TM 11-6625-601-34

TECHNICAL MANUAL

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

MAINTENANCE KIT, ELECTRONIC EQUIPMENT MK-733/ARC-54

(NSN 5821-00-901-4327)

This copy is a reprint which includes current pages from Change 1. The title was changed by C1 to read as shown above.

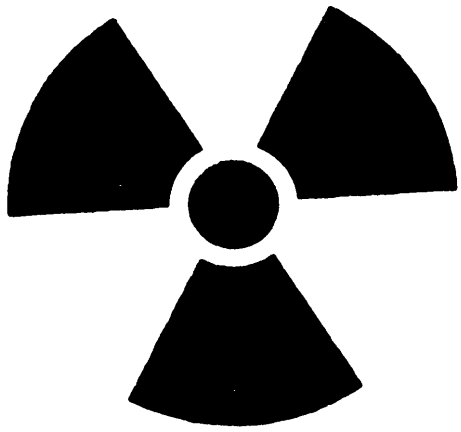
HEADQUARTERS, DEPARTMENT OF THE ARMY
AUGUST 1973

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

Be careful when working on the 54-volt inverter circuit in Test Set, Radio TS-1967/ARC-54.
Serious injury or death may result from contact with these points.

DON'T TAKE CHANCES!



Indicator ID-48 Ra226 1.5µCi 6610-839-8638

Radiation Hazard Information: The following radiation hazard information must be read and understood by all personnel before overating or repairing Maintenance Kit, Electronic Equipment MK-733/ARC-54 Hazardous radioactive materials are present in the above listed component.

The components are potentially hazardous when broken. See qualified medical personnel and the local Radiological Protection Officer (RPO) immediately if you are exposed to or cut by broken components. First aid instructions are contained in TB 43-0122, and AR 755-15.

NEVER place radioactive components in your pocket. Use extreme care NOT to break radioactive components while handling them.

NEVER remove radioactive components from cartons until you are ready to use them.

If any of these components are broken, notify the local RPO immediately. The RPO will survey the immediate area for radiological contamination and will supervise the removal of broken components. The above listed radioactive components *will not* be repaired or disassembled.

Disposal of broken, unserviceable, or unwanted radioactive components will be accomplished in accordance with the instructions in AR 755-15.

TECHNICAL MANUAL
No. 11-6625-601-34

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON D. C., *31 August 1973*

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

MAINTENANCE KIT ELECTRONIC EQUIPMENT MK-733/ARC-54

*** This manual supersedes TM 11-6625-601-45, 29 December 1965.**

LIST OF ILLUSTRATIONS

LIST OF TABLES

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1-1. Scope and Indexes of Publications

a. Scope. This manual contains instructions covering direct support and general support maintenance for Maintenance Kit, Electronic Equipment MK-733/ARC-54. It includes instructions for troubleshooting, testing, aligning and repairing the equipment. It also lists tools, materials, and test equipment to perform the maintenance of the equipment. Operation and organizational maintenance are covered in TM 11-6625-501-12.

b. Indexes of Publications.

(1) *DA Pam 310-4.* Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

(2) *DA Pam 310-7.* Refer to the latest issue of DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

1–2. Maintenance Records and Reporting of Equipment Publication Improvements

a. Maintenance Records. Department of the Army forms and procedures used for equipment maintenance shall be those prescribed in TM 38-750.

b. Reporting of Equipment Publication Improvements. The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commander U.S. Army Electronics Command, ATTN: AMSEL-MA-AC, Form Monmouth, N.J. 07703.

NOTE

For other applicable forms and records see paragraph 1-3, TM 11-6625-601-12.

1-3. Administrative Storage

For procedures, forms and records, and inspection required during administrative storage of this equipment, refer to TM 790-90-1.

1-4. Destruction of Army Materiel To Prevent Enemy Use

Refer to TM 750–244–2 for methods of destruction of materiel to prevent enemy use.

Section II. BLOCK DIAGRAM FUNCTIONING

1–5. Signal Path of Simulator-Test Set SM-349/ARC-54 Connected to Radio Set AN/ARC-54 System in Aircraft (fig. FO-2)

The simulator contains circuits that give visual indication of the operation of functions normally applied to Receiver-Transmitter, Radio RT-348/ARC-54. Also included in the simulator are circuits that simulate the homer signals and retransmit grounds. When the simulator is substituted in the place of the RT-348/ARC-54 in the aircraft, operation of the AN/ARC-54 system is checked by the use of visual indications. The functions that the simulator checks include frequency selection, squelch control, homing operation, and transmit operation.

a. Power Distribution. Operating voltage of +27.5 volts direct current (dc) for the simulator is obtained from Control, Radio Set C-3835/ARC-54. The regulated +27.5 volts dc is applied to the C-3835/ARC-54 on pin C of J101. The voltage is applied to the SM-349/ARC-54 through pin e of jack J101 and pin 18 of plug P4 to POWER switch S2. Setting switch S2 to LOAD connects resistors R2 and R3 across the power input line. This simulates the load of the RT-348/ARC-54. Setting switch S2 to ON applies +27.5 volts dc to a voltage regulator composed of resistor R1 and Zener diode CR1. The regulated +27.5 volts dc from the voltage regulator is applied to COAX CONT LEFT lamp DS9, COAX CONT RIGHT lamp DS10,

SQUELCH DIS TONE lamp DS3, SQUELCH DIS SEC lamp DS4, ODD MC lamp DS11, EVEN MC lamp DS12, SQUELCH DIS CARR lamp DS5, and motor control unit A2. Regulated +27.5 volts dc is also applied through isolation diode A2CR6 to HAR FIL lamp DS2, through isolation diode A2CR7 to PTT INT SEC TONE lamp DS7 and PTT SEC lamp DS6, and to a voltage regulator composed of resistor A1R1 and Zener diodes A1CR2 and A1CR1. The +18.2-volt dc output from the voltage regulator is applied to audio amplifiers A1Q1, A1Q2, and A1Q3, and emitter followers A1Q4 and A1Q5. Regulated +18.2 volts dc is also applied through resistor A2Rl to pin 10 of FUNCTION SELECTOR switch S3 for use as simulated homing signals. Unless otherwise indicated, POWER switch S2 is set to ON for the discussions in *b* through *g* below.

b. Frequency Selection Test. The FREQUENCY MC readout counter, ODD MC lamp DS11, EVEN MC lamp DS12, and HAR FIL lamp DS2 on the simulator give visual indications of the operation of the frequency selector circuit in the C-3836/ARC-54. The FREQUENCY MC readout counter indicates exactly the frequency selected by the C-3835/ARC-54. Lamps DS11, DS12, and DS2 light when odd-MHz frequencies, even-MHz frequencies, and frequencies below 46 MHz respectively, are selected. Setting the frequency selector switches on the C-3835/ARC-54 to a specific frequency codes the unit MHz and 0.05 MHz control wires. This coded information is applied through jack J101 and plug P4 to FREQUENCY MC counter switches S4 and S5. From switches S4 and S5, coded information is applied to motor control unit A2. The motor control unit rotates switches S4 and S5 and the counter until the selected frequency appears in the window of the FREQUENCY MC readout counter. Selecting an odd-MHz frequency lights ODD MC lamp DS11 by applying ground from the C-3835/ARC-54, through pin h of jack J101 and pin 32 of plug P4. Selecting an even-MHz frequency lights EVEN MC lamp DS12 by applying ground from the C-3835/ARC-54, through pin i of jack J101 and pin 37 of plug P4. Selecting any frequency below 46 MHz lights HAR FIL lamp DS2 by applying ground from the C-3835/ARC-54 through pin K of jack J101 and pin 4 of plug P4.

c. Squelch Control Test. Ground for the squelch tone, squelch disable and squelch carrier modes of operation originates in the C-3835/ARC-54. Setting the squelch control switch on the C-3835/ARC-54 to one of three positions applies a ground to the associated lamp in the simulator. When set to the squelch tone position, the squelch control on the C-3835/ARC-54 applies ground through pin X of jack J101 and pin 9 of plug P4 to SQUELCH DIS TONE lamp DS3, causing the lamp to light. Setting the squelch control switch on the C-3835/ARC-54 to the squelch disable position applies a ground through pin V of jack J101 and pin 12 of plug P4 of SQUELCH DIS SEC lamp DS4, causing the lamp to light. When set to the squelch carrier position, the squelch control switch on the C-3835/ARC-54 applies ground through pin W of jack J101 and pin J of jack J1 to the security device. From the security device, ground is applied through pin D of jack J1 and pin 8 of plug P4 to SQUELCH DIS CARR lamp DS5, causing lamp DS5 to light.

d. Homing Operation Test. A voltage that simulates left, right, and over-target homing signals originates in the simulator. The voltage, applied to contact 10 of FUNCTION SELECTOR switch S3A (front), is routed through switch S3A to the vertical and horizontal needles in INDICATOR ID-48/ARN. Setting switch S3 to LEFT applies a simulated left homing signal, through contacts 10 and 1 of switch S3A (front), pin 19 of plug P4, and pin B of jack J2, to the vertical needle in the ID-48/ARN. Ground for the simulated left homing signal is applied, through contacts 5 and 6 of switch S3A (front), pin 17 of plug P4, and pin t of jack J101, to the CX-3835/ARC-54. Ground from the C-3835/ARC-54 is applied through pin s of jack J101 and pin A of jack J2 to the vertical needle circuit in the ID-48/ARN. Setting switch S3 to RIGHT applies a simulated right homing signal, through contacts 10 and 2 of switch S3A (front), pin 17 of plug P4, and pin t of jack J101, to the C-3835/ARC-54. From the C-3835/ARC-54, the simulated right homing signal is applied through pin s of jack J101 and pin A of jack J2 to the vertical needle circuit in the ID-48/ARN. Ground for the simulated right homing signal is applied, through contacts 5 and 7 of switch S3A (front), pin 19 of plug P4, and pin B of jack J2, to the vertical needle circuit in the ID-48/ARN. Setting switch S3 to OVER TGT applies a simulated over target homing signal, through contacts 10 of 3 of switch S3A (front), pin 20 of plug P4, and pin MM of jack J101, to the C-3835/ARC-54. From the C-3835/ARC-54, the simulated over target signal is applied through pin NN of jack J101 and pin C of jack J2 to the horizontal needle circuit in the

ID-48/ARN. Ground for the simulated over target homing signal is applied, through contacts 5 and 8 of switch S3A (front), pin 21 of plug P4, and pin D of jack J2, to the horizontal needle circuit in the ID-48/ARN. Operating voltage for the ID-48/ARN flags is obtained from the C-3835/ARC-54. The voltage is applied through pin GG of jack J101 and pin E of jack J2 to the flag circuit in the ID-48/ARN. The ID-48/ARN flag control ground is obtained from retransmit ground switch S1. Setting switch S1 to RETRANS TONE or RETRANS CARRIER applies the control ground through pin 11 or 10 of plug P4, respectively, and pin Z or y of jack J101, respectively, to the C-3835/ARC-54. From the C-3835/ARC-54, the control ground is applied through pin FF of jack J101 and pin F of jack J2 to the flag circuit in the ID-48/ARN.

e. Retransmit and Receive Audio Signal Test. An audio signal applied to a headset-microphone connected to HEADSET jack J7 is amplified in the simulator and applied to the C-3835/ARC-54 as a simulated RT-348/ARC-54 receive audio signal. An audio signal from Control, Intercommunication Set C-1611D/AIC is applied through the C-3835/ARC-54 to the simulator and the security device as a simulated RT-348/ARC-54 transmit audio signal. The receive audio signal enters the simulator through pin 3 of jack J7 and is amplified by transistors A1Q1, A1Q2, and A1Q3. The amplified receive audio signal is routed, through emitter follower A1Q4, pin 13 of plug P4, and pin JJ of jack J101, to the C-3835/ARC-54. From the C-3835/ARC-54, the receive audio signal is applied, through pin N of jack J101 and pin 30 of jack J1, to the C-1611D/AIC. The transmit audio signal is routed from the C-1611D/AIC through pin 24 of J1 and pin y of jack J101, to the C-3835/ARC-54. From the C-3835/ARC-54, the transmit audio signal is applied through pin x of jack J101 to pin 6 of plug P4 (on the simulator) and pin B of jack J1 (on the security device). From pin 6 of plug P4, the transmit audio signal is applied, through VOL control R4, emitter follower A1Q5, and pin 2 of jack J7, to the headset-microphone. The transmit audio signal applied to pin B of jack J1 is coded in the security device and routed through pin C of jack J1 and pin 7 of plug P4 to SEC AUDIO XMIT jack J3.

f. Security Device Test. The security device codes the transmit audio when a push-to-talk ground is applied to it from the C-1611D/AIC. Push-to-talk ground from the C-1611D/AIC is applied through pin 33 of jack J1 and pin q of jack J101 to the C-3835/ARC-54. From the C-3835/ARC-54, the push-to-talk ground is applied through pin v of jack J101 to pins 41 and 42 of plug P4 on the simulator. The push-to-talk ground applied to pins 41 and 42 of plug P4 is routed to contact 1 of FUNCTION SELECTOR switch S3B (rear) and contact 5 of switch S3A (rear), respectively. Setting switch S3 to OFF applies the push-to-talk ground through contacts 1 and 10 of switch S3B (rear) to PTT SEC lamp DS6 and, through contacts 5 and 4 of switch S3A (rear), to PTT INT SEC TONE lamp DS7 causing lamps DS6 and DS7 to light. Setting switch S3 to SEC applies the push-to-talk ground through contacts 5 and 8 of switch S3A (rear), pin 44 of plug P4, and pin K of jack J1, to the security device; this activates the security tone control and security operate circuits. Ground from the security tone control circuit is applied through pin P of jack J1 and pin 39 of plug P4 to contact 3 of switch S3A (rear). Setting switch S3 to SEC applies ground through contacts 3 and 4 of switch S3A (rear) to PTT INT SEC TONE lamp DS7, causing lamp DS7 to light. Ground from the security sidetone control circuit is applied through pin A of jack J1 and pin 43 of plug P4 to contact 9 of switch S3B (rear). Setting switch S3 to SEC applies ground through contacts 9 and 10 of switch S3B (rear) to PTT SEC lamp DS6, causing the lamp to light. An additional check of the security device is obtained by applying an audio signal to SEC AUDIO REC jack J4 and monitoring the resultant coded signal at SEC AUDIO ST jack J5. The audio signal is routed from SEC AUDIO REC jack J4, through pin 15 of plug P4 and pin E of jack J1, to the security device. The security device codes the input audio signal and applies it, through pin V of jack J1 and pin 40 of plug P4, to SEC AUDIO ST jack J5. Ground for the security audio signal is applied from the security device, through pin N of jack J1 and pin 38 of plug P4, to SEC AUDIO COM jack J6.

g. Homer Antennas Continuing Test. Dc continuity of the left and right homer antenna system is checked by applying ground through each antenna system to the associated homer lamp in the simulator. The left homer antenna system is checked by applying ground, through the shield of the associated coaxial cable, the left homer antenna, and the center conductor of the coaxial cable, to plug P1. From plug P1, ground is applied to COAX CONT LEFT lamp DS9, causing lamp DS9 to light. The right homer antenna system is checked by applying ground, through the shield of associated coaxial cable,

the right homer antenna, and the center conductor of the coaxial cable, to plug P2. From plug P2, ground is applied to COAX CONT RIGHT lamp DS10, causing the lamp to light.

1-6. Signal Path of Test Set, Radio TS-1967/ARC-54 Connected to Coupler, Antenna CU-942/ARC-54 or CU-943/ ARC-54

(fig. FO-3)

The test set contains a frequency selection control system, a dummy load, and operating voltage for testing the CU–942/ARC-54 or CU–943/ARC-54. The frequency selection control system includes two groups of coded control lines. One group contains five control lines, labeled MHz select A through E, and the other group contains two control lines, labeled MHz ambiguity select A and B. The RT-348/ARC-54, normally connected to the CU–942/ARC–54 or CU-943/ARC-54, is simulated by the dummy load.

a. Frequency Selection Control Lines. Megahertz select control lines A through E and megacycle select ambiguity control lines A and B, coded for the desired frequency in the unit MHz frequency selector, are applied to the tuning circuit in the CU-942/ARC-54 or CU–943/ARC-54. The tuning circuit operates the drive motors in the CU–942/ARC-54 or CU-943/ARC-54 until the desired frequency has been reached. The MHz select A control line routes from the unit MHz frequency selector, through contacts 2 and 4 of TEST FUNCTION SELECTOR switch S11A (rear), contacts 11 and 10 of TEST FUNCTION SELECTOR, switch S10A (rear), pin E of ANT COUPLER jack J10, and pin E of jack J101, to the CU–942/ARC-54 or CU–943/ARC-54. The MHz select B control line routes from the unit MHz frequency selector, through contacts 8 and 10 of switch S11B (front), contacts 5 and 4 of switch S10B (rear), pin D of jack J10, and pin D of jack J101, to the CU-942/ARC-54 or CU-943/ARC-54. The megahertz select C control line routes from the unit MHz frequency selector, through contacts 11 and 1 of switch S11A (front), contacts 5 and 4 of switch S10A (rear), pin C of jack J10, and pin C of jack J101, to the CU-942/ARC-54 or CU-943/ARC-54. The MHz select D control line routes from the unit MHz frequency selector, through contacts 5 and 7 of switch S11B (front), contacts 6 and 5 of switch S10B (front), pin B of jack J10, and pin B of jack J101, to the CU–942/ARC-54 or CU-943/ARC-54. The MHz select E control line routes from the unit MHz frequency selector, through contacts 2 and 4 of switch S11A (front), contacts 6 and 5 of switch S10A (front), pin A of jack J10, and pin A of jack J101, to the CU-942/ARC-54 or CU-943/ARC-54. The MHz ambiguity select A control line routes from the unit MHz ambiguity frequency selector, through contacts 2 and 4 of switch S11E (front) contacts 2 and 1 of switch S10B (front), pin F of jack J10, and pin F of jack J101, to the CU-942/ARC-54 or CU-943/ARC-54. Megahertz ambiguity select B control line routes from the unit megahertz ambiguity frequency selector, through contacts 8 and 10 of switch S11A (front), contacts 2 and 1 of switch S10A (front), pin G of jack J10, and pin G of jack J101, to the CU–942/ARC-54 or CU-943/ARC-54.

b. Operating Voltage and Dummy Load. Operating voltage of +27.5 volts dc is applied from the test set, through pin J of ANT COUPLER jack J10 and pin J of jack J101, to the CU-942/ARC-54 or CU–943/ARC-54. The dummy load (antenna coupler load AT2) is connected from the test set, through ANT COUPLER LOAD jack J15 and jack J103, to the CU-942/ARC-54 or CU-943/ARC-54.

1-7. Signal Path of Control, Radio Set C-3835/ARC-54 Connected to TS-1967/ARC-54 and SM-349/ARC-54

(fig. FO-4)

The test set, and simulator check the operating functions of the C4835/ARC-54. These functions include frequency selection, squelch control, and homing operation. An indicator on the test set provides a visual check of the homing circuit. A readout counter in the simulator displays the frequency selection by the C-3835/ARC-54. An indicator on the simulator checks the operation of the squelch control circuit.

a. Frequency Selection Test. On the simulator, the FREQUENCY MC readout counter, ODD MC lamp DS11, EVEN MC lamp DS12, and HAR FIL lamp DS2 give visual indications of the operation of the frequency selector circuit in the C-3835/ARC-54. The frequency selected by the C-3835/ARC-54 is indicated on the FREQUENCY MC readout counter. Setting the frequency selector switches on the C-3835/ARC-54 to a specific frequency codes the unit and fractional MHz control wires. This coded information is applied to motor control unit A2 in the simulator. The motor control unit rotates switches S4 and S5 and the counter until the selected frequency appears in the window of the FREQUENCY MC readout counter. The

unit MHz control wires, designated A through E, are connected, through jack J101 on the C-3835/ARC-54 and CONT UNIT jack J16 on the simulator, to CONTROL UNIT TEST switch S12. From switch S12, the unit MHz control wires route through TEST FUNCTION SELECTOR switches S11 and S10, and jack J33, to the FREQUENCY MC readout counter in the simulator. The fractional MHz control lines, designated A through E, are connected, through jack J101 on the C-3835/ARC-54 and jack J16 on the simulator, to switch S11. From switch S11, the fractional megacycle control lines route through switch S10 and jack J33 to the FRACTIONAL MC readout counter in the simulator. Lamps DS11, DS12, and DS2 light when odd-MHz frequencies, even-MHz frequencies, and frequencies below 46 MHz, respectively, are selected. Selecting an odd-megahertz frequency applies a ground from the C-3835/ARC-54, through pin h of jack J101, pin 11 of jack J16 of the test set, contacts 9 and 10 of switch S11E (front), and contacts 11 and 8 of switch S10C (rear), to pin 32 of jack J33. From pin 32 of jack J33, the ground is applied to lamp DS11 in the simulator, causing the lamp to light. Selecting an even-megahertz frequency applies a ground from the C-3835/ARC-54, through pin i of jack J101, pin i of jack J16 on the test set, contacts 3 and 4 of switch S11B (rear), and contacts 11 and 8 of switch S10E (rear), to pin 37 of jack J33. From pin 37 of jack J33, the ground is applied to lamp DS12 in the simulator, which causes the lamp to light. Selecting any frequency 46 megahertz or below applies a ground from the C-3835/ARC-54, through pin K of jack J101, pin K of jack J16 on the test set, and contacts 9 and 10 of switch S11B (rear), to pin 4 of jack J33. From pin 4 of jack J33, the ground is applied to lamp DS2 in the simulator, causing the lamp to light.

b. Squelch Control Test. Ground for the squelch tone, squelch disable, and squelch carrier modes of operation originates in the C-3835/ARC-54. Setting the squelch control switch on the C-3835/ARC-54 to one of three positions applies a ground to the associated lamp in the simulator. Selecting the squelch tone mode of operation on the C-3835/ARC-54 applies a ground, through pin X of jack J101, pin X of jack J16 on the test set, contacts 9 and 10 of switch S11C (front), contacts 7 and 8 of TONE SECURITY switch S8A (rear), and contacts 6 and 3 of switch S10D (front), to pin 9 of jack J33. From pin 9 of jack J33, ground is applied to SQUELCH TONE lamp DS3 in the simulator, causing the lamp to light. Setting the squelch control switch on the C-3835/ARC-54 to the squelch disable position applies ground through pin V of jack J101 to pin V of jack J16 on the test set. From pin V of jack J16, ground routes, through contacts 6 and 7 of switch S11E (front), contacts 10 and 7 of switch S10D (front), and pin 12 of jack J33, to SQUELCH DIS SEC lamp DS4 in the simulator, causing the lamp to light. Selecting the squelch carrier mode of operation applies ground from the C-3835/ARC-54, through pin W of jack J101, pin W of jack J16 on the test set, contacts 6 and 7 of switch S11C (front), contacts 10 and 11 of switch S8A (rear), and contacts 2 and 11 of switch S10D (front), to pin 8 of jack J33. From pin 8 of jack J33, ground is applied to SQUELCH DIS CARR lamp DS5 in the simulator, causing the lamp to light.

c. Homing Operation Test. A voltage that simulates left, right, and over-target homing signals originates in the simulator. The voltage, applied to contact 10 of FUNCTION SELECTOR switch S3A (front), routes through switch S10 to the vertical and horizontal needle circuits in INDICATOR ID-48/ARN. Setting switch S3 to LEFT applies a simulated homing signal, through contacts 10 and 1 of switch S3A (front), pin 19 of plug P4, and contacts 11 and 2 of switch S10E (front), to the vertical needle circuit in the ID-48/ARN. Ground for the simulated homing signal is applied, through contacts 5 and 6 of switch S3A (front), pin 17 of plug P4, contacts 7 and 10 of switch S10C (front), and contacts 1 and 12 of switch S11C (front), to pin t of jack J16. From pin t of jack J16, ground is routed through pin t of jack J101 to the homing circuit in the C-3835/ARC-54. Ground from the homing circuit in the C-3835/ARC-54 is applied through pin s of jack J101 and pin s of jack J16 on the test set to the vertical needle circuit in the ID-48/ARN, causing the vertical needle to swing to the left. Setting switch S3 to RIGHT reverses the ground and the simulated homing signal applied to the vertical needle circuit in the ID-48/ARN, which causes the vertical needle to swing to the right. Setting switch S3 to OVER TGT applies a simulated over-target homing signal, through contacts 10 and 3 of switch S3A (front), pin 20 of plug P4, contacts 2 and 5 of switch S10D (rear), and contacts 4 and 3 of switch S11C (front), to pin MM of jack J16. From pin MM of jack J16, the simulated over-target homing signal is applied through pin MM of jack J101 to the homing circuit in the C-3835/ARC-54. The

simulated over-target homing signal is routed from the homing circuit, through pin NN of jack J101 and pin NN of jack J16, to the horizontal needle circuit in the ID-48/ARN. Ground for the simulated over-target homing signal is applied, through contacts 5 and 8 of switch S3A (front), pin 21 of plug P4, and contacts 2 and 5 of switch S10C (rear), to the horizontal needle circuit in the ID-48/ARN; this causes the horizontal needle to swing down. Operating voltage of +27.5 volts dc for the ID-48/ARN flags is obtained from the C-3835/ARC-54. The voltage is applied from the C-3835/ARC-54, through pin GG of jack J101, pin GG of jack J16, and contacts 3 and 4 of switch S11C (rear), to the flag circuit in the ID-48/ARN. Control ground for the flags is obtained from retransmit ground switch S1. Setting switch S1 to RETRANS TONE or RETRANS CARR applies ground to pin 11 or 10, respectively, of plug P4. From pin 11 or 10, ground is applied through contacts 11 and 2 of switch S10F (front) or contacts 8 and 11 of switch S10D (rear), respectively, to pin Y or Z of jack J16. The retransmit carrier ground or retransmit tone ground applied to pin Y or Z, respectively, of jack J16 is routed through pin Y or Z of jack J101 to the retransmit control circuit in the C-3835/ARC-54. From the retransmit control circuit in the C-3835/ARC-54, ground is routed, through pin FF of jack J101, pin FF of jack J16 on the test set, and contacts 3 and 4 of switch S11F (front), to the flag circuit in the ID-48/ARN, which activates the flags. The homer operate voltage obtained from the homer circuit in the C-3835/ARC-54 is applied, through pin DD of jack J101, pin DD of jack J16 on the test set, and contacts 9 and 10 of switch S11C (rear), to HOME lamp DS8 in the simulator, which causes the lamp to light.

1-8. Signal Path of TS-1967/ARC-54 Connected to Receiver-Transmitter, Radio RT-348/ARC-54

(Fig. FO-5)

The operating functions of the RT-348/ARC-54 are checked by the test set. These functions include frequency selection, transmit and receive audio operation, squelch control, and homing operation. Test jacks on the front panel of the test set facilitate connection of the test equipment to the various circuits under test.

a. Frequency Selection. The frequency selector on the test set simulates the frequency control function normally obtained from the C-3835/ARC-54 for operating the tuning circuit in the RT–348/ARC-54. The functions simulated include unit and functional megahertz selection, odd- and even-megahertz ground control, and harmonic filter operation. Setting the frequency selector on the test set to a specific frequency codes the unit and fractional megahertz control wires. This coded information is applied to the tuning circuit in the RT-348/ARC-54. The tuning circuit selects the operating frequency of the RT–348/ARC-54 corresponding to the coded information. The unit megahertz control wires, designated A through E, are connected, through TEST FUNCTION SELECTOR switches S11 and S1., RCVR/XMTR jack J11, and plug P1005 of the RT-348/ARC-54, to the tuning circuit. The fractional megahertz control wires, designated A through E, are connected, through switches S11 and S10, jack J11, and plug P1005 of the RT-348/ARC-54, to the tuning circuit. Selecting an odd-megahertz frequency applies ground from the frequency selector in the test set, through contacts 8 and 10 of switch S11E (front), contacts 11 and 9 of switch S10C (rear), pin 32 of jack J11, and pin 32 of plug P1005, to the tuning circuit in the RT-348/ARC-54. Selecting an even-megahertz frequency applies ground from the frequency selector in the test set, through contacts 2 and 4 of switch S11B (rear), contacts 11 and 9 of switch S10E (rear), pin 37 of jack J11, and pin 37 of plug P1005, to the tuning circuit in the RT-348/ARC-54. When any frequency below 46 megahertz is selected and transmit control switch S6 is set to PTT or XMIT, ground is applied from S6 through the harmonic filter control to contact 8 of switch S11B (rear). Ground is routed, through contacts 8 and 10 of switch S11B (rear), pin 4 of jack J11, and pin 4 of plug P1005, to the harmonic filter circuit in the RT-348/ARC-54. Transmit control switch S6 is normally in the RCV position as shown on figure FO-5. When the switch is set to XMIT, contacts 3 and 5 open, and 6 and 7 close. Contacts 2 and 8, and 1 and 4 remain as shown. When the switch is set to PTT, contacts 2 and 8 are closed, and 1 and 4 are open. Contacts 3 and 5, and 6 and 7 are as shown.

b. Transmit and Receive Audio Test. Transmit audio is applied from a headset-microphone connected to HEADSET jack J9 on the test set to pin 3 of jack J9. From pin 3 of jack J9, transmit audio is applied to audio amplifier A1. Amplifier circuits of transistors A1Q1, A1Q2, and A1Q3 amplify the transmit audio and route it to emitter follower A1Q4. From the emitter follower A1Q4, transmit audio routes through contacts 2 and 5 of RCVR/XMTR FUNCTION switch S9B

(rear), contacts 8 and 10 of switch S11D (front), contacts 10 and 8 of switch S10E (front), pin 6 of jack J11, and pin 6 of plug P1005, to the transmit circuit in the RT-348/ARC-54. Receive audio from the RT-348/ARC-54 is applied, through pin 13 of plug P1005, pin 13 of jack J11, contacts 4 and 6 of switch S10C (front), contacts 1 and 11 of switch S11D (front), and contacts 2 and 11 of switch S9B (front), to VOL control R8. From VOL control R8, receive audio is applied, through contacts 2 and 4 of switch S11D (rear), emitter follower A1Q5, and pin 2 of jack J9, to a headset-microphone. Receive audio common return routes from VOL control R8, through contacts 7 and 10 of switch S9B (front), contacts 2 and 4 of switch S11D (front), contacts 2 and 12 of switch S10C (front), pin 14 of jack J11, and pin 14 of plug P1005, to the receive circuit in the RT-348/ARC-54.

c. Squelch Control Test. Ground for testing the squelch disable, squelch carrier, and squelch tone modes of operation originates in the test set. Setting SQUELCH switch S7 to DIS applies ground to the contacts of TEST FUNCTION SELECTOR switches S11E (front) and S11C (front). Ground routes, through contacts 5 and 7 of switch S11E (front), contacts 10 and 7 of switch S10D (front), pin 12 of RCVR/XMTR jack J11, and pin 12 of plug P1005, to the squelch disable circuit in the RT-348/ARC-54. Ground applied to contact 5 of switch S11C (front) routes, through contacts 5 and 7, contacts 10 and 11 of TONE SECURITY switch S8A (rear), contacts 2 and 12 of switch S10D (front), pin 8 of jack J11, and pin 8 of plug P1005, to the squelch carrier circuit in the RT-348/ARC-54. Setting switch S7 to CARR removes squelch disable ground from contact 5 of switch S11E (front). Ground for operating the squelch carrier mode of operation is not removed when switch S7 is set to CARR. Setting switch S7 to TONE removes squelch carrier ground from contact 5 of switch S11C (front) and applies it to contact 8 of switch S11C (front). Ground routes, through contacts 8 and 10 of switch S11C (front), contacts 7 and 8 of switch S8A (rear), contacts 6 and 4 of switch S10D (front), pin 9 of jack J11, and pin 9 of plug P1005, to the squelch tone circuit in the RT-348/ARC-54.

d. Homer Signal Test. HOME SIMULATOR switch S1 and the homing attenuators, in conjunction with INDICATOR ID-48/ARN on the test set, provide an operational check of the homer circuits in the RT-348/ARC-54. A simulated radio frequency (rf) homer signal obtained from the test equipment connected to HOME INPUT jack J1 is applied to the homing attenuators. Setting switch S1 to LEFT applies a simulated rf homer signal, through RCVR/XMTR jack J14 and plug P1003, to the homer circuit in the RT-348/ARC-54. The homer circuit produces a voltage proportional to the input signal. This voltage applied to the vertical pointer circuit in the ID-48/ARN, through pin 19 of plug P1005, pin 19 of RCVR/XMTR jack J11, and contacts 12 and 2 of TEST FUNCTION SELECTOR switch S10E (front), causes the vertical needle to swing to the left. Setting switch S1 to RIGHT removes the simulated rf homer signal from jack J14 and applies it through RCVR/XMTR jack J13 and plug P1004 to the homer circuit in the RT-348/ARC-54. The resultant voltage produced by the homer circuit and applied to the vertical pointer circuit in the ID-48/ARN through pin 17 of plug P1005, pin 17 of jack J11, contacts 8 and 10 of switch S10C (front), contacts 1 and 11 of switch S11C (front), and contacts 1 and 2 of RCVR/XMTR FUNCTION switch S9A (front), causes the vertical needle to swing right. Setting switch S1 to ON COURSE applies a simulated rf homing signal to the homer circuits connected to jacks J13 and J14. The ON COURSE position of switch S1 simulates the condition of selecting positions LEFT and RIGHT simultaneously. The voltage applied to the needle circuit causes the vertical needle to move to the center. Reducing the input rf signal applied to jack J1 simulates the signal strength level. The voltage from the homer circuit in the RF-348/ARC-54 decreases in proportion to the decrease of input rf signal. The reduced voltage output from the homer circuit routes through pins 20 and 21 of plug P1005 and pins 20 and 21 of jack J11 to contact 3 of switch S10D (rear) and contact 3 of switch S10C (rear), respectively. The voltage applied to contact 3 of switch S10C (rear) routes through contact 5 to the horizontal needle circuit in the ID-48/ARN. The voltage applied to contact 3 of switch S10D (rear) routes from contact 5, through contacts 4 and 2 of switch S11C (front) and contacts 5 and 6 of switch S9A (front), to the horizontal needle circuit in the ID-48/ARN. This reduced voltage causes the horizontal needle to swing down. Operating voltage for the ID-48/ARN flags is applied through contacts 2 and 4 of switch S11C (rear) to the flag circuit. Operating ground for the flags is obtained from the squelch circuit in the RT-348/ARC-54. During the squelch carrier mode of operation, ground routes, through pin 10 of plug P1005, pin 10 of jack J11, and contacts 9 and 11 of switch

S10D (rear), to contact 1 of SQUELCH switch S7A (front). Setting switch S7A to CARR applies ground from contact 3, through contacts 9 and 10 of switch S9A (front) and contacts 2 and 4 of switch S11F (front), to the flag circuit. Selecting the squelch tone mode of operation applies ground, through pin 11 of plug P1005, pin 11 of jack J11, and contacts 12 and 2 of switch S10F (front), to contact 2 of switch S7A (front). Setting switch S7A to TONE applies ground from contact 3, through contacts 9 and 10 of switch S9A (front) and contacts 2 and 4 of switch S11F (front), to the flag circuit in the ID-48/ARN.

e. Security Operation Test. TONE SECURITY switch S8A in the test set simulates the operational control function that normally originates in the security device. Setting switch S8A (front) to OFF applies ground to the 150 Hertz (Hz) tone injection circuit in the RT-348/ARC-54, through contacts 3 and 1 of S8A (front), pin 39 of RCVR/XMTR jack J11, and pin 39 of plug P1005. Setting switch S8A (front) to SEC applies ground to the sidetone injection circuit in the RT–348/ARC-54, through contacts 3, 2, and 5 of S8A, pin 43 of jack J11, and pin 43 of plug P1005. Ground applied to contact 5 of switch S8A (front) is applied to the squelch disable circuit in the RT-348/ARC-54, through contacts 10 and 8 of switch S10D (front), pin 12 of jack J11, and pin 12 of plug P1005.

f. Transmit Test. The test set contains a transmitter control switch, a directional coupler, a power meter, and an attenuator-dummy load for checking the transmitter circuit in the RT-348/ARC-54. Setting transmit control switch S6 to PTT or XMIT applies ground to the inverter and blower assembly, XMIT lamp DS2, and contact 8 of RCVR/XMTR FUNCTION switch S9B (rear). From contact 8 of switch S9B (rear), ground is routed, through pin 42 of RCVR/XMTR jack J11 and pin 42 of plug P1005, to the transmitter circuit in the RT–348/ARC-54. This ground keys the transmitter, applying rf power through plug P1002 and RCVR/XMTR jack J12 to plug P3 of relay K1. From plug P3, rf power is routed, through normally closed contacts of relay K1, plug P4, RCVR/XMTR jack J2, and DIR COUPLER IN jack J3, to plug P1 of directional coupler DC1. A portion of the rf power, reflected and incident, is applied from the directional coupler to the RF POWER meter and switch assembly. The main portion of the rf power is routed from the directional coupler, through plug P2, DIR COUPLER OUT jack J6, LOAD IN jack J5, and plug P7 to attenuator-dummy load AT1. The attenuator-dummy load connects rf power to external test equipment and a test antenna. Rf power is routed to the external test equipment through jack J3 on the attenuator-dummy load and LOAD OUT jack J8. The test antenna receives rf power through jack J2 on the attenuator-dummy load and ANT jack J7.

g. Receive Test. When transmit control switch S6 is in the RCV position, rf test signals can be applied through RCVR/TEST jack J4 to the rf input circuit in the RT-348/ARC-54. With switch S6 in the RCV position, ground is applied through contacts 3 and 5, and 1 and 4, to contact 9 of RCVR/XMTR FUNCTION switch S9A (rear). Setting switch S9 to TEST applies ground, through contacts 9 and 11 of S9A (rear) and contacts 11 and 1 of TEST FUNCTION SELECTOR switch S11F (front), to terminal 2 of relay K1. Relay K1 is energized through the ground return path just described and the +27.5 volts dc applied to terminal 1. An rf test signal is applied, through plug P5 of K1, closed contacts of energized relay K1, plug P3, and RCVR/XMTR jack J12, to plug P1002 in the rf input circuit in the RT-348/ARC-54.

Section III. STAGE ANALYSIS

1-9. Test Set, Radio TS-1967/ARC-54 800-Hz Inverter and Blower Assembly Circuit

The 800-Hz inverter in the test set is a saturable core, square-wave oscillator that produces 54 volts alternating current (ac) to operate the blower motor (fig. l-l). The +27.5-volt dc bus on terminal board TB1 supplies operating voltage for the inverter circuit (fig. FO-7). Transmit control switch S6 (at XMIT or PTT position) completes the circuit to ground (fig. 1-1). The +27.5 volts dc is applied to the center tap (pin 3) of transformer T1 through a filter circuit composed of capacitors C2 and C3 and resistors R16 and R15. The filter circuit prevents transients generated by the inverter circuit from entering the +27.5-volt dc supply. The inverter circuit consists of transistors Q1 and Q2, saturable core transformer T1, and resistors R11 through R14. Voltage divider R11 and R13 develops bias for transistor Q1. Voltage divider R12 and R14 develops bias for transistor Q2. When operating voltage is first applied to the circuit, both transistors try to conduct. Circuit tolerances and d;f-

ferent conduction characteristics of the two transistors cause one to conduct more heavily than the other. Assuming higher conduction in transistor Q1, current flows from ground, through switch S6 (XMIT or PTT position), transistor Q1, and winding 4-3 of transformer T1, to the +27.5-volt dc supply. This current flow induces a voltage in winding 4-5 of transformer T1, which is negative at terminal 5. The negative voltage at terminal 5 drives the base of transistor Q1 negative, increasing the collector current. The voltage induced in winding 2–1 of transformer T1 is positive at terminal 1. This voltage drives the base of Q2 positive, decreasing the collector current. This action continues until the collector current of transistor Q1 flowing through terminals 4-3 saturates the transformer core. The voltage induced in winding 4-5 of transformer T1 drops to zero when the core saturates, causing the collector current of Q1 to decrease. The magnetic field around the windings of transformer T1 collapses as the collector current of transistor Q1 decreases, inducing voltage of opposite polarity in the windings. The opposite polarity cuts off transistor Q1 and turns on transistor Q2. The collector current of transistor Q2 flows through winding 2-3 of transformer T1 until the core saturates. The sequence is repeated as the field collapses and the voltage changes polarity, resulting in a 54-volt, 800-Hz square-wave output symmetrical with respect to ground. The output taken between the emitter of transistors Q1 and Q2 is applied direct to the blower motor. When switch S6 is in the RCV position, ground is supplied from the RT-348/ARC-54.

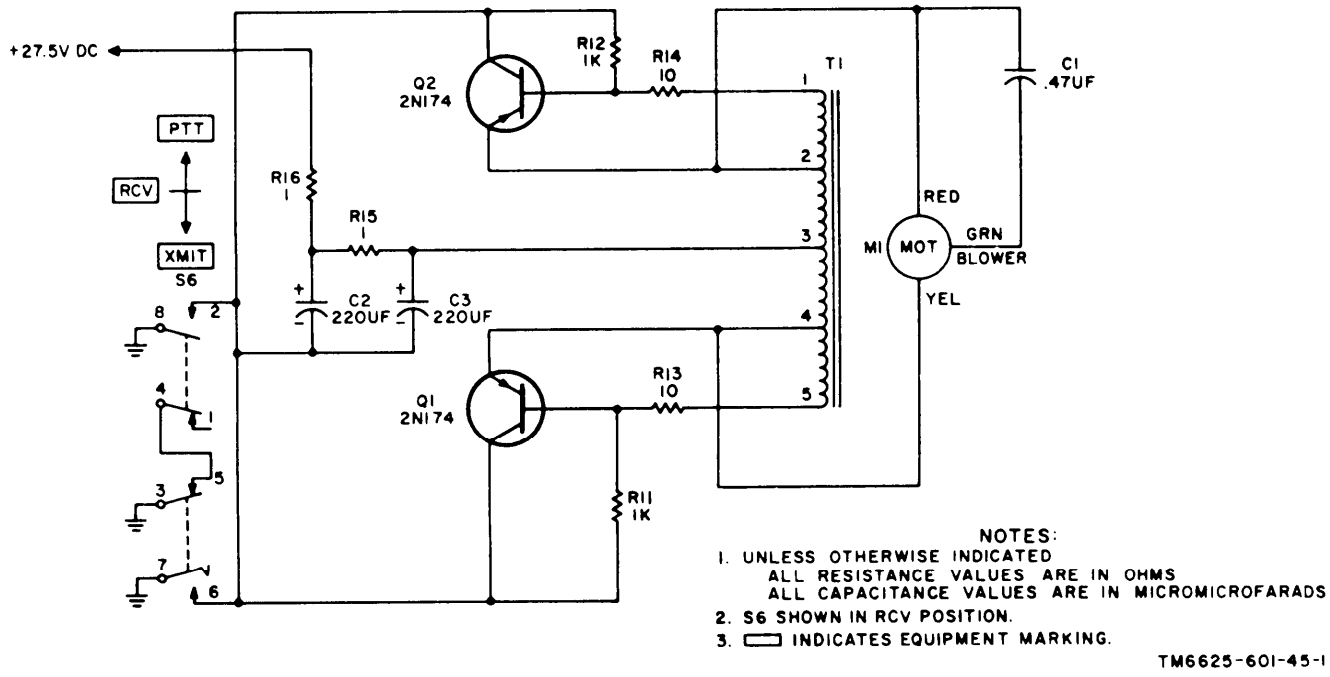


Figure 1-1. Blower and inverter, simplified schematic diagram.

1-10. Frequency Selection Circuit

(fig. 1-2)

a. General. The RT-348/ARC-54 tuning system is composed of three five-wire reentrant systems, one for 0.05-megahertz tuning and two for whole-megahertz tuning. FREQUENCY SELECTOR-MC switches S3, S4, and S5 in the test set generate codes that tune the RT-348/ARC-54 to any desired frequency from 30.00 to 69.95 megahertz in steps of 0.05 MHz. Switches S3 and S4 select the whole-megahertz frequency, and switch S5 selects increments of 0.05 megahertz. Switch S5 applies a different ground sequence for each of 20 switch positions, to the 0.05-megahertz select lines. Switch S4 generates two separate coded sequences corresponding to the whole-megahertz frequencies from 30 to 69 megahertz. Coding for the 30- to 39- and 40- to 49-megahertz frequency ranges is identical with the coding of the 50- to 59- and 60- to 69-megahertz frequency ranges, respectively. Switches S4B and S4D generate the code

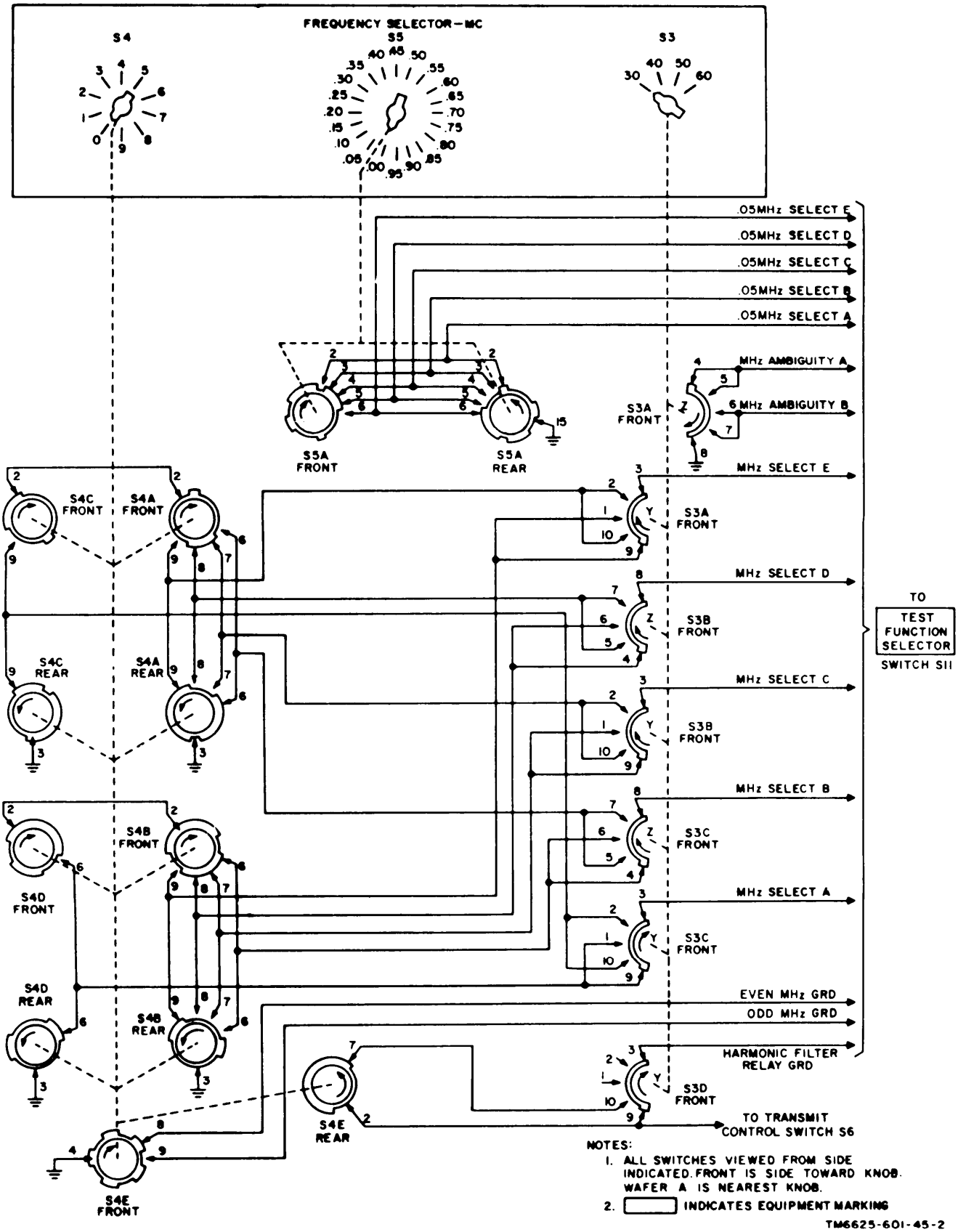


Figure 1–2. Frequency selector circuit, simplified schematic diagram.

for the 30- and 50-megahertz ranges, and switches S4A and S4C generate the code for the 40- and 60-megahertz ranges. To distinguish between frequencies that have the same code (that is, 35 and 55 megahertz), switch S3A (front) generates an ambiguity code. Odd- and even-megahertz frequencies are identified by a coded ground obtained from switch S4E (front). Switch S4E (front) routes a ground from transmit control switch S6 (XMIT or PTT position) through switch S3D (front) at frequencies below 46 megahertz to operate the harmonic filter in the RT-348/ARC-54.

b. Simplified Reentrant System. Figure 1-3 is a simplified schematic diagram of a simple open-seeking reentrant system. With the switches in the positions shown, ground is applied through contacts C and 1 of switch S1 to contact 1 of switch S2. Because contact 1 of switch S2 is at the open segment of switch S2, the motor circuit is open. Setting switch S1 to 2 applies ground, through contacts C and 2 of switch S1, contact 2 of switch S2, and contact C of switch S2, to motor B1. Motor B1 operates, turning switch S2 clockwise. When the open segment of switch S2 reaches contact 2, the circuit opens and motor B1 stops. The action described above is the same for any position of switch S1; switch S2 always stops motor B1 at the position selected by switch S1. Note that switches S1 and S2 are physically complementary; this is a characteristic of all reentrant systems. The switching arrangement of the test set frequency selector system, shown schematically in figure 1-2, is more complex than the system discussed above. However, the test set switches provide a basic function similar to that of switch S1 shown in the simple switching arrangement of figure 1-3.

c. Simplified 0.05-Megahertz Switching. Switch S5 selects fraction megahertz in steps of 0.05 megahertz. Figure 1-4 shows the 0.05-megahertz selector switch connected to a typical drive circuit. Switch S5 is shown in the .00 position. In this position, 0.05-megahertz select lines A and E are grounded by switch S5 (rear). Drive motor B1 has positioned switch S1 so that 0.05-megahertz select lines A and E, connected to contacts 2 and 6 of switch S1 (front), respectively, are open. Setting switch S5 to .05 applies ground through switch S5 (rear) to 0.05-megahertz select line B. Ground from 0.05-megahertz select line B, applied through contact 3 of switch S1 (front), energizes motor B1; this turns switch S1 in the direction shown by the arrows. When contact 3 reaches the open segment of switch S1 (front), the ground circuit

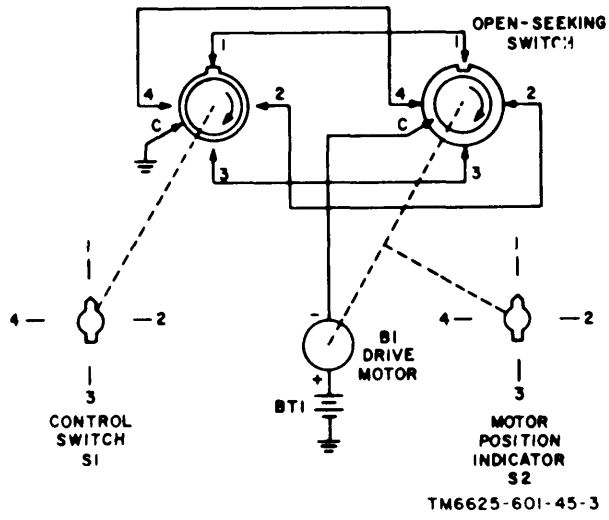


Figure 1-3. Simplified four-wire reentrant switch and drive motor circuit.

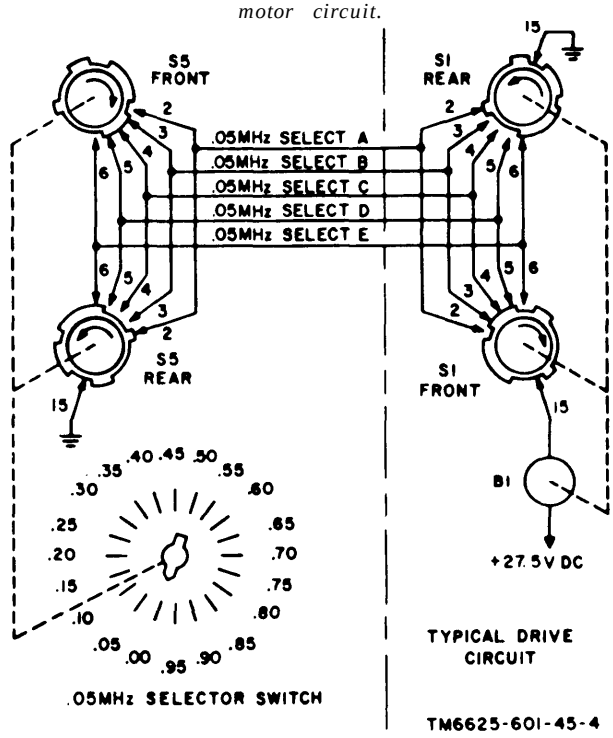


Figure 1-4. Simplified .05 megahertz selector switch and typical drive circuit.

is broken, which stops motor B1. The same action described above occurs for other positions of switch S5. The table in *d* below gives the coding of 0.05-megahertz selector switch S5.

d. 0.05-Megahertz Coding Table Table 1-1 below shows the ground coding of 0.05-megahertz switch S5. An X in the column indicates ground: a O indicates an open.

Table 1-1. 0.05-Megahertz Coding

Frequency SELECTOR-MC switch S5 position	Frequency (MHz)	0.05-MHz control line coding				
		A	B	C	D	E
.00	0.00	X	O	O	O	X
.05	0.05	O	X	O	O	O
.10	0.10	O	O	X	O	O
.15	0.15	O	O	O	X	O
.20	0.20	O	O	O	O	X
.25	0.25	X	O	O	O	O
.30	0.30	X	X	O	O	O
.35	0.35	O	X	X	O	O
.40	0.40	O	O	X	X	O
.45	0.45	X	O	O	X	X
.50	0.50	X	X	O	O	X
.55	0.55	X	X	X	O	O
.60	0.60	O	X	X	X	O
.65	0.65	X	O	X	X	X
.70	0.70	X	X	O	X	X
.75	0.75	X	X	X	O	X
.80	0.80	X	X	X	X	O
.85	0.85	O	X	X	X	X
.90	0.90	O	O	X	X	X
.95	0.95	O	O	X	X	X

e. Whole-Megahertz Switching. Figure 1-2 shows the complete TS-1967/ARC-54 frequency selection circuit. FREQUENCY SELECTOR-MC switches S3 and S4 perform the whole-megahertz tuning from 30 to 69 MHz. Switch S4 generates three sets of codes. One code covers the 30- to 39- and the 50- to 59-megahertz frequency range. The second code covers the 40- to 49- and 60- to 69-megahertz frequency range. A third code identifies odd- and even-megahertz frequencies by applying alternate grounds to the odd- and even-megahertz lines. Sections B and D of switch S4 form a five-wire code generator for the 30- and 50-megahertz frequency ranges. A separate five-wire code generator for the 40- and 60-megahertz frequency ranges is formed by sections A and C of switch S4. Setting switch S3 to 30 or 50 connects five lines from switches S4B and S4D to megahertz select lines A through E. Since the codes for frequencies in the 30- and 50-megahertz frequency ranges are identical, switch S3 generates an ambiguity code to differentiate between them. To differentiate the 30-megahertz frequency range from the 50-megahertz frequency range, ground is applied through contacts 8 and 4 of switch S3A (front) to megahertz ambiguity line A. Setting switch S3A (front) to 50 removes ground from megahertz ambiguity line A and applies it to megahertz ambiguity line B. Setting switch S3 to 40 or 60 connects five lines from S4A and S4K to megahertz select lines A through E. To differentiate between the identical codes of the 40- and 60-megahertz frequency ranges, megahertz ambiguity line B is grounded at position 40 and megahertz ambiguity line B is grounded at position 60. Setting switch S4E (front) to an odd- or even-megahertz position grounds the associated odd- or even-megahertz line.

f. Whole-Megahertz Coding Table. Table 1-2 below lists the ground coding for the whole-megahertz switches. An X in the column indicates ground; a O indicates an open.

Table 1-2. Whole-Megahertz Coding

FREQUENCY SELECTOR-MC switch positions		Frequency (MHz)	Ambiguity		Control wire coding						
					Odd-Even		Megahertz select				
S3 (10 MHz)	S4 (1 MHz)		A	B	Odd	Even	A	B	C	D	E
30	0	30	X	O	O	X	X	O	O	O	X
30	1	31	X	O	X	O	O	X	O	O	O
30	2	32	X	O	O	X	O	O	X	O	O
30	3	33	X	O	X	O	O	O	O	X	O
30	4	34	X	O	O	X	O	O	O	O	X
30	5	35	X	O	X	O	X	O	O	O	O

Table 1-2. Whole-Megahertz Coding-Continued

FREQUENCY SELECTOR-Mc switch positions		Frequency	Ambiguity		Control wire coding						
					Odd-Even		Megahertz select				
S3 (10 MHz)	S4 (1 MHz)	(MHz)	A	B	Odd	Even	A	B	C	D	E
30	6	36	X	O	O	X	X	X	O	O	O
30	7	37	X	O	X	O	O	X	X	O	O
30	8	38	X	O	O	X	O	O	X	X	O
30	9	39	X	O	X	O	X	O	O	X	X
40	0	40	X	O	O	X	X	X	O	O	X
40	1	41	X	O	X	O	X	X	X	O	O
40	2	42	X	O	O	X	O	X	X	X	O
40	3	43	X	O	X	O	X	O	X	X	X
40	4	44	X	O	O	X	X	X	O	X	X
40	5	45	X	O	X	O	X	X	X	O	X
40	6	46	X	O	O	X	X	X	X	X	O
40	7	47	X	O	X	O	O	X	X	X	X
40	8	48	X	O	O	X	O	O	X	X	X
40	9	49	X	O	X	O	O	O	O	X	X
50	0	50	O	X	O	X	X	O	O	O	X
50	1	51	O	X	X	O	O	X	O	O	O
50	2	52	O	X	O	X	O	O	X	O	O
50	3	53	O	X	X	O	O	O	O	X	O
50	4	54	O	X	O	X	O	O	O	O	X
50	5	55	O	X	X	O	X	O	O	O	O
50	6	56	O	X	O	X	X	X	O	O	O
50	7	57	O	X	X	O	O	X	X	O	O
50	8	58	O	X	O	X	O	O	X	X	O
50	9	59	O	X	X	O	X	O	O	X	X
60	0	60	O	X	O	X	X	X	O	O	X
60	1	61	O	X	X	O	X	X	X	O	O
60	2	62	O	X	O	X	O	X	X	X	O
60	3	63	O	X	X	O	X	O	X	X	X
60	4	64	O	X	O	X	X	X	O	X	X
60	5	65	O	X	X	O	X	X	X	O	X
60	6	66	O	X	O	X	X	X	X	X	O
60	7	67	O	X	X	O	O	X	X	X	X
60	8	68	O	X	O	X	O	O	X	X	X
60	9	69	O	X	X	O	O	O	O	X	X

1-11. Frequency Readout Assembly Circuit (fig. 1-5)

a. General. The frequency readout assembly in the SM-349/ARC-54 consists of a frequency readout counter, a motor control assembly, and two drive motors. Operation of the frequency readout assembly adheres to the principles of a five-wire reentrant system. For a discussion of a basic five-wire reentrant system refer to paragraph 1-10b. Coding of the input frequency control lines is obtained from either the TS-1967/ARC-54 or the C-3835/ARC-54. Selecting a specific frequency applies ground to FREQUENCY SELECTOR-MC switches S4 and S5. These grounds are routed to relays K1 and K2 in motor control unit A2. Relays K1 and K2 energize, applying operating voltage from POWER switch S2 to motors B1 and B2. The motors operate until switches S4 and S5, mechanically connected to motors B2 and B1, respectively, remove ground from relays K1 and K2. Relays K1 and K2 reenergize, removing operating voltage from motors B1 and B2. For a sequence of operation, assume that a frequency of 51.05 megahertz has been selected on the TS1967/ARC-54 or the C-3835/ARC-54. Operation of the whole-megahertz readout circuit (S5A) is discussed in *b* below. Operation of the 0.05 megahertz circuit (S4A) is discussed in *c* below.

b. Operation of Whole Megahertz Readout Circuit. The code for 51 megahertz puts ground on megahertz select line B and megahertz ambiguity select line B. The ground on megahertz select line B is applied through contacts 19 and 1 of switch S5A (rear) and terminal

2 of the motor control unit to pin 1 of relay K1. Relay K1 energizes, which applies +27.5 volts dc through pins 3 and 8 of relay K1 to terminal 5 of the motor control unit. From terminal 5, +27.5 volts dc is applied to motor B1. Motor B1 turns switch S5A (rear) clockwise until contact 19 is at an open segment of the switch. This removes the ground on megahertz select line B from pin 1 of relay K1. Simultaneously, however, ground from megahertz select ambiguity line B is applied, through contacts 12 and 19 of switch S5B (front), contacts 18½ and 20 of switch S5C (front), terminal 9 of the motor control unit, and diode CR5, to pin 1 of relay K1, keeping the relay energized. Motor B1 continues to turn switch S5 until contact 19 of switch S5A (rear) and contact 18½ of switch S5C (front) are at open segments of the switch. The open segments remove ground from relay K1, deenergizing K1; this removes +27.5 volts dc from motor B1, stopping the motor. Mechanically connected to switch S5 and motor B1 is the frequency readout counter. As motor B1 runs, the whole-megacycle dial on the frequency readout counter rotates. When motor B1 stops, the frequency indicated on the whole-megahertz dial is the whole-megahertz frequency selected.

c. Operation of .05 Megahertz Readout Circuit. The code for .05 megahertz is a ground on the .05 megahertz select line B. This ground is applied from .05 megahertz select line B, through contacts 19 and 1 of switch S4A (rear) and terminal 3 of the motor control unit, to pin 1 of relay K2. Relay K2 energizes; this applies +27.5 volts dc, through pins 3 and 8 of relay K2 and terminal 8 of the motor control unit, to motor B2. Motor B2 turns switch S4A (rear) clockwise until contact 19 reaches an open segment of switch S4A (rear). When contact 19 of switch S4A (rear) reaches the open switch segment, ground is removed from pin 1 of relay K2. Relay K2 deenergizes, removing +27.5 volts dc from motor B2, which stops the motor. The .05 megahertz dial of the frequency readout counter is mechanically connected to motor B2 and switch S4. When motor B2 stops, the frequency indicated on the .05 megahertz dial is the frequency selected.

d. Frequency Coding. For any frequency selected, the sequence of operation is as described in *b* and c above. Refer to paragraph 1-10d for the coding of .05 megahertz select lines A through E. Paragraph 1-10f contains the coding for megahertz select lines A through E and megahertz select ambiguity lines A and B.

1-12. Test Set, Radio TS-1967/ARC-54 Audio Amplifier A1

(fig. 1-6)

Audio amplifier Al consists of a voltage regulator, three audio amplifier stages, and two emitter followers. Input voltage of +27.5 volt dc is applied through terminal 19 to the voltage regulator. The voltage regulator, composed of resistor R1 and Zener diodes CR2 and CR1, regulates the voltage at +18.2 volts dc. The +18.2-volt dc output from the voltage regulator is applied to the junction of resistors R2 and R27, the collectors of transistors Q4 and Q5, and resistor R24. From the junction of resistors R2 and R27, +18.2 volts dc routes through resistor R2 to the base and collector circuits of transistor Q1. Resistor R27 connects +18.2 volts dc to the base and collector circuits of transistor Q2 and Q3 and the base circuit of emitter follower Q4. An audio signal applied to HEADSET jack J9 routes through terminal 5 and capacitor Cl to the base of transistor Q1. (Resistor R26 serves as a load for the headset connected to jack J9.) Transistor Q1 amplifies the audio signal to a level determined by the setting of gain adjust potentiometer R6. The amplified audio signal is then routed through capacitor C3 to the base of transistor Q2. Transistor Q2 amplifies the audio signal and routes it through capacitor C7 to the base of transistor Q3. Capacitor C9 couples the amplified audio signal from the collector of transistor Q3 to the base of emitter follower Q4. From the emitter of transistor Q4, the audio signal is routed through terminal 56 to switch S10, and through capacitor C11 and terminal 7 to switch S9. The audio signal applied to switch S10 is routed through terminal 55, resistor R21, and capacitor C12 to the base of emitter follower Q5. Capacitor C14 couples the audio signal from the emitter of transistor Q5 through terminal 78 to HEADSET jack J9. An audio signal applied to the VOL control is routed, through switch S11, terminal 54, resistor R22, and capacitor C13, to the base of emitter follower Q5. From the emitter of transistor Q5, the audio signal is coupled through capacitor C14 and terminal 78 to HEADSET jack J9.

1-13. Simulator-Test Set SM-349/ARC-54 Audio Amplifier A1

(fig. FO-8)

The audio amplifier located in the SM-349/ARC-54 is the same as the one located in the test set, with the following exceptions:

a. Audio from emitter follow Q4 is applied

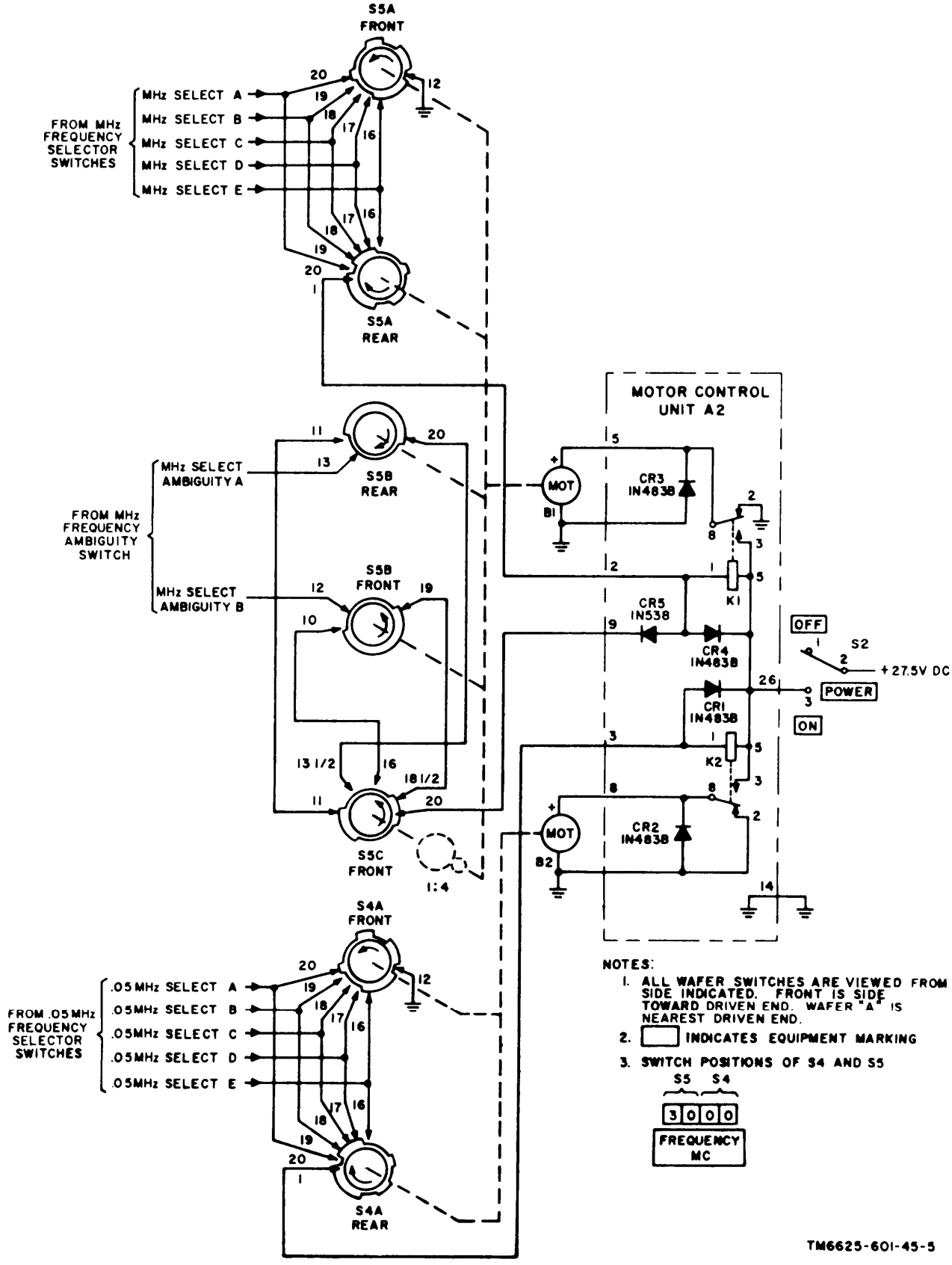


Figure 1-5. Frequency readout counter, simplified schematic diagram.

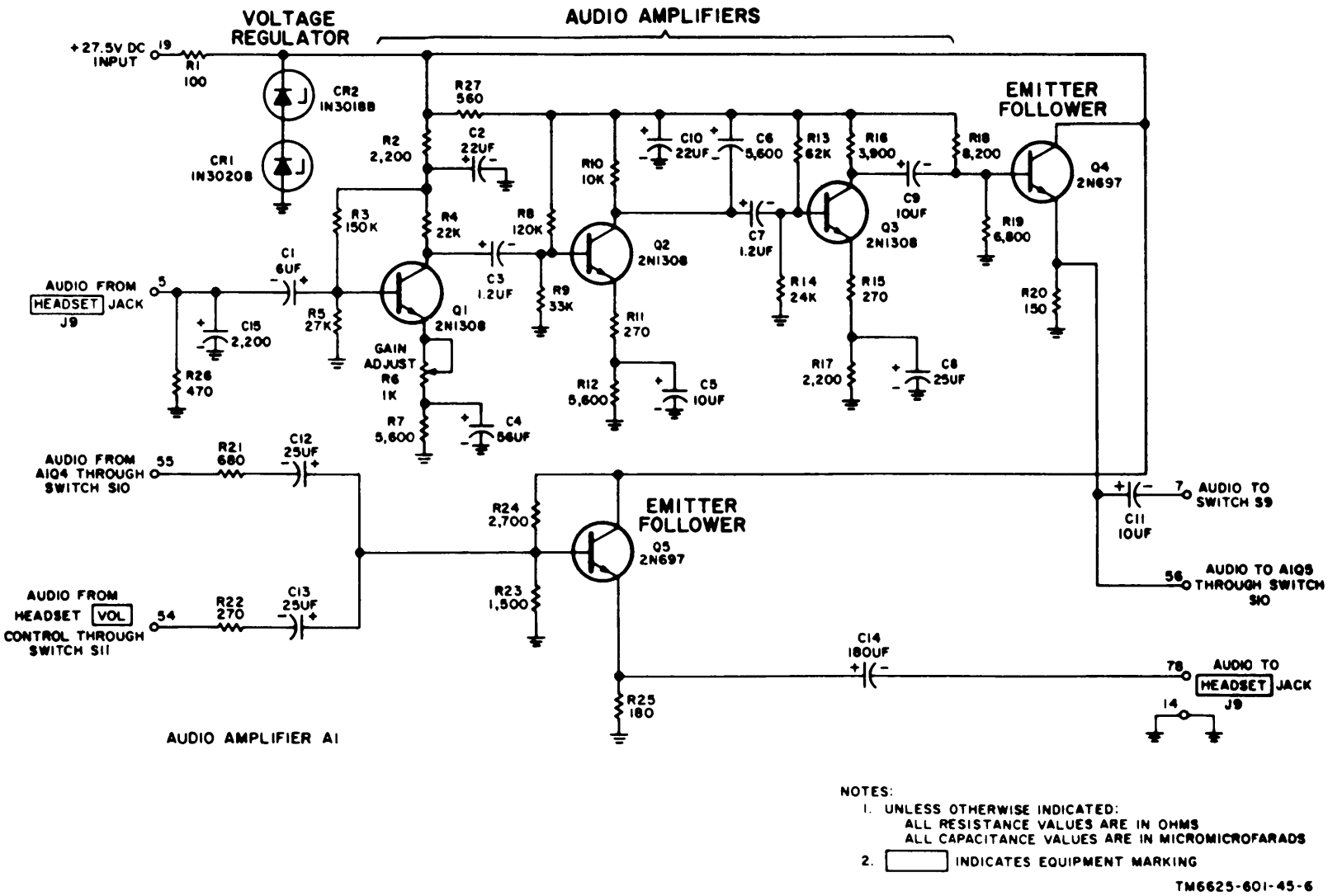


Figure 1-6. Audio amplifier A1 (located in TS-1967/ARC-54), simplified schematic diagram.

through resistor R21 and capacitor C12 to the base of emitter follower Q5.

b. Incoming audio is applied, through VOL control R4, resistor R22, and capacitor C13, to the base of emitter follower Q5.

c. Audio from emitter follower Q5 is applied through capacitor C14 and terminal 78 to HEADSET jack 7.

1–14. Rf Power-Measuring Circuit
(fig. 1-7)

The rf power-measuring circuit in the TS-1967/ARC-54 consists of a directional coupler, a function selector switch, two calibration potentiometers, and an rf power meter. Rf power applied to DIR COUPLER IN jack J3 is routed through plug P1 to directional coupler DC1. From directional coupler DC1, the main portion of the input rf power is applied through plug P2 to DIR COUPLER OUT jack J6. A small portion of the rf power, incident (output) and reflected, is detected by the diodes in directional coupler DC1, resulting in a dc voltage proportional to the incident and reflected power levels. From directional coupler DC1, the dc voltage is applied to contacts 6, 4, and 7, 5, respectively, of POWER/VSWR switch S2. Setting switch S2 to FWD applies dc voltage proportional to the incident rf power level, through contacts 4 and 12 of switch S2 and power calibrate potentiometer RI, to RF POWER meter M1. (Potentiometer R1 is used to calibrate meter M1 for the proper reading of a known amount of input rf power.) Setting switch S2 to REFL applies dc voltage proportional to the reflected rf power, through contacts 5 and 1 of switch S2 and potentiometer R1, to meter M1. Setting switch S2 to CAL applies dc voltage proportional to the incident rf power, through contacts 6 and 2 of switch S2 and VSWR CAL potentiometer R2, to meter M1. (Potentiometer R2 is used to position the meter needle to CAL.) Setting switch S2 to VSWR applies dc voltage proportional to the reflected rf power, through contacts 7 and 3 of switch S2 and potentiometer R2, to meter M1.

1–15. Test Set, Radio TS-1967/ARC-54 Homer Signal Circuit
(fig. 1-8)

The homer signal simulator circuit in the test set consists of two relays, three 6-decibel (db) attenuators, two 3-db attenuators, and a function selector switch. An rf signal applied to HOME INPUT jack J1 is routed through plug P20 to attenuator AT3. Attenuator AT3 reduces the rf signal 6 db and applies it through jacks J37 and J38 to contacts of relays K2 and K3, respectively. From the contacts of relays K2 and K3, respectively. From the contacts of relays K2 and K3, the rf signal is applied through plugs P13 and P14 to attenuators AT4 and AT6, respectively, which reduces the rf signal an additional 6 db. The attenuated rf signal (down 12 db from the input of the signal) is then routed, through jacks J44 and J45 of attenuators AT4 and AT6, and the contacts of relays K2 and K3, to home left J14 and home right jack J13, respectively. The equal level of the rf signal applied to jacks J14 and J13 simulates an on-course heading. Setting HOME SIMULATOR switch S1A (rear) to LEFT applies ground through contacts 3 and 1 of switch S1A (rear) to terminal 1 of relay K2. Relay K2 energizes, removing attenuator AT4 from the circuit and connecting attenuator AT5 in series with the output. The resultant rf signal applied to home left jack J14 is attenuated 9 db instead of 12 db as before. This simulates a left-course heading. Setting switch S1A (rear) to RIGHT removes ground from relay K2, causing K2 to reenergize. Ground is then applied through contacts 8 and 10 of switch S1A (rear) to terminal 1 of relay K3. Relay K3 energizes, removing attenuator AT6 from the circuit and connecting attenuator AT7 in series with the output. The resultant rf signal applied to home right jack J13 is attenuated 9 db instead of 12 db as before. This simulates a right-course heading.

1-16. Power Distribution Circuit
(fig. FO-6)

Operating voltage of +27.5 volts dc is obtained from an external power source. The +27.5 volts dc is applied through POWER 28V DC jack J32 to power circuit breaker CB1 in the test set. From circuit breaker CB1, +27.5 volts dc is routed to various circuits in the TS-1967/ARC-54, the SM-349/ARC-54, the C-3835/ARC-54, the RT-348/ARC-54, and the CU-942/ARC-54 or the CU-943/ARC-54.

a. Routing of Voltage in Test Set, Radio TS-1967/ARC-54. Closing circuit breaker CB1 applies +27.5 volts dc to pin a of CONT UNIT jack J16, pin 2 of lamp DS1, and contacts 10 and 7 of TEST FUNCTIONS SELECTOR switches S11D (rear) and S11F (front), respectively. With switch S11 set to TEST SET, +27.5 volts dc is routed to terminals 11 through 15 of terminal board TB1 from contacts 8 and 5 of switches S11D (rear) and S11F (front), respectively. The +27.5 volts dc applied to terminal 10 of TB1 is

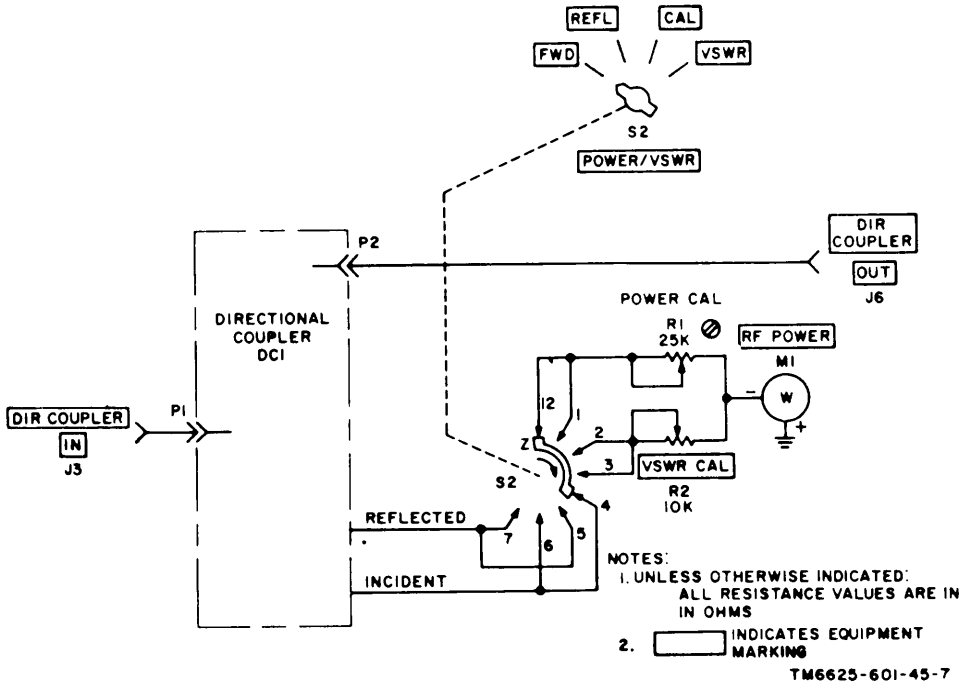


Figure 1-7. Rf power-measuring circuit, simplified schematic diagram.

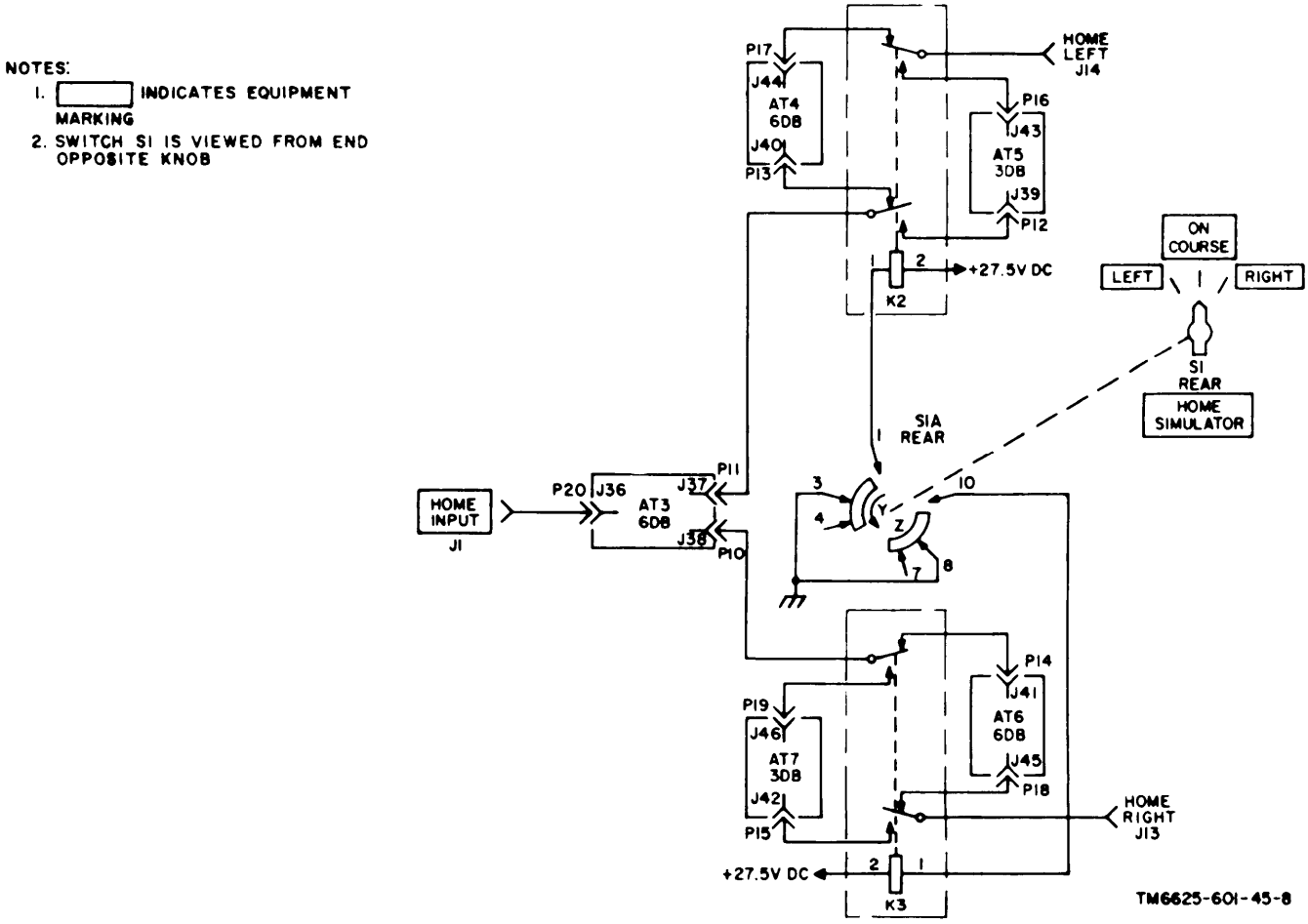


Figure 1-8. Homer signal simulator, simplified schematic diagram.

routed to pins 34, 18, and 36 of jack J33. The +27.5 volts dc applied to terminal 11 of TB1 is routed to pins 18, 36, and 34 of RCVR/XMTR jack J11. From terminal 11 of TB1, +27.5 volts dc is applied to contact 5 of RCVR/XMTR FUNCTION switch S9A (rear), pin a of jack J34, and pin J of ANT COUPLER jack J10. Setting switch S9 to TEST applies +27.5 volts dc through contacts 5 and 4 of switch S9A (rear) to terminal 18 of TB1 and contact 8 of switch S11C (rear). From terminal 18 of TB1, +27.5 volts dc is applied, through dropping resistor R10, terminal 9 of TB1, and contacts 2 and 4 of switch S11C (rear), to pins E and G of jack J35. With switch S11 set to TEST SET, +27.5 volts dc applied to contact 8 of switch S11C (rear) is routed, through contacts 8 and 10 of switch S11C (rear), to pin 16 of jack J33 and pin 16 of jack J11. The +27.5 volts dc applied to contact 1 of relay K1 is obtained from terminal 13 of TB1. From terminal 15, +27.5 volts dc is routed to pin 1 of XMIT lamp DS2, terminal 19 of audit amplifier A1, and terminal E5 of the blower inverter. The +27.5 volts dc applied to terminal 19 of audio amplifier A1 is routed to a voltage regulator composed of resistor A1R1 and Zener diodes A1CR2 and A1CR1. The out put of the voltage regulator, +18.2 volts dc, is applied to the collector circuits of transistors A1Q1 through A1Q5. The +27.5 volts dc applied to terminal E5 of the blower inverter is routed to a filter circuit composed of resistors R15 and R16 and capacitors C2 and C3. From the filter circuit, +27.5 volts dc is applied to terminal 3 of transformer T1. When the C-3835/ARC-54 is connected to jack J16 and switch S11 is set to CONT UNIT, +27.5 volts dc is removed from contacts 8 and 5 and applied to contacts 9 and 6 of switches S11D (rear) and S11F (front) respectively. This removes the +27.5 volts dc applied to terminals 10 through 15 of TB1. The +27.5 volts dc applied to contacts 9 and 6 of switches S11D (rear) and S11F (front), respectively, is routed, through pins C, D, and E of jacks J16, to the C-3835/ARC-54. From the C-3835/ARC-54, +27.5 volts dc is routed, through pins F, *f*, and *e* of jack J16 to terminal 14 of TB1, pin DD of jack J16 to contact 9 of switch S11C (rear), and pin GG of jack J16 to contact 3 of switch S11C (rear). The +27.5 volts dc applied to terminal 14 of the TB1 is routed through terminals 10, 11, 12, 13, and 15 of TB1 to the various circuits, in the same manner as when switch S11 was set to TEST SET. The routing of the +27.5 volts dc applied to contacts 9 and 3 of switch S11C (rear) is also the same as described above.

b. Routing of Voltage in Simulator-Test Set SM-348/ARC-54. The +27.5 volts dc applied to pins 34, 18, and 36 of jack J33 is routed through 6 AMP fuse F1 to POWER switch S2 in the simulator. Setting switch S2 to ON applies +27.5 volts dc to terminal 19 of audio amplifier A1 and terminal 26 of motor control A2. From terminal 19 of audio amplifier Al, +27.5 volts dc is applied to a voltage regulator composed of resistor A1R1 and Zener diodes A1CR2 and A1CR1. The +18.2-volt dc output of the voltage regulator is applied to the collector circuits of transistors A1Q1 through A1Q5 and, through terminal 17 of audio amplifier Al, to terminal 11 of motor control A2. From terminal 11 of motor control A2, +18.2 volts dc is routed through dropping resistor A2R1 and terminal 12 to pin 10 of FUNCTION SELECTOR switch S3A (front). The +27.5 volts dc applied to terminal 26 of motor control A2 is routed to pin 5 of relay A2K1 and pin 5 of relay A2K2. A voltage regulator composed of resistor R1 and Zener diode CR1 receives +27.5 volts dc from switch S2. The +27.5-volt dc output of the voltage regulator is applied to pin 1 of lamps DS1, DS3, DS4, DS5, and DS9 through DS14. The regulated +27.5 volts dc is also applied to terminal 17 of motor control AZ. From terminal 17 of motor control A2, regulated +27.5 volts dc is applied through diode A2CR6 to terminal 16, and diode A2CR7 to terminal 23. From terminal 16 of motor control AZ, regulated +27.5 volts dc is applied to pin 1 of HAR FIL lamp DS2. From terminal 23 of motor control A2, regulated +27.5 volts dc is applied to pin 1 of PTT INT SEC TONE lamp DS7 and pin 1 of PTT SEC lamp DS6. Setting switch S2 to LOAD applies +27.5 volts dc across parallel resistors R2 and R3. Resistors R2 and R3 simulate the load that the RT-348/ARC-54 places across the +27.5-volt dc source.

CHAPTER 2
DIRECT SUPPORT MAINTENANCE

Section I. GENERAL

2–1. Scope of Direct Support Maintenance

a. Direct support maintenance includes all the techniques outlined for organizational maintenance plus any special or additional techniques required to isolate a defective part. The maintenance includes removal and replacement of audio amplifier A1, motor control A2 and common components on the test set and simulator (resistors, capacitors, switches S3, S4, S5, S6, S7 and S8). In some cases a trouble can be localized by the direct support repairman to a particular functional circuit in the test set or simulator by use of the operating procedures in the monthly preventive maintenance checks and services chart in TM 11-6625-602-12. In other cases, however, a trouble is localized while performing the AN/ARC-54 unit test procedures.

b. This chapter contains sections concerning:

(1) Troubleshooting
(2) Repair and Replacement
(3) Adjustment
(4) Inspection and Service
(5) Testing

2-2. Test Equipment Required

Table 2–1 lists the test equipment required for direct support maintenance of Maintenance Kit, Electronic Equipment MK–733/ARC-54 and also lists the associated technical manuals.

Table 2–1. Test Equipment Required for Direct Support Maintenance

Test Equipment	*Technical Manual*
Generator, Signal AN/URM-127.	TM 11-6625-683-15.
Multimeter TS-352B/U.	TM 11-6625-366-15.
Power Supply PP-351/U.	TM 11-5121.
Voltmeter, Electronic AN/URM-145.	TM 11-6625-524-14.
Voltmeter, Electronic ME-30/U.	TM 11-6625-320-12.
Radio Set AN/ARC-54.	TM 11-5821-244-12.
Tool Kit, Electronic Equipment TK-105/G.	SB 11-604.
Resistor, 10-ohm, ¼-watt.	
Resistor, 150-ohm, ¼-watt.	

Section II. DIRECT SUPPORT TROUBLESHOOTING

2–3. Troubleshooting Procedures

a. *General.* The first step in servicing a defective maintenance kit is sectionalization, which means tracing the fault to a unit such as the test set. The second step is localization, which means tracing the fault to a defective stage or circuit responsible for the abnormal condition. The third step is isolation, which means locating the defective part or parts. Some defective parts, such as burned resistors, can often be located by sight and smell. Most defective parts, however, must be isolated by checking voltages and resistance.

b. Sectionalization. The maintenance kit contains two major units: the test set and the simulator. The first step in tracing trouble is to locate the unit at fault by the following methods:

(1) *Visual inspection.* The purpose of the visual inspection is to locate faults without testing or measuring circuits. Perform the visual checks given in TM 11-6625-601-12; pay particular attention to the front panel lamps and meters.

(2) *Operational tests.* Operational tests frequently indicate the general location of trouble. In many instances, the tests will help in determining the exact nature of the fault. The monthly maintenance service and inspection chart (TM 11-6625-601-12) contains a good operational test. While performing the monthly maintenance procedures, an attempt should be made to sectionalize the fault to either the test set or simulator.

c. Localization. Localization procedures should be performed after the trouble has been sectionalized *(b* above) to a particular unit. The localization procedures applicable to this equipment are listed in (1) and (2) below, and should

be used in localizing the trouble to a functional circuit in the suspected unit.

(1) *Operational test procedure.* The monthly maintenance procedures (TM 11-6625-601-12), in some cases, localize a trouble to a specific circuit in the test set or simulator.

(2) *Radio Set AN/ARC-54 test procedure.* A complete AN/ARC-54 Radio Set known to be in good operating condition is part of the test equipment required at the direct support maintenance level. To localize a trouble detected while performing the AN/ARC-54 test procedures, the repairman may duplicate the test wherein the fault occurred and, by use of schematic diagrams, voltage and resistance charts, will localize a trouble to a functional circuit.

NOTE

If none of the AN/ARC-54 test procedures can be performed, there is a possibility that no power is being applied to the AN/ARC-54 unit (RT-348/ARC-54, C-3835/ARC-54, or CU-942/ARC-54 or CU-943/ARC-54) under test. Refer to the power routing diagram (fig. FO-6) and make voltage checks at the appropriate pins on the unit connector.

d. Isolation. Once a trouble has been localized to a functional circuit in the test set or simulator, further tests and measurements must be made to isolate the trouble to a component part. The most useful tool that a technician has for troubleshooting any circuit is his complete understanding of the circuit operation. When a trouble has been localized to a functional circuit, refer to chapter 1 and review the principles of operation of the circuit. Chapter 1 contains functional and simplified schematic diagrams of each test circuit. These schematic diagrams omit the components and switches that are not directly involved with the circuit. These diagrams make the circuit more easily understood than does the overall schematic diagram. Parts locations are indicated in figures 2-1 through 2–9. The voltage and resistance tables (para 2–5) are valuable aids in isolating a defective component. When making resistance measurements, refer to figures FO-7, FO-8, and figures 2-14 through 2–22 as needed. Color code diagram for coils, resistors, and capacitors (fig. FO–1), provides pertinent resistance, voltage rating, and tolerance information.

CAUTIONS

1. This equipment contains transistor circuits in both the test set and simulator. Be sure that the test equipment used is equipped with polarized ground plugs. If substitute test equipment is used that does not have an isolation transformer in its power supply circuit, connect one in the input power circuit. (A suitable transformer is identified by Federal stock number 5950-356-1779.)

2. Make test equipment connections with care so that shorts will not be caused by exposed test equipment connectors. Tape or sleeves (spaghetti) test prods or clips as necessary to leave as little exposed as needed to make contact to the circuit under test.

2-4. Voltage and Resistance Measurements

Normal voltage and resistance measurements taken at the base, collector, and emitter of the audio amplifiers in the test set and simulator are presented in the tables in paragraph 2-5.

CAUTION

When measuring voltages, use tape or sleeving (spaghetti) to insulate the entire test prod, except for the extreme tip. A momentary short circuit can ruin a transistor.

a. Voltage Measurements. The voltage readings in the tables (para. 2-5) were obtained under the conditions specified in (1) and (2) below. Always make voltage measurements under these same conditions, or the readings obtained may be inaccurate. Make all voltage measurements with a vtvm that has an input impedance of at least 10 megohms (Voltmeter, Meter ME-30A/U, or equivalent). Connect the dc common clip or the ac ground clip of the vtvm to chassis ground of the unit under test.

(1) *Voltage measurements for audio amplifier card A1 (part of Test Set, Radio TS-1967/ARC-54).*

(a) Connect a 10-ohm (¼-watt, ±10-percent) resistor between pins 2 and 4 of HEADSET jack J9.

(b) Connect a 150-ohm (¼-watt, ±10-percent) resistor between pins 5 and 6 of RCVR/XMTR jack J11.

(c) Apply +27.5 volts dc ±1 to POWER jack J32.

(d) Set the POWER circuit breaker to ON.

(e) Set TEST FUNCTION SELECTOR

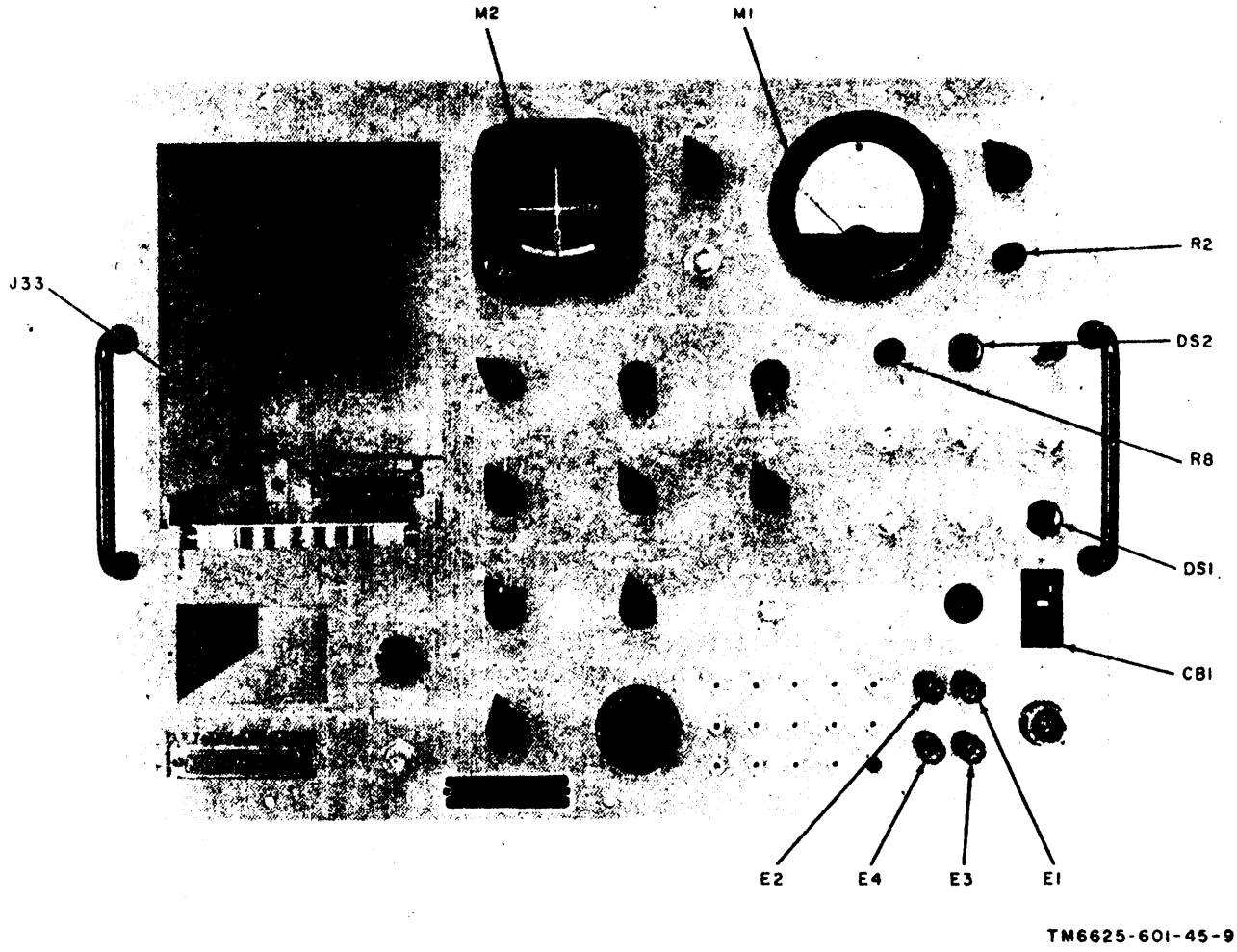


Figure 2-1. Test Set, Radio TS-1967/ARC-54, front panel view, parts location.

switches S10 to RADIO and S11 to TEST SET.

(f) Set RCVR/XMTR FUNCTION switch S9 to PTT. (All other switches may be in any position.)

(g) Apply a 1,000-Hz, 0.135-millivolt (mv), root-mean-square (rms) signal between pins 3 (high) and 1 (low) of HEADSET jack J9. (To obtain the 0.135-mv rms signal, apply 135 mv rms across a 1,000-to-l voltage divider (fig. 2-13).

(h) Connect the vtvm between pins 5 and 6 of RCVR/XMTR jack J11. Note that 390 mv rms is indicated on the vtvm. If this reading is not obtained, perform the audio amplifier adjustment procedure (para 2-20).

(2) *Voltage measurements for audio amplifier card A1 (part of Simulator-Test Set SM-349/ARC-54).*

(a) Connect a 10-ohm (22-watt, ±10-percent) resistor between pins 2 and 4 of HEADSET jack J7.

(b) Apply +27.5 ±1 volts dc to test set POWER jack J32.

(c) Set test set POWER circuit breaker to ON.

(d) Set test set TEST FUNCTION SELECTOR switches S10 to SIM, and S11 to TEST SET.

(e) Set test set RCVR2)XMTR FUNCTION switch S9 to TEST.

(f) Set the simulator HEADSET VOL control fully clockwise.

(g) Apply a 1,000-Hz, 0.135-mv rms signal between pins 3 (high) and 1 (low) of HEADSET jack J7. (To obtain the 0.135-mv rms signal, apply 135 mv rms across a 1,000-to-1 voltage divider (fig. 2-13).

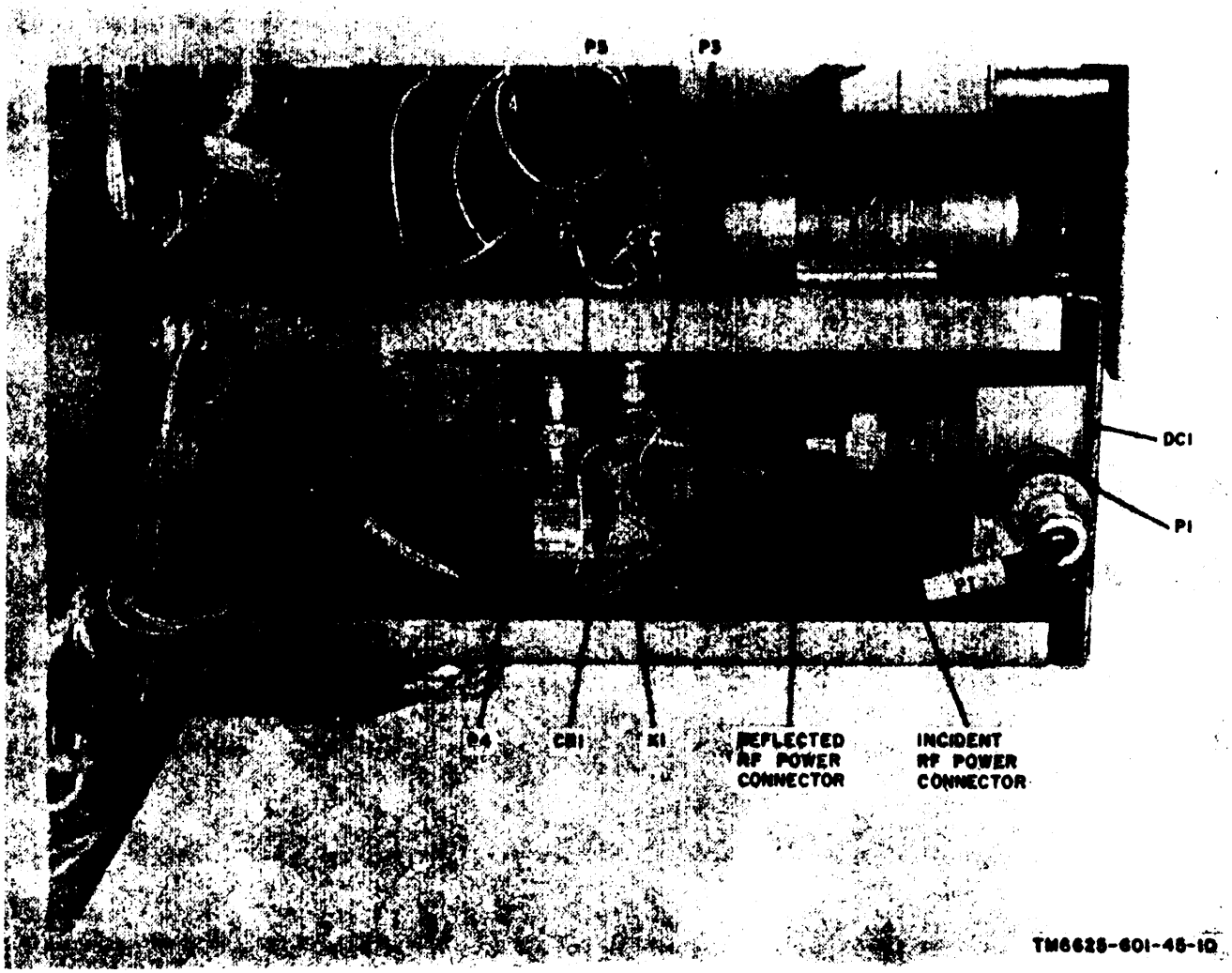


Figure 2-2. Test Set, Radio TS-1967/ARC-54, inside left view, parts location.

(h) Connect the vtvm between the test set AUDIO OUT terminals. Note 390 mv rms is indicated on the vtvm. If this reading is not obtained, perform the audio amplifier adjustment procedure (para 2-21).

CAUTION

Before using any ohmmeter. to make resistance measurements, check the open-circuit voltage across the ohmmeter test leads. Do not use the ohmmeter if the open-circuit voltage, exceeds 1.5 volts. Make resistance measurements in the test set and simulator only as directed in the tables below. Sensitive transistors can be ruined if unauthorized resistance measurements are made.

b. Resistance Measurements. The resistance readings in the tables (para 2-5) were obtained under the conditions outlined in (1) through (4) below. Always make resistance measurements under these conditions, or the readings may be inaccurate.

(1) Make all resistance measurements with Multimeter TS-352/U, or equivalent. The open-circuit voltage across the ohmmeter test leads must not exceed 1.5 volts.

(2) For each resistance measurement, set the ohmmeter range switch to the resistance scale specified in the table.

(3) Connect the ohmmeter negative lead to chassis ground of the unit under test unless otherwise indicated.

(4) Make all resistance measurements without power applied to the test set and simulator.

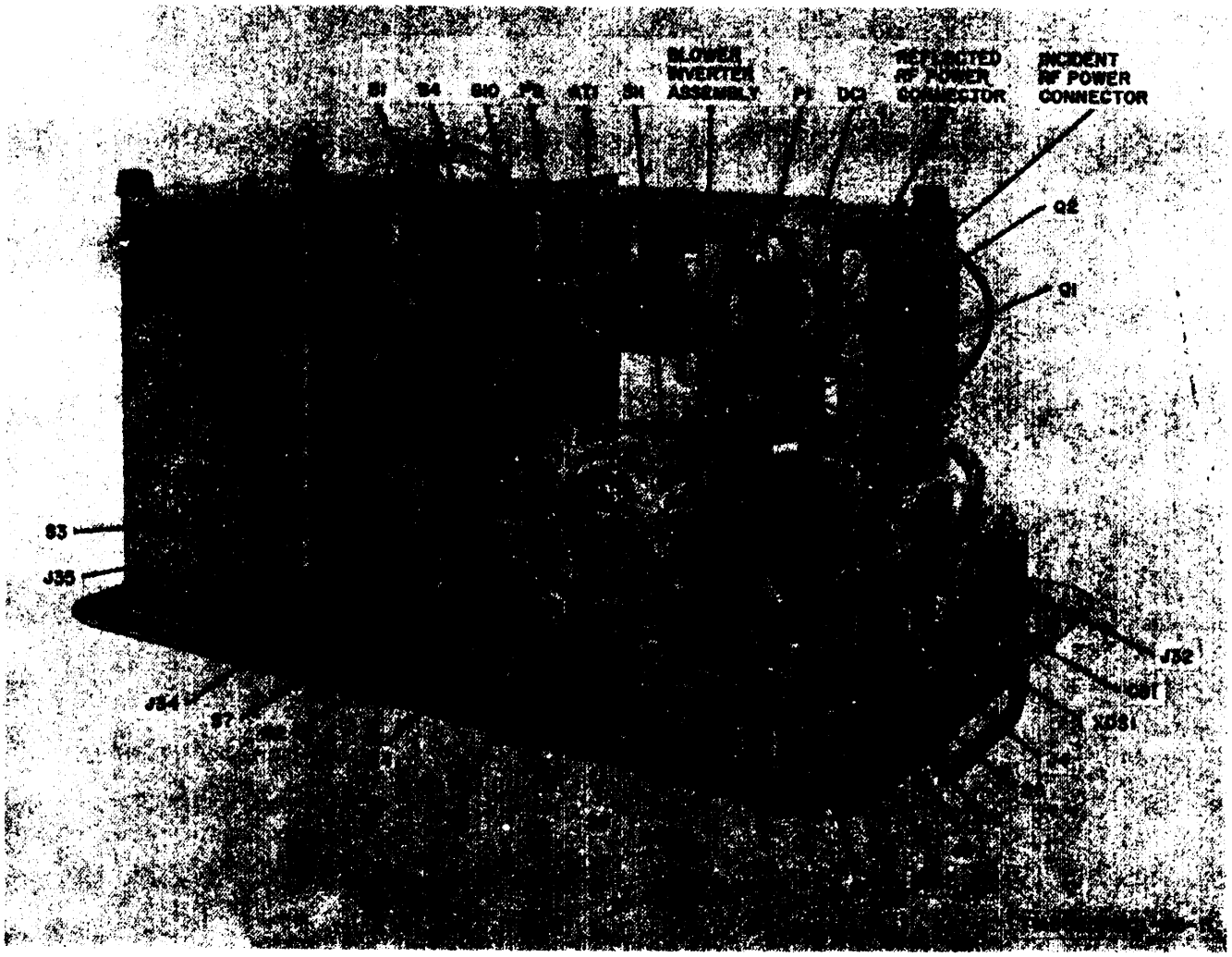


Figure 2-3. Test Set, Radio TS-1967/ARC-54, inside top view, parts location.

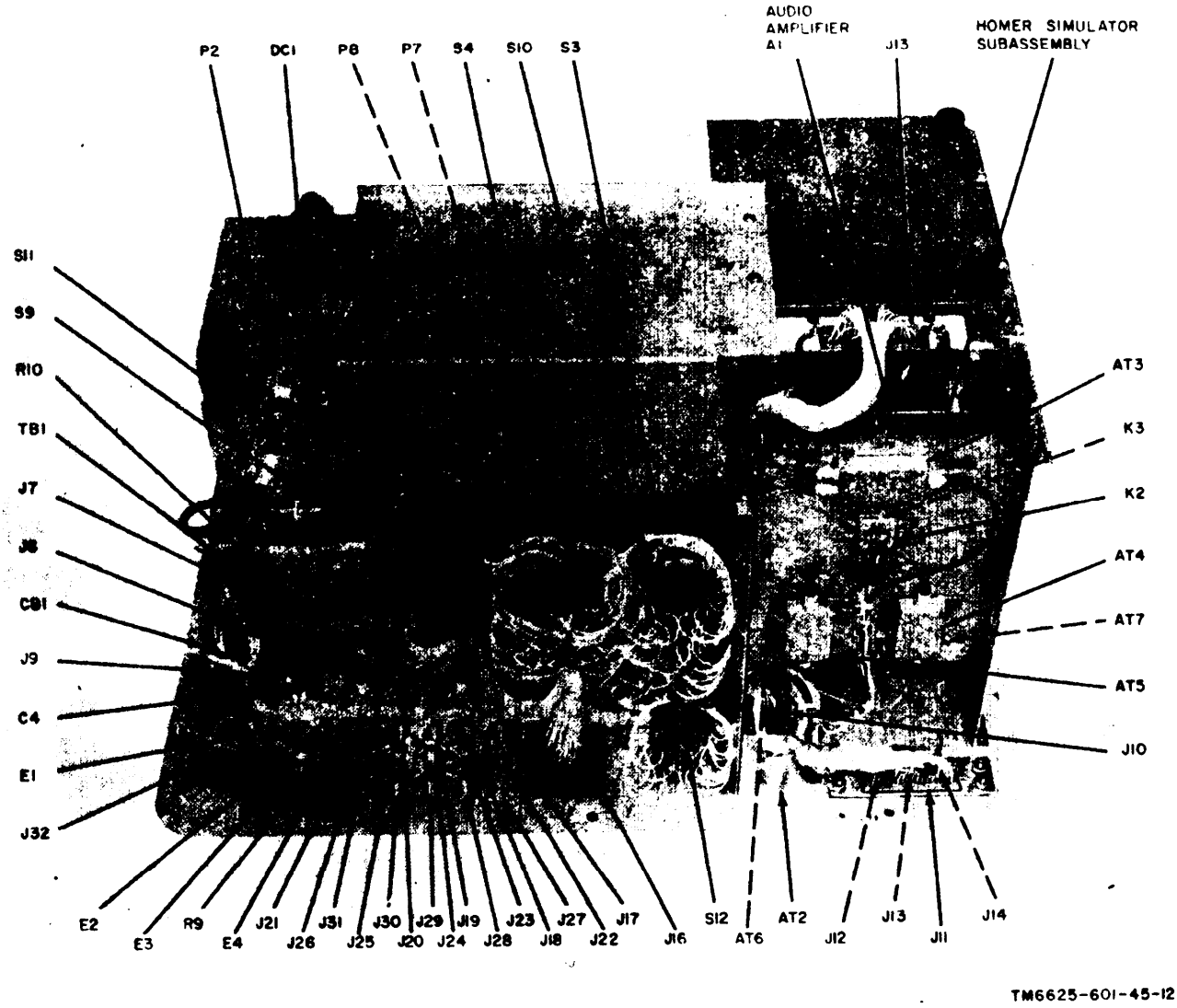


Figure 2–4. Test Set, Radio TS–1967/ARC–54, inside bottom view, parts location.

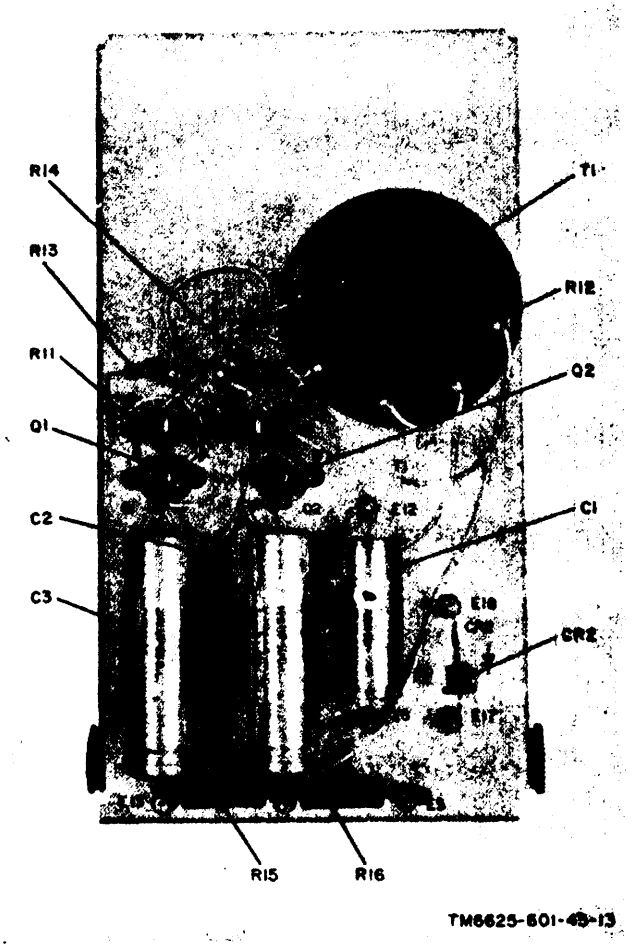


Figure 2-5. Blower inverter assembly parts location.

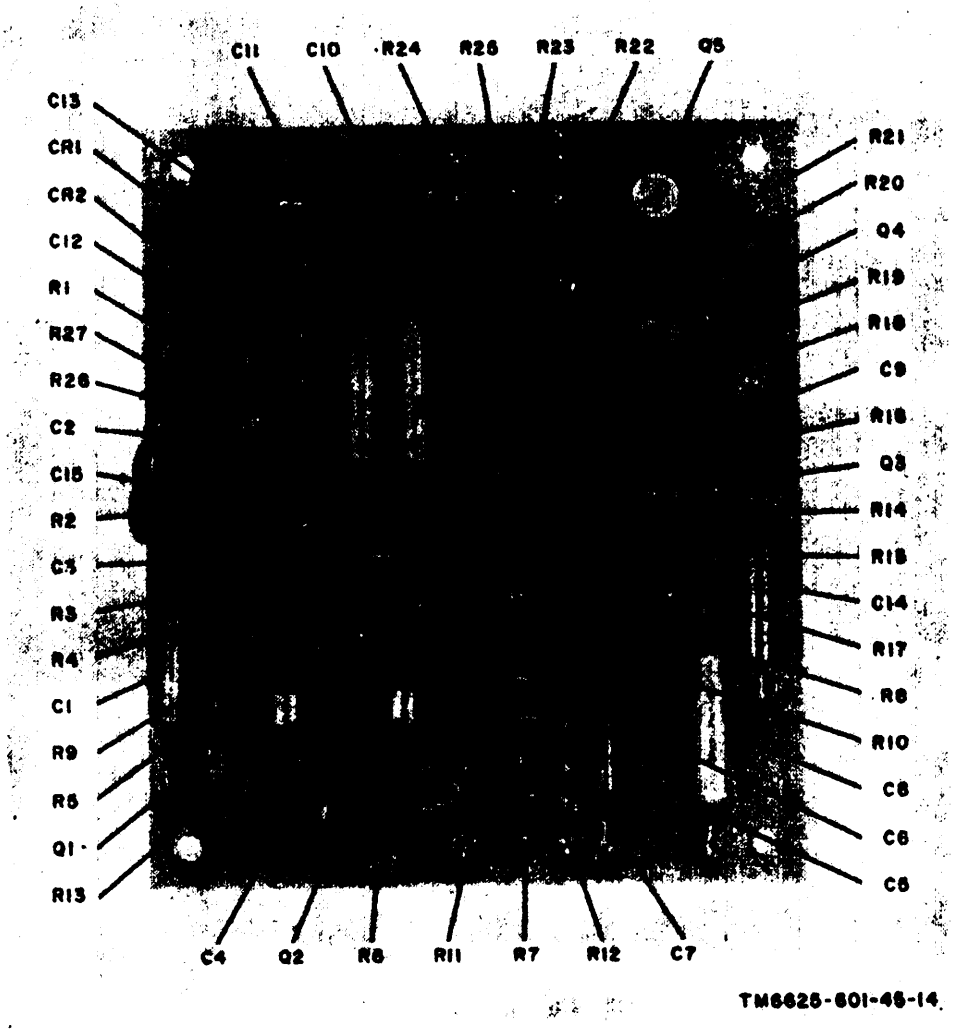


Figure 2-6. Audio amplifier A1, parts location.

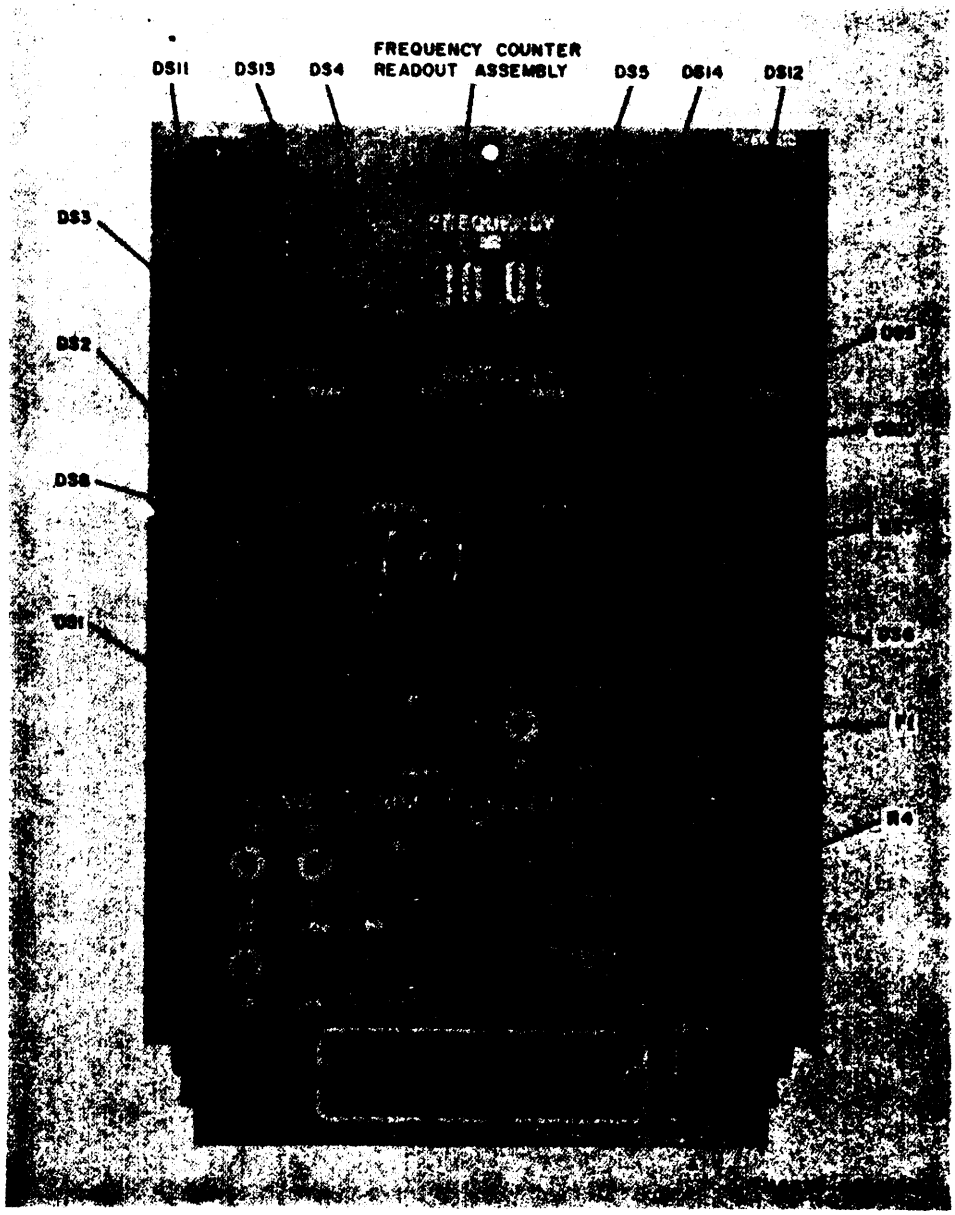


Figure 2-7. Simulator-Test Set SM-349/A.RC-54, front panel view, parts location.

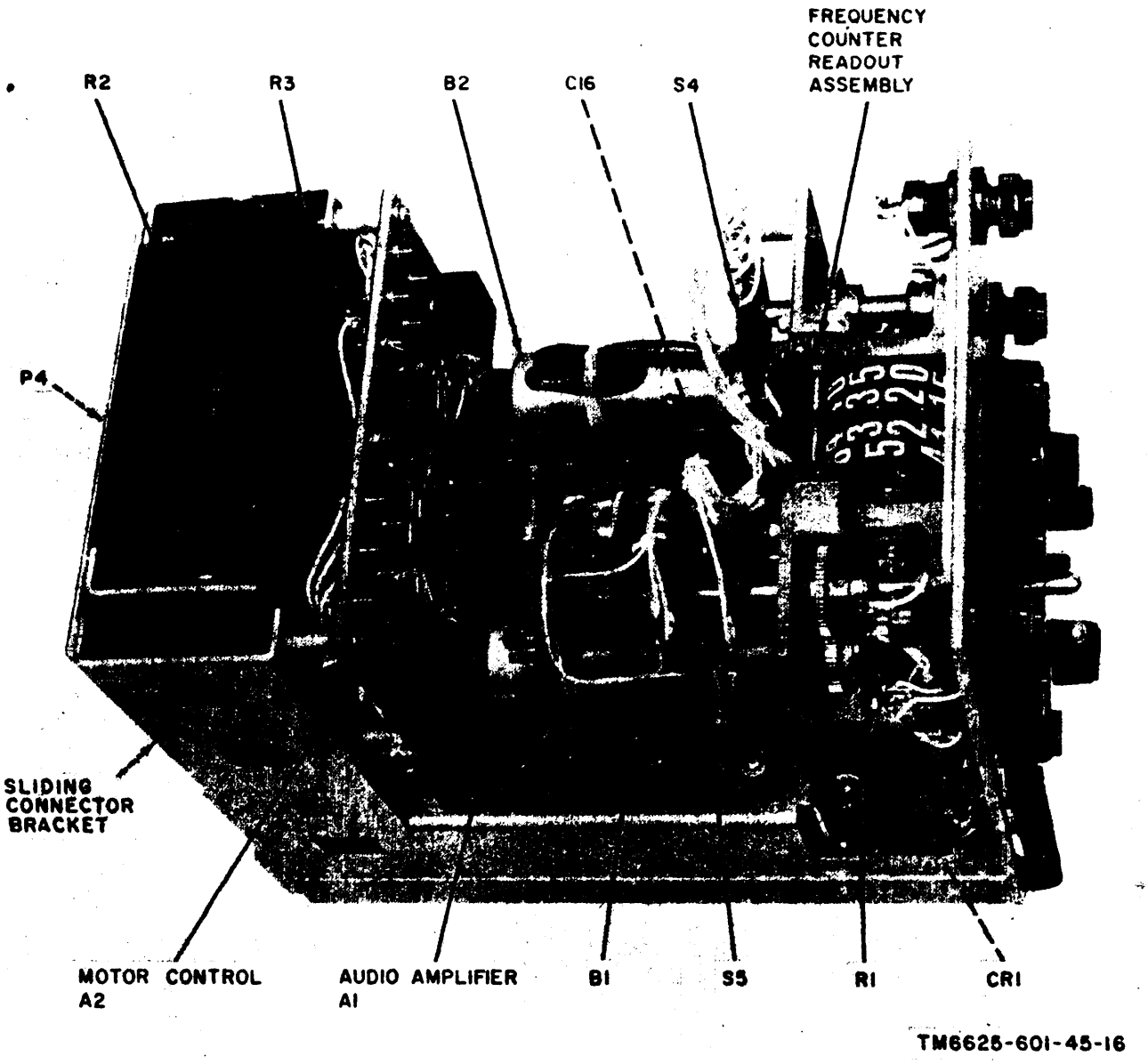


Figure 2-8. Simulator-Test Set SM-349/ARC-54, inside view, parts location.

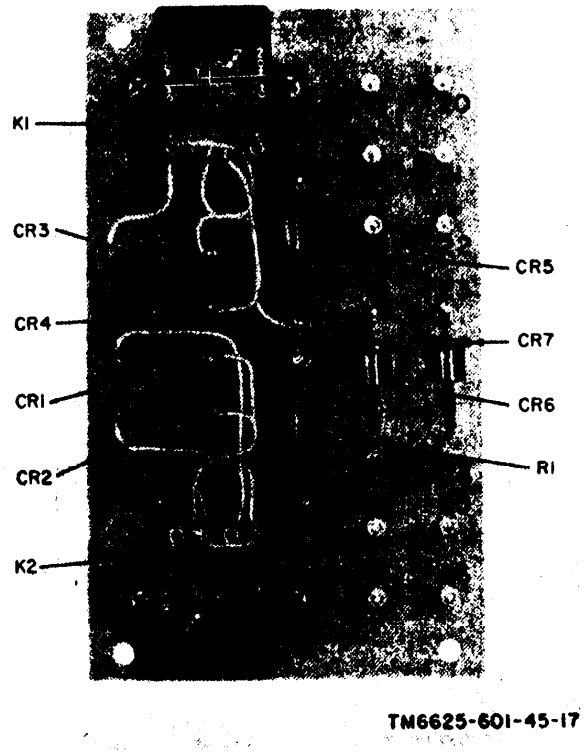


Figure 2-9. Motor Control Unit A2, parts location.

2-5. Voltage and Resistance Tables

CAUTION

Before making any voltage or resistance measurements, refer to paragraph 2-2 *a* and *b*. Use only authorized test equipment or its equivalent. Damage to transistors may result from improper measurement techniques or the use of unauthorized test equipment.

All voltage readings in the tables are positive dc. The test points listed in each table correspond to transistor connections in the equipment. Transistor connections are on terminal boards and are identified by the following designations:

B-terminal board connection to base of transistor.

C-terminal board connection to collector of transistor.

E-terminal board connection to emitter of transistor.

Table 2-2. Voltage and Resistance Measurements for Audio Amplifier A1 (Part of TS-1967/ARC-54)

Test point	Volts ac	Volts dc	Resistance (ohms)	Meter scale
A1Q1:				
E	0.0004	2.3	5.6K	RX1K
B	0.0004	2.2	3.3K	RX1K
C	0.0038	7.1	20K	RX1K
A1Q2:				
E	0.0032	3.4	5.6K	RX1K
B	0.0038	3.1	4.1K	RX1K
C	0.07	9.5	10K	RX1K
A1Q3:				
E	0.066	4.2	2.25K	RX1K
B	0.069	4.0	2K	RX1K
C	0.41	9.0	4K	RX1K
A1Q4:				
E	0.38	5.6	150	RX10
B	0.40	6.2	2.6K	RX1K
C	0	17.5	110	RX10
A1Q5:				
E	0.077	5.3	175	RX10
B	0.085	5.9	1K	RX1K
C	0	17.5	110	RX10

Table 2-3. Voltage and Resistance Measurements for Audio Amplifier A1 (Part of SM-349/ARC-54)

Test point	Volts ac	Volts dc	Resistance (ohms)	Meter scale
A1Q1:				
E	0.0014	2.3	5.8K	RX1K
B	0.0014	2.3	4.7	RX1K
C	0.0049	7.0	20K	RX1K
A1Q2:				
E	0.0043	3.4	5.7	RX1K
B	0.0049	3.2	4.1	RX1K
C	0.087	9.1	10K	RX1K
A1Q3:				
E	0.082	4.1	3K	RX1K
B	0.087	3.2	2.1K	RX1K
C	0.40	9.3	4.1K	RX1K
A1Q4:				
E	0.39	4.9	150	RX10
B	0.40	5.5	2.2K	RX1K
C	0	17.5	110	RX10
A1Q5:				
E	0.062	5.3	180	RX10
B	0.071	5.9	900	RX1K
C	0	17.5	110	RX1K

Section III. REPAIR AND REPLACEMENT

2-6. General Instructions

The direct support maintenance procedures given in this manual supplement the procedures described in the operator and organizational maintenance manual (TM 11-6625-601-12). The systematic troubleshooting procedure, which begins with the operational and sectionalization checks that can be performed at an organizational level, is carried to a higher level in this manual.

2-7. General Parts Replacement Techniques

a. Most of the test set and simulator parts are readily accessible and can be replaced easily without special procedures. To gain access to the interior of the test set, remove 10 screws from around the edges of the front panel and lift it from the lower case; use the two handles. To gain access to the interior of the simulator, remove the eight screws that secure the metal cover to the simulator chassis. Carefully lift the metal cover from the simulator.

b. Use a pencil-type iron with a 25-watt maximum capacity when replacing components contained in transistorized circuits. If the iron must be used with ac, use an isolating transformer between the iron and the line. Do *not* use a soldering gun; damaging voltages can be induced in components. When soldering transistor leads, solder quickly; whenever wiring permits, use a heat sink (such as long-nosed pliers) between the soldered joint and the transistor. Use approximately the same length and dress of transistor leads as used originally.

2-8. Removal and Replacement of Audio Amplifier A1 (Located in TS-1967/ ARC-54)

a. Remove audio amplifier A1 (fig. 2–10) as follows:

(1) Remove the six screws, lockwashers, and nuts (4) that secure the attenuator plate (5) to the test set chassis.

(2) Remove the attenuator plate (5) from the test set chassis; be careful not to put too much strain on the wire harness (6).

(3) Remove the four screws and flat washers (1) that secure the audio amplifier board (2) to the test set chassis.

(4) Pull the audio amplifier board (2) away from the chassis until the wires connected to the terminals on the bottom are accessible.

(5) Tag and unsolder all wires that connect the audio amplifier board (2) to the cable harness (3).

(6) Remove the audio amplifier board (2).

b. Replace audio amplifier A1 as follows:

(1) Connect and solder each wire to its respective terminal on the audio amplifier board (2).

(2) Position the audio amplifier board (2) in

its proper location and secure with four screws and flat washers (1).

(3) Position the attenuator plate (5) in its proper location and secure with six screws, lockwashers, and nuts (4).

2-9. Removal and Replacement of Audio Amplifier A1 (Located in SM-349/ ARC-54)

a. Remove audio amplifier Al (fig. 2-11) as follows:

(1) Remove the four screws and flat washers (1) that secure the audio amplifier board (2) to the simulator chassis.

(2) Slide the audio amplifier board (2) sideways under the counter assembly (3) until it is clear of the simulator chassis.

(3) Carefully turn the audio amplifier board (2) until the wires connected to the terminals on the bottom are accessible.

(4) Tag and unsolder the wires connected to the terminals.

(5) Remove the audio amplifier board (2).

b. Replace audio amplifier A1 as follows:

(1) Connect and solder each wire to its respective terminal on the audio amplifier board (2).

(2) Slide the audio amplifier board (2) under the counter assembly (3) into its proper position and secure with four screws and flat washers (l).

2-10. Removal and Replacement of Motor Control A2 (Located in SM-349/ ARC-54)

a. Remove motor control A2 (fig. 2-11) as follows:

(1) Remove the four screws, flat washers, and spacers (4) that secure the motor control board (5) to the simulator chassis.

(2) Carefully tilt the motor control board (5) forward until the terminals at the back are accessible.

(3) Tag and unsolder the wires from the terminals.

(4) Remove the motor control board (5).

b. Replace motor control A2 as follows:

(1) Connect and solder each wire to its respective terminal on the motor control board (5).

(2) Place the motor control board (5) in its proper position on the simulator chassis and secure with four screws, flat washers, and spacers (4).

2-11. Removal and Replacement of FREQUENCY-SELECTOR-MC Switch S3 (Located in TS-1967/ARC-54)

a. Remove FREQUENCY-SELECTOR-MC switch S3 (fig. 2–12(1)) as follows:

(1) Remove the switch knob by removing two Allen screws from the knob.

(2) Tag and unsolder all wires connected to switch S3 (28).

(3) Remove the hexagonal nut and washer that secure switch S3 to the test set chassis.

(4) Remove FREQUENCY-SELECTOR-MC switch S3.

b. Replace switch S3 as follows:

(1) Secure switch (28) to chassis with hexagonal nut and washer.

(2) Solder all wires to switch as indicated by tags.

(3) Replace knob and tighten two Allen screws.

2-12. Removal and Replacement of FREQUENCY-SELECTOR-MC Switch S4 (Located in TS-1967/ARC-54)

a. Remove FREQUENCY-SELECTOR-MC switch S4 (fig. 2–12 (1)) as follows:

(1) Remove the switch knob by removing two Allen screws from the knob.

(2) Tag and unsolder all wires connected to the switch S4 (29).

(3) Remove the hexagonal nut and washer that secure the switch S4 to the test set chassis.

(4) Remove switch S4.

b. Replace switch S4 as follows:

(1) Secure switch (29) to chassis with hexagonal nut and washer.

(2) Solder all wires to switch S4 as indicated by tags.

(3) Replace knob and tighten two Allen screws.

2–13. Removal and Replacement of FREQUENCY-SELECTOR-MC Switch S5 (located in TS-1967/ARC-54)

a. Remove FREQUENCY-SELECTOR-MC switch S5 (fig. 2–12 (1)) as follows:

(1) Remove the switch knob by removing two allen screws from the knob.

(2) Tag and unsolder all wires connected to switch S5 (62).

(3) Remove the hexagonal nut and washer that secure switch S-5 to the test set chassis.

(4) Remove switch S5.

b. Replace switch S5 as follows:

(1) Secure switch S5 (62) to chassis with hexagonal nut and washer.

(2) Solder all wires to switch S5 as indicated by tags.

(3) Replace knob and tighten two Allen screws.

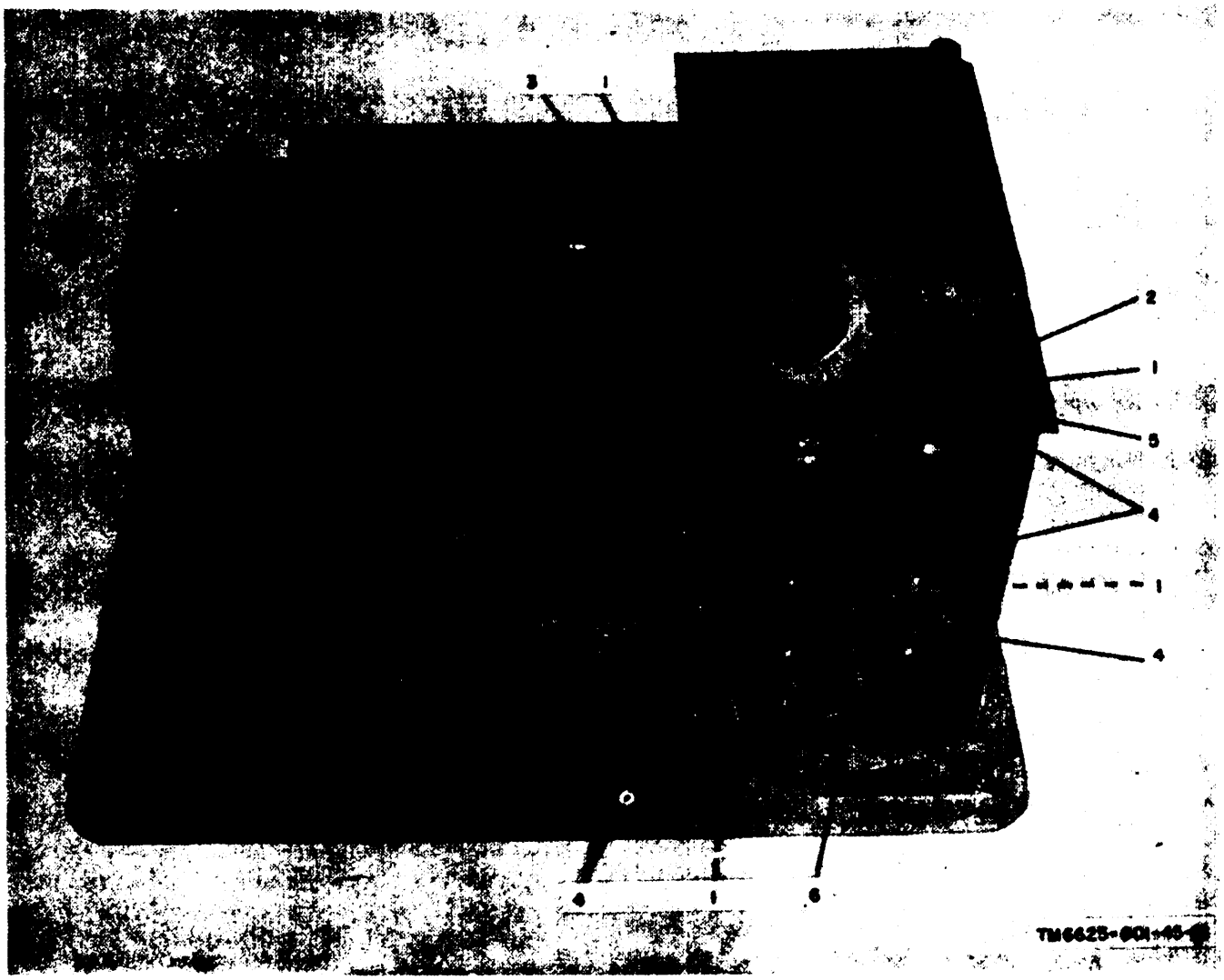


Figure 2-10. Audio amplifier A-1, rear view, cover removed (located in TS-1967/ARC-54).

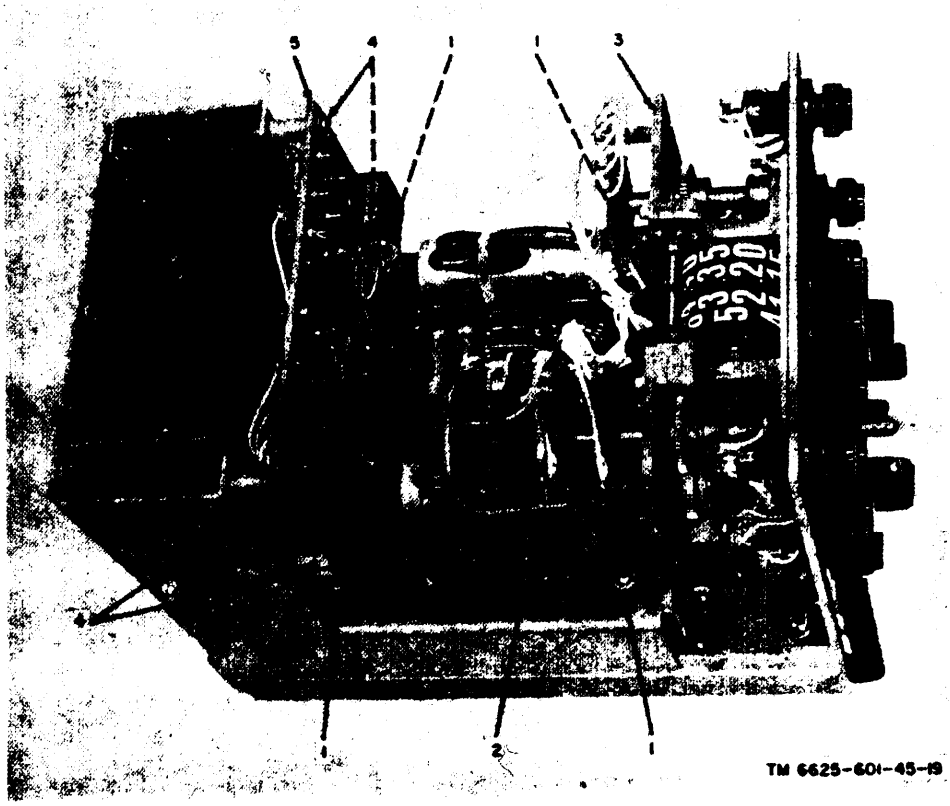
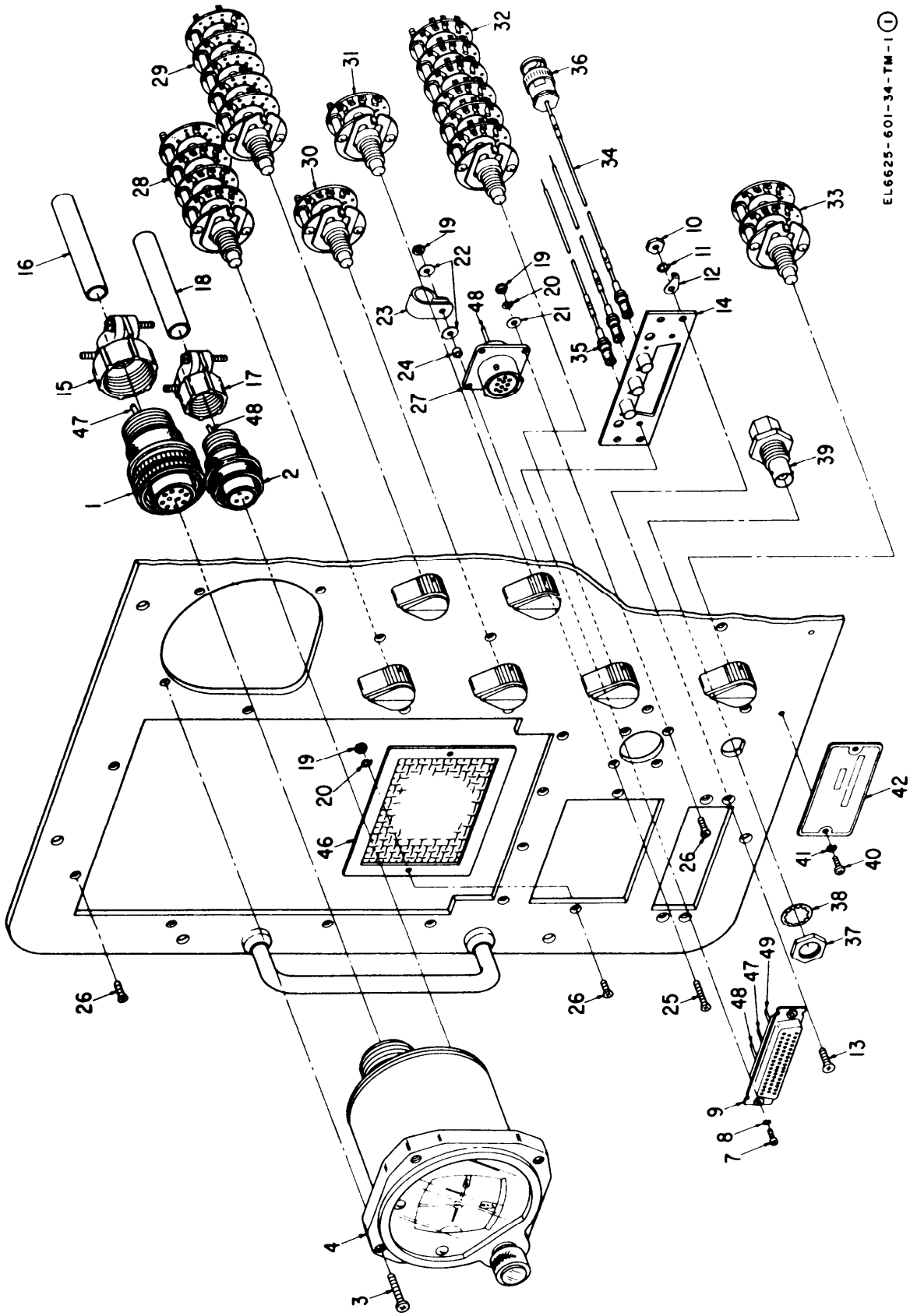


Figure 2–11. Audio Amplifier and motor control unit A2 top view, cover removed (located in SM-349/ARC–54).


EL6625-601-34-TM-1

38 Washer, lock, bronze 5% O D x 9/16 I D
39 Coupler antenna
40 Screw, machine
41 Washer, lock
42 Plate, identification
43 Screw, machine
44 Handle, bow
45 Ferrule, bow, handle
46 Screen, ventilation, metal
47 Wire, elec., 16 AWG, stranded, white
48 Wire, elec., 22 AWG, stranded, white
49 Cable, S.P., elec, 22 AWG, shielded, white
50 Panel, blank
51 Nut, plain, hex
52 Washer, lock
53 Terminal lug
54 Screw, machine
55 Ammeter, direct current
56 Setscrew, .050 hex HD 4–40 x 1/8
57 Knob
58 Nut, plain, hex
59 Washer, lock
60 Switch, rotary S1
61 Switch, rotary S2
62 Switch, rotary S5
63 Nut, plain, hex ¼–32
64 Washer, lock
65 Terminal lug
66 Resistor, variable R8
67 Resistor, variable R2
68 Lens, indicating light, red
69 Lamp, incandescent
70 Nut, plain, round, aluminum 5/32–32 x 11/16 O D
71 Washer, lock, steel .060 O D x 31/64 I D
72 Nut, plain, hex, aluminum 15/32–32
73 Lamp holder
74 Switch, rotary S9
75 Switch, lever w/knob
76 Switch, rotary S11
77 Terminal lug
78 Screw, machine
79 Jack, telephone
80 Capacitor, fixed, mica
81 Cable, R.F.
82 Screw, machine
83 Connector, receptacle, elec.
84 Screw, machine
85 Circuit breaker
86 Nut, plain, hex
87 Washer, lock
88 Terminal lug
89 Washer, flat 5/16 O D x .187 I D x .020 THK
90 Insulator, bushing, plastic
91 Post, binding, black
92 Post, binding, red
93 Nut, plain, hex, brass ¼–32 x 11/32 O D
94 Washer, lock, bronze, 13/32 O D x 9/32 I D
95 Jack, tip, white
96 Jack, tip, black
97 Connector, receptacle, elec.
98 Resistor, fixed, comp.
99 Connector, receptacle, elec.
100 Connector, receptacle, elec.
101 Screw, machine
102 Washer, flat
103 Connector, receptacle, elec.
104 Cable, R.F.

Figure 2-12①. Test Set, Radio TS-1967/ARC-54, chassis assembly, left side, as viewed from front panel (part 1 of 2).

Figure 2-12①.

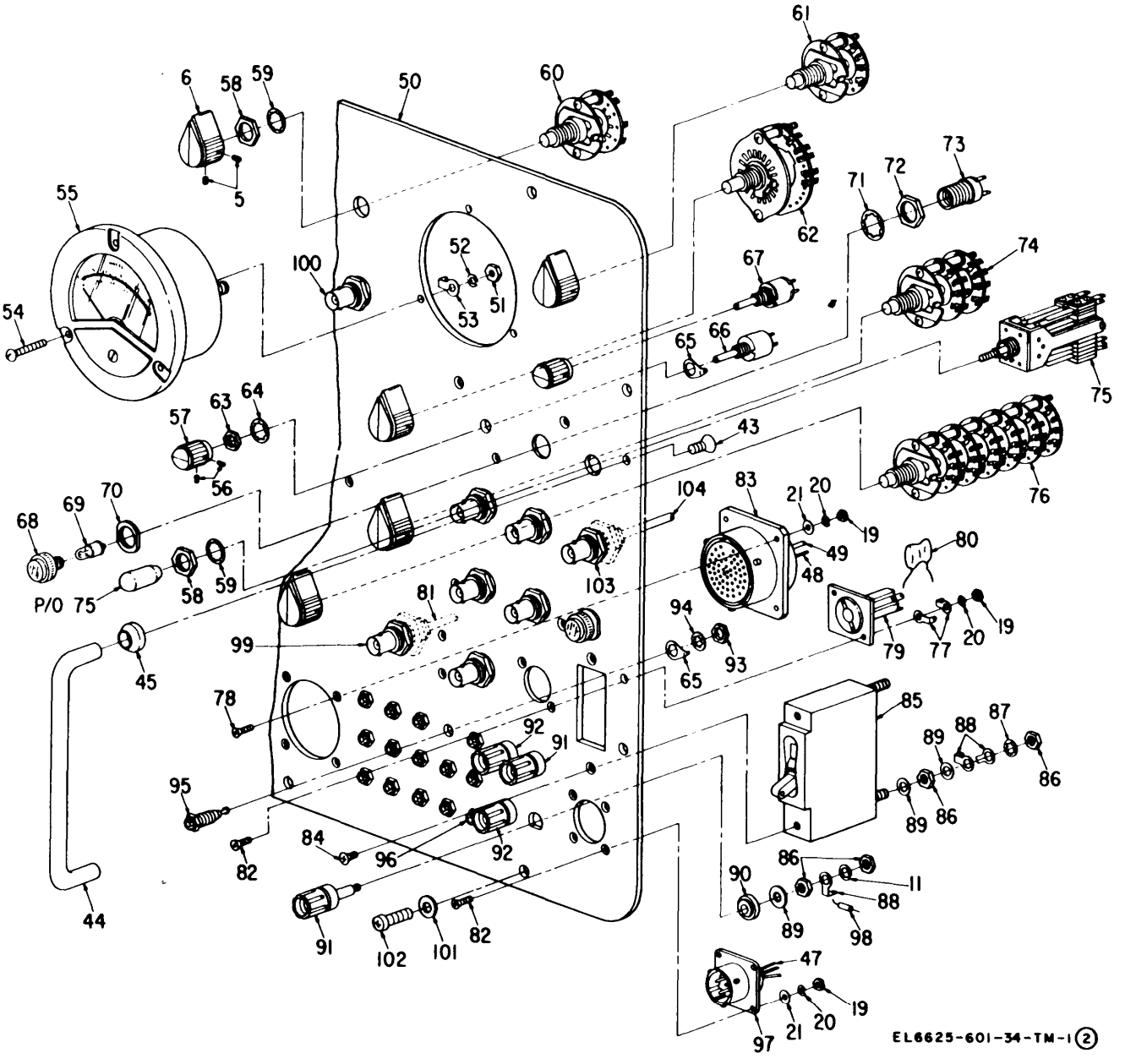


Figure 2-12 ①. Test Set, Radio, TS–1967/A.RC-54, chassis assembly, right side, as viewed from front panel (part 2 of 2).

2–14. Removal and Replacement of XMIT, RCV and PTT Switch S6 (located in TS-1967/ARC-54)

a. Remove XMIT, RCV, and PTT switch S6 (fig. 2-12 (2)) as follows:

(1) Remove XMIT, RCV and PTT toggle knob by rotating counterclockwise.

(2) Tag and unsolder all wires connected to XMIT, RCV and PTT switch S6 (75).

(3) Remove the hexagonal nut and washer that secure XMIT, RCV, and PTT switch to the test set chassis.

(4) Remove XMIT, RCV and PTT switch S6.

b. Replace switch S6 as follows:

(1) Secure switch S6 (75) to chassis with hexagonal nut and washer.

(2) Solder all wires to switch S6 as indicated by tags.

(3) Replace toggle knob.

2-15. Removal and Replacement of SQUELCH Switch S7 (located in TS-1967/ ARC-54)

a. Remove SQUELCH switch S7 (fig. 2-12 (l)) as follows:

(1) Remove switch knob by removing two Allen screws from the knob.

(2) Tag and unsolder all wires connected to switch S7 (30).

(3) Remove the hexagonal nut and washer that secure switch S7 to the test set chassis.

(4) Remove switch S7.

b. Replace switch S7 as follows:

(1) Secure switch S7 (30) to chassis with hexagonal nut and washer.

(2) Solder all wires to switch S7 as indicated by tags.

(3) Replace knob and tighten two Allen screws.

2-16. Removal and Replacement of TONE SECURITY Switch S8 (Located in TS-1967/ARC-54)

a. Remove TONE SECURITY switch S8 (fig. 2–12 (l) as follows:

(1) Remove switch knob by removing two Allen screws from the knob.

(2) Tag and unsolder all wires connected to switch S8 (31).

(3) Remove the hexagonal nut and washer that secure switch S8 to the test set chassis.

(4) Remove switch S8.

b. Replace switch S8 as follows:

(1) Secure switch (31) to chassis with hexagonal nut and washer.

(2) Solder all wires to switch S8 as indicated by tag.

(3) Replace knob and tighten two Allen screws.

2-17. Removal and Replacement of Indicator ID-48/ARN (Located in TS-1967/ ARC-54).

a. Remove Indicator ID-48/ARN (fig. 2–12 (1)) as follows:

(1) Disconnect the two plugs (1 and 2) from their respective jacks at the back of the indicator (4).

(2) Remove the three screws (3) that secure the indicator to the test set front panel.

(3) Carefully pull the indicator forward until it is clear of the front panel.

b. Replace the indicator as follows:

(1) Place indicator (4) in panel and replace three screws (3) through indicator and panel.

(2) Connect the two plugs (1 and 2) to their respective jacks at the back of the indicator.

Section IV. ADJUSTMENT

2-18. General

Whenever Audio Amplifier A1 (located in TS-1967/ARC-54) or Audio Amplifier A1 (located in SM-349/ARC-54) is replaced, adjustment at the direct support level is necessary. The procedures for adjustment of these amplifiers and test equipment necessary for adjustment follow in this section.

2–19. Test Equipment and Special Tools Required for Adjustment

a. Table 2-4 lists test equipment required for adjusting Maintenance Kit, Electronic Equipment MK–733/ARC-54. Included in the table are the associated technical manuals.

Table 2-4. Test Equipment for Direct Support Adjustments

Test Equipment	*Technical Manual*
Generator, Signal AN/URM-127	TM 11-6625-683-15
Multimeter TS-352B/U	TM 11-6625-366-15
Radio Set AN/ARC-54	TM 11-5821-244-12
Wattmeter AN/URM-120	TM 11-6625-446-12
Voltmeter, Electronic ME-30A/U	TM 11-6625-320-12
Adapter, TYPE N (female to female), UG-29A/U	
Adapter, Type N to BNC, UG-201/U (2 required)	

b. To gain access to the interior of the test set remove 10 screws from around the edge of the front panel and slide the test set from the lower case; use the two handles. To gain access to the interior of the simulator, remove it from the test set and remove the light screws that secure the metal cover to the simulator chassis. Carefully remove the metal cover from the simulator.

2-20. Adjustment Procedure for Audio Amplifier A1 (Located in TS-1967/ ARC-54)

a. Apply +27.5 volts dc to POWER jack J32.

b. Set the test set front panel controls as follows:

(1) Set POWER circuit breaker to ON.

(2) Set TEST FUNCTION SELECTOR switch S10 to RADIO.

(3) Set TEST FUNCTION SELECTOR switch S11 to TEST SET.

(4) Set RCVR, XMTR FUNCTION switch S9 to PTT.

(5) Switches not listed may be set to any position.

c. Connect a 10-ohm, ¼-watt, ±10-percent resistor between pins 2 and 4 of HEADSET jack J9.

d. Connect a 150-ohm, ¼-watt, ±10-percent resistor between pins 5 and 6 of RCVR/XMTR jack J11.

e. Connect the signal generator and vacuum-tube voltmeter to a voltage divider as shown in figure 2-13.

f. Connect line A of the voltage divider to pin 3 of HEADSET jack J9.

g. Connect line B of the voltage divider to pin 1 of HEADSET jack J9.

h. Set the output frequency of the signal generator to 100 Hz at a level of 135 mv rms as indicated on the vacuum-tube voltmeter.

i. Disconnect the vacuum-tube voltmeter from the signal generator and connect it to pins 5 and 6 of RCVR/XMTR jack J11.

j. Adjust potentiometer R6 on audio amplifier A-1 (fig. 2-6) for a 390 mv rms indication on the vacuum-tube voltmeter.

2-21. Adjustment Procedure for Audio Amplifier A1 (located in SM-349/ARC-54)

a. Remove the simulator from the test set.

b. Using Cable Assembly, Special Purpose, Electrical CX-9072/ARC-54, connect the simulator to test set RCVR/XMTR jacks J11, J12, J13 and J14.

c. Apply +27.5 volts dc to test set POWER jack J32.

d. Set the front panel controls on the test set and simulator as follows:

(1) Set POWER circuit breaker to ON.

(2) Set TEST FUNCTION SELECTOR switch S10 to RADIO.

(3) Set TEST FUNCTION SELECTOR switch S11 to TEST SET.

(4) Set POWER switch S2 on simulator to ON.

(5) Set RCVR/XMTR FUNCTION switch S9 to TEST.

(6) Set HEADSET VOL control on the simulator fully clockwise.

(7) Switches not listed may be set to any position.

e. Connect a 10-ohm, ¼-watt, ±10-percent resistor between pins 2 and 4 of HEADSET jack J7.

f. Connect the signal generator and vacuum-tube voltmeter to a voltage divider as shown in figure 2-13.

g. Connect voltage divider line A to pin 3 of HEADSET jack J7.

h. Set the output level of the signal generator to 1,000 Hz at a level of 135 mv rms as indicated on the vacuum-tube voltmeter.

i. Disconnect the vacuum-tube voltmeter from the signal generator and connect it to the test set AUDIO OUT terminals.

j. Adjust potentiometer R6 on audio amplifier A1 (fig. 2-6) for a 390 mv rms indication on the vacuum-tube voltmeter.

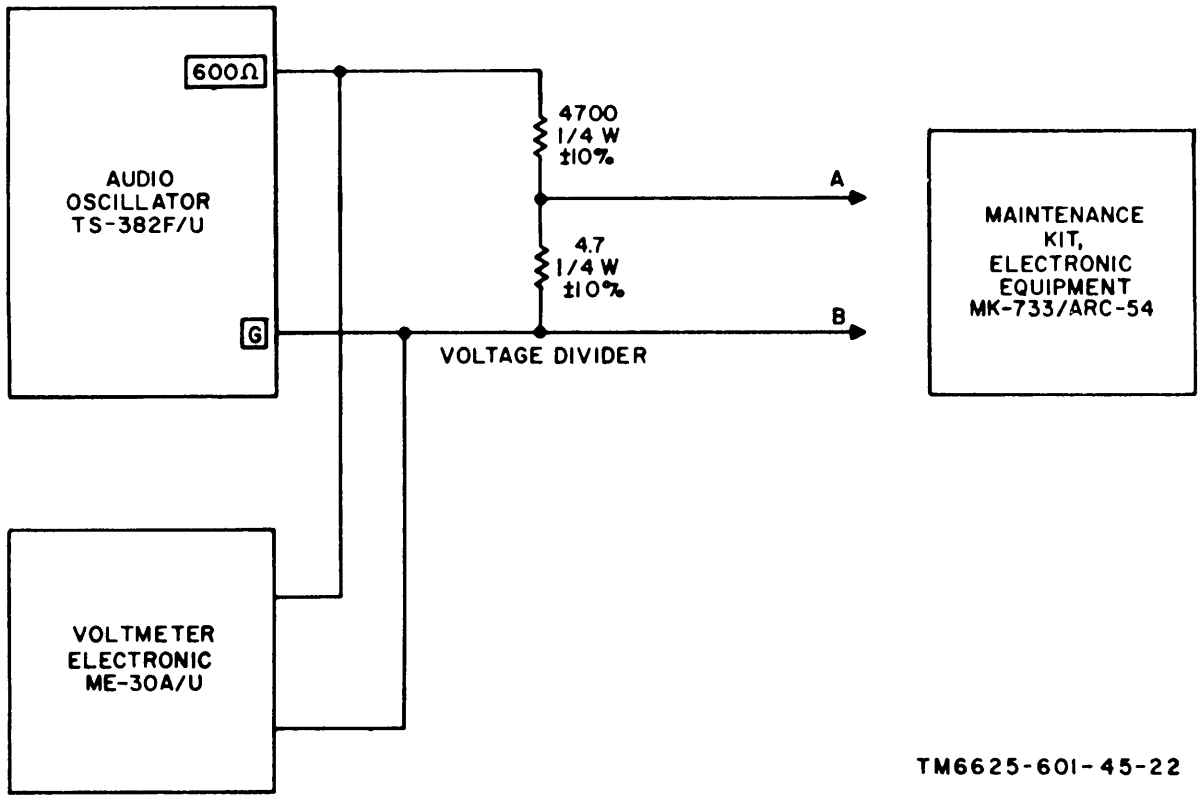


Figure 2-13. Adjustment of Audio Amplifier A1, bench test setup.

Service V. INSPECTION AND SERVICE

2-22. Direct Support Inspection

Inspection at the direct support level is limited to items listed in table 2-5.

Table 2-5. Items Requiring Direct Support Inspection

Unit	*Assembly*
Test Set, Radio TS-1967/ARC-54	Audio Amplifier A1
	Directional Coupler
	Attenuator/Dummy Load AT1
	Blower B1
	RF Power Meter M1
Simulator Test Set, SM-349/ARC-54	Frequency Counter Assembly
	Audio Amplifier A
	Motor Control A2

a. General. All assemblies and subassemblies should be clean and free of foreign material.

b. Connectors. Connectors are not serviceable if they have bent, broken or corroded contacts.

c. Markings. All nomenclature markings, stampings and decals shall be clean and legible.

d. *Covers.* A cover is not serviceable if any of the following conditions exist: distortion, holes, marred finish, corrosion or finish deficiency.

e. Gears. A gear is not serviceable if any of the following conditions exist: broken, chipped or badly worn teeth; cracked or deformed bodies.

f. Machined Metal Parts. A machined or mechanical metal part is not serviceable if any of the following conditions exist: physical damage to surfaces, corners, and edges; roughness of surface; corrosion or rust; presence of foreign matter; or damaged finish.

g. *Electrical Components.* All electrical parts shall show no indication of broken, cracked or otherwise deteriorated insulation due to aging overheating, flashover or other mechanical damage. All connecting wires shall be of the correct length and insulated as required by the applicable part.

h. Rubber, Synthetic Rubber, and Neoprene Parts. A rubber, synthetic rubber or neoprene part is not serviceable if any of the following conditions exist: deformation (tears, creases, folds, longation); rough surfaces; imbedded foreign matter; or loss of resiliency.

i. Molded, Extruded, and Machined Plastic

Parts. A plastic part is not serviceable if any of the following conditions exist: cracks, dents, bulges or scratches; signs of insulation breakdown or flashover; or badly worn or broken threads in tapped holes.

j. Window, Filters, and Lenses. A window filter, or lens is not serviceable if any of the following conditions exist: cracked or chipped markings.

2-23. Cleaning

WARNING

The fumes of trichloroethane are toxic. Provide thorough ventilation whenever used. DO NOT use near an open flame. Trichloroethane is not flammable, but exposure of the fumes to an open flame converts the fumes to highly toxic dangerous gases.

This paragraph contains procedures for cleaning the assemblies, subassemblies, and detail parts of MK–733/ARC-54. Cleaning may be done before or after inspection as necessary. References to an air jet signify a hand-operated air nozzle supplied with clean, dry, compressed air at a pressure of not more than 25 pounds per square inch.

a. Covered Cables. Clean outer surface of rubber or vinylite covered cables, or conduits or flexible, transparent vinylite, by wiping dust from cable surfaces and terminations with a lintless cloth moistened with trichloroethane. Wipe dry with a clean, dry, lintless cloth.

b. Connector.

CAUTION

Do not allow trichloroethane to run into sleeves (or conduit) covering wires or cables connected to contact terminals of the insert. Wipe dust and dirt from bodies, shells, coupling nuts and cable clamps using a lintless cloth moistened with trichloroethane. Wipe dry with a clean, lintless cloth. Remove dust from the inserts using a small soft brush in conjunction with an air jet. Wash dirt from insert, insulation and contacts using a small camels hair brush to apply trichloroethane. Dry connectors with an air jet.

c. Wired Chassis.

CAUTION

To avoid air blasting of small leads and other delicate components, do not place air nozzle too close to chassis. Exercise care not to disturb the dress of wiring and cables except where absolutely necessary. In the event it is necessary, the dress should be noted. Upon completion of the cleaning operation, wiring and cables should be restored to their original position or dressed to prevent misalignment and malfunctioning of the equipment.

Remove dust and dirt from all surfaces using a soft brush and an air jet. Complete chassis cleaning by wiping all finished surfaces with a lintless cloth, moistened with trichloroethane. Dry and polish chassis surfaces using a dry, clean, lintless cloth. Protect chassis from dust and moisture during storage.

d. Coaxial Connector Contacts. Clean coaxial connect contacts and insulating members by wiping away dust and dirt with a lintless cloth moistened with trichloroethane. Dry with a clean, dry, lintless cloth.

e. Plastic Parts: Molded, Extruded, and Machined. Blow loose dust from surfaces holes, and crevices and from any attached metal parts usung an air jet. Wipe clean with a lintless cloth moistened with trichloroethane. Dry and polish with a clean, dry, lintless cloth.

f. Rotary Switches. Clean rotary switches of the wafer type as follows: Remove dust with an air jet by turning switch back and forth several times while blowing. Wash all contacts and insulation with trichloroethane, lightly applied with a small, camels' hair brush. Dry with an air jet. Repeat wash, using clean trichloroethane and rotating switch rotor several times during the wash. Dry gently, but thoroughly with air jet.

g. Sensitive and Toggle Switches. Blow dirt from surfaces of switch bodies and attached mechanisms using an air jet. Wipe surfaces with a lintless cloth moistened with trichloroethane and dry with an air jet.

h. Windows, Filters, and Lenses. Clean plastic or glass disks, windows, filters, and lenses by gently wiping their surfaces with a clean, soft, lintless cloth that has been dampened with trichloroethane. When clean, polish carefully with lens tissue using a circular motion. If object is to be stored for any period of time, be sure surfaces are well protected.

2-24. Testing

Final testing procedures are used by direct support personnel to determine the acceptability of a repaired MK–733/ARC-54. The procedures to be followed for the MK-733/ARC-54 are the self-check tests that are part of the monthly preventive maintenance checks, and they may be found in TM 11-6625-601-12. These self-check procedures check the internal power supply for correct voltages, and amplifiers and other circuits for proper levels. If all the checks are satisfactory, the MK-733/ARC-54 can be considered to meet acceptable final test standards.

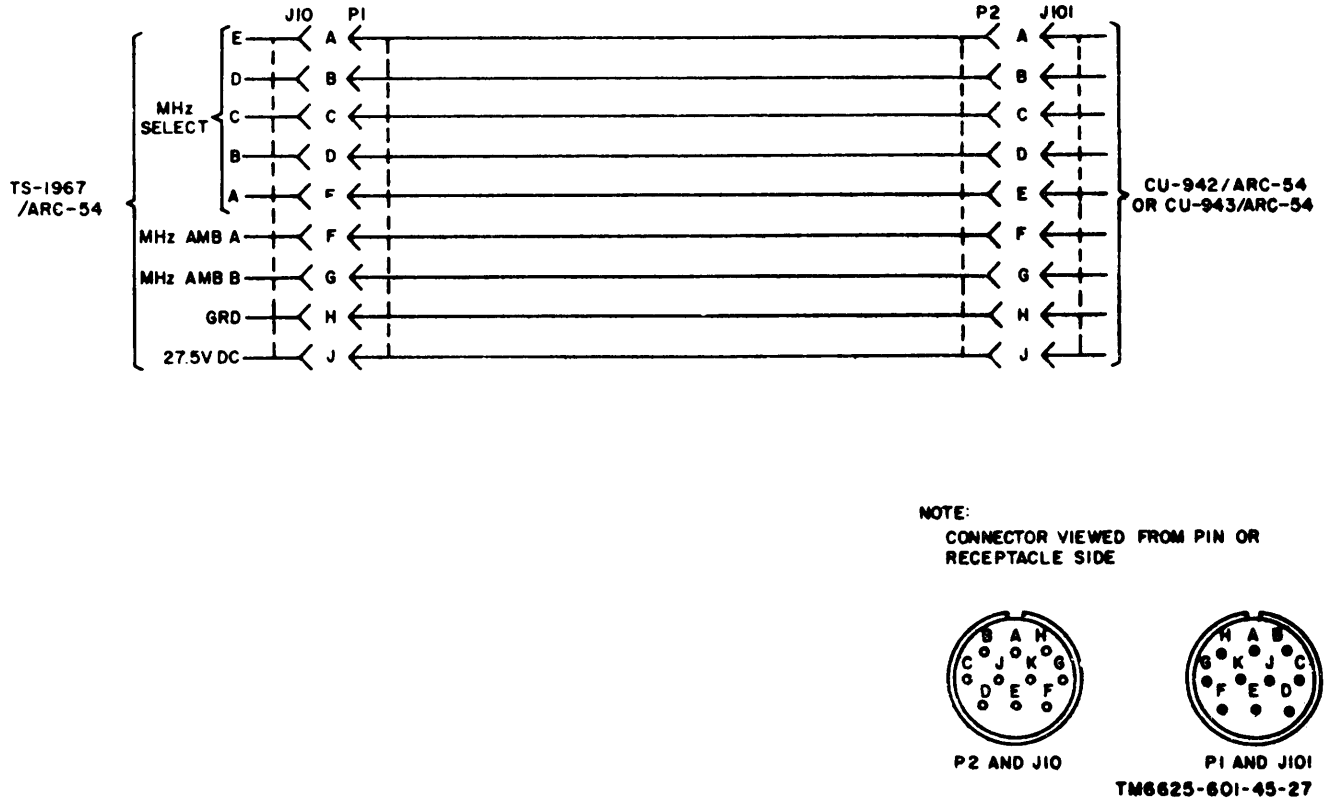


Figure 2-14. Cable Assembly, Special Purpose, Electrical CX-9070/ARC-54, schematic diagram.

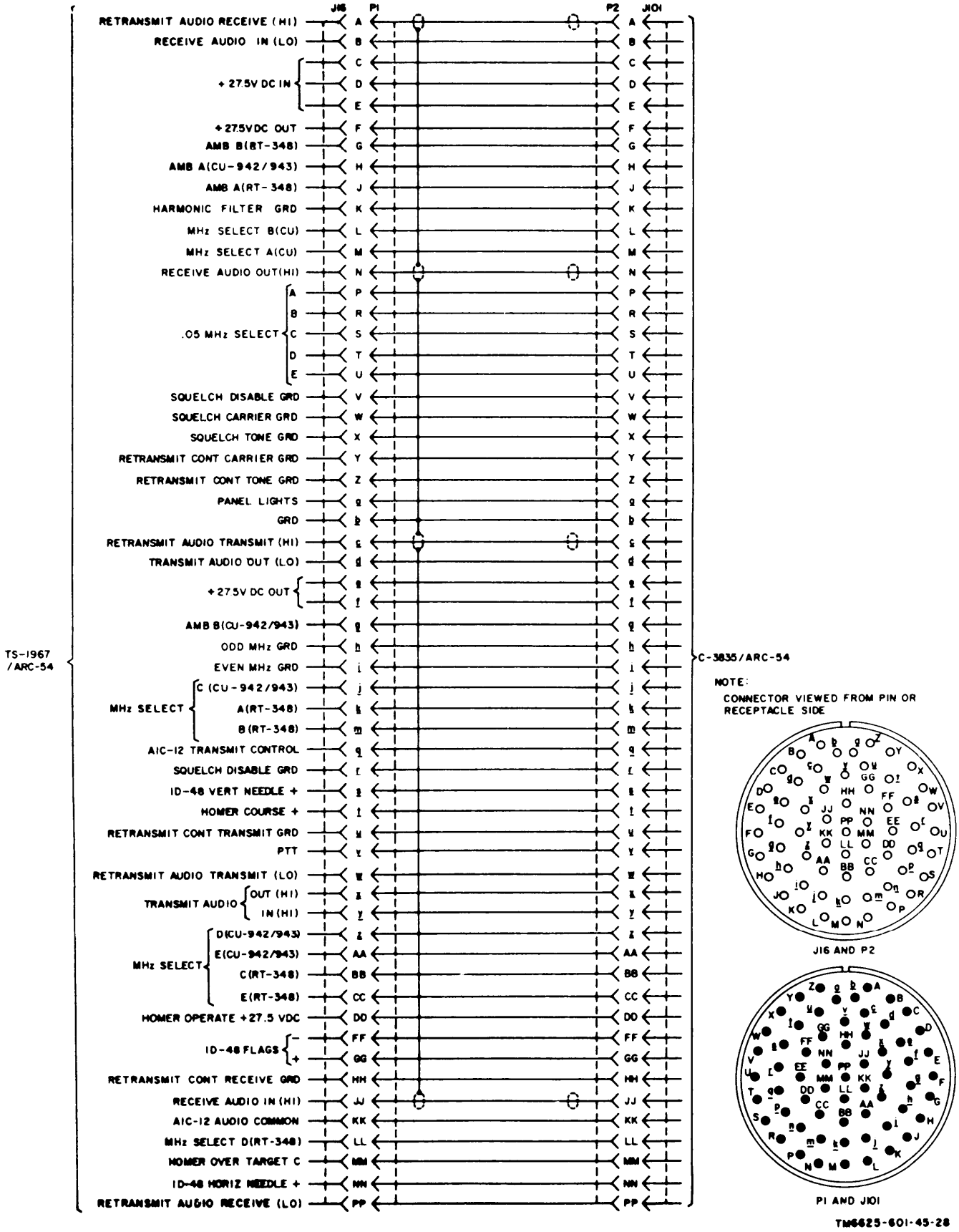


Figure 2-15. Cable Assembly, Special Purpose, Electrical CX-9071/ARC-54, schematic diagram.

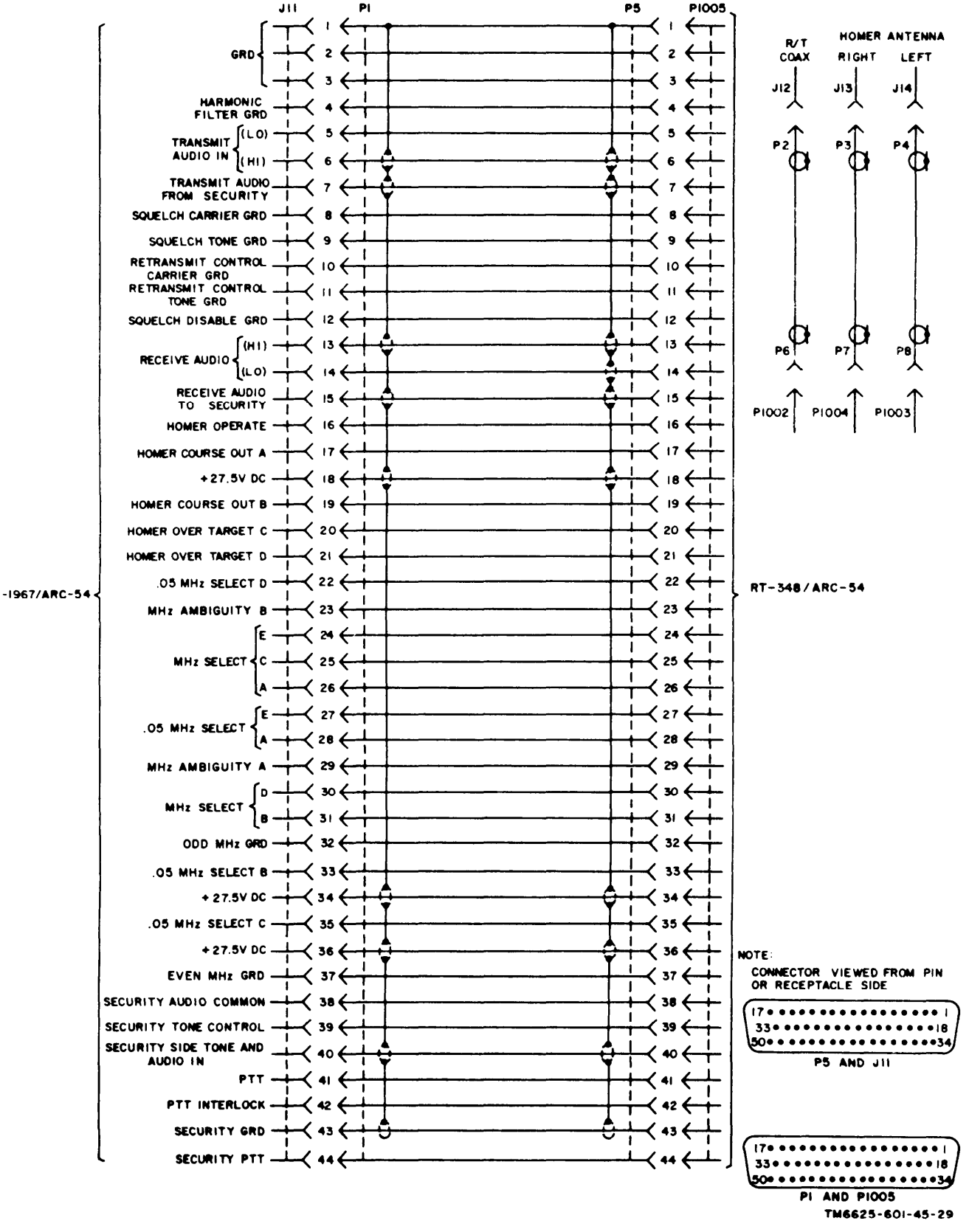


Figure 2-16. Cable Assembly, Special Purpose, Electrical CX-9072/ARC-54, schematic diagram.

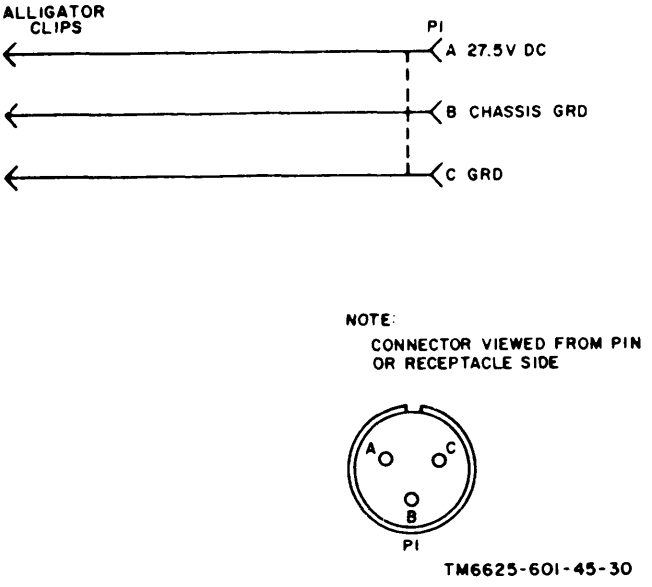


Figure 2-17. Cable Assembly, Power, Electrical, CX-11136/ARC-54, schematic diagram.

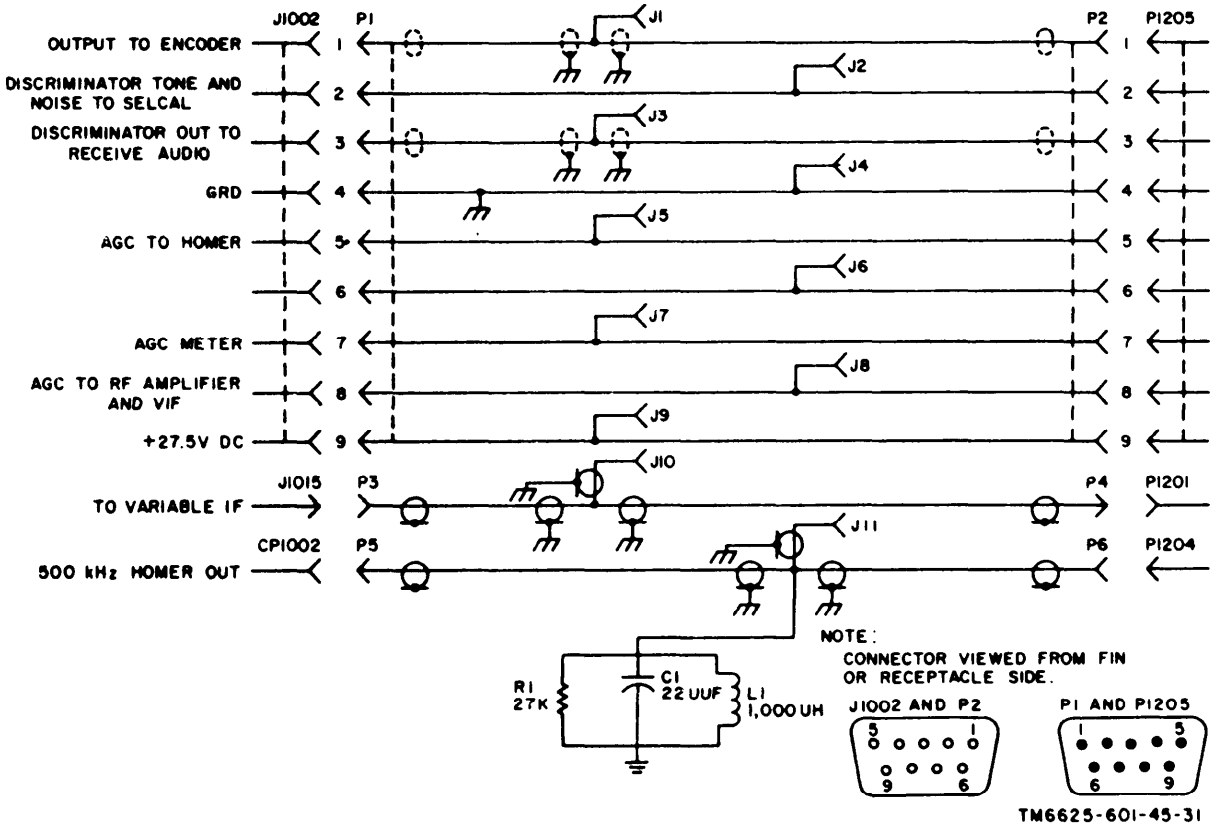


Figure 2-18. Extender, Module MX-4930/ARC-54, schematic diagram,

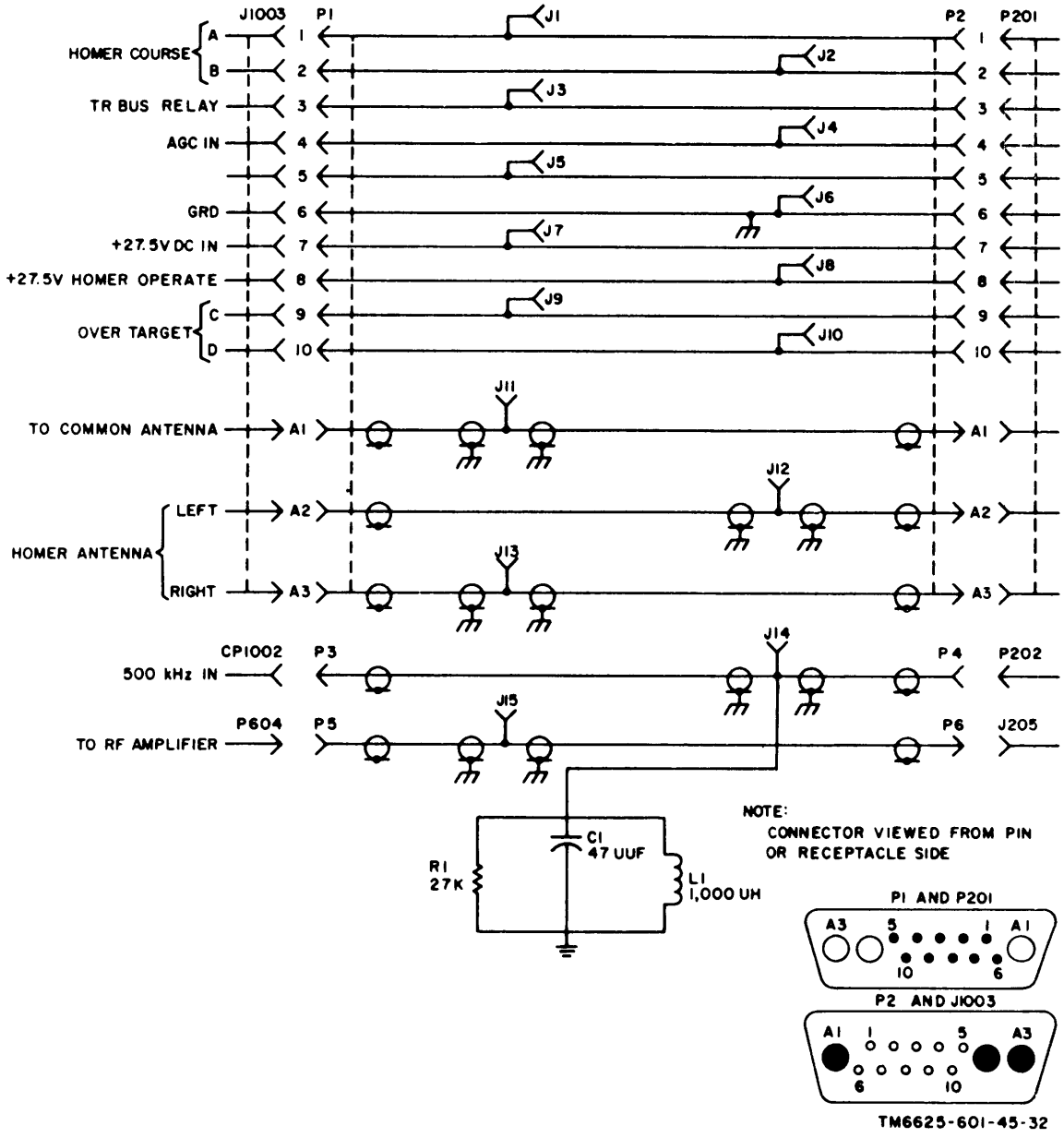


Figure 2-19. Extender, Module MX-4931/ARC-54, schematic diagram.

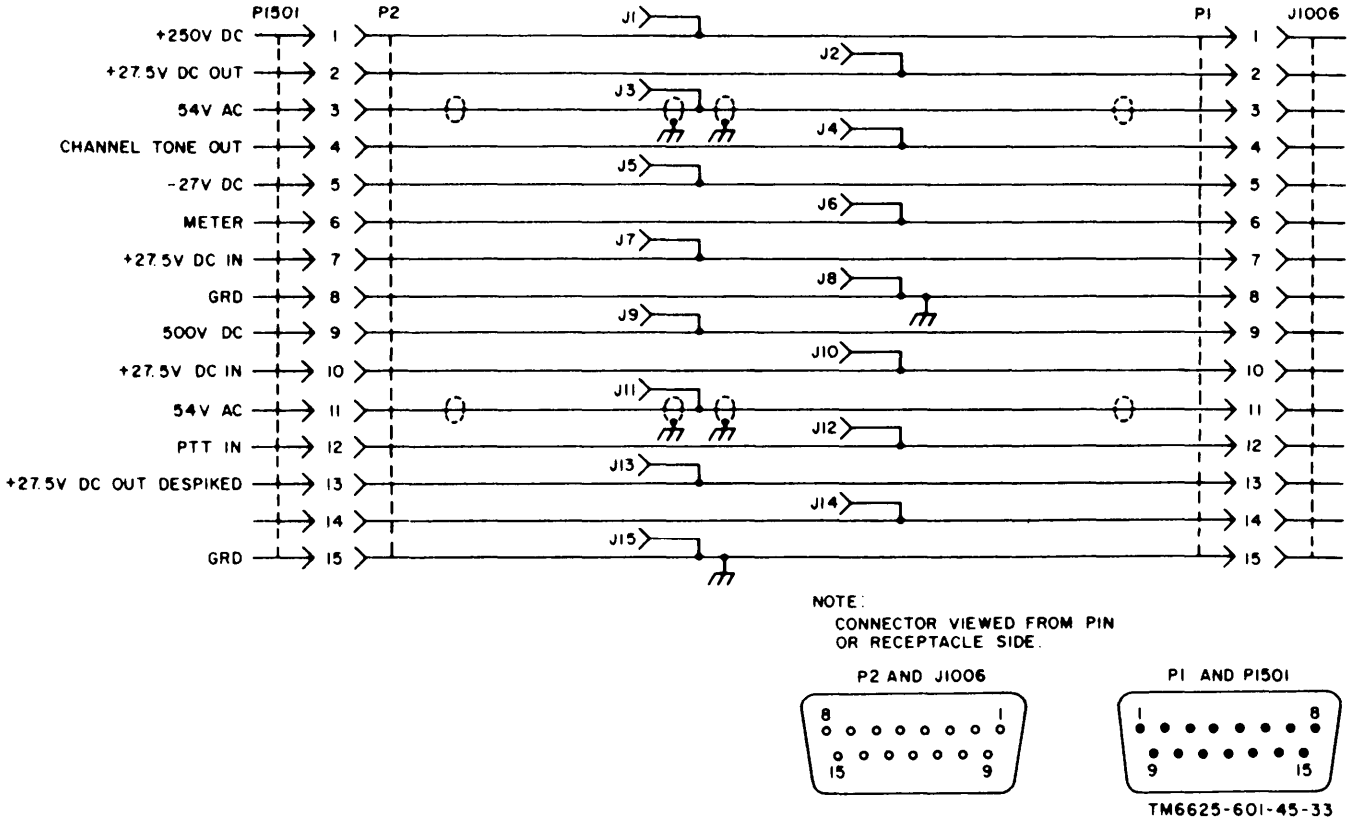


Figure 2-20. Extender, Module MX-4932/ARC–54, schematic diagram.

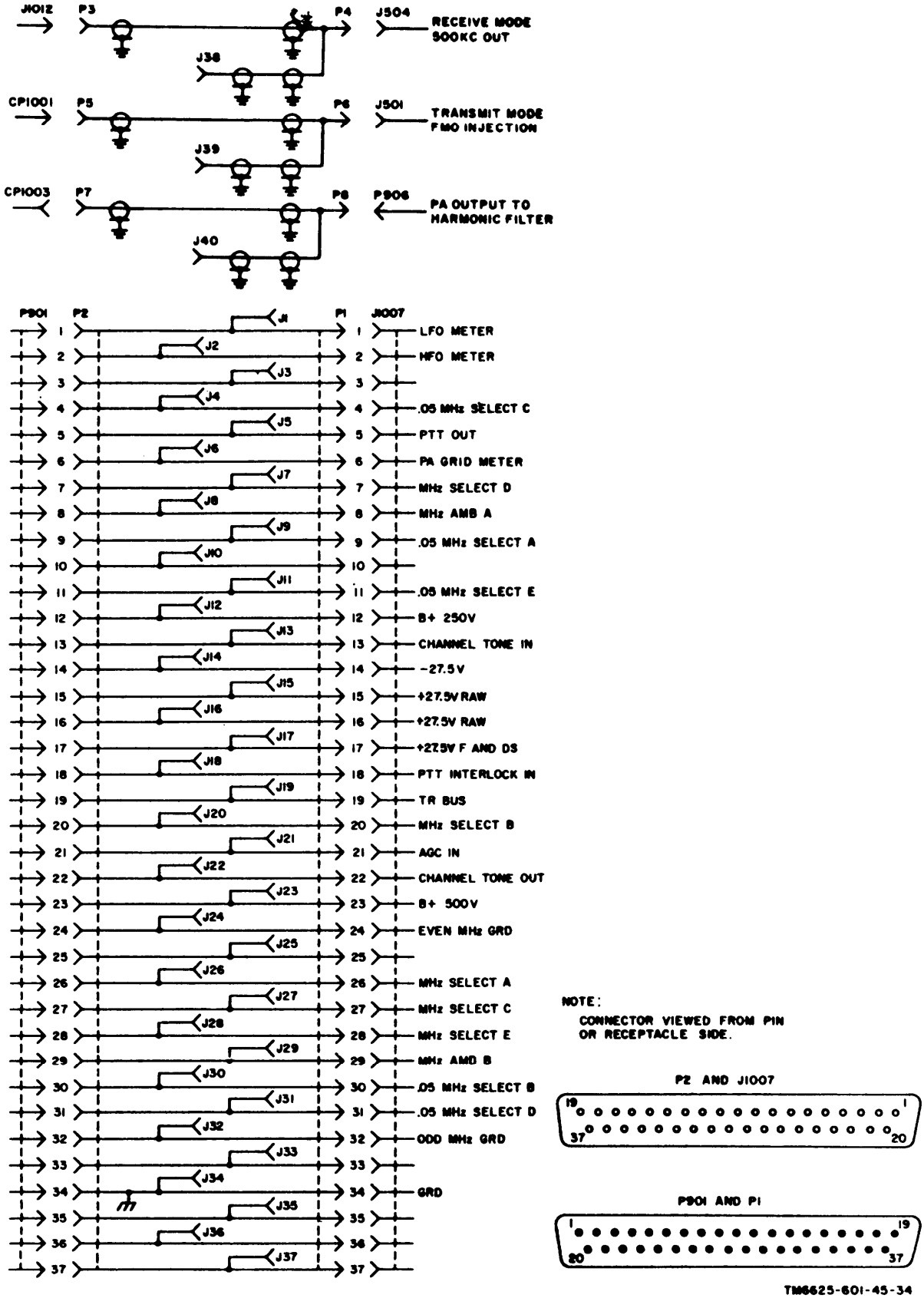


Figure 2-21. Extender, Module MX-4933/ARC-54, schematic diagram.

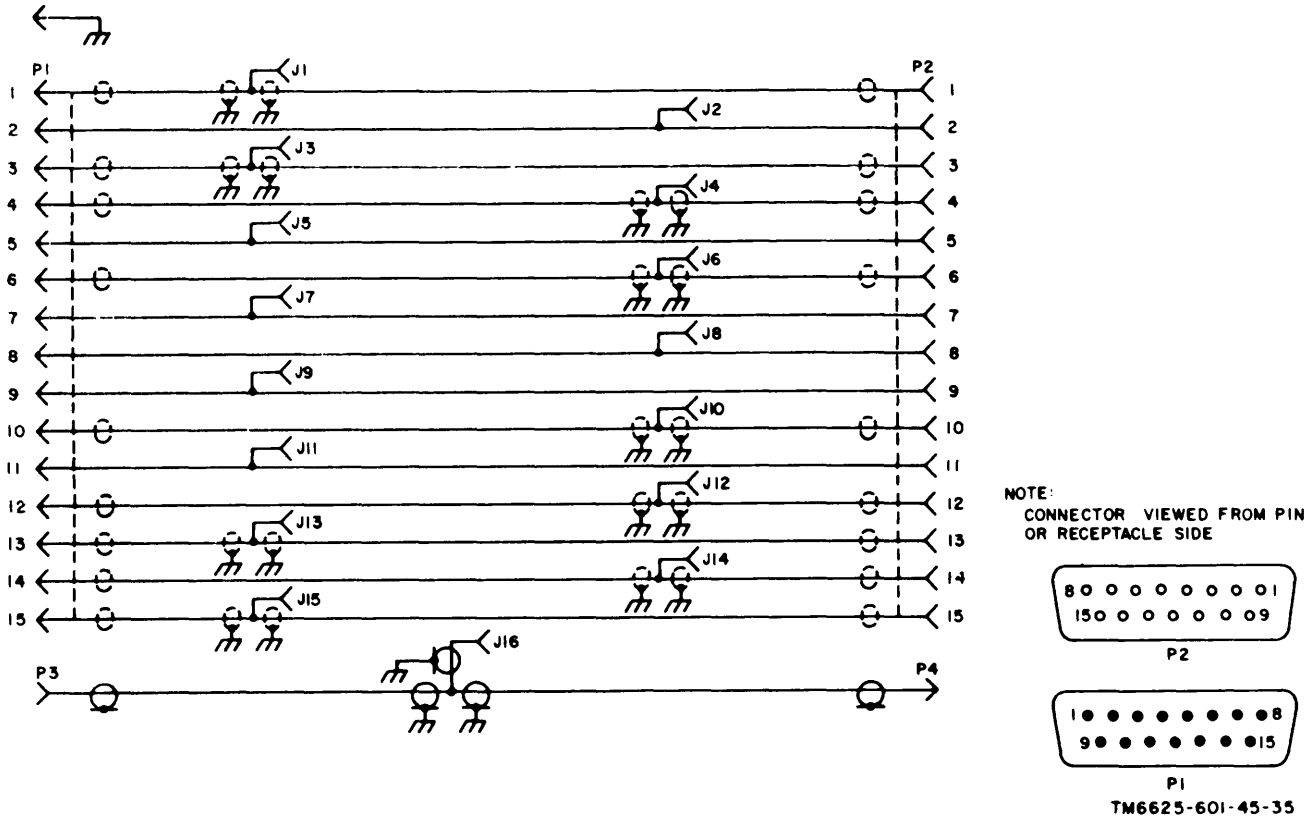


Figure 2-22. Extender, Module MX-4934/ARC-54, schematic diagram.

CHAPTER 3

GENERAL SUPPORT MAINTENANCE

Section I. INTRODUCTION

3-1. Scope of General Support Maintenance

a. General support maintenance includes all the techniques outlined for direct support maintenance plug any special or additional techniques required to isolate a defective part. The maintenance consists of replacing piece parts on audio amplifier Al boards, replacement of RF power meter Ml, directional coupler DC1, attenuator/dummy load AT1, blower B1, and repair of the counter assembly. In some cases, a trouble can be localized by the general support repairman to a particular functional circuit in the test set or simulator by use of the operating procedures in the monthly preventive maintenance checks and services chart in TM 11–6625-601-12. In other cases, however, a trouble is localized while performing the AN/ARC-54 unit test procedures.

b. This chapter contains sections concerning:

(1) Troubleshooting

(2) Repairs and Replacement

(3) Adjustment

(4) Testing

3-2. Test Equipment Required

Table 3-1 lists the test equipment required for general support maintenance of Maintenance Kit, Electronic Equipment MK-733/ARC-54 and also lists the associated technical manuals.

Table 3-1. Test Equipment Required for General Support Maintenance

Test Equipment	*Technical Manual*
Generator, Signal AN/URM-127.	TM 11-6625-683-15.
	TM 11-6625-573-15.
Multimeter TS-352B/U.	TM 11-6625-366-15.
Power Supply PP-351/U.	TM 11-5121.
Test Set, Transistor TS-1836/U.	TM 11-6625-539-15.
Voltmeter, Electronic AN/URM-145.	TM 11-6625-524-14.
Voltmeter, Electronic ME-30/U.	TM 11-6625-320-12.
Tool Kit, Electronic Equipment TK-105/G.	SB 11-604.
Wattmeter AN/URM-120.	TM 11-6625-446-15.
Radio Set AN/ARC-54.	TM 11-5821-244-12.

Section II. General Support Troubleshooting

3-3. Troubleshooting Procedures

For troubleshooting procedures at the general support maintenance category, follow the steps outlined in chapter 2, paragraph 2-3.

3-4. Voltage and Resistance Measurements

Normal voltage and resistance measurements taken at the base, collector and emitter of the blower inverter (part of Test Set, Radio TS-967/ARC-54), are presented in the table in paragraph 3-5. Voltage and resistance measurements of the audio amplifiers in the test set and simulator are presented in the tables in paragraph 2–5.

CAUTION

When measuring voltages, use tape or sleeving (spaghetti) to insulate the entire test prod, except for the extreme tip. A momentary short circuit can ruin a transistor.

a. Voltage Measurements. The voltage readings in table 3–2 were obtained under the conditions specified below. Always make voltage measurements under these same conditions or the readings obtained may be inaccurate. Make all voltage measurements with a vtvm that has an input impedence of at least 10 megohms (Voltmeter, Meter ME-30A/U, or equivalent). Connect the dc common clip to the ac ground clip of the vtvm to chassis ground of the unit under test. Voltage measurements for blower inverter (part of Test Set, Radio TS-1967/ARC-54) are taken by following the procedures outlined below:

(1) Apply +27.5 volts dc to POWER jack J32.

(2) Set the POWER circuit breaker to ON.

(3) Set XMIT-RCVR-PTT switch S6 to XMIT.

(4) Set TEST FUNCTION SELECTOR switch S11 to TEST SET.

CAUTION

Before using any ohmmeter to make resistance measurements, check the open-circuit voltage across the ohmmeter test leads. Do not use the ohmmeter if the open-circuit voltage exceeds 1.5 volts. Make resistance measurements in the test set only as directed in the chart below. Sensitive transistors can be ruined if unauthorized resistance measurements are made.

b. Resistance Measurements. The resistance readings in the table (para 3-5) were obtained under the conditions outlined in (1) through (4) below. Always make resistance measurements under these conditions, or the readings may be inaccurate.

(1) Make all resistance measurements with Multimeter TS-352/U, or equivalent. The open circuit voltage across the ohmmeter test leads must not exceed 1.5 volts.

(2) For each resistance measurement, set the ohmmeter range switch to the resistance scale specified in the chart.

(3) Connect the ohmmeter negative lead to chassis ground of the unit under test unless otherwise indicated.

(4) Make all resistance measurements without power applied to the test set.

3-5. Voltage and Resistance Table

CAUTION

Before making any voltage or resistance measurements, refer to paragraph 2-4 *a* and *b*. Use only authorized test equipment or its equivalent. Damage to transistors may result from improper measurement techniques or the use of unauthorized test equipment.

All voltage readings in the table are positive dc. The test points listed in the table correspond to transistor connections in the equipment. Transistor connections are on terminal boards and are identified by the following designations:

B—terminal board connection to base of transistor.
C-terminal board connection to collector of transistor.
E—terminal board connection to emitter of transistor.

Table 3-2. Voltage and Resistance Measurements for Blower Inverter (Part of TS-1967/ARC-54)

Test Point	Volts ac	Volts dc	Resistance (ohms) (+ lead of ohmmeter to ground)	Meter Scale
Q1:				
E	21.3	19	63	RX10
B	23.3	20.7	70	RX10
C	0	0	0	RX1
Q2:				
E	21.3	19	63	RX10
B	23.3	20.7	70	RX10
C	0	0	0	RX1

Section III. REPAIRS AND REPLACEMENT

3-6. General Instructions

The general support maintenance procedures given in this section supplement the procedures described in Chapter 2, Section III and the procedures described in the operator and organizational maintenance manual (TM 11-6625-601-12).

3-7. General Parts Replacement Techniques

Refer to paragraph 2-7 above.

3-8. Removal and Replacement of Directional Coupler DC1 (located in TS-1967/ ARC-54)

a. Remove directional coupler DC1 (fig. 3-1) as follows:

(1) Disconnect plug P1 (3) and plug P2 (4) from their respective jacks on the directional coupler (5).

(2) Disconnect the two lower plugs (1 and 2) from their respective jacks. (A IN21 crystal diode is in each of the two jacks; be careful when removing the two plugs.)

(3) Remove the four screws and lockwashers (6) that secure the directional coupler (5) to the test set chassis.

(4) Remove the directional coupler (5).

b. Replace directional coupler DC1 as follows:

(1) Place the directional coupler (5) in its proper position and secure with four screws and lockwashers (6).

(2) Carefully connect the two lower plugs (1

and 2) to their respective jacks. Note that the color dot on each plug matches the color dot on its respective jack.

(3) Connect plug P1 (3) to the jack marked TRANS.

(4) Connect plug P2 (4) to the jack marked LOAD.

3-9. Removal and Replacement of Attenuator/Dummy Load AT1 (located in TS-1967/ARC-54)

a. Remove attenuator/dummy load AT1 (fig. 3-1) as follows:

(1) Disconnect plug P9 (7) from its jack on the attenuator-dummy load (10).

(2) Remove the four screws, lockwashers, and spacers (11) that secure the attenuator-dummy load (10) to the test set chassis.

(3) Carefully lower the attenuator-dummy load (10) until plugs P7 (8) and P8 (9) are accessible.

(4) Disconnect plugs P7 (8) and P8 (9) from their respective jacks.

(5) Remove the attenuator-dummy load (lo).

b. Replace attenuator-dummy load AT1 as follows:

(1) Connect plugs P7 (8) and P8 (9) to their respective jacks.

(2) Place the attenuator-dummy load (10) in the proper position on the test set chassis and secure with four screws, lockwashers, and spacers (11).

(3) Connect plug P9 (7) to its respective jack.

3-10. Removal and Replacement of Blower B1 (Located in TS-1967/ARC-54)

a. Remove blower B1 (fig. 3-1) as follows:

(1) Tag and unsolder the blower (18) and wires (17) that are connected to terminals E14, E15, and E16 on the test set chassis.

(2) Remove the two screws, lockwashers, and mounting cleats (19) that secure the blower (18) to the test set chassis.

(3) Remove the blower (18).

b. Replace blower B1 as follows:

Place the blower (18) in the proper position on the test set chassis and secure with two screws, lockwashers, and mounting cleats (19).

3-11. Removal and Replacement of RF POWER Meter M1 (located in TS-1967/ARC-54)

a. Remove RF POWER meter M1 (fig. 3-1) as follows:

(1) Remove the two nuts and lockwashers (15) that secure the terminal lugs to the studs at the back of the meter (16).

(2) Tag and remove the terminal lugs from the studs.

(3) Remove the three screws, nuts, and lockwashers (22) that secure the meter (16) to the test set front panel (21).

(4) Carefully pull the meter (16) forward until it is clear of the front panel.

b. Replace RF POWER meter M1 as follows:

(1) Slide the meter (16) into its proper position on the front panel and secure with three screws, lockwashers, and nuts (22).

(2) Place the two terminal lugs on their respective studs and secure with two lockwashers and nuts (15).

3-12. Disassembly and Reassembly of Frequency Counter Assembly (located in SM-349/ARC-54)

a. Disassembly and Reassembly of Megahertz Select Switch S5.

(1) Disassemble megahertz select switch S5 (fig. 3-2) as follows:

(a) Tag and unsolder all wires connected to megahertz select switch S5 (1-16).

(b) Remove the two hexagonal nuts (1) that secure the rear wafer switches (2) to the mounting studs (16).

(c) Slide the rear wafer switch (2) and two switch spacers (3) off the mounting studs (16).

(d) Slide the outer gear plate (4) and two switch spacers (5) off the mounting studs (16).

(e) Remove the megahertz-pressed shaft assembly (6) from the main switch shaft (part of frequency counter (28)).

(f) Carefully remove the gear-pressed shaft assembly (9).

(g) Loosen two setscrews (8) on the megahertz switch gear (7) and slide the gear off the main switch shaft (part of frequency counter 28)).

(h) Slide the inner gear plate (10) and two switch spacers (11) off the mounting studs (16) and main switch shaft (part of frequency counter (28)).

(i) Slide the middle wafer switch (12), the two switch spacers (13), the inner wafer switch (14), and the two switch spacers (15) off the mounting studs (16) and main switch shaft (part of frequency counter (28)).

(j) Unscrew the two mounting studs (16) from the frequency counter (28).

(2) Reassemble megahertz select switch S5 as follows:

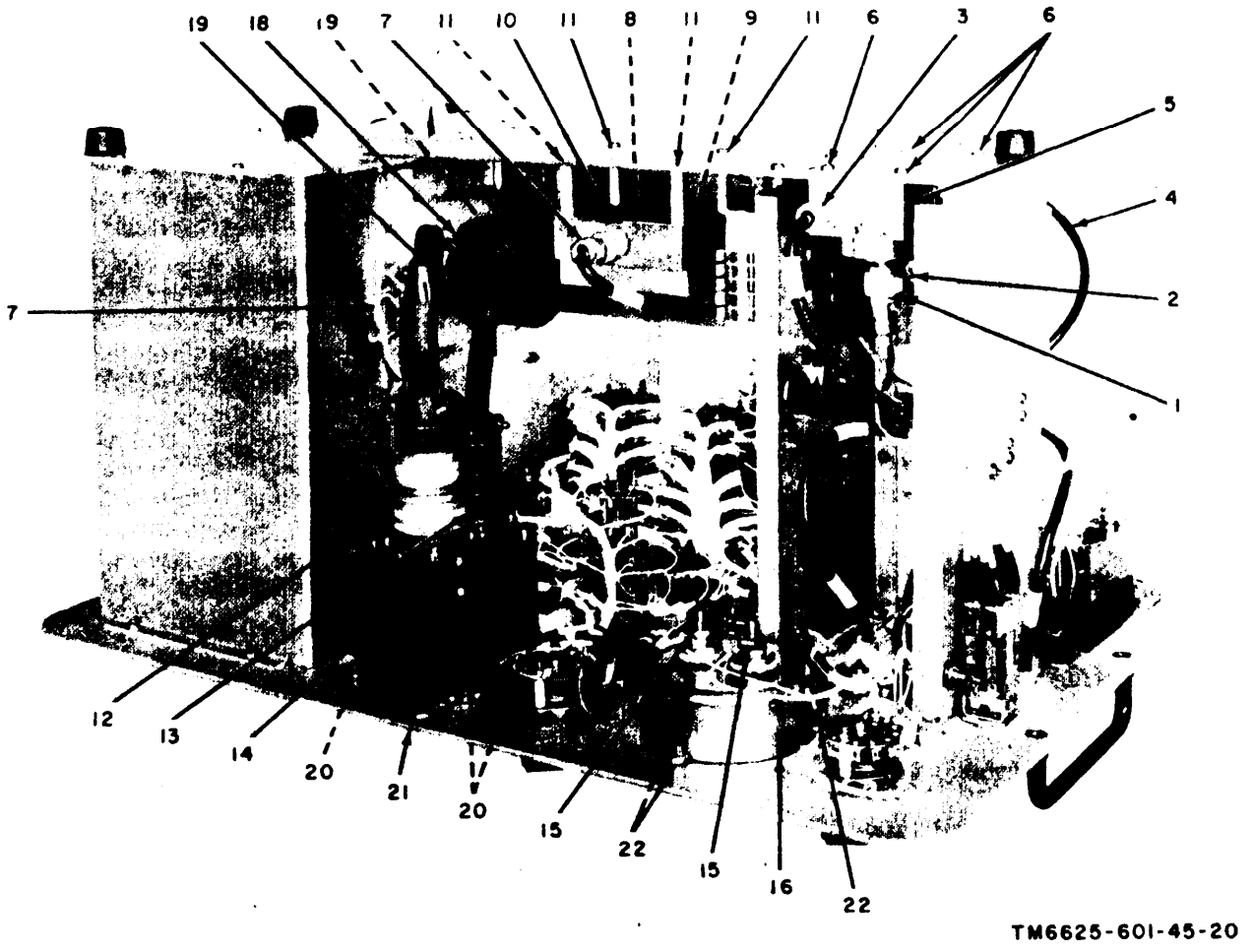


Figure 3-1. Major components TS-1967/ARC-54, top view, cover removed.

(a) Screw the two mounting studs (16)) into their proper position on the frequency counter (28).

(b) Slide a switch spacer (15) onto each of the mounting studs (16).

(c) Slide the wafer switch (14) onto the mounting studs (16) and main switch shaft (part of frequency counter (28)).

(d) Install a switch spacer (13) on each of the mounting studs (16).

(e) Slide the middle wafer switch (12) onto the mounting studs (16) and main switch shaft (part of frequency counter (28)).

(f) Slide a switch spacer (11) onto each of the mounting studs (16) and install the inner gear plate (10) in its proper position.

(g) Reassemble the megahertz switch gear (7) to the main switch shaft (part of frequency counter (28)).

(h) Place the gear-pressed shaft assembly (9) in its proper position on the inner gear plate (10).

(i) Join the megahertz-pressed shaft assembly (6) and the main switch shaft (part of frequency counter (28)) with the flats of the shafts aligned. Secure the megahertz switch gear (7) with the two setscrews (8).

(j) Install the two switch spacers (5) and the outer gear plate (4).

(k) Install two switch spacers (3) on the mounting studs (16).

(l) Slide the rear wafer switch (2) onto the mounting studs (16) and the megahertz-pressed shaft assembly (6).

(m) Secure the entire switch assembly (1-16) with two hexagonal nuts (1) installed on the mounting studs (16).

(n) Connect and solder each wire to the

proper terminal on the switch assembly (1-16).

b. Disassembly and Reassembly of Fractional Megahertz Select Switch S4.

(1) Disassemble fractional megahertz select switch S4 (fig. 3–2) as follows:

(a) Tag and unsolder all wires connected to fractional megahertz select switch S4 (17-19).

(b) Remove the two machine screws (17) and switch spacers (19) that secure the wafer switch (18) to the frequency counter (28).

(c) Slide the wafer switch (18) off the switch shaft (part of frequency counter (28)).

(2) Reassemble fractional megahertz select switch S4 as follows:

(a) Slide the wafer switch (18) onto the switch shaft (part of frequency counter (28)).

(b) Secure the wafer switch (18) in place with two machine screws (17) and switch spacers (19).

c. Disassembly and Reassembly of Frequency Counter.

(1) Disassemble the frequency counter (fig. 3-2) as follows:

(a) Tag and disconnect all wires connected to the frequency counter (this includes wires connected to switches S4 and S5).

(b) Remove the two incandescent lamps (27) from the front panel (68).

(c) Remove the four screws (24), lockwashers (26), and hexagonal nuts (25) that secure the frequency counter (28) to the front panel (68).

(d) Carefully remove the frequency counter (28) and counter spacer (29) from the front panel (68).

(e) Remove the two machine screws (30), lockwashers (31 and 33), and hexagonal nuts (32) that secure the left gear cover (34) to the frequency counter (28).

(f) Remove the two machine screws (36) and lockwashers (37) that secure the megahertz drive motor (35) to the frequency counter (28). Carefully remove the megahertz drive motor (35) from the frequency counter (28).

(g) Remove the spiral pin (38) that secures the drive gear (39) to the drive shaft of the megahertz drive motor (35). Slide the drive gear (39) off the drive shaft.

(h) Remove the two machine screws (40), lockwashers (41 and 43), and hexagonal nuts (42) that secure the right gear cover (49) to the frequency counter (28).

(i) Remove the two machine screws (44) and lockwashers (45) that secure the fractional megahertz drive motor (46) to the frequency counter (28). Carefully remove the fractional megahertz drive motor (46) from the frequency counter (28).

(j) Remove the spiral pin (47) that secures the drive gear (48) to the drive shaft of the fractional megahertz drive motor (46). Slide the drive gear (48) off the shaft.

(k) Remove the hexagonal nut (51) that secures the right idler gear (54) to the right idler shaft (55).

(l) Slide the flat washer (52), the right idler gear bearing (53), the right idler gear (54), and the right idler shaft (55) off the mounting screw (50). Remove the mounting screw (50) from the frequency counter (28).

(m) Remove the hexagonal nut (57) that secures the left idler gear (60) to the left idler shaft (61).

(n) Slide the flat washer (58), the left idler gear bearing (59), the left idler gear (60), and the left idler shaft (61) off the mounting screw (56). Remove the mounting screw (56) from the frequency counter (28).

(o) Remove the two machine screws (62 and 65) and lockwashers (63 and 66) that secure the standoff terminals (64 and 67) to the frequency counter (28). Remove the two standoff terminals (64 and 67).

(2) Reassemble the frequency counter (28) as follows:

(a) Install the two standoff terminals (64 and 67) on the frequency counter (28) and secure with the two lockwashers (63 and 66) and machine screws (62 and 65).

(b) Install the mounting screw (56) in its proper hole on the left side of the frequency counter (28).

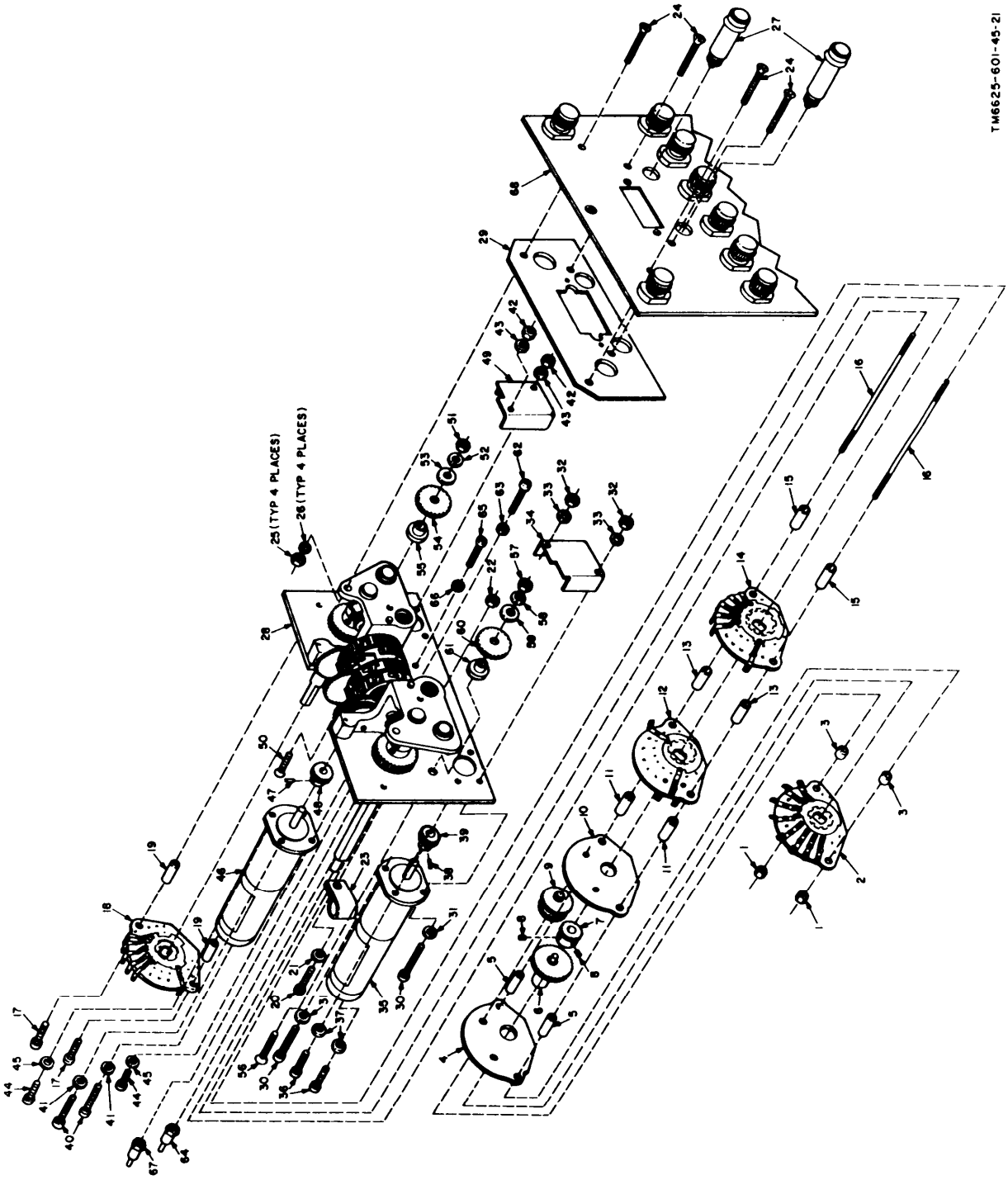
(c) Slide the left idler shaft (61), the left idler gear (60), the left idler gear bearing (59), and flat washer (58) onto the mounting screw (56) and secure with the hexagonal nut (57).

(d) Install the mounting screw (50) in its proper hole on the right side of the frequency counter (28).

(e) Slide the right idler shaft (55), the right idler gear (54), the right idler gear bearing (53), and flat washer (52) onto the mounting screw (50) and secure with the hexagonal nut (51).

(f) Slide the drive gear (48) onto the drive shaft of the fractional megahertz drive motor (46) and secure with the spiral pin (47).

(g) Place the fractional megahertz drive motor (46) in its proper position on the right side of the frequency counter (28) and secure with two machine screws (44) and lockwashers (45).


TM6625-601-45-21
25 (TYP 4 PLACES)
26 (TYP 4 PLACES)

1 Nut, hexagonal 4–40, H43
2 Switch, wafer, S15
3 Spacer, switch, MP21
4 Plate, gear, outer MP16
5 Spacer, switch, MP22
6 Shaft assembly, megacycle-pressed, MP18
7 Gear, megacycle switch MP20
8 Setscrew 4–48 x 1/8
9 Shaft assembly, gear-pressed MP19
10 Plate, gear, inner
11 Spacer, switch, MP23
12 Switch, wafer, S14
13 Spacer, switch
14 Switch, wafer, S13
15 Spacer, switch
16 Mounting stud, 4–40 x 2½, E13
17 Screw, machine, 4–40 x 5/8, H85
18 Switch, wafer
19 Spacer, switch
20 Screw, machine, 4–40 x 3/8, H74
21 Washer, flat, H19
22 Nut, hexagonal
23 Clamp, cable, H1
24 Screw, 4–40 x 5/8, H99
25 Hexagonal nut
26 Lockwasher No. 4, H27
27 Lamp, incandescent, DS13, 14
28 Counter, frequency, MP139
29 Spacer, counter, MP42
30 Screw, machine, 4–40 x 3/4, H77
31 Lockwasher
32 Nut, hexagonal
34 Cover, gear, left, MP80
35 Motor, megacycle drive B1
36 Screw, machine, 4–40 x 1/4, H72
37 Lockwasher
38 Pin, spiral, H36
39 Gear, drive, MP138
40 Screw, machine
41 Lockwasher
42 Nut, hexagonal
43 Lockwasher
44 Screw, machine
45 Lockwasher
46 Motor, fractional megacycle drive B2
47 Pin, spiral
48 Gear, drive
49 Cover, gear, right, MP81
50 Screw, mounting, 4–40 x 5/8, H60
51 Nut, hexagonal
52 Washer, flat
53 Bearing, right idler gear MP99
54 Gear, idler, right MP139
55 Shaft, idler, right MP100
56 Screw, mounting
57 Nut, hexagonal
58 Washer, flat
59 Bearing, left idler gear
60 Gear, left idler gear
61 Shaft, idler, left
62 Screw, machine, 4–40 x 1/4
63 Lockwasher
64 Terminal, standoff, E12
65 Screw, machine
66 Lockwasher
67 Terminal, standoff
68 Front panel, MP56

Figure 3-2. Frequency counter assembly, exploded view.

(Insure that the drive gear (48) and right idler gear (54) are properly meshed.)

(h) Replace the right gear cover (49) and secure to the frequency counter (28) with the two machine screws (40, lockwashers (41 and 43), and hexagonal nuts (42).

(i) Slide the drive gear (39) onto the drive shaft of the megahertz drive motor (35) and secure with the spiral pin (38).

(j) Place the megahertz drive motor (35) in its position on the left side of the frequency counter (28) and secure with two machine screws (36) and lockwashers (37). (Insure that the drive gear (39) and the left idler gear (60) are properly meshed.)

(k) Replace the left gear cover (34) and secure it to the frequency counter (28) with the two machine screws (30), lockwashers (31 and 33), and hexagonal nuts (32).

Section IV. ADJUSTMENT

3-13. Test Equipment and Special Tools Required for Adjustment

a. Table 3–3 lists test equipment required for adjusting RF Power Meter M1 (located in TS–1967/ARC-54) and also the associated technical manuals.

Table 3-3. Test Equipment Required for Adjustment

Test Equipment	*Technical Manuals*
Wattmeter AN/URM-120	TM 11-6625-446-15

b. To gain access to the interior of the test set, remove 10 screws from around the edge of the front panel and slide the test set from the lower case; use the two handles.

3–14. Adjustment Procedure for Rf Power Meter M1 (located in TS-1967/ ARC-54)

a. Remove the cover from the RT-348/ARC-54.

b. Apply +27.5 volts dc to POWER jack J32.

c. Set the test set front panel controls as follows:

(1) Set FREQUENCY SELECTOR-MC switch S3 to 40 position.

(2) Set FREQUENCY SELECTOR-MC switch S4 to 0 position.

(3) Set FREQUENCY SELECTOR-MC switch S5 to .00 position.

(4) Set TEST FUNCTION SELECTOR switch S10 to RADIO position.

(5) Set TEST FUNCTION SELECTOR switch S11 to TEST SET position.

(6) Set RCVR/XMTR FUNCTION switch S9 to PTT position.

(7) Set XMIT-RCVR-PTT switch S6 to RCVR position.

(8) Set POWER/VSWR switch S2 to FWD position.

(9) Set POWER circuit breaker to ON position.

(10) Switches not listed may be set to any position.

d. Connect the RT-348/ARC-54 and Wattmeter AN/URM–120 to the test set as shown in figure 3-3.

e. Set XMIT-RCVR-PTT stitch S6 to XMIT.

f. Adjust potentiometer R1 (fig. 3-3) until the reading on RF POWER meter M1 is equal to the reading on the AN/URM–120 (approximately 10 watts).

3-15. Testing

For final testing procedures at the general support level to determine acceptability of a repaired MK–733/ARC-54, refer to the self-check tests that are part of the monthly preventive maintenance checks in TM 11-6625-601-12. If all the checks are satisfactory, the MK-733/ARC-54 can be considered to meet acceptable final test standards.

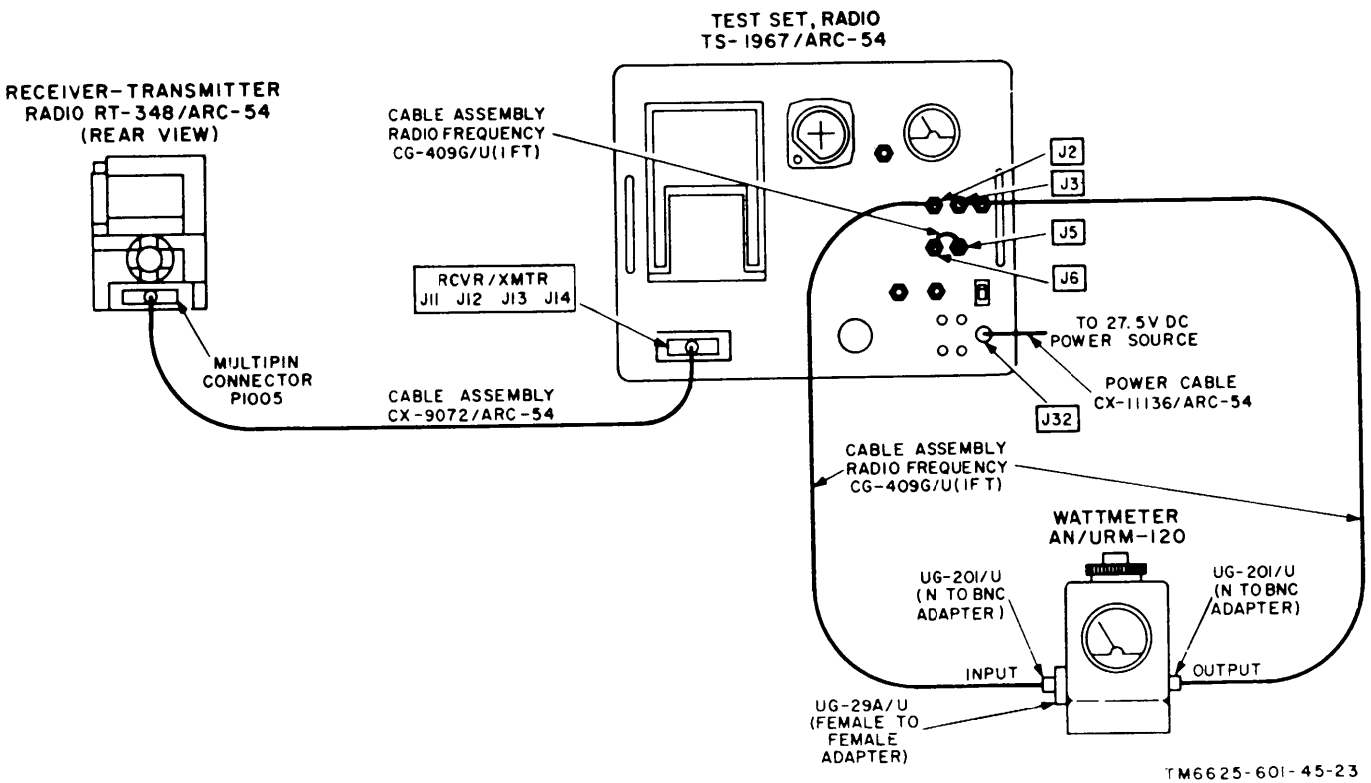


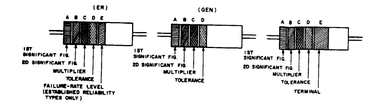
Figure 3-3. Rf power meter adjustment bench test setup.

APPENDIX A

REFERENCES

Following is a list of publications available to the repairman of Maintenance Kit Electronic Equipment MK–733/ARC-54:

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	U.S. Army Equipment Index of Modification Work Orders.
SB 11-604	Tool Kit, Electronic Equipment TK-105G.
TM 11-5121	Power Supply PP-351/U.
TM 11-5821-244–12	Operator's and Organizational Maintenance Manual: Radio Set AN/ARC-54 and Control Indicator C-8157/ARC.
TM 11-6625-320-12	Operator and Organizational Maintenance Manual: Voltmeter, Meter ME-30A/U and Voltmeters, Electronic ME-30B/U, ME-30C/U, and ME-30E/U.
TM 11-6625-366-15	Operator, Organizational, DS, GS, and Depot Maintenance Manual: Multimeter TS-352B/U.
TM 11-6625-446-15	Operator's, Organizational, DS, GS, and Depot Maintenance Manual: Wattmeter AN/URM-120.
TM 11-6625-524-14	Operator, Organizational and Field Maintenance Manual: Voltmeter, Electronic AN/URM-145.
TM 11-6625-539-15	Operator, Organizational, Field and Depot Maintenance Manual: Transistor Test Set TS-1836/U.
TM 11-6625-601-12	Organizational Maintenance Manual Including Repair Parts List: Maintenance Kit, Electronic Equipment MK-733/ARC-54.
TM 11-6625-683-15	Operator, Organizational, Direct Support, General Support, and Depot Maintenance Manual: Signal Generator AN/URM-127.
TM 38-750	The Army Maintenance Management System (TAMMS).



COLOR CODE MARKING FOR COMPOSITION TYPE RESISTORS.

COLOR-CODE MARKING FOR FILM-TYPE RESISTORS.

TABLE I

COLOR CODE FOR COMPOSITION TYPE AND FILM TYPE RESISTORS.

	BAND A	BAND B	BAND C	BAND D		BAND E	
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	FAILURE RATE LEVEL	TERM.
BLACK	0	BLACK	0	BLACK	1	BROWN	1% / 1	
BROWN	1	BROWN	1	BROWN	10	RED	0.1% / 0.01	
RED	2	RED	2	RED	100	ORANGE	0.01% / 0.001	
ORANGE	3	ORANGE	3	ORANGE	1,000	YELLOW	0.001% / 0.0001	
YELLOW	4	YELLOW	4	YELLOW	10,000	WHITE		SOLDERABLE
GREEN	5	GREEN	5	GREEN	100,000	GOLD	± 5% (COMP. TYPE ONLY)	
BLUE	6	BLUE	6	BLUE	1,000,000	RED	± 2% (NOT APPLICABLE TO ESTABLISHED RELIABILITY)	
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7					
GRAY	8	GRAY	8	SILVER	0.01			
WHITE	9	WHITE	9	GOLD	0.1			

BAND A — THE FIRST SIGNIFICANT FIGURE OF THE RESISTANCE VALUE (BANDS A THRU D SHALL BE OF EQUAL WIDTH.)

BAND B — THE SECOND SIGNIFICANT FIGURE OF THE RESISTANCE VALUE.

BAND C — THE MULTIPLIER (THE MULTIPLIER IS THE FACTOR BY WHICH THE TWO SIGNIFICANT FIGURES ARE MULTIPLIED TO YIELD THE NOMINAL RESISTANCE VALUE.)

BAND D — THE RESISTANCE TOLERANCE.

BAND E — WHEN USED ON COMPOSITION RESISTORS, BAND E INDICATES ESTABLISHED RELIABILITY FAILURE-RATE LEVEL (PERCENT FAILURE PER 1,000 HOURS). ON FILM RESISTORS, THIS BAND SHALL BE APPROXIMATELY 1-1/2 TIMES THE WIDTH OF OTHER BANDS, AND INDICATES TYPE OF TERMINAL.

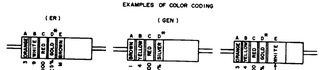
RESISTANCES IDENTIFIED BY NUMBERS AND LETTERS (THESE ARE NOT COLOR CODED.)

SOME RESISTORS ARE IDENTIFIED BY THREE OR FOUR DIGIT ALPHA NUMERIC DESIGNATIONS. THE LETTER R IS USED IN PLACE OF A DECIMAL POINT WHEN FRACTIONAL VALUES OF AN OHM ARE EXPRESSED. FOR EXAMPLE:

2R7 = 2.7 OHMS 10R0 = 10.0 OHMS

FOR WIRE-WOUND-TYPE RESISTORS COLOR CODING IS NOT USED; IDENTIFICATION MARKING IS SPECIFIED IN EACH OF THE APPLICABLE SPECIFICATIONS.

EXAMPLES OF COLOR CODING

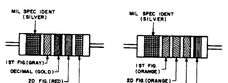


COMPOSITION-TYPE RESISTORS

FILM-TYPE RESISTORS

IF BAND D IS OMITTED, THE RESISTOR TOLERANCE IS ± 20% AND THE RESISTOR IS NOT MIL-STD.

A. COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS.



(A) 8.2 UH ± 10%

(B) 330 UH ± 5%

COLOR CODING FOR TUBULAR ENCAPSULATED R.F CHOKES. AT A, AN EXAMPLE OF THE CODING FOR AN 8.2 UH CHOKE IS GIVEN. AT B, THE COLOR BANDS FOR A 330 UH INDUCTOR ARE ILLUSTRATED.

TABLE 2

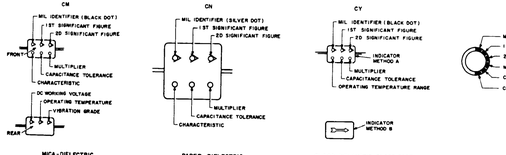
COLOR CODING FOR TUBULAR ENCAPSULATED R.F CHOKES.

COLOR	SIGNIFICANT FIGURE	MULTIPLIER	INDUCTANCE TOLERANCE (PERCENT)
BLACK	0	1	
BROWN	1	10	1
RED	2	100	2
ORANGE	3	1,000	3
YELLOW	4		
GREEN	5		
BLUE	6		
VIOLET	7		
GRAY	8		
WHITE	9		
NONE			20
SILVER			10
GOLD	DECIMAL POINT		5

MULTIPLIER IS THE FACTOR BY WHICH THE TWO COLOR FIGURES ARE MULTIPLIED TO OBTAIN THE INDUCTANCE VALUE OF THE CHOKE COIL.

B. COLOR CODE MARKING FOR MILITARY STANDARD INDUCTORS.

CAPACITORS, FIXED, VARIOUS-DIELECTRICS, STYLES CM, CN, CY, AND CB.

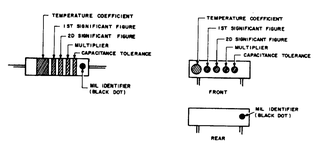


MICA-DIELECTRIC

PAPER-DIELECTRIC

GLASS-DIELECTRIC, GLASS CASE

MICA, BUTTON TYPE



C. COLOR CODE MARKING FOR MILITARY STANDARD CAPACITORS.

TABLE 3 — FOR USE WITH STYLES CM, CN, CY AND CB.

COLOR	MIL ID	1ST SIG FIG	2D SIG FIG	MULTIPLIER	CAPACITANCE TOLERANCE			CHARACTERISTIC			DC WORKING VOLTAGE	OPERATING TEMPERATURE RANGE	VIBRATION GRADE
					CM	CN	CY	CB	CM	CN	CB	CM	CY, CB
BLACK	CK CY CB	0	0	1			±20%	±20%		A			-55°C to +70°C	10-55 H z
BROWN		1	1	10					B	E	B			
RED		2	2	100	±1%		±2%	±2%	C				-55°C to +85°C	
ORANGE		3	3	1,000	±30%				D	D	300			
YELLOW		4	4	10,000					E				-55°C to +125°C	10-2,000 Hz
GREEN		5	5		±5%				F		500			
BLUE		6	6										-55°C to +150°C	
PURPLE (VIOLET)		7	7											
GREY		8	8											
WHITE		9	9											
GOLD				0.1			±5%	±5%						
SILVER	CN				±10%	±10%	±10%	±10%						

TABLE 4 — TEMPERATURE COMPENSATING, STYLE CC.

COLOR	TEMPERATURE COEFFICIENT [1]	1ST SIG FIG	2D SIG FIG	MULTIPLIER	CAPACITANCE TOLERANCE		MIL ID
					CAPACITANCES OVER 10 UUF	CAPACITANCES 10 UUF OR LESS	
BLACK	0	0	0	1		±2.0 UUF	CC
BROWN	−30	1	1	10	±1%		
RED	−80	2	2	100	±2%	±0.25 UUF	
ORANGE	−150	3	3	1,000			
YELLOW	−220	4	4				
GREEN	−330	5	5		±5%	±0.5 UUF	
BLUE	−470	6	6				
PURPLE (VIOLET)	−750	7	7				
GREY		8	8	0.01			
WHITE		9	9	0.1	±10%		
GOLD	+100					±1.0 UUF	
SILVER							

1. THE MULTIPLIER IS THE NUMBER BY WHICH THE TWO SIGNIFICANT (SIG) FIGURES ARE MULTIPLIED TO OBTAIN THE CAPACITANCE IN UUF.

2. LETTERS INDICATE THE CHARACTERISTICS DESIGNATED IN APPLICABLE SPECIFICATIONS: MIL-C-5, MIL-C-250, MIL-C-11272B, AND MIL-C-10950C RESPECTIVELY.

3. LETTERS INDICATE THE TEMPERATURE RANGE AND VOLTAGE-TEMPERATURE LIMITS DESIGNATED IN MIL-C-11015D.

4. TEMPERATURE COEFFICIENT IN PARTS PER MILLION PER DEGREE CENTIGRADE.

Figure FO-1. Color code marking for MIL-STD resistors, inductors, and capacitors.

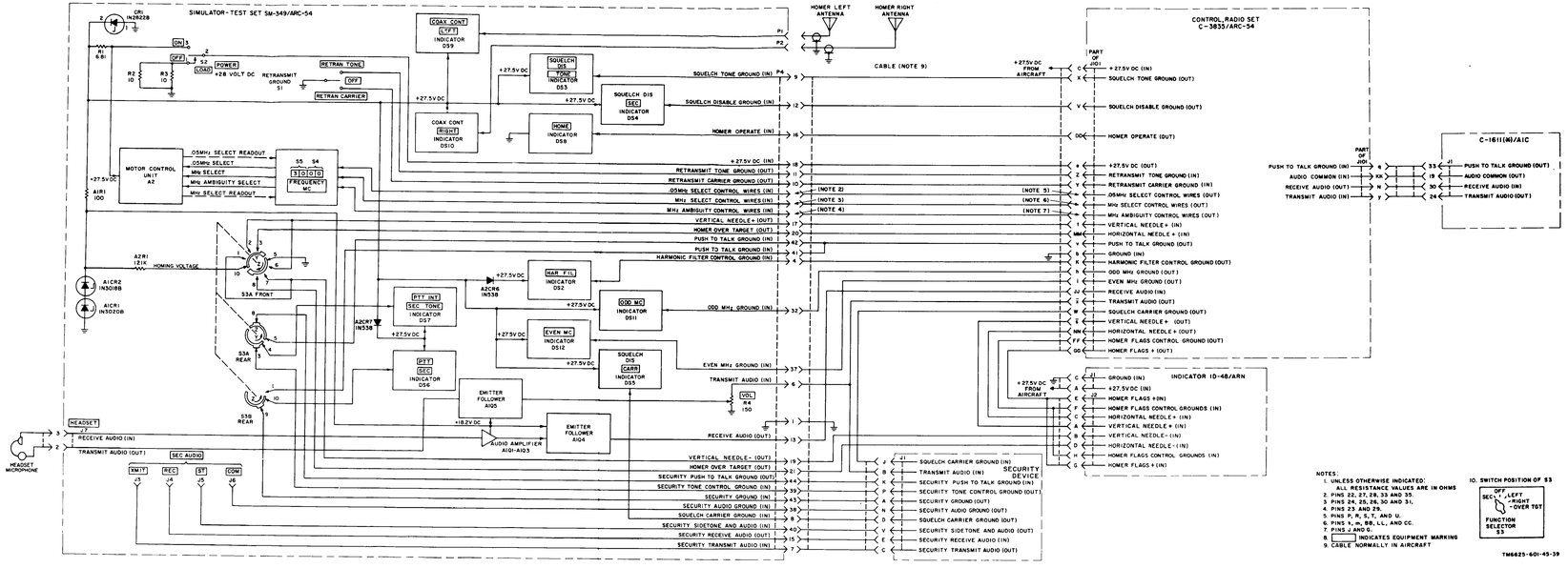
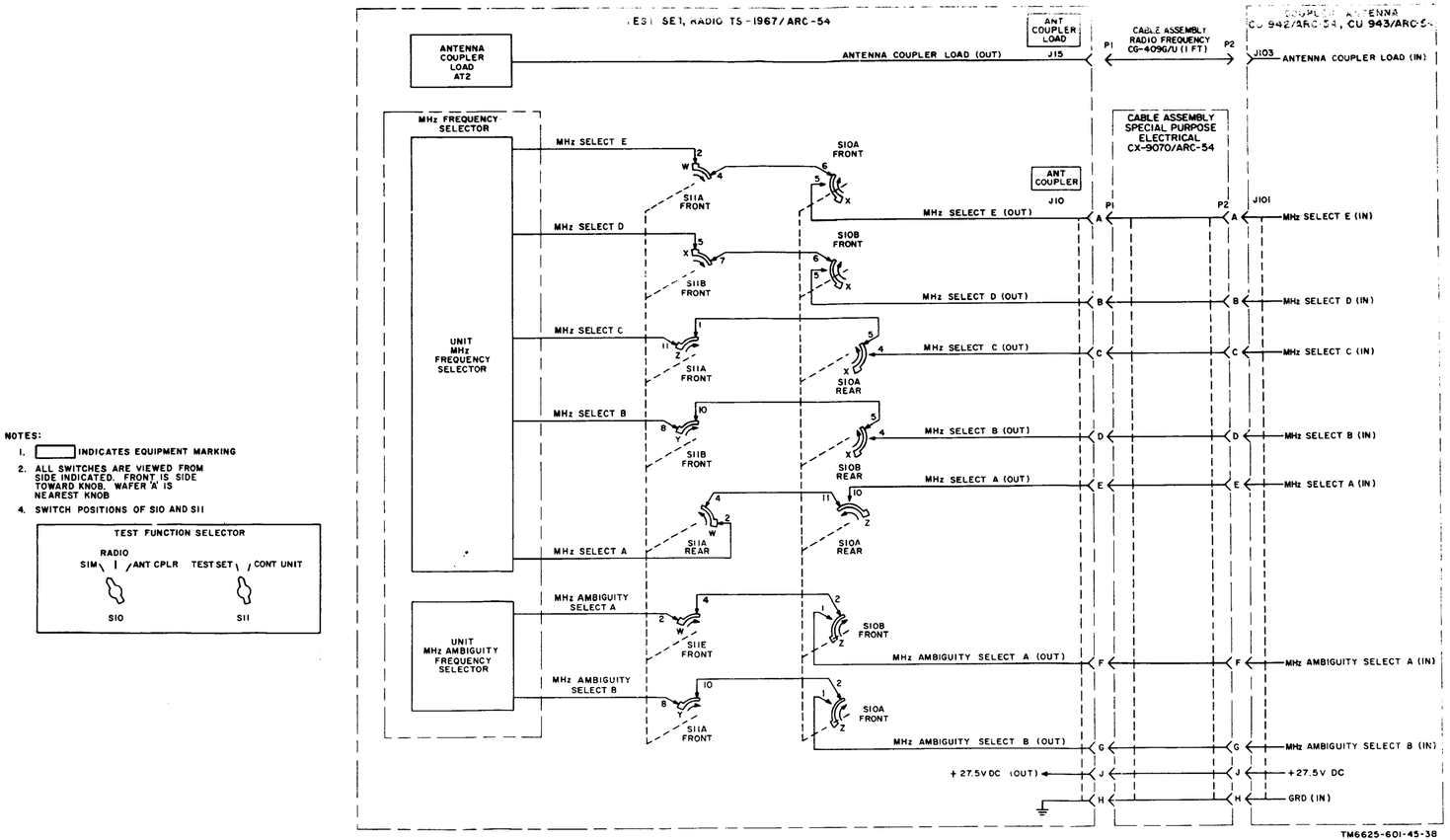


Figure FO-2. SM-349/ARC-54 connected to aircraft, simplified schematic diagram.



NOTES:

1. ▭ INDICATES EQUIPMENT MARKING
2. ALL SWITCHES ARE VIEWED FROM SIDE INDICATED. FRONT IS SIDE TOWARD KNOB. WAFER 'A' IS NEAREST KNOB
4. SWITCH POSITIONS OF S10 AND S11

Figure FO-3. TS-1967/ARC-54 connected to Antenna Coupler CU-942/ARC-54 (CU-943/ARC-54), simplified schematic diagram.

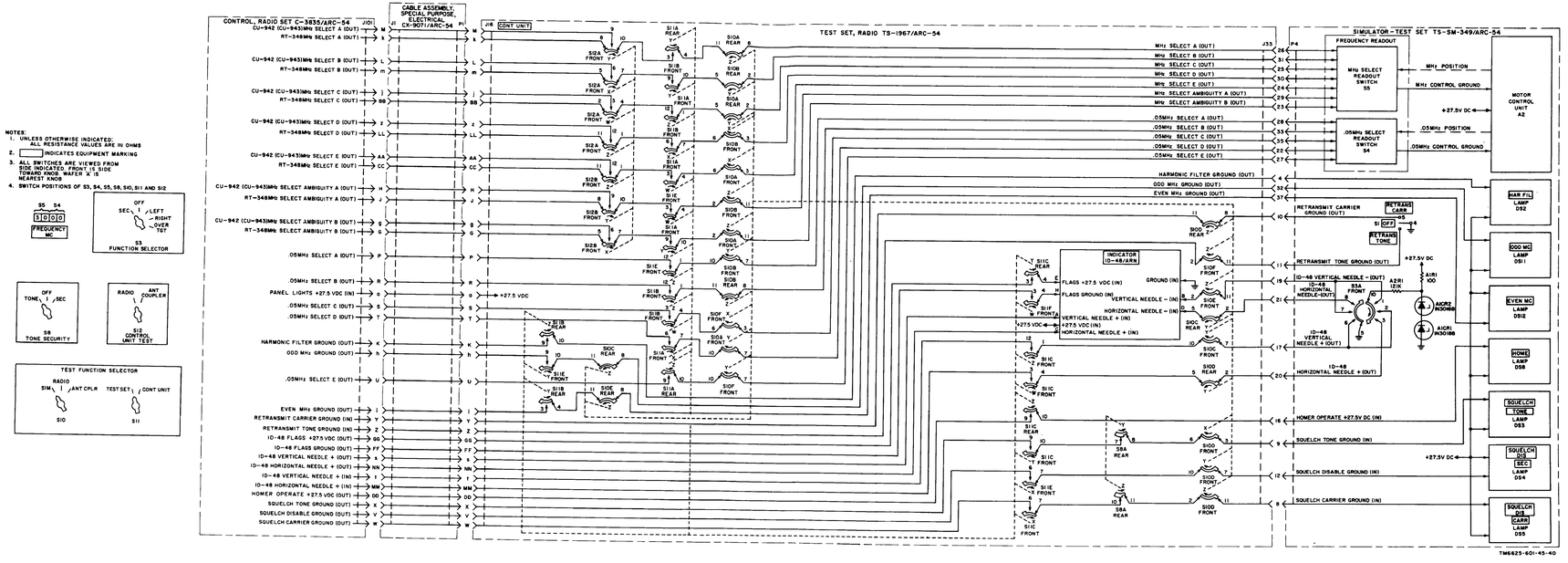


Figure FO-4. TS-1967/ARC-54 and SM-349/ARC-54 connected to Control, Radio Set C-3835/ARC-54, simplified schematic diagram.

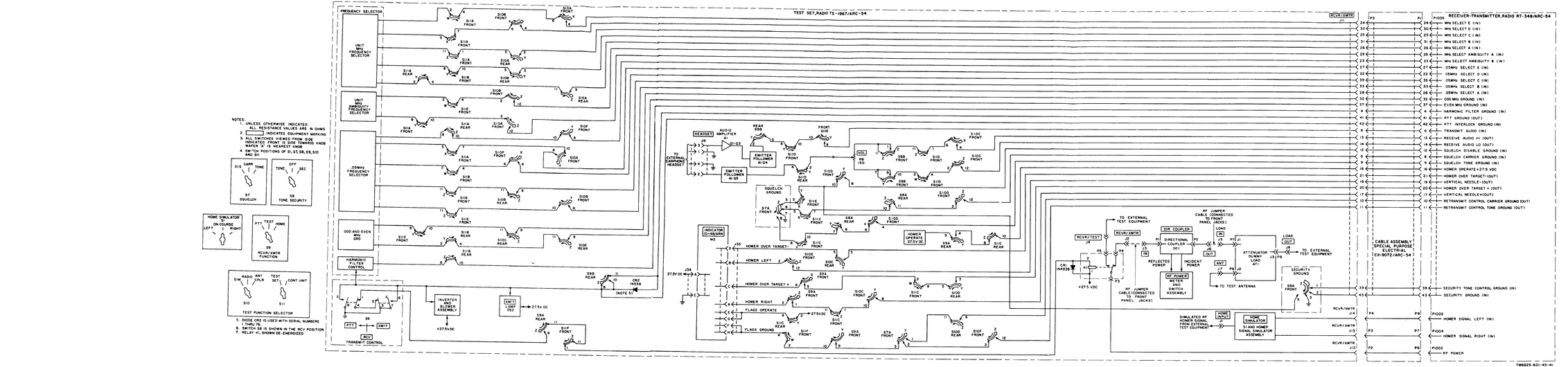


Figure FO-5. TS-1967/ARC-54 connected to Receiver-Transmitter, Radio RT-348/ARC-54, simplified schematic diagram.

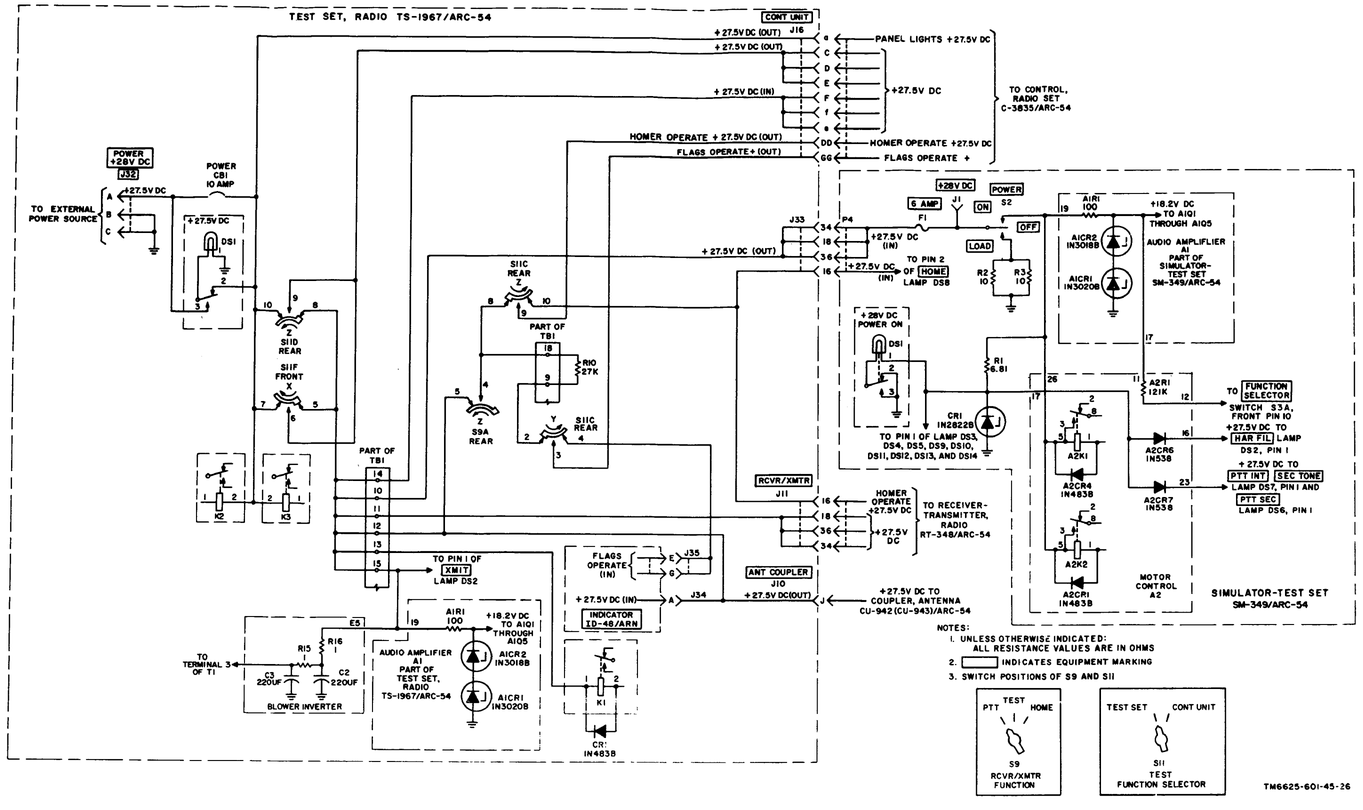


Figure FO-6. Power distribution, schematic diagram.

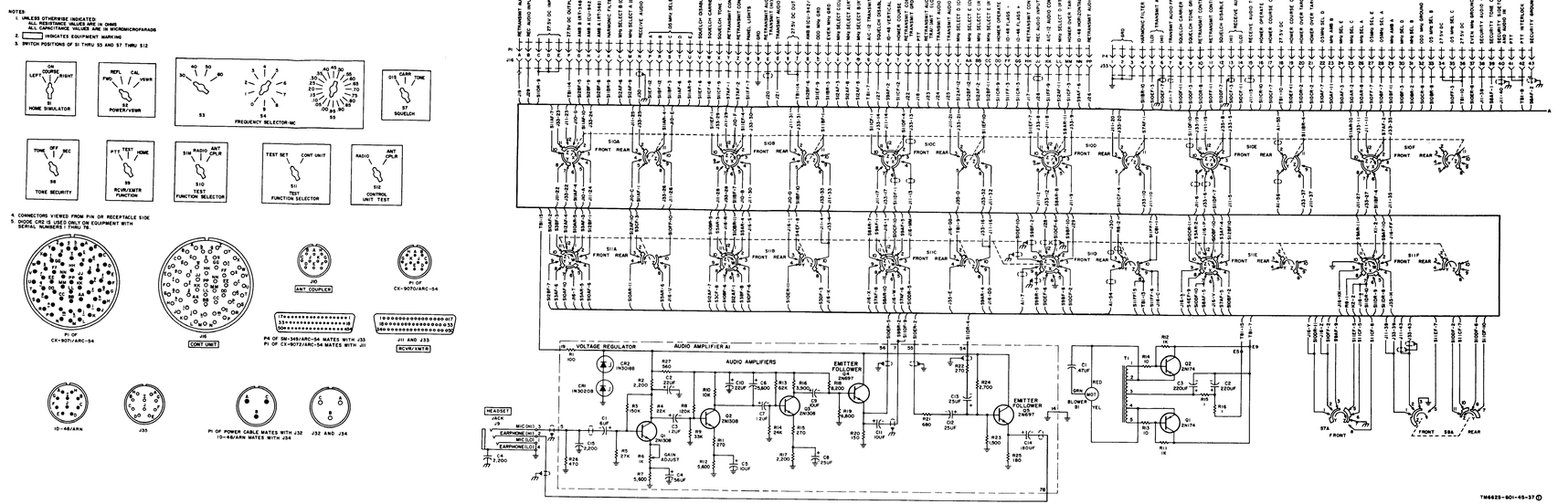


Figure FO-7®. Test Set, Radio TS-1967/ARC-54, schematic diagram (sheet 1 of 2).

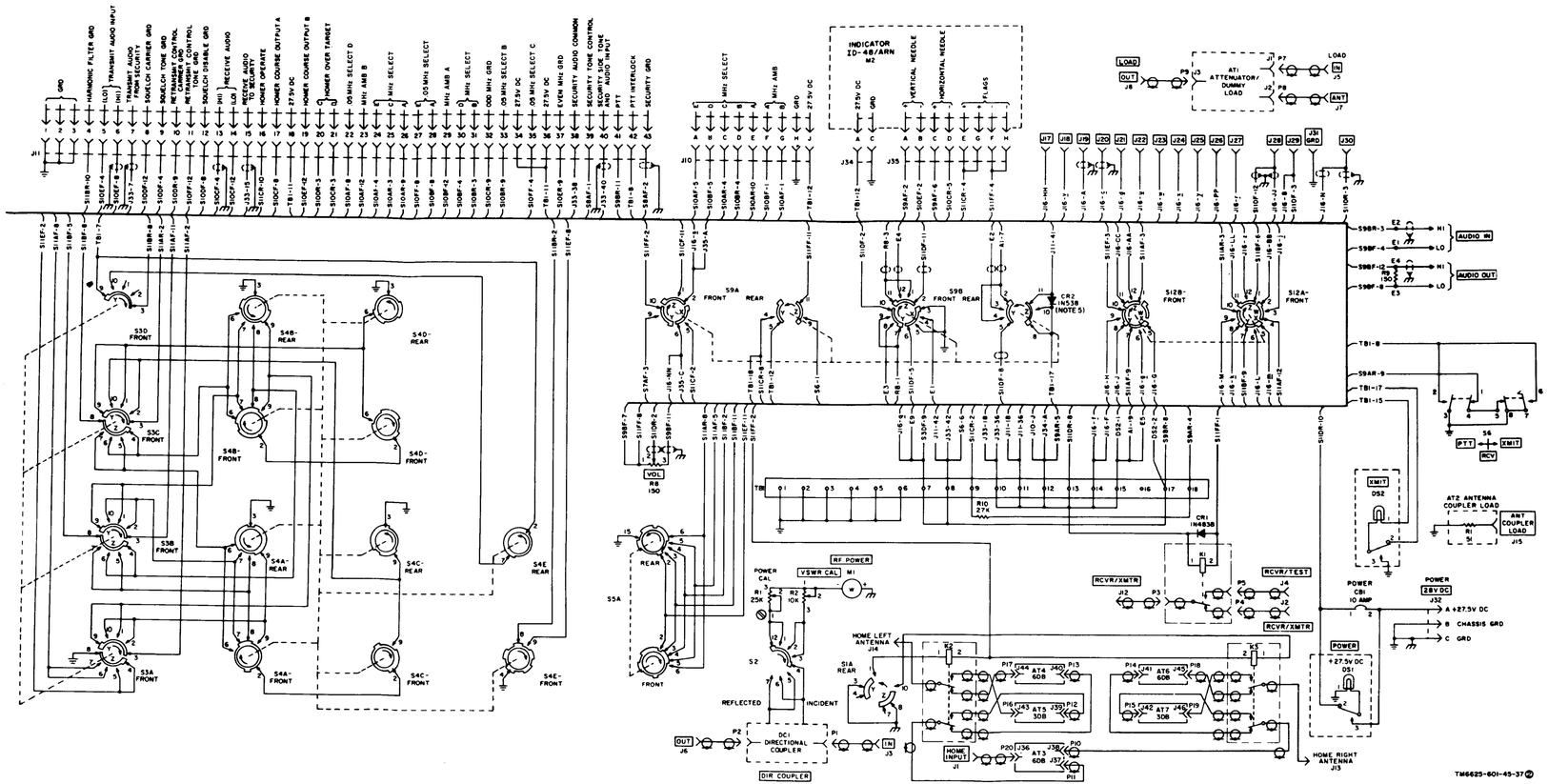


Figure FO-7®. Test Set, Radio TS-1967/ARC-54, schematic diagram (sheet 2 of 2).

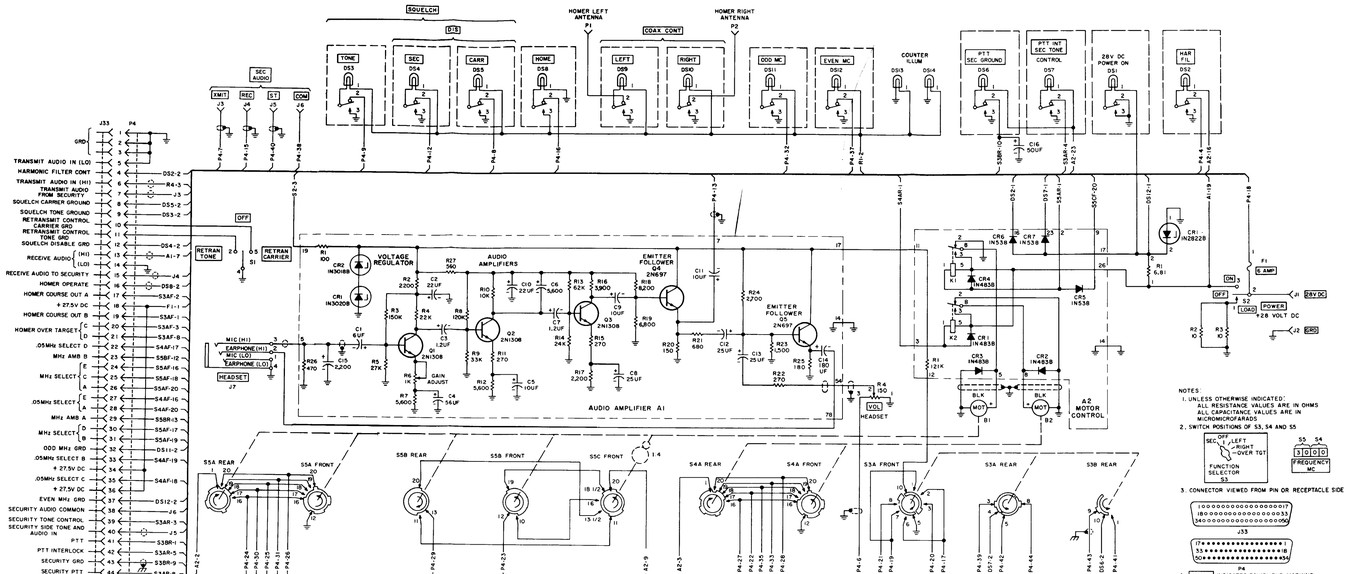


Figure FO-8. SM-819/ARC-54, schematic diagram.

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By Order of the Secretary of the Army:

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Major General, United States Army
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To be distributed in accordance with DA Form 12-36A (qty rqr block No. 1085) direct and general support maintenance requirements for MK-733/ARC-54.

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