers, and Other Mast Structures

MISCELLANEOUS PUBLICATIONS (cont)

TB 43-0118	Field Instructions for Painting and Preserving Electronics Command Equipment Including Camouflage Pattern Painting of Electrical Equipment Shelters
TB SIG 291	Safety Measures to be Observed When Installing and Using Whip Antennas, Field Typecasts, Towers, Antennas, and Metal Poles That Are Used with Communication, Radar, and Direction Finder Equipment

APPENDIX B

EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

SCOPE

This appendix lists expendable/durable supplies and materials you will need to operate and maintain the amplifier-power supply. This listing is for informational purposes only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (except Medical, Class V, Repair Parts, and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

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 (eg, "Use cleaning compound (item 5, App. C)").

b. Column (2) - Level. This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew
O - Organizational Maintenance
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 part number, followed by the Federal Supply Code for Manufacturer (FSCM) in parentheses, if applicable.

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 (e.g., 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.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
1	H	6810-00-201-0906	Alcohol, Denatured	oz
2	H		Brush, Paint	ea
3	H	7510-00-550-8446	Brush, Stiff	ea
4	H		Brush, Wire	ea
5	H	8305-00-267-3015	Cheesecloth (lint-free cloth) (81348)	yd
6	H	6850-00-105-3084	Cleaning Compound (solvent), Trichlorotrifluoroethane	oz
7	H	7930-01-055-6121	Detergent, GP, Liq.	gl
8	H		Paint, Epoxy (type 1, green 24052, MIL-C-22750)	gl
9	H		Paint, Primer (type 1 kit, MIL-P-23377)	gl
10	H		Tape, Masking (8135)	ea
11	H		Ties, Wiring Harness	ea
12	H		Tubing, Heat Shrink	ft
13	H		Wire, Electrical	ea

APPENDIX C

EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

SCOPE

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F - Direct Support Maintenance
H - General Support Maintenance

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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 part number, followed by the Commercial and Government Entity (CAGE) in parentheses, if applicable.

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 (e.g., 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.

GLOSSARY

Section I. ABBREVIATIONS

AMP	Amplifier
amps	Amperes
CAGE	Commercial and Government entity
CCW	Counterclockwise
CTA	Common table of allowance
CW	Clockwise
dc	Direct current
dB	Decibel
emi	Electromagnetic interference
FM	Frequency modulation
hf	High frequency
Hz	Hertz
MAX	Maximum
MIC	Handset mouthpiece
ms	Millisecond
MTOE	Modified table of organization and equipment
mW	Milliwatt
PTT	Press-to-talk
PWR	Power
RCV	Receiver
rf	Radio frequency
rfi	Radio frequency interference
rms	Root mean square
RPSTL	Repair parts and special tools list
RT	Receiver/Transmitter
RTN	Return
ssb	Single sideband
TMDE	Test measurement and diagnostic equipment
U/M	Unit of measure
v	Volt
vhf	Very high frequency
W	Watt
XMT	Transmit
µs	Microsecond

Section II. DEFINITION OF UNUSUAL TERMS

Attack Time - The amount of time required for a signal to be present before the squelch circuit will respond to the signal.

Hysteresis - The amount a received signal that has removed squelch may decrease in signal strength without causing squelching to occur.

Net - A group of communicating radio stations operating on the same frequency, often in a definite time schedule and sequence.

Pass Transistor Network - A circuit that converts vehicle power (+ BATTERY) to a constant dc output voltage (+ CONDITIONED POWER) for the AN/PRC-104 variable load.

Release Time - The amount of time required for a signal to be absent before the squelch circuit will respond to the absence of the signal.

Retransmit - To transmit vhf fm signals received from a remote VHF FM radio set as hf ssb signals to a remote HF SSB radio set and received hf ssb signals from a remote HF SSB radio set as vhf fm signals to a remote VHF FM radio set.

Sensitivity - A measure of the ability of the squelch circuit to distinguish between a weak signal and a no-signal condition.

Sidetone - The sound of the Operator's own voice heard in the handset, while transmitting.

Signal-to-Noise Ratio - The ratio of the amplitude of desired signal to the amplitude of noise signal occurring at the same time.

SINAD Sensitivity - The minimum standard modulated carrier-signal input required to produce a specified ratio in decibels of signal-plus-noise-plus-distortion to noise-plus-distortion.

Squelch - To quiet the receiver by reducing its gain automatically in response to background noise or a continuous audio tone when there is no voice modulated input signal.

Transorb - A diode that both acts like a Zener diode to provide overvoltage protection by absorbing overvoltage transients, and additionally permanently shorts when the voltage exceeds a specified limit.

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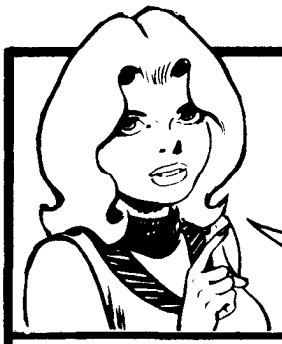
RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS



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FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)
Commander
Stateside Army Depot
ATTN: AMSTA-US
Stateside, N.J. 07703-5007

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	PARAGRAPH	FIGURE NO	TABLE NO	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
2-25	2-28			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.
3-10	3-3		3-1	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.
5-6	5-8			Add new step f.1 to read, "Replace cover plate removed in step e.1, above." REASON: To replace the cover plate.
		F03		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.

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
SSG I. M. DeSpiritof 999-1776

SIGN HERE
I. M. DeSpiritof

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DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 11-5820-923-40	14 FEB 86	Amplifier Power Supply AM-7152/GRC-213

BE EXACT PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME GRADE OR TITLE AND TELEPHONE NUMBER

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Fort Monmouth, New Jersey 07703-5007

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General, United States Army
Chief of Staff

Official:

MILDRED E. HEDBERG
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The Adjutant General

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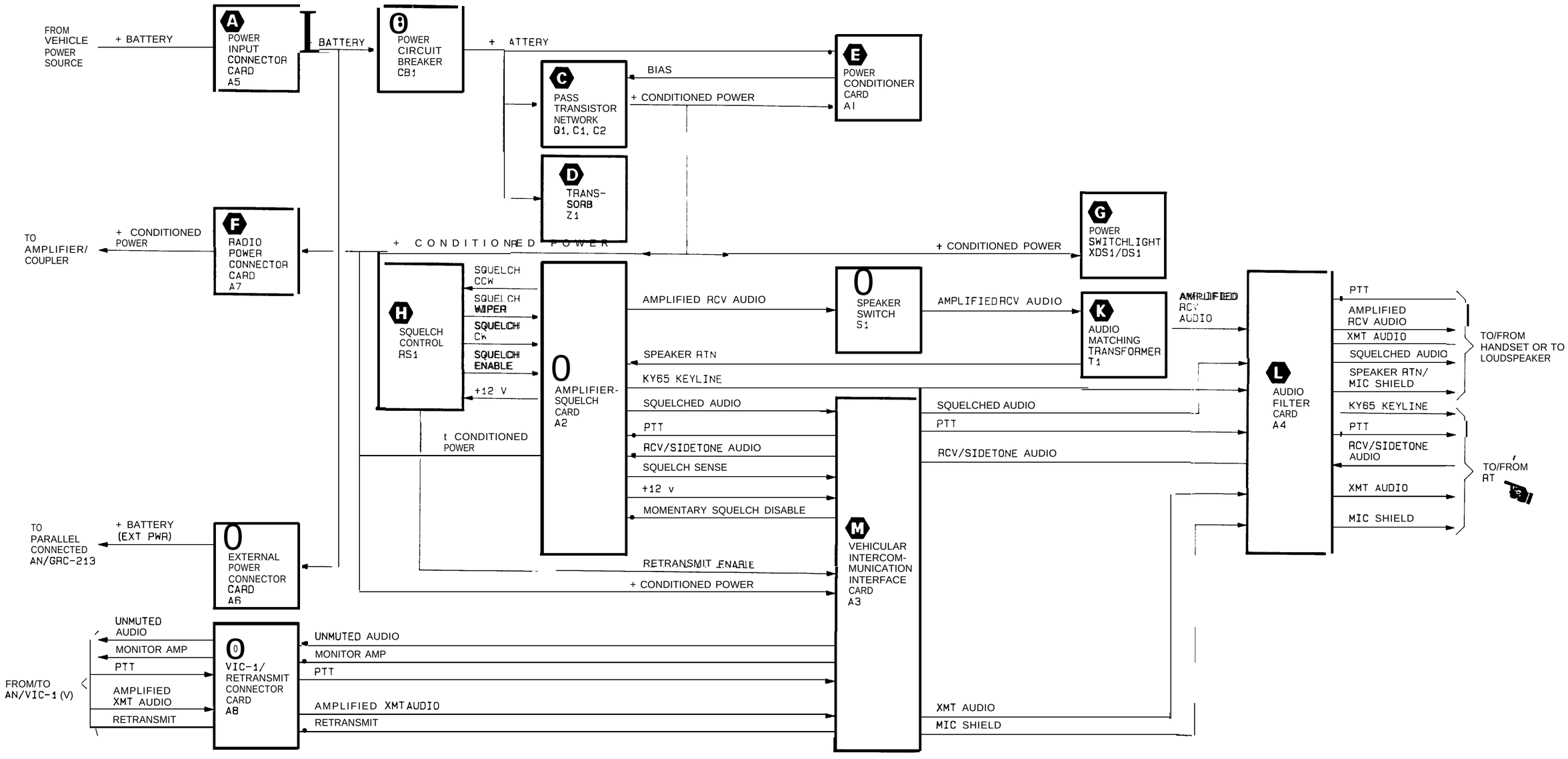
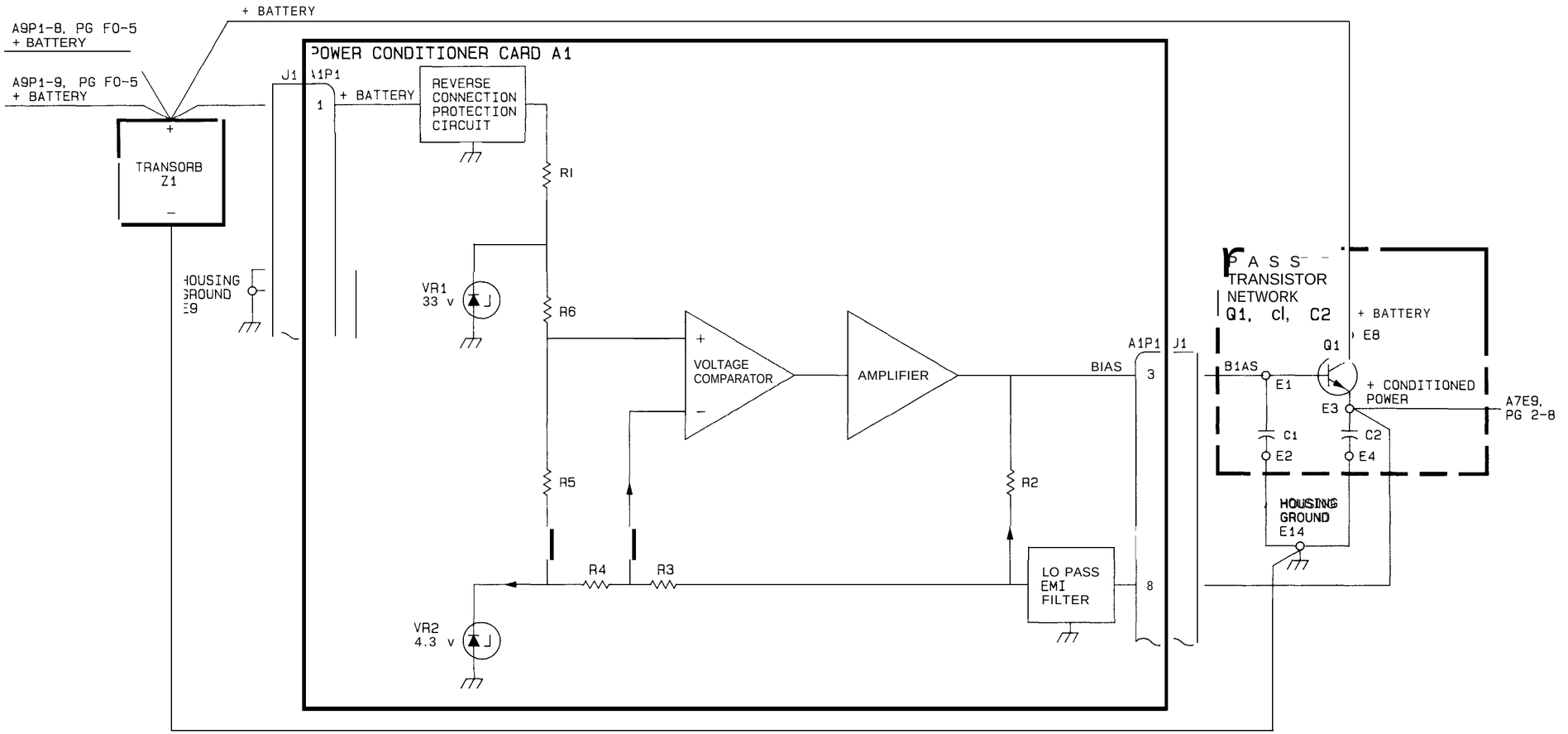
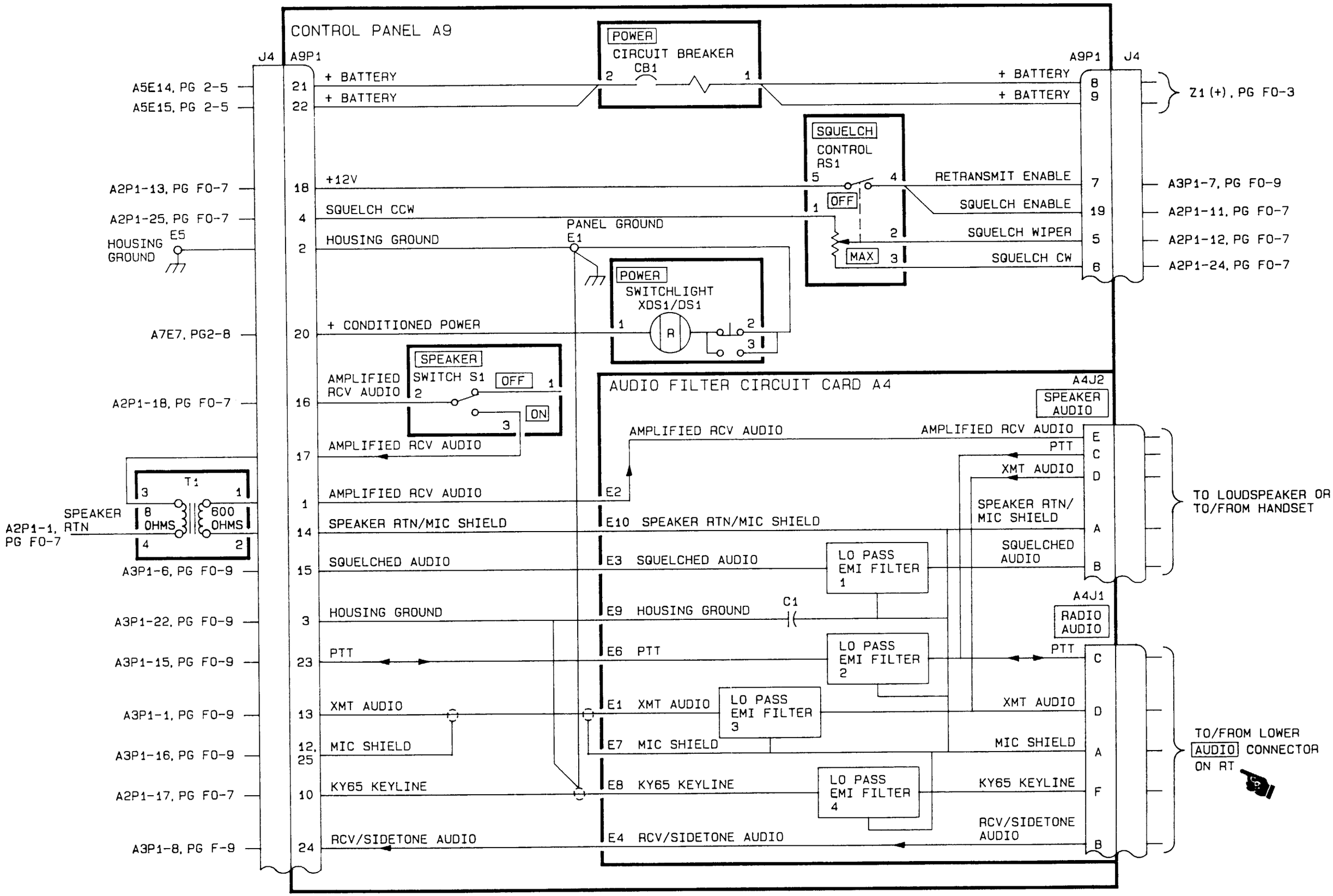
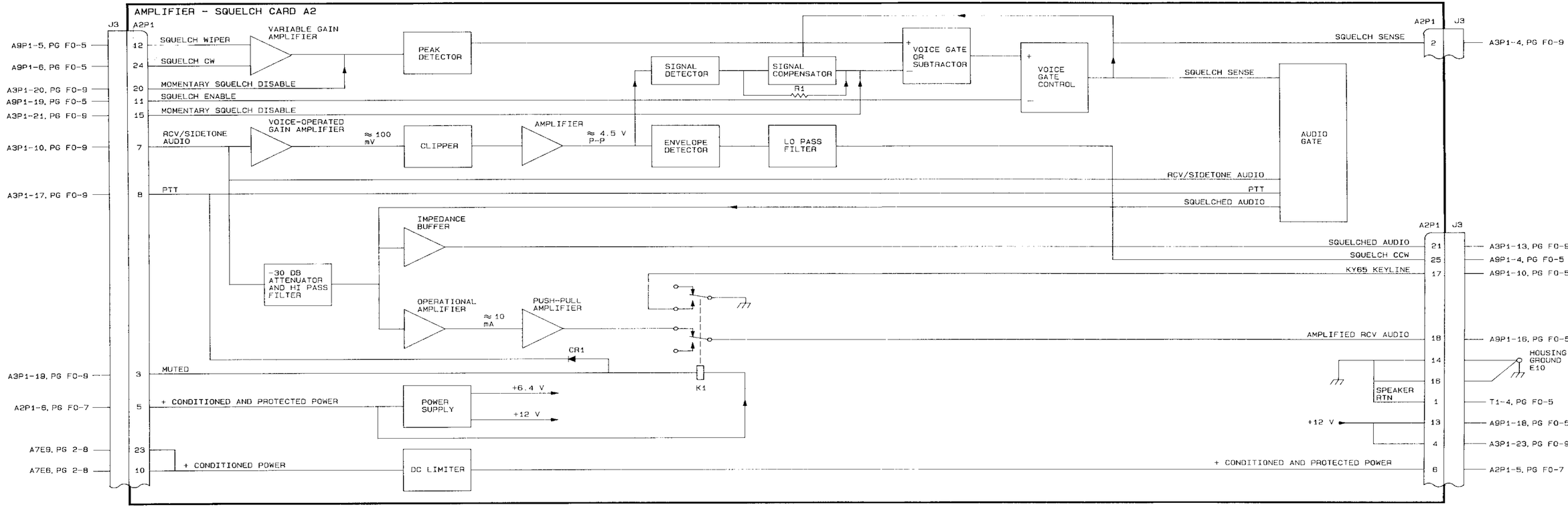
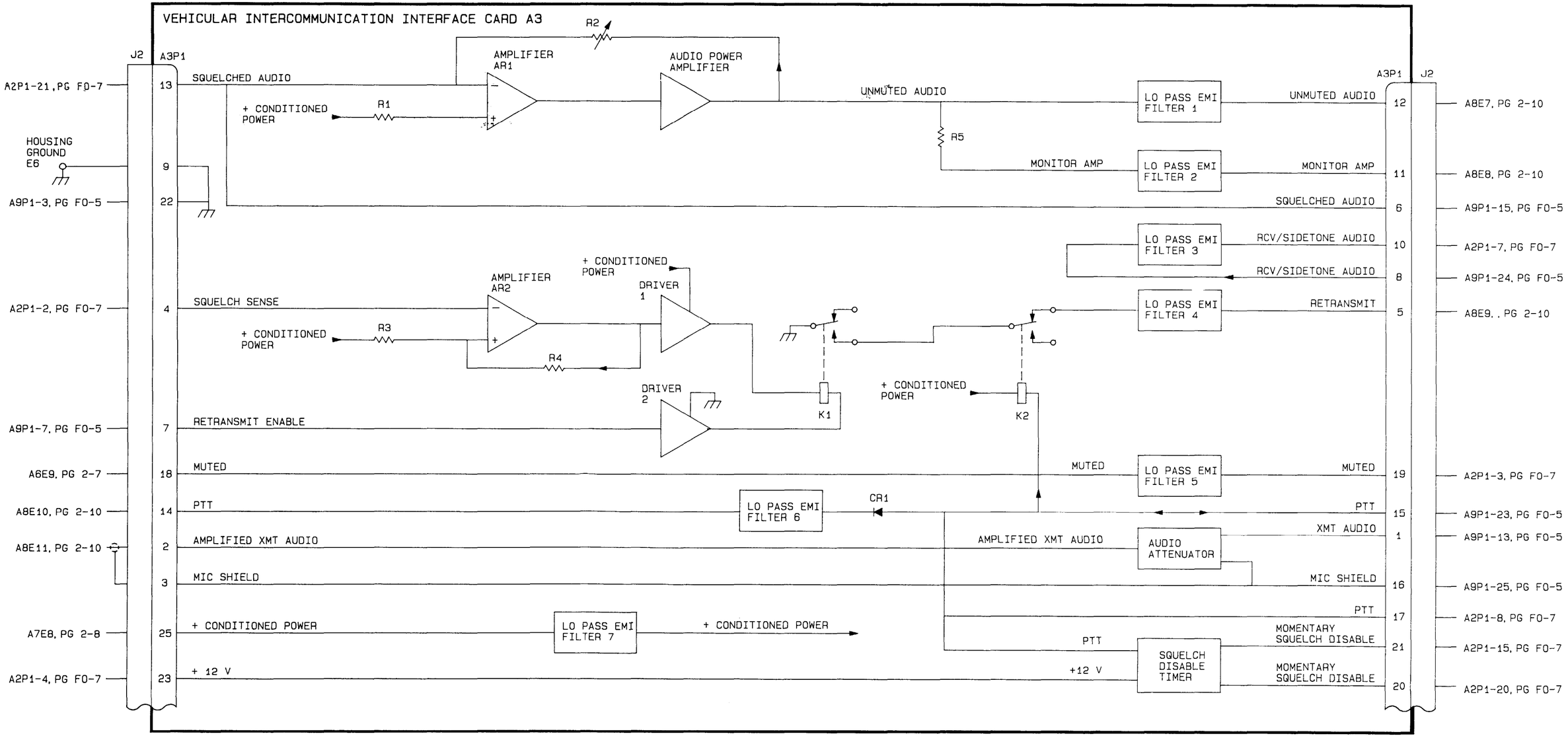

FROM VEHICLE POWER SOURCE
+ BATTERY
A POWER INPUT CONNECTOR CARD A5
BATTERY
B POWER CIRCUIT BREAKER CB1
+ ATTERY
C PASS TRANSISTOR NETWORK Q1, C1, C2
BIAS
+ CONDITIONED POWER
E POWER CONDITIONER CARD A1
D TRANS-SORB Z1
TO AMPLIFIER/ COUPLER
+ CONDITIONED POWER
F RADIO POWER CONNECTOR CARD A7
+ CONDITIONED POWER
+ CONDITIONED POWER
G POWER SWITCHLIGHT XDS1/DS1
H SQUELCH CONTROL RS1
SQUELCH CCW
SQUELCH WIPER
SQUELCH CW
SQUELCH ENABLE
+12 V
AMPLIFIER-SQUELCH CARD A2
AMPLIFIED RCV AUDIO
SPEAKER SWITCH S1
AMPLIFIED RCV AUDIO
K AUDIO MATCHING TRANSFORMER T1
SPEAKER RTN
KY65 KEYLINE
SQUELCHED AUDIO
PTT
RCV/SIDETONE AUDIO
SQUELCH SENSE
+12 v
MOMENTARY SQUELCH DISABLE
t CONDITIONED POWER
RETRANSMIT ENABLE
+ CONDITIONED POWER
M VEHICULAR INTERCOM-MUNICATION INTERFACE CARD A3
SQUELCHED AUDIO
PTT
RCV/SIDETONE AUDIO
XMT AUDIO
MIC SHIELD
AMPLIFIED RCV AUDIO
L AUDIO FILTER CARD A4
PTT
AMPLIFIED RCV AUDIO
XMT AUDIO
SQUELCHED AUDIO
SPEAKER RTN/ MIC SHIELD
KY65 KEYLINE
PTT
RCV/SIDETONE AUDIO
XMT AUDIO
MIC SHIELD
TO/FROM HANDSET OR TO LOUDSPEAKER
TO/FROM RT
TO PARALLEL CONNECTED AN/GRC-213
+ BATTERY (EXT PWR)
EXTERNAL POWER CONNECTOR CARD A6
UNMUTED AUDIO
MONITOR AMP
PTT
AMPLIFIED XMT AUDIO
RETRANSMIT
FROM/TO AN/VIC-1 (V)
VIC-1/ RETRANSMIT CONNECTOR CARD A8
UNMUTED AUDIO
MONITOR AMP
PTT
AMPLIFIED XMT AUDIO
RETRANSMIT


+ BATTERY
A9P1-8, PG FO-5
+ BATTERY
A9P1-9, PG FO-5
+ BATTERY
TRANSORB
Z1
POWER CONDITIONER CARD A1
J1
A1P1
1
+ BATTERY
REVERSE
CONNECTION
PROTECTION
CIRCUIT
RI
HOUSING
GROUND
E9
VR1
33 v
R6
VOLTAGE
COMPARATOR
AMPLIFIER
BIAS
A1P1
J1
3
R5
R2
R4
R3
VR2
4.3 v
LO PASS
EMI
FILTER
8
PASS
TRANSISTOR
NETWORK
Q1, C1, C2
+ BATTERY
E8
Q1
B1AS
E1
+ CONDITIONED
POWER
E3
A7E9,
PG 2-8
C1
C2
E2
E4
HOUSING
GROUND
E14


CONTROL PANEL A9
J4
A9P1
POWER
CIRCUIT BREAKER
CB1
2
1
A5E14, PG 2-5
A5E15, PG 2-5
21
22
+ BATTERY
+ BATTERY
A9P1
J4
+ BATTERY
+ BATTERY
8
9
Z1 (+), PG FO-3
SQUELCH
CONTROL
RS1
A2P1-13, PG FO-7
18
+12V
5
4
RETRANSMIT ENABLE
7
A3P1-7, PG FO-9
A2P1-25, PG FO-7
4
SQUELCH CCW
OFF
1
SQUELCH ENABLE
19
A2P1-11, PG FO-7
HOUSING GROUND
E5
PANEL GROUND
E1
2
SQUELCH WIPER
5
A2P1-12, PG FO-7
HOUSING GROUND
2
MAX
3
SQUELCH CW
6
A2P1-24, PG FO-7
POWER
SWITCHLIGHT
XDS1/DS1
A7E7, PG2-8
20
+ CONDITIONED POWER
1
R
2
3
SPEAKER
SWITCH S1
OFF
1
AMPLIFIED
RCV AUDIO
2
A2P1-18, PG FO-7
16
ON
3
AMPLIFIED RCV AUDIO
17
AUDIO FILTER CIRCUIT CARD A4
A4J2
SPEAKER
AUDIO
AMPLIFIED RCV AUDIO
AMPLIFIED RCV AUDIO
PTT
E
C
XMT AUDIO
D
T1
3
1
SPEAKER
A2P1-1,
PG FO-7
RTN
8
OHMS
600
OHMS
4
2
AMPLIFIED RCV AUDIO
1
E2
SPEAKER RTN/
MIC SHIELD
A
A3P1-6, PG FO-9
SPEAKER RTN/MIC SHIELD
14
E10 SPEAKER RTN/MIC SHIELD
SQUELCHED AUDIO
15
E3 SQUELCHED AUDIO
LO PASS
EMI FILTER
1
SQUELCHED
AUDIO
B
TO LOUDSPEAKER OR
TO/FROM HANDSET
A4J1
RADIO
AUDIO
A3P1-22, PG FO-9
3
HOUSING GROUND
E9 HOUSING GROUND
C1
A3P1-15, PG FO-9
23
PTT
E6 PTT
LO PASS
EMI FILTER
2
PTT
C
A3P1-1, PG FO-9
13
XMT AUDIO
E1 XMT AUDIO
LO PASS
EMI FILTER
3
XMT AUDIO
D
A3P1-16, PG FO-9
12,
25
MIC SHIELD
E7 MIC SHIELD
MIC SHIELD
A
TO/FROM LOWER
AUDIO CONNECTOR
ON RT
A2P1-17, PG FO-7
10
KY65 KEYLINE
E8 KY65 KEYLINE
LO PASS
EMI FILTER
4
KY65 KEYLINE
F
A3P1-8, PG F-9
24
RCV/SIDETONE AUDIO
E4 RCV/SIDETONE AUDIO
RCV/SIDETONE
AUDIO
B


AMPLIFIER - SQUELCH CARD A2
J3
A2P1
A9P1-5, PG FO-5
A9P1-6, PG FO-5
A3P1-20, PG FO-9
A9P1-19, PG FO-5
A3P1-21, PG FO-9
A3P1-10, PG FO-9
A3P1-17, PG FO-9
A3P1-19, PG FO-9
A2P1-6, PG FO-7
A7E9, PG 2-8
A7E8, PG 2-8
12
24
20
11
15
7
8
3
5
23
10
SQUELCH WIPER
SQUELCH CW
MOMENTARY SQUELCH DISABLE
SQUELCH ENABLE
MOMENTARY SQUELCH DISABLE
RCV/SIDETONE AUDIO
PTT
MUTED
+ CONDITIONED AND PROTECTED POWER
+ CONDITIONED POWER
VARIABLE GAIN AMPLIFIER
VOICE-OPERATED GAIN AMPLIFIER
≈ 100 mV
PEAK DETECTOR
CLIPPER
AMPLIFIER
≈ 4.5 V P-P
SIGNAL DETECTOR
SIGNAL COMPENSATOR
R1
ENVELOPE DETECTOR
LO PASS FILTER
VOICE GATE OR SUBTRACTOR
VOICE GATE CONTROL
AUDIO GATE
IMPEDANCE BUFFER
-30 DB ATTENUATOR AND HI PASS FILTER
OPERATIONAL AMPLIFIER
≈ 10 mA
PUSH-PULL AMPLIFIER
CR1
K1
POWER SUPPLY
+6.4 V
+12 V
DC LIMITER
SQUELCH SENSE
SQUELCH SENSE
RCV/SIDETONE AUDIO
PTT
SQUELCHED AUDIO
SQUELCHED AUDIO
SQUELCH CCW
KY65 KEYLINE
AMPLIFIED RCV AUDIO
+ CONDITIONED AND PROTECTED POWER
A2P1
J3
2
21
25
17
18
14
16
1
13
4
6
SPEAKER RTN
+12 V
HOUSING GROUND E10
A3P1-4, PG FO-9
A3P1-13, PG FO-9
A9P1-4, PG FO-5
A9P1-10, PG FO-5
A9P1-16, PG FO-5
T1-4, PG FO-5
A9P1-18, PG FO-5
A3P1-23, PG FO-9
A2P1-5, PG FO-7


VEHICULAR INTERCOMMUNICATION INTERFACE CARD A3
J2
A3P1
A2P1-21, PG FO-7
13
SQUELCHED AUDIO
R2
AMPLIFIER AR1
AUDIO POWER AMPLIFIER
+ CONDITIONED POWER
R1
UNMUTED AUDIO
LO PASS EMI FILTER 1
UNMUTED AUDIO
12
A8E7, PG 2-10
HOUSING GROUND E6
9
R5
MONITOR AMP
LO PASS EMI FILTER 2
MONITOR AMP
11
A8E8, PG 2-10
A9P1-3, PG FO-5
22
SQUELCHED AUDIO
6
A9P1-15, PG FO-5
LO PASS EMI FILTER 3
RCV/SIDETONE AUDIO
10
A2P1-7, PG FO-7
RCV/SIDETONE AUDIO
8
A9P1-24, PG FO-5
+ CONDITIONED POWER
AMPLIFIER AR2
DRIVER 1
A2P1-2, PG FO-7
4
SQUELCH SENSE
LO PASS EMI FILTER 4
RETRANSMIT
5
A8E9, . PG 2-10
+ CONDITIONED POWER
R3
R4
DRIVER 2
K1
+ CONDITIONED POWER
K2
A9P1-7, PG FO-5
7
RETRANSMIT ENABLE
A6E9, PG 2-7
18
MUTED
MUTED
LO PASS EMI FILTER 5
MUTED
19
A2P1-3, PG FO-7
A8E10, PG 2-10
14
PTT
LO PASS EMI FILTER 6
CR1
PTT
15
A9P1-23, PG FO-5
XMT AUDIO
A8E11, PG 2-10
2
AMPLIFIED XMT AUDIO
AMPLIFIED XMT AUDIO
AUDIO ATTENUATOR
1
A9P1-13, PG FO-5
3
MIC SHIELD
MIC SHIELD
16
A9P1-25, PG FO-5
PTT
17
A2P1-8, PG FO-7
A7E8, PG 2-8
25
+ CONDITIONED POWER
LO PASS EMI FILTER 7
+ CONDITIONED POWER
PTT
MOMENTARY SQUELCH DISABLE
21
A2P1-15, PG FO-7
SQUELCH DISABLE TIMER
A2P1-4, PG FO-7
23
+ 12 V
+12 V
MOMENTARY SQUELCH DISABLE
20
A2P1-20, PG FO-7