

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT,

GENERAL SUPPORT,

AND DEPOT MAINTENANCE MANUAL

RADIO SETS

AN/URC-10, AN/URC-10A,

AND

ACR RT-10

This copy is a reprint which includes current pages from Changes 1 through 5.

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**OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT, GENERAL SUPPORT AND DEPOT
 MAINTENANCE MANUAL
 RADIO SETS AN/URC-10, AN/URC-10A, AND ACR RT-10**

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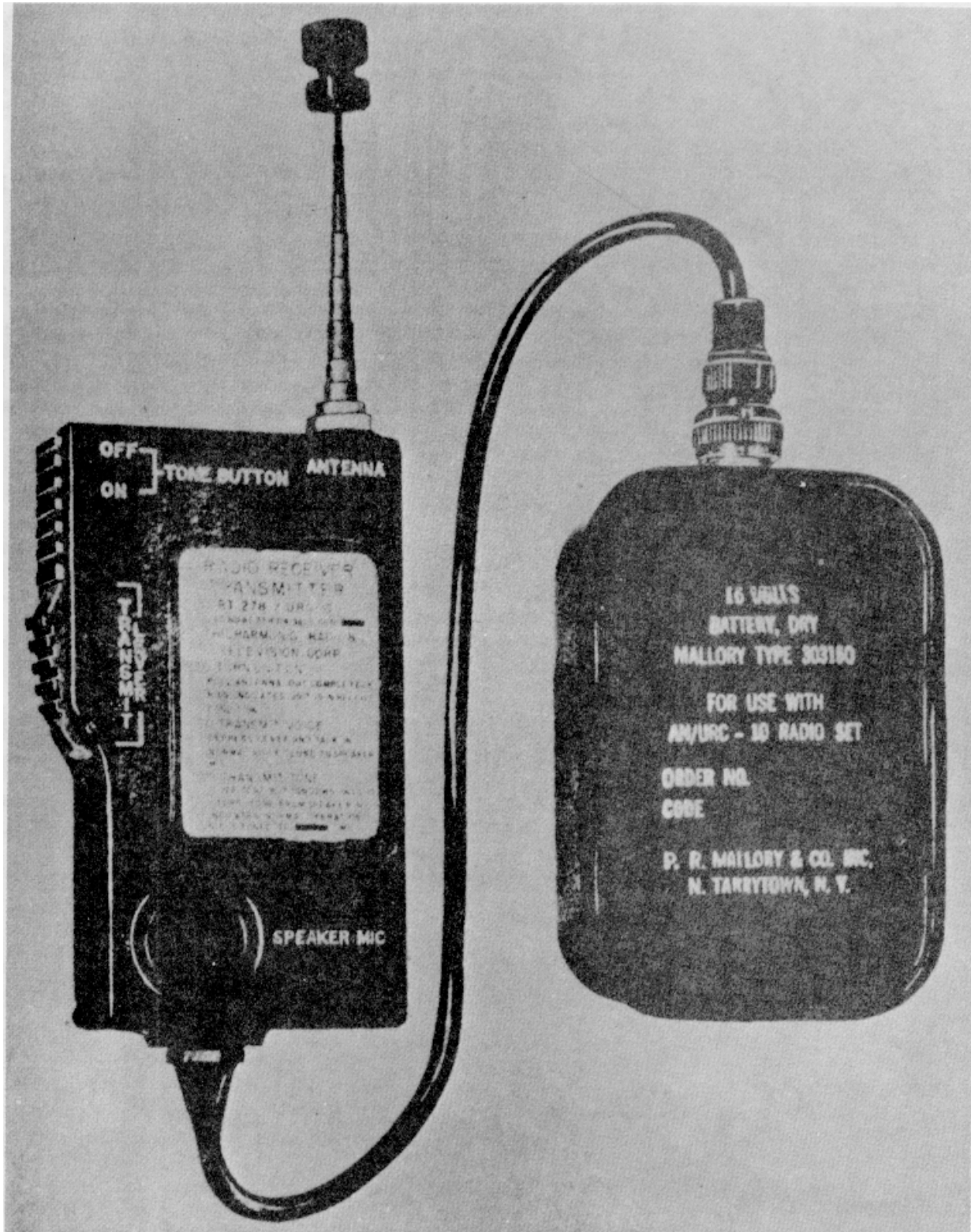


Figure 1-1. Radio Set AN/URC-10 (Receiver-Transmitter RT-278)

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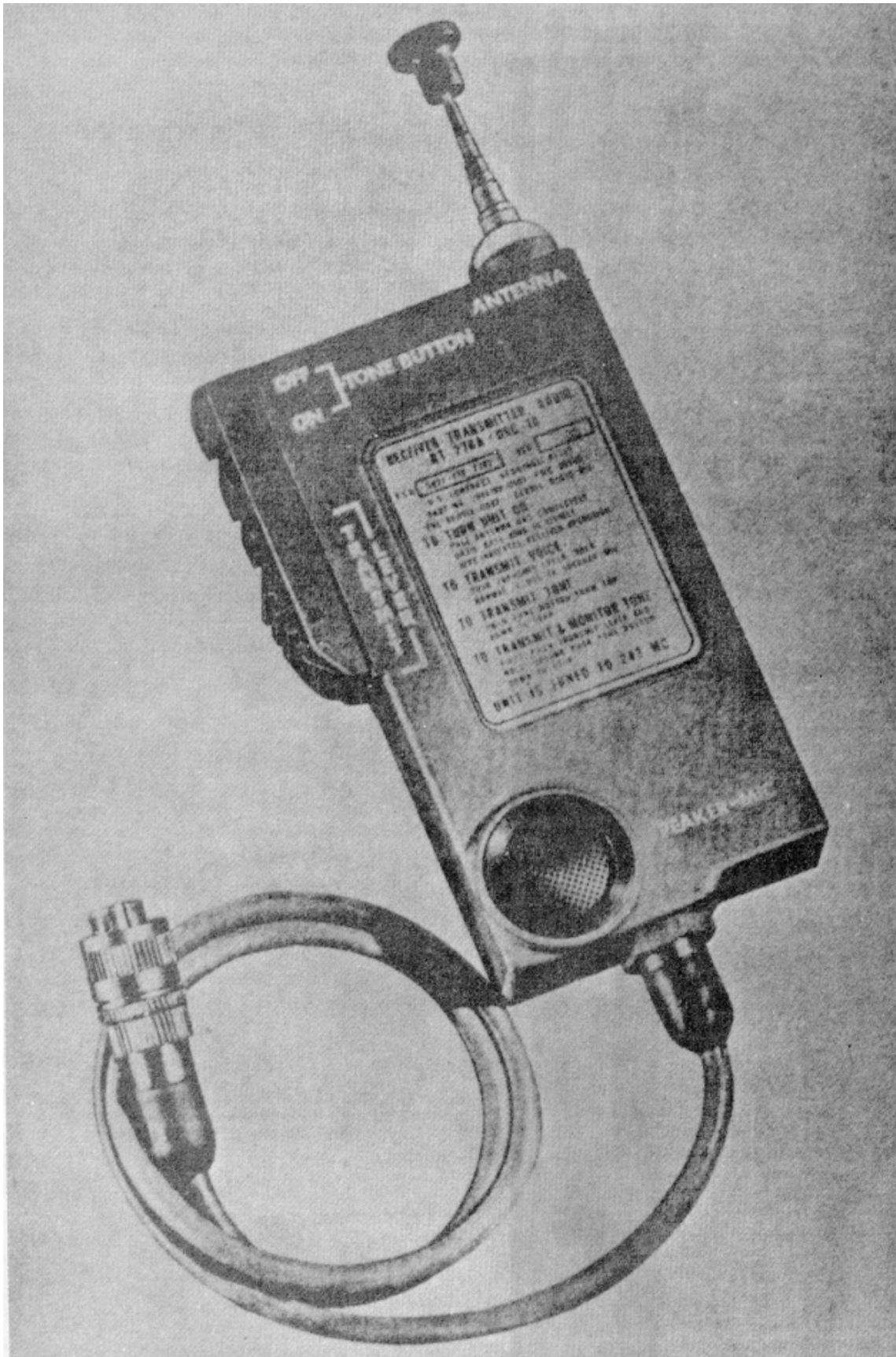


Figure 1-2. Receiver-Transmitter RT-278A/URC-10

SECTION I
INTRODUCTION AND DESCRIPTION

1-1. Scope

This manual provides instructions for operation, maintenance, and functioning of the radio sets indicated below:

Receiver-Transmitter, Radio RT-278/URC-10
Receiver-Transmitter, Radio RT-278A/URC-10
Receiver-Transmitter, Radio ACR RT-10
Receiver-Transmitter, Radio RT-278B/URC-10A

Refer to figures 1-1, 1-2, 1-3, and 1-3.1, respectively, for illustrations of the above equipment. Appendixes include the maintenance allocation chart, and illustrated parts lists.

1-2. Indexes of Publications

a. DA Pam 810-4. 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.

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

1-2.1. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Report of Packaging and Handling Deficiencies) as prescribed in AR 700-58 (Army)/NAVSUP PUB 378 (Navy)/AFR 71-4 (Air Force)/and MCO P4030.29 (Marine Corps).

c. Discrepancy in Shipment Report (DISREP) (SF 561). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 5538 (Army)/NAVSUP PUB 459 (Navy)/ AFM 75-34 (Air Force)/and MCO P4610.19 (Marine Corps).

1-2.2. 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, US Army Electronics Command, ATTN: AMSEL-MA-C, Fort Monmouth, NJ 07703.

1-3. Unless otherwise specified, all information given herein applies to all four radio sets.

1-4. Purpose

1-5. The radio set is a portable radio receiver-transmitter designed to transmit and receive voice signals on the frequencies reserved, for air-sea-rescue. The transmitter also emits a tone-beacon signal for homing use. This tone-beacon signal may be manually locked-in during unattended operation.

1-6. General Characteristics

1-7. The radio set is a lightweight, compact, battery-operated portable unit which uses modular construction for basic circuit functions to simplify maintenance and replacement procedures.

1-8. Four encapsulate modules are utilized: Receiver module; transmitter module; audio module; and tone generator module. Interconnections are accomplished by a printed circuit board which provides mating module connectors. The waterproof case is provided with speaker/microphone, antenna (including an ON/OFF switch), a function switch and a tone switch. Battery power is provided through an external battery connected to the radio set by a waterproof cable (RT-278/URC-10 and RT-278A/URC-10, figures 1-1 and 1-2, respectively); or by an integral battery pack (ACR RT-10 and RT-278B/URC-10A) only (figures 1- and 1-3.1 respectively).

1-9. Items Comprising an Operable Equipment

FSN	Qty	Nomenclature, part No. and mfr code	Fig. No.
<p>NOTE The part number is followed by the applicable 5-digit Federal supply code for manufacturers (FSCM) identified in SB 70842 and used to identify manufacturer, distributor, or Government agency; etc.</p> <p>NOTE Dry batteries shown are used with the equipment but are not considered part of the equipment. They will not be preshipped automatically but are to be requisitioned in quantities necessary for the particular organization in accordance with SB 11-6.</p>			
5821-912-4480		Radio Set ACR RT-10, 2004100-0501,06845, which includes:	1-3
6135-930-0810	1	Battery, Dry K308A	
	1	Receiver-Transmitter, Radio RT-278/URC-10	1-1
	1	OR Receiver-Transmitter, Radio RT-278A/URC-10	1-2
5820-858-5721		Radio Set AN/URC-10 which includes:	
6135-889-1485	1	Battery, Dry BA-1387/URC-10	1-1
	1	Receiver-Transmitter, Radio RT-278/URC-10	1-1
	1	OR Receiver-Transmitter, Radio RT-278A/URC-10	1-2

Change 4 1-2

1-10. Figure 1-4 lists the leading particulars of the radio sets.

1-11. Differences Between Models

1-12. The differences between the RT-278/URC-10 and the RT-278A/URC-10 are primarily those caused by detailed circuit changes, which are fully described in paragraphs 4-1 through 4-7 and 6-1 through 6-37. Refer to paragraphs 1-16 to 1-21 for a special operational and maintenance differences.

1-13. One difference between the RT-278A/URC-10 and ACR RT-10 (fig. 1-2 and 1-3, respectively) is the addition of an antenna coil (76, fig. 6-7) in the ACR RT-10 model to match impedance of the antenna to the output of the transmitter. The other difference between these models is the method by which -16 vdc is supplied to the radio set. The RT-278A/URC-10 requires an external cable and connection to the 16 vdc battery; radio set ACR RT-10 has an integral battery pack which is part of the rear cover. Two types of battery packs are used in this manner, K308 and K308A. the K308 battery pack, figure 1-5, is part of the rear cover assembly and both the rear cover and battery pack must be replaced if the battery is defective. Power connection to the radio set is provided by a plug/ socket arrangement, P501/J501, as shown in figure 1-6.

1-14. The K308A battery pack, which resembles the K308 battery pack shown in figure 1-5, consists of two sections, a rear cover, and a detachable battery. To remove the battery, for test or replacement, a retainer clip at the bottom of the rear cover is swung upward, allowing the battery to slide out from the cover. The K308A battery is shown removed from the rear cover in figure 1-7. A flexible silicon-rubber material at the top of the battery is penetrated by two wire prods (part of the rear cover) to make connection with the battery terminals where the K308A battery is assembled to the cover.

1-15. There exists in the field ACR RT-10's which were purchased by the US Navy that have a quarter (1/4)

wave antennas rather than the half (1/2) wave antennas which exist on the US Air-Force ACR RT-10's. The Navy units do not utilize an antenna. Other than these differences the radio sets are identical.

1-15.1. Receiver-Transmitter RT-278B/URC-10A is similar to the ACR RT-10 unit with the K308A back. The physical differences include a support plate on top of the rear cover, and a modified antenna cap and nut to prevent accidental extension of the antenna. The internal circuitry of the modules used in this unit differs from those used in this unit differs from those used in the other three versions.

1-16. Special Considerations For Operation and Maintenance of Receiver- Transmitter RT-278A/URC-10.

1-17. To obtain reliable communications using Receiver-Transmitter RT-278A/URC-10, it is important to become familiar with the following special considerations.

1-18. Operating Instructions.

1-18.1. The following operating instructions apply to all radio sets, unless otherwise indicated.

NOTE

To turn on radio set RT-278B/URC-100A, first unscrew the antenna cap from the nut.

a. Turn On. Pull the antenna out completely until the base ring is visible. Hiss at this time indicates that the receiver is operating.

b. Transmit Voice. Push the TRANSMIT LEVER; talk normally, but close to speaker/microphone.

c. Transmit Tone. Push the TONE button from the top, down to its stop.



Figure 1-3. Receiver-Transmitter ACR RT-10

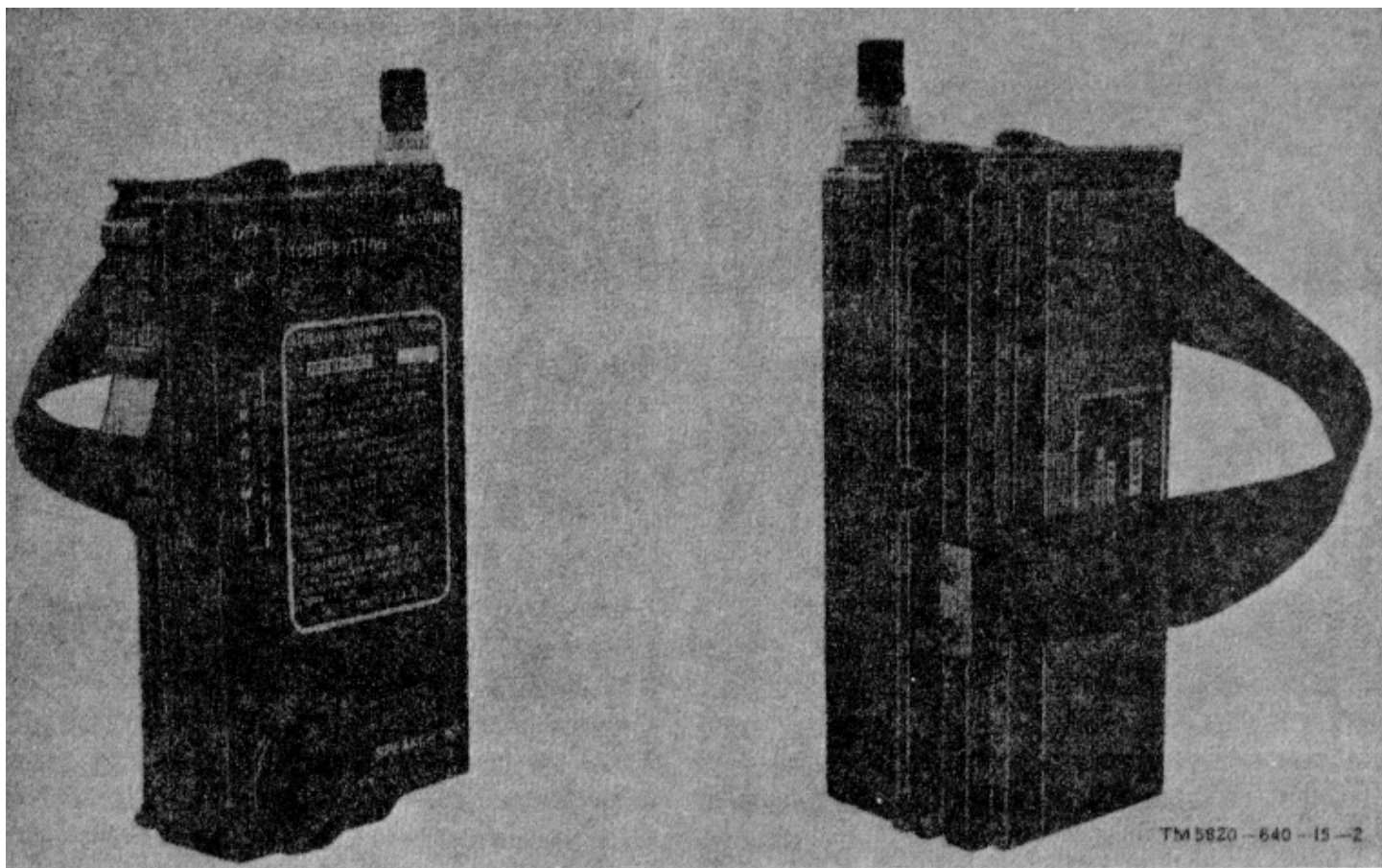


Figure 1-3.1. Receiver-Transmitter RT-278B/URC-10A.

Receiver-Transmitter RT-278/URC-10

<p>Encapsulated modules</p> <p>Number of semi-conductors</p> <p>Frequency range</p> <p>Output characteristics</p> <p>Power requirements</p> <p>Battery type</p> <p>Transmitter RF power</p> <p>Receiver sensitivity</p> <p>Weight</p> <p>Dimensions (less battery)</p> <p>Antenna</p>	<p>1 transmitter</p> <p>1 receive</p> <p>1 audio</p> <p>1 tone generator</p> <p>18</p> <p>240 to 260 MC (with selected crystal)</p> <p>Voice and tone</p> <p>-16 VDC</p> <p>Battery, Dry-BA-1387/URC-10</p> <p>-MIN 200 MW CW</p> <p style="text-align: center;"><u>S+N</u></p> <p>-MIN 10 UV for a N of 4:1</p> <p>27 OZ</p> <p>6 by 3-1/2 by 1-1/2 inch</p> <p>Telescopic whip type</p>
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Receiver-Transmitters RT-278A/URC-10 and ACR RT-10

<p>Encapsulated modules</p> <p>Number of semi-conductors</p> <p>Frequency range</p> <p>Output characteristics</p> <p>Power requirements</p> <p style="padding-left: 20px;">RT-278A/URC-10</p> <p style="padding-left: 20px;">ACR RT-10</p> <p>Transmitter RF output</p> <p>Receiver sensitivity</p> <p>Intermediate frequency</p> <p>Audio output</p> <p>Modulation</p> <p>Operating ranges</p>	<p>1 transmitter</p> <p>1 receiver</p> <p>1 audio</p> <p>1 tone generator</p> <p>18</p> <p>240 to 260 MC (with selected crystal)</p> <p>Voice and tone-modulated RF signals</p> <p>16 VDC (Battery BA- 1387/U-RC-10 or equivalent)</p> <p>16 VDC (Battery KA-308A/RT-10 or equivalent)</p> <p>MIN 200 MW carrier</p> <p>Maximum of 5 microvolts required for 6DB S/N Ratio</p> <p>700 KC</p> <p>225 to 565 MV (across 4-ohm speaker)</p> <p>Greater than 80 percent</p> <p>Temperature: -55 to +55 DEG C ambient</p> <p>Altitude: Up to 20,000 feet (operating)</p> <p style="padding-left: 40px;">Up to 70,000 feet (non-operating)</p> <p>Distances: Using conventional service type aircraft</p> <p style="padding-left: 20px;">UHF equipment with which to communicate:</p> <p>On ground - APPROX 1 Mile</p> <p>To A/C at 1,000 FT - APPROX 20 Miles</p> <p>To A/C at 2,000 FT - APPROX 30 Miles</p> <p>To A/C at 4, 000 FT - APPROX 50 Miles</p>
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Figure 1 4. Loading Particulars (Sheet 1 of 2)

Receiver-Transmitter RT-278B/URC-10A

<p>Encapsulated modules</p> <p>Number of semi.-conductors</p> <p>Frequency range</p> <p>Output characteristics</p> <p>Power requirements</p> <p>Transmitter RF output</p> <p>Receiver sensitivity</p> <p>Intermediate frequency</p> <p>Audio output</p> <p>Modulation</p> <p>Operating ranges</p>	<p>1 transmitter</p> <p>1 receiver</p> <p>1 audio</p> <p>1 tone generator</p> <p>26</p> <p>240 to 260 MHz (with selected crystal)</p> <p>Voice and tone-modulated RF signals</p> <p>16 VDC(K308A Battery)</p> <p>MIN 200 MW carrier</p> <p>Maximum of 5 microvolts required for 6DB S/N ratio</p> <p>700 KHz</p> <p>15 to 50 milliwatts</p> <p>Greater than 80 percent</p> <p>Temperature: -55 to plus 55 DEG C</p> <p>Altitude: Up to 20,000 feet (operating) Up to 70,000 feet (non-operating)</p> <p>Distances: Using conventional service type aircraft UHF equipment with which to communicate: On ground - APPROX 1 Nile To A/C at 1,000 FT - APPROX 20 miles To A/C at 2,000 FT- APPROX 30 miles To A/C at 4,000 FT - APPROX 50 miles</p>
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Figure 1-4. Leading Particulars (Sheet 2 of 2)

d. Transmit and Monitor Tone. First, push TRANSMIT LEVER and hold. Second, push TONE button down to stop.

e. Turn Off. Close antenna completely into case. (For RT-278B/URC-10A ,screw antenna cap into locknut) Be sure that TONE button is OFF after using tone transmission.

1-19. OPERATING PROCEDURE.

a. Hold radio so that the antenna points up (perpendicular to the ground) not pointing toward the receiving station or aircraft when communicating with it. The radiation field null occurs directly off the end of the antenna.

b. Always attempt to have a clear path between the radio set and the receiving station (Aircraft or ground receiver) with which communications are to be made. Jungle foliage greatly attenuates the radio signal; approximately 20 DB attenuation per 100 feet is produced by Jungle foliage. This attenuation is characteristic at the normal operating frequency of ,e RT-278A/URC-10 and will limit the range of communication.

c. Receiving equipment must be in good condition, and squelch circuits must be properly set for low noise (or disabled) in order to obtain the optimum range of communication with the RT-278A/URC-10.

1-20. PERFORMANCE CHECKING THE RT-278A/URC-10.

a. The tone monitoring function of the RT-278A/URC-10 provides a check of audio module circuits and battery condition only. This function does not check the transmitter module circuits.

b. Receiver module circuits will operate properly even though battery voltage may be greatly deteriorated, However, transmitter circuits may not operate at all with low battery voltage, Therefore, a receiver performance check will not provide a valid check of the battery condition.

c. Field testing of RT-278A/URC-10; RT-278B/URC-10A, and ACR RT-10 radio sets and associated batteries, types BA1387 and K308/K308A is facilitated by the use of Test Set. Radio Frequency, AN/URM-172. Refer to paragraph 5-5 .

1-21. SPECIAL MAINTENANCE FACTORS.

a. Receiver-Transmitter RT-278A/URC-10 has no receiver front end selectivity, Therefore, image frequency signals (1.4 MC below the operating frequency) and many other spurious signals will be received, in addition to the desired signals. This condition is normal. Do not attempt to align or change the radio set circuits to eliminate this condition.

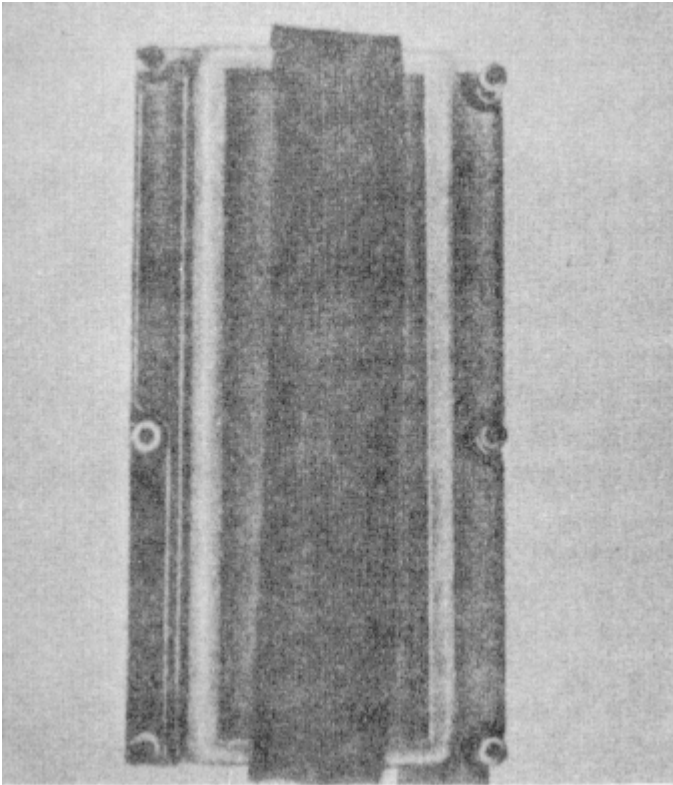


Figure 1-5. Rear View of K308 Battery Pack

b. If a frequency counter equipment is not available at the maintenance area, the transmitter and receiver frequency checks specified in the maintenance section of this manual cannot be made. In lieu of these precise frequency checks, tune the oscillator circuits of the transmitter and receiver modules, to obtain maximum oscillator currents; frequency of each oscillator will then be near enough to its current value to permit reliable operation of the radio set.

c. Some Receiver-Transmitter RT-278A/URC-10 transmitter modules contain silvered-brass slugs in their T102 and L102 coils. Do not change the positions of these slugs when tuning the set for 243-MC operation. The slug in coil T102 has a hole in it, through which the alignment hex tool is inserted for adjustment of the powdered-iron core (also in L1Z2). Detail procedures for adjustment of these slugs will accompany higher-frequency crystals, to be supplied if the units are to be tuned to frequencies higher than 243-MC. If either silvered-brass slug is missing from the noted coils, 243-MC operation of the radio set remains unaffected.

d. Radio Sets that incorporate modules that have alignment or adjustment holes sealed off will not be tampered with or adjusted at any level of maintenance. These modules are properly set at the factory and will mate to the Bendix or ACR sets without need of adjustment when inserted as a replacement. No adjustment should be attempted by the maintenance technician if a sealed module does not operate. Need of adjustment would indicate that a component has failed or changed value thereby rendering the complete module unsatisfactory. Note that component parts of sealed modules cannot be removed or replaced with satisfactory results at any level of maintenance.

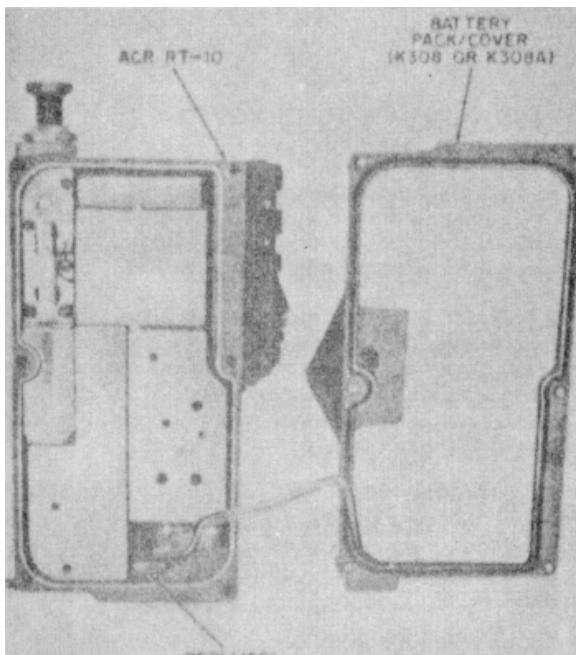


Figure 1-6. Battery Pack and Cover Removed to Show Connection to Radio Set

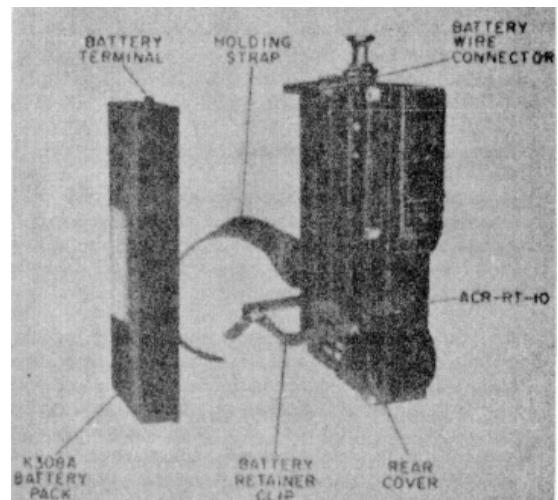


Figure 1-7. K308A Battery Pack Separated From Rear Cover

**SECTION II
PREPARATION FOR MAINTENANCE**

- 2-1. **GENERAL.** prepare Radio Set AN/URC-10 for maintenance.
- 2-2. Special procedures are not required in order to

**SECTION III
TEST EQUIPMENT AND TOOLS**

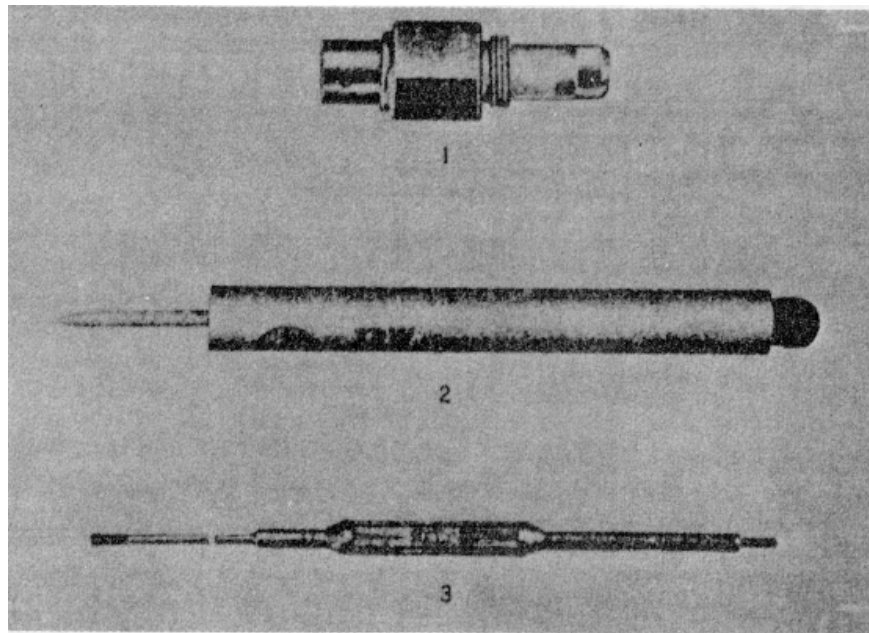
- 3-1. **GENERAL.**
- 3-2. This Section lists and describes the test equipment and tools required to disassemble, assemble, and test the Radio Sets AN/URC-1, ACR RT-10, and RT-278B/URC-10A
- 3-3. **TEST EQUIPMENT.**
- 3-4. Figure 3-1 lists all test equipment required for field maintenance of the radio sets.
- 3-5. **TOOLS.**
- 3-6. Figure 3-2 lists the special tools and test equipment required for general support and depot maintenance of the radio sets.

COLLOQUIAL NAME	TYPE DESIGNATION	ALTERNATE	USE
Receiver-Transmitter RT-278/URC-10			
Test Set Test Set, Radio	None Frequency Power AN/URM-172	"GO-NO GO" evaluation of	Receiver-Transmitter RT-271/UPC-10 ,and Battery BA-1387/URC-10.
Receiver- Transmitters RT-78A/URC-10, ACR RT-10, and RT-278/URC-10A			
Test Set	Test Set, Radio Frequency Power 28ANUR 72 AN/URM-172	None	"GO;NO-GO" evaluation of Receiver-Transmitter RT-A/URC-10, RT-10, RT-278B/URC-10A, and battery K308A/K308. and BA-1387.
<i>Figure 3-1. Test Equipment Required</i>			
Receiver- Transmitters RT-278A/URC10, ACR RT-10, and RT-278/URC-10A			
RF Signal Generator	Signal Generator AN/USM-44	Hewlett-Packard 608C or D	Generates RF input signals.
Frequency Counter	Frequency Meter AN/USM-207	Hewlett-Packard 524C (with 526C head)	Measures frequency of signals accurately.
VTVM	Multimeter Ballantine 300	Measures audio output.	
ME -26(*)		Or equivalent	Measures transmitter output power.
Wattmeter	Test Set, Radio Fre- Power AN/USM-161	Or equivalent	Provides operation power for
Power Source (-16VDC, 200MA)	Power Supply PP-3940/G	Or equivalent	Measures current drain of radio set.
Ammeter	Multimeter TS-352B/U	Or equivalent	Used to calibrate oscilloscope
Variable Attenuator (1-12 D B, in 1-DB steps) 50 ohm	Attenuator, Variable CN-796/U	Or equivalent during modulation check.	
Audio Signal Generator	Signal Generator AN/URM-127	Hewlett-Packard Model 200C modulation checks.	Supplies audio signal for
Test Cover			shield cover, having alignment hole drilled through it.
<i>Figure 3-2 Special Tool Required (Sheet 1 of 3)</i>			

^aMultimeter ME-26(*)/U represents Multimeters ME-2A/U, ME-26B/U, ME-26C/U, and ME-26D1U.

COMMON NAME	TYPE DESIGNATION	ALTERNATE	USE
Receiver Transmitters RT-278A/URC-10, ACR RT-10, and RT-278B/URC-10A			
Oscilloscope (.1V/CM vertical sensitivity, DC input) Detector (1-1000 MC, 50-ohm input)	Oscilloscope AN/USM-140A Semiconductor Device, Diode MX-3671()/U	Tektronix Model 543A, with Model 53/54 Preamp Or equivalent	Displays modulation signals during modulation checks. Detects modulated Signals during modulation checks.
Tool Kit	Tool Kit, Electronic Equipment TK-100/G		General purpose common tools
Test Set	Test Set, Radio Frequency Power AN/URM-172		Determines remaining hours of battery life.

Figure 3-2. Special Tools Required (Sheet 2 of 3)



1. Antenna coaxial adaptor
2. Alignment screwdriver, non-metallic
3. Alignment hex tool, non-metallic

Section III

FIGURE & INDEX NO.	PART NUMBER	NOMENCLATURE	USE & APPLICATION
1	CT-74147	Antenna Coaxial Adapter	Matches 50-ohm test equipment to antenna input of radio set.
2	TRW #6 Peaker (XA -0266), with Ceramic Tip (A-0266)	Alignment Screwdriver, non-metallic	Use to turn tuning capacitors and coil slugs.
3	TRW Nylon Peaker (A-0634)	Alignment Hex Tool, non-metallic 0,112 in. Allen Wrench	Use to turn coil slugs. Used to remove rear cover screws.

Figure 3-2. Special Tools Required (Sheet 3 of 3)

SECTION IV
THEORY OF OPERATION

INDEX OF DIAGRAMS

NUMBER	TITLE	NUMBER	TITLE
4-1	RF Transmitter Amplifier, Simplified Schematic	4-9	Receiver Second IF. Amplifier, Simplified Schematic
4-2	RF Transmitter Doubler, Simplified Schematic	4-10	Receiver Final IF. Amplifier, Simplified Schematic
4-3	Final RF Transmitter Amplifier and Doubler, Simplified Schematic	4-11	Audio Driver, Simplified Schematic
4-4	Sweeping Tone Generator Oscillator, Simplified Schematic	4-12	Audio Output, Simplified Schematic
4-5	Receiver RF Amplifier, Simplified Schematic	4-13	Radio Set AN/URC-10 (Receiver-Transmitter RT-27 8), Schematic Diagram (2 Sheets)
4-6	Receiver Oscillator, Simplified Schematic	4-14	Receiver-Transmitter RT-278A/URC-10, and ACR RT-10, Schematic Diagram (Units of Serial Number 1 thru 6772)
4-7	Receiver Multiplier, Simplified Schematic	4-15	Receiver-Transmitter RT-278A/URC-10, and ACR RT-10, Schematic Diagram (Units of Serial Number 6773 and up)
4-8	Receiver First IF. Amplifier, Simplified Schematic.	4-16	Receiver-Transmitter RT-278B/URC-10A, Schematic Diagram

4-1. GENERAL.

4-2. This section describes theory of operation of radio sets RT-278/URC-10 (fig. 4-13), RT-278A/URC-10 (fig. 4-14), ACR RT-10 (fig. 4-15), and RT-278B/URC-10A (fig. 4-16). The radio sets are completely transistorized and all major circuit functions are provided by encapsulated modules.

4-3. THEORY OF OPERATION, TRANSMITTER (RT-278/URC-10).

4-4. When in voice transmission mode, the transmit-receiver (t/r) relay switches the speaker/microphone to use the microphone function. The antenna operates in the transmitter output band and the signal from the microphone is applied to the audio amplifier. The analysis of the audio stage is given in paragraph 4-8. The output of the audio amplifier is transformer-coupled to a 120-MC doubler and the final RF amplifier. The transmitter consists of a crystal oscillator (figure 4-1) which generates a 60-MC signal. This signal is RF transformer coupled to the buffer doubler (figure 4-2) which applies, a 120-MC signal to the final amplifier through an RF transformer (L102). The final amplifier (figure 4-3) also operates at 120 MC and provides the RF power drive. Thus, output is again doubled in frequency by a solid state varicap doubler (Type PC-1080). The RF out-put is applied to the antenna through the antenna matching network.

4-5. RF generation of the tone transmission is accomplished in essentially the same manner as described in paragraph 4-4. The tone modulation mode is activated by the TONE button. When this button is depressed, the input to the audio amplifier is

disconnected from the microphone and connected into the tone generator. This generator (figure 4-4) provides a continuous swept frequency audio tone. The tone generator consists of two junction transistors (Q401 and Q402) wired as separate oscillators. The audio output is capacitance-coupled to the audio preamplifier.

4-6. THEORY OF OPERATION, RECEIVER (RT-278/URC -10).

4-7. With the unit in the receive mode of operation, and the antenna extended to energize the equipment, the transmit-receive relay places the antenna in the receiver RF position. The speaker/microphone is transferred to speaker condition and applied to the output of the audio amplifier. The receiver RF amplifier (figure 4-5) receives the radiated RF energy from the antenna which is RF transformer coupled to the diode converter (CR201). The mixing frequency is supplied by the crystal oscillator stage (figure 4-6) and frequency multiplier (figure 4-7). This signal is capacitively coupled to the diode converter (CR201). The output of the first IF. amplifier is filtered to the desired IF. frequency and capacitance coupled to the second IF. amplifier stage (figure 4-8). Two additional stages of IF. amplification (figures 4-9 and 4-10) are supplied. The output of the last IF. stage (Q204) is transformer coupled to the diode detector (CR202 and its associated detector filter network. The audio output is capacitance coupled to the input of the audio amplifier (paragraph 4-8).

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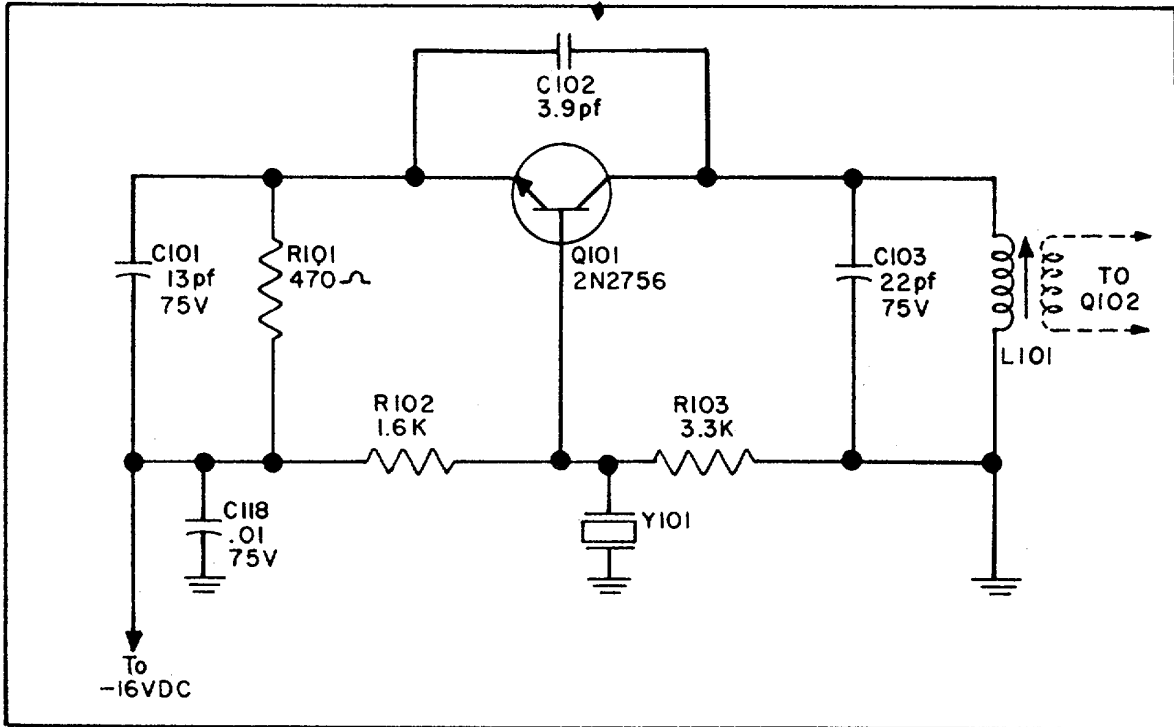


Figure 4-1. RF Transmitter Amplifier, Simplified Schematic

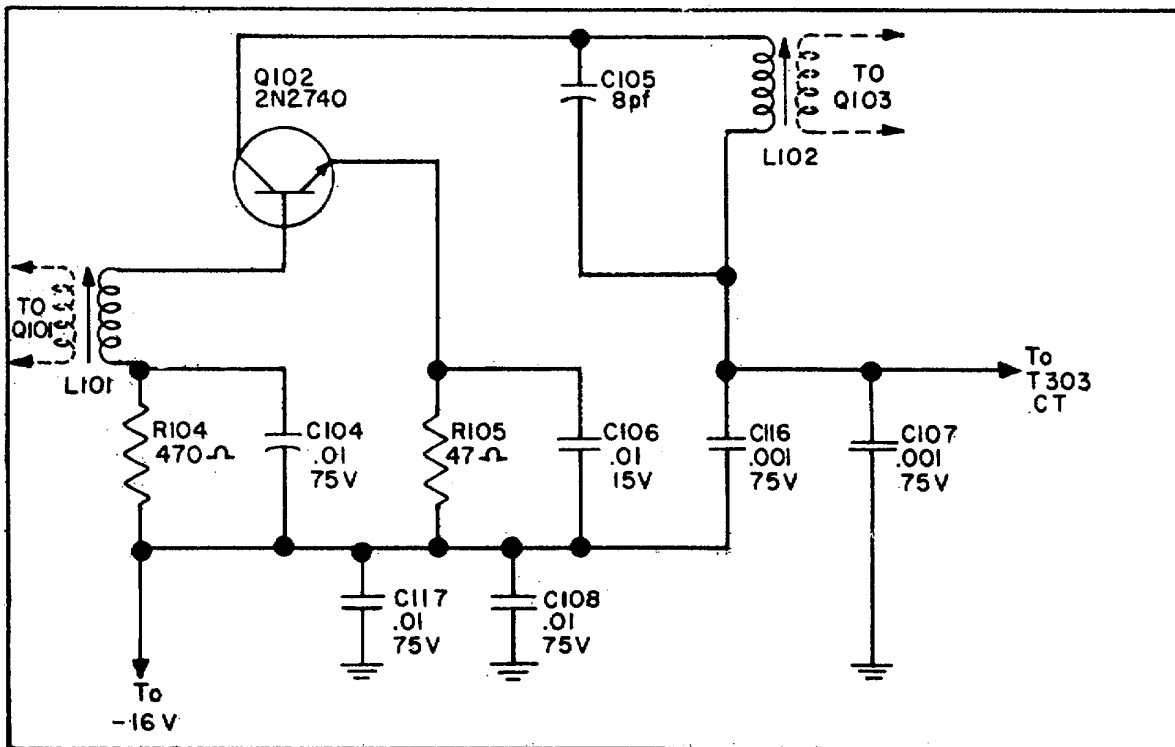


Figure 4-2. RF Transmitter Doubler, Simplified Schematic

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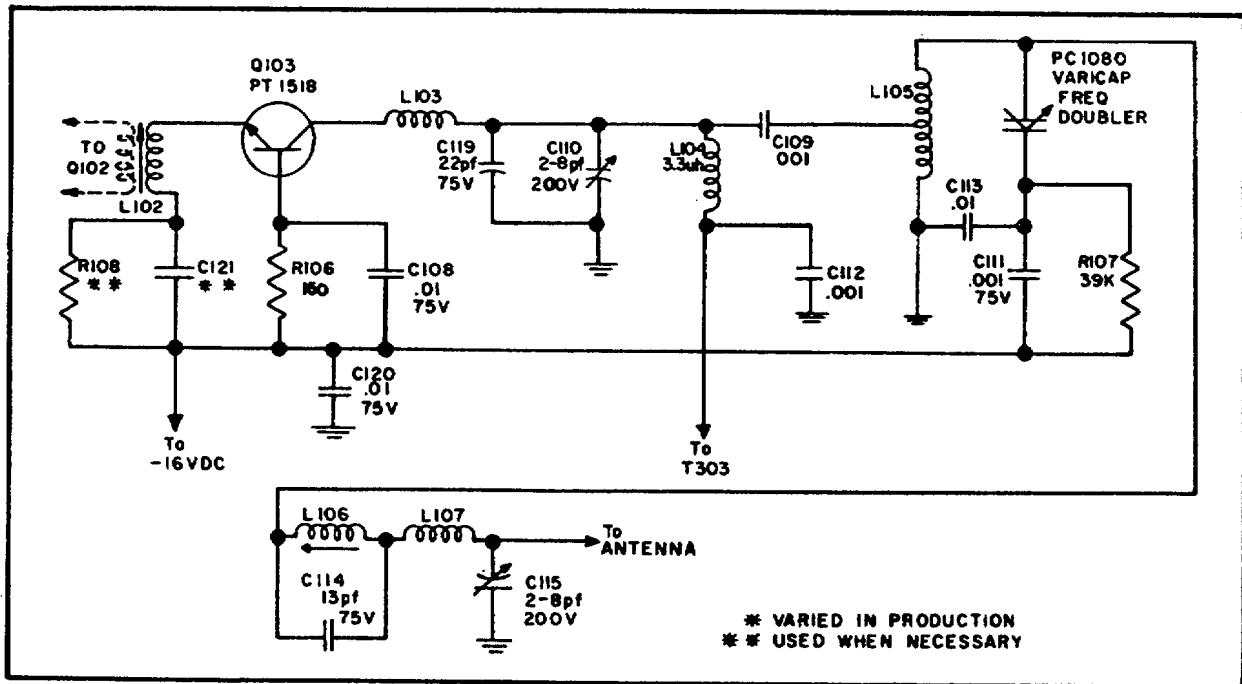


Figure 4-3. Final RF Transmitter Amplifier and Doubler, Simplified Schematic

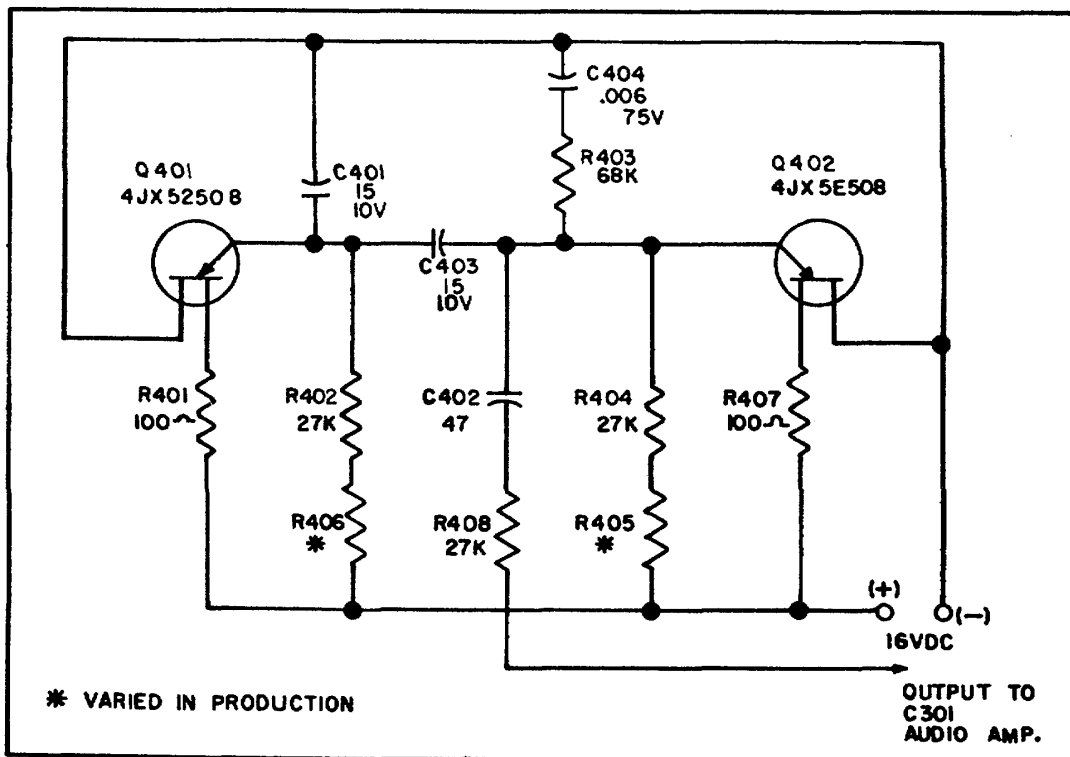


Figure 4-4. Sweeping Tone Generator Oscillator, Simplified Schematic

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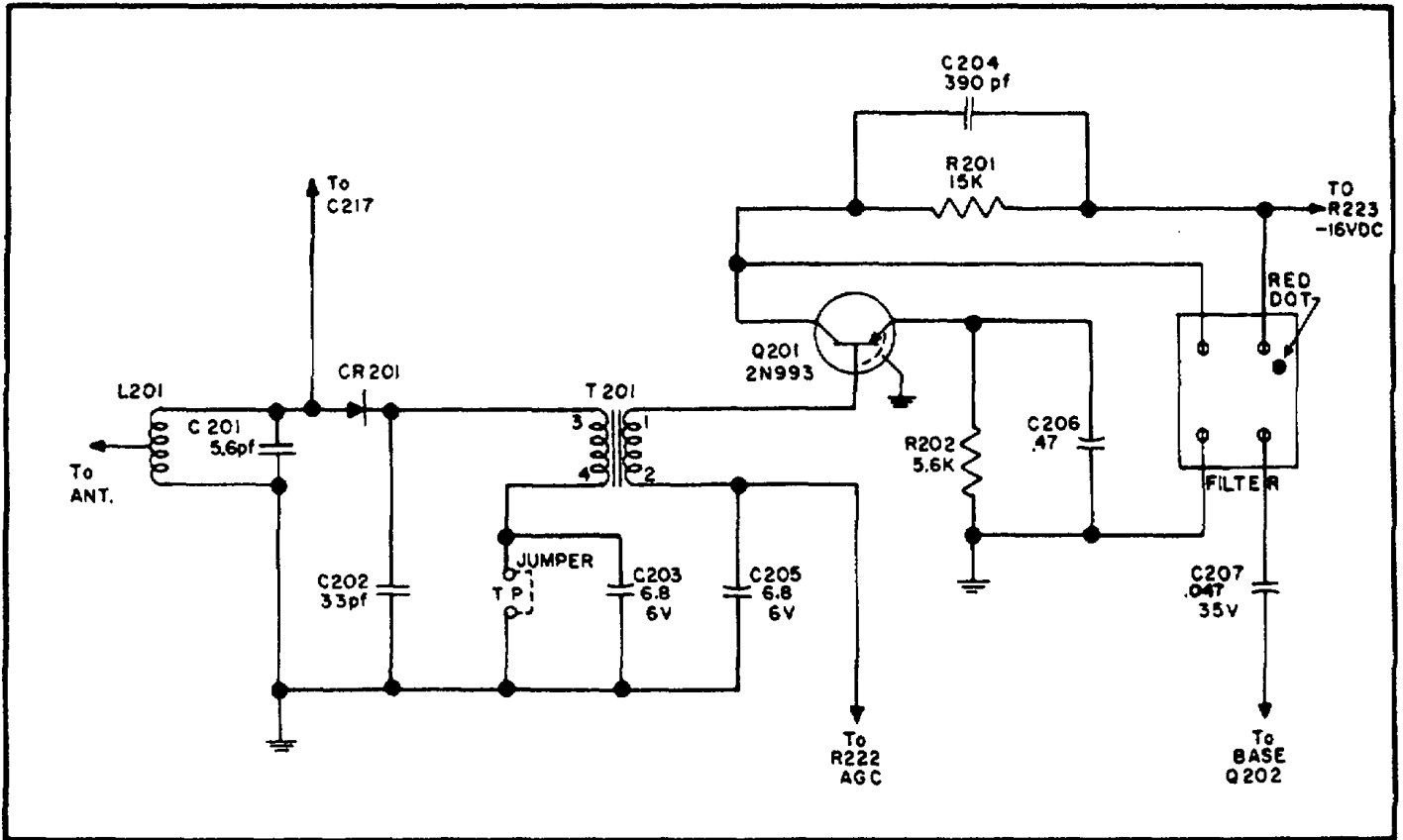


Figure 4-5. Receiver RF Amplifier, Simplified Schematic

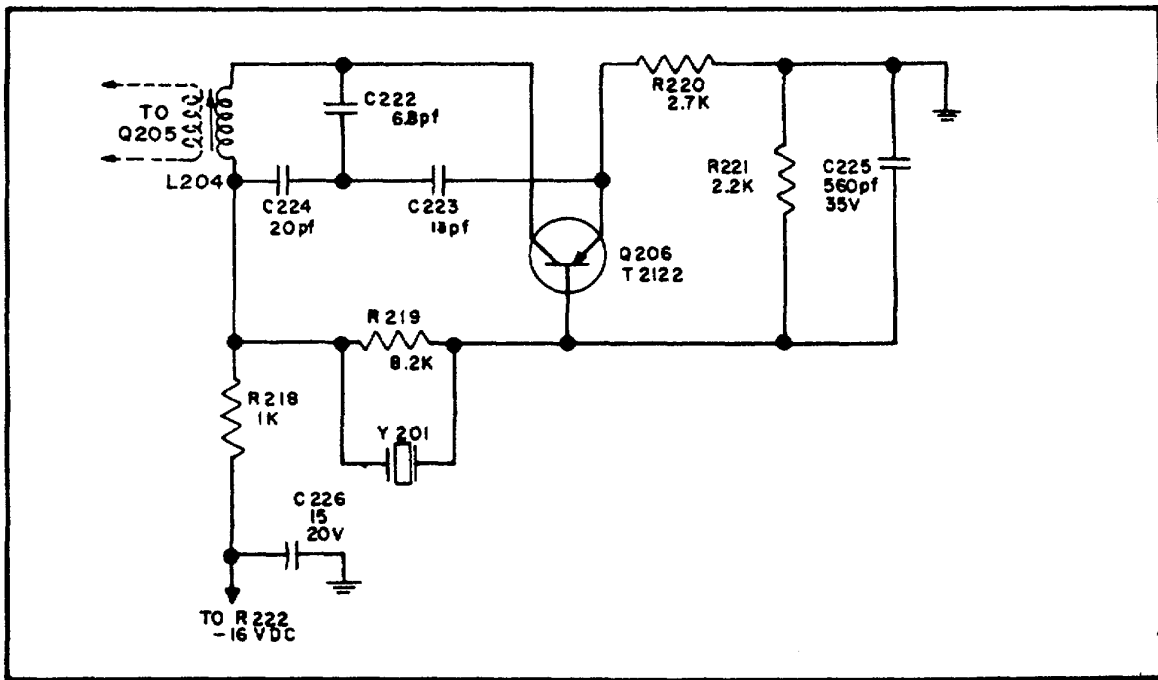


Figure 4-6. Receiver Oscillator, Simplified Schematic

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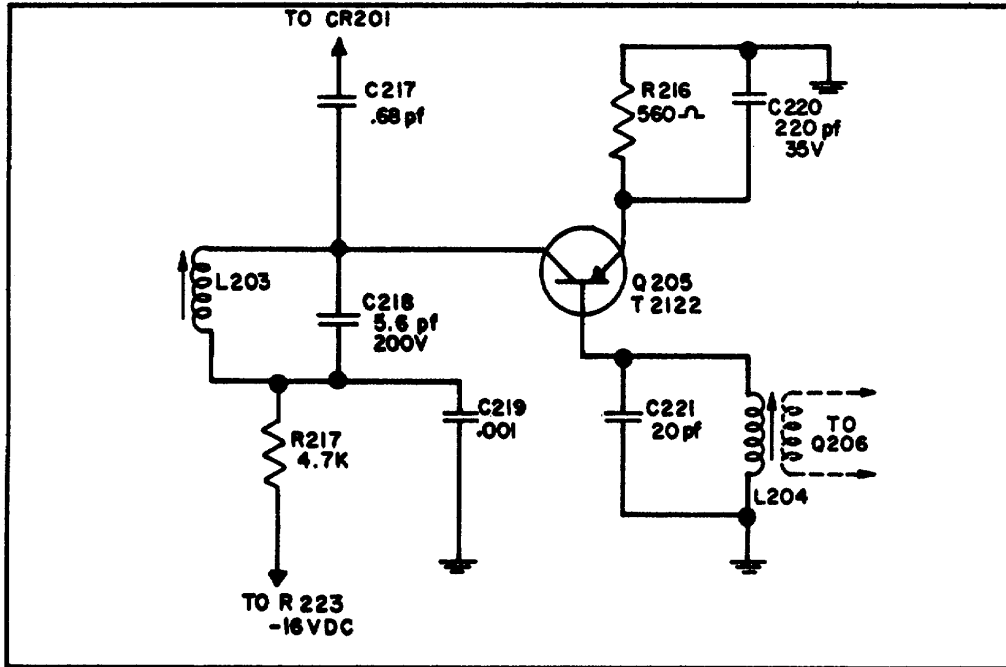


Figure 4-7. Receiver Multiplier, Simplified Schematic

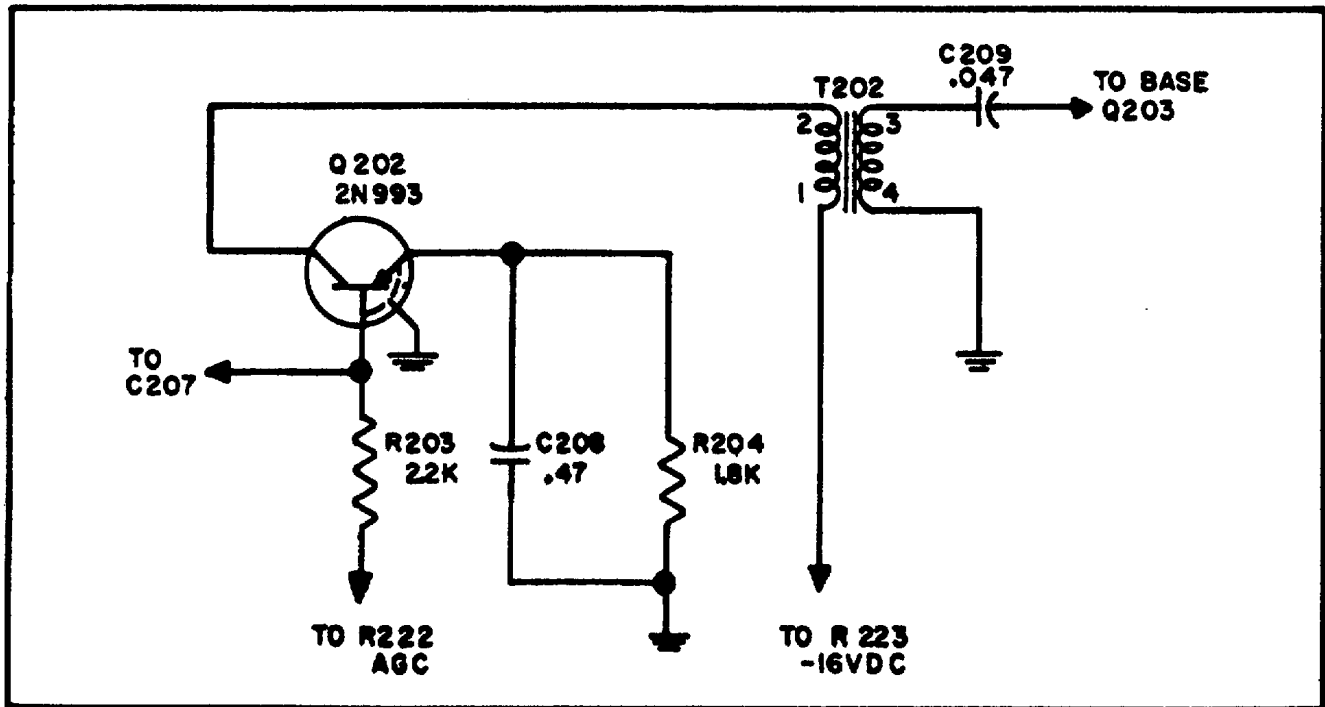


Figure 4-8. Receiver First IF. Amplifier, Simplified Schematic

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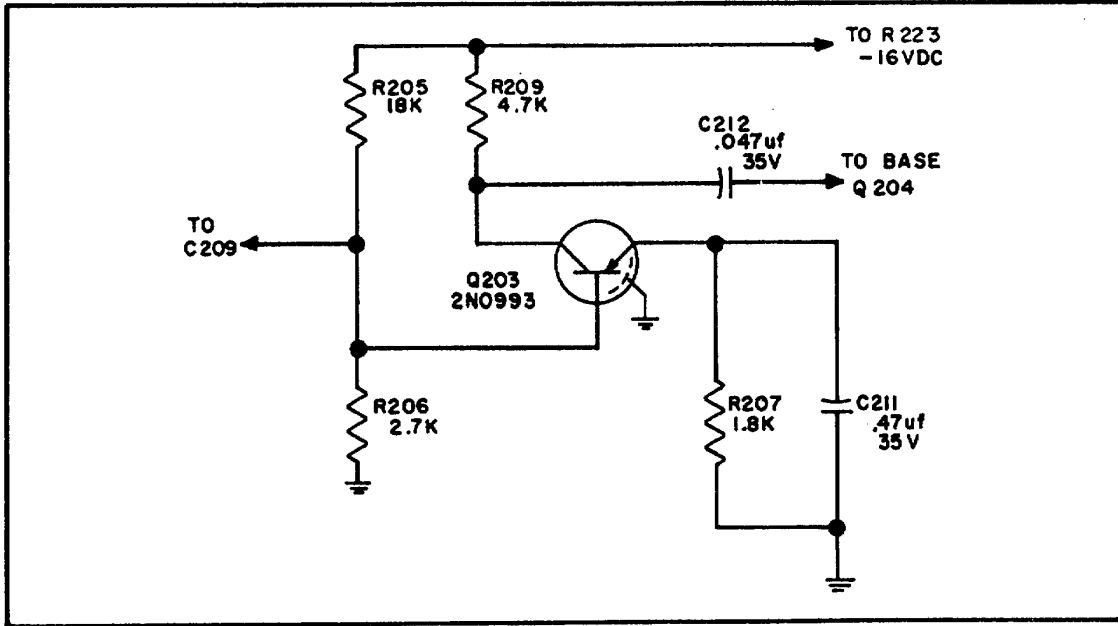


Figure 4-9. Receiver Second IF. Amplifier, Simplified Schematic

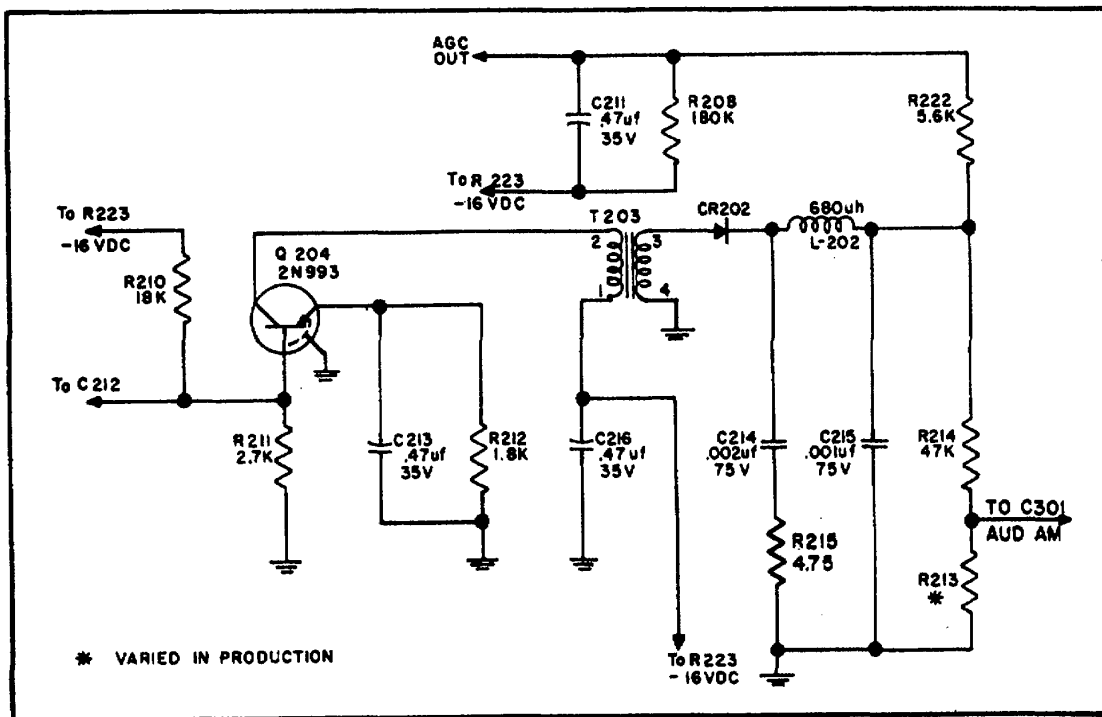


Figure 4-10. Receiver Final IF. Amplifier, Simplified Schematic

Section IV

Paragraphs 4-8 to 4-9

4-8. THEORY OF OPERATION, AUDIO AMPLIFICATION AND MODULATION (RT-278/URC-10).

4-9. The audio amplifier serves a dual function of modulator and audio amplifier. This is accomplished by switching the audio amplifier input and output terminations. In the modulator mode, the speaker/microphone is connected to the preamplifier input and the audio output is applied as modulation to the transmitter 120-MC doubler and final amplifier stages. Audio output transformer (T303) serves a dual function

of modulation coupling transformer and audio output matching transformer to the speaker. In the receiver audio amplifier mode, the output of the receiver detector is capacitance coupled to the audio pre-amplifier input. The audio output transformer is coupled to the speaker. The input of the audio amplifier is a transformer matched circuit. The output is capacitance coupled to the audio driver (figure 4-11), the output of which is transformer coupled to the push-pull power amplifiers (figure 4-12). The audio output is coupled through a transformer (T303) to the transmitter or speaker dependent upon the mode of operation selected.

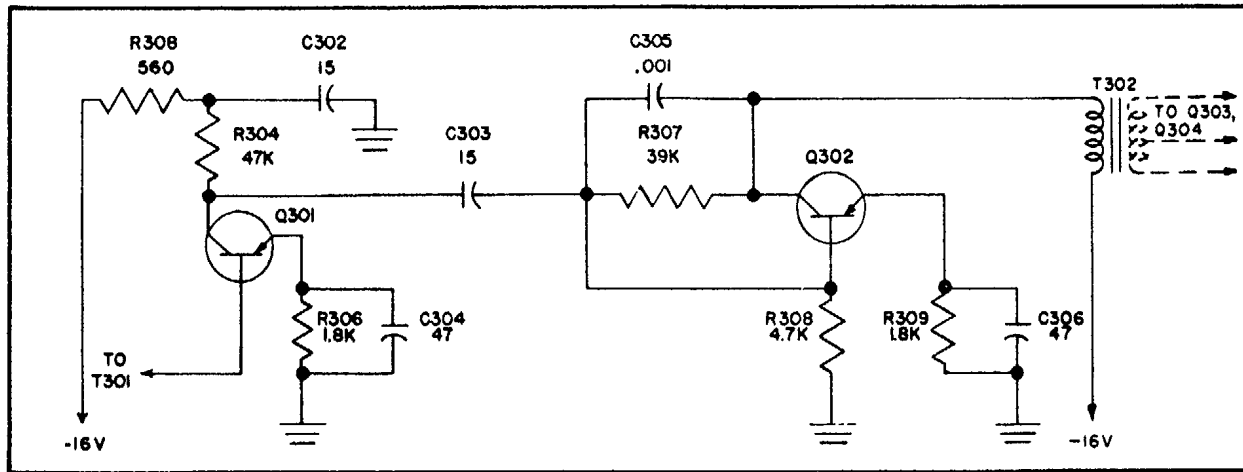


Figure 4-11. Audio Driver, Simplified Schematic

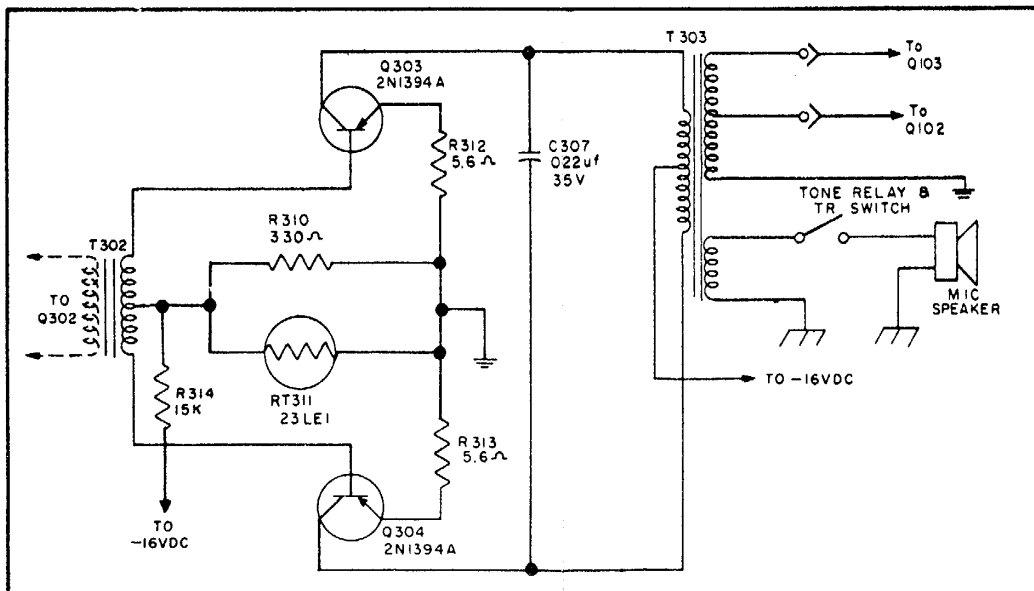


Figure 4-12. Audio Output, Simplified Schematic

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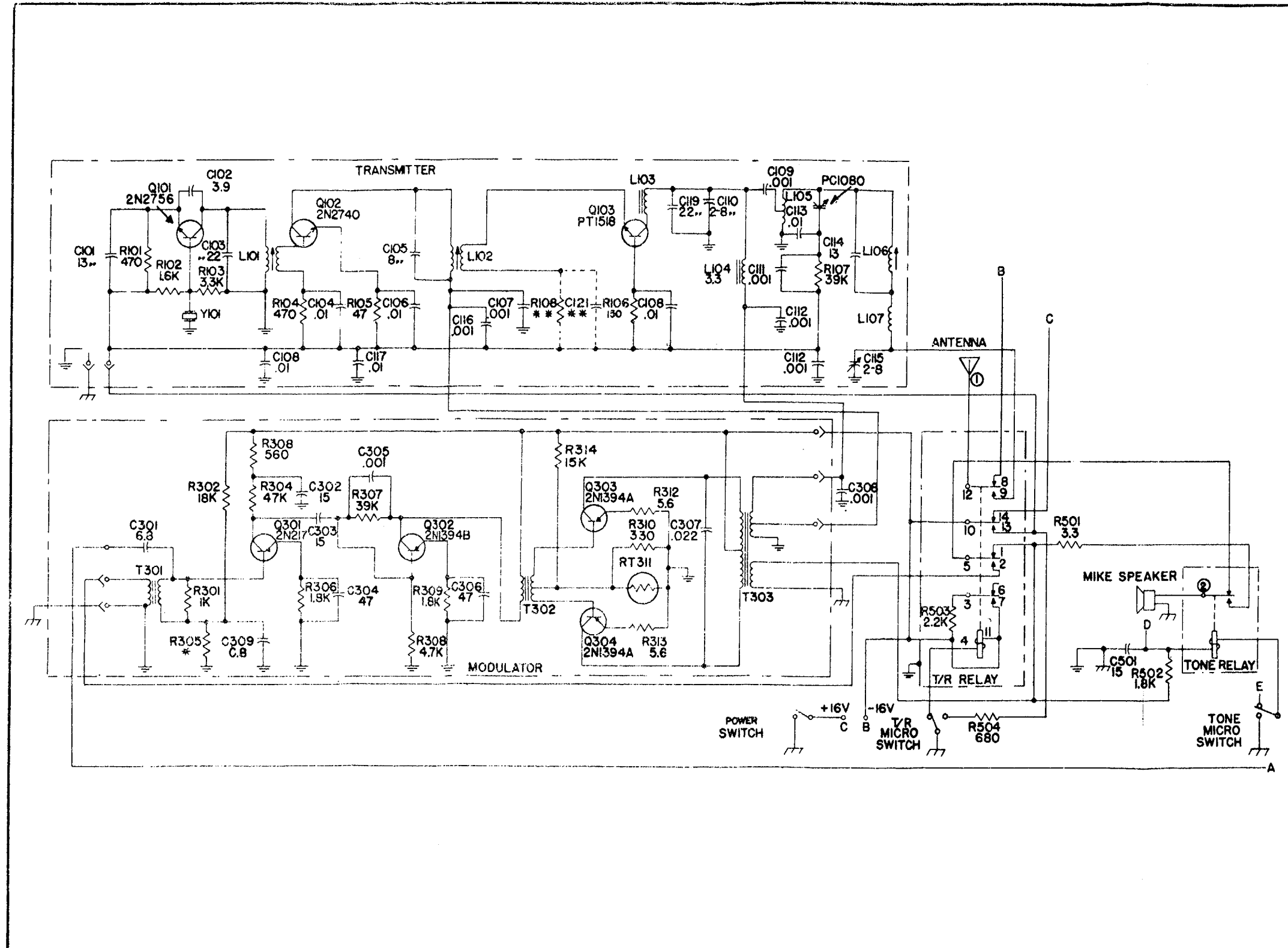
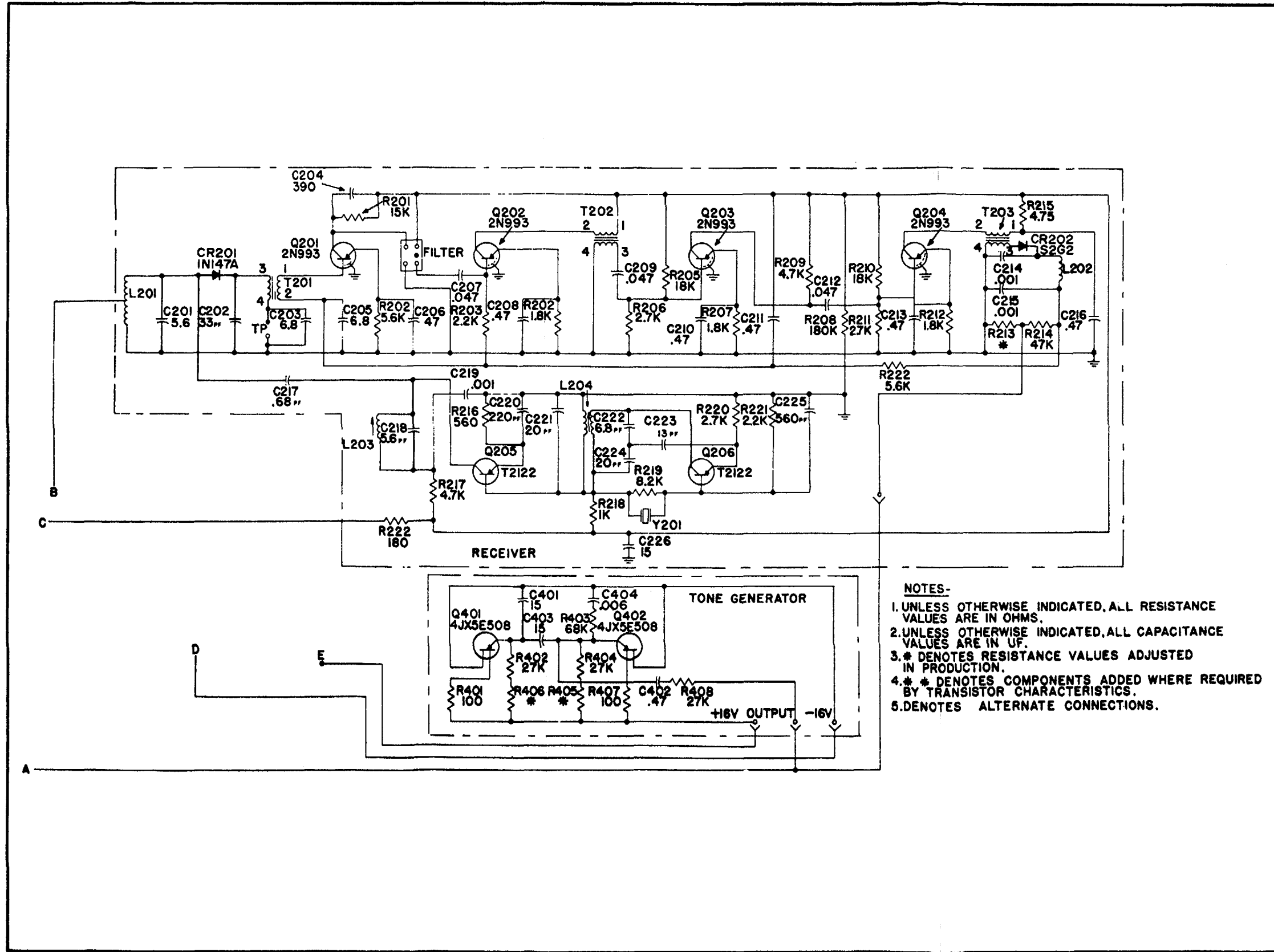


Figure 4-13. Radio Set AN/URC-10 (Receiver-Transmitter RT-278), Schematic Diagram (Sheet 1 of 2)

Section IV



- NOTES-**
1. UNLESS OTHERWISE INDICATED, ALL RESISTANCE VALUES ARE IN OHMS.
 2. UNLESS OTHERWISE INDICATED, ALL CAPACITANCE VALUES ARE IN UF.
 3. * DENOTES RESISTANCE VALUES ADJUSTED IN PRODUCTION.
 4. ** DENOTES COMPONENTS ADDED WHERE REQUIRED BY TRANSISTOR CHARACTERISTICS.
 5. DENOTES ALTERNATE CONNECTIONS.

Figure 4-13. Radio Set AN/URC-10 (Receiver-Transmitter RT-278), Schematic Diagram (Sheet 2 of 2)

Paragraphs 4-10 to 4-19

Section IV

4-10. THEORY OF OPERATION (RT-278A/URC-10 and ACR RT-10).

4-11. Refer to figure 4-14. When the antenna is extended, switch S501 closes to connect the -16 VDC power to the circuits. With neither the t/r switch S502 nor tone switch S503 operated, relay K501 contacts are in the positions shown in figure 4-14 and the receiver module stages receive operating power at this time. Receiver hiss can be heard from the speaker/microphone MK501 at this time.

4-12. The receiver converter oscillator-doubler stage Q201 is a crystal-controlled oscillator, and develops the RF signal at this time. From the out-put of Q201, the signal (at twice the frequency of crystal Y201) is transformer coupled to converter buffer-doubler stage Q202. This stage doubles the signal frequency and transformer couples it through T202 to the converter mixer crystal CR201. Notice that when the receiver-transmitter is in the receive mode, received signals from the antenna are fed through contacts of the t/r relay K501 to the primary circuit of transformer T202. These received signals are then coupled also through T202 to the converter mixer crystal CR201.

4-13. Diode CR201 mixes the converter RF signal, and the received antenna signals to produce their difference frequency (700KC) signal at its output. The frequency of the crystal Y201 is chosen so that the converter signal input to CR201 has a frequency that is 700KC below the desired received antenna signals. From the output of CR201, the 700-KC IF. signals are then fed through four-IF. amplifier stages (Q203 through Q206) to the audio detector stage CR202. Detected audio signals are then fed through the filtering network to terminal E204 of the receiver module. From this terminal, the audio signals are fed to the input terminal E301 of the audio module.

4-14. The audio module stages receive operating voltage whenever the ON/OFF switch S501 is ON. During the receive mode, the audio module functions as a conventional audio amplifier. Audio signals from the receiver module are first applied to pre- amplifier stage 9301. Output from that stage is then further amplified by driver stage Q302 before being applied to push-pull amplifier stages Q303 and Q304. From the output of the push-pull stages, the amplified audio signals are coupled through transformer T303 and through contacts of relay K501 to the speaker/microphone MK501.

4-15. When the t/r switch S502 is actuated to transmit, contacts of relay K501 switch the -16 VDC battery voltage over to the transmitter module stages, and remove operating voltage from the receiver module stages. Also, contacts of K501 connect the speaker/microphone MK501 to the input of transformer T301 of the audio module. The transmitter module generates output RF signals at this time, and the audio module modulates the RF signal produced with- in the transmitter module. Stage Q101 of the transmitter module is a crystal-controlled oscillator, which produces an RF signal at the frequency of the crystal Y101. From the output of Q101, the RF signal is coupled through T101 to buffer-doubler stage Q102. Output from Q102 is

then at twice the crystal frequency, and is coupled through T102 to output amplifier stage Q103. The RF output from Q103 is then coupled to the varactor doubler stage CR101, whose output RF signal (at four times the crystal frequency) is then coupled through L104 and contacts of the relay K501 to the antenna.

4-16. During the voice transmission mode, the speaker/microphone MK501 applies voice signals to the input of the audio module, whose stages then amplify these signals. Amplified audio signals from the push-pull output stages (Q303 and Q304) are then coupled through transformer T303 and contacts of relay K501 to terminal E103 of the transmitter module. From that terminal, the audio signal is fed to stages Q102 and Q103 of the transmitter module to amplitude-modulate the RF signals passing through those stages. Hence, the output RF signals during transmission mode are modulated by voice signals applied to speaker/microphone MK501.

4-17. The tone generator circuit of the receiver- transmitter functions in two modes. First, it is possible to transmit the swept tone signal without monitoring; second, the tone transmission may be achieved while simultaneously monitoring the tone via the speaker/microphone MK501. For either tone mode, both switches S502 and S503 will be actuated to their ON positions; however the sequence in which these switches are actuated will determine which tone mode is obtained. The sequence of operation of S502 and S503 is achieved mechanically by action of the transmit and tone switches of the radio set.

4-18. If the tone is to be transmitted while simultaneously monitoring it, the transmit/receive switch (S502) is first operated, and then the tone switch (S503) is operated as instructed on the radio set instruction plate. This actuates S502 before S503 and the circuits operate as follows. When S502 operates, it energizes the t/r section of relay K501, and its contacts 9-10 connect the -16 VDC to the transmitter module stages and to the tone generator stages. The -16 VDC through resistor R503 at this time charges capacitor C501 to that voltage. Now when S503 is subsequently operated, it connects the ground end of the tone relay section of K501, and also connects the ground circuit to the tone generator stages. Capacitor C501 supplies sufficient discharge current through the tone relay coil at this time to pull in that relay section. Contacts of the tone relay section then connect the speaker/microphone MK501 across output transformer T303 of the audio module. Holding current for the tone relay coil is through R502 and the relay coil.

4-19. The tone generator circuit is now activated and produces a swept tone signal output. Unijunction transistors Q401 and Q402 are connected in audio oscillator configurations, to produce an output tone signal that is swept from approximately 300 to 1000 CPS, at a rate between two and three times a second. The swept tone signal is fed through terminal E511 to the input of the audio module; this same terminal feeds receiver audio signals to the module

during receive mode, or voice signals to the module during voice transmission mode. Amplified swept tone signal from the output of the audio module is then fed to the transmitter module stages Q102 and Q103 (to modulate the outgoing RF signal at this time) and to speaker/microphone MK501 (for monitoring of the swept tone). Resistor R502 provides attenuation of the swept tone signal applied to speaker/microphone MK501 during this tone mode.

4-20. If the swept tone is to be transmitted without monitoring, then the tone switch button only is operated, as instructed on the radio set instruction plate. This action operates switch S503, then switch S502 in that order. When switch S503 operates first, it connects the ground end of the tone relay coil, and connects the tone generator stages to ground as before. However, since S502 has not operated at this time, the t/r relay contacts are in the positions shown in figure 4-14 and the -16 VDC has not been applied through R503 to capacitor C501. No charge exists then on C501.

4-21. When switch S502 now operates the t/r relay section switches to its transmit position as before and -16 VDC is fed through R503. Capacitor C501 charges to the voltage level determined by divider action of R503 and the resistance of the tone relay coil. However, the current flowing through the tone relay coil during this mode never becomes large enough to cause pull-in of the relay section. Contacts of the tone relay section then remain in the positions shown in figure 4-14. Analysis of the circuits under these conditions shows that the tone generator circuit is energized and that its swept tone output is applied to the audio module input as before. The transmitter module is energized, and RF output signal (modulated by the swept tone) is produced at the antenna output at this time. The speaker/microphone MK501 is connected to the primary of T301 in the audio module during this mode, and the swept tone signal is not heard from the speaker/microphone. Resistor R501, in conjunction with R502, discharges capacitor C501 during receive operation, to insure that C501 has no charge voltage accumulated prior to operation of the switches S502 and S503 to their transmission (and/or tone) positions.

4-22. RT-278A/URC-10 and ACR RT-10 Wiring Differences For Serial Number 6773 And Up.

4-23. For units of serial number 6773 and up, wiring changes were made for relay K501 and switch S502, to obtain more reliable operation of the units. Figure 4-15 shows the schematic diagram of these wiring differences. Operation of the units is the same as those of serial number 6772 or less, but electrical switching action differs slightly. First, the antenna connection E506 is no longer switched between the transmitter module output, and the receiver module input for transmit and

receiver modes. Instead the antenna is always connected to the output of the transmitter module, but is disconnected from the receiver module input during the transmit mode. Second, -16 VDC operating voltage is no longer fed through contacts of relay K501 to the transmitter module stages, but is now fed through t/r switch S502 during the transmit mode.

4-24. Activation of the t/r and tone control sections of relay K501 is still basically the same as before, but different paths are used to apply the voltages to the t/r coil as shown. Resistor R501 has also been removed, since it is no longer necessary to remove the charge voltage from C501 during no-tone operation. If at any time, the printed circuit board assembly is replaced in units having a serial number of 6772 or less, it will be necessary to change the case wiring of the unit to accommodate the wiring changes shown.

4-25. The only difference between the RT-278A/URC-10 and ACR RT-10 units is the addition of an integral battery pack to the latter unit, while the RT-278A/URC-10 requires a cable connection to an external 16 vdc plug in battery.

4-26. THEORY OF OPERATION (RT-278B/URC-10A)

4-27. Figure 4-16 is a schematic diagram of radio set RT-278B/URC-10A. Although the overall operation of the radio set is identical with that of the three prior versions, covered in the previous paragraphs, there are differences in the relay circuits and in the circuit configuration of the modules.

4-28. Instead of one composite relay, two separate relays are used for T/R switching and tone switching, respectively, KS01 and K502. Power is applied to the receiver, transmitter, and audio modules, during transmit and receive modes, in essentially the same manner as described in paragraphs 4-15 and 4-16, except for the different relay contact configurations.

4-29. The circuit configuration of the tone generator module is similar to that used in the ACR RT-10 radio set except for minor component changes to accommodate improved unijunction transistors. Audio module circuits have been redesigned to achieve greater audio gain stability under varying voltage and temperature conditions. The receiver module circuits are redesigned to provide improved agc characteristics and increased bandwidth. Local oscillator frequency is changed to permit use of frequency doubling, instead of quadrupling. Transmitter module circuits are redesigned to use frequency doubling after the crystal oscillator, rather than quadrupling. The transmitter final stage is transistorized, instead of using a varicap doubler, thus ensuring improved performance and efficiency.

Section IV

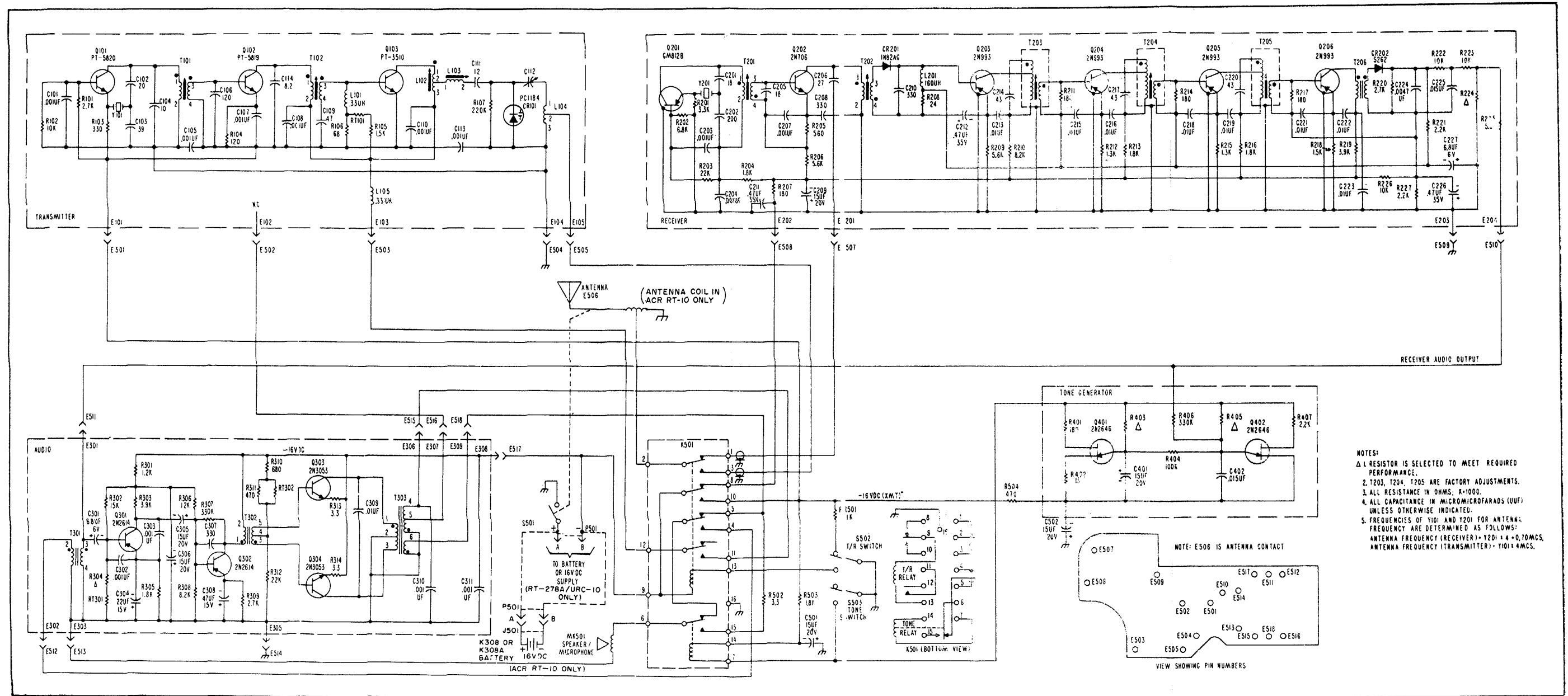


Figure 4-14. Receiver-Transmitter RT-278A/URC-10 and ACR RT-10, Schematic Diagram (Units of Serial Number 1 thru 6772)

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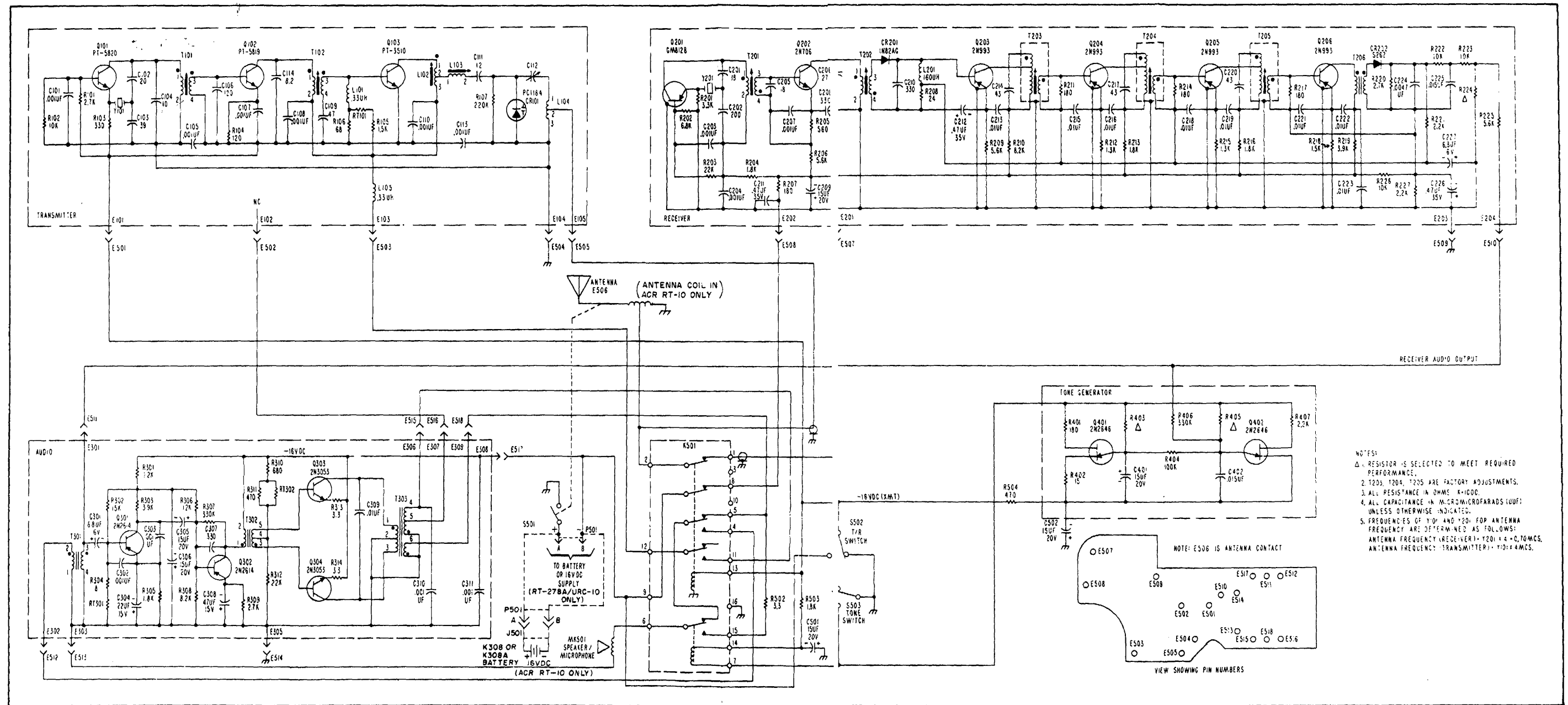


Figure 4-15. Receiver-Transmitter RT-278A/URC-10 and ACR RT-10, Schematic Diagram (Units of Serial Number 6773 and up)

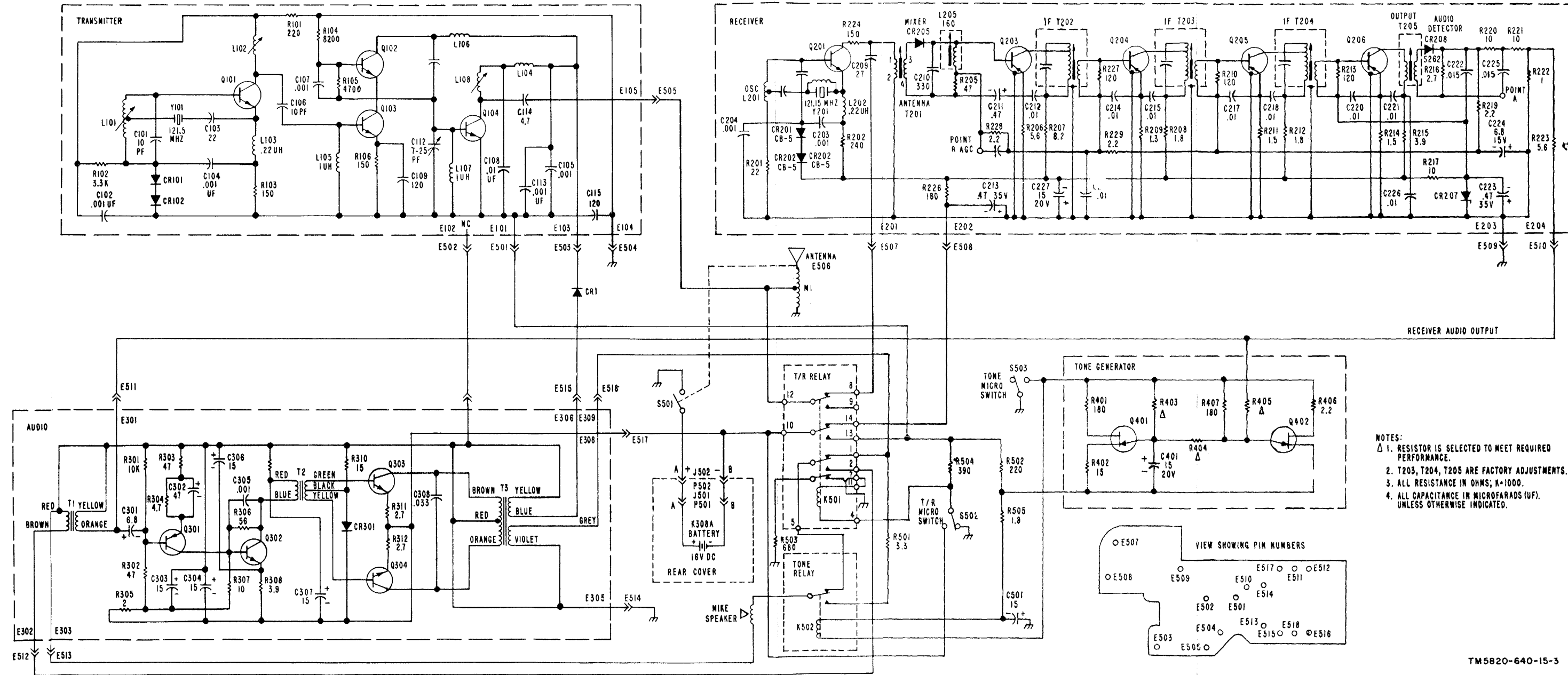


Figure 4-16. Receiver-Transmitter RT-278B/URC-10A, schematic diagram

SECTION V

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Note. The pilot or copilot does not perform preventive or organizational maintenance.

5-1. Scope of Maintenance

The maintenance duties assigned to the organizational electronic equipment repairman or crew chief are listed below, together with references to paragraphs covering the specific maintenance functions. The tools, materials, and test equipment required are listed in paragraph 5-2.

5-2. Tools, Materials, and Test Equipment Required for Organizational Maintenance

- a. Tool Kit, Electronic Equipment TK-101/G.
- b. Lint-free cloth.
- c. Cleaning Compound, FSN 7930-395-9542.
- d. Sandpaper, fine, No. 000.
- e. Test Set, Radio Frequency Power AN/URM-

112.

5-3. Preventive Maintenance

Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the

occurrence of trouble, to reduce downtime, and to assure that the equipment is serviceable,

a. Systematic Care. The procedures given in paragraphs 5-6 and 6-7 cover routine systematic care and cleaning essential to proper upkeep and operation of the equipment.

b. Preventive Maintenance Checks and Services. The preventive maintenance checks and services chart (para 5-4) outlines functions to be performed at monthly intervals. These checks and services are to maintain Army electronic equipment in a combat-serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist the organizational electronic equipment repairman or crew chief in maintaining combat serviceability, the chart indicates what to check, how to check, and what the normal conditions are. The References column lists the paragraphs or illustrations that contain supplementary information. If the defect cannot be remedied by the organizational electronic equipment repairman or crew chief, higher category maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 8-760.

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5-4. Monthly Preventive Maintenance Checks and Services Chart

Seq. No.	Item	Procedure	Reference
PHYSICAL CHECKS			
1	Exterior surfaces	<ul style="list-style-type: none"> a. Clean receiver-transmitter unit ... b. Make visual inspection for dents and cracks. c. Check all exposed metal surfaces for rust and corrosion. 	<ul style="list-style-type: none"> a. Para 5-6. b. None c. Para 5-7.
2	Intercabling.....	<ul style="list-style-type: none"> a. Inspect power cable assembly .. for cracks and breaks. Check the connectors for damage. 	<ul style="list-style-type: none"> a. Figures 1-1 and 1-2.
3	Battery	<ul style="list-style-type: none"> b. Clean cable assembly Inspect external battery or integral battery pack for leakage, corrosion and swelling. Disconnect battery when radio set is not to be used for one or more days.	<ul style="list-style-type: none"> b. Para 5-6. Para 1-14; figures 1-1 and 1-7.
4	Publications.....	Manual must be complete and in usable condition.	None
OPERATION			
5	Controls	While making operating checks (para 5-5), observe that mechanical action of each control button is smooth and free of external or internal binding.	Figures 1-1, 1-2, and 1-3.
6	Connection	Insure firm connections of RT-unit to external battery.	Figures 1-1 and 1-2.
7	Turn-On.....	Extend antenna fully; observe that antenna is clean, free of dents, and remains in extended position. Hiss at this time indicates receiver operating.	Figures 1-1, 1-2, and 1-8.
8	Performance	Test performance of Radio Set AN/URC-10	Para 5-5.
STOPPING			
9	Antenna	Collapse antenna into case of RT-unit; antenna should collapse easily and completely.	Figures 1-1, 1-2, and 1-8.

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5-5. Performance Testing of Radio Set AN/URC-10

Note. Figure 5-1 shows Test Set, Radio Frequency Power AN/URM-172 used for a typical radio set performance check.

Step	Test equipment	Test	Procedure	Normal indication
1	AN/URM-172 ^a	Transmitter performance.	Completely extend bottom section <i>ONLY</i> of collapsible antenna on radio set. Warning: Full or partial extension of section of antenna other than bottom section will cause excessive radiation interference.	N/A.
2	AN/URM-172	Transmitter performance.	Place Radio Set AN/URC-10 in test set tray.	N/A.
3	AN/URM-172	Transmitter performance.	Depress TRANSMIT LEVER.....	ACCEPT. ^b
4	AN/URM-172	Transmitter performance.	Depress TRANSMIT LEVER and push down TONE BUTTON.	Accept and tone should be heard. ^b
5	AN/URM-172	Battery life	Connect battery to be tested to test set via connectors appropriately marked.	Convert meter reading via appropriate table to remaining hours of life. ^c

^aThe AN/URM-172 must always be used with its shield cover in place.

^bThose units that read reject are not suitable to affect an emergency rescue and should be deadlined for maintenance and repair.

^cMaximum hours of battery life remaining is determined by referring to battery data card table listing closest to ambient temperature. If reading indicates less than 60% of maximum life, replace battery.

5-6. Cleaning

Inspect the exterior of the radio set. The exterior surfaces should be free of dust, dirt, grease, and fungus.

a. Remove dust and loose dirt with a clean, soft cloth.

Warning: Prolonged breathing of cleaning compound is dangerous; make sure that adequate ventilation is provided. Cleaning compound is flammable; do not use near a flame. Avoid contact with the skin; wash off any that spills on your hands.

b. Remove grease, fungus, and ground-in dirt from the case; use a cloth dampened (not wet) with cleaning compound.

c. Remove dust and dirt from cable and equipment connectors. Remove grease and grime with a lint-free cloth moistened with the cleaning compound.

5-7. Preservation

Remove rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper. Brush two thin coats of paint on the bare metal to protect it from further corrosion. Refer to the applicable cleaning and refinishing practices specified in TB SIG 364.

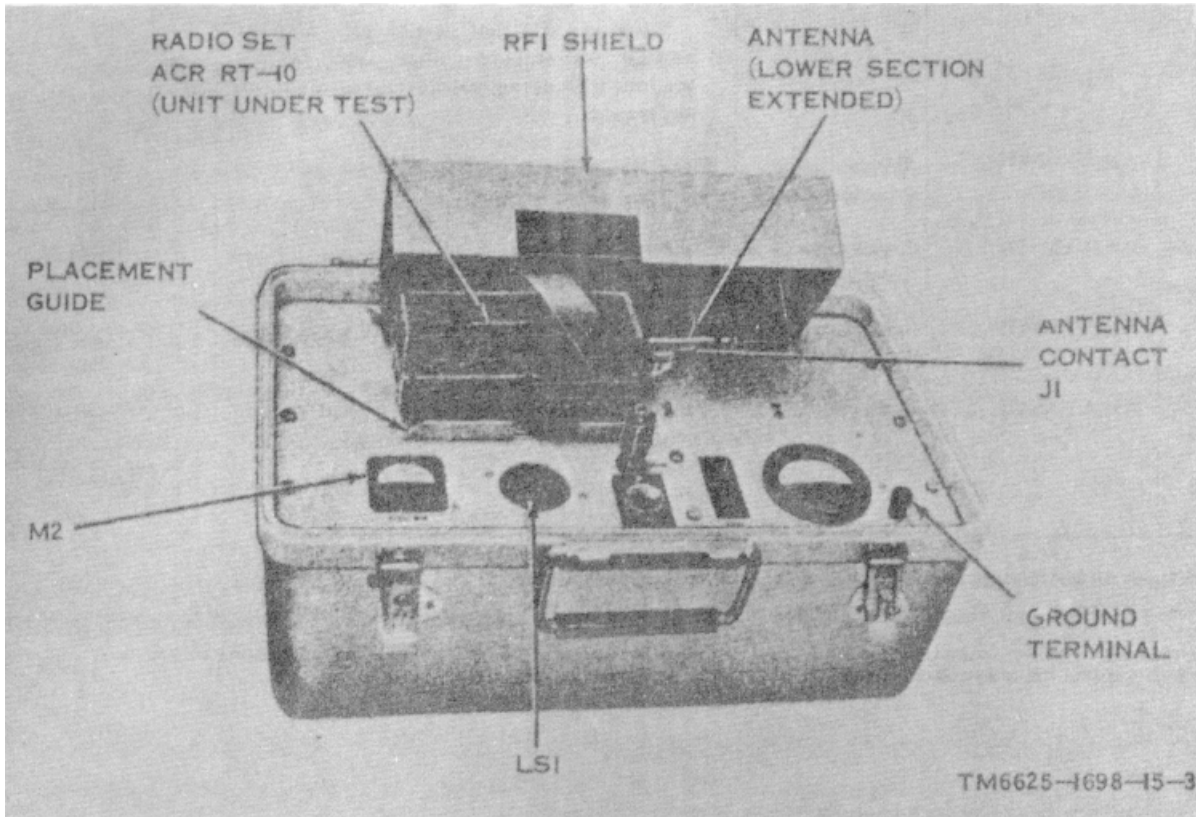


Figure 5-1. Typical Transmitter Test Using Test Set AN/URM-172

SECTION VI

CHECK-OUT, OR ANALYSIS

INDEX OF DIAGRAMS

NUMBER	TITLE	NUMBER	TITLE
6-1	Troubleshooting Radio Set AN/URC-10	6-7	Receiver-Transmitter ACR RT-10, Exploded View
6-3	Radio Set AN/URC-10 or ACR RT-10 Bench Test Set-Up Diagram	6-8	Antenna Assembly, Removal and Replacement
6-5	Radio Set AN URC-10 (Receiver-Transmitter RT-278), Exploded View	6-9	Receiver-Transmitter RT-278A/URC-10, Module and Alignment Locations
6-6	Receiver-Transmitter RT-278A/URC-10, Exploded View	6-10	Modulation Checks, Test Setup

6-1. GENERAL.

6-2. This Section provides instructions for locating and identifying the cause of malfunctions in the radio set.

NOTE

Unless otherwise specified, all procedures given herein for Receiver-Transmitter RT-278/URC-10 also apply directly to Receiver-Transmitters ACR RT-10 and RT-278B/URC-10A..

6-3. BENCH TEST SET-UP.

6-4. The test set-up required for test and alignment of radio sets AN/URC-10 and ACR RT-10 is shown in figure 6-3, No alignment procedures can be performed on radio set RT-278B/URC-10A.

6-5. TROUBLESHOOTING AN/URC-10, ACR RT-10, RT-278B/URC-10A (figure 6-1).

6-6. The test procedure and module substitution guide is designed to evaluate all switches, controls, relays, and performance of the radio set. When application of the recommended substitutions fail to eliminate the trouble, higher echelon repair is necessary. All functions of the radio set, including battery output, are

analyzed and malfunctions indicated on the transceiver test set.

6-7. DELETED

6-8. DELETED

6-9. REMOVAL (RT-278/URC-10). (See figure 6-5.)

6-10. BATTERY REMOVAL.

a. Disconnect connector cable assembly (12) from battery (1).

6-11. MODULE REMOVAL.

a. Remove cover (2) by removing six screws (3) and washers (4).

b. Pull tapes (9) to remove modules (5,6). Remove screw (9) and lock washer (10) from module (8) and pull the module straight out.

CAUTION

Do not rock or twist any module during removal as this action will damage the connector pins and printed circuit board.

c. Grasp module (7) and pull out.

Section VI

Paragraphs 6-12 to 6-19

6-12. SPEAKER/MICROPHONE REMOVAL. Remove cover (25), and screw. Lift speaker/microphone assembly (26) from case (34).

6-13. COMPONENT BOARD REMOVAL. Remove four screws (31) and lock washers (32) and lift component board (30) from case (34).

6-14. REMOVAL (RT-278A/URC-10).

6-15. Refer to figure 6-6, showing the exploded view of Receiver-Transmitter RT-278A/URC-10. All index numbers in the following removal instructions refer to figure 6--6.

6-16. ANTENNA, REMOVAL AND REPLACEMENT. Extreme caution must be used when removing or replacing the antenna assembly from RT-278A/URC-10 to avoid damaging the power switch assembly or its

6-18. When replacing the antenna, it is important that the following procedure be followed to prevent damage to the power switch assembly or its actuator.

a. First position the antenna elements with respect to the plastic antenna insulator assembly (9) as shown in figure 6-6, so that the ball-end of the outermost antenna section projects approximately one-half inch out of the bottom end of the insulator assembly (9).

b. Rotate the insulator assembly (9) so that the switch-actuator slot (lower one) in it faces toward the rear of the radio set case.

c. Holding the antenna sections and plastic insulator assembly (9) in the same relative position to each other, gently insert the antenna assembly into its compartment of the radio set.

d. Insure that the plastic antenna insulator assembly (9) is fully seated (in accordance with the keying notches at its lower end). Then screw the

actuator. Figure 6-8 shows the correct position of the antenna assembly elements during removal and replacement.

6-17. Remove the antenna as follows:

a. Loosen and unscrew the antenna insulator nut (10, figure 6-6), and then extend the antenna sections such that the largest diameter section of the antenna (bottom-most section) projects only about one-half inch out of the antenna compartment.

b. Carefully pull the antenna outward slowly until the top end of the insulator assembly (9) can be grasped. Grasp the plastic insulator assembly (9), and while holding this assembly and the antenna sections in the same relative positions to each other, continue to pull them out of the antenna compartment.

antenna insulator nut (10) into the case and tighten it securely.

e. Extend the antenna and listen for receiver hiss output to check ON/OFF switch action.

6-19. REMOVAL AND REPLACEMENT OF RADIO SET COVER. To remove or replace the cover (1, figure 6-6) from the RT-278A/URC-10, or ACR RT-10 (1, figure 6-7), proceed as follows:

a. Loosen the six captive screws (2) and gently lift the cover off. Disconnect P501 (ACR RT-10 only). Use care to prevent damage to the preformed packing (4) in the cover. Use care to prevent damage to the sealing land of the set while the cover is OFF. Do not let tools accidentally strike the sealing land.

b. When replacing the cover (1) on the radio set, insure that the cushioning pad (5) and the preformed packing (4) are in their correct positions in the cover, connect P501 (ACR RT-IO only). Install the cover and tighten the six captive screws (2) securely.

Step	Test equipment	Test procedure	Normal indication	If indication	
				Is normal	Is abnormal
1	AN/URM-172	Remove battery and connect to test set via appropriate connectors. (Refer to para 1-13 and 1-14).	Battery tests OK. (Refer to para 5-5).	Proceed to step 2.	Replace battery.
2	AN/URM-172	Extend antenna fully	Rushing sound in speaker	Proceed to step 3	Replace receiver module; then audio module if necessary.
3	AN/URM-172	Completely extend the bottom section ONLY of the collapsible antenna on the radio set. Warning: Full or partial extension of section of the antenna other than the bottom section will cause excessive radiation interference.	Test Set Meter reads "ACCEPT".	Proceed to step 4.	Replace transmitter module.
4	AN/URM-172	Place Radio Set AN/URC-10 in the Test Set Tray. Depress TRANSMIT LEVER. Depress TRANSMIT LEVER and push down TONE BUTTON (tone monitor mode).	Test Set Meter reads "ACCEPT" and swept tone heard in speaker.	Proceed to step 5.	Replace tone module.
5	See figure 6-3	Measure transmitter output power (para 6-31).	Output power measures at least 200 mw.	Proceed to step 6.	Align or replace Transmitter module
6	See figure 6-3	Measure receiver sensitivity (para 6-33).	As specified in para 6-33	Unit is acceptable.	Align or replace receiver module.

Figure 6-1. Troubleshooting, Radio Set AN/URC-10

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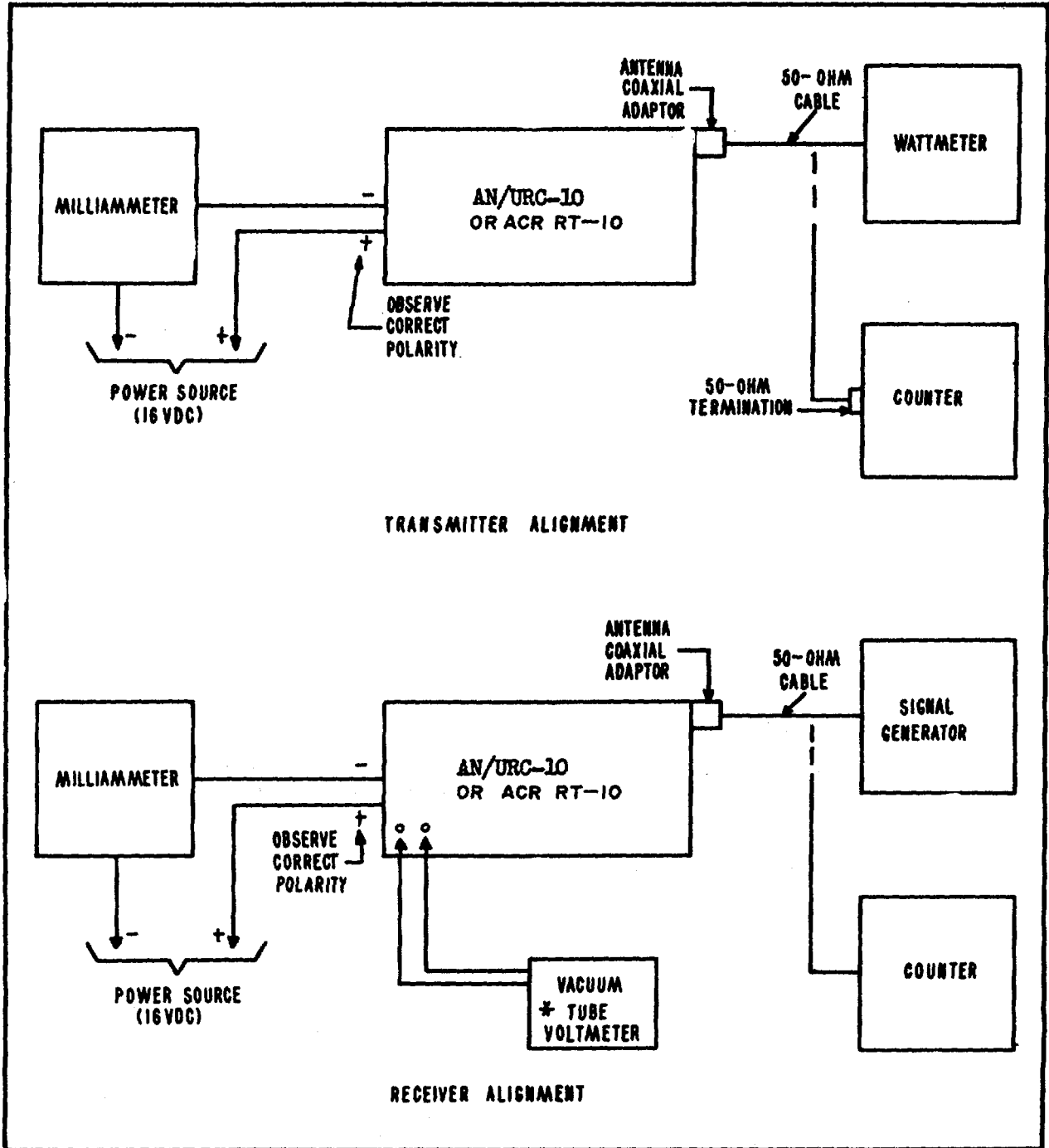


Figure 6-3. Radio Set AN/URC-10 or ACR RT-10 Bench Test Set-Up Diagram

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Paragraph 6-20

Note

If the preformed packing (4) needs replacement at any time, coat the new preformed packing with Dow-Corning DC-4 compound before pushing the packing into its groove in the cover.

6-20. REMOVAL AND REPLACEMENT OF BATTERY (RT-278A/URC-10 AND ACR RT-10).

a. To remove the battery from the RT-278A/URC-10, first loosen the locknut on the connector of the cable assembly (39, figure 6-6). Then loosen the connector from the battery (67) and disconnect it. When replacing the battery, first mate the connector to the battery and fasten it securely. Then tighten the locking ring on the connector, to achieve a water-tight connection.

b. Two different types of batteries are used in ACR RT-10 units: the K308 battery pack (figure 1-6) is integral with the rear cover and battery replacement necessitates discarding the entire rear cover assembly; the K308A battery pack, figure 1-8, can be separated from the rear cover and replaced without disassembling the unit.

c. To remove the K308 battery pack and rear cover from the ACR RT-10 (figure 6-7), loosen the six captive screws (2) and move aside the cover to expose the battery connector, P501 (74). Remove P501, discard the battery pack and rear cover. When replacing the battery pack and rear cover, insure that cushioning pad (5) and preformed packing (4) are correctly positioned. Connect P501 (74), install cover (1), and tighten six screws (2).

d. To remove the K308A battery pack (66) from the ACR RT-10 (figure 6-7), grasp the lanyard on the battery retainer clip (67) and swing the clip outward from the case. Grasp the battery (66) and slide downward out of the rear cover channels. Replace the new battery by sliding upward into the rear cover channels, making sure that the flexible silicon-rubber material at the top of the battery is penetrated by the two wire prods in the top of the battery contact plate (69). Grasp the lanyard and swing down the retainer clip (67) to secure the battery in place.

Note

K308 and K308A battery packs are interchangeable providing that the respective rear covers are also replaced.

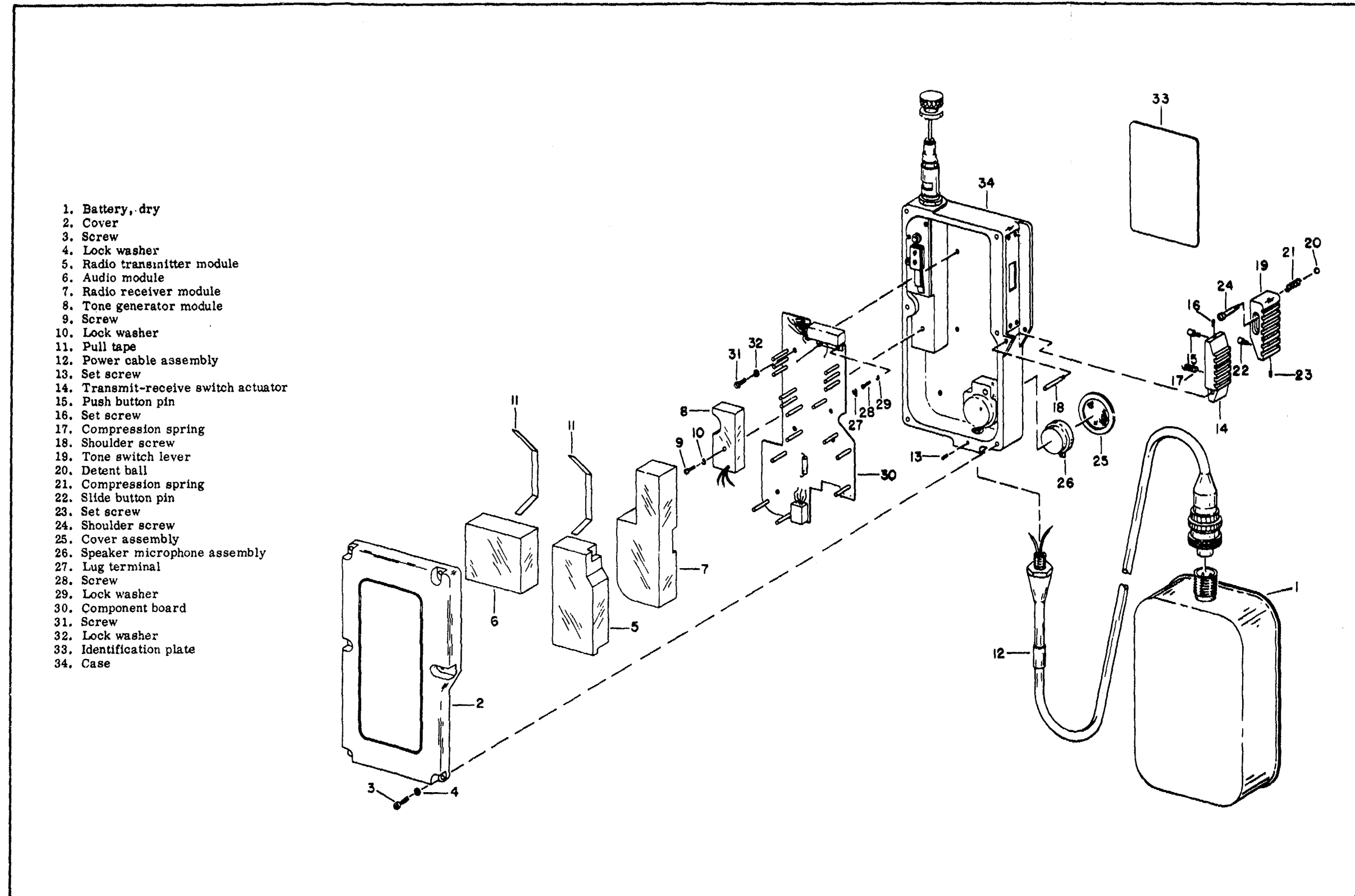


Figure 6-5. Radio Set AN/URC-10 (Receiver-Transmitter RT-278), Exploded View

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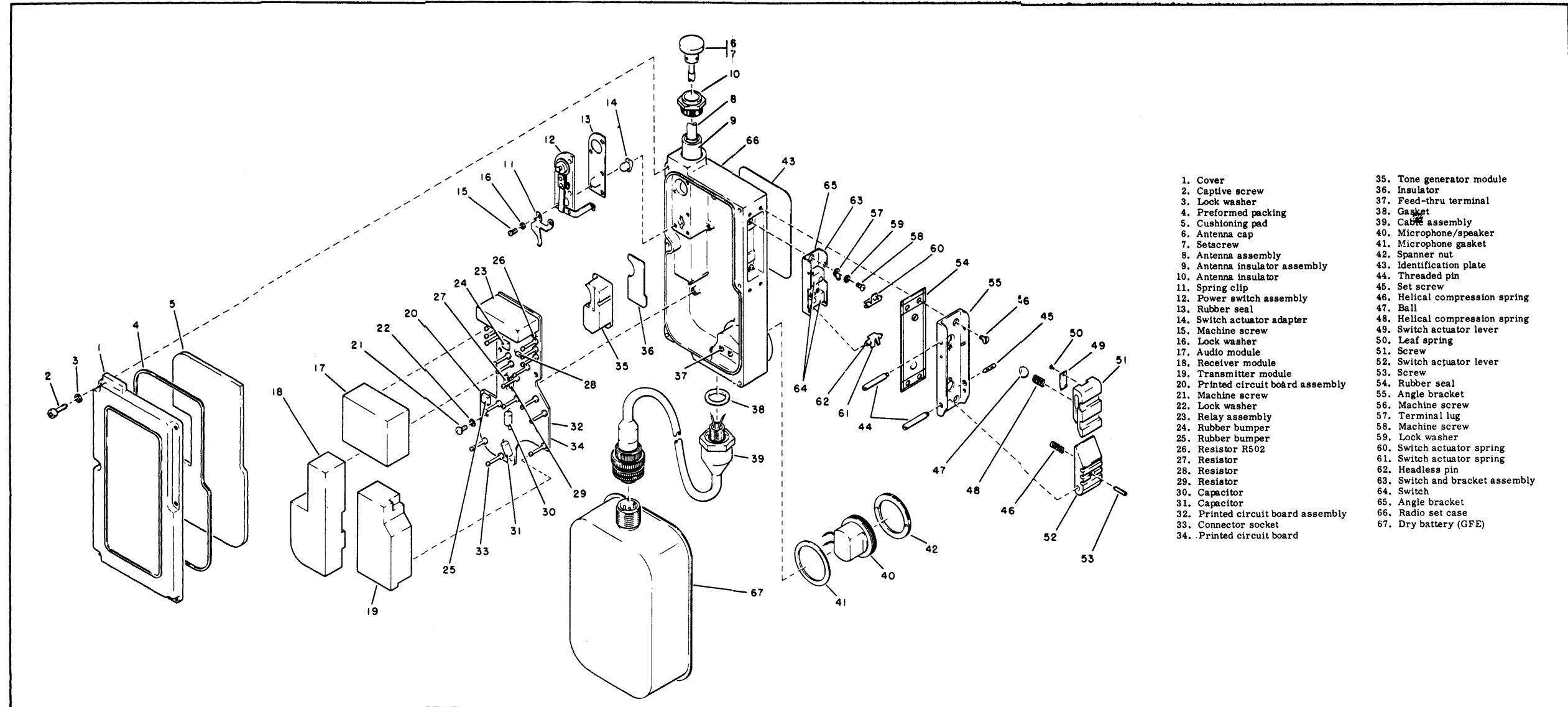


Figure 6-6. Receiver-Transmitter RT-278A/URC-10, Exploded View

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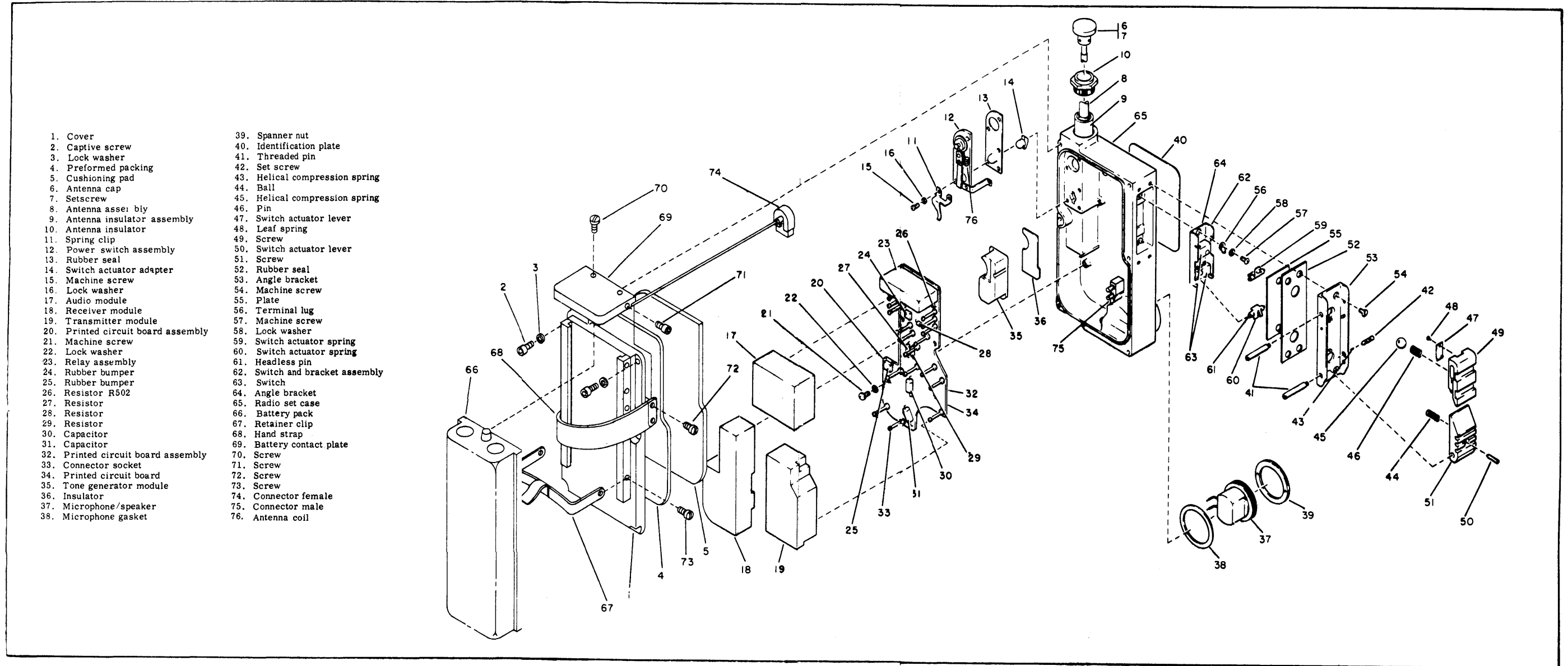


Figure 6-7. Receiver-Transmitter ACR RT-10, Exploded View

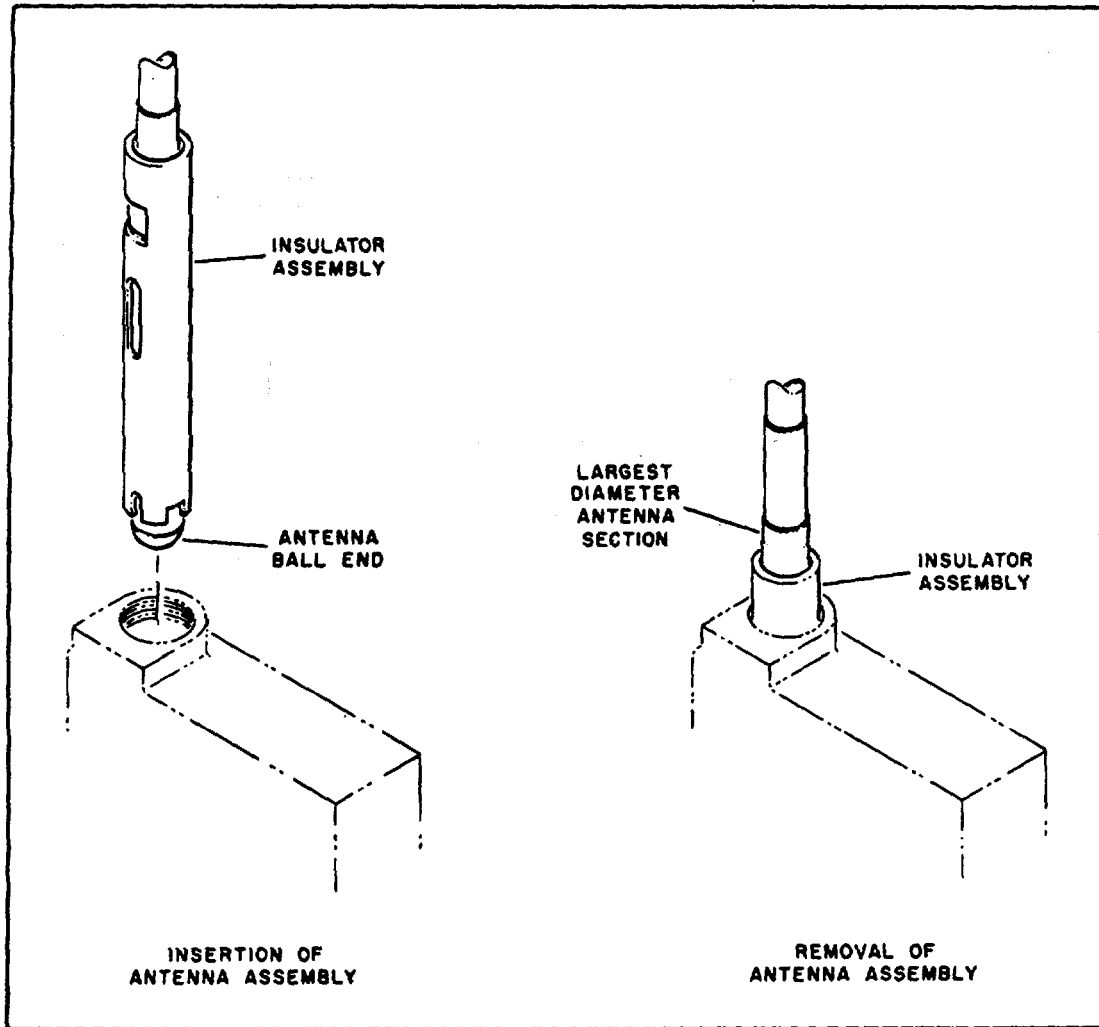


Figure 6-8. Antenna Assembly, Removal and Replacement

6-21. REMOVAL AND REPLACEMENT OF MODULES (RT-278A/URC-10 or ACR RT-10).

a. Remove the cover (1, figure 6-6) as instructed in paragraph 6-19.

b. To remove any of the three plug-in modules (receiver, transmitter, or audio module), gently grasp the module (or the lanyard of the audio module) and pull it straight outward from the radio set.

CAUTION

Use care when removing modules, to prevent damage to the connector sockets(33, figure 6-6) or to the printed circuit board assembly (34).

c. To replace any module, position the module over its connector sockets (33) correctly and push the module into place. Insure that the module is fully seated into place. Replace the cover (1).

6-22. REMOVAL AND REPLACEMENT OF SPEAKER/MICROPHONE. Removal of the speaker/microphone from the RT-278A/URC-10 or ACR RT-10 requires the following procedure:

a. Remove the spanner nut (42, figure 6-6). Then lift the speaker/microphone (40) out of its waterproof compartment.

b. When replacing the speaker/microphone first seat it in its compartment. Install the gasket (41). Replace the spanner nut (42) and tighten it.

6-23. REMOVAL AND REPLACEMENT OF PRINTED CIRCUIT BOARD ASSEMBLY. The printed circuit board assembly of the radio set (32, figure 6-6) is removed or replaced as follows:

a. Remove the cover (1) and remove the three plug-in modules (receiver, transmitter, and audio module).

b. Remove the five machine screws (21) which hold the printed circuit board assembly in the case.

c. Remove the five machine screws and lock washers (15 and 16) and hold the switch assembly (12).

d. The printed circuit board assembly, the switch assembly, and the tone generator module (35) can now be lifted out of the case far enough for inspection of the track side of the printed circuit board assembly. If complete removal of the printed circuit board assembly is required, unsolder the necessary wires between the board assembly and the speaker/microphone terminals, switch assembly, or tone generator module.

e. To replace the printed circuit board assembly, first resolder any wires that were disconnected during removal. Then replace the board assembly in its correct position within the case and reinstall the five machine screws (21) that mount the printed circuit board assembly.

f. Position the tone generator module (35), the switch assembly (12) and the spring clip (11) in their correct positions and fasten them with the five machine screws and lock washers (15 and 16).

g. Reinsert the plug-in modules and replace the cover.

6-24. CONTINUITY TEST PROCEDURE. This paragraph covers the DC circuit checkout for the motherboard, relay, switch and cable configuration. The three plug-in modules should first be removed. The motherboard, relay and tone generator module can best be removed as an assembly.

6-25. The motherboard and switch circuits are shown in figure 4-14 and figure 4-15. The original version, figure 4-14, can be readily identified since it includes a resistor R501 which is not in the later version. This continuity test procedure can be used to check either version and is performed as follows:

a. Do not connect battery or other power to the unit. Visually check all wires, components and contacts.

b. Check S501 for resistance to ground. Minimum resistance 10 megohms.

c. Extend antenna to its maximum length. The resistance of S501 to ground shall be less than 0.1 ohm.

d. Check resistance between the following terminals. Resistance should be less than 0.2 ohms.

E508 to E517
E518 to speaker terminal (purple lead)
E507 to E506 (antenna contact)
E502 to E516
E510 to E511
E513 to speaker terminal (black lead)
E504, E509 and E514 to case (GRD)

6-25.1. REMOVAL (RT-278B/URC-10A).

6-25.2. Refer to figure E-4 for an exploded view of Receiver-Transmitter RT-278B/URC-10A. Removal procedures for components of this radio set are identical to those provided, and referenced below, for radio set ACR RT-10 with K308A battery. Note that differences may exist with regard to item index numbers; be sure, however, that item nomenclature is the same.

a. Antenna Removal and Replacement. Refer to paragraph 6-16. Note that antenna cap and nut used on RT-278B/URC-10A is threaded and must first be unscrewed before removal.

b. Removal and Replacement of Cover. Refer to paragraph 6-19.

c. Removal and Replacement of Battery. Refer to paragraph 6-20d.

d. Removal and Replacement of Modules. Refer to paragraph 6-21; tone generator module removal and replacement is covered in paragraph 6-23.

e. Removal and Replacement of Speaker/Microphone. Refer to paragraph 6-22.

f. Removal and Replacement of Printed Circuit Board Assembly. Refer to paragraph 6-23.

6-26. Alignment and Adjustment

The following paragraphs describe the radio set alignment and adjustment procedures. Note that the radio sets which have antenna coil modifications must be amended by the following instructions:

- a. Before performing the test procedure, disconnect the antenna coil ground connection by removing the screw and lifting the solder lug (fig. 4-14, 4-15, and 4-16).
- b. Perform the required procedure.
- c. When the test procedure is completed, replace the antenna coil ground connection.

NOTE

No alignment procedures are to be performed on Receiver-Transmitter RT-278B/URC-10A.

6-27. Receiver Alignment (RT-278/URC-10)

Perform the following procedures to align the receiver portion of the radio set.

- a. Remove the antenna assembly, and install the antenna coaxial adapter in its place.
- b. Connect the equipment as shown in figure 6-3.
- c. Remove the cover from the radio set and install the test cover.
- d. Adjust alignment coils L201, L203, and L204 (fig. 6-11).

6-28. Transmitter Alignment (RT-278/URC-10)

Perform the following procedures to align the transmitter portion of the radio set.

- a. Remove the antenna assembly and install the antenna coaxial adapter in its place.
- b. Connect the equipment as shown in figure 6-3.
- c. Remove the cover from the radio set and install the test cover.
- d. Depress TRANSMIT LEVER and insert a wedge to hold actuator in transmit mode.
- e. Adjust alignment coils L101, L102 and capacitors C110 and C115 (fig. 6-11).

6-29. Receiver-Transmitter, Radio RT-278A/URC-10) or ACR RT-10 Alignment

Figure 6-3 and figure 6-10 show the test setups required during alignment. This alignment includes measurement of the transmitter frequency, modulation and power, the receiver frequency and sensitivity, and actual adjustments of the transmitter and receiver modules to achieve correct power and sensitivity values.

Caution: When making alignments to the transmitter or receiver module, use only the non-metallic alignment tools specified. Use only tools which mate correctly with the alignment capacitor slots or the tuning slugs, to prevent damage to the tuning devices. When using the hex tool, insert it fully into the coil slug until the end of the tool hits bottom. Do not use undue force on any tuning device.

6-30

For the following alignment procedure, the antenna assembly is removed and replaced by the antenna coaxial adapter. If this antenna coaxial adapter is not available, alignment may be accomplished by connecting

Section VI

Paragraphs 6-31 to 6-32

the test equipment directly to the antenna, provided that the antenna sections are collapsed so that only the largest section of antenna extends out of the case (which must be done to operate the ON/OFF switch of the radio set). Measurements taken using this alternate method will be relative values only, but may be compared with measurements taken on known-good radio set, using the same test setup. This comparison can then be used to determine if any specific radio set requires alignment or other repair. Alignment procedures are the same as when using the antenna coaxial adapter, except that the signal values specified are no longer valid.

6-31. TRANSMITTER MODULE ALIGNMENT (RT-278A/URC-10 or ACR RT-10). (See figure 6-9.)

a. Remove the antenna assembly, and install the antenna coaxial adapter in its place.

b. Connect the electronic counter to the coaxial adapter. Momentarily key the transmitter, and check that the counter indicates the correct frequency for transmission within $\pm 0.003\%$ (243.0 MC for distress band).

c. Connect the wattmeter to the antenna coaxial adapter, and again momentarily actuate the transmit switch to measure transmitter power output. Check that output power is at least 200 MW.

d. If the above measurements are correct (frequency and power), do not perform any further alignment of this module. If incorrect frequency or power values are observed in steps a. through c., proceed as follows:

(1) Connect the equipment as shown in figure 6-3, and connect the wattmeter to the antenna coaxial adapter. Remove the cover from the radio set and install the test cover (having holes for alignment).

(2) Key the transmitter and check for indication of output power; then peak all adjustments as described in step f.

e. If no output power indication is observed when the radio set is keyed, proceed in the following manner:

(1) Preset the following adjustments as noted:

L102 - bottom end of its range, inward
L103 - half-way in
T102 and T101 - slugs flush with the outward end of Coil form.

(2) Connect the ammeter in the power line as shown in figure 6-3 and adjust T101 inward until the first peak of current is noted on the ammeter.

(3) Adjust T102 inward until maximum current reading is obtained.

(4) Slowly adjust C112 for an indication of output power. If none is seen, alternately adjust L103 one-turn in either direction and then again adjust C112 until an output power indication is obtained.

f. After the initial output power indication is obtained, adjust all of the transmitter module alignments to obtain maximum output power indication. Use the position of T102 (it has two peak positions) that yields greatest output power. Adjust L102 as required to keep the total current drain by the radio set below 200 milliamperes (when swept tone transmission is used without monitors).

g. Next, disconnect the wattmeter and check the modulation level (per Instructions of paragraph 6-32). If modulation levels are incorrect, repeat step f. adjustments until correct modulation levels are simultaneously obtained with the correct output power and current drain. Then connect the electronic counter to the antenna coaxial adapter. Key the transmitter and observe the frequency indication on the counter.

h. Adjust T101 of the transmitter module, until the frequency read by the counter is equal to the specified transmitter frequency, within plus or minus 5 KC.

i. Disconnect the test equipment and remove the antenna coaxial adapter and the alignment cover from the radio set. Reinstall the antenna assembly (paragraph 6-16) and the cover (paragraph 6-19). Reconnect the associated battery (paragraph 6-20) to the radio set.

6-32. MODULATION CHECK (See figure 6-10). For this modulation check, it is first assumed that the radio set has been connected as shown, and that the transmitter module power output adjustments have been made (paragraph 6-31, steps a. through f.)

a. Connect the audio signal generator either electrically or acoustically (by use of a speaker) to the microphone/speaker of the radio set, to apply input audio signals when desired.

b. Set the variable attenuator for 12-DB attenuation. Key the transmitter and adjust the oscilloscope centering controls until the sweep is deflected vertically to the half-scale mark on the graticule.

c. Unkey the transmitter and set the variable attenuator for 6-DB attenuation; then key the transmitter and adjust the vertical gain control on the oscilloscope until the sweep is deflected to the full-scale graticule mark.

d. Repeat steps b. and c. (they interact) until correct indications are obtained for both positions of the variable attenuator (half-scale deflection for 12-DB position, and full-scale deflection for 6-DB position).

e. Key the transmitter and apply input audio signal (from the audio signal generator) to the radio set. Set the audio signal generator to produce approximately 1000-CPS signal. Adjust the amplitude of the audio

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Paragraph 6-33

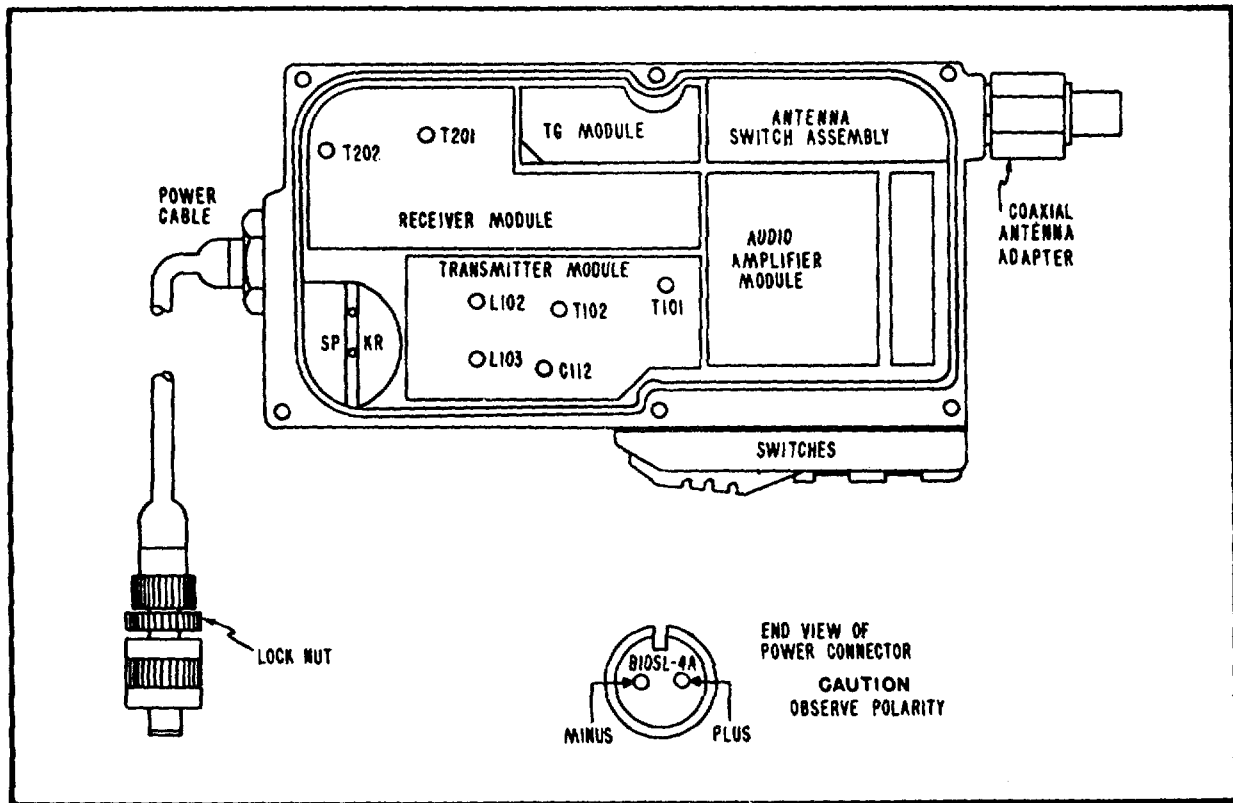


Figure 6-9. Receiver-Transmitter RT-278A/URC-10, Module and Alignment Locations

audio signal until limiting signals are observed on the oscilloscope. Adjust the oscilloscope controls as required to SYNC the signals on the display.

f. Using the graticule markings on the oscilloscope, check the positive and negative modulation levels of the displayed signals. As calibrated in steps b, c, and d, the half-scale graticule mark represents 0% modulation level. The full-scale graticule mark represents 100% positive modulation level at this time. Negative 100% modulation level is now represented by the position of the oscilloscope sweep when the transmitter is unkeyed.

g. Check that the positive modulation peaks of the displayed signal are at least 80% (the positive peaks of the signal should be positioned at least 80% of the distance between the half-scale and full-scale graticule marks on the oscilloscope).

h. Check that the negative modulation peaks of the displayed signals are at least 90% (the negative signal peaks should be positioned at least 90% of the distance between the half-scale graticule mark and the 100% negative modulation position (the position of the sweep when the transmitter is unkeyed)).

i. If the modulation levels are not correct, repeat the tuning procedures for the transmitter module, varying the settings slightly until correct modulation levels are obtained simultaneously with the correct output power and current drain for the transmitter module.

j. After modulation levels are checked, continue with the tuning and alignment checks for the transmitter module (paragraph 6-31, steps g. on).

6-33. RECEIVER MODULE ALIGNMENT RT-278A/URC-10 or ACR RT-10). (See figure 6-9.)

CAUTION

Do not attempt to realign the IF stages of the receiver module.

a. Remove the antenna assembly and install the antenna coaxial adapter in its place.

b. Remove the cover and install the test cover. Then, connect the test equipment as shown in figure 6-3. Connect the signal generator first to the antenna coaxial adapter and adjust it to apply a 5-microvolt 30-percent-modulated (1000 CPS) signal to the radio set input. Adjust the signal generator frequency to the specified

Section VI

Paragraphs 6-34 to 6-35

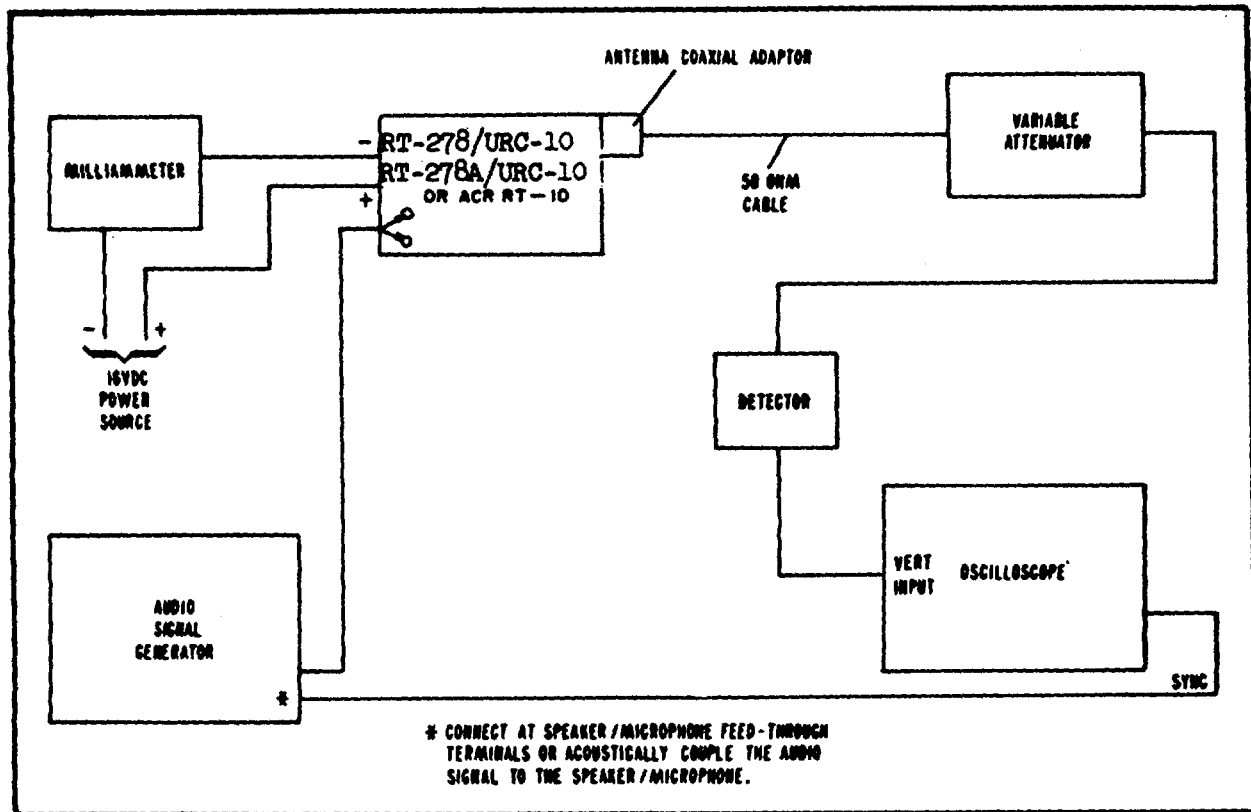


Figure 6-10. Modulation Checks, Test Setup

receiver frequency, within plus or minus 2 KC.

c. Note the VTVM reading at this time (DB reading).

d. Remove modulation from the signal generator output, and note that the VTVM reading decreases by at least 6 DB.

e. If the indications observed in steps a. Through d. are correct, no further alignment is required for the receiver module. In the event incorrect indications are obtained in steps a. through d., proceed as follows: (Refer to step f. if no oscillator signal was present during step d.)

(1) Connect the signal generator to the antenna coaxial adapter and adjust the RF signal (30-percent-modulated 1000-CPS signal) until some indication is seen on the VTVM. Adjust the signal generator frequency to the specified receiver frequency, within plus or minus 5 KC.

(2) Observing the VTVM reading, again adjust the signal generator frequency, to obtain a maximum reading on the VTVM. Then adjust T202 of the receiver module to obtain maximum VTVM indication (T202 has two peak positions; use that which gives

maximum VTVM indication). Readjust the RF signal level if required to keep the VTVM on scale.

(3) Remove the modulation signal and check for 6 DB decrease in output signal (measured on the VTVM). Adjust T201 of the receiver module so that at least 6 DB decrease in output signal occurs when modulation is removed from the test input signal.

f. If the oscillator in the receiver module is not oscillating, adjust T201 of the receiver module until an increase of current is seen on the ammeter (figure 6-3). After oscillation is obtained, proceed with steps (1) through (3) to align the module.

g. After all alignment has been performed for the receiver module, remove the antenna coaxial adapter, the test equipment, and the alignment cover from the radio set. Reinstall the antenna assembly (paragraph 6-16) and the cover (paragraph 6-19).

6-34. MAINTENANCE AND INSPECTION SCHEDULE.

6-35. The required maintenance procedures for the radio set are detailed in figure 6-11.

Section VI

I. VISUAL INSPECTION

UNIT	CHECK FOR
1. Case; 2. Switches; 3. Relays; 4. Antenna; 5. Battery cable	Cracks, decomposed gaskets or insulation, oxidation or corrosion, freedom of movement of controls, positive action of switches and relays; relay pull-in and drop-out with minimum voltage requirements.

II. LUBRICATION

(Receiver-Transmitter RT-278A/URC-10 or ACR RT-10)

Remove five (5) screws (Fig 7, 15) and five (5) washers Fig 6-7, 16). This provides access to the antenna switch compartment when items Figure 6-7, 12 & 13 are removed. Inspect for saturation of the compartment with silicon grease. If it is not, saturate the antenna switch compartment with Dow Corning silicon grease, DC4 or equivalent. The grease is necessary to maintain the units water tightness.

III. ALIGNMENT (Receiver-Transmitter RT-278/URC-10)								
IN					OUT			
TEST STEP	PARA REF	TEST EQUIP.	TEST POINT	SIGNAL IN	TEST EQUIP.	TEST POINT	SIGNAL OUT	REMARKS
1. Receiver oscillator	6-27	RF Generator	1	RF-243 MC modulated 30% with 1000 CPS	1.Audio power indicator 2.Oscilloscope	2	Observe indicator on oscilloscope	Adjust L204 for 1000 CPS indication on scope.
2. Receiver RF and quadrupler coil	6-27	RF Generator	1	RF-243MC modulated 30% with 1000 CPS	1. Audio power indicator 2.Oscilloscope	2	Observe indicator on oscilloscope	Adjust L201 and L203 for MAX indication with the least amount of RF from generator
3. Transmitter oscillator	6-28	0-200 MA meter in DC power line	NA	NA	RF power indicator	1	Observe milliammeter in power line	Adjust L101 for peak reading on milliammeter
4. RF amplifier adjustment	6-28	NA	NA	NA	RF power indicator	1	Observe RF power	Adjust C110, and C 115 for MAX power indication
5. RF doubler	6-28	NA	NA	NA	RF power indicator	1	Observe RF power	Adjust L102 for MAX power indication
6. Transmitter overall	6-28	NA	NA	NA	RF power indicator	1	200 MW adjust L101, L102, C110 and C 115 for MAX power indication	Carefully

Figure 6-11. Maintenance - Alignment - Adjustment Chart (Sheet 1 of 2)

Section VI

III. ALIGNMENT

(Receiver-Transmitter RT-278/URC-10)

TEST STEP	PARA REF	TEST EQUIP.	TEST POINT	SIGNAL IN	TEST EQUIP.	TEST POINT	SIGNAL OUT	REMARKS
NOTE								
Place test cover (supplied with test set) on unit and perform steps 7 and 8.								
7. Receiver	6-27	RF Generator 243 MC modulated 30% at 1000 CPS	Antenna extended	Proximity coupling from radiated power	NA	NA	Audible from speaker	Adjust L204, L203, and L201 for MAX audible signal with least amount of radiated power
8. Transmitter	6-28	NA	NA	NA	wattmeter	Extended antenna	Observe indication on watt-meter	Adjust L102, C10 and C115 for MAX indication on field strength meter
<p>TEST POINT 1 -- Remove lead from antenna feed-thru and use this to insert RF signal when aligning receiver and for monitoring RF power when transmitting.</p> <p>TEST POINT 2 - Remove leads from speaker, terminate with 4 ohms, and observe output on audio power meter and scope across termination.</p>								

III. ALIGNMENT

(Receiver-Transmitter RT-278/URC-10)

1. Transmit frequency	6-31	Electronic counter (FIG. 6-3)	1	NA	NA	NA	NA	Specified transmit frequency plus or minus 5 KC
2. Transmit power	6-31 (FIG. 6-3)	Wattmeter	1	NA	NA	NA	NA	At least 200-MW output power
3. Transmit modulation	6-32	Oscilloscope, audio generator, detector, attenuator (FIG. 6-10)	1	1000 CPS audio	NA	NA	NA	At least 80% positive & 90% negative modulation
4. Receiver sensitivity	6-33	Signal generator, VTVM (FIG. 6-3)	1	5-micro-volt 30% modulation (1000 CPS) RF signal at receiver specified frequency	VTVM	2	AC 1000 DB signal CPS signal, 6 DB reduction with no modulation	At least 6-DB signal output reduction when modulation is removed.
<p>TEST POINT 1 - Remove antenna assembly and insert the antenna coaxial adapter; connect 50-ohm test equipment to the adapter.</p> <p>TEST POINT 2 - Install alignment cover and connect VTVM at the feed-through terminals to the speaker/microphone.</p>								

Figure 6-11. Maintenance - Alignment - Adjustment Chart (Sheet 2 of 2)

**SECTION VII
DEPOT OVERHAUL STANDARDS**

7-1. Applicability of Dot Overhaul Standards

Radio Sets AN/URC-10, AN/URC-10A, and ACR RT-10 must be tested thoroughly after repair or overhaul to insure that, they meet adequate performance standards for return to stock and reissue. Use the tests described in this section to measure the performance of the repaired or overhauled equipments. It is mandatory that equipment repaired for reissue, or returned to stock for reissue, meet all the performance standards given in this section.

7-2. Applicable References

a. Repair Standards. Applicable procedures of the depot performing this test and its general standards for repaired electronic equipment given in TB SIG 3551, TB SIG 355-2, and TB SIG 355-3 form a part of the requirements for testing this equipment.

b. Modification Work Orders. Perform all modification work orders applicable to this equipment before making the test specified. DA Pam 310-7 lists all available MWO's.

7-3. Test Procedures for Receiver-Transmitter, Radio RT-278/URC-10 and Receiver-Transmitter, Radio RT-278A/URC-10

a. The test equipment and power required for depot overhaul standards for RT-278/URC-10 and RT-278A/URC-10 are the same as indicated in figure 3-2.

b. The operational tests for depot overhaul standards for RT-278/URC-10 and RT-278A/URC-10 are the same as the tests given in figure 6-1, steps 5 and 6. Perform the tests in the order in which they are listed and observe that the results meet the minimum standard indicated in each test. After satisfactory completion of the above tests, perform a talk/listen operational test using a second radio set, in a screened enclosure.

7-4. Depot Overhaul Standards for Receiver-Transmitter, Radio RT-278/URC-10A and Receiver-Transmitter, Radio ACR RT-10

Test facilities, general test requirements, and performance tests for RT-278B/URC-10A and Radio

ACR RT-10 are described in paragraphs 7-4, 7-6, and 7-7 below.

7-5. Test Facilities Required

a. The following items are required for depot testing.

<i>Item</i>	<i>Technical Manual</i>	<i>Common Name</i>
Power Supply PP-9M0G	TM 11-6130-247-15	Dc power supply
Digital Voltmeter AN/GSM-64	TM 11 6225-444-15	Digi voltmeter
Digital Readout Electronic Counter AN/USM-207	TM 11-6625-700-10	Frequency counter
Oscilloscope AN/USM-140A	TM 11-2265-535-15	Oscilloscope
Electronic Voltmeter ME-30E/U	TM 11-6625-320-12	Voltmeter
Multimeter TS352B/U	TM 11-6625-366-15	Multimeter
Signal Generator AN/USM-44A	TM 11-6625-508-10	RF signal generator
Signal Generator AN/URM-17	TM 11 6625-683-15	Audio signal generator
Frequency Com- parator CM-77A/USM	TM 11-6625-493-15	Frequency comparator
Test Set, Radio- frequency Power AN/USM-161	TM 11-6625-498-12	RF power meter
Variable Attenuator HP-355A		Attenuator
Variable Attenuator HP-355B		Attenuator

b. Additional Equipment.

<i>Item</i>	<i>Quantity</i>
Resistor, 3 ohm, 2 watt	1
Dummy Load, 50 ohm, DA-265()/U	1

Item	Quantity
Antenna Adapter, ACR P/N A3-1-0057B	1
Coaxial Cable, RG58C/U, 12" long, terminated by BNC connectors	1

7-6. General Test Requirement

- a. Adjust the power supply output for + 16 volts.
- b. Remove radio set antenna and install antenna adapter. Temporarily remove the ground connection (remove screw) from the antenna coil during test. Replace ground connection at end of paragraph 7-7 test.
- c. Set radio set for receiver mod (TRANSMIT LEVER in OFF position).
- d. When testing the receive section set the test frequencies to the value given within ± 2 kHz.
- e. After satisfactory completion of the specific tests of paragraph 7-7, perform a talk/listen operational test, using a second radio set, in a screened enclosure.

7-7. Test of Radio Set AN/URC-10A and ACR RT-10

- a. *Receiver Sensitivity and Noise Test.*
 - (1) Connect radio set and test equipment as shown in figure 7-1.
 - (2) Perform initial test setup instructions (para 76a, b, and c)
 - (3) Set RF signal generator to 243.0 MHz; set internal modulation level to 30 percent at 1000 Hz; adjust RF output level for 50 microvolts.
 - (4) Note the audio level (in db) across the terminals of the radio set speaker as indicated by the Voltmeter ME-30(*)/U.
 - (5) Remove the RF signal generator internal modulation. The Voltmeter shall indicated at least a 6 db reduction in the audio level.

- b. *Receiver Audio Power Output Test.*
 - (1) Connect radio set and test equipment as shown in figure 7-1.
 - (2) Perform initial test setup instructions (para 7-6a, b, and c).
 - (3) Set RF signal generator to 243.0 MHz; set internal modulation level to 30 percent at 1000 Hz; adjust RF output level for 150 microvolts.

(4) Calculate the audio power output ($P = \frac{E^2}{R}$) based on the voltmeter reading (E) and the speaker nominal impedance (R = 43 ohms). Audio power output should be 15 milliwatts minimum (0.254 vrms)

- c. *Transmitter Rf Power Output Test.*
 - (1) Connect radio set and test equipment as shown in figure 7-2.
 - (2) Perform initial test setup instructions (para 7-6a, b, and c).
 - (3) Set the TRANSMIT LEVER to transmit position, observe the indication on the RF power meter, incorporating the losses due to the attenuation of the 20 db pad and the thermistor. The RF power output should be 200 mw minimum.

d. *Transmitter Modulated Signal Characteristics Test*

- (1) Connect radio set and test equipment as shown in figure 7-3.
- (2) Perform initial test setup instructions (para 74a, b, and c).
- (3) Set the audio signal generator output frequency to 1000 Hz; adjust output amplitude to 0.5 millivolts rms as measured across the speaker/microphone terminal
- (4) Set the oscilloscope controls for a real-time display with 2 milliseconds per centimeter vertical sensitivity. (First remove modulation and observe reference cw signal amplitude; restore modulation and observe modulated signal amplitude.)

(5) Set the TRANSMIT LEVER to transmit and observe the ratio of cw peak signal amplitude to audio modulated peak signal amplitude on the oscilloscope. This ratio represents the percentage of modulation when the radio set microphone input is provided at (simulated) normal conversation level. The observed values should be 80% positive and 90% negative (minimum).

(6) Disconnect the audio signal generator output and repeat step (5) with the radio set in a tone transmit mode (TONE BUTTON ON): observe sweeping tone modulated signal.

f. *Transmitter Frequency Accuracy Test.*

(1) Connect radio set and test equipment as shown in figure 7-4.

(2) Perform initial test setup instructions (para 7-6a, b, and c).

(3) Set the TRANSMIT LEVER to transmit and observe that the frequency counter reads 243.0 MHz ± 7.2 KHz.

g. *Transmit and Receive Current Tests.*

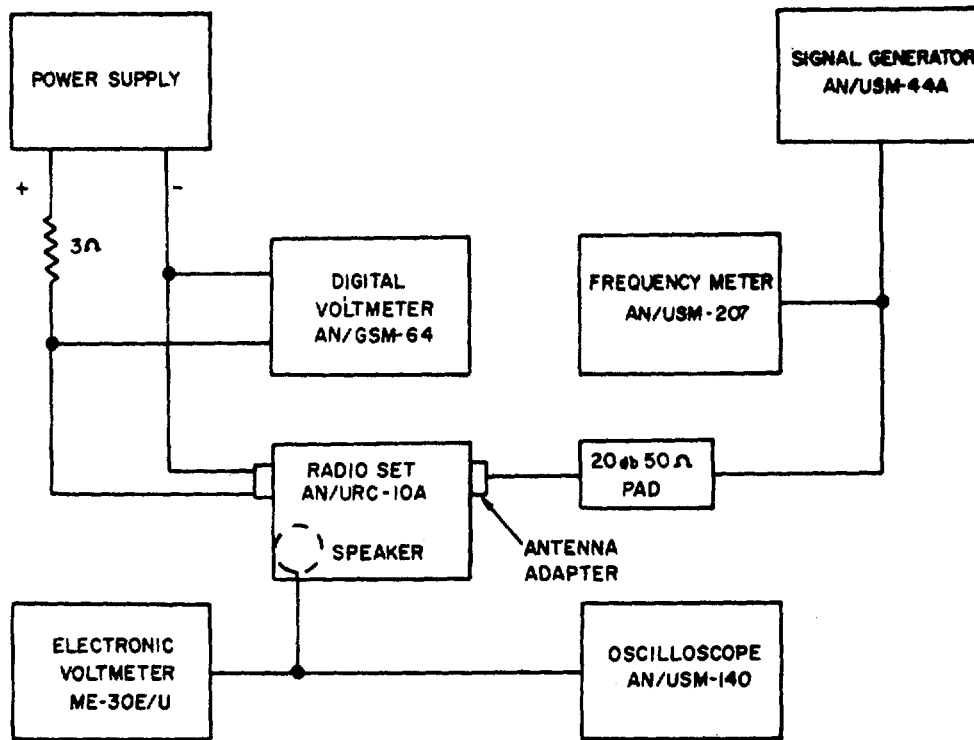
(1) Connect radio set and test equipment as shown in figure 7-5.

(2) Perform initial test setup instructions (para 7-6a, b, and c).

(3) Set the TONE BUTTON to ON and observe that the multimeter indicates a tone transmit current of 180 milliamperes (maximum).

(4) Set the TONE BUTTON to OFF and depress the TRANSMIT LEVER. Observe that the milliammeter indicates a cw transmit current of 145 milliamperes maximum.

(5) Set TRANSMIT LEVER to off and observe that the milliammeter indicates quiescent (receive) current of 30 milliamperes maximum.



TM5820-640-15-C3-5

Figure 7-1. Receiver test setup.

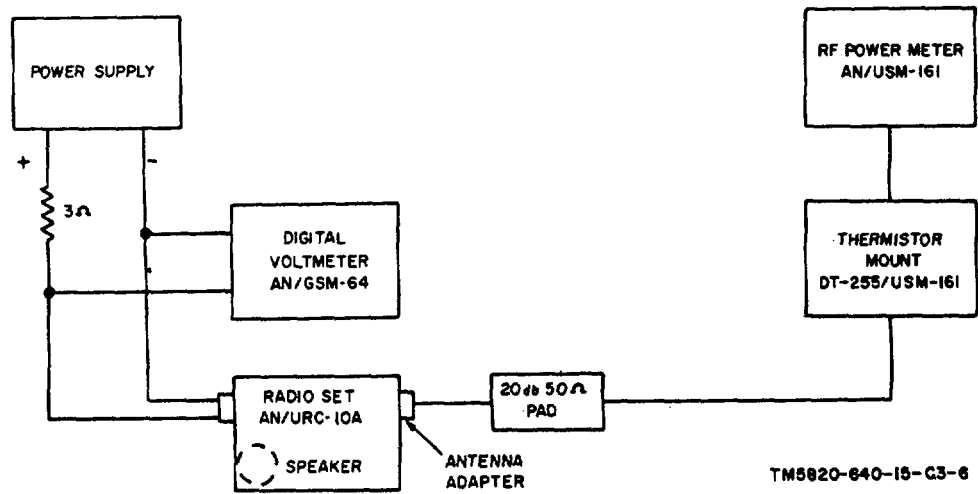


Figure 7-2. Transmitter RF power-output test setup.

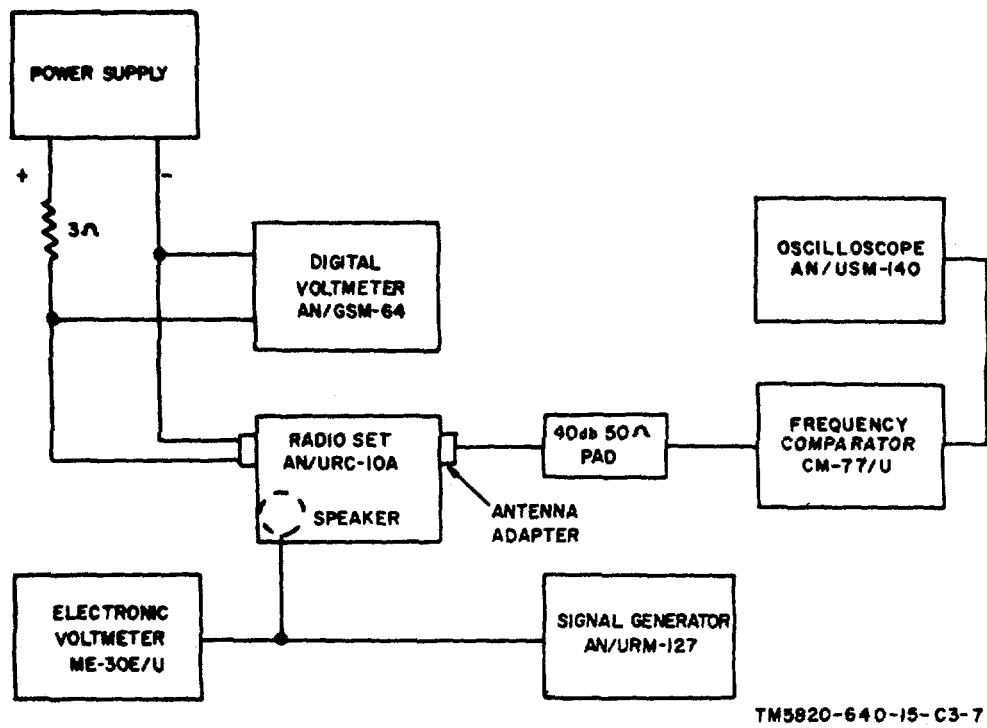


Figure 7-3. Transmitter modulated signal characteristics test setup.

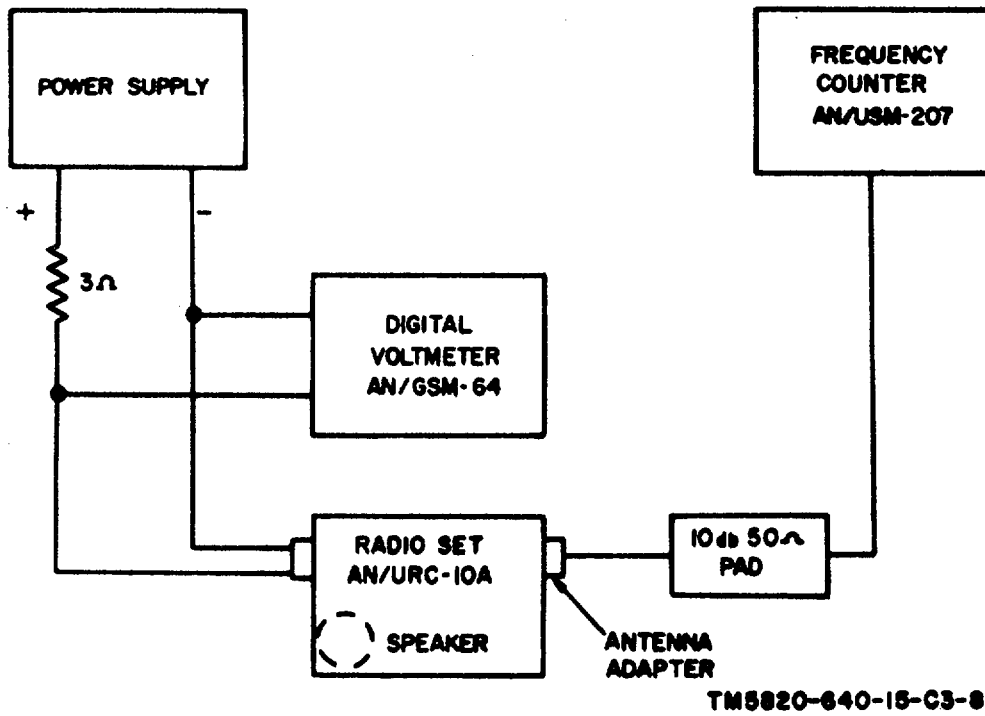


Figure 7-4. Frequency accuracy test setup.

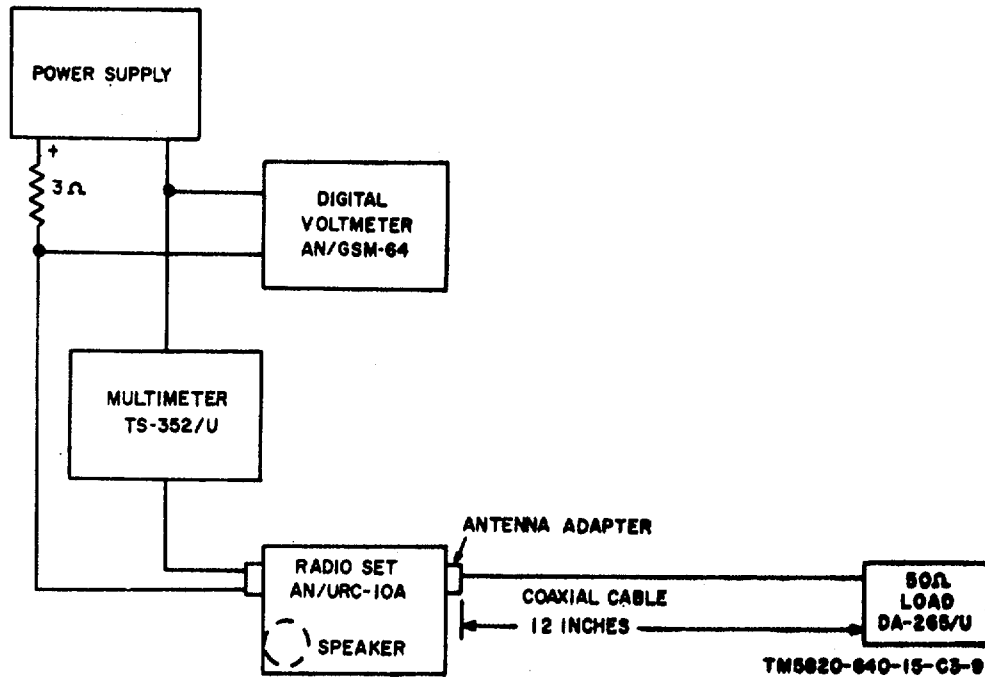


Figure 7-5. Transmit and receive current test setup.

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APPENDIX A

REFERENCES

Following is a list of applicable references available to the operator and repairman of the Radio Sets AN/URC-10, AN/URC-10A and ACR RT-10.

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, Lubrication Orders, and Modification Work Orders.
DA Pam 310-7	Index of Modification Work Orders.
TB SIG 355-1	Depot Inspection Standard for Repaired Signal Equipment.
TB SIG 355-2	Depot Inspection Standard for Refinishing Repaired Signal Equipment.
TB SIG 355-3	Depot Inspection Standard for Moisture and Fungus Resistant Treatment.
TB 746-10	Field Instructions for Painting and Preserving Electronics Command Equipment.
TM 11-5985-237-12P	Operator and Organizational Maintenance Repair Parts and Special Tool Lists and Maintenance Allocation Chart: Attenuator, Variable CH-796/U.
TM 11-6130-247-15	Organizational DS, GS, and Depot Maintenance Manual Including Repair Parts and Special Tool Lists: Power Supply PP-3940/G.
TM 11-6625-200-12	Organizational Maintenance Manual: Multimeters ME-26A/U, ME-26B/U, ME-26C/U, and ME-26D/U.
TM 11-6625-320-12	Operator and Organizational Maintenance Manual: Voltmeter, Meter ME-30 A/U and Voltmeters, Electronic ME-30B/U, ME-30C/U, and ME-30E/U.
TM 11-6625-366-15	Organizational, DS, GS, and Depot Maintenance Manual: Multimeter TS-352B/U.
TM 11-6625-444-15	Operator, Organizational, Field and Depot Maintenance Manual: Digital Voltmeters AN/GSM-64 and V-34A.
TM 11-6625-493-15	Operator, Organizational, DS, GS, and Depot Maintenance Manual: Frequency Comparator CM-77A/USM.
TM 11-6625-498-12	Operator and Organizational Maintenance Manual: Test Set, Radio Frequency Power AN/USM-161.
TM 11-6625-508-10	Operator's Manual: Signal Generators AN/USM-44 and AN/USM-44A.
TM 11-6625-535-15	Organizational, DS, GS, and Depot Maintenance Manual: Oscilloscope AN/USM-140A.
TM 11-6625-683-15	Operator, Organizational, Direct Support, General Support, and Depot Maintenance Manual: Signal Generator AN/URM-127.
TM 11-6625-700-10	Operator's Manual: Digital Readout, Electronic Counter AN/USM-207.
TM 11-6625-1698-15	Organizational, DS, GS, and Depot Maintenance Manual: Test Set, Radio Frequency Power AN/URM-172.
TM 38-750	The Army Maintenance Management System (Tamms)

APPENDIX C

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

C-1. General

This appendix provides a summary of the maintenance operations covered in the equipment literature for Radio Sets AN/URC-10 and ACR RT-10. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

F	Direct Support Maintenance
H	General Support Maintenance
D	Depot Maintenance

d. Tools and Equipment. The numbers appearing in this column refer to specific tools and equipment which are identified by these numbers in section III.

e. Remarks. Self-explanatory.

C-2. Explanation of Format for Maintenance Allocation Chart

a. Group Number. Group numbers correspond to the reference designation prefix assigned in accordance with ASA Y32.16, Electrical and Electronics Reference Designations. They indicate the relation of listed items to the next higher assembly.

b. Component Assembly Nomenclature. This column lists the item names of component units, assemblies, subassemblies, and modules on which maintenance is authorized.

c. Maintenance Function. This column indicates the maintenance category at which performance of the specific maintenance function is authorized. Authorization to perform a function at any category also includes authorization to perform that function at higher categories. The codes used represent the various maintenance categories as follows:

Codes	Maintenance Category
O	Organizational Maintenance

C-3. Explanation of Format for Tool and Test Equipment Requirements

The columns in the tool and test equipment requirements chart are as follows:

a. Tools and Equipment. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool for the maintenance function.

b. Maintenance Category. The codes in this column indicate the maintenance category normally allocated the facility.

c. Nomenclature. This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

d. Federal Stock Number. This column lists the Federal stock number.

e. Tool Number. Not used.

SECTION II. MAINTENANCE ALLOCATION CHART																
(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY NOMENCLATURE	(3) MAINTENANCE FUNCTIONS											(4) TOOLS AND EQUIPMENT	(5) REMARKS		
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD				
1.	RADIO SETS AN/URC-10, AN/ URC-10A AND ACR RT-10	O	O										F	D	1 through 21	
1.1	RECEIVER MODULE		F			H							F		1, 3, 4, 9, 10, 12, 13, 14, 15	
1.2	TRANSMITTER MODULE		F			H							F		3, 4, 5, 9, 10, 11, 12, 13, 14, 15	
1.3	AUDIO MODULE		F										F		2, 4, 6, 7, 8, 9, 10, 12, 13, 14, 15	
1.4	TONE GENERATOR MODULE		H										H		11	
1.5	PRINTED CIRCUIT BOARD	F											H		4, 10, 12	
1.6	POWER SWITCH ASSEMBLY	F											H		4, 10, 12	
1.7	MICROPHONE/SPEAKER	F											H		4, 10, 12	
1.8	ANTENNA	F											F		4, 10, 12	
2	BATTERY		O	O									O		11	

TOOLS AND TEST EQUIPMENT REQUIREMENTS

TOOLS AND EQUIPMENT	MAINTENANCE CATEGORY	NOMENCLATURE	FEDERAL STOCK NUMBER	TOOL NUMBER
1	H	AN/URC-10 (continued)		
2	H	SIGNAL GENERATOR AN/USM-44	6625-669-4031	
3	H	SIGNAL GENERATOR AN/USM-127	6625-783-5965	
4	H	FREQUENCY METER AN/USM-207	6625-911-6368	
5	F	MULTIMETER ME-26(*)/U	6625-360-2493	
6	H	TEST SET, RADIOFREQUENCY POWER AN/USM-161	6625-892-5541	
7	H	OSCILLOSCOPE AN/USM-140A	6625-066-2525	
8	H	ATTENUATOR VARIABLE CW-796/U	5895-831-5991	
9	H	SEMICONDUCTOR DEVICE, DIODE MX-3671/U	4935-583-1526	
10	H	POWER SUPPLY PP-2940/G	6130-985-8136	
11	F	TOOL KIT TK-100/G	5180-605-0079	
12	O	TEST SET, RADIO FREQUENCY POWER AN/URM-172 ()	6625-832-8551	
13	F	MULTIMETER TS-352B/U	6625-242-5023	
14	F	ANTENNA COAXIAL ADAPTER		
15	F	ALIGNMENT SCREWDRIVER, NON-METALLIC		
16	D	ALIGNMENT HEX TOOL, NON-METALLIC		
17	D	DIGITAL VOLTMETER AN/GSM-64	6625-870-2264	
18	D	ELECTRONIC VOLTMETER ME-30E/U	6625-669-0742	
19	D	FREQUENCY COMPARATOR CM-77A/USM	6625-788-3780	
20	D	VARIABLE ATTENUATOR HP MODEL 355A	5985-242-5023	
21	D	VARIABLE ATTENUATOR HP MODEL 355B	5985-879-4648	
22	D	DUMMY LOAD DA-265()/U	5985-069-8820	

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CHANGE 3 C-3

APPENDIX D

REPAIR PARTS LISTS

Section I. INTRODUCTION

D-1. General

This appendix contains a list of repair parts required for the performance of direct support, general support, and depot maintenance for Radio Set ACR RT-10.

Note 1. No special tools, test, and support equipment are required.

Note 2. No parts authorized at organizational category.

D-2. Explanation of Sections

This repair parts list is divided into two principal sections:

a. *Repair Parts for DS, GS, and Depot Maintenance, Section II.* This chart lists repair parts authorized for maintenance performance at direct support, general support, and depot categories.

b. *Federal Stock Number Index, Section III.* This is a cross-reference index of Federal stock numbers to illustrations by figure and item number.

D-3. Explanation of Columns

The following is an explanation of the columns in section II.

a. *Source, Maintenance, and Recoverability Codes, Column 1.*

- (1) *Source code, column 1a.* The selection status and source for the listed item is noted here. Source code and its explanation is as follows:

<i>Code</i>	<i>Explanation</i>
P	Applies to repair parts that are stocked in or supplied from the GSA/DSA, or Army supply system, and authorized for use at indicated maintenance categories.

- (2) *Maintenance code, column 1b.* The lowest category of maintenance authorized to install the listed item is noted here.

Code Explanation

F-Direct Support Maintenance

H-General Support Maintenance

- (3) *Recoverability code, column 1c.* The information in this column indicates whether unserviceable items should be returned for recovery or salvage. Recoverability code and its explanation is as follows:

Note. When there is no code indicated in the recoverability column, the part will be considered expendable.

Code Explanation

R-Applies to repair parts and assemblies which are economically repairable at DSU and GSU activities and normally are furnished by supply on an exchange basis,

b. *Federal Stock Number, Column 2.* The Federal Stock number for the item is indicated in this column.

c. *Description, Column 3.* The Federal item name, a five-digit manufacturer's code, and a part number are included in this column.

d. *Unit of Issue, Column 4.* The unit used as a basis of issue (e.g., ea, pr, ft, yd, etc.) is noted in this column.

e. *Quantity Incorporated in Unit Pack, Column*

5. The total quantity contained in the unit pack is indicated in this column.

f. Quantity Incorporated in Unit, Column 6. The total quantity in the unit pack is indicated in this column.

g. Quantity Authorized and Maintenance Allowance, Column 7. The total quantity of an item required to be on hand and necessary for the operation and maintenance of the equipment is given in this column. Items to be requisitioned as required are indicated by an asterisk (*). This same quantity is the quantitative allowance for DS/GS categories of maintenance which will represent initial stockage for a 80-day period for the number of equipments supported.

h. One-year Allowances Per 100 Equipments/Contingency Planning Purposes, Column 8. Opposite the appearance of each item, the total quantity required for distribution and contingency planning purposes is indicated. The range of items indicates total quantities of all authorized items required to provide for adequate support of 100 equipments for one year.

i. Depot Maintenance Allowance Per 100 Equipments, Column 9. This column indicates the total quantity of each item authorized depot maintenance for 100 equipments.

j. Illustration, Column 10.

(1) *Figure number, column 10a.* The number of the illustration in which the item is shown in this manual is indicated in this column.

(2) *Item or symbol number, column 10b.* The callout number used to reference the item in the illustration is indicated in this column.

D-4. Location of Repair Parts

Repair Parts for the Radio Set, Receiver-Transmitter, ACR RT-10 are identified by Federal stock number and are located by the procedures given in *a* and *b* below.

a. Use the index of Federal stock numbers to figure and item numbers and locate the Federal stock numbers. The Federal stock numbers are listed in numerical sequence and are cross-referenced to the figure number and item number.

b. Use the repair parts list to find the repair part and the figure and item number as noted in the index of Federal stock numbers.

D-5. Federal Supply Codes

This paragraph lists the Federal Supply code and the associated manufacturer's name.

<i>Code</i>	<i>Manufacturer</i>
06845	Bendix Corp., The Radio Division
18560	ACR Electronics Corp.

AGO 7765A

SECTION II. REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1)			REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT AND DEPOT MAINTENANCE						(4)	(5)	(6)	(7)						(8)	(9)	(10)	
(A)	(B)	(C)	(2) FEDERAL STOCK	MODEL						IND CD	(3) DESCRIPTION	UNIT OF ISSUE	QTY INC IN UN PK	QTY INC IN UNIT	30 DAY MAINT. ALW.			1 YR. ALW. PER	DEP OT MAINT ALW	ILLUSTRATIONS	
SRCE CD	MNT C	REC CD		1	2	3	4	5	6						(A) 1-20	(B) 21-50	(C) 51-100			(A) 1-20	(B) 21-50	(C) 51-100	(A) FIGURE NUMBER	(B) ITEM OR SYMBOL NUMBER
P	P	R	5821-912-4480																	E3	
P	H		5821-949-0692																	E3	14
P	H		5950-832-9432																	E3	76
P	F		5821-934-1250																	E3	8
P	F		5821-930-5727																	E3	17
P	H		5821-832-8955																	E3	69
P	H		5821-949-0695																	E3	20
P	F		5821-949-0691																	E3	I
P	F		5821-930-5656																	E3	1B
P	F		5821-949-0693																	E3	13
P	F		5821-949-4632																	E3	3T
P	H		5821-949-0690																	E3	12
P	H		5821-930-5762																	E3	35
P	F		5821-930-5257																	E3	19

SECTION III. FEDERAL STOCK NUMBER INDEX

INDEX - FEDERAL STOCK NUMBER CROSS-REFERENCE TO FIGURE AND INDEX NUMBER OR REFERENCE SYMBOL					
STOCK NO.	FIGURE NO.	ITEM NO. REF. SYMBOL	STOCK NO.	FIGURE NO.	ITEM NO. REF. SYMBOL
5821-832-8955	E3	69			
5821-930-5256	E3	18			
5821-930-5727	E3	17			
5821-930-5726	E3	35			
5821-930-5257	E3	19			
5821-934-1250	E3	8			
5821-949-0690	E3	12			
5821-949-0691	E3	4			
5821-949-0692	E3	14			
5821-949-0693	E3	13			
5821-949-0695	E3	20			
5821-949-4632	E3	37			
5950-832-9432	E3	76			

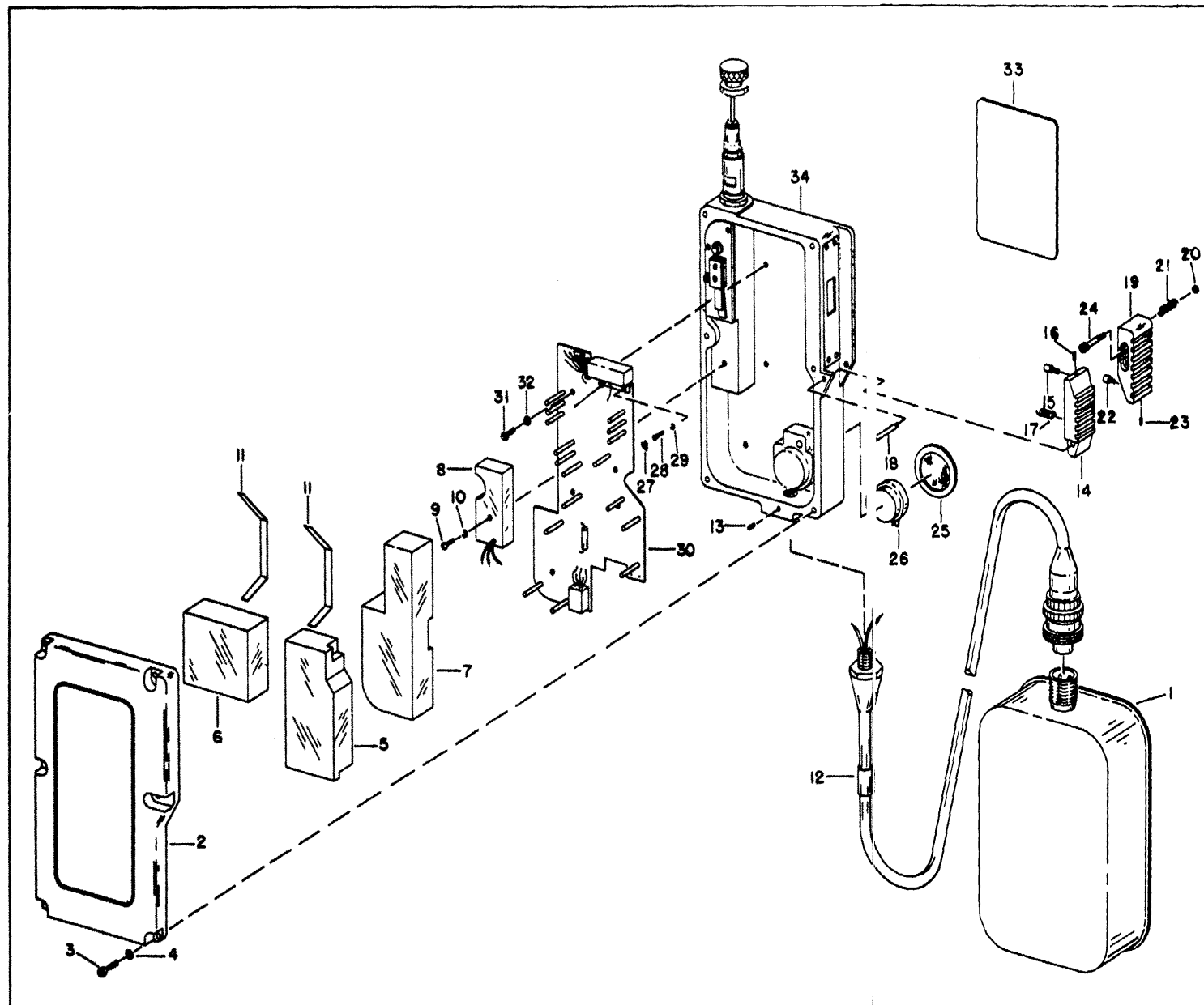


Figure E-1. Radio Receiver-Transmitter RT-278/URC-10, Exploded View

APPENDIX E
ILLUSTRATED PARTS

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION							UNITS PER ASSY	USABLE ON CODE
		1	2	3	4	5	6	7		
E-1		RADIO SET								1
E-1-1		. BATTERY, DRY (90303)							1	
E-1		. RADIO RECEIVER-TRANSMITTER ASSEMBLY COVER, RECEIVER-TRANSMITTER							1	
E-1-2		ATTACHING PARTS								
-3		. SCREW, EXTERNALLY RELEIVED BODY; No. 6-32 by 11/16 in. Lg							6	
		st								
-4		. WASHER, LOCK							6	
		---*---								
-5		. TRANSMITTER, RADIO							1	
-6		. AUDIO							1	
-7		. RECEIVER, RADIO							1	
-8		. TONE GENERATOR							1	
		ATTACHING PARTS								
-9		. SCREW MACHINE							1	
-10		. WASHER, LOCK							1	
		---*---								
-11		. TAPE; Pull, 1/4 in. W by 3 in., Lg, nylon							2	
-12		. CABLE ASSEMBLY, POWER ELECTRICAL							1	
		ATTACHING PARTS								
-13		. SETSCREW; No. 6-32 by 1/8 in. Lg, st							1	
		---*---								
-14		. LEVER; Actuating, transmit-receive switch							1	
-15		. PIN; Actuating, push button							1	
		ATTACHING PARTS								
-16		. SETSCREW; No. 6-32 by 1/8 in. Lg thd, st.							1]	
		---*---								
-17		. SPRING, HELICAL, COMPRESSION							1	
		ATTACHING PARTS								
-18		. SCREW SHOULDER; No. 6-32 by 1/8 in. Lg thd, st							1	
		---*---								
-19		. LEVER; Actuating, tone switch							1	
-20		. BALL; Detent							1	
-21		. SPRING, HELICAL COMPRESSION							1	
-22		. PIN; Actuating, slide button							1	
		ATTACHING PARTS								
-23		. SETSCREW; No. 4-40 by 1/8 in. Lg st							1	
		---*---								
-24		. SCREW SHOULDER; No. 6-32 by 1/8 in. Lg thd, st							1	
-25		. COVER ASSEMBLY; Microphone speaker							1	
-26		. SPEAKER-MICROPHONE ASSEMBLY							1	
-27		. TERMINAL, LUG; No. 2							2	
		ATTACHING PARTS								
-28		. SCREW MACHINE							1	
-29		. WASHER, LOCK							1	
		---*---								
-30		. COMPONENT BOARD							1	
		ATTACHING PARTS								
-31		. SCREW MACHINE							4	
-32		. WASHER, LOCK							4	
		---*---								
-33		. PLATE, IDENTIFICATION							1	
-34		. CASE, RECEIVER-TRANSMITTER							1	

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION							UNITS PER ASSY	USABLE ON CODE
		1	2	3	4	5	6	7		
E-2		RADIO RECEIVER-TRANSMITTER RT-27 A/URC-10							1	
E-2-1		RADIO RECEIVER-TRANSMITTER RT-278A/URC-10							1	
-2		COVER, RADIO SET							1	
-3		ATTACHING PARTS							6	
-3A		SCREW CAPTIVE							6	
-4		WASHER, LOCK							1	
-5		PLATE IDENTIFICATION (for Army use only)							1	
-6		PACKING, PREFORMED							1	
-7		PAD, CUSHIONING							1	
-8		ANTENNA TELESCOPING ASSEMBLY							1	
-9		CAP, ANTENNA							1	
-10		ATTACHING PARTS							2	
-11		SETSCREW							1	
-12		ANTENNA ASSEMBLY (96499) (06845 NO. 2004007-0701)							1	
-13		INSULATOR, ANTENNA							1	
-14		ATTACHING PARTS							1	
-15		INSULATOR, ANTENNA							1	
-16		CLIP, SPRING							1	
-17		SWITCH ASSEMBLY, POWER							1	
-18		SEAL, RUBBER							1	
-19		ADAPTER, SWITCH ACTUATOR							1	
-20		ATTACHING PARTS							5	
-21		SCREW, MACHINE							5	
-22		WASHER, LOCK							1	
-23		AUDIO MODULE ASSEMBLY							1	
-24		RECEIVER MODULE ASSEMBLY							1	
-25		TRANSMITTER MODULE ASSEMBLY							1	
-26		MAIN PRINTED CIRCUIT BOARD ASSEMBLY							1	
-27		ATTACHING PARTS							5	
-28		SCREW MACHINE							5	
-29		WASHER, LOCK							1	
-30		RELAY ASSEMBLY (82415) (06845 NO. 2004016-0701)							3	
-31		BUMPER, RUBBER							6	
-32		BUMPER, RUBBER							1	
-33		RESISTOR, FIXED, COMPOSITION							1	
-34		RESISTOR							1	
-35		(DELETED)							1	
-36		RESISTOR							1	
-37		CAPACITOR							1	
-38		CAPACITOR							1	
-39		CAPACITOR							1	
-40		PRINTED CIRCUIT BOARD ASSEMBLY							17	
-41		SOCKET, CONNECTOR							1	
-42		PRINTED CIRCUIT BOARD							1	
-43		TONE GENERATOR MODULE ASSEMBLY							1	
-44		INSULATOR, ELECTRICAL							1	
-45		TERMINAL, INSULATED, FEED-THRU (98291) (06845 NO. 2004028-0701)							5	
-46		CABLE ASSEMBLY							1	
-47		GASKET							1	
-48		CABLE ASSEMBLY							1	
-49		SPEAKER-MICROPHONE ASSEMBLY							1	
-50		SPEAKER, MICROPHONE (86194) (06845 NO. 2004000-0701)							1	
-51		GASKET, MICROPHONE							1	

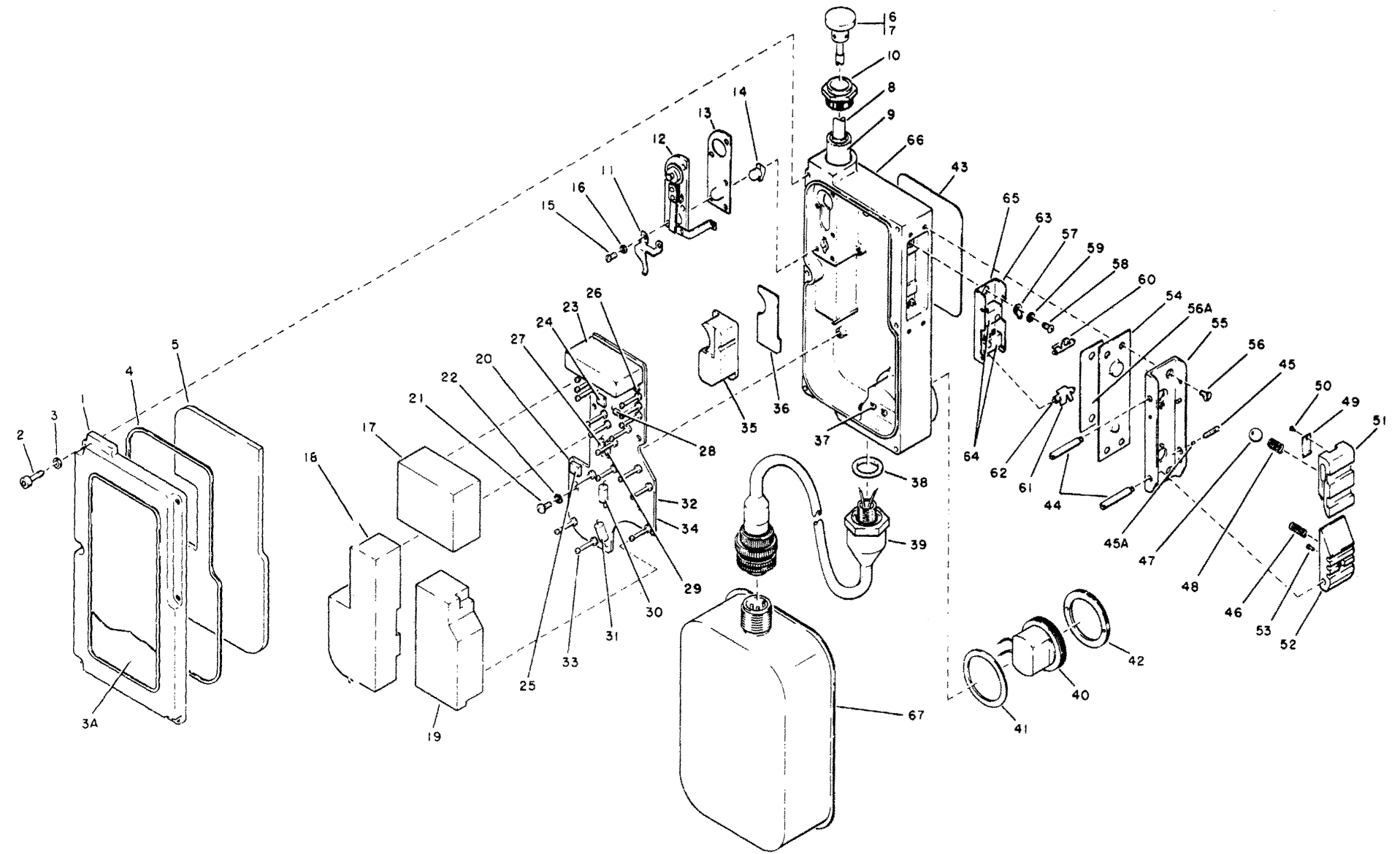


Figure E-2. Radio Receiver-Transmitter RT-278A/URC-10, Exploded View

FIG. & ITEM NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNIT PER ASSY	USABLE ON CODE
E-2-42		. .NUT, SPANNER	1	
-43		. PLATE, IDENTIFICATION	1	
-44		. PIN, STRAIGHT, Threaded	2	
-45		. SETSCREW	1	
-45A		. PIN	1	
-46		. SPRING, HELICAL, COMPRESSION	1	
-47		. BALL	1	
-48		. SPRING, HELICAL, COMPRESSION	1	
		. SWITCH ACTUATOR ASSEMBLY, Lever	1	
-49		. . LEVER, SWITCHACTUATOR	1	
-40		. . SPRING, LEAF	1	
-51		. . SCREW	1	
-52		. LEVER, SWITCH ACTUATOR	1	
-53		. SCREW, EXTERNALLY RELIEVED BODY	1	
-54		. SEAL, RUBBER	1	
-55		. ANGLE ASSEMBLY, Bracket	1	
		ATTACHING PARTS		
-56		. SCREW, MACHINE	4	
		-----*-----		
-56A		. PLATE, SUPPORT	1	
		. SWITCH AND BRACKET ASSEMBLY	1	
-57		. . TERMINAL, LUG	1	
		ATTACHING PARTS		
-58		. . SCREW, MACHINE	1	
-59		. . WASHER, LOCK	1	
		-----*-----		
-60		. . SPRING, SWITCH ACTUATOR	1	
-61		. . SPRING, SWITCH ACTUATOR	1	
-62		. . PIN, STRAIGHT, Headless	2	
-63		. . SWITCH AND BRACKET ASSEMBLY	1	
-64		. . . SWITCH	2	
		ATTACHING PARTS		
		. . . RIVET, TUBULAR (57771) (06h45 NO. 2004050-0701)	2	
		-----*-----		
-65		. . . BRACKET, ANGLE	1	
-66		. CASE, RADIO SET	1	
-67		. BATTERY, DRY (90303) (not supplied with this assembly) (OFE)	REF	

FIG. & ITEM NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNIT PER ASSY	USABLE ON CODE
E-3		RADIO RECEIVER-TRANSMITTER ACR RT-10		
E-3-1		RADIO RECEIVER-TRANSMITTER ACR RT-10	1	
-2		. COVER, RADIO SET	1	
-3		ATTACHING PARTS		
-4		. SCREW, CAPTIVE	6	
-5		. WASHER, LOCK	6	
-6		. PACKING, PREFORMED	1	
-7		. PAD, CUSHIONING	1	
-8		. ANTENNA TELESCOPING ASSEMBLY	1	
-9		. CAP, ANTENNA	1	
-10		ATTACHING PARTS		
-11		. SETSCREW	2	
-12		-----*-----		
-13		. ANTENNA ASSEMBLY (96499) (06845 NO. 2004007-0701)	1	
-14		. INSULATOR ASSEMBLY, Antenna	1	
-15		ATTACHING PARTS		
-16		. INSULATOR, ANTENNA	1	
-17		-----*-----		
-18		. CLIP, SPRING	1	
-19		. SWITCH ASSEMBLY, POWER	1	
-20		. SEAL, RUBBER	1	
-21		. ADAPTER, SWITCH ACTUATOR	1	
-22		ATTACHING PARTS		
-23		. SCREW, MACHINE	5	
-24		. WASHER, LOCK	5	
-25		-----*-----		
-26		. AUDIO MODULE ASSEMBLY	1	
-27		. RECEIVER MODULE ASSEMBLY	1	
-28		. TRANSMITTER MODULE ASSEMBLY	1	
-29		. MAIN PRINTED CIRCUIT BOARD ASSEMBLY	1	
-30		ATTACHING PARTS		
-31		. SCREW, MACHINE	5	
-32		. WASHER, LOCK	5	
-33		-----*-----		
-34		. RELAY ASSEMBLY (82415) (06845 NO. 2004015-0701)	1	
-35		. BUMPER, RUBBER	3	
-36		. BUMPER, RUBBER	6	
-37		. RESISTOR, FIDED, COMPOSITION	1	
-38		. RESISTOR	1	
-39		. (DELETED)		
-40		. RESISTOR	1	
-41		. CAPACITOR	1	
-42		. CAPACITOR	1	
-43		. PRINTED CIRCUIT BOARD ASSEMBLY	1	
-44		. . . SOCKET, CONNECTOR	17	
-45		. . . PRINTED CIRCUIT BOARD	1	
-46		. TONE GENERATOR MODULE ASSEMBLY	1	
-47		. INSULATOR, ELECTRICAL	1	
-48		. SPEAKER-MICROPHONE ASSEMBLY	1	
-49		. . SPEAKER, MICROPHONE (86194) (08845 NO. 2004000-0701)	1	
-50		. . GASKET, MICROPHONE	1	

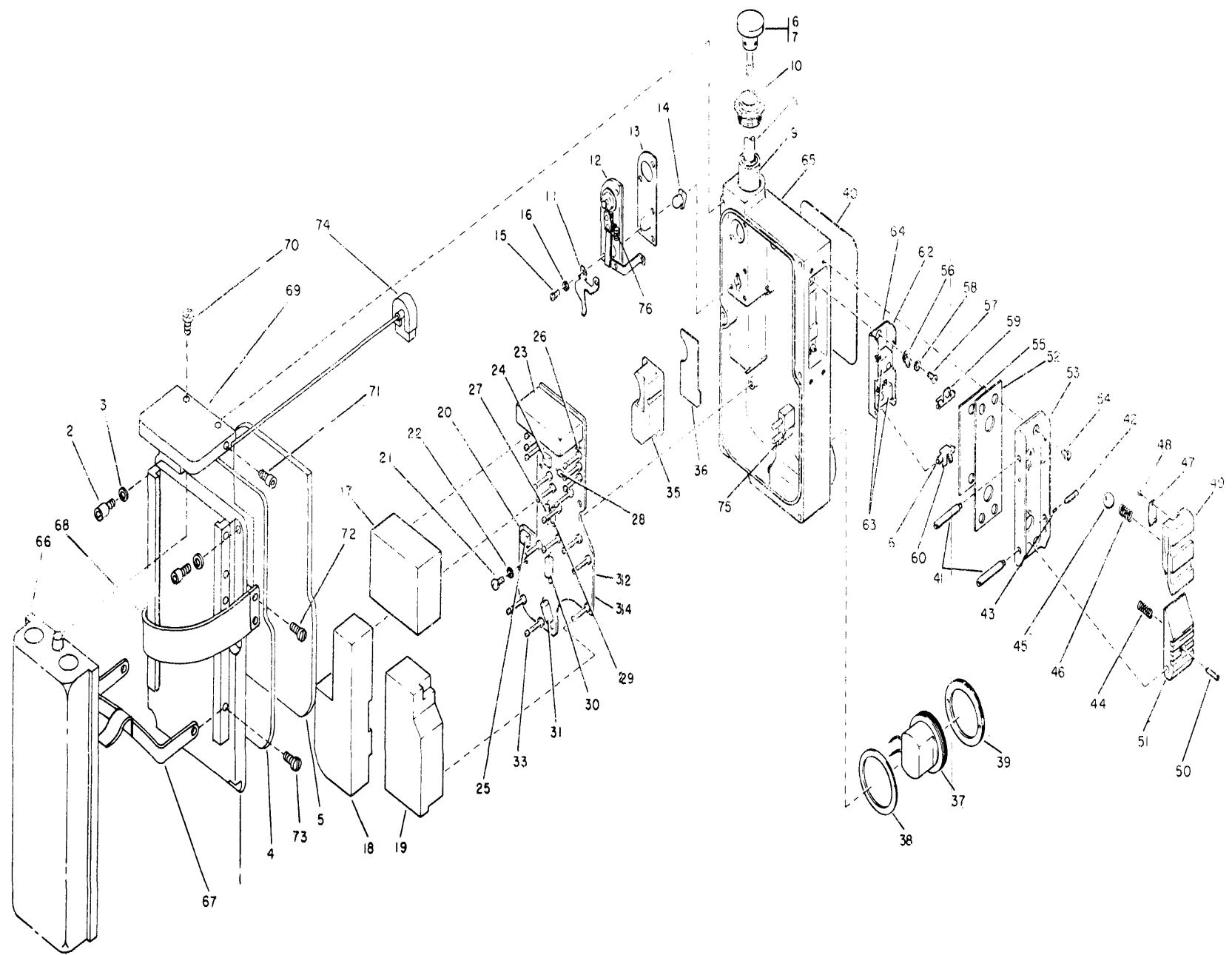
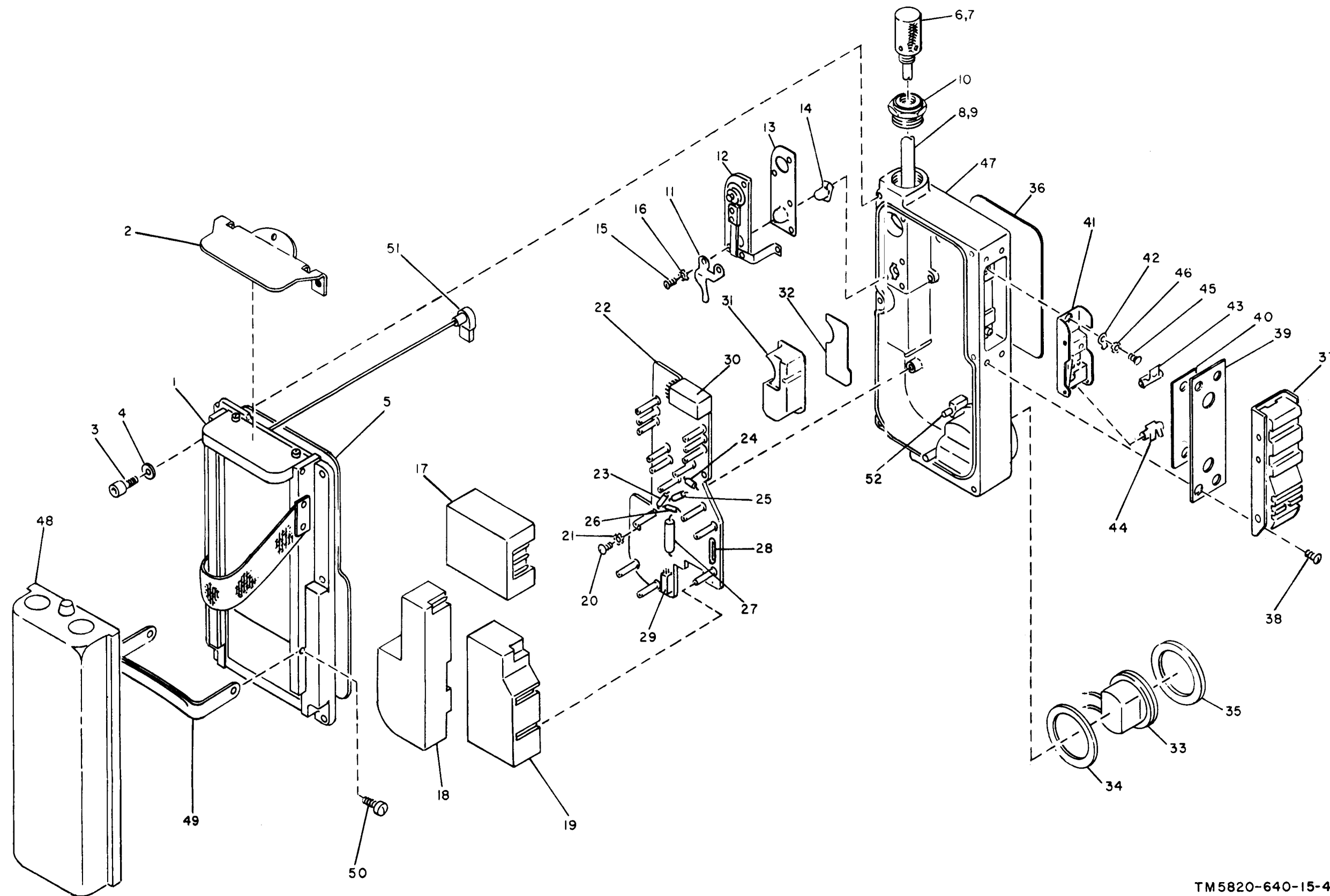


Figure E-3. Receiver-Transmitter ACR RT-10

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION							UNITS PER ASSY	USABLE ON CODE
		1	2	3	4	5	6	7		
E-3-39		.	.	.	.	.	.	.	1	
	-40	.	.	.	.	.	.	.	1	
	-41	.	.	.	.	.	.	.	2	
	-42	.	.	.	.	.	.	.	1	
	-43	.	.	.	.	.	.	.	1	
	-44	.	.	.	.	.	.	.	1	
	-45	.	.	.	.	.	.	.	1	
	-46	.	.	.	.	.	.	.	1	
	-47	.	.	.	.	.	.	.	1	
	-48	.	.	.	.	.	.	.	1	
	-49	.	.	.	.	.	.	.	1	
	-50	.	.	.	.	.	.	.	1	
	-51	.	.	.	.	.	.	.	1	
	-52	.	.	.	.	.	.	.	1	
	-53	.	.	.	.	.	.	.	1	
	-54	.	.	.	.	.	.	.	4	
	-55	.	.	.	.	.	.	.	1	
	-56	.	.	.	.	.	.	.	1	
	-57	.	.	.	.	.	.	.	1	
	-58	.	.	.	.	.	.	.	1	
	-59	.	.	.	.	.	.	.	1	
	-60	.	.	.	.	.	.	.	1	
	-61	.	.	.	.	.	.	.	2	
	-62	.	.	.	.	.	.	.	1	
	-63	.	.	.	.	.	.	.	2	
	-64	.	.	.	.	.	.	.	1	
	-65	.	.	.	.	.	.	.	1	
	-66	.	.	.	.	.	.	.	REF	
	-67	.	.	.	.	.	.	.	1	
	-68	.	.	.	.	.	.	.	1	
	-69	.	.	.	.	.	.	.	1	
	-70	.	.	.	.	.	.	.	2	
	-71	.	.	.	.	.	.	.	2	
	-72	.	.	.	.	.	.	.	4	
	-73	.	.	.	.	.	.	.	2	
	-74	.	.	.	.	.	.	.	2	
	-75	.	.	.	.	.	.	.	2	
	-76	.	.	.	.	.	.	.	1	

FIG. & ITEM NUMBER	PART NUMBER	DESCRIPTION	UNIT PER ASSY	USABLE ON CODE
E-4	P3-14-0111D-2	RECEIVER-TRANSMITTER RT-278B/URC-10A		
-1	P3-14-0029C-2	COVER, RADIO SET	1	
-2	A1-17-0210B	BRACKET, BATTERY SUPPORT ATTACHING PARTS	1	
-3	A1-05-0021-2	SCREW, CAPTIVE	6	
-4	A1-05-0106	WASHER, LOCK	6	
-5	A1-18-0124A	PACKING, PREFORMED	1	
	A3-01-0068A	ANTENNA, TELESCOPING ASSEMBLY	1	
-6	A1-17-0145A	CAP, ANTENNA ATTACHING PARTS	1	
-7	A1-05-0052A	SETSCREW ----*----	2	
-8	A1-06-0066A	ANTENNA ASSEMBLY	1	
-9	A3-01-0061B	INSULATOR ASSEMBLY, ANTENNA ATTACHING PARTS	1	
-10	A1-18-0135A	INSULATOR, ANTENNA ----*----	1	
-11	A1-17-0158B	CLIP, SPRING	1	
-12	A3-01-0062B-2	SWITCH ASSEMBLY, POWER	1	
-13	A1-18-0159B	SEAL, RUBBER	1	
-14	A1-17-0159A	ADAPTER, SWITCH ACTUATOR ATTACHING PARTS	1	
-15	A1-05-0094-3	SCREW, MACHINE	6	
-16	A1-05-0089-134	WASHER, LOCK ----*----	6	
-17	P3-14-0026C	AUDIO MODULE ASSEMBLY	1	
-18	P3-14-0024C	RECEIVER MODULE ASSIEBLY	1	
-19	P3-14-0025C	TRANSMITTER MODULE ASSELY	1	
	A3-06-0127D	PRINTED CIRCUIT BOARD ASSEMBLY ATTACHING PARTS	1	
-20	A1-05-0094-2	SCREW, MACHINE	5	
-21	A1-05-0050A	WASHER, LOCK ----*----	5	
-22	A1-07-0035D	PRINTED CIRCUIT BOARD	1	
-23	RC07GF221J	RESISTOR, FIXED, COMPOSITION	1	
-24	RC07GF391K	RESISTOR, FIXED, COMPOSITION	1	
-25	RC07GF3R3X	RESISTOR, FIXED, COMPOSITION	1	
-26	RC07GF182J	RESISTOR, FIXED, COMPOSITION	1	
-27	CS13BE156K	CAPACITOR, FIXED, TANTALUM DIELECTRIC	1	
-28	JAN1N3611	SEMICONDUCTOR DEVICE, DIODE	1	
-29	A1-22-0004A	RELAY, ARMATURE	1	
-30	A1-22-0003A	RELAY, ARMATURE	1	
-31	P3-14-0027C	TONE GENERATOR MODULE ASSEMBLY	1	
-32	A1-18-0161A	INSULATOR, ELECTRICAL	1	
-33	A3-06-0104A	SPEAKER/MICROPHONE ASSEMBLY	1	
-34	A1-18-0162	GASKET, MICROPHONE	1	
-35	A1-05-0057A	NUT, SPANNER	1	
-36	A1-20-0073B	PLATE, IDENTIFICATION	1	
-37	A3-06-0072C	SWITCH ACTUATOR ASSEMBLY, LEVER ATTACHING PARTS	1	
-38	A1-05-0093-13	SCREW, MACHINE ----*----	4	

FIG. & ITEM NUMBER	PART NUMBER	DESCRIPTION							UNIT PER ASSY	USABLE ON CODE
		1	2	3	4	5	6	7		
E-4-39	A1-18-0163B	SEAL, RUBBER							1	
-40	A1-17-0165A	PLATE, SUPPORT							1	
-41	A3-01-0065B	SWITCH AND BRACKET ASSEMBLY							1	
-42	341	TERMINAL LUG (mfd by 79963)							1	
-43	A1-17-0166B	SPRING, SWITCH ACTUATOR							1	
-44	A1-17-0167B	SPRING, SWITCH ACTUATOR							1	
		ATTACHING PARTS								
-45	A1-05-0094-1	SCREW, MACHINE							1	
-46	A1-05-0050A	WASHER, LOCK							1	
		----*----								
-47	A3-06-0111D-2	CASE, RADIO SET							1	
-48	P4-01-0008C	BATTERY PACK, K308A							1	
-49	A1-17-0146A	LOCKING HANDLE								
		ATTACHING PARTS								
-50	A1-05-0087A	SCREW, SELF-TAPPING							2	
		----*----								
-51	A1-03-0002-2	CONNECTOR ASSEMBLY, FEMALE							1	
-52	A1-03-0002A-1	CONNECTOR ASSEMBLY, MALE							1	



TM5820-640-15-4

Figure E-4. Receiver-Transmitter RT-278B/URC-10A, exploded view.

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