Handbook of MAINTENANCE INSTRUCTIONS

FOR

MODEL AN/ARC-5
Aircraft Radio Equipment

VOLUME 2

VHF COMPONENTS

WITH RADIO TRANSMITTER T-126/ARC-5

●

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15 APRIL, 1944

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UNSATISFACTORY REPORTS

FOR U. S. ARMY AIR FORCE PERSONNEL

In the event of malfunctioning, unsatisfactory design or unsatisfactory installation of any of the component units of this equipment, or if the material contained in this book is considered inadequate or erroneous, an Unsatisfactory Report, AAF Form No. 54 or a report in similar form shall be submitted in accordance with the provisions of Army Air Force Regulation No. 15-54, listing:

1. Station and organization.
2. Nameplate data (type number or complete nomenclature if nameplate is not attached to the equipment).
3. Date and nature of failure.
4. Airplane model and serial number.
5. Remedy used or proposed to prevent recurrence.
6. Handbook errors or inadequacies, if applicable.

FOR U. S. NAVY PERSONNEL

Report of failure of any part of this equipment during its guaranteed life shall be made on Form N. Aer. 4112 "Report of Unsatisfactory or Defective Material" or a report in similar form, and forwarded in accordance with the latest instruction of the Bureau of Aeronautics. In addition to other distribution required, one copy shall be furnished to the Inspector of Naval Material, 30 Church Street, New York, and the Bureau of Ships. Such reports of failure shall include:

1. Reporting activity.
2. Nameplate data.
3. Date placed in service.
4. Part which failed.
5. Nature and cause of failure.
6. Replacement needed (yes-no).
7. Remedy used or proposed to prevent recurrence.

FOR BRITISH PERSONNEL

Form 1022 procedure shall be used when reporting failure of radio equipment.

NOTICE

The components of Model AN/ARC-5 Aircraft Radio Equipment described in this volume are furnished on U. S. Navy contract NXsa-40001. Lots 1 and 2 of this contract correspond to earlier U. S. Army Contracts W-2126-SC-387 (File No. 2808-WF-42) and W-2126-SC-1221 (File No. 7461-WF-43). The name plates of units bearing Army nomenclature show no contract or file number. The nameplates of units bearing "AN" nomenclature show the Army file number. In no case does the Navy contract number appear on the nameplates of the components described in this text.

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SAFETY NOTICE

THE DYNAMOTOR ON THE MODULATOR OF THIS EQUIPMENT GENERATES 600 VOLTS D-C. THIS IS SUFFICIENT TO CAUSE SEVERE SHOCK, OR EVEN DEATH. MAKE ABSOLUTELY CERTAIN THAT THE DYNAMOTOR IS NOT RUNNING BEFORE MAKING ANY ADJUSTMENT WHATEVER EXCEPT TUNING THE TRANSMITTERS.

Removing the tube cover of the modulator exposes the high voltage plate connections to the top caps of Tubes JAN-1625. This cover should be safety-wired in place at the time of installation. Removing the top cover on Radio Transmitter T-23/ARC-5 exposes many high voltage connections. The high voltage from the dynamotor also appears on the test jack on the front of this radio transmitter; this hazard should be avoided by stopping the dynamotor whenever the cap is removed from this jack. *Do not attempt to connect or disconnect a transmitter or a power plug while the dynamotor is running.* Do not depend upon *hearing* the dynamotor or upon observing the several switch positions to determine whether the dynamotor is running—feel it.

FIRE: If the radio compartment has been exposed to gasoline vapor, make certain that it is aired out well before turning on the power.

The dynamotor on the receiver generates 250 volts d-c. The danger of exposure to this voltage must not be ignored. Make certain that all dynamotors are off before performing any adjustment to the equipment other than those accessible at the front of the receiver.

THE ATTENTION OF OFFICERS AND OPERATING PERSONNEL IS DIRECTED TO U. S. NAVY BUREAU OF ENGINEERING CIRCULAR LETTER NO. 5a OF 3 OCTOBER, 1934, OR SUBSEQUENT REVISIONS THEREOF ON THE SUBJECT OF "RADIO-SAFETY PRECAUTIONS TO BE OBSERVED."

DESTRUCTION OF ABANDONED MATERIAL IN THE COMBAT ZONE

In case it should become necessary to prevent the capture of this equipment, or when ordered to do so, DESTROY IT SO THAT NO PART OF IT CAN BE SALVAGED, RECOGNIZED OR USED BY THE ENEMY. BURN ALL PAPERS AND BOOKS.

MEANS:—

1. Explosives, when provided.
2. Hammers, axes, sledges, or whatever heavy objects are readily available.
3. Burning by means of incendiaries, such as gasoline, oil, paper or wood.
4. Grenades and shots from available arms.
5. Where possible, and time permits, bury all debris or dispose of it in streams or other bodies of water.

PROCEDURE:—

1. Obliterate all identifying marks. Destroy nameplates and circuit labels.
2. Demolish all panels, castings, switch- and instrument-boards.
3. Destroy all controls, switches, relays, connecting means, and meters.
4. Rip out all wiring in electrical equipment. Smash gas, oil and cooling systems in gas engine generators, etc.
5. Smash every electrical or mechanical part whether rotating, moving or fixed.
6. Break up all operating instruments such as keys, headsets, microphones, etc.
7. Destroy all classes of carrying cases, straps, containers, etc.

GUARANTEE

This equipment, including all parts and spare parts, except vacuum tubes, and material normally consumed in operation, is guaranteed for a period of ONE YEAR from the date of delivery of the equipment to and acceptance by the Government with the understanding that all such items found to be defective as to material, workmanship or manufacture will be repaired or replaced, f.o.b. any point within the continental limits of the United States designated by the Government, without delay and at no expense to the Government; provided that such guarantee will not obligate the contractor to make repair or replacement of any such defective items unless the defect appears within the aforementioned period and the contractor is notified thereof in writing within a reasonable time and the defect is not the result of normal expected shelf life deterioration.

To the extent the equipment, including all parts and spare parts, as defined above, is of the contractor's design or is of a design selected by the contractor, it is also guaranteed, subject to the foregoing conditions, against defects in design.

All such defective items will be subject to ultimate return to the contractor. In view of the fact that normal activities of the Naval Service may result in the use of equipment in such remote portions of the world or under such conditions as to preclude the return of the defective items for repair or replacement without jeopardizing the integrity of Naval communications, the exigencies of the Service, therefore, may necessitate expeditious repair of such items in order to prevent extended interruption of communications. In such cases the return of the defective items for examination by the contractor prior to repair or replacement will not be mandatory. The report of a responsible authority, including details of the conditions surrounding the failure, will be acceptable as a basis for affecting expeditious adjustment under the provisions of this contractual guarantee.

The above one year period will not include any portion of time the equipment fails to perform satisfactorily due to any such defects, and any items repaired or replaced by the contractor will be guaranteed anew under this provision.

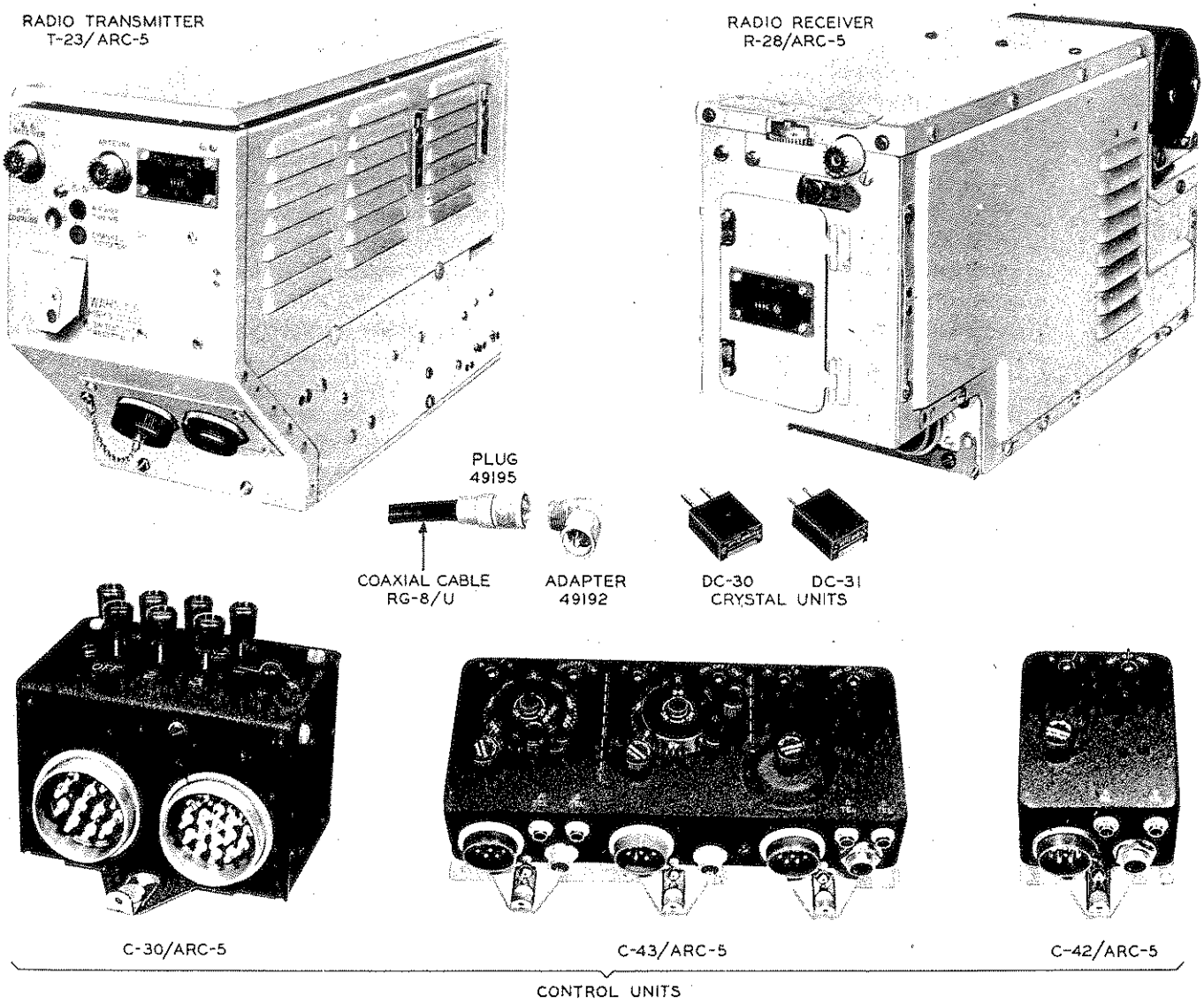

Figure 1—VHF Components of Model AN ARC-5 Aircraft Radio Equipment

SECTION I—GENERAL DESCRIPTION

1. INTRODUCTION

a. GENERAL

This is Volume 2 of a HANDBOOK OF MAINTENANCE INSTRUCTIONS FOR MODEL AN/ARC-5 AIRCRAFT RADIO EQUIPMENT. It covers the VHF (very-high-frequency) components of the radio equipment designated. Except for a few cases of necessary cross-reference, it does not include LF-MF-HF (low-frequency — medium-frequency — high-frequency) components, which are covered in Volume 1. Moreover, there are certain equipment components which are employed at all frequencies. Descriptions and maintenance instructions for these elements are likewise contained in Volume 1, and are not repeated in this volume.

Operating instructions for pilots and radio operators are contained in: HANDBOOK OF OPERATING INSTRUCTIONS FOR MODEL AN/ARC-5 AIRCRAFT RADIO EQUIPMENT; this includes instructions for operating the equipment at all frequencies. Section III of this maintenance handbook covers the operation of the equipment at very high frequencies only.

The VHF components of Model AN/ARC-5 Aircraft Radio Equipment, which are described in this volume, provide for two-way radio-telephone communication in the frequency band between 100 and 156 megacycles. (In an emergency, they may also be employed for radio-telegraph communication, but this is not the normal procedure.)

The equipment is of low power and is intended for use over moderate distances. Under most conditions, reliable communication can be expected over a range slightly greater than the line-of-sight (optical) path. However, under certain circumstances, signals may be intercepted far beyond the line-of-sight distance. This matter, and its bearing on radio security, are discussed in Section III, Paragraphs 8a and 8b, of this volume.

All VHF telephonic and tone-modulated telegraphic communication is carried out on the basis of amplitude modulation.

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b. EQUIPMENT SUPPLIED

The following are furnished as VHF components of Model AN/ARC-5 Aircraft Radio Equipment:

Name of Unit	*Over-all Dimensions*	*Weight (Pounds)*	*Numerical Series of Reference Symbols*
Radio Transmitter T-23/ARC-5, with Tubes and Crystals	$15\frac{3}{16}$″ x $8\frac{9}{16}$″ x $5\frac{29}{64}$″	12.3	300 to 399
Radio Receiver R-28/ARC-5, with Tubes and Crystals, less Dynamotor	14″ x $7\frac{5}{32}$″ x $4\frac{7}{8}$″	14.5	100 to 299
Crystal Unit DC-30 for VHF Transmitter	$1\frac{13}{16}$″ x $1\frac{1}{8}$″ x $\frac{7}{16}$″	0.06	
Crystal Unit DC-31 for VHF Receiver	$1\frac{5}{8}$″ x $1\frac{1}{8}$″ x $\frac{7}{16}$″	0.06	
Control Unit C-30/ARC-5	$3\frac{3}{4}$″ x $4\frac{1}{2}$″ x $4\frac{1}{8}$″	1.4	400 to 409
Control Unit C-42/ARC-5	$5\frac{15}{32}$″ x $3\frac{1}{4}$″ x 3	1.0	460 to 469
Control Unit C-43/ARC-5	$2\frac{3}{4}$″ x $9\frac{1}{2}$″ x $5\frac{1}{2}$″	2.6	410 to 419
Test Equipment IE-35-A			620 to 659
Test Equipment AN/GRM-1			600 to 699
Cable, Coaxial, RG-8/U (previously coded CASSF-50-1)		0.1 per foot	
Adapter, Coaxial, Right Angle, Type 49192	$1\frac{5}{16}$″ x $1\frac{5}{16}$″ x $\frac{3}{4}$″	0.07	
Plug, Coaxial, Type 49195	$1\frac{9}{16}$″ x $\frac{3}{4}$″	0.06	

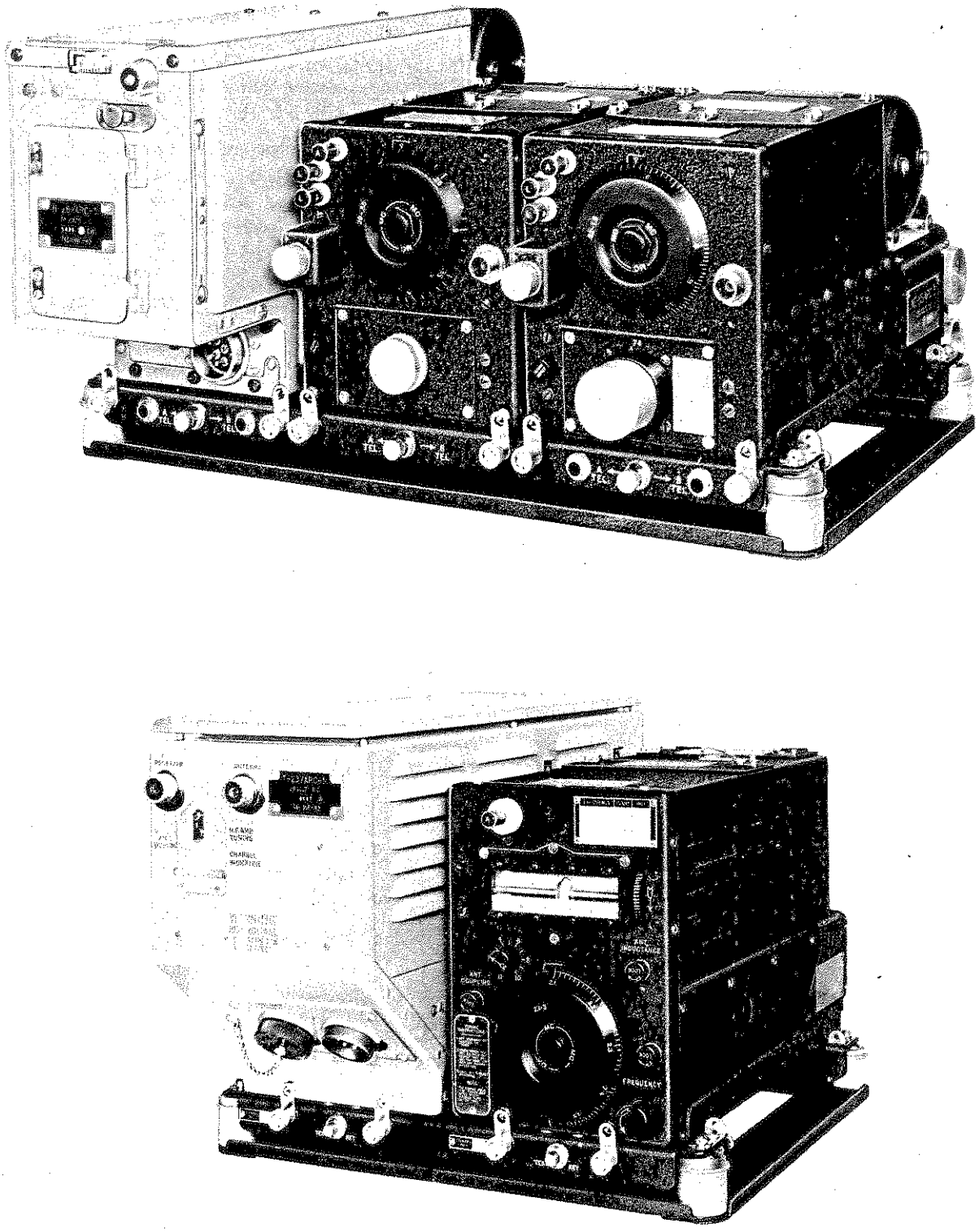


Figure 2—VHF and LF-MF-HF Transmitters and Receivers

Over-all dimensions and weights are shown in Figures 55, 56 and 57. Photographs of the components, except the test equipments, are shown in Figure 1 (the test equipments are covered in Section V of this volume). A VHF transmitter and a VHF receiver, mounted in racks with typical LF-MF-HF components, are shown in Figure 2.

c. EQUIPMENT REQUIRED BUT NOT SUPPLIED.

The VHF components described in this volume constitute only a part of Model AN/ARC-5 Aircraft Radio Equipment. In order to form a working radio system, it is necessary to provide certain basic components which are common to all frequencies (LF, MF, HF and VHF). These common components, including a modulator unit, racks, mountings, etc., are described in Volume 1.

An antenna AT-8/AR, AN-104A, AN-104AX, or the equivalent is also required.

d. OPERATING CHANNELS

The VHF equipment, both transmitting and receiving, is designed to operate on four pre-set frequency channels which are, for convenience, designated "A", "B", "C", and "D". All frequencies in the transmitter and receiver are controlled by quartz crystals which have relatively low frequency drift within the temperature range which is encountered in service.

The transmitter can be set to operate on any desired frequencies within the following limits:

Channel	*Frequency*
A	100 to 124 mc.
B	122 to 146 mc.
C	122 to 146 mc.
D	132 to 156 mc.

The receiver can be set to operate on any desired four channels between 100 and 156 megacycles.

e. REMOTE CONTROL

Both transmitting and receiving VHF equipment is designed for remote control only. Channel selection, the choice of automatic or manual volume control, the control of signal volume in the headset circuit, and the connection to either of two headset circuits, are all accomplished by the use of control units which are within convenient reach of the pilot. So, also, is the selection of tone, CW or voice transmission.

f. ANTENNA REQUIREMENTS

The antenna and antenna relay used with the LF-MF-HF components cannot be used in the VHF range. A separate VHF antenna is connected to the VHF transmitter by means of a coaxial transmission line which is made of Cable RG-8/U (CASSF-50-1). A similar line is used to carry the antenna circuit from the transmitter to the VHF receiver. The antenna switching relay for the VHF components is contained within the transmitter.

Two types of quarter-wave base-fed antennas are used with the VHF equipment. Rod-type Antenna AT-8/AR has a base that is similar to the ZB and ABK antennas except that the socket is of larger diameter. Mast-type Antennas AN-104A (Army) and AN-104AX (Navy) are for dual-purpose use, primarily as a VHF antenna, and secondarily as a support for a fore-and-aft type antenna.

g. PRIMARY POWER

Primary power is obtained from the aircraft 24-to-28 volt, d-c power supply. The current drain at 28 volts, for the VHF equipment, under various operating conditions, is as follows:

Operating Condition	*Current Drain*
VHF Receiver only	2.0 amperes
VHF Transmitter and Modulator	
Standby	2.7 amperes
Transmitting	9.5 amperes
VHF Receiver, Transmitter and Modulator	
Standby	4.7 amperes
Transmitting	11.5 amperes
Channel Switching	6.9 amperes

h. OPERATING CONDITIONS

The VHF components of Model AN/ARC-5 Aircraft Radio Equipment are, in general, designed to perform satisfactorily at ambient temperatures from −58F (−50C) to +122F (+50C); at any relative humidity up to 90 per cent; and at any atmospheric pressure from sea level to 35,000 feet. An exception to these limits should be noted in the case of early model VHF receivers. Receivers with selector O-101 have a low-temperature rating of −4F (−20C). Receivers with selector O-101A have a low-temperature rating of −22F (−30C).

i. NOTE ON FREQUENCY DESIGNATIONS

Throughout this handbook the terms low-frequency (LF), medium-frequency (MF), etc., will be used in conformity with the following standard designations of frequencies:

Very Low Frequency (VLF)	10 to	30 kilocycles
Low Frequency (LF)	30 to	300 kilocycles
Medium Frequency (MF)	300 to	3,000 kilocycles
High Frequency (HF)	3 to	30 megacycles
Very High Frequency (VHF)	30 to	300 megacycles
Ultra High Frequency (UHF)	300 to	3,000 megacycles
Super High Frequency (SHF)	3,000 to	30,000 megacycles

2. VHF RECEIVER

a. GENERAL

The VHF receiver of Model AN/ARC-5 Aircraft Radio Equipment is designated Radio Receiver R-28/ARC-5. A photograph of this receiver, together with its associated dynamotor ★DY-2/ARR-2, is shown in Figure 3. Its association and interconnection with other units are indicated in the cabling diagrams of Figures 58 and 59 and in the system schematic drawing of Figure 60.

The receiver is a ten-tube superheterodyne designed to receive amplitude-modulated signals on any one of four pre-selected crystal-controlled channels in the frequency band from 100 to 156 megacycles. No provision is made for tuning during flight to any channel other than the four just mentioned.

Channel selection is obtained by means of a motor driven selector mechanism which is under the control of push buttons in a remote control unit. Both automatic volume control (AVC) and manual volume control (MVC) are provided. Either may be used at the option of the pilot and in either instance, the signal level in the headsets may be varied.

No beat-frequency oscillator is provided, since the receiver is intended primarily for use in radio-telephone reception. Consequently, it is not well adapted to the reception of CW telegraph signals. As mentioned

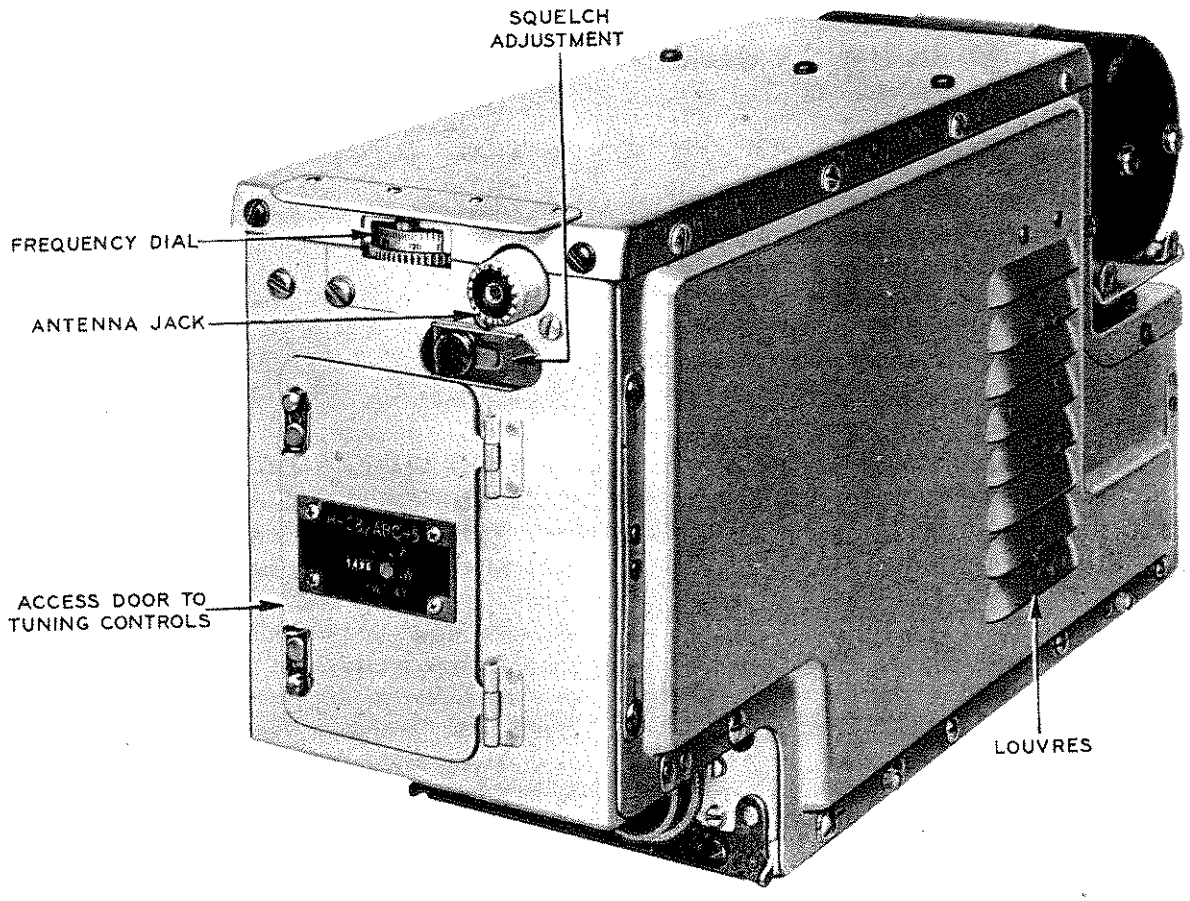


Figure 3—VHF Receiver

later in this volume, however, such operation may be used in an emergency.

A complete description of Radio Receiver R-28/ARC-5 will be found in Section IV of this volume.

b. BRIEF CIRCUIT DESCRIPTION

A block diagram of the receiver circuit, indicating the various stages, is shown in Figure 4. A simplified schematic of the circuit is shown in Figures 61 and 62. The two drawings are necessary because two somewhat different selector mechanisms have been used in earlier and later production models of the receiver. (This is fully explained in later sections of this volume).

Complete schematic diagrams of the circuit are shown in Figures 63 and 64. A stage of tuned r-f amplification (V-101) is followed by a mixer (sometimes called first detector) (V-102). Two i-f amplifier stages (V-103 and V-104) are followed by a dual triode tube (V-105), which functions as a detector, an AVC rectifier and a squelch rectifier. The succeeding tube (V-106) serves as a squelch amplifier and as a first stage of audio-frequency amplification. A second stage of audio frequency amplification (V-107) furnishes sufficient power output to operate several headsets.

The radio-frequency oscillator (V-108) is of the crystal-controlled type. It is followed by two harmonic generator stages (frequency multipliers) (V-109) and (V-110). The final frequency, as supplied to the mixer, is 24 times the crystal frequency.

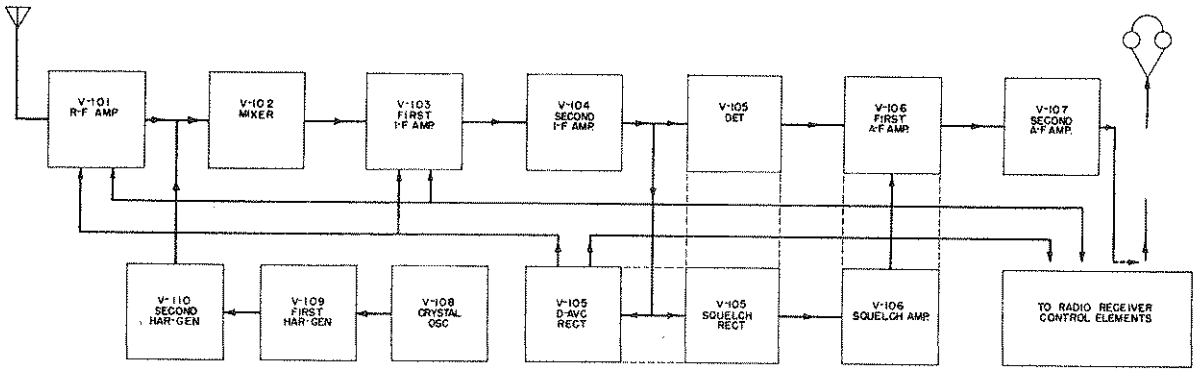


Figure 4—Block Diagram of VHF Receiver

3. VHF TRANSMITTER

a. GENERAL

The VHF transmitter of Model AN/ARC-5 Aircraft Radio Equipment is designated Radio Transmitter T-23/ARC-5. A photograph of the transmitter is shown in Figure 5. The association with other units is indicated in the cabling diagrams of Figures 58 and 59 and in the system schematic drawing of Figure 60. A complete description of the VHF transmitter will be found in Section IV of this volume.

The transmitter is capable of delivering approximately 6 to 10 watts of carrier-frequency power into a 50-ohm antenna or transmission line such as Cable RG-8/U (CASSF-50-1). It is intended primarily for use in telephonic transmission, but may be used, in an emergency, to transmit either CW or tone-modulated MCW telegraph signals. All modulation, both telephone and telegraph, is on the basis of amplitude modulation.

The audio-frequency power for modulating the transmitter is furnished by Modulator Unit MD-7/ARC-5. The high-voltage d-c power is also furnished by this unit. The modulator is described in Volume 1.

Any one of four pre-set crystal-controlled channels can be selected by means of a motor-driven selector mechanism, which is under control of push buttons in the radio control unit. A coaxial type antenna switching relay is built into the transmitter. This serves to

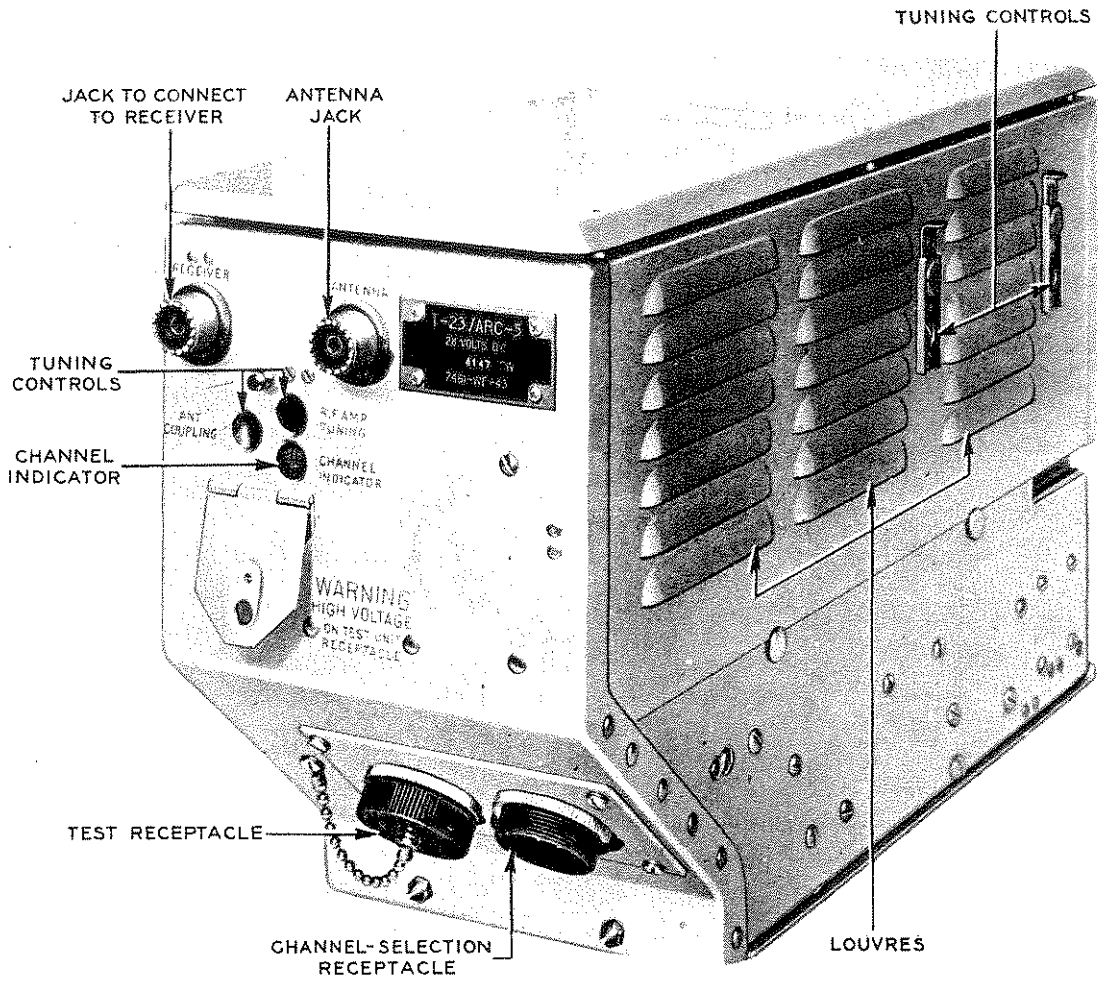


Figure 5—VHF Transmitter

transfer the antenna circuit from the receiver to the transmitter when a signal is to be transmitted.

b. BRIEF CIRCUIT DESCRIPTION

A schematic circuit diagram of the transmitter is shown in Figure 65. A crystal-controlled harmonic oscillator (V-301) excites the first harmonic generator stage (V-302) at double the crystal frequency. In turn, this later stage triples the frequency, and excites the second harmonic generator (V-303) at six times the crystal frequency. The second harmonic generator, which again triples the frequency, drives the output stage (V-304) at eighteen times the crystal frequency. The output tube is plate and screen modulated by audio-frequency power obtained from the modulator unit.

Four complete sets of r-f tuned circuits are provided, one set being tuned to each of the four pre-set frequencies. They are mounted in rotatable turrets (Z-301, Z-302 and Z-303), which are driven by the channel selecting motor (B-301). When actuated by the depression of one of the push buttons of the radio control unit, this motor rotates all turrets to such a position that the proper tuned circuits are connected. At the same time, mechanism is provided to operate one set of springs of switch S-301, thereby connecting the appropriate crystal into the circuit.

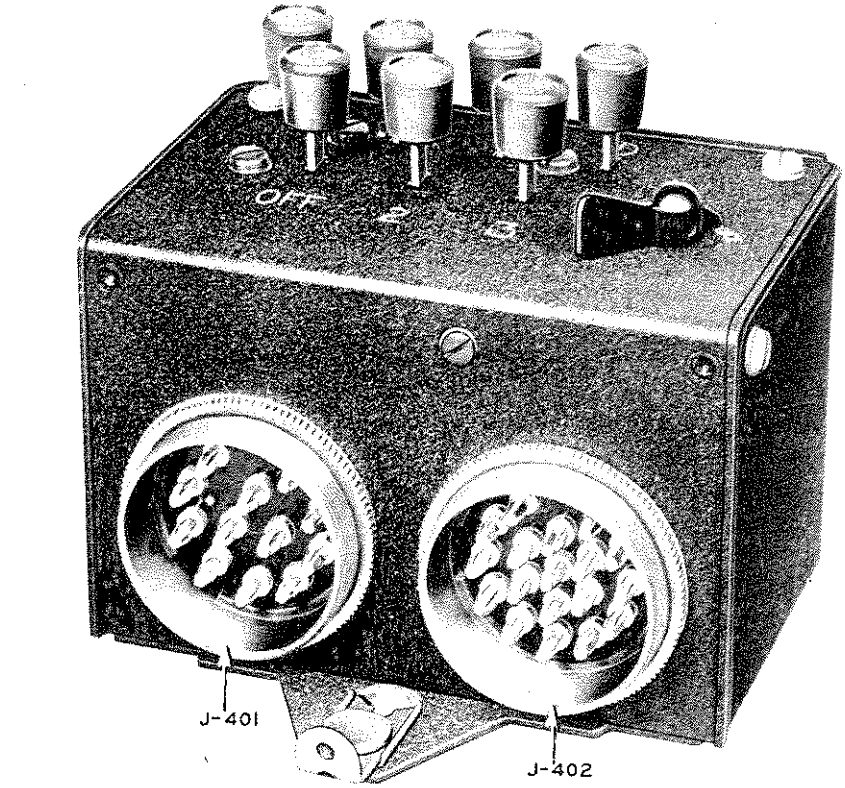
A complete description of the VHF transmitter is given in Section IV of this volume.

4. VHF CONTROL UNITS

a. GENERAL

Three control units are supplied for use with the VHF components of Model AN/ARC-5 Aircraft Radio Equipment. These are as follows:

Control Unit C-30/ARC-5—providing facilities for the remote control of one VHF transmitter and two MF-HF transmitters. It also furnishes the means for controlling the channel selection of one VHF receiver.



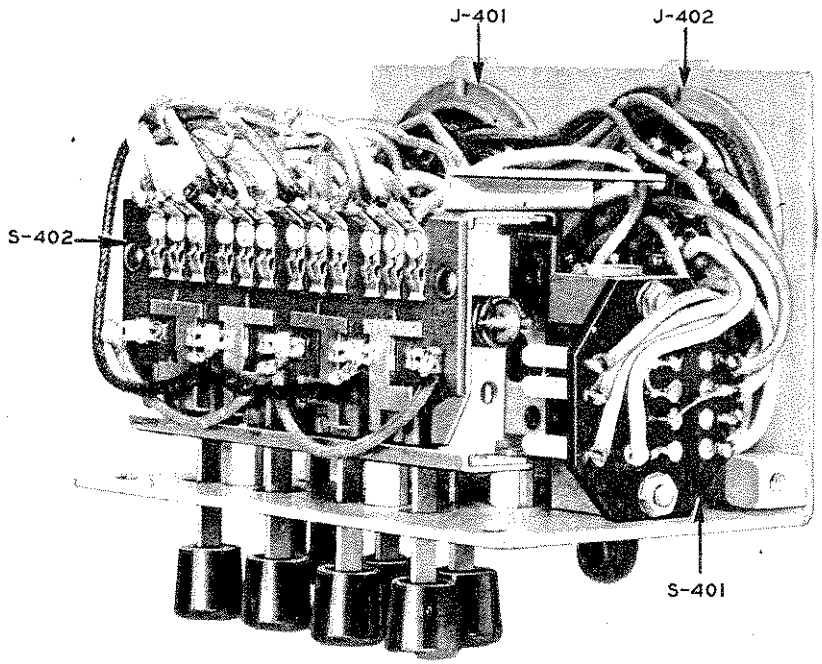


Figure 6—Control Unit C-30 ARC-5

Control Unit C-42/ARC-5—providing the controls for one VHF receiver, except for channel selection. Channel selection must be made by some other means, such as Unit C-30 mentioned above.

Control Unit C-43/ARC-5—arranged to control one VHF receiver, except for channel selection, in exactly the same manner as Unit C-42 just listed. In addition, it provides complete controls for two LF-MF-HF receivers.

Each of these control units is described briefly in the following paragraphs. A more complete description is contained in Section IV of this volume.

b. CONTROL UNIT C-30/ARC-5

The general arrangement of Control Unit C-30 ARC-5 is shown in Figure 6. A schematic circuit diagram is shown in Figure 7.

The depression of any one of the four push buttons, A, B, C, D, energizes the heater circuits of all transmitting equipment (including the MF-HF transmitters, if these are supplied). It also operates the channel-selecting mechanism in the VHF transmitter *and the VHF receiver*. The equipment is then ready for two-way communication on one of the VHF channels (A, B, C or D, depending upon which button was depressed).

The depression of push button 2 or 3 energizes the heater circuits of all transmitting equipment. It also selects one of the two MF-HF transmitters. The equipment is thus prepared for transmission on one of the channels to which the MF-HF transmitters have previously been tuned.

The operation of button 2 or 3 *does not* affect the condition of the VHF receiver; it remains on the channel last selected by push button A, B, C or D. The depression of the OFF push button de-energizes the heater circuits of all transmitters, but *does not* change the condition of the VHF receiver; it remains on the channel last selected (A, B, C or D). It will be noted that, in these cases, although the VHF receiver remains tuned to one of the four channels, the pilot or operator has no visible indication of which channel.

The TONE-CW-VOICE switch is used to control the type or emission of the transmitter. Ordinarily, it is left in the VOICE position when the VHF transmitter is used.

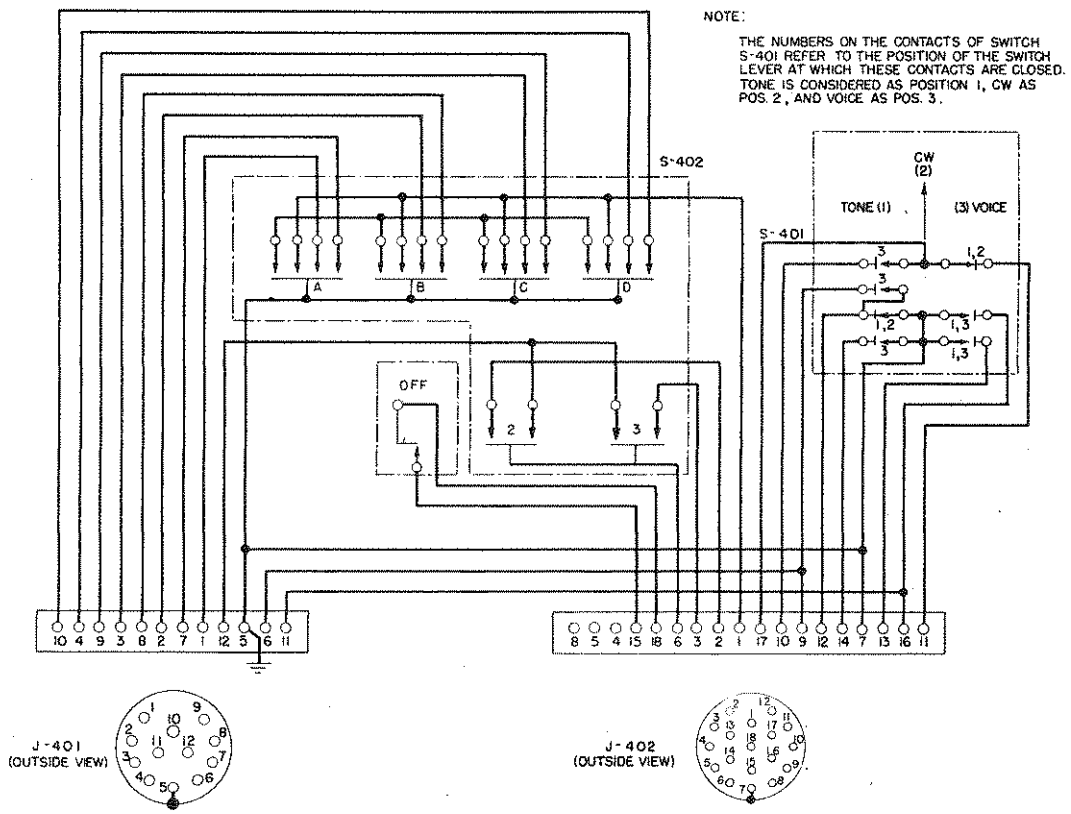


Figure 7—Control Unit C-30/ARC-5—Schematic Circuit

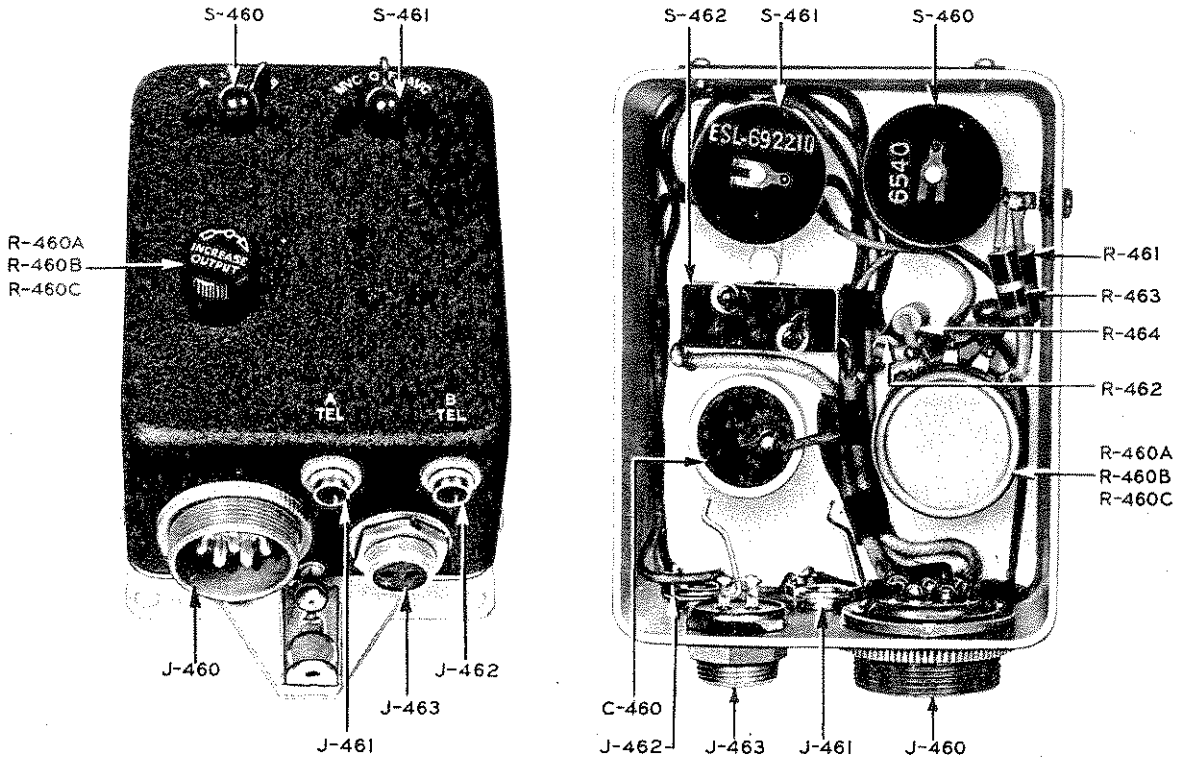


Figure 8—Control Unit C-42/ARC-5

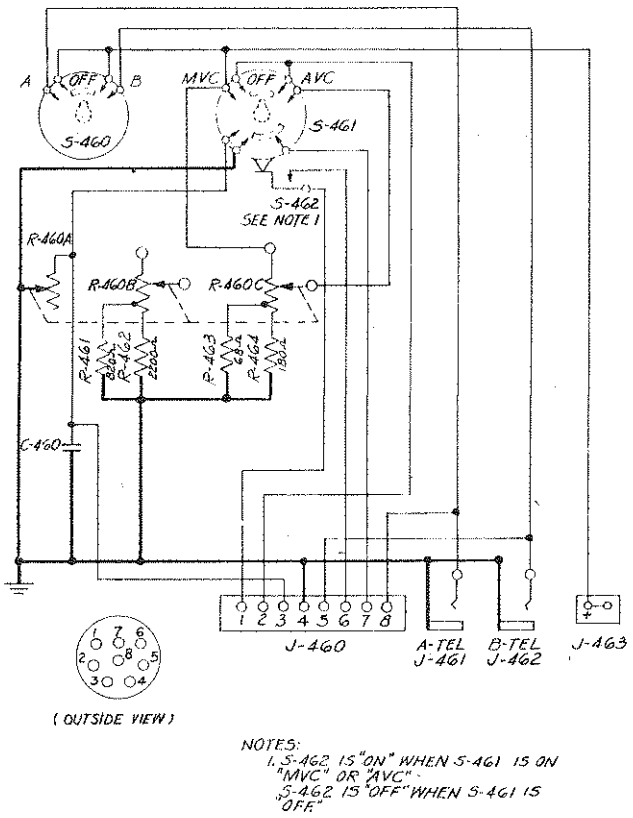


Figure 9—Control Unit C-42/ARC-5—Schematic Circuit

SPECIAL OPERATING NOTE

Wait 6 seconds after pressing push button A, B, C or D before pressing 2, 3 or OFF. If this is not done, the channel switching motor in the VHF receiver may continue to run. It can be stopped by pressing the A, B, C or D push button. The motor may burn out if this instruction is not followed. *This information should be passed on to all pilots and operators.*

c. CONTROL UNIT C-42/ARC-5

Photographs of Control Unit C-42/ARC-5 are shown in Figure 8. A schematic circuit diagram is shown in Figure 9. Except for channel selection, this unit controls one VHF receiver; the channel selection is made by Control Unit C-30, as explained in the preceding paragraph.

The MVC-OFF-AVC switch turns the VHF receiver on and off and also sets it for operation on the basis of either automatic volume control or manual volume control. Regardless of whether automatic or manual control is used, the level of noise and signal in the headsets can be regulated by operation of the INCREASE OUTPUT knob.

The switch designated A-B serves to connect the output of the VHF receiver to either of two headset

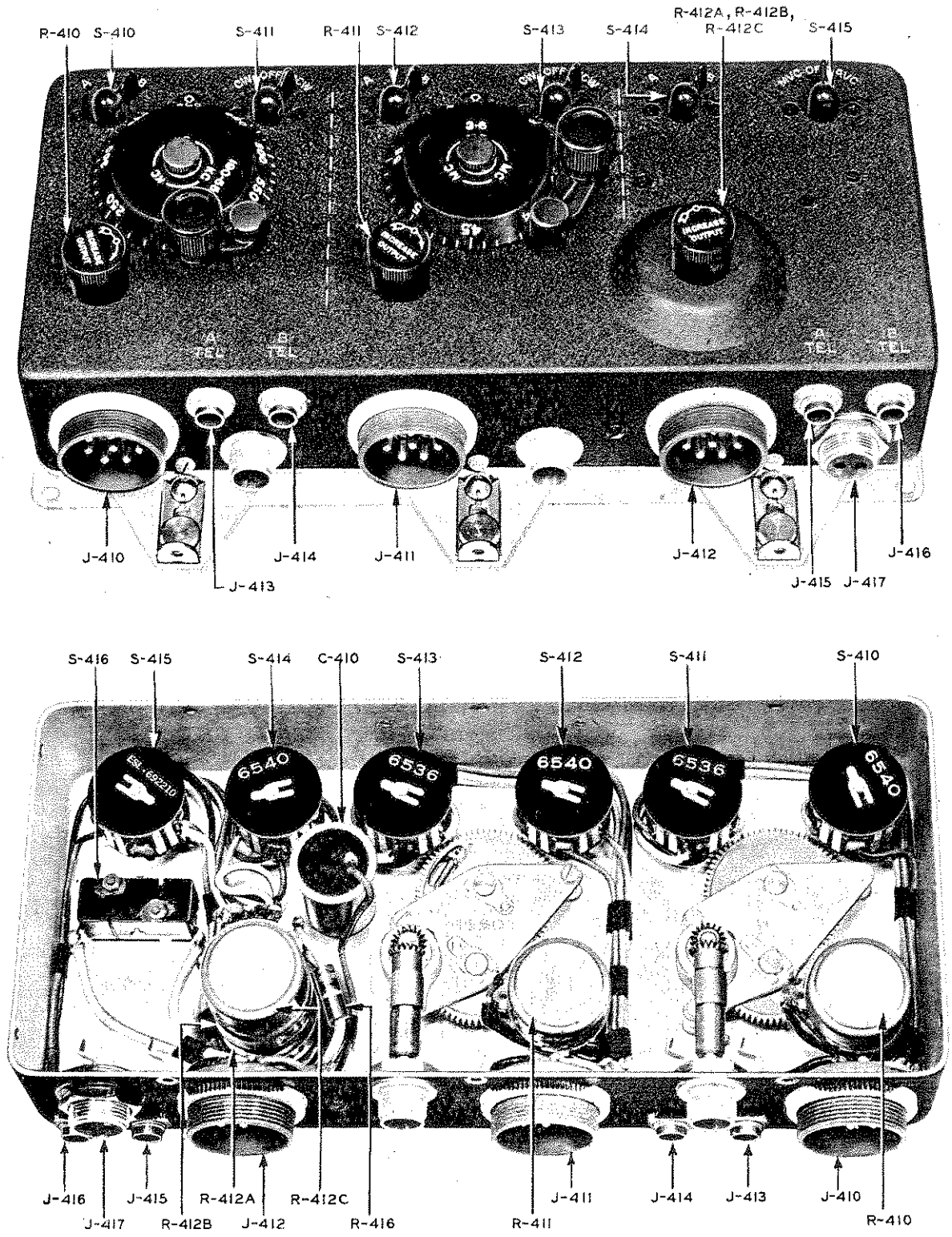


Figure 10—Control Unit C-43/ARC-5

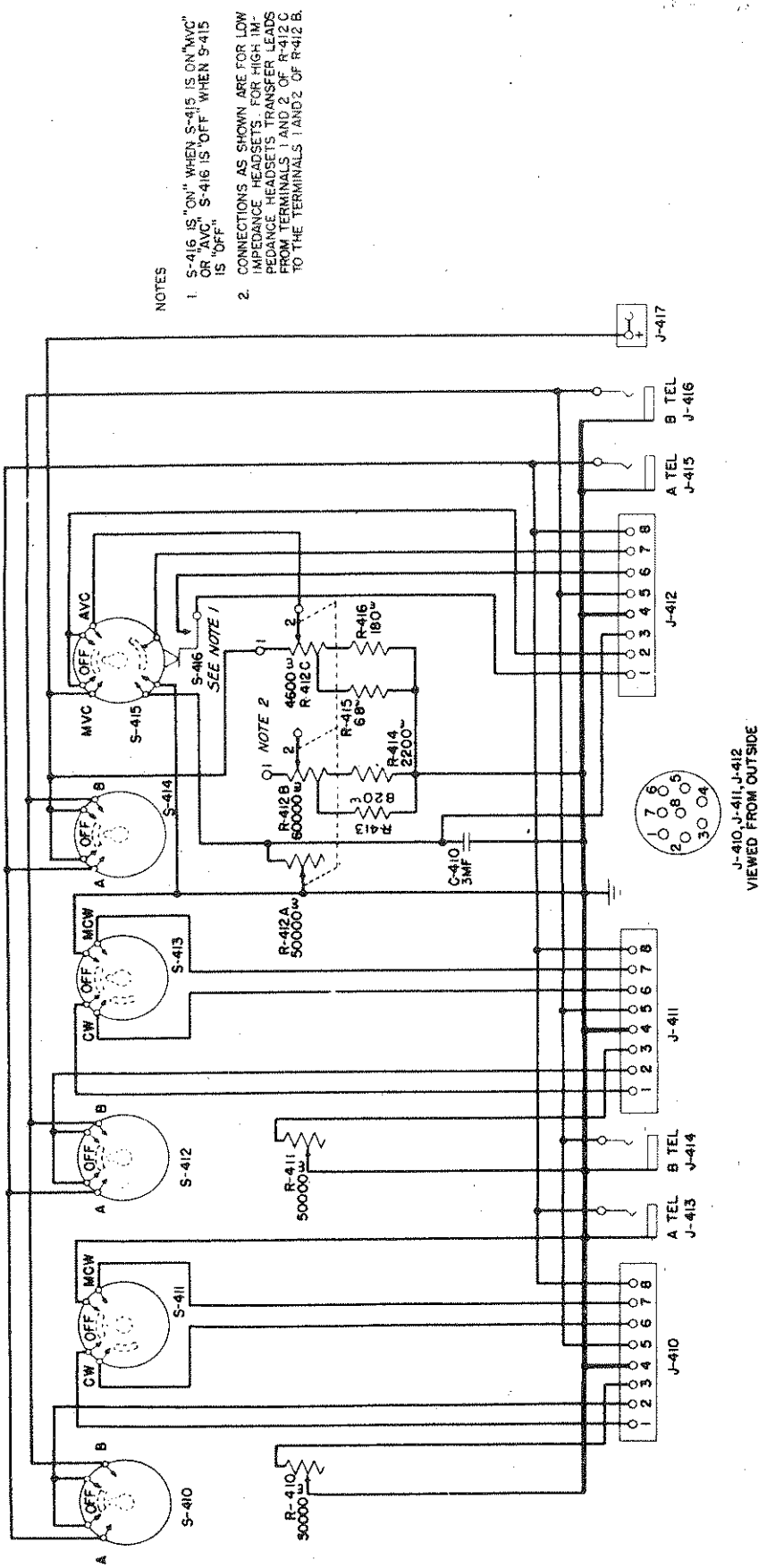


Figure 11—Control Unit C-43 ARC-5—Schematic Circuit

circuits. Access to these circuits is afforded by the A TEL-B TEL jacks at the bottom of the control unit. The jacks accommodate the plugs in which the headset cords terminate.

d. CONTROL UNIT C-43/ARC-5

Figure 10 shows photographs of Control Unit C-43/ARC-5. A schematic circuit diagram is shown in Figure 11. The right-hand section of this unit is identical, in function and use, with Control Unit C-42/ARC-5, just described. The center and left-hand sections provide complete control, including tuning or channel selection, for two LF-MF-HF receivers. The functions and operation are the same as those of Control Unit C-26/ARC-5, which is described in Volume 1 of this handbook.

5. TESTING EQUIPMENT FOR VHF

Information regarding the testing equipment used in connection with the adjustment and maintenance of the VHF components of Model AN/ARC-5, Aircraft Radio Equipment will be found in Section V (Maintenance) of this volume.

6. VHF TUBE COMPLEMENT

The VHF components of Model AN/ARC-5 Aircraft Radio Equipment utilize the following tubes:

Quantity	*Army Type*	*JAN Type*	*Use*
	Transmitter		
2	VT-136	JAN-1625	Oscillator (V-301). 1st Harmonic Generator (V-302).
2	VT-286	JAN-832A	2nd Harmonic Generator (V-303). Power Amplifier (V-304).
	Receiver		
4	VT-269	JAN-717A	R-F Amplifier (V-101). Mixer (V-102). 1st Harmonic Generator (V-109). 2nd Harmonic Generator (V-110).
3	VT-288	JAN-12SH7	1st I-F Amplifier (V-103). 2nd I-F Amplifier (V-104). Oscillator (V-108).
2	VT-289	JAN-12SL7GT	Detector, AVC Rectifier and Squelch Rectifier (V-105). 1st A-F Amplifier and Squelch Amplifier (V-106).
1	VT-134	JAN-12A6 or JAN-12A6GT	2nd A-F Amplifier (V-107).

ADAPTATION OF TEXT
FOR USE WITH
RADIO TRANSMITTER T-126/ARC-5

Throughout the following text the VHF transmitter referred to is RADIO TRANSMITTER T–23/ARC–5. The descriptive material and the instructions for use of this transmitter apply equally to RADIO TRANSMITTER T–126/ARC–5 in all respects except the two features outlined below.

1. FREQUENCY RANGE

Transmitter	*Carrier Frequency in Megacycles*			
	Channel A	*Channel B*	*Channel C*	*Channel D*
R.T. T–23	100–124	122–146	122–146	132–156
R.T. T–126	100–124	100–124	100–124	122–146

2. COMPONENT PARTS

The tuning coil assemblies in turrets Z–301, Z–302, and Z–303 of Radio Transmitter T–126/ARC–5 differ from those described in this text but all other component parts are identical. The following tuning coil assemblies are used in Radio Transmitter T–126/ARC–5. (Refer to Table of Replaceable Parts, page 96.)

Turret	*Coil Assembly Used*			
	Channel A	*Channel B*	*Channel C*	*Channel D*
Z–301	ES–693863	ES–693863	ES–693863	ES–693864
Z–302	ES–695797	ES–695797	ES–695797	ES–695836
Z–303	ES–695798	ES–695798	ES–695798	ES–695838

SECTION II—INSTALLATION AND ADJUSTMENT

1. INITIAL INSPECTION AND BENCH TEST

Check the supply of component units against the list forwarded with the shipment, and the cabling diagram for the particular type of aircraft furnished by the Bureau of Aeronautics. (In the absence of such a cabling diagram, Figures 58 and 59 may be used. These, however, are merely illustrative of possible combinations of equipment, and do not necessarily represent the actual installation involved.)

Examine each component to determine that no obvious mechanical fault exists. This examination should include, as a minimum, the following: inspection of the threads of receptacles and plugs, examination of pin plug assemblies for bent or otherwise unserviceable units, checking of all fuses (both active and spare), inspection of all vacuum tubes to see that these are of the proper type and inserted securely in their respective sockets, examination of transmitter and receiver crystals for type, frequency and location in proper sockets.

It is recommended that an electrical bench test of each component be made before it is installed in an aircraft. This can be made with Test Equipment AN/GRM-1. (See Section V of this handbook.) Such a pre-installation test will tend to insure the proper operation of the equipment after it is installed. It will also minimize the amount of work which will have to be done in and about the aircraft.

It should be remembered that trouble shooting and repair work on installed radio equipment is difficult and should be avoided wherever possible. Where a considerable amount of installation work is to be done, it is recommended that a permanent installation of Test Equipment AN/GRM-1 be made available. Such an installation is shown in Figure 66.

2. INSTALLATION

a. GENERAL

Installation of the VHF components should follow the same general procedure as that recommended for the LF-MF-HF components in Volume 1 of this handbook. Installation dimensions and weights for the VHF components are indicated in Figures 55, 56 and 57 of this volume.

Cabling diagrams for each type of aircraft will be furnished by the Bureau of Aeronautics. If for any reason such a diagram is not available, those shown in Figures 58 and 59 may be used as a general guide, remembering that these are merely illustrative, and do not necessarily represent any actual installation.

b. SAFETY WIRING

Safety wiring should be applied to the following parts of the VHF equipment:

The knurled nuts which secure the transmitters and receivers to the mounting racks.

The end bells of the VHF receiver dynamotor.

The snapslides which secure the dynamotor of the VHF receiver.

The snapslides which secure the second harmonic generator and power amplifier tube sockets in the VHF transmitter.

The snapslides which secure the control units.

c. VACUUM TUBES

Before the power is turned on in a new installation, check carefully to see that all tubes are securely in place and in their proper sockets.

TUBES SUPPLIED WITH THE EQUIPMENT SHALL BE CONSUMED PRIOR TO THE EMPLOYMENT OF TUBES FROM GENERAL STOCK.

Tube complements for the VHF equipment are given in Section I, Paragraph 6, of this volume.

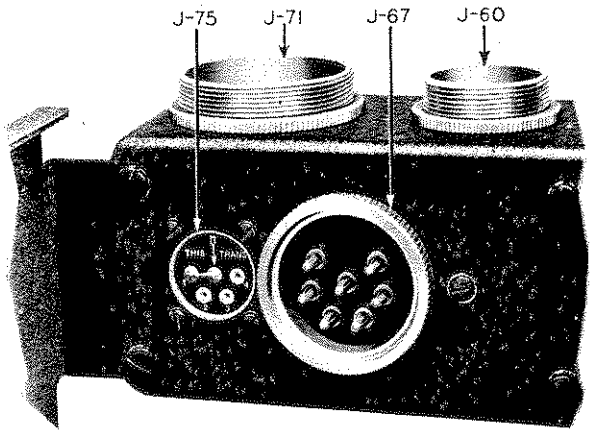


Figure 12—Transmitter Rack Selector Plate Wired for VHF Transmitter

d. LOCATION OF TRANSMITTERS AND RECEIVERS

The VHF transmitter and the VHF receiver should be installed in their respective racks in the positions shown in the cabling diagram supplied by the Bureau of Aeronautics. The selector plate of the stall which holds the VHF transmitter must be wired with its center terminal connected to terminal 1. This is illustrated on the photograph in Figure 12. The MF-HF transmitter positions should be strapped to Terminals 2 and 3.

e. COAXIAL CABLES

All antenna wiring for the VHF equipment should be made with coaxial cable RG-8/U (formerly coded CASSF-50-1). The plug and right-angle adapter used with this cable are shown on the photograph in Figure 1. All coaxial cabling should be made as short as possible, consistent with proper slack for motion of equipment in the shock mountings, and for removal of plugs and fittings. The coaxial cable from the VHF antenna should be connected to the right-hand receptacle of Radio Transmitter T-23/ARC-5. The coaxial cable from Radio Receiver R-28/ARC-5 should be connected to the left-hand receptacle on the transmitter. In the normal non-energized position of the antenna relay within the radio transmitter, the antenna circuit passes through the coaxial relay to the receiver. These functions may be readily understood by reference to Figure 60.

f. VHF TRANSMITTER CRYSTALS

Each Radio Transmitter T-23/ARC-5 requires from one to four Crystal Units DC-30 (one for each channel which is to be used). The frequency of the crystal is one-eighteenth of the carrier frequency:

$$\text{Crystal Frequency} = \frac{\text{Carrier Frequency}}{18}$$

$$\text{Carrier Frequency} = 18 \times \text{Crystal Frequency}$$

The location of the crystal corresponding to each channel selector push button (A, B, C and D) is engraved on the proper socket.

g. VHF RECEIVER CRYSTALS

Each Radio Receiver R-28/ARC-5 requires from one to four Crystal Units DC-31 (one for each channel which is to be used). The frequency of the crystal is one-twenty-fourth of the difference between the carrier frequency and the intermediate frequency (6.9 megacycles):

$$\text{Crystal Frequency} = \frac{\text{Carrier Frequency} - 6.9 \text{ mc}}{24}$$

$$\text{Carrier Frequency} = (24 \times \text{Crystal Frequency}) + 6.9 \text{ mc}$$

h. RECEPTACLE CAPS

All receptacles not in use in a given installation should be capped. Each receiver rack is furnished with one cap CW-2/ARC-5 (5319). This is placed over receptacle J-6 or J-7 in those installations where one or the other of them is unused. An additional cap of the same type is secured to the front of each Radio Transmitter T-23/ARC-5 by means of a short length of chain. This cap is used to cover receptacle J-307 at all times, except when the transmitter is connected to Test Unit I-155-A.

Beware of the high voltage that is exposed at the terminals of the receptacle when this cap is removed.

i. PUSH BUTTONS OF C-30/ARC-5

If a Control Unit C-30/ARC-5 is installed in an aircraft with only one or two radio transmitters, it is recommended that the unused push buttons be blocked in order to prevent their accidental operation by the pilot or operator. Likewise, if it is known that one or more of the VHF channel selection push buttons are not to be used, they should also be blocked. This can be accomplished by drilling a small hole in the shank close to the surface of the control unit and then inserting a cotter pin through the shank.

It will be found that, in some cases, the push button knobs are secured to their shanks by means of small internal springs. In order to prevent trouble due to rusting and failure of these springs in service, it is advisable to cement the knobs in place. This can be done by the use of Glyptal cement.

j. VHF ANTENNA

There are certain precautions which should be observed in connection with the installation of the VHF antenna. The mounting base dimensions for Antenna AT-8/AR are identical with those of Antennas ZB and ABK; they may be installed in a similar manner. The mast-type antenna requires particular attention to insure proper grounding. It is recommended that a grounding strip be connected to the skin of the airplane at the point where the mast passes through the skin, making sure that clean metallic surfaces are in electrical contact. The over-all length of the strip should not exceed 2½ inches (make it shorter if possible); it should be not less than ½ inch wide; and it should be made of the same material as the skin of the airplane. A minimum clearance of 3/16 inch should be maintained between the skin of the airplane and the metallic portion of a mast-type antenna. In attaching a fore-and-aft antenna to the top of a VHF mast, the wire to the insulator should be as short as possible; the distance from the hole in

the mast to the hole in the strain insulator should not exceed two inches. Paint, caulking materials and compounds, and oils must be kept from the insulating surfaces of both types of antenna in order not to impair their efficiency.

In general, the VHF antenna should be located somewhere along the center line of the airplane. For other than carrier-based airplanes, it recommended that locations be tried on the bottom of the fuselage. It should be noted that if a location is selected too far forward or in the vicinity of the propellers, a phenomenon known as propeller modulation may distort the signal. Another point to be kept in mind at these frequencies is the shadowing effect produced by wings, fuselage and tail surfaces.

A final and positive check on antenna location can be made by a flight test with the airplane and ground station at least 30 miles apart for a check of the horizontal pattern. The airplane should be flown at various attitudes and constant distance in order to determine the shadow effect of wings, fuselage and tail surfaces. An additional check should be made at various altitudes directly above the ground station in order to observe the signal strength.

k. COAXIAL TRANSMISSION LINE

The connection between the VHF antenna and the VHF transmitter and receiver is usually made with a flexible coaxial transmission line such as RG-8/U (CASSF-50-1) or its equivalent. When space is available to obtain the necessary bending radii at the ends of the transmission line, the line should be terminated in Navy Type Plugs 49195 (see Figure 57). If space is not available, and it is necessary to make sharp turns, Navy Type Adapter 49192 or its equivalent should be used (see Figure 57).

3. ADJUSTMENT

a. PRECAUTIONS

Precautions preparatory to turning on the power of this equipment appear in the Safety Notice in the front of this volume.

Before making the following adjustments read carefully the paragraphs below and SECTION III (OPERATION) so that the functions of the controls are well understood.

Before Radio Receiver R-28/ARC-5 and Radio Transmitter T-23/ARC-5 are tuned in an airplane, the VHF antenna and the coaxial transmission line should be in place. The proper connections for each type of aircraft are shown in the cabling diagram furnished by the Bureau of Aeronautics.

b. TUNING PROCEDURE FOR VHF RECEIVER

(1) *General.*

The following procedure assumes that the VHF receiver is in good operating condition and has been properly aligned. All that is required is to tune it to four channels.

(2) *Apparatus Required.*

One Crystal Unit DC-31 for each frequency to which the receiver is to be tuned.

Screwdriver.

Tuning wrench for VHF receiver (one of these wrenches is secured to the rear of the small door on the front of each VHF receiver).

Buzzer-type r-f noise generator as supplied with Test Equipment IE-35-A. (Not always required.)

(3) *Preparation.*

Disconnect the coaxial cable from the antenna jack of the VHF receiver. Remove the receiver from its rack. Remove the right hand cover and insert crystals of the desired frequencies. Replace the cover and restore the receiver to the rack. Turn the MVC-OFF-AVC switch to the MVC position. Turn the volume control to give maximum sensitivity. Allow 30 seconds for the tubes to heat up.

(4) *Tuning.*

Operate the channel selector to A by depressing push-button A. Open the door on the front of the receiver and remove small tuning wrench clipped to the inside of the door. (Additional wrenches of this same type are furnished with Test Equipments AN/GRM-1 and IE-35-A.) Insert the long end of the wrench into the hole adjacent to the letter A. (See Figure 13.) With the end of the wrench on the bottom of the hole, a slight movement in a counter-clockwise direction should cause it to engage in the hollow head of the socket head cap screw which holds the selector cam to the tuning shaft. Continue turning in a counter-clockwise direction one full turn.

Do not remove the wrench from the locking screw until the cam has been adjusted and locked.

Turn the manual tuning dial at the top of the receiver to the approximate frequency of Channel A. Then, while listening to the background noise in the headset, rock the manual tuning dial until a maximum of background noise is heard. If necessary, reduce the gain by turning the volume control. Lock the A selector cam by turning the locking screw in a clockwise direction. *Remove the wrench.* Repeat this procedure for channels B, C, and D.

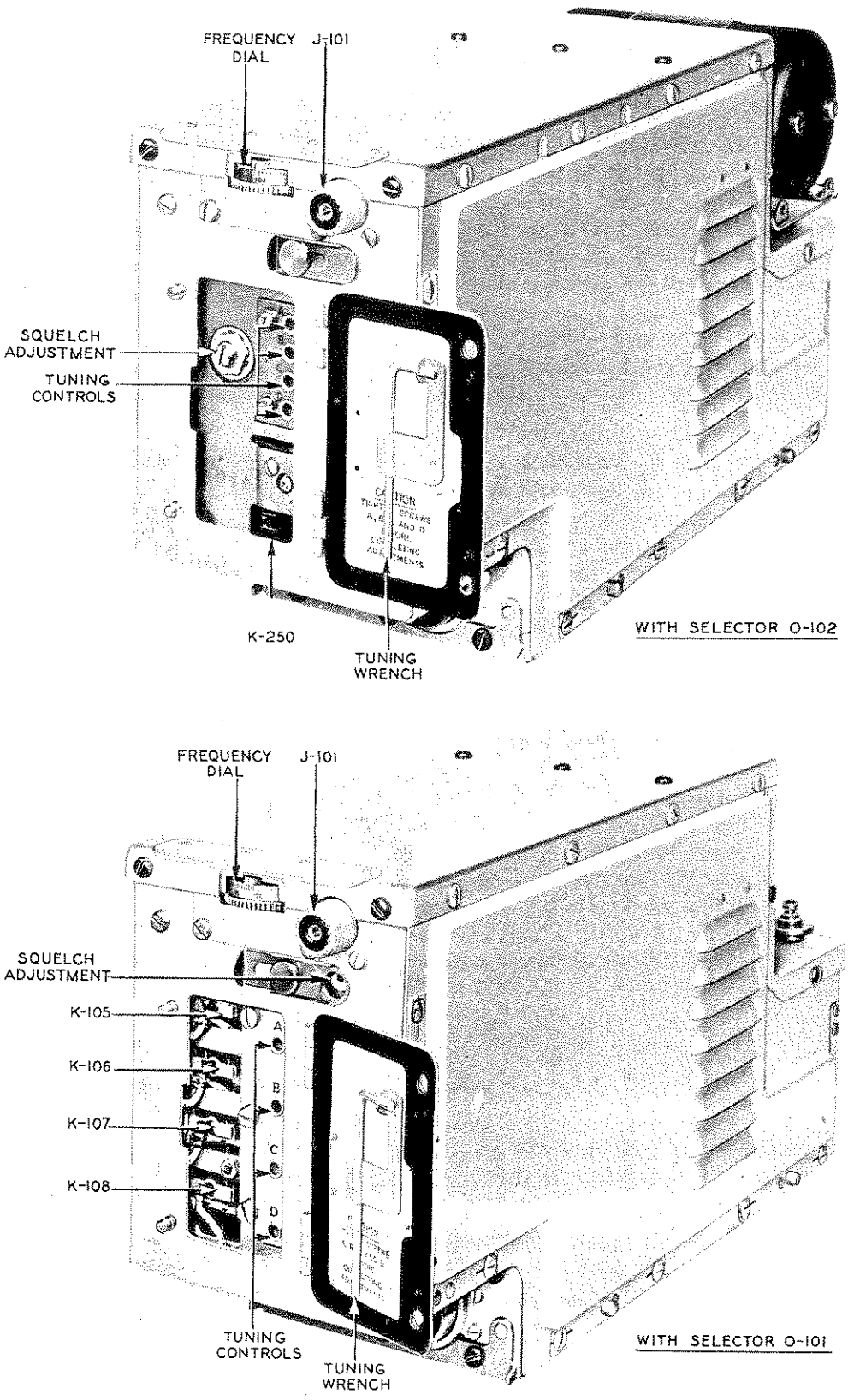


Figure 13—VHF Receiver Tuning Controls

Re-check the operation of the tuning control mechanism on all four channels.

Under some circumstances it may be found that the level of background noise in the headset is not sufficiently high to provide a convenient tuning guide. If this is the case, use the buzzer-type r-f noise generator. Place it near the antenna receptacle of the receiver. If increased pick-up is required, insert a piece of wire several inches long into the receptacle. After the receiver has been tuned replace the antenna connection.

NOTE

If the selector cam locking screws are not sufficiently tightened, the drag of the pawl may cause the cam to slip on the shaft. In this event, the depression of a channel selecting push button (A, B, C, or D) causes the tuning motor to run continuously. To correct this condition: turn the receiver OFF, turn the manual tuning dial until the loose locking screw is in line with the hole, depress the push button for the channel under consideration, turn the receiver ON to re-energize the selector relay, insert the wrench, retune the channel as described, and then tighten the locking screw.

This trouble condition should not be confused with another cause of motor "run away" which sometimes results from improper manipulation of the channel selection push buttons. This latter condition arises as follows: push button A, B, C, or D is depressed, and then, before channel selection is completed in the receiver, push button 2, 3, or OFF is depressed. *The motor continues to run until it burns out or until one of the buttons, A, B, C, or D is re-operated.*

c. TUNING PROCEDURE FOR VHF TRANSMITTER

(1) *General.*

The procedure given below covers a complete retuning of a VHF transmitter installed in an airplane. If the transmitter has already been tuned on the bench to the four frequencies required, steps (3) to (11), inclusive, can be omitted. In this case, it is necessary merely to adjust the output circuit and antenna coupling to the particular transmission line and aircraft antenna.

NOTE

The tuning procedure given below includes certain meter readings on Test Unit I-155-A. These are based upon a battery voltage of 28 volts. If the battery is lower than this, lower meter readings may be expected; if the battery is higher, higher meter readings may be obtained.

(2) *Apparatus Required.*

One Crystal Unit DC-30 for each frequency to which the transmitter is to be tuned.

Test Unit I-155-A (Part of Test Equipment IE-35-A)

Transmitter Tuning Wrench (Part of Test Equipment IE-35-A)

Antenna A-85-A (Part of Test Equipment IE-35-A)

Indicator I-106-A (Part of Test Equipment IE-35-A)

Screwdriver

(3) *Preparation.*

Remove the radio transmitter from the rack. Remove the bottom cover plate and insert Crystal Units DC-30 in their proper sockets. Be sure that the frequencies of the crystal units correspond to the channel carrier frequencies as shown on the label on the inside of the cover plate. Replace the bottom cover plate and re-install the transmitter in the rack. If the transmitter rack has space for more than one transmitter, be sure that the VHF transmitter is installed in the stall which is wired for position #1 (see Section II, Paragraph 2d of this volume).

Re-attach the lower right-hand receptacle which connects to the control unit. Remove the cap marked CAUTION HIGH VOLTAGE from the lower left-hand receptacle and attach the cord of Test Unit I-155-A. Connect Antenna A-85-A in place of the coaxial transmission line to the aircraft antenna. Set the TONE-CW-VOICE switch on the radio control unit to VOICE. Operate the push button for Channel A on the radio control unit and observe that A appears on the CHANNEL INDICATOR in the front panel of the transmitter. Repeat for channels B, C, and D to check mechanical operation of the selector. Allow the transmitter to warm up for 30 seconds before proceeding further. Then operate the push button on the microphone or the test switch on the transmitter rack only as long as required to make each measurement or adjustment.

(4) *Heater and Plate Voltages.*

Turn the meter switch on Test Unit I-155-A to position 6. The meter should read approximately 54 scale divisions, indicating 27 volts on the tube heaters (corresponding to 28 volts at the battery). Turn the switch to position 7. The meter deflection should be between 53 and 55 scale divisions, indicating a plate voltage of 530 to 550 volts.

(5) *Crystal Check*

Turn the meter switch on Test Unit I-155-A to position 1. The meter now measures the grid current of the oscillator tube. Observe that this is between 4 and 70 scale divisions (0.07 to 1.2 milliamperes) for each of the four channels. A reading outside these limits indicates trouble, probably a defective crystal.

(6) *Oscillator Output Circuit.*

Turn the meter switch to position 2. Insert the tuning wrench in opening 2 on the right-hand side of the transmitter and adjust the inductor (L-302) in the oscillator plate circuit until a maximum deflection of the meter is obtained. Ordinarily, this should be between 25 and 90 scale divisions, indicating 1.5 to 5.4 milliamperes grid current in the first harmonic generator tube.

(7) *First Harmonic Generator Output Circuit.*

With the meter switch still in position 2, insert the tuning wrench in opening 3-A on the right-hand side of the transmitter and adjust the tuning (L-303) of the first harmonic generator plate circuit. It will be noted that as this circuit is tuned, a major dip (usually 5 per cent or more) will occur in the meter deflection.

Under some conditions one or more smaller dips may also be observed. Adjust the tuning to the bottom of the *major* dip; that is, to a *minimum* meter deflection. Extreme care should be exercised here to avoid tuning to any secondary or minor dip which may occur. *If this is done, the transmitter will be tuned to the wrong harmonic of the crystal and will radiate on an unauthorized frequency.*

(8) *Second Harmonic Generator Input Circuit.*

Turn the meter switch to position 3 and adjust L-305 of the input circuit of the second harmonic generator through opening 3-B on the left-hand side of the transmitter. Adjust for maximum meter deflection. Then, with the meter switch still in position 3, go back to opening 3-A and make any necessary final readjustment of L-303 to obtain a maximum meter reading. This should be between 25 and 90, corresponding to 1.5 to 5.4 milliamperes grid current in the second harmonic generator tube.

(9) *Second Harmonic Generator Output Circuit.*

Turn the meter switch to position 4. Insert the tuning wrench in opening 4 and adjust inductor L-308 in the output circuit of the second harmonic generator to get a maximum deflection of the meter. This should be between 20 and 80, indicating a grid current in the r-f amplifier of 1.2 to 4.8 milliamperes.

(10) *R-F Amplifier Output Circuit and Antenna Coupling.*

Set the meter switch in position 5. The meter now indicates the cathode current (total space current) of the r-f amplifier tube. Insert the tuning wrench in the opening marked ANT COUPLING in the front panel. Turn this control to the limit of counter-clockwise rotation to obtain minimum coupling. With the wrench in the opening marked RF AMP TUNING, adjust the r-f amplifier output circuit (L-311) until a steady reading of the meter is obtained over several turns of the adjusting nut. Note this reading as "detuned cathode current." It should be approximately 50 to 60 meter scale divisions (50 to 60 milliamperes). Then readjust RF AMP TUNING for maximum dip (minimum current) as observed on the meter. Next, increase the ANT COUPLING by turning clockwise in small steps until the cathode current reaches about 90 per cent of the untuned cathode current observed above. On each step, after changing the coupling, readjust the RF AMP TUNING for maximum dip.

(11) *Channels B, C, and D.*

Repeat steps (6) to (10) inclusive, for channels B, C, and D. All circuits of the transmitter are now properly tuned and matched to Antenna A-85-A. However, they are not necessarily matched to the transmission line and antenna of the aircraft.

(12) *Antenna Matching.*

Remove the artificial antenna and reconnect the transmission line and aircraft antenna. Operate channel selector push-button A and check that A appears on the channel indicator on the front panel of the radio transmitter. Set the meter switch of Test Unit I-155-A in position 5 (r-f amplifier space current). Reduce the ANT COUPLING to minimum by turning the control in a counter-clockwise direction. Adjust the RF AMP TUNING for maximum dip (minimum current) as observed on the meter. Then increase the ANT COUPLING by turning the control in a clockwise direction in small steps until the cathode current reaches approximately 90 per cent of the detuned cathode current, as determined in (10) above. On each step, after changing the coupling, readjust the RF AMP TUNING for maximum dip.

NOTE

At some frequencies it may be found that minimum antenna coupling will occur at some setting other than full counter-clockwise rotation of the ANT COUPLING control,

and the direction of rotation of the control required to increase the antenna coupling may be reversed. In any case, a setting should be found which results in a cathode current (with the RF AMP TUNING adjusted for maximum dip) equal to 90 per cent of the detuned cathode current.

(13) *Radiation Check.*

With Indicator I-106-A on the ground, or the wing of the aircraft about 10 or 20 feet from the antenna, turn the tuning dial until a peak deflection of the meter is obtained, while the transmitter is being operated on Channel A. The dial setting of the indicator should correspond to the frequency assigned for Channel A. Repeat on Channels B, C, and D. If a large error in frequency is observed, it is probable that inductor L-303 in the plate circuit of the first harmonic generator has been tuned to a minor dip rather than to the major dip referred to in step (7). In this case repeat step (7) and the subsequent tuning procedure. Do not extend the antenna of the indicator any farther than is necessary to obtain the required sensitivity of measurement. (Otherwise, the indicator is likely to be damaged, as explained in Section V of this volume.)

d. SQUELCH ADJUSTMENT OF VHF RECEIVER

The squelch adjustment of the VHF receiver should be made with the equipment connected to the antenna and with the main engines of the airplane operating. With the receiver in the MVC condition, turn the INCREASE OUTPUT knob until the background noise in the headset is at a high level. Then, go to the AVC condition and turn the squelch control on the front of the receiver until the squelch just fails to trip or trips only occasionally on spurts of noise. Check the adjustment on the three remaining channels and readjust as necessary. Then turn the squelch control *counterclockwise* a very slight amount (not more than 5 degrees). This adjustment must be made very carefully, since an improperly adjusted squelch circuit can materially degrade the performance of the receiver. The output of the LF-MF-HF receivers should be disconnected from the TEL circuit while this adjustment is being made.

In this connection it should be noted that an improperly shielded ignition system or poor bonding at any point of the airplane may cause high background noise. This high noise level requires that the squelch be adjusted to a relatively insensitive condition, thus reducing the over-all sensitivity of the receiver and the operating range.

SECTION III—OPERATION OF VHF EQUIPMENT

OPERATION OF THIS EQUIPMENT INVOLVES THE USE OF HIGH VOLTAGES WHICH ARE DANGEROUS TO LIFE. OPERATING PERSONNEL MUST AT ALL TIMES OBSERVE ALL SAFETY REGULATIONS. SEE SAFETY NOTICE ON PAGE IX OF THIS BOOK.

NOTE

The method of operation which follows is based upon an installation using Control Units C-30/ARC-5 and either C-42/ARC-5 or C-43/ARC-5. Where other control units are used, the method will differ in detail, but the same general sequence of operations should be followed.

1. OPERATION OF VHF RECEIVER

Depress push button A, B, C, or D depending upon the channel desired. (These push buttons are located on Control Unit C-30/ARC-5—see Figure 6. They control the channel selection of both the VHF receiver and the VHF transmitter. Receiver and transmitter are always tuned to the same channel.)

Turn on the VHF receiver by operating the MVC-OFF-AVC switch to either the AVC or the MVC position. (This switch will be found on either Control Unit C-42/ARC-5 or Control Unit C-43/ARC-5—see Figures 8 and 10. Ordinarily, AVC operation should be used. However, if the reception of very faint signals is required, or if it is suspected that the receiver is not properly adjusted, MVC should be used.)

Connect the output of the receiver to the headset circuit which is in use. Do this by turning the A-B switch on the control unit.

Turn the INCREASE OUTPUT knob until the desired level of sound is heard in the headset. (This knob is located on Control Unit C-42/ARC-5 or C-43/ARC-5. If no sound is heard in the AVC condition, switch to MVC momentarily and turn the INCREASE OUTPUT knob all the way to the right.)

2. OPERATION OF VHF TRANSMITTER

Turn on the transmitter and select the desired channel by depressing push button A, B, C, or D. (These push buttons are located on Control Unit C-30/ARC-5—see Figure 6. They control channel selection on both the VHF transmitter and the VHF receiver. Transmitter and receiver are on the same channel.)

Wait 30 seconds for the transmitter tubes to heat up.

Turn the TONE-CW-VOICE switch to VOICE. (This switch will be found on Control Unit C-30/ARC-5. Normal operation of the VHF equipment is always on VOICE. For use of TONE and CW see paragraph below, dealing with "Emergency Operation.")

Press the microphone switch, the throttle switch, or the key. Speak clearly and distinctly into the microphone. If a hand microphone is used, it should be held very close to the mouth. (If the equipment is operating properly, sidetone will be heard in the headset.)

3. SWITCHING FROM ONE VHF CHANNEL TO ANOTHER VHF CHANNEL

Press the proper push button (A, B, C, or D) on Control Unit C-30/ARC-5. (This causes both the VHF transmitter and the VHF receiver to switch to the new channel.)

4. SWITCHING FROM A VHF CHANNEL TO AN LF-MF-HF CHANNEL

Press push button 2 or 3 on Control Unit C-30/ARC-5, depending upon which of the MF-HF transmitters is to be used. (This switches transmitters but leaves the VHF receiver tuned to the channel last selected. Monitoring can be continued on this channel. No warm-up period for the MF-HF transmitter is necessary, since *all* transmitter tubes are kept hot when *any* transmitter is turned on.)

SPECIAL OPERATING NOTE

Wait 6 seconds after pressing push button A, B, C, or D before pressing 2, 3 or OFF. If this is not done, the channel switching motor in the VHF receiver may continue to run. It can be stopped by pressing the A, B, C, or D push button. The motor may burn out if this instruction is not followed. *This information should be passed on to all pilots and operators.*

5. SWITCHING FROM AN LF-MF-HF CHANNEL TO A VHF CHANNEL

Press push button A, B, C, or D, on Control Unit C-30/ARC-5, depending upon which of the VHF channels is to be used. (This switches the VHF transmitter and receiver to the channel selected, but leaves the LF-MF-HF receiver in operation; monitoring can be continued on it. No warm-up period for the VHF transmitter is necessary, since *all* transmitter tubes are kept hot during the time *any* transmitter is turned on.)

6. TURNING OFF VHF TRANSMITTER

Press the OFF push button on Control Unit C-30/ARC-5. (This turns off *all* transmitters, MF, HF, and VHF. It does not affect any of the receivers.)

7. TURNING OFF VHF RECEIVER

Turn the MVC-OFF-AVC switch on Control Unit C-42/ARC-5 or C-43/ARC-5 to the OFF position. (This turns off the VHF receiver but does not affect the LF-MF-HF receivers or any transmitter.)

8. OPERATING NOTES

a. OPERATING RANGE

The reliable operating range of the VHF components of Model AN/ARC-5 Aircraft Radio Equipment is limited to a distance slightly greater than the optical (line-of-sight) path. Thus, if both transmitting and receiving antennas are at zero or low altitudes, no more than a few miles range can be counted upon. When one or both antennas are elevated, and the distance to the horizon increased, the range is correspondingly greater. However, extreme range must not be expected at very high altitudes. For example, two aircraft flying at 20,000 feet are within the "line-of-sight" path when nearly 400 miles apart, yet it might be impossible to communicate over the VHF channels. At this distance, the received signals are of such low power that they may be lost or "swamped" in background noise. Intervening obstructions, such as hills or mountains, may greatly reduce the operating range.

The ability to receive weak signals, and consequently, the operating range, is very greatly influenced by the electrical disturbances set up within the aircraft. Improper shielding of the ignition system, generators, motors and other electrical apparatus will reduce range. Inadequate or loose bonding of metal parts will do the same.

Interference from natural electrical disturbances or static is materially less in the VHF band than at lower frequencies. Except in the case of near-by electrical storms, natural static has relatively little effect.

b. INTERCEPTION RANGE

Although the range of *reliable* communication is limited by the conditions pointed out above, signals may *sometimes* be intercepted far beyond the optical range. Under certain anomalous or "freak" conditions, readable signals may be heard several hundred miles beyond the horizon. Although these occasions are relatively rare, they are unpredictable and may occur at any time. *Security requires that the possibility of interception by a distant enemy receiver always be kept in mind.*

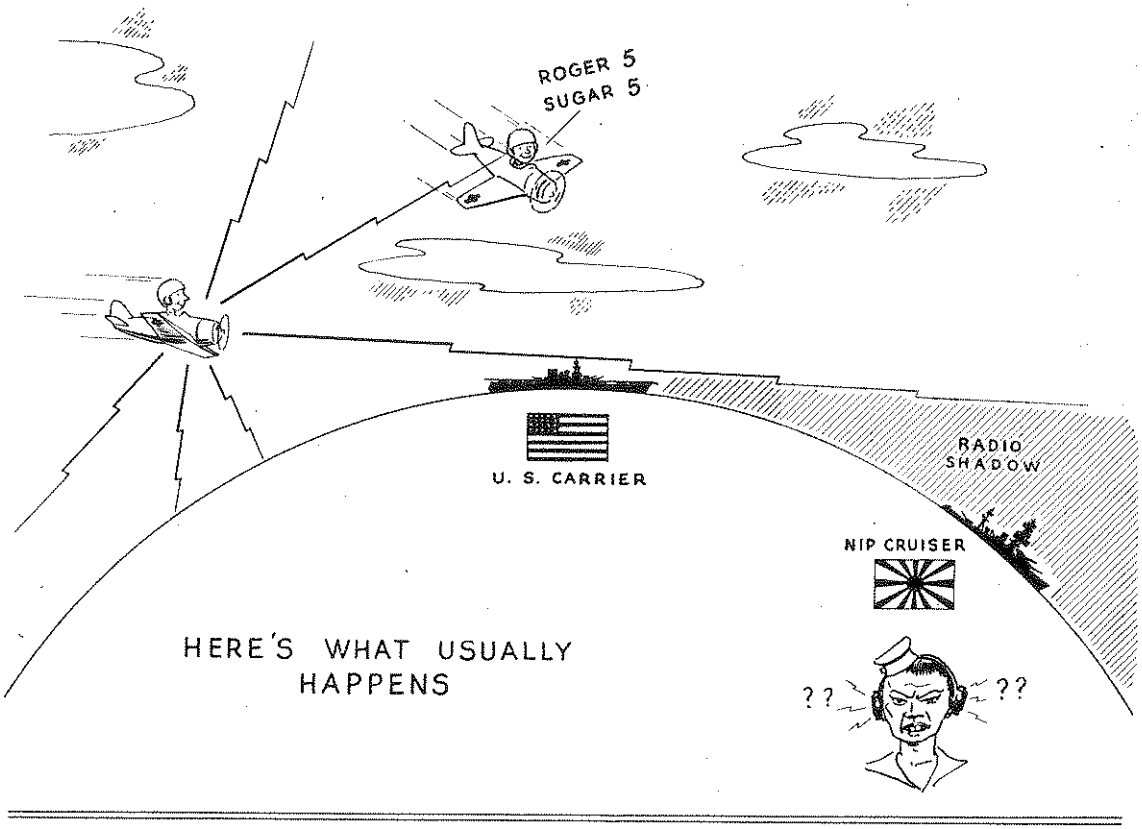
c. AVC AND MVC OPERATION

As pointed out previously, the VHF receiver is ordinarily used with AVC (automatic volume control). In this condition, the circuit automatically adjusts its gain for varying signal strength; a substantially constant output is obtained over a very wide range of incoming signal strength. At the same time, the squelch circuit is effective. This circuit operates to silence the receiver until a signal of predetermined level is received. This level is determined by the squelch adjustment, which can be made at the face of the receiver, but *not* at the control unit.

When properly adjusted, the squelch feature spares the pilot the annoyance of a continual roar in the headset due to background noise—in the absence of a signal, he hears nothing, except for an occasional noise peak which causes a momentary spurt in the headset. If improperly adjusted, however, the squelch may fail to trip on weak signals which might otherwise be read. For this reason, if there is any doubt about the squelch adjustment, or if it is important to receive very faint signals, the squelch should be turned off. This is done by switching to MVC (manual volume control).

When MVC operation is used, the automatic gain adjustment and squelch features mentioned above are both disabled. Consequently, signal strength, as heard in the headset, may vary over a considerable range, and a more or less continuous noise background will be heard. The noise, particularly, may become annoying after an extended period. For this reason, the MVC condition is ordinarily used only for short intervals, and under the circumstances outlined in the preceding paragraph.

With either AVC or MVC operation, the pilot is able to adjust the *average* signal or noise level to a desired value by operation of the INCREASE OUTPUT knob on the radio control unit.


ROGER 5
SUGAR 5
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RADIO
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NIP CRUISER
HERE'S WHAT USUALLY
HAPPENS
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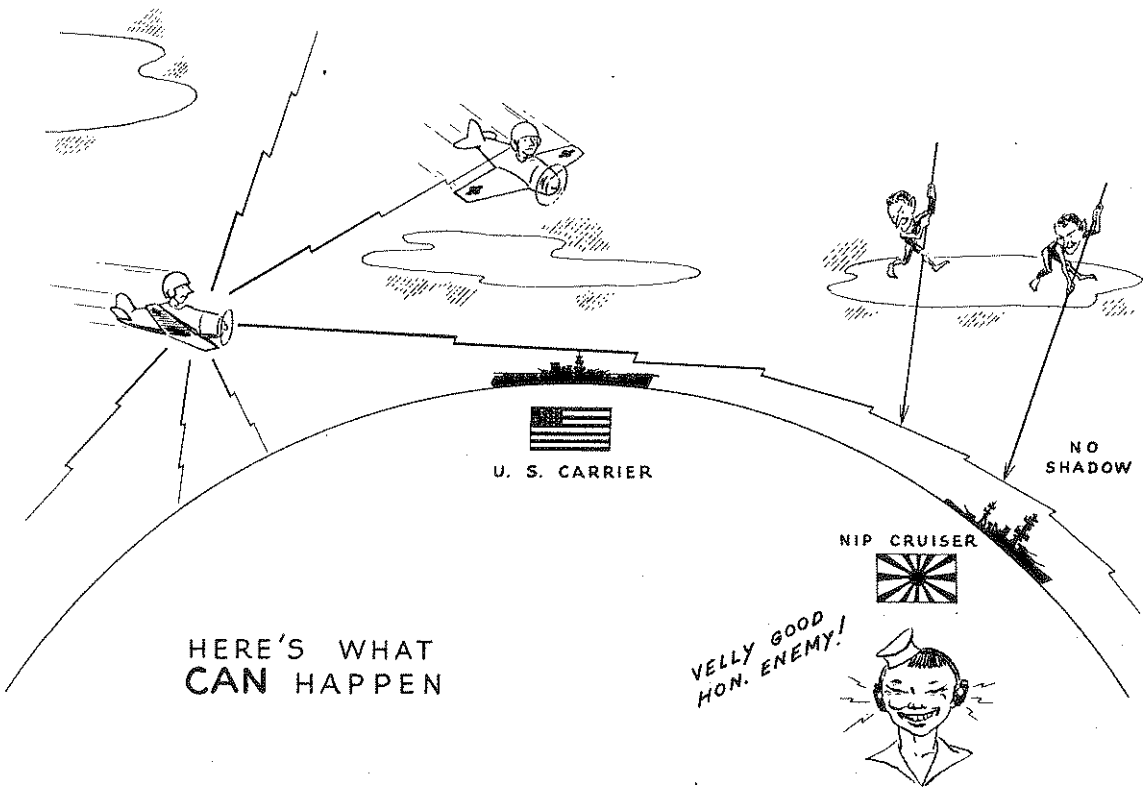

U. S. CARRIER
NO
SHADOW
NIP CRUISER
HERE'S WHAT
CAN HAPPEN
VELLY GOOD
HON. ENEMY!

d. TONE, CW, AND VOICE OPERATION

The VHF transmitter and receiver of Model AN/ARC-5 Aircraft Radio Equipment are designed for radio-telephone or "voice" communication. They are not particularly well suited for radio-telegraph operation. However, they may be used for this purpose in an emergency (see Paragraph 9 of this section).

To transmit CW or tone-modulated telegraph signals, it is necessary to turn the rotary switch on Control Unit C-30/ARC-5 to the appropriate position. Dots and dashes can then be sent by manipulation of the key, throttle switch or microphone switch. Operation at speeds above 10 or 15 words per minute should not be attempted, since the antenna transfer relay in the VHF transmitter is not designed for high-speed operation, and may fail to follow the keying.

Telegraph keying should never be carried on with the emission selection switch in the VOICE position. Under this condition, the transmitting dynamotor is started and stopped with each operation of the key. The heavy starting current reduces the life of the dynamotor and the dynamotor relay. In the CW and TONE positions, the dynamotor is running continuously.

The VHF receiver is well suited to the reception of tone-modulated signals at any speed. However, since no beat-frequency oscillator is included in the circuit, it is not very satisfactory for use on CW signals. Under some circumstances, such signals will be heard as a series of clicks (somewhat similar to those of a Morse telegraph sounder, but much more difficult to read). Under other conditions, they will appear as variations in the background noise or "hash," which can be read at low speeds. When, in an emergency, it is necessary to copy CW signals, the operator should try both the AVC and the MVC conditions. Sometimes one, and sometimes the other, will be better, depending upon signal strength, noise level, interference, etc.

e. UNUSED PUSH BUTTONS ON C-30/ARC-5

Control Unit C-30/ARC-5 is arranged with push buttons for the control of three transmitters (two MF-HF and one VHF), but is sometimes used in installations with only one or two transmitters. If, in such a case, a push button for which there is no corresponding transmitter is operated, sidetone will be heard (indicating to the pilot that he is transmitting), but no signal will go on the air. Likewise, the control unit is arranged for operation of the VHF transmitter on four channels. If fewer than four channels are equipped with crystals, and a push button for one of the unequipped channels is pressed, the same thing will happen. For this reason, it is advisable to block all unused push buttons to prevent their accidental operation. This can be done in the manner explained in Section II of this volume.

9. EMERGENCY OPERATION

The following suggestions should be considered for use solely under emergency conditions in which communication of some sort must be established in order to complete a mission. Designated units of the equipment are assumed to be defective or destroyed with no spares available. Most of the following emergency operations require access to the major units, and in some cases to the inside of major units, and are therefore not always practicable in flight.

VHF RECEIVING EQUIPMENT

Condition	*Emergency Remedy*
Failure of V-107 (2nd AF amp. tube)	Replace with corresponding tube (12A6) from least necessary LF-MF-HF receiver.
Blown fuse	There is one spare fuse under each fuse cover on the receiver rack.
Circuit breaker open	Re-set the circuit breaker in Junction Box J-17/ARC-5.
One or more conductors in a cable destroyed	In the worst case, in which the cable is completely severed, cut back the outer lacquer covering, braided shield and rubber covering on both ends by at least five inches (assuming there is sufficient slack). Splice like-colored wires and cover with rubber or friction tape, dry paper, or dry cloth.
Receiving dynamotor failure	Replace dynamotor with one from the least necessary receiver.
A-F choke open-circuited	Connect a wire across its terminals and try to receive through the residual hum.
By-pass capacitor short-circuited	Disconnect and try to receive without the capacitor. In some cases this will be possible.
Generator failure or low battery	To conserve the battery, turn off non-essential receivers, if individual switches are provided (as on Control Units C-42/ARC-5 and C-43/ARC-5). Otherwise, remove non-essential receivers from the rack.
Other station unable to use voice transmission	To receive tone-modulated telegraph signals, operate the VHF receiver in the usual way. To receive CW telegraph signals, try both AVC and MVC reception. Under some conditions, readable signals will be heard.

VHF TRANSMITTING EQUIPMENT

Condition	*Emergency Remedy*
Modulator unit failure	The VHF transmitter may be used to transmit tone telegraph signals under some conditions of trouble in the modulator unit. Under other trouble conditions, it may send CW telegraph signals. In any case, keying speed should be limited to 10 or 15 words per minute. Operate key on C-30/ARC-5 to TONE or CW.
Blown fuse	There are two spare 20 ampere fuses on the right side of the modulator facing the receptacles. There are two fusible resistors (R-324 and R-326) in the VHF transmitter. If one or both of them blow, try to locate and remove cause; then replace. If no spare, short-circuit the blown resistor. These resistors are located near the receptacle on the rear of the transmitter. They are accessible when the bottom cover-plate is removed.
Circuit breaker open	Re-set the circuit breaker in Junction Box J-17/ARC-5.
One or more conductors in a cable destroyed	In the worst case, in which the cable is completely severed, cut back the outer lacquer covering, braided shield and rubber covering on both ends by at least five inches (assuming there is sufficient slack). Splice like-colored wires and cover with rubber or friction tape, dry paper, or dry cloth.
By-pass capacitor short-circuited	Disconnect and try to operate without it. In many cases this will be possible.
Generator failure or low battery	To conserve battery, operate OFF button on C-30/ARC-5 when transmitter is not in use (it will require 20 to 30 seconds to warm up tubes when transmitter is needed). If one or more transmitters are non-essential, remove from rack. In an extreme case, it is possible to remove the tubes from the modulator (DANGER! HIGH VOLTAGE) and operate the VHF transmitter on CW telegraph at low speed. Keep switch on C-30/ARC-5 in VOICE position when not transmitting in order to stop dynamotor.

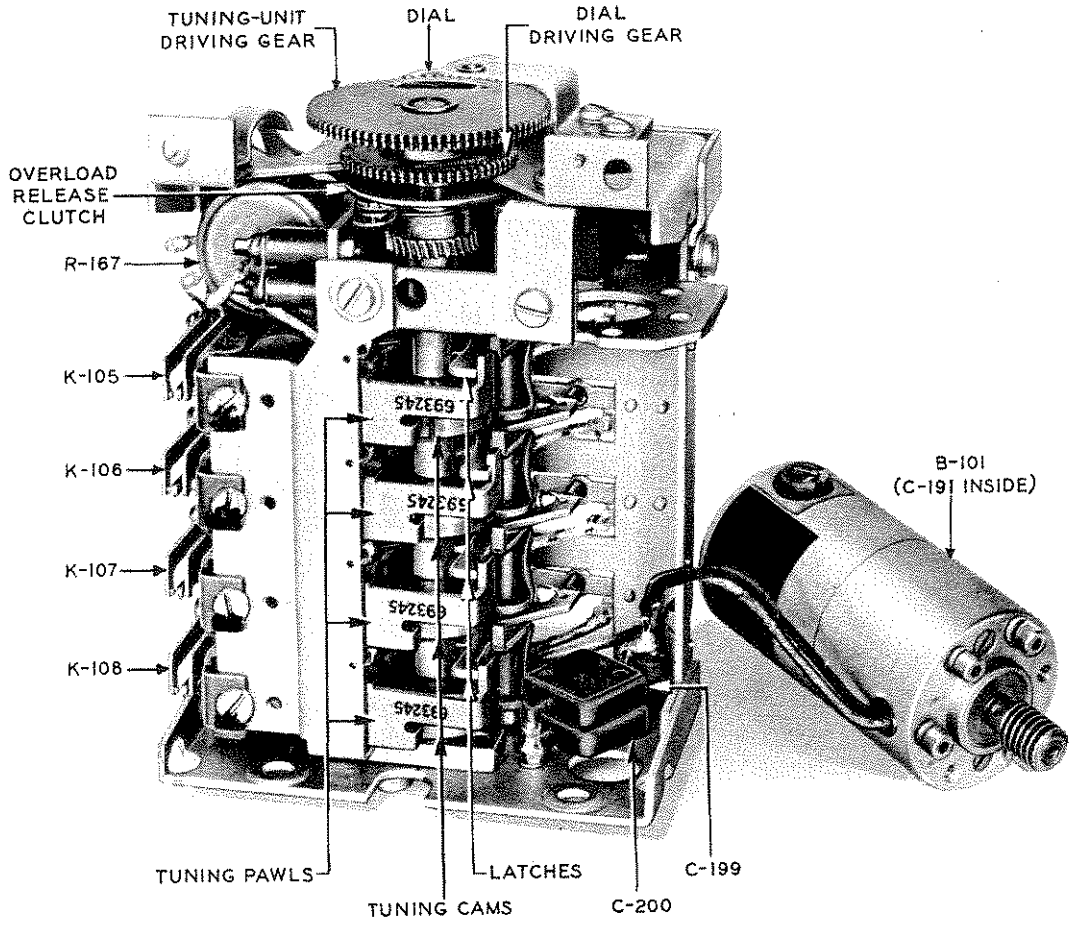


Figure 14—Selector O-101 (or O-101A)

SECTION IV—MECHANICAL AND ELECTRICAL CHARACTERISTICS

1. INTRODUCTION

The mechanical and electrical characteristics of the VHF components of Model AN/ARC-5 Aircraft Radio Equipment are described in this section. Corresponding information on the LF-MF-HF components will be found in Volume 1.

2. RADIO RECEIVER R-28/ARC-5

Photographs.....Figs. 2, 3, 13, 14, 17, 19–23, 50 and 51
Schematic Circuits.....Figs. 4, 15, 16, 18, 24–31, 61, 62, 63 and 64
Wiring Diagrams.....Figs. 68–73
Dimensions and Weights...Fig. 55

a. GENERAL MECHANICAL ARRANGEMENT

Radio Receiver R-28/ARC-5 is designed to mount in the space provided on the mounting racks described in Volume 1. Removable covers, one of which is provided with louvres, afford protection against mechanical injury and at the same time provide for adequate ventilation. The general structural arrangement of the receiver is apparent from the photographs of Figures 2, 3 and 13. Over-all dimensions and weights are given in Figure 55.

The receiver is tuned to any one of four pre-set frequency channels by the operation of a motor-driven selector mechanism. This, in turn, is controlled by push-button type switches in a control unit (Control Unit C-30/ARC-5). The selector, in carrying out its functions, performs two operations:

1—It rotates the main tuning capacitor of the receiver to the proper position.

2—It connects the proper one of four oscillator crystals into the circuit.

Two different types of selector have been used in Radio Receiver R-28/ARC-5. The earlier type, which in this handbook is designated selector O-101 (or O-101A), was used in the first 3,480 receivers. The later type, referred to as selector O-102, has been used in all subsequent production. Although they are different in mechanical design and construction, both types of selector attain the same result; namely, rotation of the tuning capacitor shaft and connection of the proper crystal. Each of the two types is described separately in the following paragraphs.

NOTE

The designations "O-101," "O-101A" and "O-102," as used herein, are merely for convenience in description and discussion. They *do not* constitute code or stock numbers, and should not be so used. Ordering information is contained in "Table of Replaceable Parts," Section VII.

b. CHANNEL SELECTOR O-101 (AND O-101A)

The first 400 Receivers R-28/ARC-5 (serial numbers 1 to 400) were manufactured with selector O-101. The next 3,080 receivers (numbers 401 to 3480) were equipped with a slightly modified form of this selector which is designated O-101A. The general arrangement of these earlier selectors is shown in Figure 14. The functioning of the mechanism is shown schematically in Figures 15 and 16.

Referring to Figure 15, it will be seen that there are four tuning cams, one associated with each of the channels A, B, C, D. Each cam is adjustable, in respect of its angular position on the cam shaft, from the front of the receiver. Also, each of the cams is associated with an extension of the armature of the corresponding relay (K-105, K-106, K-107 or K-108). When the relay is energized by the operation of the corresponding push button of the remote control unit (Control Unit C-30/ARC-5), its armature moves until it is in contact with the associated cam. The motion is sufficient to release the mechanical latch of any relay previously operated. The battery supply circuit to the motor (B-101) is thereby closed and the motor is started. The motor shaft is connected to the selector cam shaft through two worm reduction gears such that the shaft revolves at approximately 30 rpm. Rotation continues until the armature of the energized relay is in line with the notch of its associated cam. It then drops into the notch, stopping the cam shaft and opening the circuit to the motor. The overload release clutch shown in the shaft between the motor and the cams permits the motor to coast to a stop after the cam shaft has been locked. At the same time, the circuit to one of the four crystal-connecting relays is closed, thus causing the operation of the relay and the connection of the proper crystal to the oscillator circuit. Also, the circuit to the channel selecting relay itself is opened. It does not restore to its normal

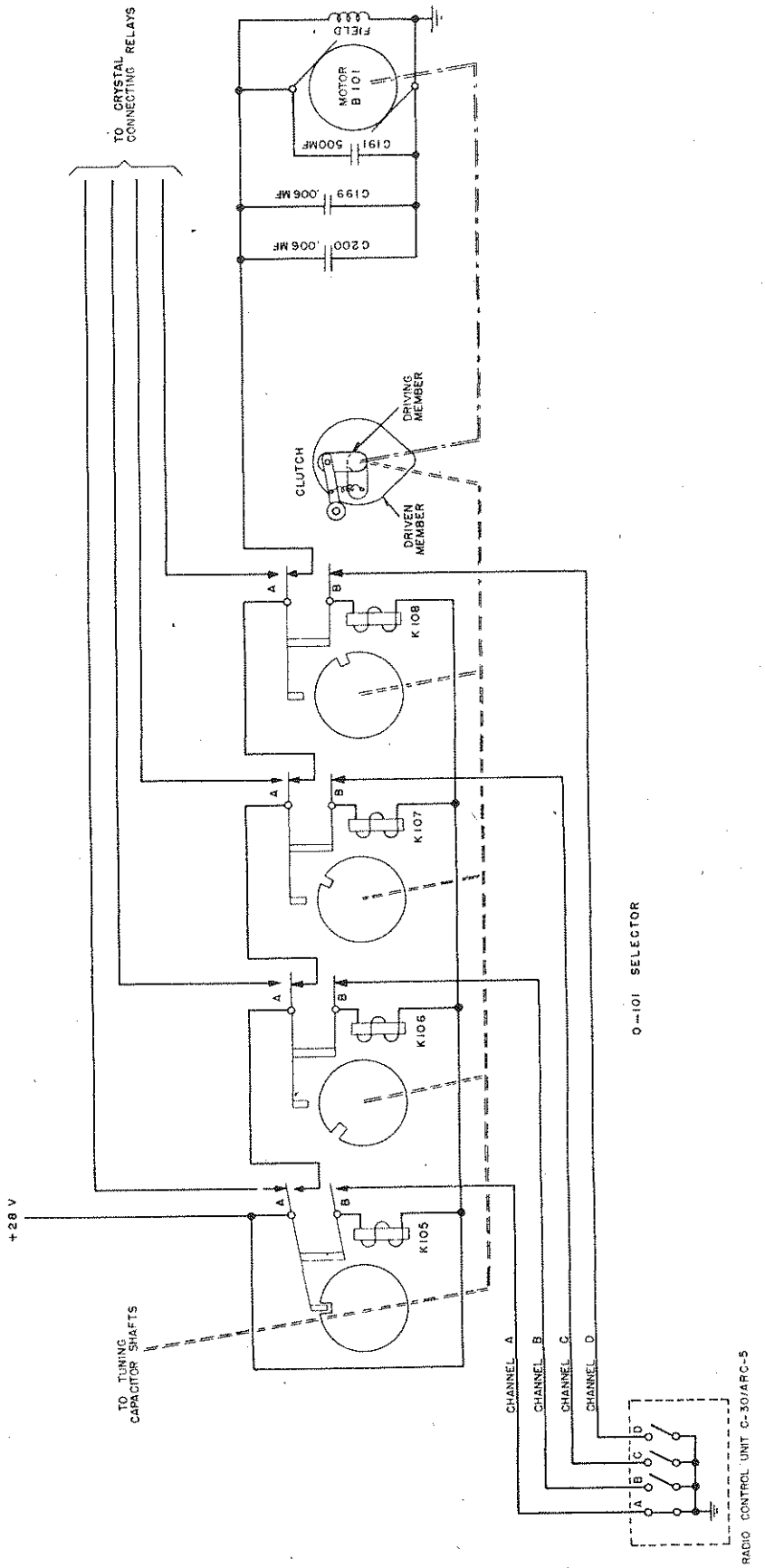


Figure 15—Selector O-101—Schematic Circuit

position, however, since the armature is engaged and held in position by a mechanical latch.

It will be seen that, as a result of the above sequence of operations, the cam shaft of the selector unit is mechanically locked in a position which was pre-determined by the setting of the tuning cam. Since the shaft is connected to the tuning capacitor shafts of the receiver through a 1-to-1 ratio train of anti-backlash gears, the tuning capacitors are also locked in a pre-determined position. As previously mentioned, the appropriate crystal is also connected to the oscillator circuit. The receiver is thus tuned to the required frequency. The frequency (in megacycles) is indicated, approximately, by the dial at the front of the tuning unit.

With the O-101 selector, as shown, a difficulty is sometimes encountered in operation at low temperatures. The construction of the overload release clutch is such that in certain positions its cam and roller impose a comparatively heavy load on the motor. When a new selection is to be made, the motor may then have insufficient starting torque to overcome the load. In order to overcome this difficulty, a modified selector, designated O-101A, was used in later production. In this unit, which is shown schematically in Figure 16, switch S-101 and its associated cam were added. This closes the motor circuit, regardless of the position of the other elements of the selector, as long as the clutch is in the high-torque position. This insures that the motor will start on the next selection. The modified selector also includes a brake to reduce the coasting of the motor after its circuit has been opened.

c. CHANNEL SELECTOR O-102

All Radio Receivers R-28/ARC-5, after the first 3,480, were manufactured with selector O-102. The improvement in operation which was thereby obtained may be summarized as follows: With the older selectors it is possible to obtain a "runaway" condition, in which the selector motor continues to operate indefinitely after the control unit push buttons have been operated in a certain sequence. For example, if the pilot operates the A, B, C or D channel button, and then, within less than six seconds, operates button 2, 3 or OFF, the VHF selection may not be completed and the motor may continue to operate until power is removed, until the motor burns out, or until button A, B, C or D is re-operated. This is the reason for the caution regarding rapid succession in push button operation which appears elsewhere in this text. With the new selector, O-102, this possibility is removed.

The general arrangement of the O-102 selector is shown in the photographs of Figure 17. Its operation may best be understood by reference to the functional schematic diagram of Figure 18. The drawing shows the selector in the position corresponding to channel A.

Assume that the push button for some other channel, for example C, is depressed at the control unit. Ground from the control unit reaches relay K-250 through the channel control lead and the closed sector of switch S-251; the relay operates. The relay, in operating, connects battery and ground to the motor brushes in the proper polarity to cause counter-clockwise rotation. The four pawl selecting cams, and switches S-251, S-252 and S-253, are driven through the worm reduction gearing and the over-running (one-way) clutch, O-251. After the cam shaft has rotated through part of a revolution, the pawl-selecting cam for channel A is disengaged from its corresponding tuning pawl. All pawls are then in their normal or unoperated position. Switch S-250 then restores to normal under control of its retractile spring.

A short time later, pawl-selecting cam C allows its pawl to drop until it is in contact with its tuning cam. The pawl then rides upon the face of the tuning cam, ready to drop into its slot. The circuit between ground at the control unit and relay K-250 is now opened at switch S-251; the relay releases, reversing the connections to the brushes of the motor. The motor reverses, and starts to turn in a clockwise direction. The tuning cams rotate (they did not rotate during the previous counter-clockwise operation of the motor, due to the one-way action of clutch O-250). The pawl-selecting shaft and cams stop, due to the one-way action of clutch O-251, which permits rotation only during the counter-clockwise operation of the motor. When tuning cam C has rotated to the position where its slot is in line with the pawl, the pawl drops into the slot, locking the tuning shaft and the tuning capacitors in the pre-determined position. The motor and main drive shaft can coast to a stop, due to the overload release feature of clutch O-250. At the same time that pawl D operates to lock the tuning shaft, it causes switch S-250 to operate. This opens the battery supply circuit to the motor and short circuits the brushes, thus providing a dynamic braking action.

Switch S-252 is sometimes called a "safety switch." If for any reason a pawl fails to drop into its slot, S-252 opens the battery supply circuit to the motor brushes. This prevents continued rotation of the motor. Switch S-253 closes a circuit from battery to one of the four crystal selecting relays, depending upon which channel is selected. The relay, as explained later in this volume, connects the proper crystal to the oscillator circuit of the receiver.

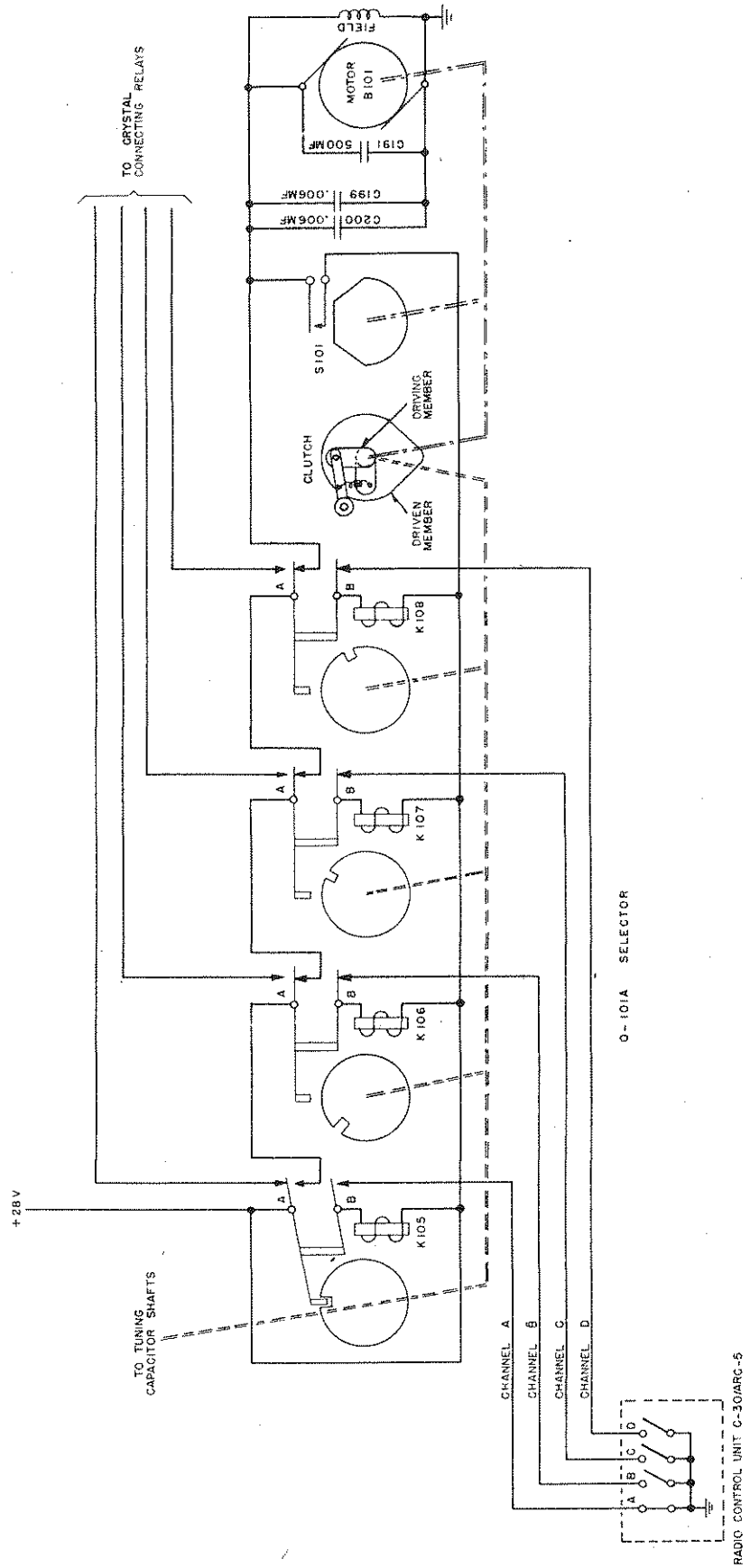


Figure 16—Selector O-101A—Schematic Circuit

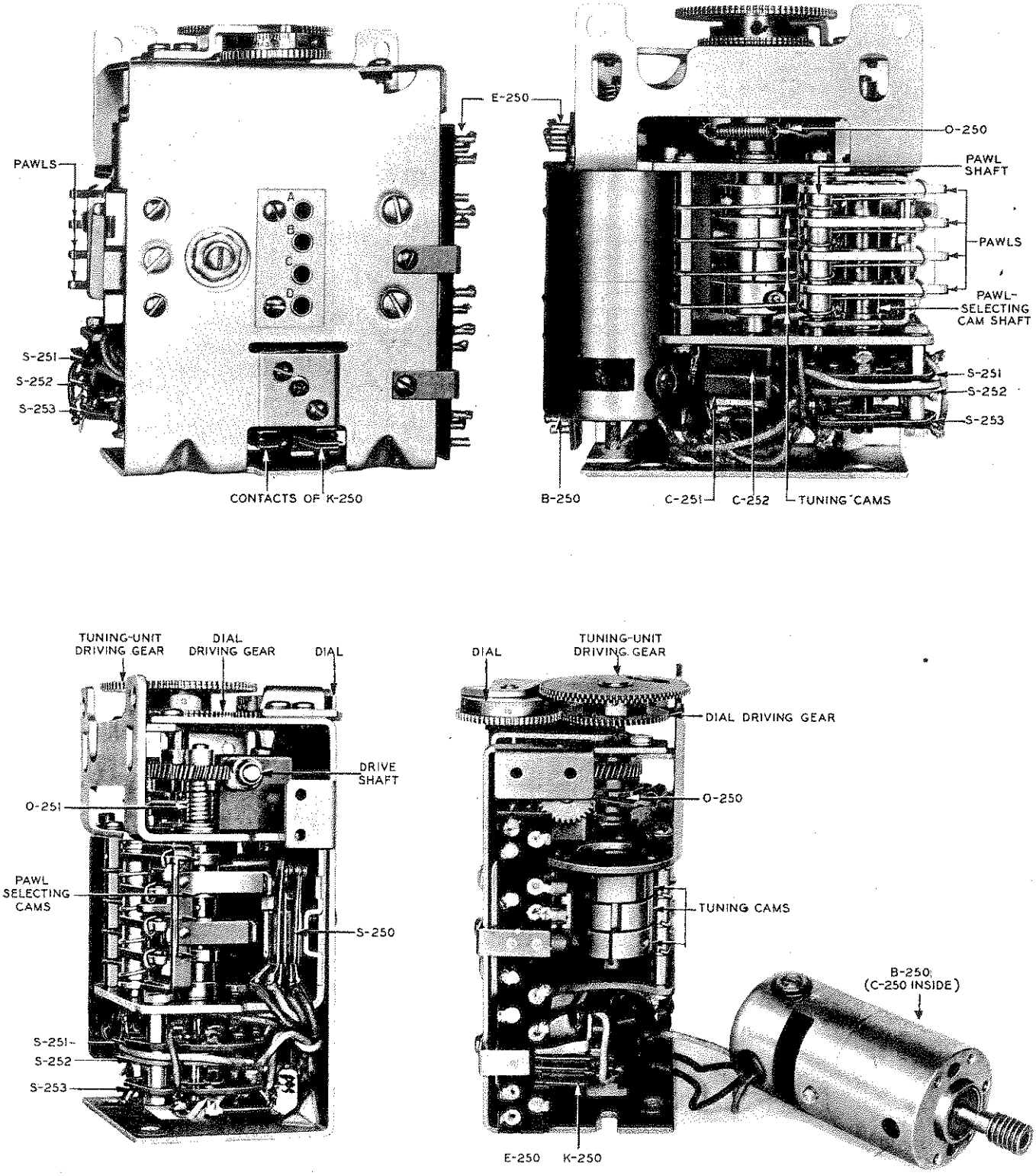


Figure 17—Selector O-102

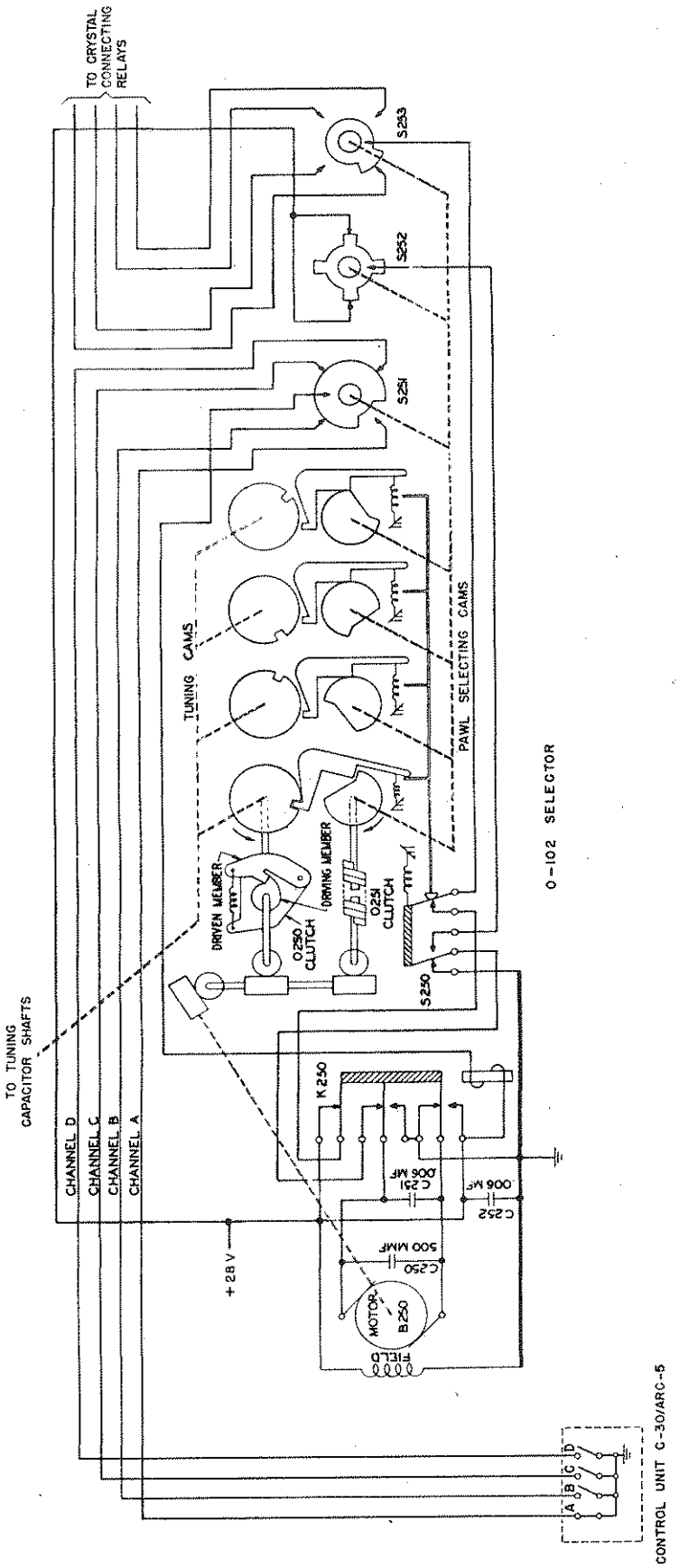
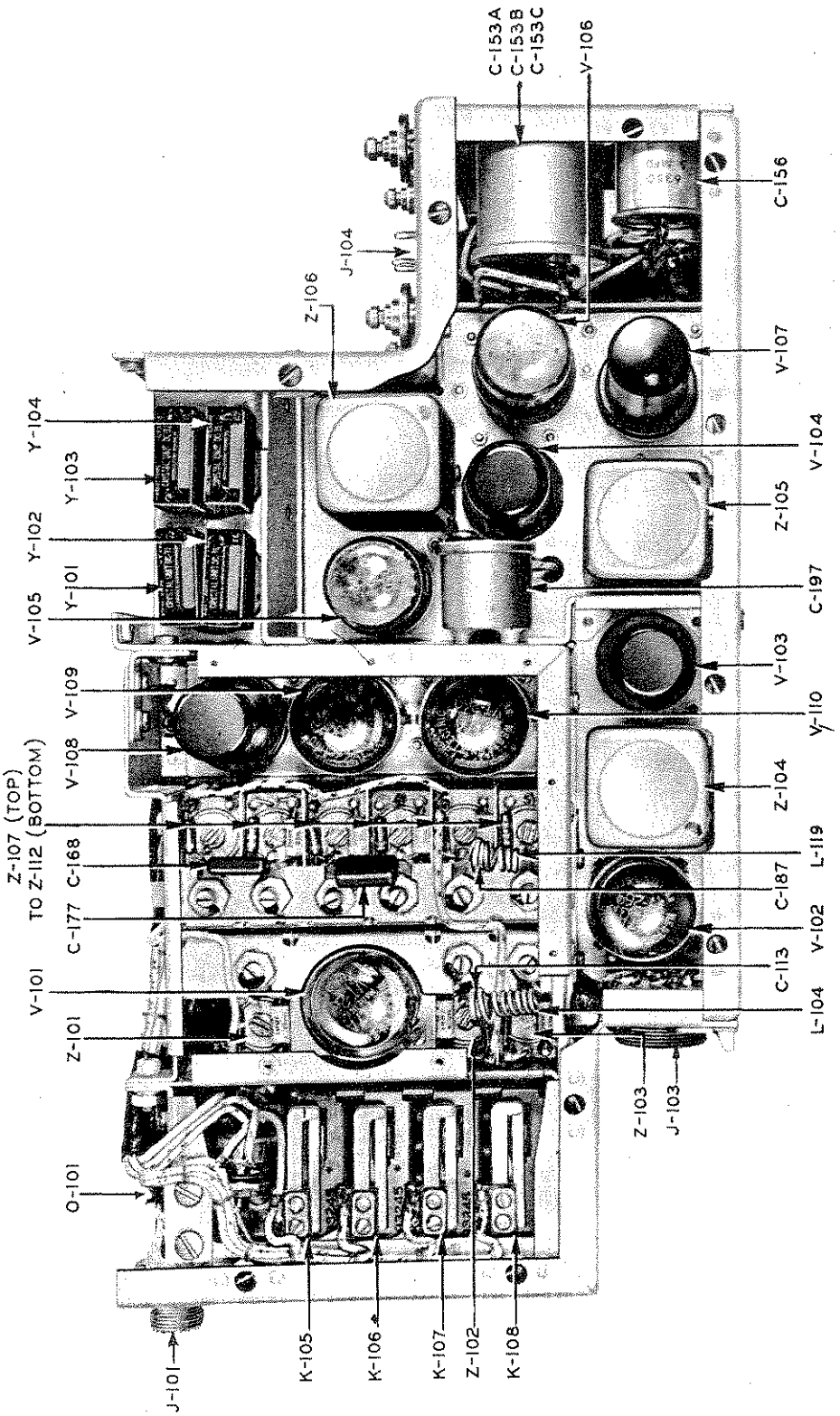


Figure 18—Selector O-102—Schematic Circuit



* *Figure 19—VHF Receiver—Right Side (Showing Selector O-101)*

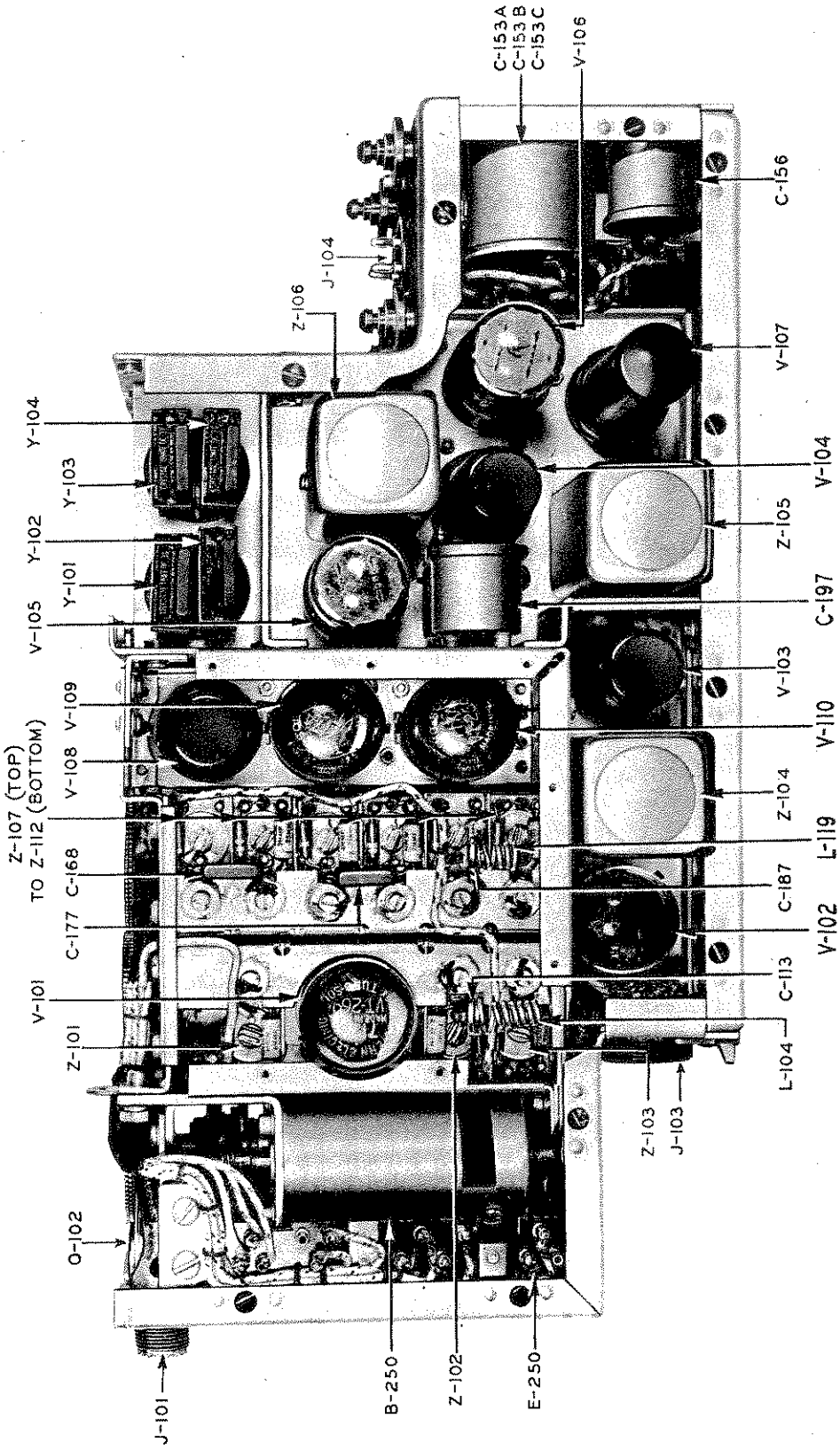


Figure 20—VHF Receiver—Right Side (Showing Selector O-102)

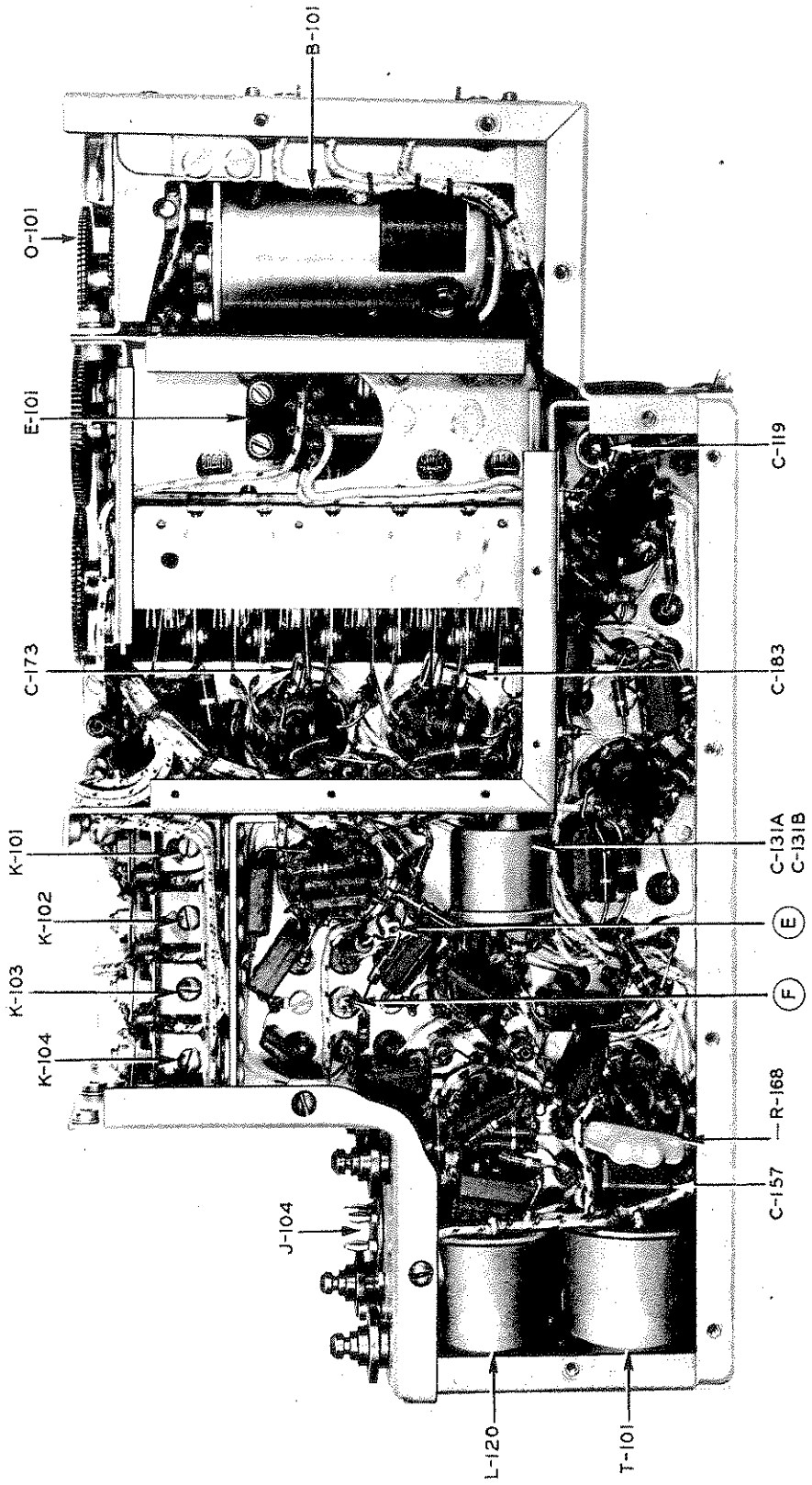


Figure 21—VHF Receiver—Left Side (Showing Selector O-101)

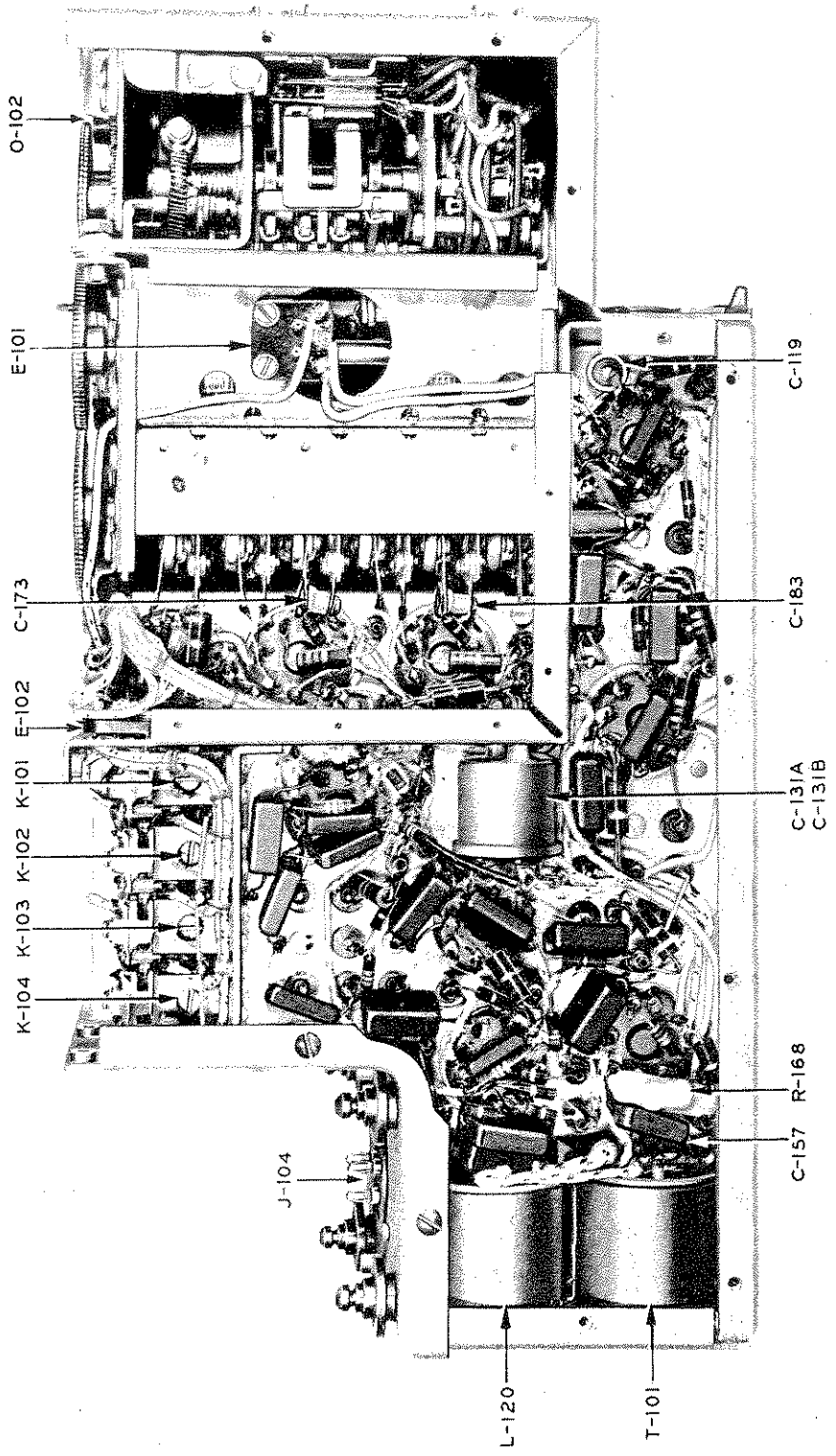


Figure 22—VHF Receiver—Left Side (Showing Selector O-102)

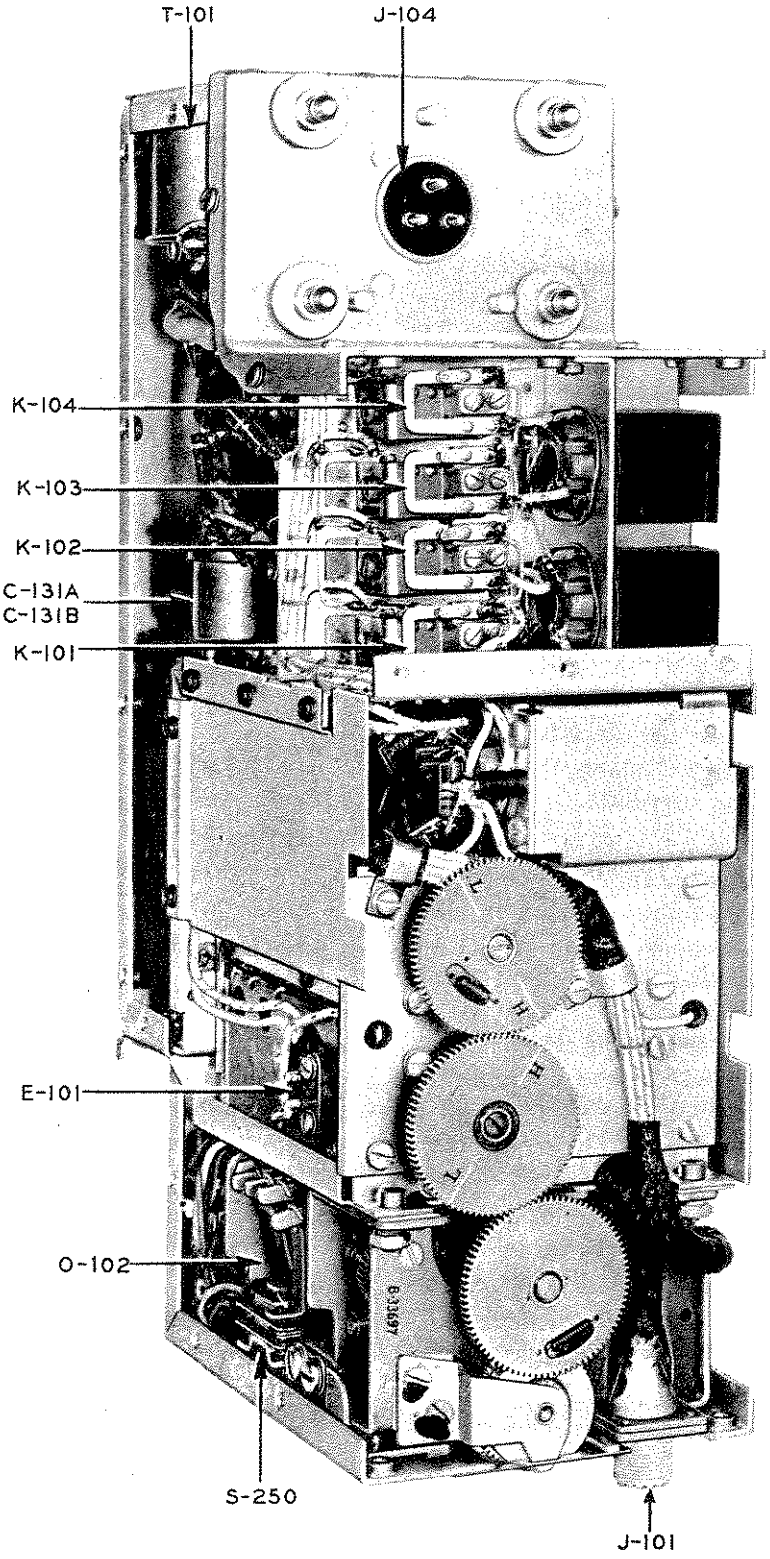


Figure 23—VHF Receiver—Top

d. ELECTRICAL CHARACTERISTICS

(1) *General*

Radio Receiver R-28/ARC-5 uses a ten-tube superheterodyne circuit to receive amplitude modulated signals in the 100-to-156 megacycle frequency band. The radio-frequency oscillator is controlled by any one of four quartz crystals. The selection of the crystal, as well as the tuning of the radio-frequency circuits, is under control of push button type switches in a remote control unit (Control Unit C-30/ARC-5). Both automatic volume control and manual volume control are provided, either being effective at the option of the pilot or operator. No beat-frequency oscillator is provided, since the receiver is intended primarily for use in radio-telephone reception.

It should be pointed out that this receiver is interchangeable with Radio Receiver BC-942-A, which forms part of Radio Set SCR-274-N (U. S. Army Signal Corps designations). The only difference is in output impedance; Receiver R-28/ARC-5 has an output impedance of 300 ohms to match low-impedance headsets, while Receiver BC-942-A is wired for an impedance of 4,000 ohms to match high-impedance headsets. The change from one impedance to the other can be readily made by changing the wiring to the secondary of the output transformer.

A block diagram of the receiver is shown in Figure 4. A stage of tuned radio-frequency amplification (V-101) is followed by a mixer (sometimes called a first detector), (V-102). Two I-F amplifier stages (V-103 and V-104) are followed by a dual triode tube (V-105), which functions as a detector, an AVC rectifier and a squelch rectifier. The succeeding tube (V-106) serves as a squelch amplifier and as a first stage of audio-frequency amplification. A second stage of audio frequency amplification (V-107) furnishes sufficient output power to operate several headsets.

The radio-frequency oscillator (V-108) is of the crystal-controlled type. It is followed by two stages of harmonic generators (frequency multipliers) (V-109 and V-110). The final frequency, as supplied to the mixer, is 24 times the crystal frequency.

The circuit of the receiver is shown, in simplified form, in Figures 61 and 62. The complete schematic circuit is shown in Figures 63 and 64. Two sets of circuit drawings are required by the fact that, as explained above in Paragraph IV-2-a, two different types of tuning selector mechanism have been used in the receiver. However, the construction and operation of the r-f, i-f and a-f circuits are identical in both cases. In the succeeding paragraphs of this section, the explanation of circuit operation will be based upon the simplified schematic which shows the new (O-102) selector. This is shown in Figure 62. In addition, reference will be made to the small schematic drawings which show separate portions of the circuit (Figures 24, 25, 26, 27, 28, 29, 30, and 31).

(2) *R-F Amplifier (V-101)*

Referring to Figures 24 and 62, it will be seen that the tuned input circuit of the r-f amplifier comprises tuning capacitor C-105A and unit Z-101. The latter contains inductor L-101, the dotted inductor (explained later), blocking capacitor C-102, trimming capacitor C-103, padding capacitor C-104 and de-coupling resistor D. From an r-f point of view, the two inductors are in series between grid and ground. Capacitor C-102, offering negligible impedance to the r-f currents, prevents d-c voltage introduced into the grid circuit from being short-circuited to ground. Capacitor C-105A, which is mechanically ganged to the eight other tuning capacitors, is connected between grid and ground and thus shunts the series inductors. Therefore, as indicated in Figure 24, the input resonant circuit includes the series inductors and the tuning capacitor. The junction of the inductors represents a tap on the inductive branch of the circuit.

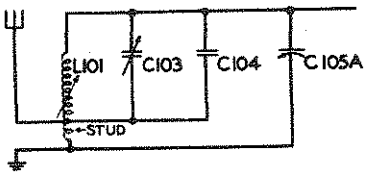


Figure 24—R-F Amplifier Input—Equivalent Circuit

The circuit element represented by the dotted inductor in Figure 24 is approximately ¼ inch of a stud in Z-101. At the frequencies involved, the inductance of this stud represents a satisfactory coupling impedance for the coaxial transmission line from the antenna. De-coupling resistor D and r-f by-pass capacitor C-102 prevent interstage coupling through the AVC lead. Trimming capacitor C-103 is provided to facilitate the accurate alignment of the ganged resonant circuits.

As the d-c grid return for V-101 is made to the AVC lead, this stage is subject to automatic volume control action. Moreover, it will be observed that the d-c return for the cathode is made through cathode bias resistor K to the MVC lead, placing this stage under the control of the manual volume control as well. (The relation between the automatic and the manual volume control actions will be described later.) The r-f ground return from the cathode is obtained through two by-pass capacitors B, B, connected to different pins on the tube socket. Resistor R-104 in the plate circuit prevents parasitic oscillations.

The amplified r-f impulses in the plate circuit are

applied to the tuned circuit consisting of variable capacitor C-105B and unit Z-102. This latter unit is similar in action to Z-101. In Z-102, the capacitive reactance of C-112 is negligibly small. The inductive reactance of the leads of this capacitor at the frequencies involved, however, is not negligible. As a result, from an r-f point of view, this circuit element presents an impedance which is inductive in nature. It therefore appears as an inductor in Figure 25. As in the case of Z-101, the net result may be considered the equivalent of a tapped inductor. The voltage developed across the impedance of C-112 is coupled to the grid circuit of the succeeding stage through C-113 and L-104. The capacitive reactance of C-113 is small in comparison with the inductive reactance of L-104. Since the tuned input circuit of the succeeding stage is similar to the output circuit of the r-f amplifier, the equivalent coupled circuits may be considered to resemble those shown in Figure 25. The plate voltage, fed to this stage through de-coupling resistor D, is prevented from appearing on the grid of the succeeding stage by blocking capacitor C-113. Capacitor C-112 prevents the d-c high voltage from being short-circuited.

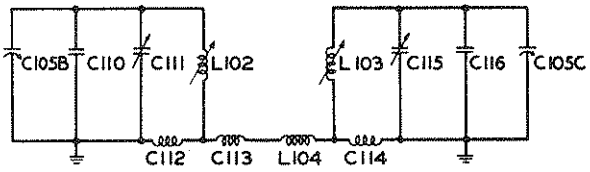


Figure 25—R-F Amplifier Output—Equivalent Circuit

(3) *Mixer (V-102)*

The voltage impressed on the grid of the mixer is composed not only of the signal impulses, coupled from Z-102 as previously described, but also of the output from a local source of high-frequency. It should be observed that, since the grid circuit is returned directly to ground through R-107 and R-108 in series, the mixer is not subject to AVC action. Test-point D is provided for maintenance purposes. The cathode is returned to ground through cathode bias resistor K. The functions of the remaining resistors and capacitors are similar to those of the corresponding elements in the r-f amplifier circuit.

The interaction of the signal voltage in the 100 to 156-megacycle range with the r-f voltage from the local source in the grid circuit of the mixer produces the usual resultants in the plate circuit. The tuned primary of the intermediate frequency transformer, Z-104, selects the desired intermediate frequency of 6.9 mc (the difference between the signal and the local source). As in the case of all resonant circuits in the i-f section, the primary of Z-104 is tuned by varying the inductance. This is accomplished by moving a powdered iron core axially within the form on which L-105 is wound. Fixed capacitor C-122 provides the bulk of the capacitance required in the resonant circuit. Although only one capacitor is indicated across each of the i-f resonant circuits in Figure 62, two capacitors possessing negative temperature co-efficients are used in each case. Coupling between the primary and secondary circuits is accomplished by transformer action between the primary and secondary windings.

(4) *First I-F Amplifier (V-103)*

The voltage developed across coil L-106 and capacitor C-125 (tuned to 6.9 megacycles) is applied to the grid of the first i-f amplifier tube V-103. The output voltage of this stage appears across the primary of Z-105, which is similar to that of Z-104. Three features of this amplifier should be observed. In the first place, the grid circuit is returned to the AVC lead. Secondly, the cathode return is completed through the cathode resistor to the MVC lead. Thirdly, a voltage divider composed of R-112 and R-113 is present in the grid-cathode circuit. These resistors are in series across the AVC and MVC leads. Their junction is connected to the grid of V-103 through the secondary circuit of Z-104. In this way, both the automatic and manual volume control voltages applied to this tube are reduced. This reduction in the control voltages is necessitated by the fact that the tube employed for V-103 (Tube VT-288, JAN-12SH7) has a sharper cut-off characteristic than that employed for V-101 (Tube VT-269, JAN-717A). The voltage divider therefore insures satisfactory volume control action in both stages from the voltage supplied by common control leads.

(5) *Second I-F Amplifier (V-104)*

Except for the fact that neither automatic nor manual volume control voltage is applied to it, the second i-f stage resembles the first stage. The cathode of V-104 returns to ground through R-124 and R-125 in series. The junction of these resistors is connected to the grid circuit through R-122 and the secondary of Z-105, while the cathode is connected to the other end of R-124. Therefore, bias applied to this tube consists of the voltage drop across R-124 (approximately 2 volts). The total potential drop developed across the two resistors in series (37 volts) is applied to the squelch circuit and will be considered in more detail later in this section.

(6) *Detector (V-105)*

As indicated in Figures 26 and 62, one triode section (terminals 4, 5 and 6) of tube V-105 is used as a diode detector. The grid and cathode constitute the two active elements of the diode. The plate plays no part in the detector action; it is connected to the cathode merely to minimize the input capacitance of the tube.

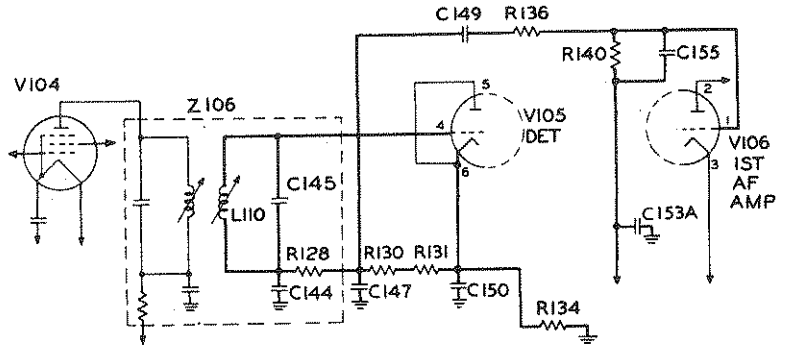


Figure 26—Detector—Partial Schematic Circuit

As a result of the rectifying action of the diode and the drop across load resistors R-130 and R-131, the potential across capacitor C-147 varies at an audio-frequency rate corresponding to the modulation of the incoming signal. This a-f potential is applied via C-149 and R-136 to the grid of the first a-f triode (terminal 1 of V-106). Capacitor C-155, connected across a portion of the grid return of the first a-f amplifier, reduces the response to unwanted higher audio frequencies. Capacitor C-153A serves as an a-f grid return.

The capacitance of C-144 (100 mmf.) is small in comparison with the capacitance of C-150 (6,000 mmf.). Consequently, when the diode conducts on the positive half-cycle (i.e., when the upper end of coil L-110 is positive), capacitor C-144 is charged to a voltage nearly equal to the peak value appearing across L-110. The time constant of the network consisting of C-144, C-147, C-150, R-128, R-130 and R-131 is large in comparison with the period of an i-f cycle. Therefore, the d-c voltage across C-144 does not decrease substantially during the succeeding negative half-cycle. The significance of this fact will be pointed out in subsequent paragraphs of this section.

(7) *A VC Circuit (V-105)*

The delayed automatic volume control circuit, with its associated circuits, is shown schematically in Figure 27. Its operation is illustrated by the partial schematic of Figure 28. Both the detector, which utilizes one triode section of V-105, and the AVC rectifier, which uses part of the other section of the same tube, operate as diodes. For this reason they are shown as diodes in Figure 28, which disregards the inactive elements.

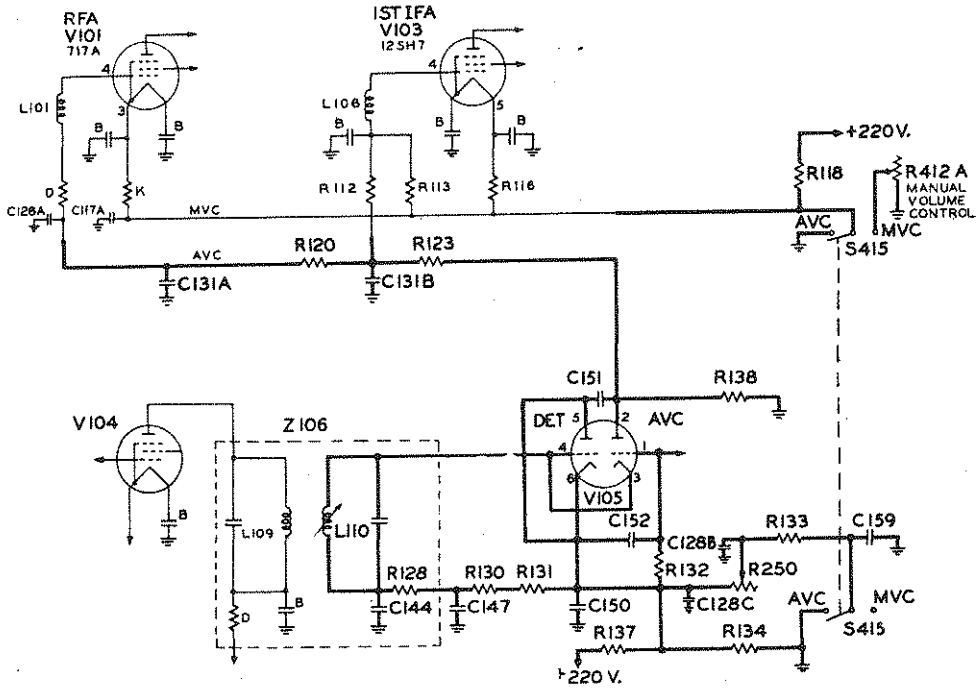


Figure 27—AVC and MVC—Partial Schematic Circuit

It will be observed that the cathode of the AVC rectifier and the effective plate (actually the grid) of the detector are connected together, and that the plate of the former is connected through C-151 to the cathode of the latter. In other words, the two diodes are connected back-to-back from an i-f viewpoint. As a result, when an i-f voltage is impressed across these two tubes they conduct on opposite half-cycles. For example, when the upper end of L-110 is positive, current will flow through the detector diode. When the upper end is negative, current will flow through the AVC diode.

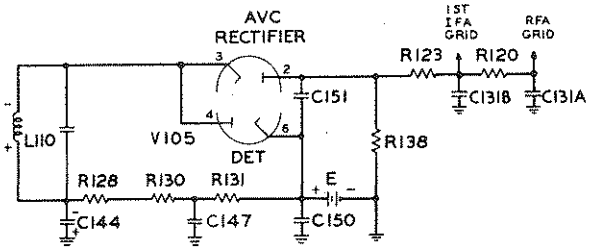


Figure 28—AVC Rectifier—Partial Schematic Circuit

As previously mentioned, C-144 is charged nearly to the peak value of voltage appearing across L-110 during the positive half-cycle by detector action. Observe that the upper plate of C-144 is negative with respect to ground under this condition. As a result, during the negative half-cycle (when the upper end of L-110 is negative) the voltage across C-144 and that across L-110 are in series aiding, and the total peak voltage available is approximately doubled. The electron flow from rectification is downward through R-138, through the element indicated as battery E, resistors R-131, R-130, R-128, and through L-110 back to the cathode of the AVC rectifier.

In the actual receiver circuit, battery E is replaced by a voltage derived from the voltage divider, consisting of resistors R-137 and R-134 (see Figure 27). It will be seen that the negative end of this battery is toward the AVC rectifier plate and the positive end is toward the cathode. In the absence of a signal, the cathode is, therefore, positive with respect to the plate. Since a rectifier will conduct only when its cathode is negative with respect to the plate, no space current flows unless the signal peak voltage is greater than this initial bias. The AVC action therefore is of the "delayed" variety; i.e., no control takes place unless the level of the incoming signal exceeds a certain pre-determined value. It will be noticed that the action of the detector diode is independent of this delay bias.

When the AVC rectifier conducts, electrons flow downward through load resistor R-138. The upper end of this resistor is therefore negative with respect to ground. The negative voltage developed across R-138 is applied to the grid of the first i-f amplifier through the low-pass filter consisting of R-123 and C-131B. The control voltage to the r-f amplifier grid is filtered further by R-120 and C-131A. The time constant of the filter must be sufficiently large to remove not only the r-f, but also the a-f, or modulation, ripple if satisfactory results are to be obtained. The AVC voltage thus acts to maintain the mean signal (carrier) level constant by varying the sensitivity of the receiver.

Load resistor R-138 offers approximately 75 per cent of the total resistance in the d-c path for the AVC rectifier. As a result, the peak d-c voltage developed across this load is approximately equal to 75 per cent of the total peak voltage effective around the circuit. This latter voltage is approximately equal to twice the peak voltage developed across L-110 (owing to the action of C-144 previously discussed) less the delay bias. Capacitors C-131A and C-131B in the R-C filter charge to the resultant mean peak voltage and, owing to the time constant of this circuit, maintain this charge over a number of r-f cycles. Therefore the AVC voltage is approximately equal to 75 per cent of the difference between *twice* the mean peak signal voltage across L-110, and the delay bias. The effectiveness of the AVC circuit is thus enhanced.

As explained previously, the delay bias for the AVC is derived from voltage divider R-137, R-134. Consequently, the amount of delay is determined by the voltage drop across R-134. When the AVC-MVC switch in the control unit is in the MVC position, this voltage is approximately 50 volts. When the switch is in the AVC position, however, R-134 is shunted by the combination of R-133 and R-250 in series. Under this condition, the voltage applied as a delay bias can be varied between approximately 10 and 50 volts by adjustment of R-250.

When properly made, the AVC action can be depended upon to control the output level of the receiver over a wide range of received signal strength. When the switch in the control unit is turned to the MVC position, the constant delay bias of 50 volts serves to prevent overloading on stronger signals. Manual volume control is depended upon to adjust the receiver to accommodate different signal strengths.

As previously mentioned, resistors R-112 and R-113 in the grid circuit of the first i-f amplifier constitute a voltage divider to reduce the control voltage applied to this tube. C-128A is an r-f by-pass capacitor which serves as a feed-through insulator at the point where the AVC line passes through the shield surrounding the r-f circuits. This insulator button, however, is constructed to afford approximately 500 μμf capacitance between the lead and the shield (which is

grounded). Electrically, therefore, this constitutes an r-f by-pass capacitor. Its function is to prevent coupling between the high and low-frequency circuits. The two leads to R-250 are similarly by-passed by C-128B and C-128C. Capacitor C-159 is used to by-pass any stray a-c voltages induced in the lead to the control unit.

(8) *MVC Circuit.*

The MVC (manual volume control) circuit is shown in Figure 27. When switch S-415 in the remote control unit is in the AVC position, the MVC lead (to the cathodes of the r-f amplifier and the first i-f amplifier) is connected directly to ground. Under this condition, the sensitivity of the receiver is determined entirely by the action of the AVC circuit.

When switch S-415 is in the MVC position, the sensitivity of the receiver can be regulated by manipulation of variable resistor R-412A in the remote control unit. It will be observed that R-412A and R-118 form a voltage divider between the positive high-voltage source and ground. The voltage developed across R-412A (positive with respect to ground) is applied to the cathodes of the r-f and first i-f amplifiers. The higher this voltage, the greater the bias and the less the gain of these stages. The AVC circuit then is ineffective *except*, as explained previously, when relatively strong signals are received. It reduces these to a point where they will not overload the receiver.

(9) *Squelch Rectifier (V-105).*

The basic operation of the squelch rectifier circuit is illustrated in Figure 29. One grid (terminal 1) of V-105 constitutes the anode (plate) of the squelch rectifier diode. The cathode element connected to terminal 3 serves as the cathode of this diode; it also, as pointed out previously, acts as the cathode of the AVC rectifier. As in the case of the AVC action explained above, the peak r-f voltage applied across the squelch rectifier circuit during a negative half-cycle is approximately equal to double the peak voltage across inductor L-110.

The squelch rectifier is similar to the detector circuit in that current flow, which results from rectification, occurs in a closed circuit which is independent of ground. This path includes the squelch load resistor, R-132, resistors R-131, R-130 and R-128, inductor L-110, as well as the grid and cathode of the tube. Since the closed path does not include ground at any point the voltage from the divider composed of R-137 and R-134 has no bearing on the operation of the squelch rectifier itself. The current through R-132 causes the upper end of this resistor to be negative with respect to the lower end, which is connected to the voltage divider. A description of the use of the potential drop across R-132 is given later.

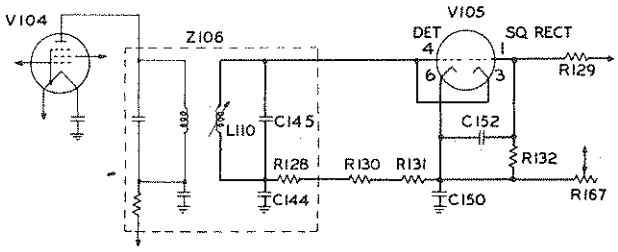


Figure 29—Squelch Rectifier—Partial Schematic Circuit

(10) *Squelch Amplifier (V-106).*

The partial schematic circuit diagram of Figure 30 shows the circuit configuration of the squelch and the first a-f amplifiers. The equivalent circuit is shown in Figure 31. Referring to the latter figure, it will be seen that the grid of the squelch amplifier is returned to the cathode through two batteries, S and V, connected in series opposing. (The significance of these batteries will be explained later. So, also, will the derivation of the voltage represented by the battery marked "37V" in the plate circuit.)

When the voltage of V is greater than that of S, the grid of the squelch amplifier is positive with respect to the cathode. Under this condition, the 37-volt battery causes current flow in the plate circuit. The upper end of resistor R-141 is then negative with respect to the lower end. Since the upper end is connected, through R-140, to the grid of the first a-f amplifier, the drop across R-141 serves as a cut-off bias for this tube. The a-f amplifier is thus disabled, and no noise is heard in the headsets.

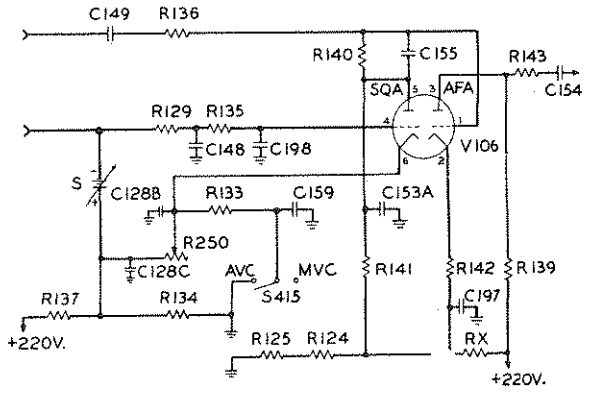


Figure 30—Squelch Amplifier—Partial Schematic Circuit

If, on the other hand, S is greater than V, the grid of the squelch amplifier is negative with respect to its cathode. Space current is reduced, or may be nil. The consequent potential drop across R-141 is correspondingly reduced. In this condition the squelch amplifier contributes little or nothing to the bias of the first a-f amplifier tube. Plate current flows in the

normal manner and audio frequencies appearing on the grid are amplified. The first a-f stage is not disabled.

Referring to Figures 30, 31 and 62, it will be seen that battery S actually represents the potential drop across the squelch rectifier load, R-132. Its voltage therefore depends upon the strength of the received signal. Resistors R-129 and R-153, together with capacitors C-148 and C-198, constitute a filter for the rectified voltage and also tend to prevent the squelch amplifier from responding to sudden bursts of static. If S-415 is in the AVC position, and if the rectified signal voltage, S, is less than voltage V, the first a-f amplifier is disabled. It will be seen from Figure 62 that battery V represents the voltage drop across variable resistor R-250 (which is part of the voltage divider composed of the additional resistors R-133, R-134, and R-137 when S-415 is in the AVC position). By varying this resistor, the voltage may be varied within the approximate range of 0 to 50 volts. In order to restore the first a-f amplifier to normal operating condition, the rectified signal voltage applied to the squelch amplifier must be sufficiently great to overcome the voltage across R-250 and to supply cut-off bias to the squelch amplifier stage. Therefore the adjustment of R-250 determines, within limits, the signal strength required to restore the first audio stage to normal operating condition. Incidentally, R-250 determines the point at which the squelch operates and the delay bias for the AVC rectifier. Although R-250 is pre-set for the desired squelch operation, the circuit is so designed that an appropriate adjustment of delay bias is made simultaneously.

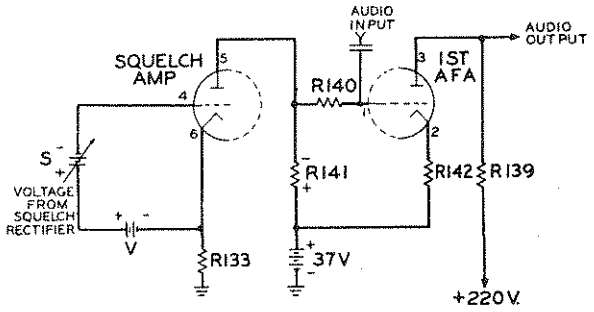


Figure 31—Squelch Amplifier—Equivalent Circuit

When S-415 is in the MVC position, R-250 is disconnected from its ground return. The full voltage drop of approximately 50 volts across R-134 is then applied to the cathode of the squelch amplifier. Since the plate voltage is in the order of only 37 volts, the cathode is positive with respect to the plate, and no plate current flows in this tube. Therefore no voltage is developed across load resistor R-141, and the first a-f stage operates normally. In other words, squelch operation is available only when S-415 is in the AVC position. When S-415 is in the MVC position, the first a-f stage operates normally at all times.

The voltage required for the plate of the squelch amplifier tube is derived from the voltage drop across resistors R-124 and R-125 in the cathode circuit of the second i-f amplifier tube, V-104. The cathode current of this tube is approximately 9 milliamperes under operating conditions. This current, flowing through the combined resistance of the two resistors mentioned (4,120 ohms) causes, by Ohm's law, a drop of 37 volts. This is the voltage represented symbolically by the 37-volt battery in Figure 31.

(11) *First A-F Amplifier (V-106)*

Aside from its interconnection with the squelch circuit, described in the preceding paragraphs, the first a-f amplifier is conventional. Some degree of degeneration (negative feed-back) results from the fact that the cathode bias resistor, R-142, is not by-passed for audio frequencies. The output audio voltage developed across load resistor R-139 is coupled to the input of the second a-f amplifier through resistor R-143 and capacitor C-154. Capacitor C-153A in the grid circuit serves as an a-f by-pass around resistor R-141. R-140 provides a grid return and at the same time prevents the a-f voltage from being short-circuited.

(12) *Second A-F Amplifier.*

The second audio-frequency amplifier, which employs a beam-power tube, is a conventional resistance-capacitance coupled stage. Capacitor C-157 across output transformer T-101 provide some shaping of the audio response characteristics. Bias is supplied by cathode resistor R-145, which is by-passed by C-196. The output transformer is provided with a tapped secondary to accommodate high or low impedance headsets. It should be observed that the plate circuit of this amplifier is returned directly to the positive high-voltage brush of the dynamotor, while the screen grid, together with all the other positive high-voltage circuits, is returned through L-121. Resistor R-168, connected across the primary of transformer T-101, is a silicon carbide unit (Thyrite varistor). Its resistance varies markedly with the impressed voltage; at low voltage, the resistance is very high, and at high voltage, the resistance is low. It thus acts as a variable protective shunt, which automatically provides a short circuit across the transformer when high-voltage surges, due to switching or other causes, would otherwise cause breakdown of the windings.

(13) *Output Circuit.*

An audio volume control bridged across the output circuit of the receiver is provided in the associated remote control unit. This control comprises two

potentiometers ganged to the INCREASE OUTPUT control. One potentiometer is provided for high impedance headsets, and the other for low. This volume control, or a-f level control, is employed primarily to provide the desired headset volume with full AVC action. The reason is that, while full AVC keeps the output of the receiver relatively constant over a range of input signals, additional provision must be made for adjusting the output for comfortable headset volume. This control is not provided to alter the sensitivity of the set in accommodating various signal strengths. It governs the headset level for a given set of conditions, and normally is allowed to remain fixed while full AVC is in use.

Resistor R-412A, ganged to the same shaft, however, is used to accommodate the receiver to various signal strengths when S-415 is in the MVC position.

(14) *Oscillator (V-108).*

Referring to Figure 62, it will be seen that the heterodyne oscillator is of the crystal-controlled harmonic type. The frequency is determined by the connection of one of four crystals (Y-101, Y-102, Y-103, Y-104) to the grid of tube V-108. It will be noted that capacitor C-165 is relatively large (1000 mmf); consequently, the screen is practically at ground potential at radio frequencies. In effect, then, the crystal is effectively connected between the grid and screen. Capacitors C-163 and C-164 constitute an r-f voltage divider, the mid-point of which is connected to the cathode. The resulting difference of r-f potential between the cathode and grid provides the feed-back which is necessary to sustain oscillations.

The plate tank circuit is resonated at the fourth harmonic of the crystal frequency by means of coil L-111 and capacitors C-105D and C-166. The trimming of coil L-111, as well as of all other coils in the oscillator-harmonic generator and r-f stages, is accomplished by means of silver-plated brass screws.

Any one of four crystals (Y-101, Y-102, Y-103, Y-104) can be connected to the oscillator circuit by the operation of the appropriate crystal selecting relay (K-101, K-102, K-103, K-104).

(15) *First Harmonic Generator (V-109).*

The output of the oscillator stage is coupled to the input circuit through capacitor C-168 (see Figure 62). At the frequencies involved in this part of the circuit (four times the crystal frequency), capacitors C-167, C-168 and C-169 offer a capacitive reactance. Terminal "A," at the junction of resistors R-153 and R-154, is for testing purposes.

The first harmonic generator operates as a frequency tripler. Its input circuit is tuned to the fourth harmonic of the crystal, and its output is tuned to the twelfth harmonic. Resistor R-156 (12 ohms) in the plate lead serves as a suppressor of parasitic oscillations. The combination of capacitor C-176 and inductor L-114, as well as the combination of C-178 and L-116, presents an inductive reactance. As a result, the points between which the circuits are coupled by C-177 (which actually appears as a small inductor) are equivalent to taps on the inductors in Z-109 and Z-110. C-177 prevents positive high voltage from appearing at the grid of V-110. Terminal "B" of Z-110 is employed for testing purposes.

(16) *Second Harmonic Generator (V-110).*

Tube V-110 functions as a second harmonic generator. Its input circuit is tuned to the twelfth harmonic of the crystal frequency and its output to the twenty-fourth harmonic. It will be noticed that the plate tank circuit (Z-111 combined with C-105H) is followed by an additional tuned circuit (Z-112 and C-105I). The coupling between these units is similar to that employed between the r-f stage and the mixer. Terminal "C" is a test point.

(17) *Channel Selection.*

Each VHF receiver is normally equipped with four crystals for determining the frequency of the local oscillator, and thereby the frequency to which the receiver will respond. The resonant circuits of the r-f amplifier, oscillator and harmonic generator stages are tuned by means of nine ganged rotary capacitors. In order to select a particular channel, therefore, it is necessary to rotate the variable capacitors to the proper position and to connect the proper crystal.

The rotation of the ganged capacitors to the proper position is effected by means of selector O-101, selector O-101A or selector O-102, depending upon the date at which the particular receiver was manufactured. These selectors were described in some detail in an earlier part of this section. The selector also closes a circuit to one of four crystal selecting relays, K-101, K-102, K-103 and K-104. This causes the relay to operate and connect the proper crystal to the grid circuit of the oscillator.

(18) *Receiver Power Supply.*

The 28-volt aircraft storage battery is connected to the receiver through switch S-416 in the remote control box. This switch is actuated by the same shaft as the MVC-OFF-AVC switch. Its circuit is closed when the latter is in either the MVC or AVC position. It is open when the switch is in the OFF position. The 28-volt current is fed to the low voltage side of Dynamotor ★DY-2/ARR-2 through low pass filter C-158, L-121 and C-153B. This serves to reduce noise arising from commutator ripple. Condenser C-34, connected directly across the low voltage brushes, serves to by-

pass any radio frequency currents arising from sparking at the brushes.

3. RADIO TRANSMITTER T-23/ARC-5

Photographs.....Figs. 2, 5, 32—35
Schematic Circuit.....Figs. 60 and 65
Wiring Diagram.....Fig. 74
Dimensions and Weights...Fig. 55

a. MECHANICAL CHARACTERISTICS

Radio Transmitter T-23/ARC-5 is designed for mounting in the space provided on the racks described in Volume 1. A readily removable shield, which is provided with louvres, affords mechanical protection and adequate ventilation. The general mechanical arrangement of the transmitter is indicated on the photographs in Figures 5, 32, 33, 34 and 35. Over-all dimensions and weights are given in Figure 55.

The transmitter is provided with four complete sets of tuned r-f circuits, one for each of the four channels to which it can be tuned. These tuned circuits are mounted in rotatable turrets Z-301, Z-302, Z-303 which are connected, through a system of shafting and gearing, to tuning motor B-301. This motor, in combination with a system of relays and switches to be described later, rotates the turrets to a position where the proper tuned circuits are connected into the circuit. The appropriate crystal for each transmission channel is connected into the circuit by the operation of one of the spring combinations of switch S-313 (on the under side of the chassis). The operation of the proper springs is effected by a cam on turret Z-302, acting through a plunger.

The tube sockets for the driver (second harmonic generator) and power amplifier tubes are of somewhat unusual construction, as indicated on the photographs in Figure 35. This design minimizes stray circuit capacitances and inductances; all connections between the tube elements and their respective tuned circuits are as direct and short as it is feasible to make them. The two sockets, X-303 and X-304, are interchangeable.

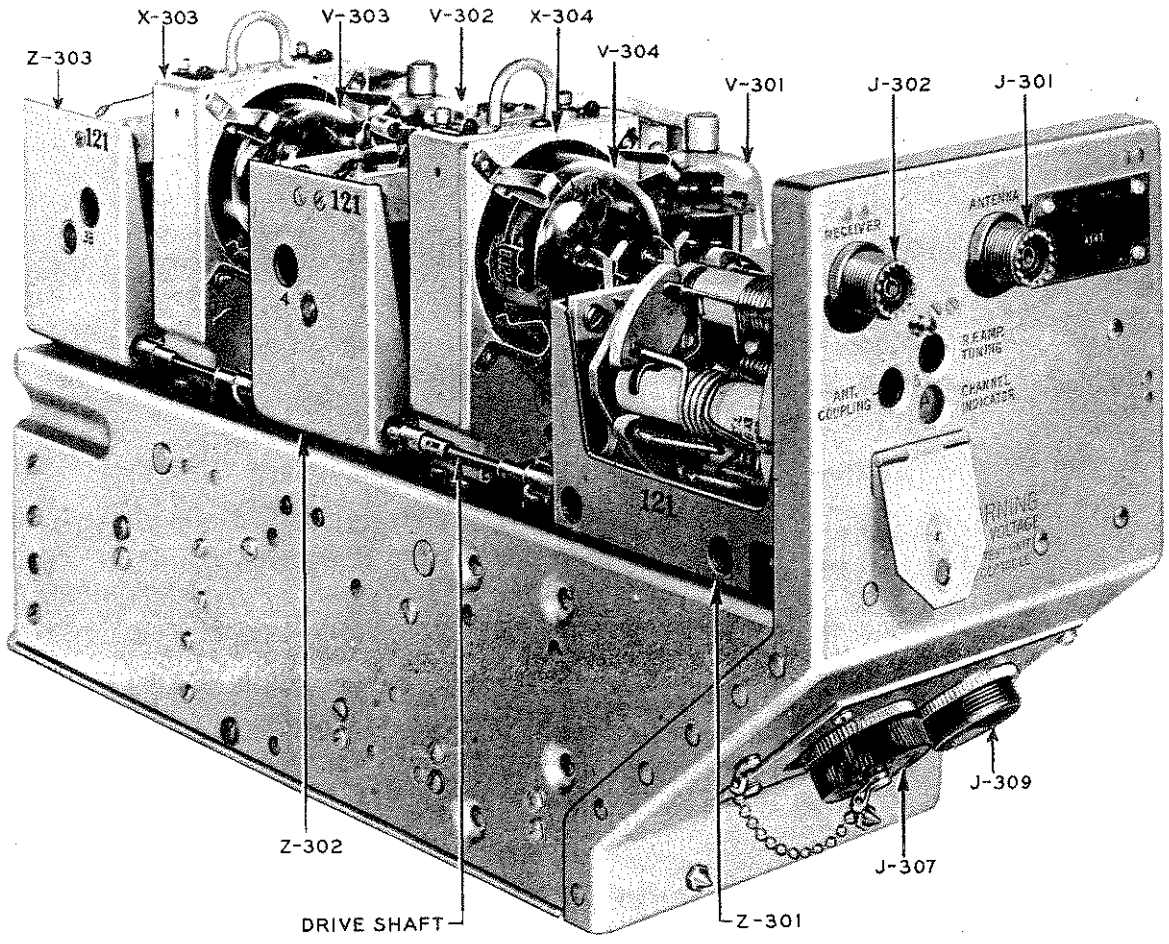


Figure 32—VHF Transmitter—Left

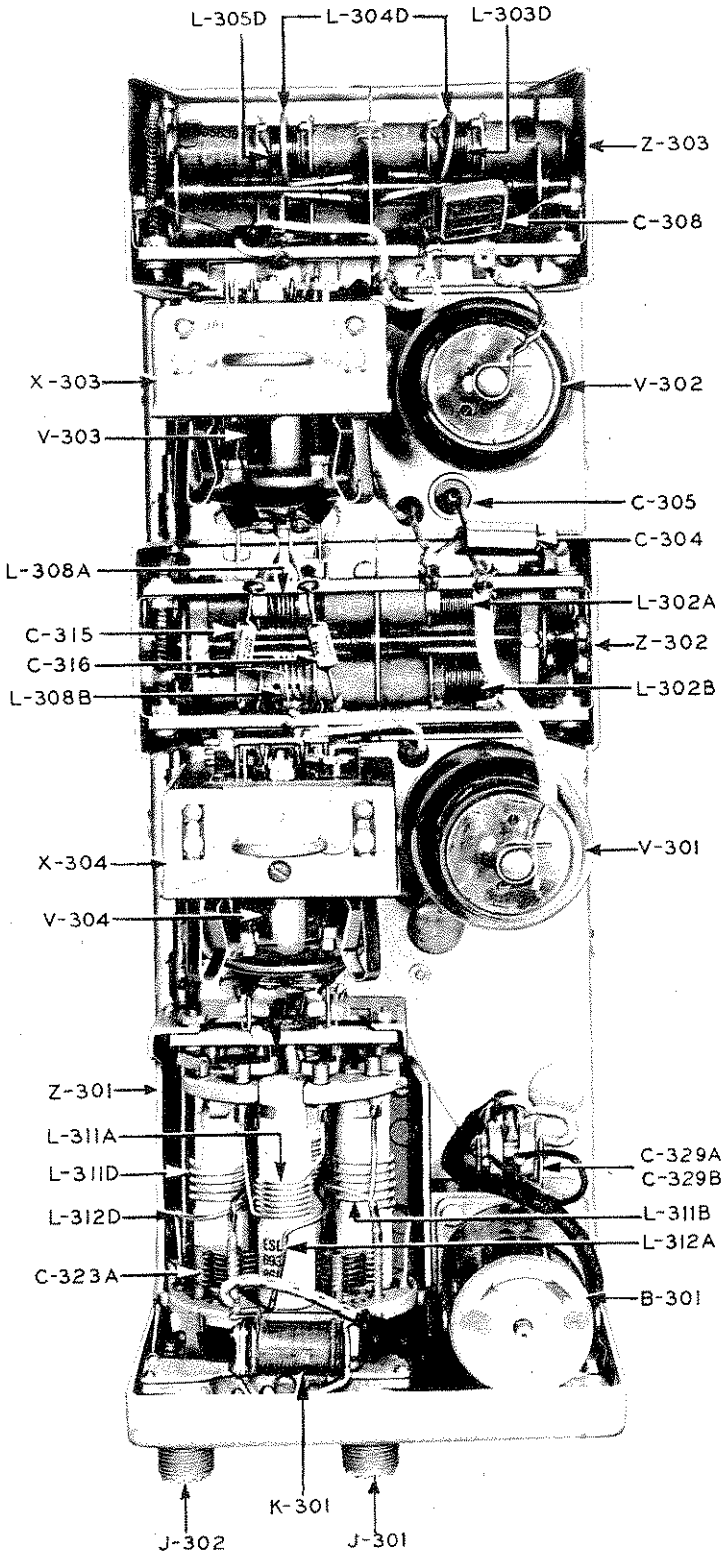


Figure 33—VHF Transmitter—Top

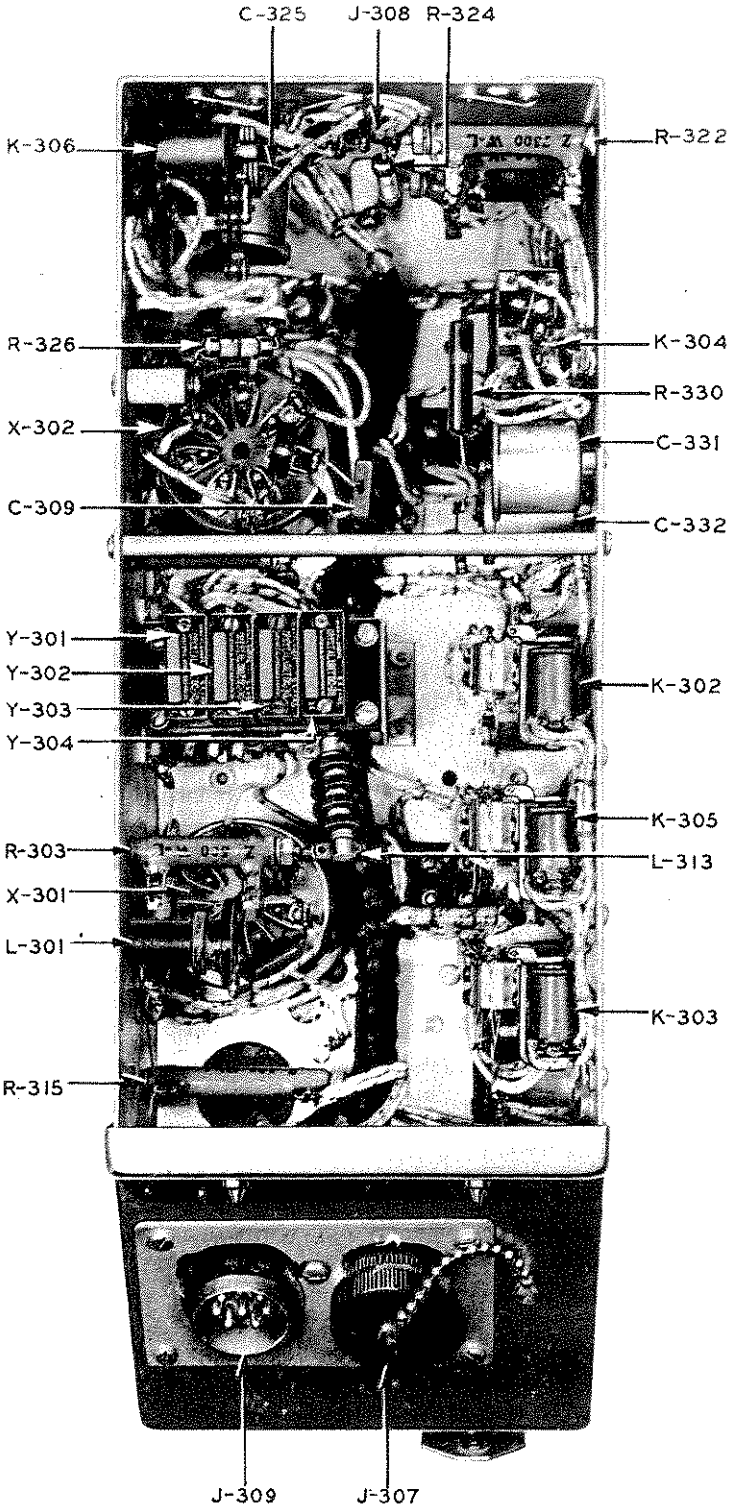


Figure 34—VHF Transmitter—Bottom

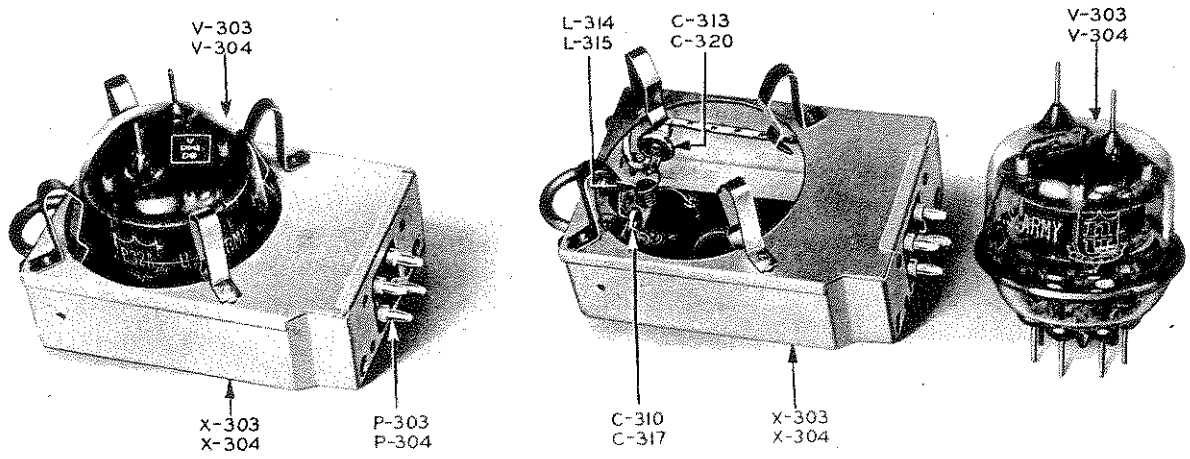


Figure 35—Sockets X-303 and X-304

b. ELECTRICAL CHARACTERISTICS

The circuit of Radio Transmitter T-23/ARC-5 is shown on the schematic drawing in Figure 65. The crystal-controlled harmonic oscillator (V-301) is followed by two harmonic generators (V-302 and V-303) and by a power amplifier (V-304). The frequency of the carrier output is 18 times the crystal frequency. Output power is approximately 6 to 10 watts. Modulating power for the transmitter is obtained from Modulator MD-7/ARC-5 which is described in Volume 1.

(1) *Oscillator (V-301).*

The oscillator stage is of the crystal-controlled harmonic type. It utilizes the cathode (terminal 6), the control grid (terminal 4) and the screen grid (terminal 3) of a beam-power tetrode, V-301. The cathode, control grid and plate of this tube serve as an electron-coupled harmonic generator (doubler) tuned to the second harmonic of the crystal frequency. Tuning is effected by variable inductors, L-302A, L-302B, L-302C and L-302D, all of which are mounted in rotatable turret Z-302.

As previously pointed out, turret Z-302 rotates, under control of the channel selection circuit, so as to connect the proper coil into the circuit. Also, it operates one of the spring assemblies of switch S-313 so as to connect the proper crystal to the grid circuit of the oscillator stage. It will be noted that the tuned circuit does not include any tuning capacitor (capacitors C-303 and C-304 serve merely as r-f by-passes; their impedance at the frequencies involved is negligible). The inductors are resonated by the tube interelectrode capacitances and wiring. Each inductor is tuned by the adjustment of a composite slug, part powdered iron and part copper.

In the oscillator portion of the stage, the cathode, control and screen grids of the tube, together with the associated resistors, capacitors and inductors (R-301, R-302, R-303, C-301, C-302, C-303, L-301 and L-313) act as a triode oscillator under the control of one of the crystals. Since C-303 is relatively large, the screen is substantially at ground potential with regard to the radio frequencies existing in the circuit.

Thus the crystal is effectively connected between the screen and control grids. Capacitors C-301 and C-302 constitute an r-f voltage divider, the junction of which is connected to the cathode. This provides the feedback necessary to sustain oscillations. This difference in potential causes the electron stream to vary at a frequency determined by the constants of the crystal. The plate current which flows through L-302 (A, B, C or D) therefore possesses a component of crystal frequency. The plate circuit is resonated at twice the crystal frequency. The screen remains substantially at r-f ground potential. This condition minimizes any reaction between the output and oscillator sections.

Inductor L-301 helps to maintain the r-f potential on the cathode while R-303 provides cathode bias. Inductor L-313 tends to prevent radio-frequency currents from flowing through grid leak resistor R-301. Inductor L-302A, used for channel A (100 to 124 megacycles) is wound with resistance wire to reduce the tendency to self-oscillation at the lower frequencies.

(2) *First Harmonic Generator (V-302).*

The output of the harmonic oscillator tube is coupled to the control grid of the first harmonic generator tube V-302, through coupling capacitor C-305. The capacitance of C-305 and the input capacitance of tube V-302 act together as a voltage divider. That part of the radio-frequency voltage developed across the latter appears between the control grid and cathode of V-302. R-305 in series with R-304 is used with test circuits to obtain grid current measurements. R-306 furnishes a d-c cathode bias on the stage, while R-304 furnishes grid leak bias.

The plate circuit of V-302 is tuned to the third harmonic of the input frequency (the sixth harmonic of the crystal frequency) by means of coils L-303

(A, B, C or D). These coils are located in turret Z-303 with coils L-305 (A, B, C and D). The greater part of the fixed capacitance for the tuned circuit of V-302 is furnished by the output capacitance of this tube. C-308 is a radio frequency by-pass capacitor.

(3) *Second Harmonic Generator (V-303).*

The tuned plate circuit of the first harmonic generator is link-coupled to the tuned grid circuit of the second harmonic generator tube V-303. This is a push-pull beam power tube operating as a frequency tripler. The grid circuit is tuned to the output frequency of V-302 by means of coils L-305 (A, B, C or D). The fixed capacitance of the tuned circuit is largely furnished by the input capacitance of V-303

Inductors L-303 (A, B, C and D) are located in the right half of motor driven turret Z-303 and coils L-305 (A, B, C and D) are located in the left half. Coupling between the two is achieved by means of links L-304 (A, B, C or D). Radio-frequency by-pass capacitor C-308 and resistors R-307, R-308 and R-309 are also contained in turret Z-303. Resistors R-308 and R-309 are grid leaks which furnish bias to the control grids of V-303 when r-f excitation is supplied. Cathode bias is furnished by R-310.

V-303 is mounted horizontally in a plug-in socket assembly shown as X-303 in Figure 65. This assembly also contains the by-pass capacitors. The output circuit of V-303 is tuned to the third harmonic of the input frequency or the eighteenth harmonic of the crystal frequency. Tuning is accomplished by means of variable inductors L-308 (A, B, C or D). The capacitance required is composed of trimmer capacitor C-335, the output capacitance of V-303 and the input capacitance of V-304 in series with the capacitances of C-315 and C-316. The coils are located in the left-hand side of motor driven turret Z-302. Inductors L-306 and L-307 are shunt feed inductors for the plates of V-303. Resistor R-311 and capacitor C-314 form a de-coupling network to the plate voltage supply.

(4) *Power Amplifier (V-304).*

The output of the second harmonic generator is coupled through capacitors C-315 and C-316 to the radio-frequency power amplifier tube, V-304. This is a push-pull beam power tetrode which is plate and screen modulated by audio-frequency power supplied by Modulator MD-7/ARC-5. It is mounted in socket assembly X-304, which also contains the radio-frequency by-pass capacitors.

Resistor R-315, mounted outside X-304, furnishes cathode bias to V-304. Resistors R-312 and R-313, located in turret Z-302, furnish grid leak operating bias to the stage. Inductors L-309 and L-310 are shunt feed coils in the plate circuit. Resistor R-316 and capacitor C-322 furnish a decoupling network in the plate voltage supply.

The output of V-304 is tuned by means of variable cores in inductors L-311 (A, B, C or D). The associated capacitance is largely contributed by the output capacitance of V-304 together with the capacitance presented by the various connecting leads. Coupling to the antenna is obtained by means of coils L-312 (A, B, C and D). This coupling is varied by antenna capacitors C-323 (A, B, C and D). These inductors and capacitors are located in turret Z-301 at the front of the chassis.

(5) *Relays.*

In order to control channel selection and to switch operating and modulating voltages, the circuit of Radio Transmitter T-23/ARC-5 includes the following relays:

K301—Antenna Switching Relay
K-302—Plate and Screen Voltage Control Relay
K-303—Modulated Screen Supply and Key Control Relay
K-304—Motor Control Relay
K-305—Auxiliary Plate and Screen Voltage Control Relay
K-306—Modulated Plate Supply and Voltage Regulator Interlock Relay

The purpose of motor control relay K-304 is to close the circuit of the tuning motor under control of the channel selecting push buttons in the control unit. Relays K-302, K-303, K-305 and K-306 are transmitter enabling relays which furnish operating voltages to the transmitter. These relays operate under control of the channel selecting push buttons, but only after the motor relay has released. Thus plate voltage is never applied while the turrets are being rotated by the motor drive. The antenna switching relay K-301, under the control of the microphone push button, switches the VHF antenna from the receiver to the transmitter.

Reference to Figure 65 will show that the winding of motor control relay K-304 is completed to ground at the channel switches A, B, C or D in the control unit through the contacts of selection switch S-313.

The operation of relay K-304 closes the armature circuit of the channel selection motor. This operates the motor, which in turn drives the turrets through a series of reduction gears.

As turret Z-302 rotates, cams A, B, C and D operate spring assemblies A, B, C and D of switch S-313. When the turret reaches the correct position for the channel selected, the circuit to the winding of motor

control relay K-304 is opened. The relay then releases, thereby removing battery and short circuiting the motor armature. The motor stops. The lower pair of springs in the spring assembly of switch S-313 close, connecting the proper crystal to the oscillator circuit. Relay K-304, in its released position, closes the operating path to the transmitter enabling relays, K-302, K-303, K-305 and K-306.

Relay K-302 closes the plate and screen supply leads from the modulator unit to the various stages of the transmitter. These leads are also connected through contacts of K-305 in series with those of K-302. The purpose of the contacts in series is to prevent excessive arcing at high altitudes.

One set of contacts of relay K-303 controls the modulated screen voltage supply to the r-f power amplifier (V-304). The second set of contacts controls the voltage applied to the winding of the antenna transfer relay.

One set of contacts of relay K-306 controls the modulated plate voltage supply to the r-f power amplifier (V-304). The second set of contacts completes the circuit of the voltage regulator tube (located in the modulator) and assures that the voltage regulator is struck regardless of the position of the emission switch on the control unit.

The antenna relay, K-301, is operated under the joint control of relay K-303 and the microphone push button. When the push-to-talk button on the microphone is operated, K-301 transfers the VHF antenna from Radio Receiver R-28/ARC-5, to Radio Transmitter T-23/ARC-5.

The 24-28 volt supply for operating the relays is controlled by the OFF push button on the control unit. Relay K-304 may operate from this supply whenever one of the channel selector buttons A, B, C or D on the control unit is operated. So long as K-304 is operated, however, K-302, K-303, K-305 and K-306 are prevented from operating to close the high-voltage leads until the turrets have ceased rotating and the motor relay has released.

4. CONTROL UNIT C-30/ARC-5

The general arrangement of Control Unit C-30/ARC-5 is shown on the photographs in Figure 6 and in the outline drawing in Figure 56. The latter figure also gives the installation dimensions and weights.

This unit includes the switches required for complete control of one VHF transmitter and two MF-HF transmitters of Model AN/ARC-5 Aircraft Radio Equipment. It also provides for control of channel selection of one VHF receiver.

Referring to the circuit schematic of Figure 7, it will be seen that the battery supply to all transmitting equipment, both MF-HF and VHF, is under control of push button switch OFF. When this button is depressed, the battery supply circuit (terminals 15 and 18 of receptacle J-402) is opened. When it is released by the operation of one of the other push buttons, the the battery circuit is closed and the heater circuits of all transmitting equipment are energized.

The operation of push button A, B, C or D places a ground on terminal 1 of receptacle J-402. This action, as can be seen by referring to Figure 60, causes relay K-303 to operate. This, in turn, prepares a circuit for the operation of relay K-301 in the VHF transmitter under the control of the microphone push button. The operation of push button A, B, C or D also causes relays K-302 and K-305 to operate after relay K-403 has operated. When the microphone push button is depressed, relays K-52 and K-301 operate to connect the transmitter to the high-voltage supply and VHF antenna. This is done through terminal 9 of J-402 and terminal 6 of J-401.

The depression of push button A, B, C or D also grounds two of the channel selection leads to receptacle J-401. One of these (1, 2, 3 or 4) operates the channel selector in the VHF transmitter through terminals 1, 2, 3 or 5 of its receptacle J-309. The other (7, 8, 9 or 10) operates the channel selector in the VHF receiver through terminals 1, 2, 4 or 5 of its receptacle J-103.

When push button 2 or 3 is depressed, ground is placed upon lead 2 or lead 3 of receptacle J-402. This ground causes one or the other of the MF-HF transmitters to be selected and placed under control of the microphone.

In older models of Control Unit C-30/ARC-5, provision was made for an additional switch in the microphone circuit. This switch is no longer used, but the stenciling may still be found and should be disregarded. The stenciling reads "R in."

Switch S-401, when turned to the TONE position, places ground on terminals 12, 13 and 16 of receptacle J-402. In addition, terminals 11 and 17 are connected together. These connections prepare the modulator and MF-HF transmitters for modulated CW telegraph operation, as described in detail in Volume 1 of this handbook.

When switch S-401 is turned to the CW position (2), terminal 12 of J-402 is grounded and terminals 11 and 17 are connected together. The modulator and the MF-HF transmitters are thereby prepared for CW telegraph operation. Ordinarily, neither the TONE nor the CW position of switch S-401 is used for VHF operation, since the VHF components are intended primarily for voice operation. However, if unusual circumstances require it the VHF transmitter can be used for telegraphy at low speeds. In this case, the TONE and CW positions of switch S-401 serve the same functions as those described above for MF-HF operation.

When S-401 is turned to VOICE (3), terminals 13, 14 and 16 of J-402 are grounded; terminals 9 and 12 are connected together; likewise terminals 10 and 17 are also connected together. The ground on terminal 13 removes the disabling bias on tube V-51 of the modulator unit; that on 14 disables the tone oscillator tube V-50; that on 16 connects voltage regulator tube V-52 across the high-voltage supply for the screen grid circuits. The connection between 9 and 12 places the dynamotor of the modulator under control of the key or microphone push button. The connection between 10 and 17 closes the voice sidetone injection circuit.

5. CONTROL UNIT C-42/ARC-5

Control Unit C-42/ARC-5 provides for the control of one VHF receiver, except for channel selection (which, as previously described, is under control of the push buttons of Control Unit C-30/ARC-5). This unit is the mechanical and electrical equivalent of the VHF (right hand) section of Control Unit C-43/ARC-5, which unit is fully described in a subsequent paragraph. Here are the reference numbers for equivalent parts:

C-42/ARC-5	*C-43/ARC-5*
Capacitors	
C-460	C-410
Switches	
S-460	S-414
S-461	S-415
S-462	S-416
C-42/ARC-5	*C-43/ARC-5*
Jacks	
J-460	J-412
J-461	J-415
J-462	J-416
J-463	J-417
C-42/ARC-5	*C-43/ARC-5*
Resistors	
R-460	R-412
R-461	R-413
R-462	R-414
R-463	R-415
R-464	R-416

6. CONTROL UNIT C-43/ARC-5

The general arrangement of Control Unit C-43/ARC-5 is shown on the photograph in Figure 10 and on the outline drawing in Figure 56. The latter figure also gives the installation dimensions and weights.

This unit is used to control two LF-MF-HF receivers and one VHF receiver (except for channel selection in the VHF receiver, which as previously explained, is controlled by the push buttons of Control Unit C-30/ARC-5).

Referring to the schematic circuit in Figure 11, it will be seen that the left and center sections of this unit (switches S-410, S-411, S-412, S-413; resistors R-410, R-411; two tuning knobs and associated dials) control the operation of two LF-MF-HF receivers. Volume 1 of this handbook explains the operation of these two sections when used to control LF-MF-HF receivers.

The right-hand section of the control unit controls one VHF receiver, except, as pointed out above, for channel selection. Switch S-414 connects the VHF receiver output to either of two headset circuits, A or B. Switch S-415, when turned to the AVC position, connects terminal 3 of receptacle J-412 to ground. In this way R-412A is short circuited and the MVC lead of the VHF receiver is grounded. At the same time, terminal 7 of J-412 is also grounded, causing the AVC and squelch circuits of the VHF receiver to become effective. At the same time, switch S-415 connects one of two attenuator networks (R-412B, R-413, R-414, R-412C, R-415, R-416) into the circuit as a volume control.

The use of one or the other of these networks is determined by the impedance of the headsets used. High impedance sets call for the first. Low impedance sets call for the second. When the proper network is connected, a reasonably good impedance match is obtained between the three circuit elements involved (output transformer T-101 of the VHF receiver, volume control network of the control unit, and headsets) for all settings of the volume control knob.

When switch S-415 is turned to the MVC position, ground is removed from terminal 7 of receptacle J-412 to disable the squelch circuit of the VHF receiver and prevent AVC action on weak signals. This switch also removes the short circuit from R-412A, allowing the position of the volume control knob to determine the gain of the receiver and consequently the volume of the output. Switch S-415, in its MVC position, connects directly across the receiver output.

Switch S-416 is connected mechanically with switch S-415. It completes the battery circuit to the VHF receiver whenever the latter is in either the AVC or the MVC position. It also opens the battery circuit when the latter is in the OFF position.

Receptacle J-417, and its associated wiring, carries side-tone from the modulator or unit so that full volume of side-tone will reach the headset circuit regardless of the setting of the attenuator (volume control) in the AVC condition.

Capacitor C-410 serves to prevent oscillations through feedback into the MVC lead.

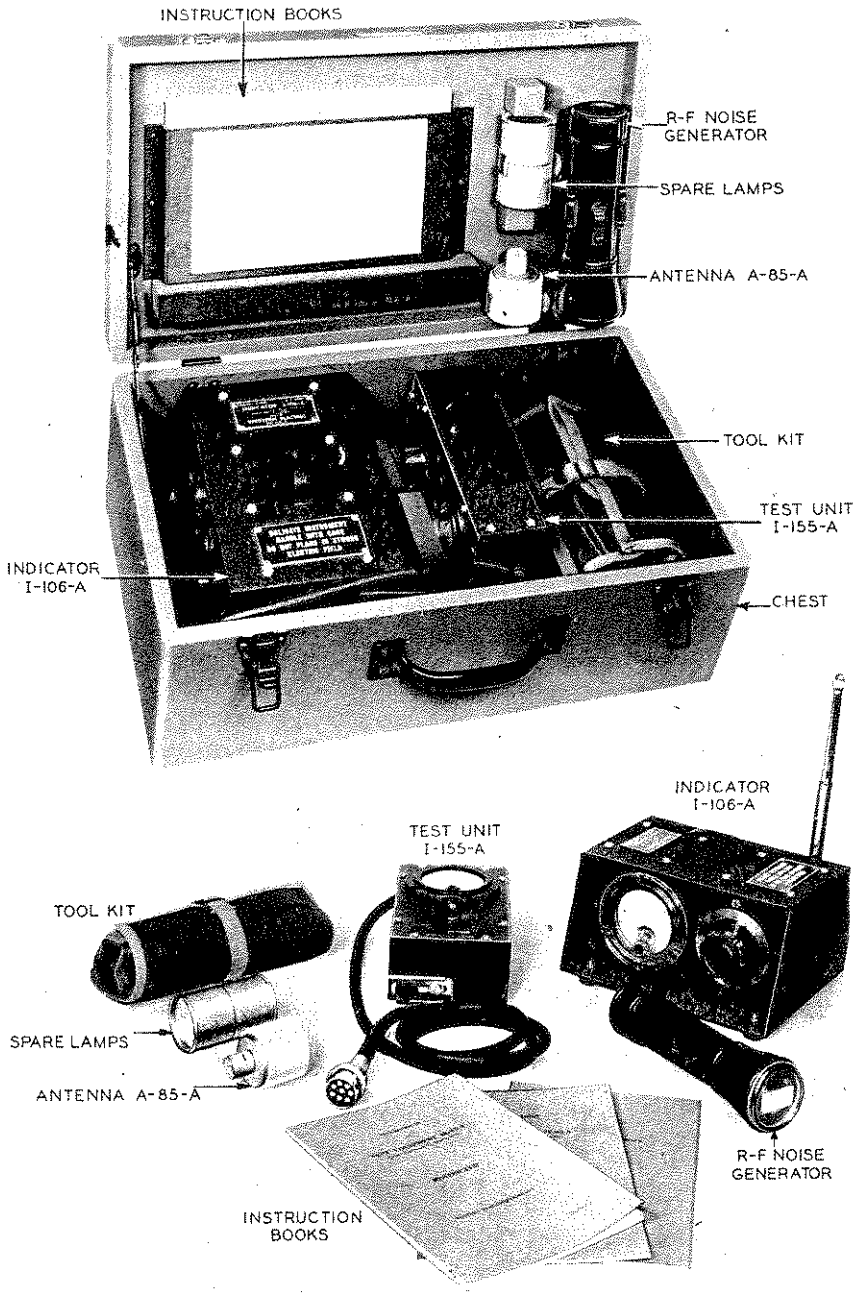


Figure 36—Test Equipment IE-35-A

SECTION V—MAINTENANCE

1. TEST EQUIPMENT

A. GENERAL.

Three groups of testing equipment are used in connection with the adjustment, testing and repair of the VHF components of Model AN/ARC-5 Aircraft Radio Equipment. As noted in subsequent paragraphs, some of the test units are also useful in connection with the LF-MF-HF components. The three groups are:

Test Equipment IE-35-A. This provides apparatus and tools which are used in the tuning and field maintenance of the VHF transmitter and receiver.

Test Equipment AN/GRM-1. This provides facilities for making bench tests of all components (both LF-MF-HF and VHF) of Model AN/ARC-5 Aircraft Radio Equipment.

General Purpose Apparatus. This includes such items as output meters, tube analyzers, signal generators, etc., which are used in the general maintenance of all radio equipment.

B. TEST EQUIPMENT IE-35-A.

Photographs.....Figs. 36, 37, 38, 40 and 42
Schematic Circuits.....Figs. 39 and 41
Wiring Diagram.....Fig. 78

Test Equipment IE-35-A comprises the following units:

Chest CH-130-A
Antenna A-85-A
Lamp Kit (spare lamps for antenna)
Indicator I-106-A
Test Unit I-155-A
R-F Noise Generator
Tool Kit
Three Copies of Instruction Pamphlet

Two views of the test equipment are shown in Figure 36. It is essential that this equipment be available wherever it is necessary to tune the VHF components to new frequency channels. This equipment is also useful for rough field checks of the operation of the VHF components and in connection with such minor repairs as tube replacement.

(1) *Antenna A-85-A.*

This artificial antenna, shown in Figure 37, provides a load of approximately 50 ohms at 12 watts when attached to the antenna jack of the VHF transmitter. It also provides a convenient visual aid in tuning, since, when the transmitter is properly tuned, the lamps glow with moderate brilliancy. The three lamps, all of which are connected in parallel, are 28-volt, 0.17 ampere, airplane type. The lamp kit, which provides six spares, is packed in a heavy cardboard container.

(2) *Indicator I-106-A.*

Indicator I-106-A, illustrated in Figures 38 and 39, is a device for checking the radiation from a VHF antenna, energized by a transmitter operating in the frequency band of 100 to 156 megacycles. Essentially, it comprises a telescopic antenna coupled to a parallel-tuned circuit which, in turn, is connected to a silicon-crystal rectifier and a d-c microammeter.

The scale of the variable air capacitor which resonates the tuned circuit is calibrated to read directly in megacycles. Hence the indicator may be used as a frequency meter. After a VHF transmitter has been tuned, the indicator may be placed 10 to 20 feet away from the transmitting antenna, and the dial of the indicator turned until a peak deflection is obtained on the microammeter. The dial reading of the indicator will approximate the carrier frequency.

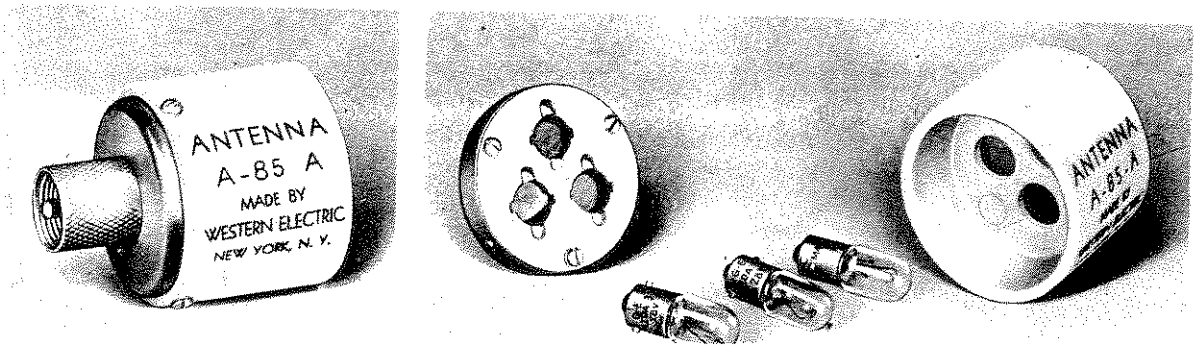


Figure 37—Antenna A-85-A

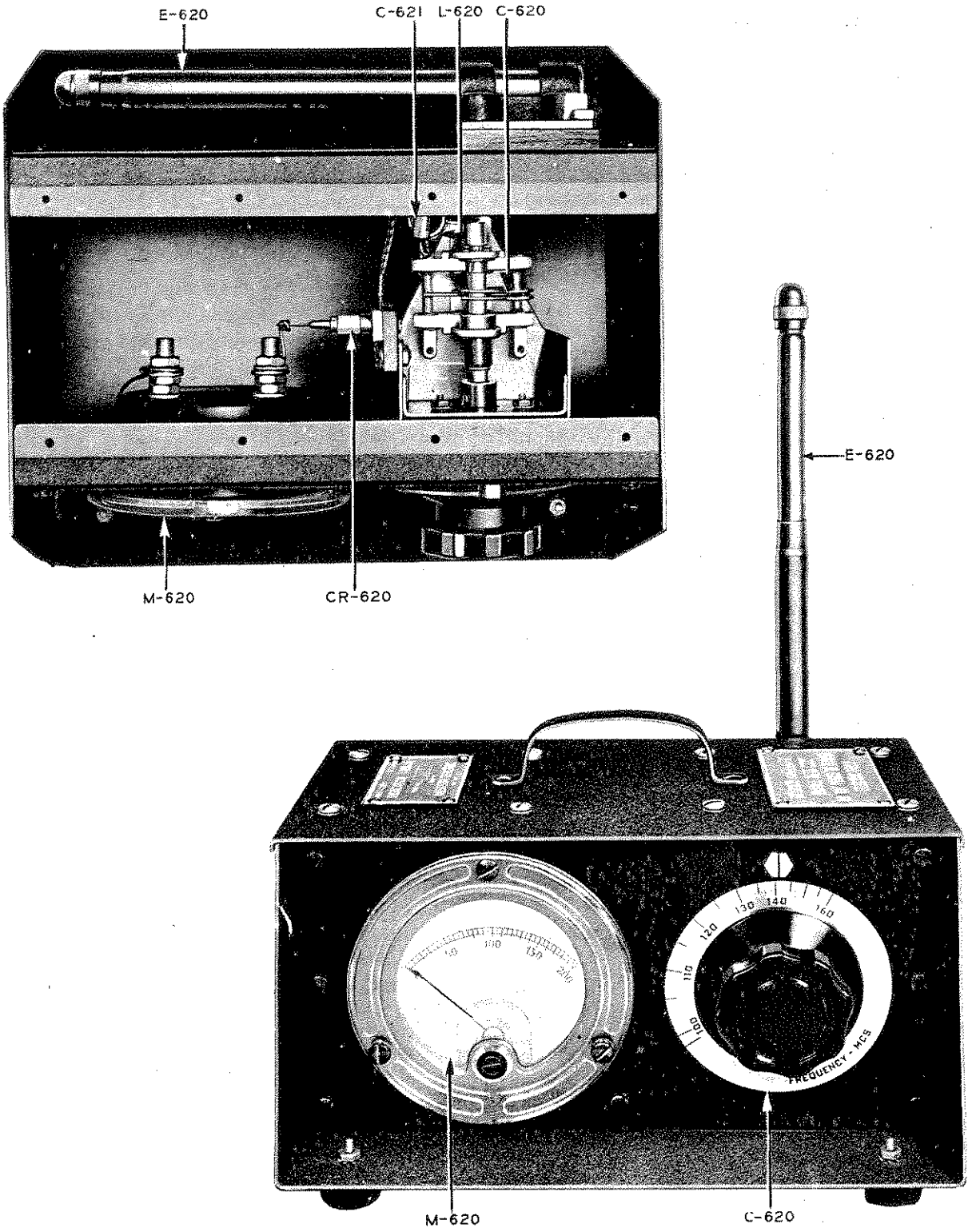


Figure 38—Indicator I-106-A

Since both the crystal and the microammeter are sensitive, care should be taken not to expose the instrument to strong r-f fields. Moreover, the antenna should never be extended farther than is necessary to obtain the required sensitivity of measurement. A spare crystal unit is carried in a clip inside the indicator.

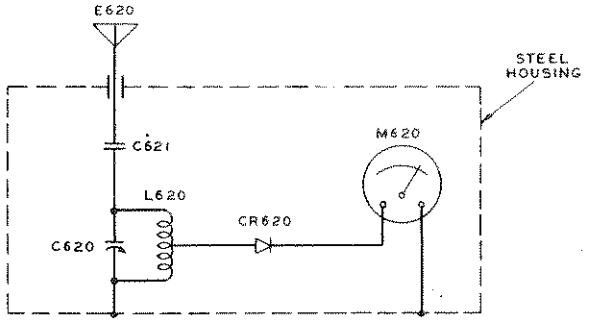


Figure 39—Indicator I-106-A—Schematic Circuit

The handling, inspection and use of a cartridge type silicon crystal rectifier unit require particular care in order to avoid damage. In many cases the body of the person handling the crystal unit is not at ground potential owing to his movement across an insulated floor or deck. The static charge carried by the body may then be discharged through the unit, if it is held by the base and the tip is brought into contact with grounded equipment. The same thing may occur if the tip of the unit is at ground potential and its base is touched by a person or object carrying a static charge. Likewise, if the unit is handed from one person to another, a discharge may take place.

To avoid damage, therefore, always hold the crystal unit by its base. Ground the base to the equipment momentarily before attempting any further handling of it. Before handing the unit to another person, first touch his bare hand or face, in order to equalize any static charge.

Exposure of a unit to a strong electromagnetic field may damage or destroy it. Do not remove a crystal unit from its holder, or from the spare crystal compartment, when in the vicinity of a source of strong electromagnetic fields. When a crystal unit is not in use, *always* keep it wrapped in metal foil or in a closed metal box or compartment.

(3) *Test Unit I-155-A.*

Test Unit I-155-A is illustrated in Figures 40, 41, and 78. It includes a 0-100 scale d-c meter (1.0 milliampere for full scale deflection), together with a seven-position rotary switch, six resistors, and a cord and plug for attachment to test receptacle J-307 on the front of Radio Transmitter T-23/ARC-5. (A tuning wrench for this transmitter will be found in the pocket under the snapslide in one end of unit I-155-A.)

(4) *R-F Noise Generator.*

The r-f noise generator supplied with Test Equipment IE-35-A is illustrated in Figure 36. It is sometimes useful (in localities where electrical disturbances are at a very low level) as a source of noise when adjusting or tuning a VHF receiver. It comprises a small adjustable buzzer, mounted in a tubular flashlight case which contains a two-cell battery. The unit is shipped without battery cells.

(5) *Tool Kit.*

The tool kit, illustrated in Figure 42, comprises a canvas roll and two each of the following tools:

Screwdriver for No. 1 Phillips head screws
Tuning wrench for VHF transmitter
Tube extractor for receiver-type tubes
Wrench for hexagonal socket-head No. 6 cap screws
Wrench for hexagonal socket-head No. 8 cap screws
Wrench for hexagonal socket-head No. 6 set screws
Wrench for Bristo No. 6 four-spline set screws

(6) *Instruction Pamphlet.*

Three copies of an instruction pamphlet are contained in a pocket on the cover of the chest. This pamphlet contains instructions for tuning the VHF transmitter and receiver of Model AN/ARC-5 Aircraft Radio Equipment. In some cases it will be found that the pamphlet is written in terms of U. S. Army code numbers and designations; the instructions for tuning Radio Receiver BC-942-A (Army code) and Radio Transmitter BC-950-A (Army code) apply equally to the corresponding VHF units of AN/ARC-5. In case of any doubt, refer to Section II of this volume.

C. TEST EQUIPMENT AN/GRM-1.

Test Equipment AN/GRM-1 is intended for use at a maintenance center. It is used for making bench tests of all the components of Model AN/ARC-5 Aircraft Radio Equipment. (Receiver Test Set No. 7918 and Transmitter Test Set No. 9558, which are described in Volume 1, are for the LF-MF-HF units only.)

Although most routine tests and many repairs can be made with the AN/GRM-1 equipment, major overhauls, realignment work, sensitivity and selectivity checks, etc., require additional test apparatus. The

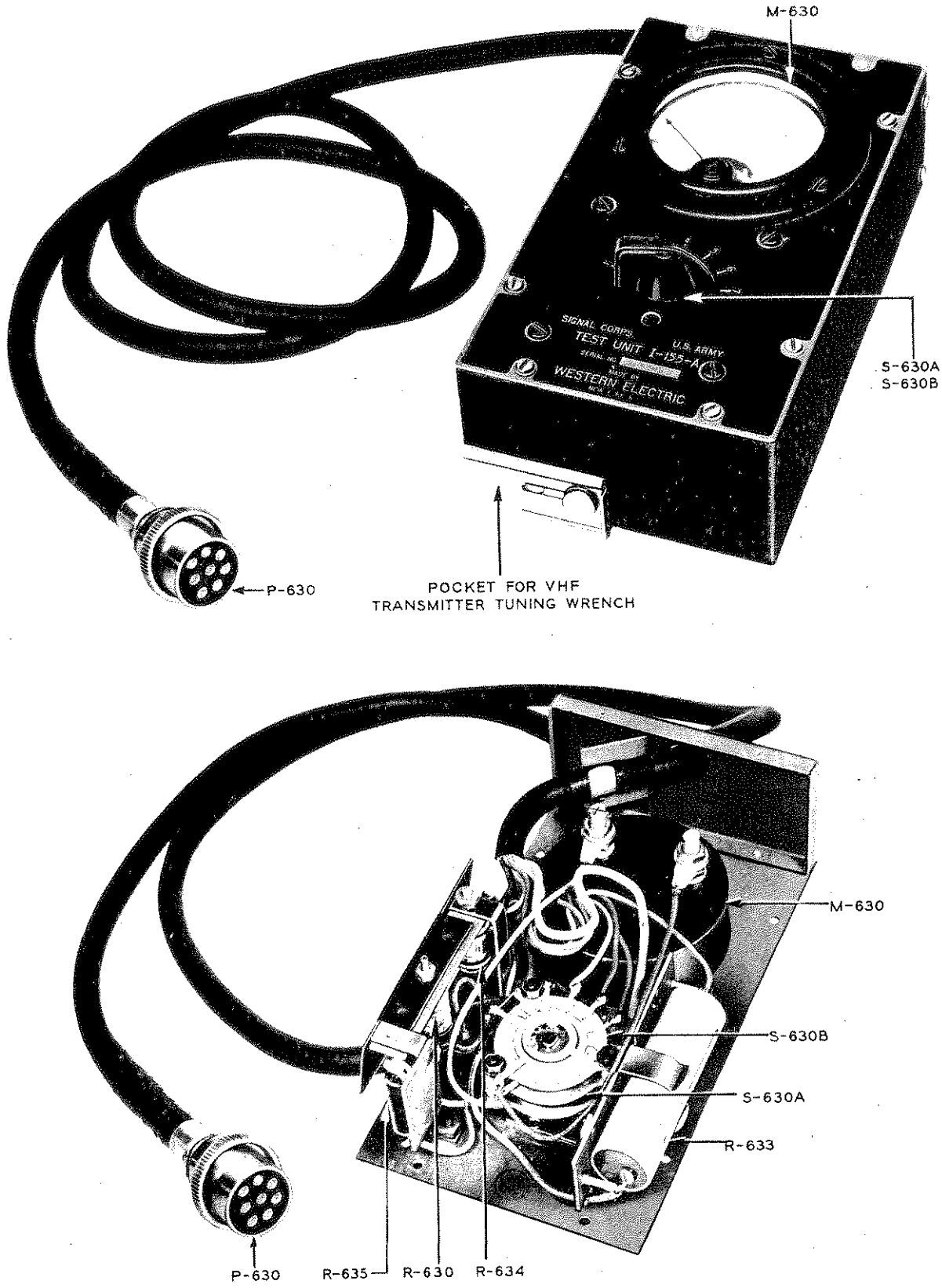


Figure 40—Test Unit I-155-A

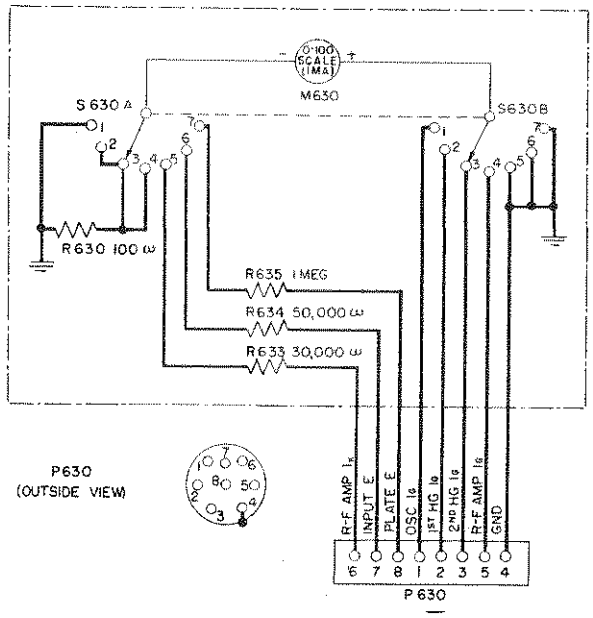


Figure 41—Test Unit I-155-A—Schematic Circuit

nature of this additional apparatus is described in Paragraph 1d, below.

The components of Test Equipment AN/GRM-1 are listed in the table appearing on the instruction diagram, Figure 66. This diagram also shows the cabling arrangement for the test equipment and typical voltage and current values for transmitters and receivers of all frequency bands. Each of the major components is described briefly in the following paragraphs.

(1) *Antenna A-61-A.*

This artificial antenna is used in connection with the maintenance and bench testing of the MF-HF transmitters. It comprises a 100 mmf vacuum capacitor, a series-parallel combination of resistors with a total resistance of 4.7 ohms, and a 0 to 4-amperes thermocouple ammeter. The current values obtained when testing under various conditions are given in Table C of Figure 66.

(2) *Antenna A-68-A.*

This artificial antenna is used to provide an output load in the bench testing of VHF transmitters. Its construction is shown in Figure 43. It consists of a non-inductive resistance of approximately 50 ohms in

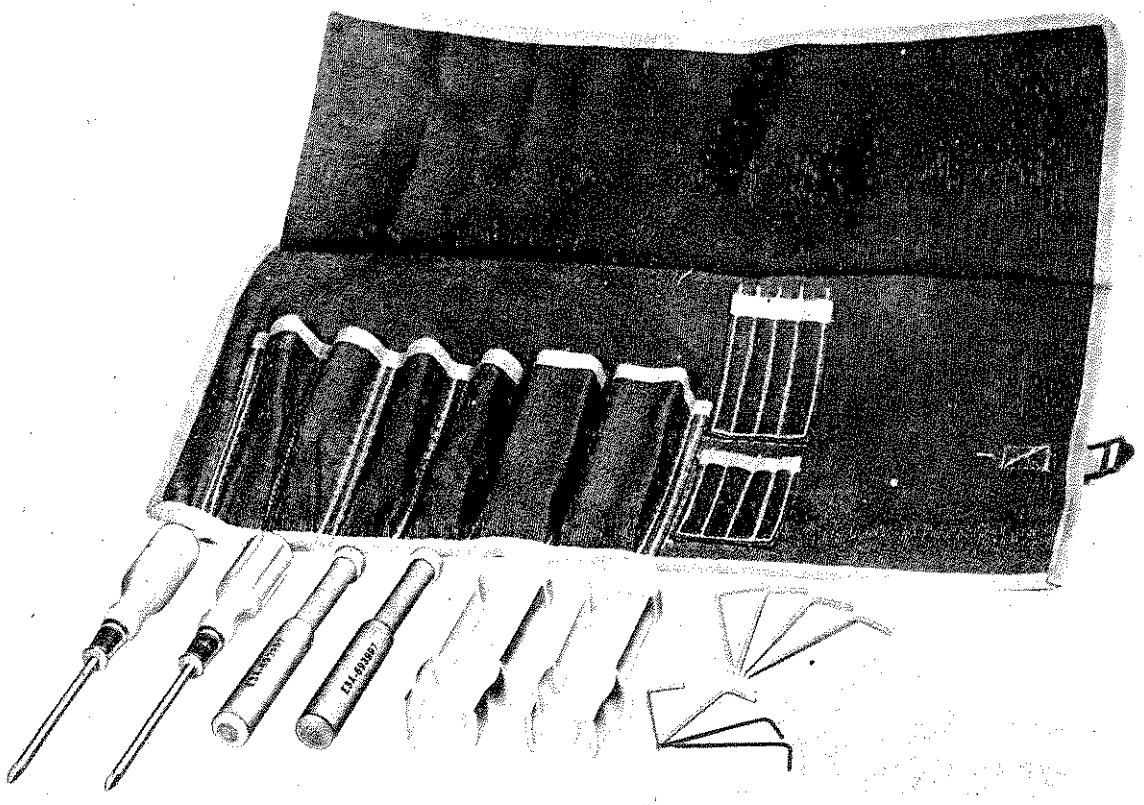


Figure 42—Tool Kit of Test Equipment IE-35-A

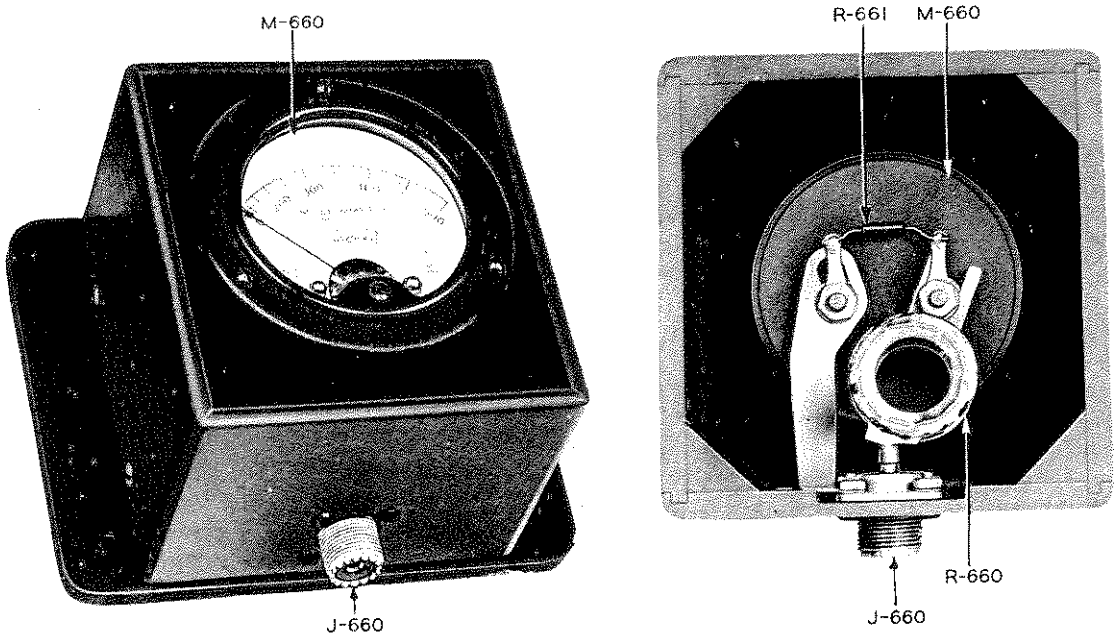


Figure 43—Antenna A-68-A

series with a thermocouple ammeter having a range of 0 to 0.5 ampere. It is connected to the output of the transmitter by means of a five-foot coaxial cord (CD-745). A properly adjusted and tuned Radio Transmitter T-23/ARC-5 should put approximately 325 milliamperes into this antenna.

(3) *Antenna TS-79/U (A-69-A).*

This unit comprises a 50-ohm non-inductive resistor mounted in an insulated housing. A coaxial plug and two soldering terminals are provided. It is used to connect the antenna jack of a VHF receiver to a signal generator. The construction of this antenna is shown in Figure 44. This unit was formerly coded Antenna A-69-A.

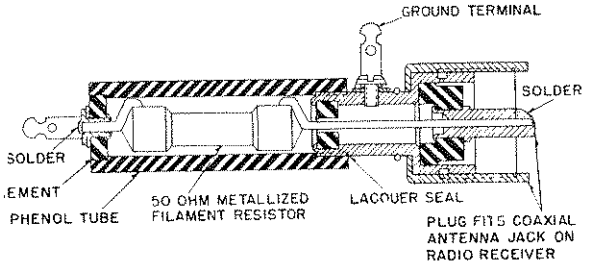


Figure 44—Antenna TS-79/U (A-69-A)

(4) *Antenna Relay Unit RE-2/ARC-5.*

This antenna relay unit, which is used in connection with the testing of the LF-MF-HF units, is described in Volume 1 of this handbook.

(5) *Control Units C-30/ARC-5 and C-43/ARC-5.*

These units are used to control the transmitters and receivers which are under test. They are described in Section IV of this volume.

(6) *Control Unit MC-237.*

This is a local tuning crank for use in connection with the testing of LF-MF-HF receivers.

(7) *Cords CD-525, CD-527, CD-528, CD-531, CD-532, CX-31/GRM-1 and CX-32/GRM-1.*

These cords are identical, except for length, with certain cable assemblies which are used in connection with the LF-MF-HF equipment described in Volume 1. The cable assemblies, as described and shown in the drawings therein, are of lengths as specified for each installation. The nominal length is shown in the drawings as "L." The corresponding cords used in Test Equipment AN/GRM-1 are all five feet long. The correspondence between test equipment cords and LF-MF-HF cable assemblies is:

Test Equipment Cord	*LF-MF-HF Cable Assembly*
CD-525	Cable Assembly No. 7548
CD-527	Cable Assembly No. 5808
CD-528	Cable Assembly No. 5810
CD-531	Cable Assembly No. 7547
CD-532	Cable Assembly No. 6693
CX-31/GRM-1	Cable Assembly No. 9376
CS-32/GRM-1	Cable Assembly No. 5803

(8) *Cords CD-706, CD-745, CD-905 CX-33/GRM-1 and CX-34/GRM-1.*

These cords, and their construction, are shown in Figure 67.

(9) *Modulator and Dynamotor.*

The modulator and dynamotor used in Test Equipment AN/GRM-1 are described in Volume 1.

(10) *Mounting Bases, Plates and Racks.*

The mounting bases, mounting plates and mounting racks are described in Volume 1.

(11) *Shunting Unit.*

The i-f shunting unit supplied as a part of Test Equipment AN/GRM-1 is provided for use when aligning the intermediate frequency stages of the VHF receiver. A 1500-ohm resistor and 0.006 mf capacitor are connected in series and enclosed in an insulated housing. Insulated clips are soldered to the terminals of the shunting unit. This unit is shown in Figure 45.

(12) *Test Unit I-104-A.*

Test Unit I-104-A is used in the servicing of both LF-MF-HF and VHF receivers. Its construction is shown in Figure 46, schematic circuit in Figure 47 and wiring diagram in Figure 79. The connections used in testing receivers are shown in Figure 66.

In the case of VHF receivers, the test unit permits the tester to select the channel. (Provision is made for the selection of as many as 8 channels, although Radio Receiver R-28/ARC-5 utilizes only four. This is done in order to anticipate possible future designs incorporating more than four channels.

The CONTROL SWITCH has two functions: (a) When an LF-MF-HF receiver is under test, it determines whether the receiver shall be in the CW or MCW condition. (b) When a VHF receiver is under test, it sets the receiver for either MVC or AVC operation.

The INCREASE OUTPUT control operates in the same manner as the corresponding control in Radio Control Unit C-43/ARC-5; it determines the sensitivity or power output of the receiver under test.

The METER switch, in its various positions, connects shunts and multipliers to the meter and also connects the meter to different parts of the receiver circuit. The meter readings which should normally be obtained

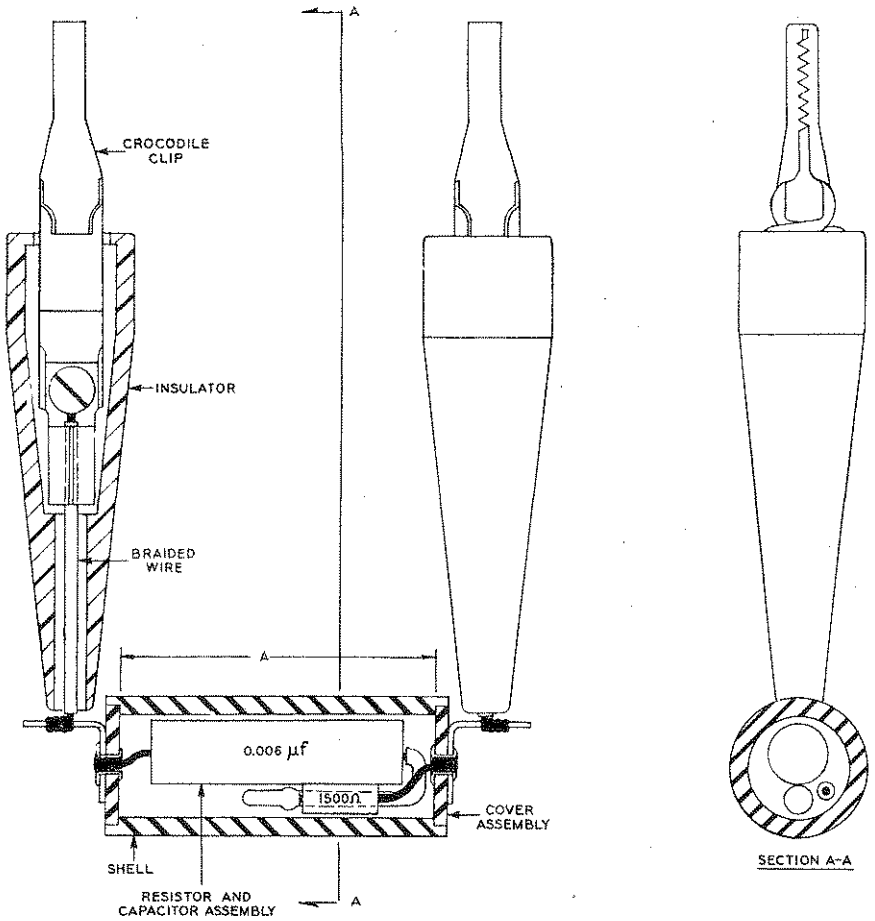


Figure 45—I-F Shunting Unit

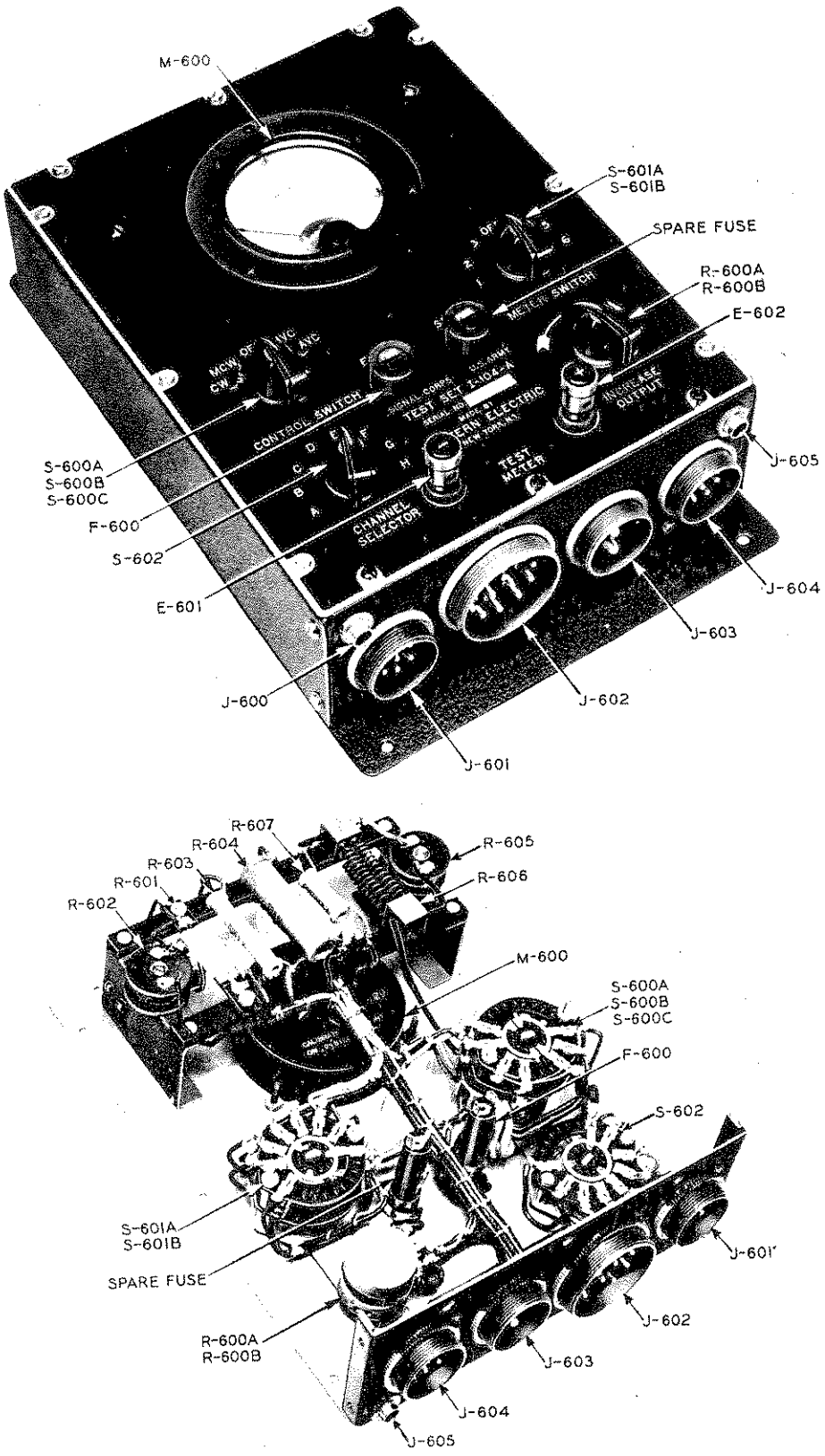


Figure 46—Test Unit I-104-A

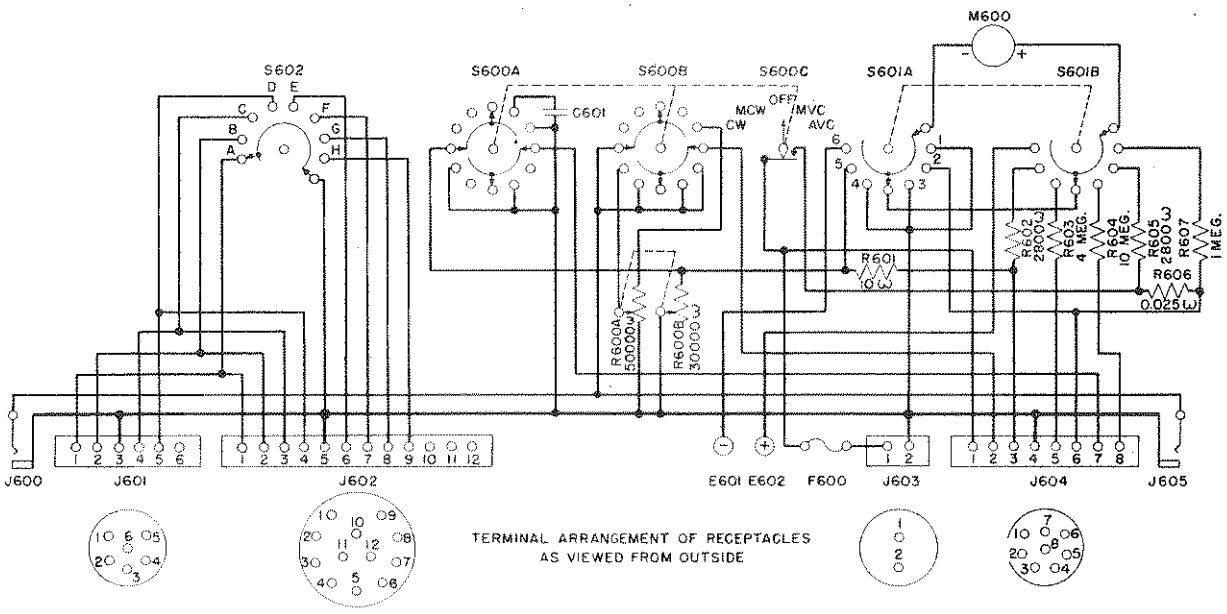


Figure 47—Test Unit I-104-A—Schematic Circuit

when testing both LF-MF-HF and VHF receivers are given in Table A of Figure 66.

(13) *Test Unit I-155-A.*

Test Unit I-155-A is identical with the same unit as supplied with Test Equipment IE-35-A and described above in Paragraph 1b. It is used in connection with the servicing of VHF transmitters.

(14) *Test Unit TS-58/GRM-1.*

This test unit is used in connection with the testing of both the MF-HF and the VHF transmitters. The construction is shown in Figure 49. The schematic circuit and the wiring diagram, respectively, are shown in Figures 48 and 80. The method of connecting this unit to the transmitter under test is shown in Figure 66. This figure also shows, in Table C, test voltages and currents.

(15) *Crystal Units.*

The first five crystal units listed in Figure 66 (3,000, 4,000, 5,300, 7,000 and 9,100 kilocycles) are used in checking the dial calibration of MF-HF transmitters. Crystal Units DC-30 are used in connection with the tuning and testing of VHF transmitters. Crystal Units DC-31 are used in testing the VHF receivers.

(16) *Tools.*

The use of the tools supplied with Test Equipment AN/GRM-1 are given in the table of Figure 66.

d. General Utility Test Apparatus.

As mentioned previously, Test Equipments IE-35-A and AN/GRM-1 must be supplemented by a certain amount of general utility testing apparatus. The nature and amount of this auxiliary equipment depends upon the nature of the work undertaken. The following will suffice for most of the VHF maintenance work which is ordinarily carried out in the field:

Volt-Ohmmeter	R-F Signal Generator
Output Meter	I-F Signal Generator
Tube Checker	A-F Oscillator

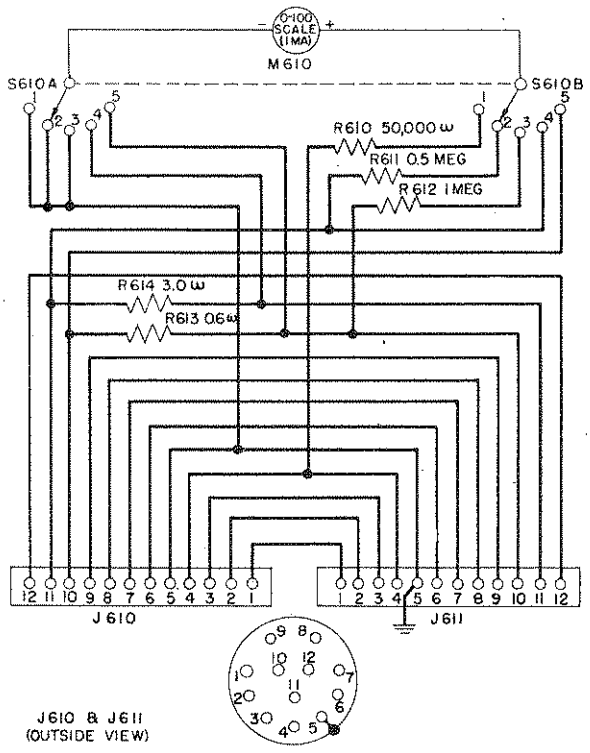


Figure 48—Test Unit TS-58/GRM-1—Schematic Circuit

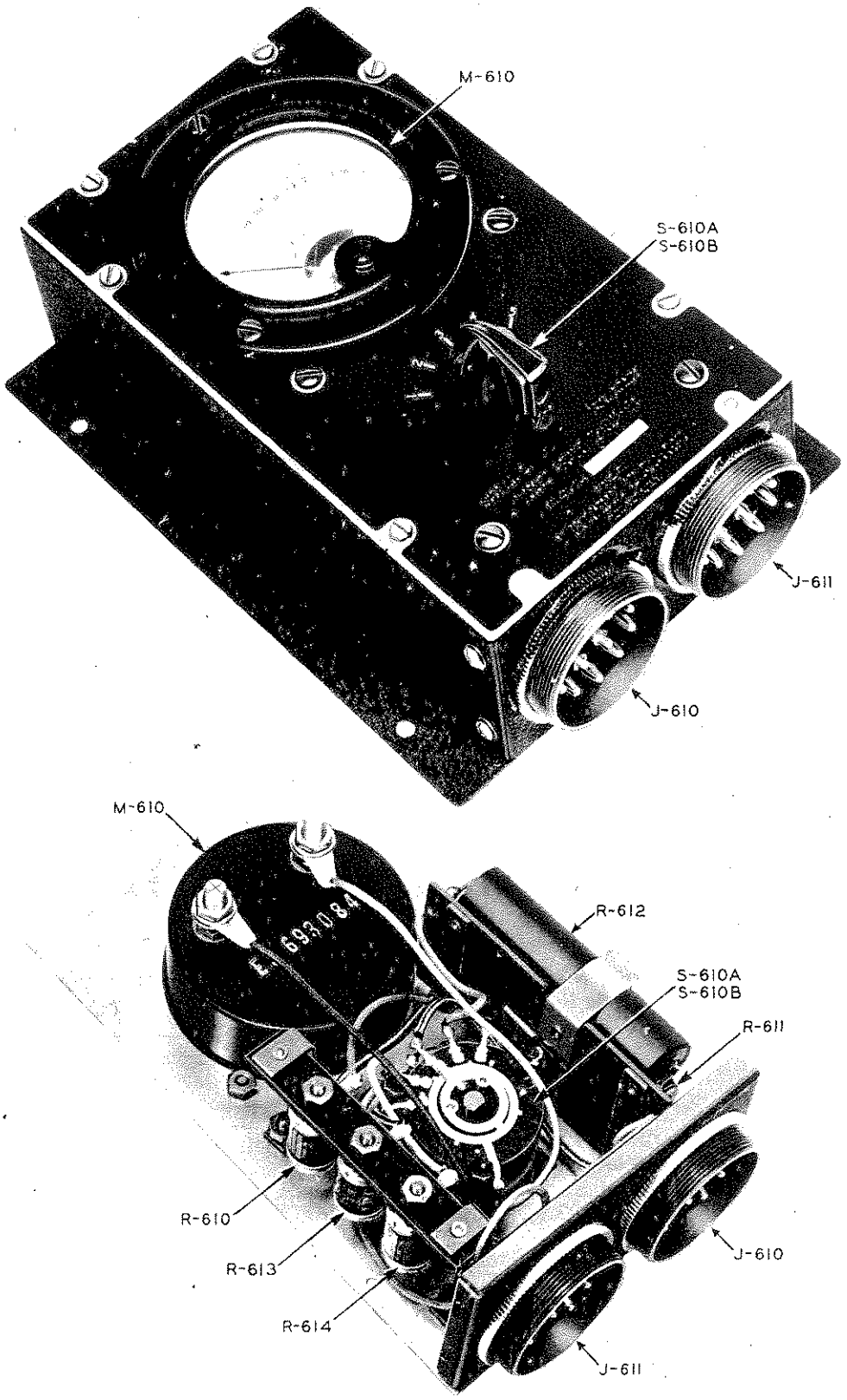


Figure 49—Test Unit TS-58 GRM-1

The conditions under which these various units are required are outlined in the following paragraphs.

(1) *Volt-Ohmmeter.*

A volt-ohmmeter is required to make the resistance and d-c voltage measurements which are used in servicing both the VHF transmitter and the VHF receiver. The voltmeter should have a resistance of at least 1,000 ohms per volt, and preferably 20,000 ohms per volt. It should have several ranges, including one reading up to 750 or 1,000 volts. The ohmmeter should measure, with reasonable precision, resistances as low as 1.0 ohm, and at least as high as one megohm. Weston Test Analyzer Model 772, or Weston Volt-Ohmmeter Model 564 Type 3-C, may be used. RCA VoltOhmyst, Jr. and Volt-Ohmmeter I-107 (U. S. Army code) are also suitable.

(2) *Output Power Meter.*

An output power meter is required to measure the output of the VHF receiver. This meter should be capable of measuring power outputs up to 2 watts into a resistance load of 300 ohms (or, 24.5 volts across 300 ohms). Preferably, the meter should be capable of measuring outputs as low as 0.1 milliwatt, but this is not absolutely necessary unless signal-to-noise ratios are to be measured.

(3) *Vacuum Tube Checker.*

A vacuum tube checker (analyzer) is useful in checking the condition of the tubes used in the VHF receiver. Any of the standard checkers may be used for this purpose, although one which is capable of measuring mutual conductance is preferable.

(4) *R-F Signal Generator.*

In order to align the radio-frequency and harmonic generator stages of the VHF receiver, it is necessary to have a standard signal generator which can be tuned from 100 megacycles to 156 megacycles. The output must be continuously variable from 1 microvolt to 0.1 volt, or preferably, to 1.0 volt. The output should appear across an impedance of 30 ohms or less.

It is desirable, but not absolutely necessary, that the signal generator be capable of 30 ± 2 per cent modulation at 400 cps or 1000 cps with negligible frequency modulation. If audio-frequency response characteristics are to be measured, it must be possible to modulate the output of the generator at a depth of 30 ± 2 per cent with modulating frequencies between 90 and 6000 cps. Means should also be provided to indicate that it is so modulated.

If an over-all selectivity test is to be made, it is necessary that the signal generator be capable of being set to 156 megacycles, ± 5 kilocycles. Or, alternatively, it should be possible to read the frequency within ± 5 kc at approximately 156 mc.

The General Radio signal generators of the 804 Series are suitable for this purpose. If over-all selectivity tests are to be made, it is advisable to supplement the signal generator with a crystal controlled frequency calibrator.

(5) *I-F Signal Generator.*

In order to align and test the intermediate-frequency stages of the VHF receiver, it is necessary to have a signal generator with the proper characteristics. The signal generator must be capable of being set to 6900 ± 5 kc (the mid-band of the i-f amplifier) or else, suitable calibrating equipment should be provided to insure that the frequency of the generator is within the limits mentioned. The stability of the generator should be such that frequency shifts greater than ±2 kc are not encountered during a measurement. It should be possible to read the dial to ±5 kc over the frequency range from 6400 kc to 7400 kc if i-f band width measurements are to be made.

The output of the signal generator should be continuously variable from 1 microvolt to at least 0.1 volt, and preferably to 1.0 volt. The output should appear across a low impedance (less than 100 ohms). The signal generator should be capable of being modulated to a depth of 30 per cent by a tone of 400 cps or 1000 cps. If audio-frequency response measurements are to be made with this generator, it should be possible to modulate the output to a depth of 30 per cent at frequencies varying from 90 to 6000 cps. Means should be provided to indicate that the modulation is 30 ± 2 per cent.

The Hickok 19-X Signal Generator, used in conjunction with the LM Series Heterodyne Frequency Meter will meet the above requirements.

(6) *A-F Oscillator.*

If audio-frequency response tests are to be made on the VHF transmitter or the VHF receiver, it is necessary to have a variable-frequency audio oscillator. This should be of sufficient power to modulate the transmitting equipment at approximately 75 per cent or the standard signal generator to a depth of 30 per cent over the frequency range from 90 to 6,000 cps. The oscillator may be a Hewlett-Packard Type 200-B, a General Radio Type 608-A, a Western Electric Type 13-A, or an equivalent.

2. PRE-FLIGHT CHECK

It is recommended that, *in so far as radio silence and security regulations permit,* the following check of the VHF equipment be made before each flight of the aircraft in which it is installed:

See that a suitable source of 28-volt power is available. If the engine generator or other primary power source is not operating, connect to an external power supply, such as a battery cart or a putt-putt. Do not attempt to carry out the check on the aircraft battery alone; this might result in low voltage and a discharged battery.

See that the VHF transmitter and receiver are located in the proper stalls and are secured by safety wiring. Also check the safety wiring of the control units.

Check that each channel selection push button operates both the VHF transmitter and the VHF receiver to the proper channel. The channel selection of the transmitter can be checked by observing the letters A, B, C and D which appear through the window in the front of the unit. In the case of the receiver, observe that the frequency dial on the front panel indicates the assigned frequency for each channel.

Listen on each VHF channel. If signals are heard, check the operation of the INCREASE OUTPUT *control with both MVC and AVC. If no signals are heard, listen to the background noise on MVC.*

Pay particular attention to dynamotor noise when the VHF receiver is operated on MVC and maximum sensitivity. If there is any question regarding the receiver dynamotor, replace it with one which is known to be in good condition.

Check the cord and plug of each headset and microphone for open and short circuits and for intermittent troubles.

If conditions permit, call the tower or another aircraft and carry on a short two-way conversation on each VHF channel. Pay particular attention to the side tone and the quality of the modulation.

If radiation is permitted (i.e., radio silence not in force), but it is not feasible to talk with the tower or another aircraft, check with an Indicator I-106-A, or some other convenient radiation indicator, that the VHF transmitter radiates on each of the four channels.

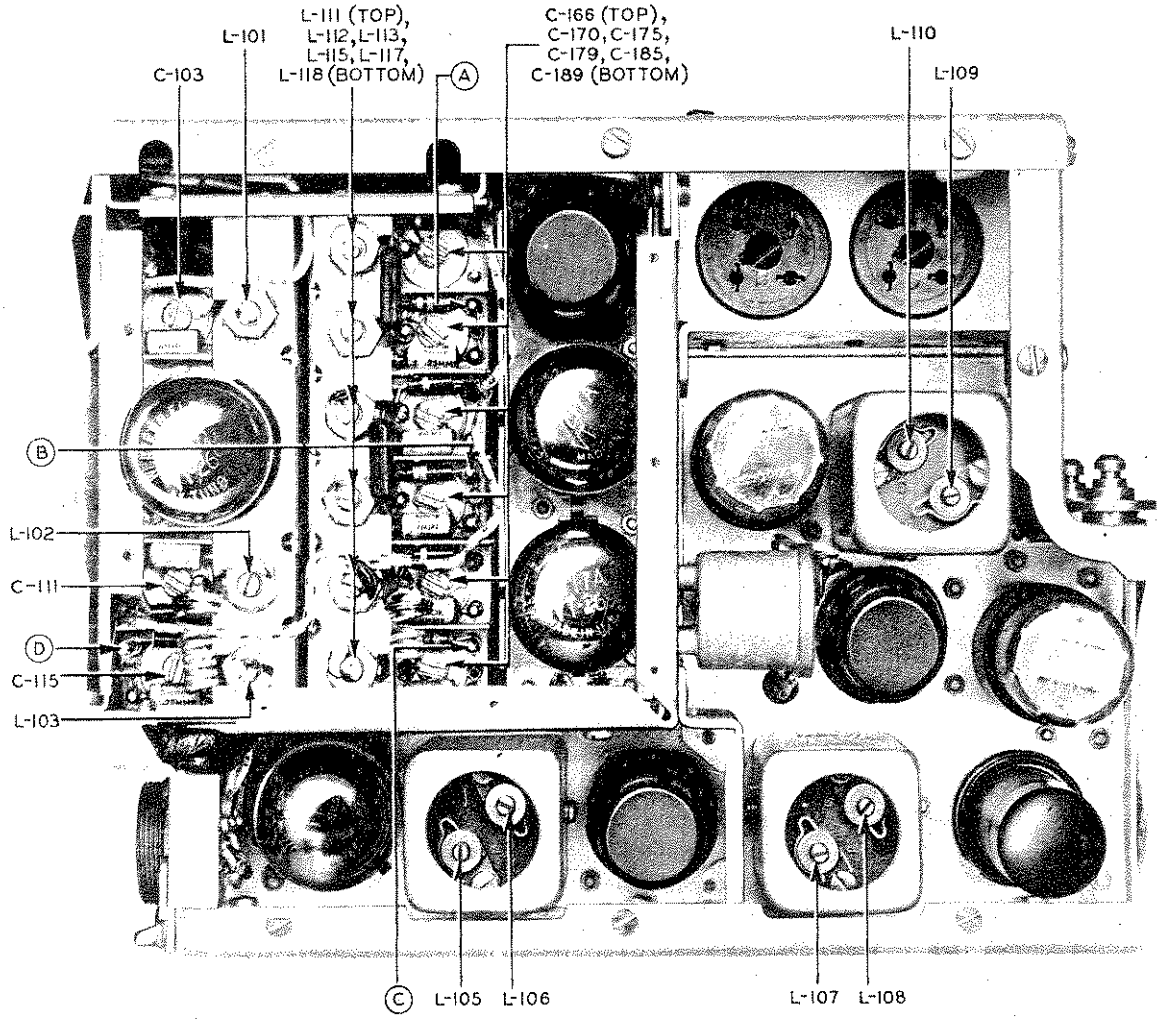


Figure 50—VHF Receiver—Alignment and Test Points

If conditions do not permit either of the last two checks to be carried out, remove the antenna cable from the jack on the front of the VHF transmitter and insert Antenna A-85-A (part of Test Equipment IE-35-A). Shout or whistle into the microphone, and notice that side tone is received; also, that the lamps of the artificial antenna increase in brilliancy with modulation.

3. PERIODIC INSPECTION

A systematic visual inspection and operating test should be made on the VHF components at regular intervals. This may be done at the time of the "50-hour" inspection of the aircraft, at regular monthly intervals, or at such other times as may be ordered by competent authority. In addition to the specific items listed below, a careful watch should be maintained for *any* abnormal condition or unusual operation. Remember: Many operating failures and serious troubles can be forestalled by careful and intelligent routine inspections.

The periodic inspection should include, as a minimum, the items listed in the following paragraphs.

a. REMOVAL AND CLEANING OF UNITS.

Remove all VHF units, including the control units, from their respective mountings. Wipe the exteriors with a clean, dry cloth and remove the dust covers from the transmitter and receiver. Clean the interiors of the units and also all plugs, receptacles and jacks with an air hose. Use only air which is intended for cleaning purposes and which is free from oil and grit. Also, blow any condensed moisture from the air line and gun before turning it on the equipment. Care should be exercised not to blow hard enough to displace or damage any wiring or apparatus.

b. VISUAL INSPECTION.

Examine all exposed wiring, cabling, plugs, receptacles, bonding straps, ground connections and antenna lead-ins for obvious damage or wear. Look particularly for worn or frayed insulation which might be caused by vibration and rubbing, or by insufficient slack in cabling and wiring. Make sure that there is sufficient slack to avoid limiting the motion of the units in their shock mountings.

Inspect the wiring of the transmitter and receiver for loose or broken connections. Look for broken or damaged parts and for evidences of overheating (discolored or carbonized resistors, charred insulation, melted wax, etc.). Remember that troubles can often be located by the sense of smell; a transformer or coil which has been overheated frequently causes a characteristic odor which persists for a long time.

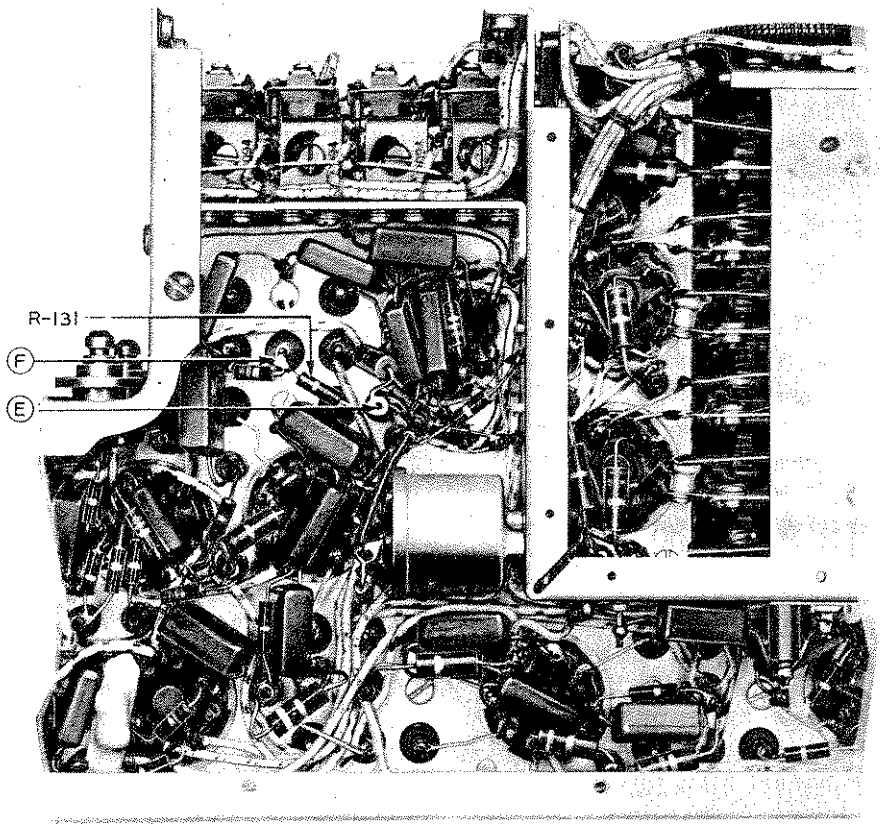


Figure 51—VHF Receiver—Test Points

Tighten all screws and nuts which can be reached without disturbing wiring or apparatus. Examine other screws and nuts for looseness; tighten where necessary.

Inspect carefully for any other evidence of trouble or abnormal operation.

Replace any defective parts.

Burnish the contacts of all relay springs and of all relay-type switch springs. Check them for proper follow in both the operated and non-operated positions.

c. BENCH TEST.

Replace the dust covers and place the VHF transmitter, receiver and control units in their appropriate positions on a test bench equipped with Test Equipment AN/GRM-1 (see Figure 66). Test the transmitter by making the measurements listed in Tables B and C of Figure 66. Test the receiver by making the first five measurements listed in Table A of the same figure. Operate the equipment on all four channels. Operate the receiver on both AVC and MVC. Repair or replace any defective components.

Check the tuning of the transmitter and the receiver by carrying out the procedure given in Section II.

d. RE-INSTALLATION AND ANTENNA MATCHING.

Replace the VHF units in their proper positions in the aircraft and reconnect all cords and cables. Be sure that all plug-locking rings are hand-tight. Replace all safety wiring.

Match the transmitter output circuit to the antenna by carrying out the procedure given in Section II.

e. SQUELCH ADJUSTMENT.

The squelch adjustment of the VHF receiver should be made with the equipment connected to the antenna and with the main engines of the airplane operating. With the receiver in the MVC condition, turn the INCREASE OUTPUT knob until the background noise in the headset is at a high level. Then, go to the AVC condition and turn the squelch control on the front of the receiver until the squelch just fails to trip or trips only occasionally on spurts of noise. Check the adjustment on the three remaining channels and readjust as necessary. Then turn the squelch control *counterclockwise* a very slight amount (not more than 5 degrees). This adjustment must be made very carefully, since an improperly adjusted squelch circuit can materially degrade the performance of the receiver. The output of the LF-MF-HF receivers should be disconnected from the TEL circuit while this adjustment is being made.

In this connection it should be noted that an improperly shielded ignition system or poor bonding at any point of the airplane may cause high background noise. This high noise level requires that the squelch be adjusted to a relatively insensitive condition, thus reducing the over-all sensitivity of the receiver and the operating range. The importance of proper shielding and bonding cannot be over-emphasized.

f. OPERATING CHECK.

Carry out a regular pre-flight check in accordance with the procedure outlined in Paragraph 2 of this section.

4. LUBRICATION

a. VHF TRANSMITTER.

The VHF transmitter requires periodic lubrication of the large gear which forms part of each turret assembly and of the worm gear on the end of the tuning motor shaft. These points should receive an application of grease (AN-G/3A, Beacon M-285, Royco 94, or equivalent) at approximately every 20,000 operations of the channel selection mechanism. The amount of lubricant applied should be just sufficient to cover the gear teeth in each case. Care should be exercised to prevent any of the grease from getting on contact springs or other contact-making parts.

All moving parts of the transmitter, other than those mentioned above, are so lubricated at the time of manufacture that they should not require further lubrication during their normal service life.

b. VHF RECEIVER.

The mechanism of the VHF receiver should be lubricated after each 20,000 operations (channel selections), as follows:

Apply a small amount of grease (AN-G/3A, Beacon M-285, Royco 94, or equivalent) to:

The worm on the end of the motor shaft

The teeth of the tuning gears and the frequency indicator driving gear on the top of the receiver

The gears within the selector mechanism

Apply a *very small* amount of oil (AN-O/4, Univis 34 or equivalent) to:

All shaft bearings in the selector mechanism (but *not* the bearings of the tuning capacitor shafts)

All cam faces in the selector mechanism

All pawl bearings

Extreme care should be used to avoid excessive oil or grease which might work its way into contacts.

No lubrication is required at points other than those listed above.

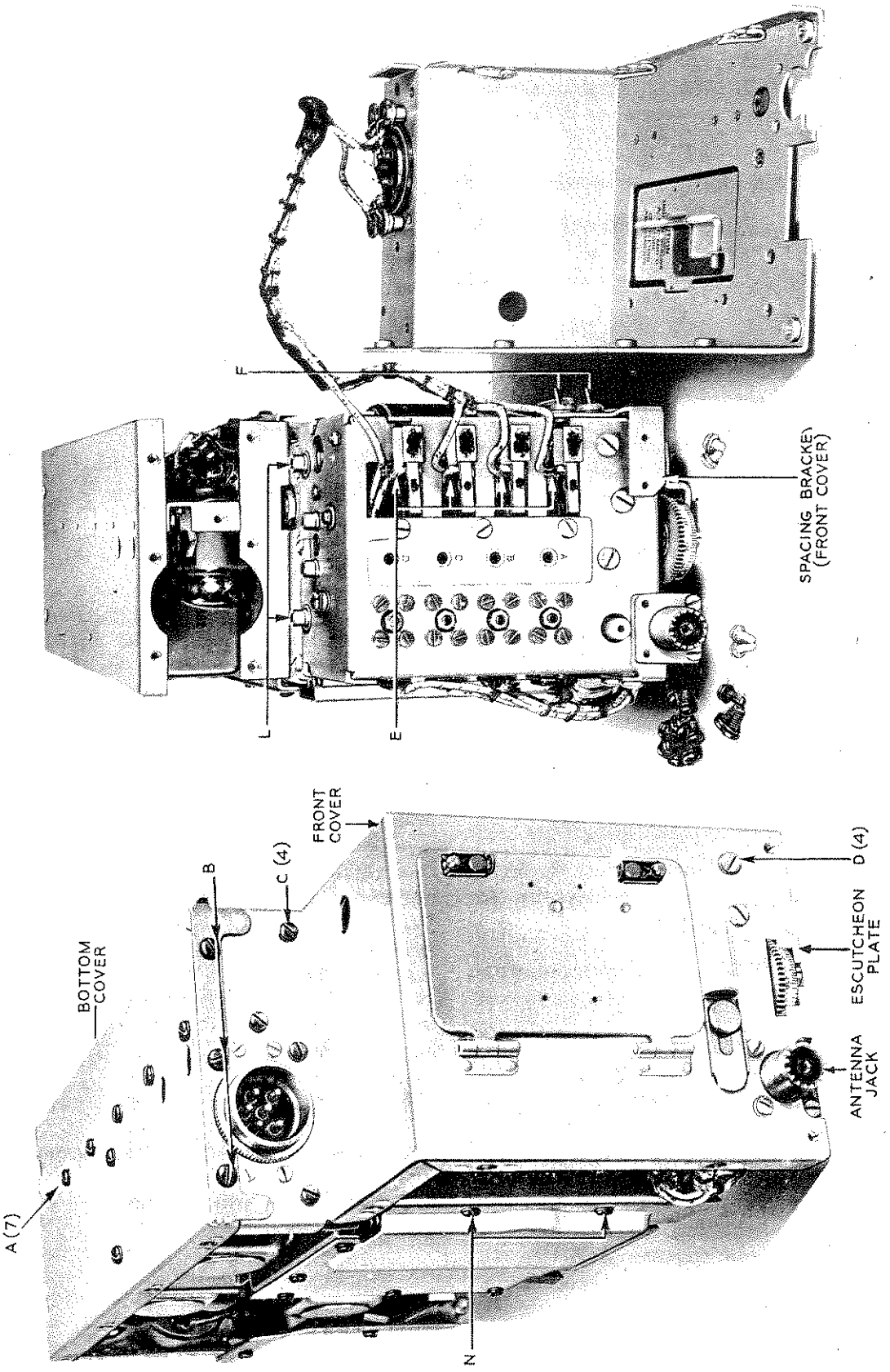


Figure 52—Replacement of Selector O-101

5. REPLACEMENT OF SELECTOR 0-101 IN VHF RECEIVER

It is recommended that, when trouble is experienced with selector 0-101 (or 0-101A), it be replaced with selector 0-102. The steps necessary to do this are given below:

(1) Remove the top and side covers of the receiver.

(2) Remove screws A and B (Figure 52) from the bottom and front of the bottom cover plate. This will allow the front end of the bottom plate to pivot about the rear of the receiver.

(3) Remove screws C (Figure 52) from the lower part of the front cover and screws D near the top of the front cover. Remove the dial escutcheon plate.

(4) Slide the front cover forward to clear the antenna jack. Remove the cover and cut the four wires, E, connected to the contact springs of the 0-101 selector. These wires should be cut as close as possible to the spring terminals.

(5) Remove screws F (Figure 52) and the front cover bracket.

(6) Remove screws H (Figure 53) and the cable clamp. Discard the clamp. Bend the antenna jack, cable and bracket upward to clear the selector.

(7) Cut the seven wires, K, as close as possible to their terminating point (Figure 53) and swing the cable up out of the way.

(8) Remove the No. 8 socket head screws L (Figure 52) and M (Figure 53). Remove the old selector unit.

(9) Remove screws N (Figure 52), releasing the r-f shield between the selector unit and the r-f unit of the receiver. Replace with the new r-f shield which is supplied with the new selector.

(10) Hold the new selector in position and replace the two socket head screws, L, at the bottom. Do not turn these screws up all the way; make finger-tight only. The gears should be so meshed that when the two tuning capacitor gears are meshed at the teeth marked "L-L," the frequency indicator dial is lined up with its high-frequency mark (to the right of the 156 mc mark) in line with the index line. Also, when the tuning capacitor gears are meshed at the "H-H" marks, the frequency scale should be at its lowest setting.

(11) Before the two socket head screws, M, at the top of the selector are replaced, care must be taken to insure the proper mesh of the selector gear with its mating gear on the tuning capacitor shaft. The free portion of the split gear on the selector should be rotated approximately two teeth to provide proper tension in the anti-backlash spring.

(12) Replace socket head screws M and check for proper mesh of gears. There should be visible play in the mesh; this can be checked by rotating the solid gear of the r-f tuning capacitor shaft while the selector is locked on one of its channel positions. If noticeable play is absent, shims should be placed at M between the selector and the r-f unit shield. If the gear mesh is too loose (less than 50 per cent of tooth engagement), then screws M should be loosened slightly and the top of the selector moved slightly to the left, as viewed from the front, until proper gear mesh is obtained.

(13) Replace the antenna jack and cable and secure with the two screws, H, at the side of the selector.

(14) Replace the front cover bracket and secure with screws F.

(15) Unlace seven-wire cable K; reform and tape as shown in Figures 53 and 54. Solder wires to the proper terminals as shown in the wiring diagram of Figure 70. The terminals of terminal strip E-250 are numbered consecutively from bottom (terminal 1) to top (terminal 13).

(16) Unlace four-wire cable E and remove the tape nearest the cut end of the wires. Hold the front cover in approximate position and form the cable along the inside of the flange to terminating points on the terminal strip. Cut the wires to approximately the correct length and relace or retape. Solder to the proper terminals as shown in the wiring diagram of Figure 70.

(17) Replace the front cover mounting bracket and the antenna jack bracket. Leave the mounting screws for these slightly loose.

(18) Replace the front cover and secure the seven screws, B and C (Figure 52). Replace the seven screws, A, which secure the bottom cover plate.

(19) Replace dial escutcheon plate and four screws D.

(20) Replace and secure the top cover of the receiver.

(21) Tighten the screws which secure the front cover bracket and the antenna jack bracket.

(22) Replace the side covers.

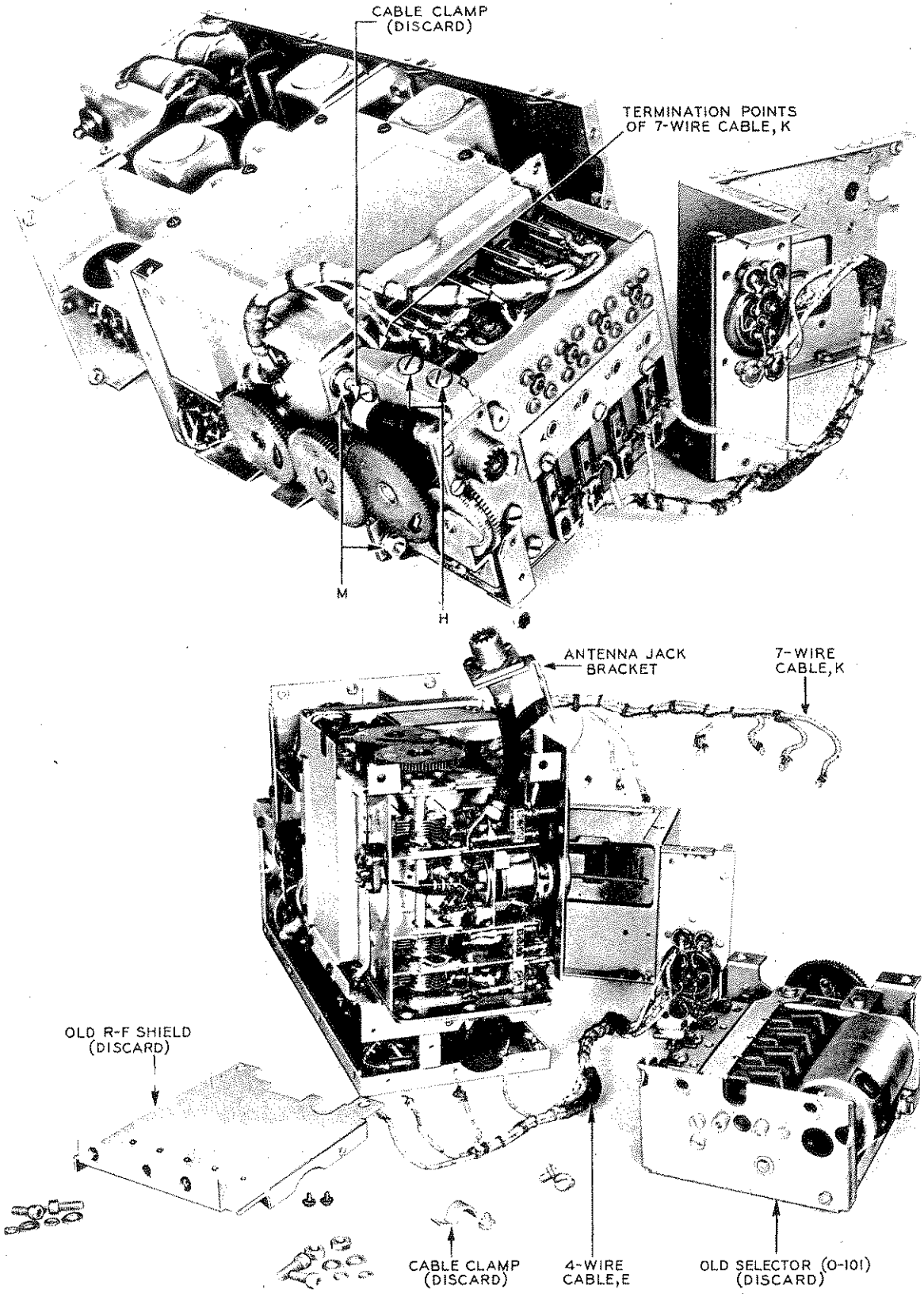
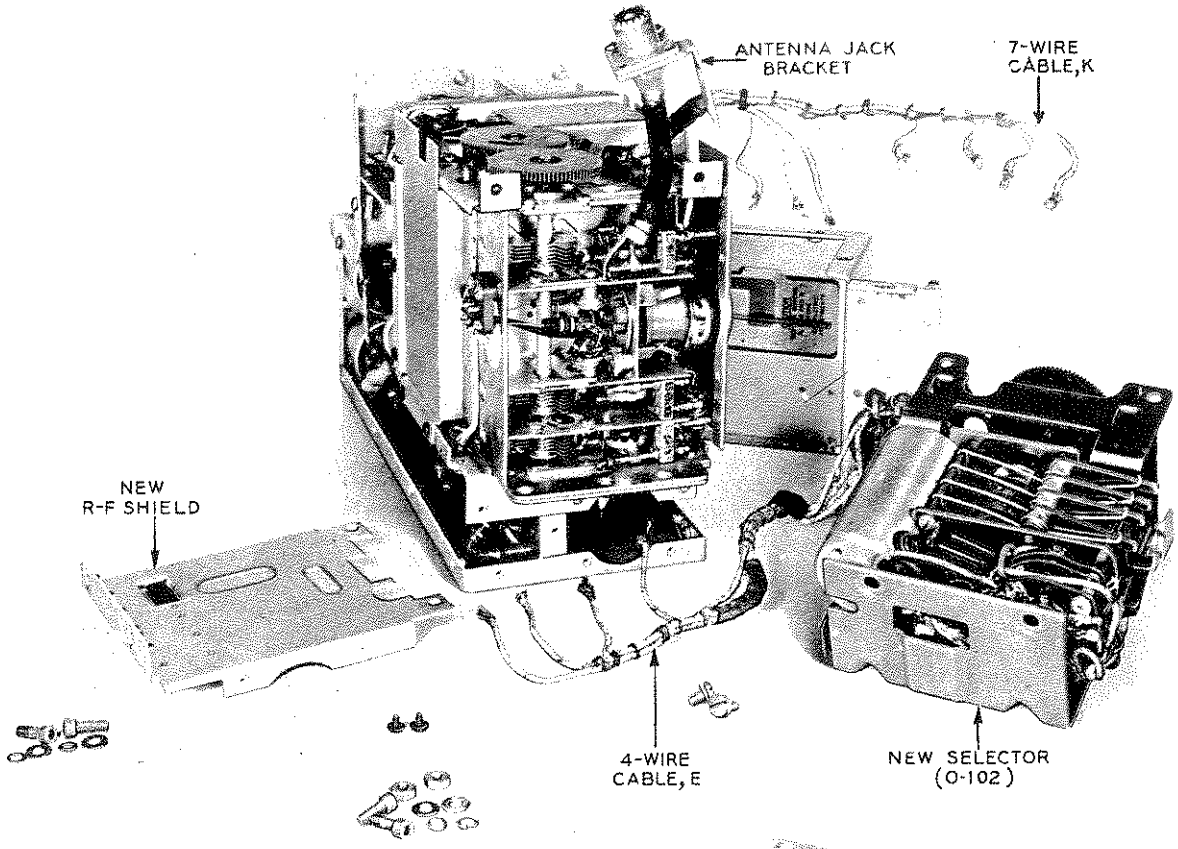


Figure 53—Replacement of Selector O-101 (continued)



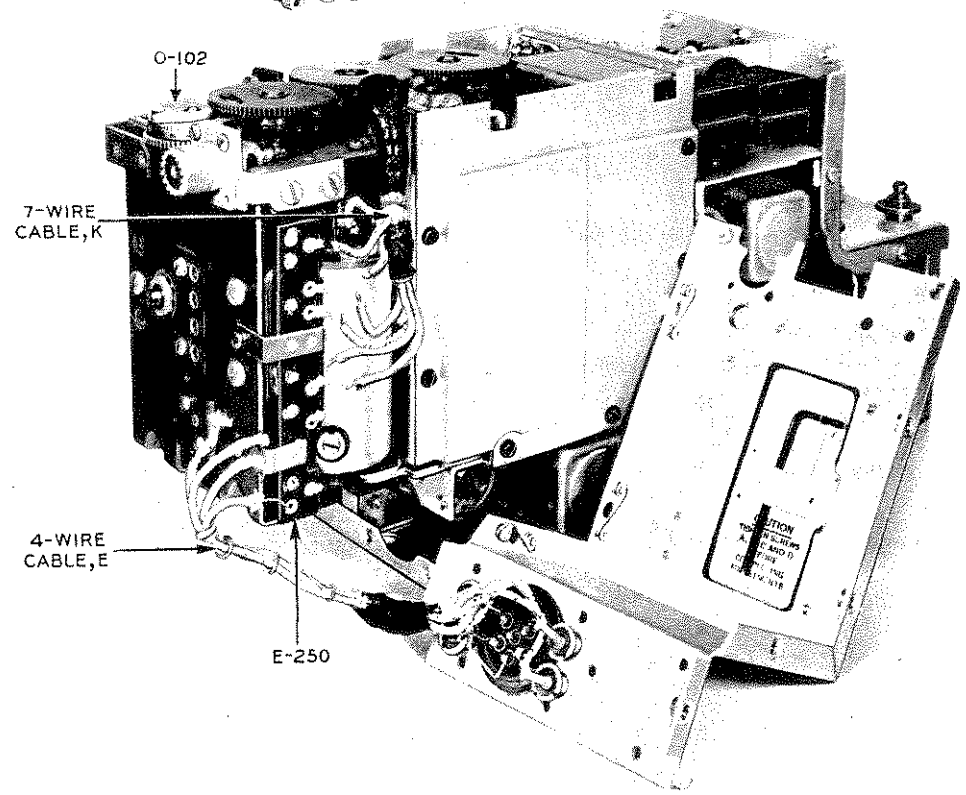


Figure 54—Replacement of Selector O-102 (continued)

6. REPLACEMENT OF TUNING INDUCTORS IN VHF TRANSMITTER

The design of the turrets of the VHF transmitter is such that the tuning inductors can be replaced in case of damage. The recommended procedure for changing these coils is outlined in the following paragraphs:

a. FRONT TURRET COILS, L-311A, B, C, D.

To replace a coil in the front turret, first remove the power amplifier tube, V-304, and then turn the motor in a counter-clockwise direction until the coil is in the top position.

Unsolder the ends of the coil from the terminals on the rear end plate of the turret. Remove the clamping yoke which holds the coil form in place. Remove the coil form by lifting it from the slotted rear turret plate and at the same time withdrawing it from the hole in the front turret plate. Care must be exercised to avoid damage to the turret contact springs or the antenna coupling capacitor.

See that the new coil form has a tuning slug in place. Transfer the retaining ring from the old coil form to the new one. Insert the new form in the turret. Replace the clamping yoke. Be sure that the coil form is pushed forward as far as possible and that the clamping yoke rests in the notch of the coil form.

Solder the ends of the winding in position.

Check for a minimum of $\frac{3}{32}$ inch clearance between the coupling loop and the winding of the coil form and for a minimum of $\frac{1}{16}$ inch clearance between the coupling loop and adjacent loops.

After a coil assembly has been replaced in the front turret it should be checked for coverage of its frequency band. If it fails to cover the band, the condition can usually be corrected by carefully changing the turn separation, i.e., by lengthening or shortening the coil. See Paragraph 11-b(6) of this section.

b. CENTER TURRET COILS, L-302A, B, C, D and L-308A- B, C, D.

To replace a coil in the center turret, first remove all tubes from the transmitter and then turn the motor in a counter-clockwise direction until the coil is in the top position and is centered between the two terminal strips. Remove the two clamping yokes which secure the coil form to the turret assembly.

Remove the old coil form and replace it with the new form. Replace the two clamping yokes. Replace the vacuum tubes.

c. REAR TURRET COILS, L-303A, B, C, D, L-304A, B, C, D and L-305A, B, C, D.

To replace one of the coil assemblies of the rear turret, remove the second harmonic generator tube, V-303, and then rotate the motor until the coil assembly is centered at the top. Remove the two clamping yokes. Remove the old assembly and replace it with the new. Replace the clamping yokes and the tube.

7. REPLACEMENT OF VHF TRANSMITTER TURRETS

The following procedures are recommended for use when a turret of the VHF transmitter is to be replaced.

a. FRONT TURRET, Z-301.

When a front turret is to be replaced, remove all vacuum tubes. Unsolder the connection between the turret and the antenna relay (this requires a soldering copper with a long, thin tip). Unsolder the two wires which are connected to capacitors C-329A and C-329B on the motor. Unsolder the wire which is brought up through the chassis and connects to capacitor C-322 in the plate supply lead. Remove the screw which secures this capacitor to the chassis and the two screws which secure the choke coil assembly, L-309, L-310. Remove the three turret mounting screws. Two of these are located below the coil forms; the third is located at the extreme right front corner of the transmitter chassis and passes through the motor base.

Remove the flexible shaft extending along the left-hand side of the chassis by removing the cotter pin and sliding the collar toward the rear until free of the shaft. Remove the turret with the choke coils and capacitor attached, by slipping it toward the rear. Be careful not to break the connections to the coil of antenna relay K-301.

Transfer the motor and the coil assemblies from the old to the new turret. Be sure that each coil assembly is lined up with the proper channel indicator marking (A, B, C or D) on the disc at the front of the new turret assembly. Also transfer the choke coils with their attached resistor and capacitor.

To replace the turret reverse the procedure for removal. Before replacing the cotter pin in the flexible shaft align the front and center turrets as explained below. The original pin probably cannot be reused. Replace it with a new pin, or if the identical replacement part is not available, with a $\frac{1}{16}$ inch x $\frac{1}{2}$ inch cotter pin. Form the pin (or cotter pin) so that it does not foul the chassis.

The new front turret must be so aligned with the center and rear turrets that the proper coil assemblies for each channel come into the circuit at the same time. In the event that there is any question regarding the frequency range of a given coil assembly (i.e., whether it is for channel A, B, C or D) note the drawing number which is stamped on the form and

refer to the Table of Replaceable Parts in this volume. This table shows, for each such drawing number, the corresponding frequency range and channel. When aligning the front turret, see that the tuning controls for each channel are accessible through the holes in the front panel of the transmitter.

Check the new front turret contact springs for proper registration on each channel. There should be circuit continuity through the springs for ten complete revolutions of the tuning motor before and after the normal stopping point is reached. If the turret does not stop properly for this adjustment, remove the cotter pin and index the front turret without rotating the center turret until proper alignment is obtained. Then reinsert the cotter pin through the six-position coupling by lining up the nearest hole in the flexible shaft.

Check the continuity and follow of all spring contacts which connect the various circuit elements in the turret with the power amplifier, with the antenna relay and with chassis ground.

b. CENTER TURRET, Z-302, AND CRYSTAL SWITCH, S-313.

Except in case of emergency, neither a center turret nor a crystal switch should ever be replaced separately. These two units are carefully matched and adjusted to each other in the factory, using tools and methods which are seldom available in the field. They should, therefore, be treated as a single assembly; a failure of either calls for the replacement of both.

To replace a center turret and crystal switch, first remove all tubes and crystals from the transmitter, and then unsolder all external connections to the two terminal strips on the top of the turret. Unsolder the connection to plate circuit choke coils L-306 and L-307. Unsolder the four white wires connecting the crystal switch to the crystal socket. Unsolder the white wire between the switch and the grid terminal of the oscillator tube socket. Also unsolder the connection of choke coil L-313. Do not, at this time, remove the five color-coded wires from the cable form to the switch; these have sufficient slack so that they can be disconnected more conveniently after the turret has been lifted from the chassis.

Disconnect the shaft coupling on each side of the center turret. Remove the three screws which secure the turret to the chassis and lift the turret and crystal far enough to give access to the five color-coded mentioned in the last paragraph. Unsolder these five wires.

Transfer the coil assemblies from the old to the new chassis. Reconnect and solder the five color-coded wires to the new crystal switch. Replace and secure the new turret and switch assembly. Turn the new turret rotor until it is aligned mechanically, channel for channel, with the front and rear turrets. Reconnect the shafting, using temporary pins in the couplings.

Check the mechanical alignment several times on each channel, and change the temporary coupling pins as necessary until a satisfactory alignment is obtained. Replace the temporary pins with permanent pins, making sure that there is no danger of fouling the chassis. Reconnect and solder the white wires and the choke coil to the crystal switch.

Replace tubes and crystal units.

c. REAR TURRET, Z-303.

When a rear turret is to be replaced, first remove the harmonic generator tubes, V-302 and V-303. Unsolder all external connections to the terminal strip on the top of the turret. Disconnect the shaft connection and remove all the three screws which secure the turret to the chassis. Remove the turret.

Transfer the coil assemblies from the old to the new turret. Secure the new turret to the chassis and reconnect the wires to the terminal strip. Place the turret in mechanical alignment with the front and center turrets, using the same general procedure described above. Install a permanent coupling pin, being sure that it will not foul the chassis.

8. MAINTENANCE OF MOTORS B-101, B-250 AND B-301

It is expected that the channel switching motors of the VHF transmitter and receiver will require relatively little maintenance during the service life of the equipment.

The bearings are lubricated at the factory with a grease which meets the standard specification, AN-G3, for low temperature operation. It is not expected that further lubrication will be required during the life of the motor. Armature end-play is limited by steel spacing washers or by a spring washer which does not require adjustment.

Brush replacement is seldom required, and should be avoided when possible. Experience shows that by the time the brushes are worn down to their minimum length (⅛ inch) the commutator is usually worn out and the bearings are contaminated by carbon dust. Under these conditions the recommended practice is to replace the motor, since any attempt at salvage will probably cost more than the value of the motor. However, if unusual conditions make it necessary to replace brushes, it is essential that they be run in for a considerable period before the motor is placed in service in a transmitter or a receiver. The run-in period will vary from one to twenty-four hours, depending upon conditions and upon the amount of motor brush noise which can be tolerated in the headsets of the radio equipment. This run should be under

no load or a very light load. Under no circumstances should the selecting mechanism of the transmitter or receiver be connected to the motor during this run.

If brushes are removed for examination and are then replaced, care must be exercised to replace them in their original positions. This is facilitated by the fact that the brushes are marked with + and − symbols for identification purposes.

Brush pressure is satisfactory if, with the cap removed from the brush holder and the brush resting against the commutator, the end of the brush spring extends at least 3/16 inch beyond the brush holder. If this is not the case, the spring should be stretched slightly.

9. MAINTENANCE OF RELAYS

All relays are adjusted at the time of manufacture and should require very little attention aside from an occasional burnishing of the contacts. This may be done with the contact burnishing tool furnished with Test Equipment AN/GRM-1. If contacts are badly pitted, they may be smoothed with a very fine file and then thoroughly burnished. Care should be exercised to prevent any metallic filings from falling into the apparatus. Abrasive paper or cloth should never be used on relay contacts; their use is very likely to lead to premature burning and pitting, with resultant service failure. No lubricant of any kind should ever be used on relays.

Relay contacts should have adequate separation in their "open" position and substantial follow (to insure contact pressure under vibration) in their "closed" position. When this is not the case, the relay spring adjusting tools supplied with Test Equipment AN/GRM-1 may be used to give the springs the proper set. However, this operation is difficult and should not be undertaken, except in an emergency, by an inexperienced person.

Relay springs, coils or armatures should not be replaced in the field. In case of damage, other than that which can be remedied by contact burnishing or spring adjustment, the entire relay should be replaced.

10. GENERAL SERVICING PROCEDURE FOR VHF COMPONENTS

Except in an emergency, the servicing procedures given in this section should be undertaken only by qualified personnel provided with adequate testing equipment and tools. An inexperienced man, working without proper facilities, can easily cause misalignment or damage which requires extensive repairs.

It should be remembered *at all times* that dangerous voltages are generated by the transmitter and receiver dynamotors of this equipment. The former has a voltage, close to 600 volts, which can readily cause serious injury or death. The receiver high voltage, about 300 volts, is also dangerous, and under some conditions may be fatal. Attention is called to the safety notice in the front of this volume.

In hunting trouble, the service man should make it a rule to look for the simple things first. He should remember that the most common causes of failure are improper tuning or adjustment, dirty contacts, high-resistance or "rosin-soldered" connections, wiring crosses and short circuits, and defective vacuum tubes.

The possibility of intermittent troubles should not be overlooked. Such conditions can often be brought to light by shaking or jarring the equipment while making operating checks or voltage and resistance measurements.

If a fuse blows, or if sparks or smoke is seen, power should be removed from the unit affected; it should not be re-connected until an effort has been made to locate and clear the source of trouble. In this connection, visual evidence of overheating, such as charred or carbonized resistors and wiring, melted wax or filling compound, etc., is frequently of help. Also, it should be remembered that a transformer or choke coil which has been overheated often retains a characteristic odor for a long time.

In the following instructions, certain values of voltage and resistance are specified as typical. Because of ordinary variations in tube characteristics, resistor and capacitor values, aging of components, etc., these values must be taken as merely approximations. They indicate the general range of voltage and resistance which may be expected under typical conditions. As long as the measurements of a particular unit do not vary widely from the values given, discretion must be used before assuming that replacement is necessary.

Ordinarily, the existence of trouble is brought to the attention of the service personnel in one of three ways: (1) the pilot or operator reports difficulty in operation; (2) trouble is encountered in the pre-flight check (see Section V, Paragraph 2); (3) some unusual or irregular condition is disclosed by the periodic inspection (see Section V, Paragraph 3). Regardless of which of these is the source of the trouble report, an effort should be made to obtain all pertinent information for a clue to the source of the trouble. Complete and intelligent trouble reports greatly assist in repair and readjustment.

Ordinarily, the first step in servicing an equipment reported faulty is to determine the general location of the trouble, i.e., whether the difficulty lies in the transmitter, the receiver, the control units, the mountings, the wiring, etc. This is most readily done by a process

of substitution and comparison. For example, if the VHF receiver is inoperative, but other receivers in the same rack are satisfactory, the VHF unit should be placed in a stall which normally holds a LF-MF-HF receiver. If the control unit which controls this stall is then turned to the cw position, the VHF receiver should operate. If it does, then the trouble is probably in the VHF control unit or the wiring to the VHF stall. If it does not, the trouble is in the VHF receiver itself. Or, if a VHF receiver known to be in good condition is available, it may be substituted for the one in question, and an attempt made to operate it. Similar methods of substitution and comparison will readily suggest themselves for the other VHF components.

After the faulty component has been discovered, further servicing should be carried out with one or more of the following procedures, depending upon the nature of the fault and the testing facilities available:

a—A bench test using Test Equipment AN/GRM-1

b—Voltage and resistance measurements

c—Alignment and sensitivity checks

Details of these procedures are given in subsequent paragraphs of this section.

After the trouble has been cleared and the unit reinstalled in the aircraft, the pre-flight check outlined in Paragraph 2 of this section should be made.

11. BENCH TESTS WITH TEST EQUIPMENT AN/GRM-1

Test Equipment AN/GRM-1 simulates a complete installation of Model AN/ARC-5 Aircraft Radio Equipment and can, therefore, be used to make an operating test on any component which is suspected of being faulty. At the same time, it affords means for measuring certain critical voltages and currents in the transmitters and receivers. The values of these voltages and currents, under normal conditions, are given in the tables on the instruction diagram for the test equipment, Figure 66. Further details for testing the VHF receiver and transmitter are given in the following paragraphs.

a. VHF RECEIVER.

(1) *Preparation.*

Before a VHF receiver is placed in position for a bench test with Test Equipment AN/GRM-1, its vacuum tubes should be checked; or, if no tube checker or analyzer is available, it should be provided with a set of tubes which are known to be in good condition. Tests should be made with both the regular dynamotor of the receiver and the test equipment dynamotor (or any other Dynamotor *DY-2/ARR-2 which is known to be in good condition).

As can be seen from Figure 66, the VHF receiver may be connected to the test equipment in either one of two ways: by placing it in the receiver rack; by connecting it to Test Unit I-104-A through cord CD-527 and cord CD-706 with its attached adapter. In the former case, the receiver is operated in its normal position; in the latter, it may be turned on its side or back and the covers removed to give access to the apparatus within the receiver.

(2) *AVC Operation.*

Operate the controls to the AVC position. The d-c supply should be adjusted to 28 volts, as indicated by a meter reading of 56 scale divisions when the meter switch of Test Unit I-104-A is in position 1. After approximately 20 seconds the input current, as measured with the meter switch in position 2, should be 17 to 25 scale divisions (1.7 to 2.5 amperes). Plate voltage, switch position 3, should be 48 to 52 divisions (240 to 260 volts). With the switch in position 5, to measure cathode current to the r-f amplifier and the first i-f amplifier, plus the current through the bleeder resistor of the gain control line, the meter deflection should be between 40 and 100 divisions (10 to 25 milliamperes).

(3) *MVC Operation.*

Turn the volume control on the test unit to the limit of its clockwise rotation for maximum volume. Turn the control switch to the MVC position. The readings set forth above should not change appreciably. Turning the volume control counter-clockwise should result in a decrease of cathode current approaching a reading of 4 scale divisions (1 milliampere) as a minimum.

(4) *Noise.*

Listening tests should be conducted on each of the four channels in both the AVC and the MVC conditions. If one channel shows appreciably more or less noise than the others, the tuning adjustment on the front of the receiver should be varied. If this does not result in uniform performance, check for a defective crystal by replacing the regular crystal with one from the set furnished with the test equipment.

If excessive noise is heard on two or more channels, it is likely that the dynamotor is at fault. To check this, replace it with one known to be in good condition.

(5) *Rough Operating Check.*

A rough check of the operation of the VHF receiver can be made by operating a transmitter on the frequency to which the receiver is tuned while the receiver is connected to Test Unit I-104-A and is disconnected from the normal sidetone circuit. The receiver should pick up a signal from the transmitter. Since the r-f input to the receiver under this condition is very high,

this merely gives a rough check of the functioning of the receiver; it does not necessarily indicate adequate sensitivity.

b. VHF TRANSMITTER.

CAUTION

WHEN PUSH BUTTON A, B, C, D, 2 OR 3 OF CONTROL UNIT C-30/ARC-5 IS OPERATED, DANGEROUS VOLTAGES MAY EXIST IN THE MODULATOR UNIT AND IN THE TRANSMITTER. EXTREME CARE MUST BE EXERCISED TO AVOID CONTACT WITH THESE VOLTAGES. NEVER TOUCH ANYTHING IN THE MODULATOR UNIT OR THE TRANSMITTER WHEN THE TRANSMITTING DYNAMOTOR IS RUNNING. REMEMBER THAT EVEN IF THE MICROPHONE BUTTON OR THE KEY IS NOT OPERATED, DANGEROUS VOLTAGES ARE STILL ON THE CIRCUIT IF THE EMISSION SELECTOR SWITCH IS IN THE TONE OR CW POSITION.

(1) *Preparation.*

A VHF transmitter can be connected to Test Equipment AN/GRM-1 by inserting it in position 1 of the mounting rack or by connecting it to Test Unit TS-58/GRM-1 by means of Cord CX-33/GRM-1 with its attached adapter. In the latter case, the transmitter can be turned on its side or back and the covers removed to give access to the apparatus and wiring. In either case, the transmitter is also connected to the control unit, to Test Unit I-155-A and Antenna A-68-A, as indicated in Figure 66.

Normally, the transmitter should be tested with its own tubes. However, if there is any reason to believe that one or more of these is defective, tests may be made with tubes which are known to be satisfactory, and the results tabulated. Then the original tubes may be replaced and any difference in performance noted. In this way, worn-out or defective tubes may be culled out even though no tube checker for the transmitter tubes is available.

(2) *Voltage, Current and Output Power Checks.*

The supply voltage should be adjusted to approximately 27 volts, as indicated by a reading of 54 scale divisions on the meter of Test Unit TS-58/GRM-1 when the meter switch is in position 1. Screen voltage, plate voltage, screen current and r-f amplifier plate current should be within the limits given in the table of Figure 66. The r-f current into the artificial antenna, A-68-A, should be approximately 325 milliamperes on all channels. All measurements should be taken with the transmitter operating in the VOICE condition. Grid currents, r-f amplifier cathode currents, supply voltage and plate voltage should all be within the limits set forth in the table of Figure 66, when measured with Test Unit I-155-A.

Modulation can be checked by whistling or speaking into the microphone. The deflection of the meter on the artificial antenna should increase during modulation.

(3) *Channel Selection.*

The channel selection mechanism should operate smoothly and with normal speed. If this is not the case, the fault may be due to a defective motor or to worn or improperly aligned gears. Replace the motor or the turret which is at fault.

If the motor fails to start, check the voltage appearing on the terminals at the base of the motor. Voltage from the yellow lead (field) to chassis ground should be the same as the d-c supply voltage (normally 27 volts). The black lead (armature) should be at ground potential when K-304 is in the non-operate position and should be 27 volts above ground when K-304 is operated. If the above voltages do not appear, the fault is probably due to improper operation of relay K-304. If the voltages at the terminals are normal but the motor still fails to function, the brushes may be stuck in their holders, or worn out. If replacement of the brushes does not correct the difficulty, the complete motor should be replaced.

In some cases it may be found that the channel selection motor does not stop promptly at the end of a channel selection, but coasts so far that the circuit is re-energized through switch S-313. The selecting mechanism then goes through another revolution, or even through several revolutions before coming to a stop. This is usually caused by the failure of the normally closed contacts on relay K-304. (See Paragraph 9 of this section for methods of burnishing relay contacts.) These contacts, when functioning properly, short circuit the motor armature at the completion of a selection; this short circuit serves as a dynamic brake and brings the motor to a comparatively quick stop.

(4) *Operation of Relays.*

Invert the transmitter and observe the action of relays K-302, K-303, K-304, K-305 and K-306. When supply voltage is applied and the motor is at rest, K-302, K-303, K-305 and K-306 should be operated; K-304 should be non-operated. During channel

switching while the motor is running, K-304 should be operated and the others non-operated. When the channel has been selected K-304 should release, the remaining relays should operate, and the motor should stop.

(5) *Trouble Indications on Meters.*

The measurements taken with Test Unit I-155-A, when compared with the normal readings given in the table of Figure 66, frequently disclose trouble conditions which might otherwise be difficult to trace. A low (or zero) reading in position 1 may be due to (a) failure of the crystal unit, (b) faulty operation of the crystal selector switch, (c) lack of plate or screen voltage on the oscillator tube, V-301, (d) a defective tube, V-301.

A low or zero reading on position 2, 3, 4, or 5 may be due to a defective vacuum tube, failure of the spring clips to contact the coil studs or improper tuning of the preceding stage. If the tube is known to be good and the voltages on the tube are found normal but the circuit still fails to tune properly, the fault may be due to the coil itself in which case the coil assembly should be replaced.

A zero reading on position 7 indicates an open fuse (R-324 or R-326) or a failure of relay K-302 or K-305. A low reading on position 7 indicates either a faulty dynamotor or excessive plate or screen current drain. Check the plate and screen current on positions 4 and 5 of Test Unit TS-58/GRM-1.

If the readings observed on Test Units TS-58/GRM-1 and I-155-A are normal but little or no antenna current is indicated on Antenna A-68-A, retune L-312, check the antenna relay (K-301) for continuity and the antenna coupling circuit (L-312 and C-323) for good contact with the springs. Also inspect the two springs S-314 and S-315 and be sure that they effectively short-circuit the inactive coils.

(6) *Band Coverage.*

After a transmitter tube or an r-f tuning coil has been replaced, it is advisable to check the r-f tuned circuits for complete coverage of their respective bands. To check the A channel circuits for such coverage, insert the DC-30 Crystal Unit for 100 megacycles in the A channel crystal socket and tune the transmitter. Use Indicator I-106-A to verify that the carrier is at correct frequency. See that normal indications are obtained on the test units and artificial antenna of Test Equipment AN/GRM-1. Replace the 100 megacycle crystal with the 123 megacycle unit and tune to this carrier frequency. To check channel B and C circuits for coverage, use the 123 and 146 megacycle crystal units. For channel D, use the 132 and 156 megacycle crystals.

If difficulty is experienced in obtaining complete coverage of any band, two adjustments are available. Capacitor C-335 (the two small metal strips connected across the tuned output circuit of the second harmonic generator) can be varied by bending carefully with a pair of pliers. The inductance of the coils in the tuned plate circuit of the power amplifier (L-311A, B, C, D) can be changed by increasing or decreasing their length, thereby changing the average separation between turns and the inductance. To do this, unsolder one end of the coil from its support on the rear plate of the turret, stretch or compress the coil, and re-solder to the support.

12. D-C VOLTAGE MEASUREMENTS

A systematic measurement of the positive d-c voltages existing between the chassis and various terminals in the receiver and transmitter will frequently facilitate the location of trouble in VHF equipment. The terminals include those of all vacuum tube sockets, and also those on terminal strips in the unit involved. Recommended procedures for these measurements are given in the following paragraphs.

a. VHF RECEIVER.

Voltage measurements on the VHF receiver should be made with the dynamotor and all vacuum tubes in place. The controls should be in the MVC position and the volume control knob should be turned to its full clockwise position (maximum volume). All voltages are to be measured from the terminal involved to chassis ground. The voltmeter should have a resistance of at least 1,000 ohms per volt (full scale deflection). The voltages shown at each tube socket in Figure 81 are those which are obtained when the receiver is tuned to a crystal controlled channel. The values which are obtained when the receiver is not tuned to a channel are listed in the table of note 5 in the same figure. Measurements within ±20 per cent of those indicated should be considered satisfactory. An occasional deviation even greater than this does not necessarily indicate trouble unless it is accompanied by other irregular conditions.

It will be found that some of the terminals of socket X-101 (tube V-101) are not readily accessible. However, they can be reached, with a little practice, if a long insulated probe is used. Terminals 1 and 2 are strapped together, so a check that either is connected to ground is ordinarily sufficient. Likewise, terminals 3 and 5 are connected together through the cathode of the tube; if it is known that the tube is good, and that the socket terminals are clean, a check of either 3 or 5 is sufficient.

b. VHF TRANSMITTER.

CAUTION

VOLTAGES AS HIGH AS 600 VOLTS ARE EXPOSED. READ THE SAFETY NOTICE ON PAGE IX.

Voltage measurements on the VHF transmitter should be made with all tubes in place and with the transmitter connected to the modulator unit. The equipment should be operating in the VOICE condition on a crystal controlled channel. Supply voltage should be approximately 28, as measured at the battery (27 volts at the transmitter). All measurements are to be made between the terminal involved and chassis ground. The voltmeter should have a resistance of at least 1,000 ohms per volt (full scale deflection). The voltages to be expected under normal conditions are shown in the diagram of Figure 82. Values within 20 per cent of these should be considered satisfactory. Occasional deviations somewhat greater than this may be encountered in a transmitter which is in good condition. They do not necessarily indicate trouble unless accompanied by other irregular conditions.

13. RESISTANCE MEASUREMENTS

The location of trouble in the VHF receiver and transmitter is often greatly simplified by the measurement of the resistance from the terminals of tube sockets and receptacles to the chassis ground. Recommended procedures for making these measurements are given in the following paragraphs.

a. VHF RECEIVER.

Resistance measurements on the VHF receiver should be made with the unit removed from the rack, with all cables disconnected, and with the tubes and dynamotor in place. The squelch control (R-167 or R-250) should be turned in its maximum clockwise position. The receiver should be tuned to a channel, with the corresponding pawl of the selector latched in place.

Resistance values within ±20 per cent of those shown in Figure 83 will ordinarily be obtained, although occasionally a somewhat greater deviation may be found. These do not necessarily indicate trouble unless they are accompanied by other evidences of irregularity.

It will be found that some of the terminals of socket X-101 (tube V-101) are not readily accessible. However, they can be reached, after a little practice, if a long insulated probe is used. Terminals 1 and 2 are strapped together at the socket, so a check that either is connected to ground is ordinarily sufficient. Likewise, terminals 3 and 5 are connected through the cathode of the tube; if it is known that the tube is in good condition, and that the socket terminals are clean, a check of either 3 or 5 is sufficient.

b. VHF TRANSMITTER.

Resistance measurements on the transmitter should be made with the unit removed from the mounting rack, with all cables disconnected, and with tubes removed. However, after the tubes have been removed, the "plug-in" sockets, X-303 and X-304, should be replaced. Care should be taken to insure that the plate clips for tubes V-301 and V-302 do not become grounded during the measurements.

Ordinarily, values within ±20 per cent of those shown in Figure 84 will be found. However, an occasional value outside these limits does not necessarily indicate trouble unless there are other irregular conditions present at the same time.

14. ALIGNMENT AND MEASUREMENTS—R-F, I-F AND A-F

a. GENERAL.

The adjustments, measurements and tests described in the following paragraphs of this section are intended to supplement the more simple procedures previously outlined; in general, they are used in cases where a VHF transmitter or receiver has been seriously damaged and requires a major overhaul. They are also desirable where certain critical parts, which are likely to change the circuit alignment, have been replaced. In the case of tube replacement in the VHF receiver, a re-alignment of the stage or stages affected should be made *if fully qualified personnel and adequate testing equipment are available;* otherwise, it is better to hazard a slight reduction in performance, rather than to take the chance of serious trouble which almost certainly results from "tinkering" by an unskilled man with inadequate facilities.

The amount and kind of testing equipment required are discussed in paragraphs 1a to 1d of this section. In general, it is necessary to have available a Test Equipment AN/GRM-1 and a certain amount of general purpose testing apparatus. As explained in paragraph 1d, the amount and kind of general purpose equipment depends upon the precise nature of the work undertaken.

b. TEST POINTS AND TEST METER.

In order to facilitate testing, certain points in the circuit of the VHF receiver have been designated as "test point A," "test point B," etc. These points are shown as circles in the circuit diagrams (Figures 61, 62, 63 and 64) and in the photographs in Figures 21, 50 and 51.

Test point A is used to measure the amount of drive (at the fourth harmonic of the crystal frequency) on the grid of the first harmonic generator tube, V-109. Test point B affords a means of measuring the drive (at the twelfth harmonic of the crystal frequency) on the grid of the second harmonic generator tube, V-110. Test points C and D are both arranged to provide for measurement of the grid drive on the mixer tube, V-102. Since the resistance values associated with points C and D are different (180,000 and 10,000 ohms in the case of C; 100,000 ohms and 10,000 ohms in the case of D), their sensitivities differ. Either is used, depending upon conditions, as explained later.

Test points E and F are connected across resistor R-131, which constitutes part of the load of the diode detector (V-105). Accordingly, measurements made between these two points are an indication of the i-f voltage at the detector.

Measurements in connection with test points A, B, C, D, E and F can all be made with meter M-600, which is included in Test Unit I-104-A. When the METER SWITCH control of the test unit is turned to position 6, the meter is connected directly to the two binding posts marked TEST METER. Flexible leads terminated in small insulated test clips can be used to connect these binding posts to the test points. Since the meter is of high sensitivity (50 microamperes, full-scale deflection) great care must be used to avoid overloading and damaging it. It is recommended that, when not in use, the binding post be short-circuited in order to provide a damping load which minimizes the chance of damage from mechanical shocks.

15. I-F ALIGNMENT AND MEASUREMENTS

a. EQUIPMENT REQUIRED.

The alignment and measurements of the intermediate-frequency circuits which are described in the following paragraphs should not be undertaken without suitable testing equipment. This includes: Test Equipment AN/GRM-1; an output power meter; a standard signal generator which can be set to 6,900±5 kilocycles; a crystal-controlled frequency standard or calibrator. The last item is not required if the precision of the standard signal generator is such that the frequency limits of ±5 kilocycles can be depended upon. It can also be dispensed with if a VHF transmitter with crystals of suitable frequency is available. In this event, the transmitter can be used as a frequency standard, although at a cost of some loss of convenience.

b. CALIBRATION OF SIGNAL GENERATOR FOR 6,900 ±5 KC.

The signal generator used for these tests can be calibrated by using the i-f amplifier, detector and a-f amplifier circuits of Radio Receiver R-28/ARC-5 as follows: Couple the output of the signal generator to coil L-104 through a small condenser, 5 to 50 mmf. Couple the frequency standard, operated on its 100 kc standard frequency, to the same point through convenient length of leads. With varying outputs of 10 to 1000 microvolts from the signal generator (unmodulated) tune the signal generator about its indicated 6.9 mc frequency setting until a beat note is heard in the output of the VHF receiver. Tune the generator for zero beat and record the dial setting. At the same time, check that varying the attenuator on the output of the signal generator from 10 to 1000 microvolts does not vary the beat note more than approximately ±5 kc.

If no frequency standard is available, a Radio Transmitter T-23/ARC-5 can be used to calibrate the signal generator, provided crystal units of proper frequency are available. The transmitter and the receiver should be tuned to the same channel and the signal generator coupled to coil L-104 as described above. The signal generator output is then heterodyned with the signal picked up by the receiver and its frequency adjusted for zero beat.

c. INTERMEDIATE-FREQUENCY CIRCUIT ALIGNMENT.

After the signal generator has been set to 6,900 ± 5 kc, as described above, the i-f circuit alignment of the receiver can be carried out in the following steps:

(1) Remove the two side covers, the r-f shield over tube V-101, and the snap-on caps of the i-f filter units.

(2) Connect the receiver to Test Unit I-104-A by means of Cord CD-706.

(3) Connect the ungrounded side of the output of the signal generator directly to the grid (terminal 4) of V-102. This may be most conveniently accomplished by clipping to coil L-104 on the tube side of the r-f tuning unit (Z-113).

(4) Connect the ground side of the output of the signal generator to the nearest accessible part of the chassis.

(5) Connect the output power meter to one of the headset jacks of Test Unit I-104-A. Set the input impedance of the meter to 300 ohms.

(6) Turn the INCREASE OUTPUT control on the test unit to its maximum clockwise position.

(7) Turn the CONTROL SWITCH of the test unit to the MVC position.

(8) Modulate the output of the signal generator 30 per cent at 400 or 1000 cycles per second.

(9) Adjust the output voltage of the signal generator until the output meter indicates approximately 100 milliwatts.

(10) Align filter Z-106 as follows: Connect the i-f shunting unit (see Figure 45) from terminal 4 of V-105 to ground. Adjust the output voltage of the signal generator to give approximately 10 milliwatts as read on the output power meter. Adjust the trimmer screw marked "P," in the top of the i-f unit, to give peak power output as indicated on the output power meter, reducing the signal generator at the same time to maintain approximately 10 milliwatts output. Connect the shunting unit from terminal 8 of V-104 to ground and repeat the above procedure while adjusting the trimmer screw marked "G" in the top of the i-f unit for peak power output.

(11) Align filter Z-105 in a similar manner. While aligning the primary (screw P) connect the shunting unit from terminal 4 of V-104 to ground. While aligning the secondary (screw G) connect it from terminal 8 of V-103 to ground.

(12) Align filter Z-104 in a similar manner. While aligning the primary (screw P) connect the shunting unit from terminal 4 of V-103 to ground. While aligning the secondary (screw G) connect it from terminal 8 of V-102 to ground.

(13) Replace the snap-on covers of the i-f filter units.

(14) Replace other covers unless further tests (see below) are to be made.

WARNING

In no case should alignment of the i-f stages be made with a signal input great enough to cause an a-f output from the receiver in excess of 300 milliwatts or to cause a test meter reading in excess of 50 scale divisions (25 microamperes) when the meter is connected between test points E and F. Signals stronger than this cause the delayed automatic gain control circuit to function, even though the receiver is being operated in the MVC condition. If, for any reason, the alignment is carried out with the receiver in the AVC condition, the test meter, connected as above, must be kept below 15 scale divisions (7.5 microamperes).

d. OVER-ALL SENSITIVITY OF I-F AMPLIFIER.

After the i-f circuit has been aligned, its overall sensitivity can be measured with the following procedure. The receiver should be connected to the output meter and to Test Unit I-104-A with controls at MVC and maximum volume output. Meter M-600 of the test unit should be connected to the binding posts by the operation of the METER SWITCH to position 6. The "+" binding post should be connected to test point E and the "−" binding post connected to test point F. The signal generator should be adjusted to a frequency of 6,900 ±5 kc, modulated 30 per cent at 400 or 1,000 cycles per second.

(1) Disconnect the grid (terminal 4) of the mixer tube (V-102) from its input circuit (Z-103) and connect it to ground through a small resistor of approximately 0.5 megohm (value not critical).

(2) Connect the output of the signal generator to terminal 4 of V-102 and to chassis ground. Adjust the voltage of the signal generator until the output meter reads 10 milliwatts (1.7 volts). The voltage of the signal generator, as indicated by its r-f voltmeter, should be between 10 and 20 microvolts.

e. Stage-by-Stage Gain of I-F Amplifier.

In order to measure the stage-by-stage gain of the i-f amplifier, the receiver and testing equipment should be connected as described above in connection with the measurement of the over-all sensitivity. The following steps should then be carried out.

(1) Connect the grounded output terminal of the signal generator to the receiver chassis. Connect the ungrounded terminal through a capacitor of approximately 0.001 mfd (value not critical) to the grid of the first i-f amplifier tube (terminal 4 of V-103). Vary the output voltage of the signal generator until the a-f output of the receiver, as measured by the output meter, is 10 milliwatts. The test meter of Test Unit I-104-A should read between 12 and 16 scale divisions (6 to 8 microamperes). The r-f voltmeter of the signal generator should read between 600 and 1200 microvolts.

(2) Repeat the procedure just described, connecting the signal generator to the grid of the second i-f amplifier tube (terminal 4 of V-104). The signal generator r-f voltage required to produce a test meter deflection of 12 to 16 divisions and an a-f output of 10 milliwatts should be between 34,000 and 68,000 microvolts.

f. BAND WIDTH OF I-F AMPLIFIER.

An over-all check of the performance of the i-f amplifier can be obtained by measuring the band width, or the relative sensitivity at different frequencies

close to the midband frequency (6,900 kc). To do this, proceed as follows:

(1) Determine, as in paragraph 15d of this section, the signal voltage which, at 6,900 ±5 kc, modulated 30 per cent at 400 cps, will cause an a-f output from the receiver of 10 milliwatts. This is a measure of the mid-band senstitivity.

(2) Increase the signal voltage to twice the value just determined. Tune the signal generator to the frequency below 6,900 kc which causes the a-f output to again become 10 milliwatts. Do the same thing above 6,900 kc. The difference between the two frequencies so determined should be 140 ±10 kc. The sensitivity of the i-f amplifier is down 6 db at these frequencies.

(3) Increase the signal voltage to 1,000 times the value determined in (1), above. Determine the frequencies, above and below 6,900 kc, at which this signal causes an a-f output of 10 milliwatts. The difference between these two frequencies should be 400 ± 50 kc. The sensitivity of the i-f amplifier is down 60 db at these frequencies.

(4) The arithmetic average of the two frequencies determined in (2), above, should be 6,900 ±10 kc.

(5) Adjust the signal generator voltage to the value determined in (1), above. Tune the generator to the frequency which gives maximum a-f output. Reduce the output voltage of the generator until an a-f output of 10 milliwatts is again obtained. The ratio of this voltage to that determined in (1) should be not less than 0.7.

16. A-F MEASUREMENTS

a. EQUIPMENT REQUIRED.

The equipment required to carry out the audio-frequency measurements described in the following paragraphs is the same as that listed above in paragraph 15a of this section.

b. AUDIO-FREQUENCY GAIN.

To check the gain of the a-f amplifier stages, proceed as follows:

(1) With the signal generator adjusted to 6,900 ±5 kc modulated 30 per cent at 400 or 1,000 cycles per second, connect its grounded terminal to the receiver chassis. Connect its ungrounded terminal through a capacitor of approximately 0.001 mfd (value not critical) to the grid of the second i-f amplifier tube (terminal 4 of V-104).

(2) Connect the test meter of Test Unit I-104-A to test points E and F of the receiver. Connect the a-f output meter to the headset jack on the test unit.

(3) Vary the output r-f voltage of the signal generator until the a-f output of the receiver, as measured by the output meter, is 10 milliwatts. The test meter deflection should be between 12 and 16 scale divisions (6 to 8 microamperes).

c. AUDIO FREQUENCY POWER OUTPUT.

To measure the power output of the a-f amplifier stages, proceed as follows:

(1) Connect the signal generator, test meter and output meter as in the preceding test. Adjust the signal generator for an output of 6,900 ±5 kc, modulated 30 per cent at 400 or 1,000 cycles per second.

(2) Adjust the signal generator voltage to give a reading of 100 scale divisions (50 microamperes) on the test meter. The a-f output, measured by the output meter, should be at least 450 milliwatts. This value should be obtained on both MVC and AVC.

d. SQUELCH ADJUSTMENT RANGE.

To measure the range of adjustment of the squelch circuit, proceed as follows:

(1) Connect the receiver to Test Unit I-104-A and to the a-f output meter. Turn the CONTROL SWITCH of the test unit to the AVC position. Turn the INCREASE OUTPUT control to its maximum clockwise position.

(2) Adjust the signal generator for an output of 6,900 ±5 kc, modulated 30 per cent at 400 or 1,000 cps. Connect the grounded terminal of the signal generator to the receiver chassis and the ungrounded terminal to the grid of the mixer tube (terminal 4 of V-102).

(3) Turn the squelch adjustment of the receiver to its maximum clockwise position.

(4) Adjust the voltage of the signal generator until the a-f output meter reads 10 milliwatts. Note this voltage, as indicated by the r-f voltmeter of the signal generator.

(5) Reduce the r-f voltage to one half the value noted above. Some a-f output should still be present.

(6) Turn the squelch control in a counter-clockwise direction until the a-f output just disappears.

(7) Slowly increase the voltage of the signal generator and notice that the a-f output of the receiver increases rapidly. When the r-f voltage noted in (4), above, is reached, the output should be back to substantially 10 milliwatts.

(8) Turn the squelch control to its maximum counter-clockwise position. Increase the r-f signal voltage until approximately 10 milliwatts a-f output is again obtained. The signal voltage, as indicated by the signal generator r-f voltmeter, should be at least six times the value noted in (4), above.

17. R-F ALIGNMENT AND MEASUREMENTS

a. EQUIPMENT REQUIRED.

The alignment and measurement procedures described in the following paragraphs require the use of suitable testing equipment. They should never be undertaken without adequate facilities in respect of test sets, meters and tools. A test bench with Test Equipment AN/GRM-1 or its equivalent is essential. A standard signal generator, with the characteristics described in Paragraph 1d(4) of this section, is also necessary.

b. TEST POINTS C AND D.

In the procedures given in the following paragraphs, it is sometimes specified that a measurement is to be made at *either* test point C *or* test point D. In these cases, point C should always be tried first and then, if it is found that a satisfactory meter reading cannot be obtained, test point D should be used. In this connection, it must be remembered that the stud just above D carries positive plate potential; accidental contact between this stud and the lead to the test meter will almost certainly destroy the meter. At the time of manufacture the stud is covered with varnished tubing. If this tubing becomes detached it should be replaced before any tests are made.

In some cases it may be found that a usable reading cannot be obtained with the test meter connected to either test point C or test point D. In such cases, remove the screen potential from the mixer tube, V-102, by unsoldering one lead of the 39,000-ohm resistor (R-110) which is connected between terminal 6 of the tube socket and the adjacent stand-off terminal. The removal of screen potential reduces the plate current of the tube to a very small value, thereby removing approximately 2 volts of cathode bias which normally opposes current flow in the test meter.

c. RADIO-FREQUENCY CIRCUIT ALIGNMENT.

The purpose of the following procedure is to adjust tuned circuits Z-101, Z-102, Z-103 and Z-107 to Z-112, inclusive, so that they are resonant at the proper frequencies throughout the entire tuning range of the receiver, 100 to 156 megacycles.

It will be seen that the r-f circuit alignment procedure is given in sixty-seven successive steps, designated (1) to (67), inclusive. The general sequence of operations is:

Steps	*Operation*
(1) to (4)	Adjust the coils of the harmonic generator stages on channel A (signal frequency, 104 mc).
(5) to (8)	Adjust the coils of the r-f amplifier stage on channel A.
(9) to (23)	Trim the capacitors and coils of the harmonic generator stages on channel D (signal frequency, 156 mc).
(24) to (31)	Trim the capacitors and coils of the r-f amplifier stage on channel D.
(32) to (34)	Trim the final tuned circuit of the harmonic generator stages, and, if necessary, the final tuned circuit of the r-f amplifier stage, on channel D.
(35) to (49)	Re-trim the coils and capacitors of the harmonic generator stages on channel A.
(50) to (57)	Re-trim the coils and capacitors of the r-f amplifier stage on channel A.
(58) to (60)	Re-trim the final tuned circuit of the harmonic generator stage, and, if necessary, the final tuned circuit of the r-f amplifier stage, on channel A.
(61)	Repeat previous steps, as required, until all tuned circuits track, within ± 5 per cent, on channel A and channel D.
(62) to (65)	Make final trimming adjustments of the first four harmonic generator tuned circuits on channel C (144 mc).
(66) and (67)	Check setting of frequency dial on channel B (120 mc) and channel C (144 mc).

Before starting the r-f alignment, remove the dust cover and r-f shield on the tube side of the receiver. Connect the receiver to Test Unit I-104-A. Set the CONTROL SWITCH of the test unit to MVC, the METER SWITCH to position 3, the INCREASE OUTPUT control to its maximum clockwise position, and the CHANNEL SELECTOR to position A. Connect the TEST METER binding posts to flexible leads which are terminated in small insulated test clips. Connect the r-f signal generator through Antenna TS-79/U or its equivalent (a 50-ohm non-inductive resistor) to the antenna jack on the face of the receiver. Insert Crystal Units DC-31 in the crystal sockets of the receiver as follows:

Channel A Crystal frequency, 4045.833 kc; Signal frequency, 104 mc.

Channel B Crystal frequency, 4712.500 kc; Signal frequency, 120 mc.

Channel C Crystal frequency, 5712.500 kc; Signal frequency, 144 mc.

Channel D Crystal frequency, 6212.500 kc; Signal frequency, 156 mc.

If any of the r-f tuned circuit units (Z-101, Z-102, etc.) have been replaced, set their trimming capacitors and coil tuning slugs in approximately the same positions as those of the replaced units or of the old units which remain in the receiver.

Set the cams of the tuning selector so that when it is operated to channel A, the frequency dial on the face of the receiver reads exactly 104 mc; also, so that on channel D, it reads exactly 156 mc. Operate the selector electrically several times after these adjustments to check that the frequency indications are correct.

Proceed with the r-f circuit alignment as follows:

(1) Connect the positive lead from the test meter to the receiver chassis and the negative lead to test point A.

(2) Operate the receiver on channel A and adjust the tuning slugs of coils L-111 and L-112 for peak deflections of the test meter.

(3) Connect the negative meter lead to test point B and adjust coils L-113 and L-115 for peak meter readings.

(4) Connect the negative meter lead to test point C and adjust coils L-117 and L-118 for peak meter reading. If a usable reading cannot be obtained, shift to test point D. (Be careful of the high voltage on the adjacent stud.)

(5) Connect the positive test meter lead to test point E and the negative lead to test point F.

(6) Adjust the signal generator to produce an unmodulated signal of approximately 0.1 volt at 104 mc.

(7) Slowly rock the frequency dial of the signal generator about its 104 mc point, meanwhile observing the test meter. Tune for peak reading of the test meter, reducing the signal voltage as necessary to keep the test meter reading at or below 20 scale divisions. Leave the frequency of the generator at the point of peak meter reading.

(8) Adjust coils L-101, L-102 and L-103 for peak readings of the test meter. Reduce the signal voltage as necessary to keep the meter deflections at or below 20 scale divisions. (If the signal generator frequency varies with the setting of its output attenuator, it may be necessary to retune the generator during this procedure.)

(9) Operate the CHANNEL SELECTOR switch of the test unit to channel D. Connect the positive test meter lead to the receiver chassis and the negative lead to test point A.

(10) Note the reading of the test meter and then adjust trimmer capacitor C-166 for peak reading. If this peak reading is only slightly greater than the previously noted reading, let the trimmer remain in position. If the peak is more than about 10 per cent above the previously noted reading, continue rotation of the trimmer *in the same direction* until the meter reads about half-way between its initial and peak values.

(11) Trim coil L-111 for peak meter reading.

(12) Adjust trimmer capacitor C-170. Use the method given in step (10), above.

(13) Trim coil L-112 for peak meter reading.

(14) Connect the negative test meter lead to test point B.

(15) Adjust trimmer capacitor C-175. Use the method given in step (10).

(16) Trim coil L-113 for peak meter reading.

(17) Adjust trimmer capacitor C-179. Use the method given in step (10).

(18) Trim coil L-115 for peak meter reading.

(19) Connect the negative test meter lead to test point C or point D.

(20) Adjust trimmer capacitor C-185. Use the method given in step (10).

(21) Trim coil L-117 for peak meter reading.

(22) Adjust trimmer capacitor C-189. Use the method given in step (10).

(23) Trim coil L-118 for peak meter reading.

(24) Connect the positive test meter lead to test point E and the negative lead to point F.

(25) Slowly vary the frequency dial of the signal generator about its 156 mc point, meanwhile observing the test meter. Tune for peak reading of the test meter, reducing the signal voltage as necessary to keep the test meter reading at or below 20 scale divisions. Leave the frequency of the signal generator at the point of peak meter reading.

(26) Adjust trimmer capacitor C-103. Use the method given in step (10).

(27) Trim coil L-101 for peak meter reading.

(28) Adjust trimmer capacitor C-111. Use the method given in step (10).

(29) Trim coil L-102 for peak meter reading.

(30) Adjust trimmer capacitor C-115. Use the method given in step (10).

(31) Trim coil L-103 for peak meter reading.

(32) Connect the positive test meter lead to the receiver chassis and the negative lead to test point C or D.

(33) Adjust trimmer capacitor C-189 for peak test meter reading.

(34) If the peak meter reading found in step (33) is more than 10 per cent greater than the initial reading, connect the test meter leads to points E and F and adjust trimmer capacitor C-115 for peak meter reading.

(35) Operate the CHANNEL SELECTOR switch of the test unit to channel A. Connect the positive test meter lead to the receiver chassis and the negative lead to test point A.

(36) Note the meter reading and then adjust coil L-111 for peak meter reading. If this peak is only slightly greater than the previously noted reading, let the coil adjustment alone. If the peak is more than about 10 per cent above the previously noted reading, continue rotation of the coil adjustment screw *in the same direction* until the meter reads about half-way between the initial and the peak values.

(37) Trim capacitor C-166 for peak meter reading.

(38) Trim coil L-112. Use the method of step (36), above.

(39) Trim capacitor C-170 for peak meter reading.

(40) Connect the negative test meter lead to test point B.

(41) Trim coil L-113. Use the method of step (36).

(42) Trim capacitor C-175 for peak meter reading.

(43) Trim coil L-115. Use the method of step (36).

(44) Trim capacitor C-179 for peak meter reading.

(45) Connect the negative test meter lead to test point C or D.

(46) Trim coil L-117. Use the method of step (36).

(47) Trim capacitor C-185 for peak meter reading.

(48) Trim coil L-118. Use the method of step (36).

(49) Trim capacitor C-189 for peak meter reading.

(50) Connect the positive test meter lead to test point E and the negative lead to point F.

(51) Adjust the signal generator for an output voltage of about 0.1 volt. Slowly rock its frequency dial about the 104 mc point, meanwhile observing the test meter. Tune for a peak reading of the test meter, reducing the signal voltage as necessary to keep the reading at or below 20 scale divisions. Leave the frequency of the signal generator at the point of peak test meter reading.

(52) Trim coil L-101. Use the method of step (36).

(53) Trim capacitor C-103 for peak test meter reading.

(54) Trim coil L-102. Use the method of step (36).

(55) Trim capacitor C-111 for peak meter reading.

(56) Trim coil L-103. Use the method of step (36).

(57) Trim capacitor C-115 for peak meter reading.

(58) Connect the positive test meter lead to the receiver chassis and the negative lead to test point C or D.

(59) Trim coil L-118 for peak test meter reading.

(60) If the peak meter reading found in step (59) is more than 10 per cent greater than the initial reading, connect the test meter leads to test points E and F and trim coil L-103 for peak meter reading.

(61) Repeat any or all of steps (9) to (60), inclusive, as necessary, until all tuned circuits track within 5 per cent at signal frequencies of 104 and 156 megacycles.

(62) Connect the positive lead from the test meter to the chassis and the negative lead to test point A. Carefully tune the receiver to channel C (144 mc).

(63) Trim capacitors C-166 and C-170 for peak meter readings.

(64) With the receiver still tuned to channel C, connect the negative test lead to point B.

(65) Trim capacitors C-175 and C-179 for peak meter readings.

(66) Tune the receiver to channel B (120 mc). The frequency dial on the face of the receiver should indicate approximately 120.

(67) Tune the receiver to channel C (144 mc). The frequency dial on the face of the receiver should indicate approximately 144.

The radio-frequency tuned circuits of the receiver are now aligned.

d. HARMONIC GENERATOR DRIVE MEASUREMENTS.

After the radio-frequency tuned circuits have been aligned, the drive of the harmonic generator stages should be checked. To do this, connect the receiver to Test Unit I-104-A, as before, and tune it to each of the four crystal-controlled channels (104 mc, 120 mc, 144 mc and 156 mc). The signal generator is not used. Proceed as follows:

(1) Connect the positive test meter lead to the receiver chassis and the negative lead to test point A.

(2) Operate the receiver to channel A and observe the test meter reading. Do the same on channels B, C and D. In each case the meter reading should be at least 28 scale divisions.

(3) Connect the negative test meter lead to test point B.

(4) Observe the meter reading on each of the four channels. It should be, in each case, at least 20 scale divisions.

(5) Remove the screen potential from the mixer tube, V-102, by unsoldering one lead of resistor R-110, which is connected between terminal 6 of the tube socket and the adjacent stand-off terminal.

(6) Connect the negative test meter lead to test point D.

(7) Observe the meter reading on each of the four channels. It should be, in each case, at least 18 scale divisions.

e. R-F AMPLIFIER GAIN MEASUREMENTS.

To measure the gain of the r-f amplifier stage, connect the receiver to Test Unit I-104-A, as before; also, connect it to the r-f signal generator through artificial antenna TS-79/U or its equivalent (a 50-ohm non-inductive resistor). Remove the four Crystal Units DC-31 from the receiver. Then proceed as follows:

(1) Remove screen potential from the grid of the mixer tube, V-102, by unsoldering one lead of resistor R-110.

(2) Connect the positive test meter lead to the receiver chassis and the negative lead to test point D.

(3) Turn the frequency dial of the receiver to the 104 mc point.

(4) Adjust the signal generator to an output of 0.1 volt, 104 mc, unmodulated. Rock the frequency control of the generator about the 104 mark, until a peak reading is observed on the test meter. This reading should be at least 9 scale divisions if the gain of the r-f amplifier is satisfactory.

(5) Repeat steps (3) and (4), using 156 mc instead of 104 mc. The meter reading should be at least 9 scale divisions.

(6) Replace the four crystal units and reconnect resistor R-110.

18. OVER-ALL RECEIVER MEASUREMENTS

a. EQUIPMENT REQUIRED.

In order to carry out the over-all tests of the VHF receiver which are described in the following paragraphs, it is necessary to have a test bench equipped with a Test Equipment AN/GRM-1, an audio-frequency output power meter (see paragraph 1d (2) of this section), and an r-f standard signal generator (see paragraph 1d (4) of this section). If the tests are to include one for over-all sensitivity, it is essential that the signal generator be capable of modulation at 30 per cent, 400 or 1,000 cycles per second, with negligible frequency modulation.

b. RECEIVER NOISE LEVEL CHECK.

To check the receiver noise level, proceed as follows:

(1) Connect the receiver to the Test Unit I-104-A and to the output power meter.

(2) Insert an artificial antenna, TS-79/U, or its equivalent (a 50-ohm non-inductive resistor) in the antenna jack of the receiver. Short-circuit the artificial antenna with a short piece of wire at least as large as 20 gauge.

(3) Operate the receiver on any crystal-controlled channel in the MVC condition.

(4) Turn the INCREASE OUTPUT control to its extreme clockwise position and read the output meter. The reading should not exceed two milliwatts (0.77 volt).

(5) Turn the INCREASE OUTPUT control to its extreme counter-clockwise position and read the output meter. The reading should not exceed 50 microwatts (0.039 volt).

c. AUTOMATIC VOLUME CONTROL MEASUREMENT.

To measure the automatic volume control characteristic, proceed as follows:

(1) Connect the receiver to Test Unit I-104-A and to the output power meter. Also connect it, through the artificial antenna, TS-79/U or its equivalent, to the r-f signal generator.

(2) Operate the receiver on any crystal-controlled channel in the AVC condition.

(3) Adjust the signal generator for an output of 1,000 microvolts, modulated 30 per cent at 400 or 1,000

cps, at the receiver frequency. Tune it carefully to the receiver.

(4) Adjust the INCREASE OUTPUT control of the test unit until the output of the receiver is 100 milliwatts (5.5 volts across 300 ohms).

(5) Increase the voltage of the signal generator to 0.1 volt. The output of the receiver should be between 100 and 354 milliwatts (5.5 and 10.3 volts).

(6) Reduce the voltage of the signal generator to 20 microvolts. The output of the receiver should be at least 22.5 milliwatts and not more than 100 milliwatts (2.6 to 5.5 volts across 300 ohms).

d. OVER-ALL SENSITIVITY MEASUREMENT.

As mentioned previously, the precise measurement of the over-all receiver sensitivity requires the use of a signal generator which can be modulated 30 per cent with practically no frequency modulation. Even a slight amount of frequency modulation will result in serious error and misleading results. If there is any doubt about the signal generator, it is recommended that a rough qualitative check of sensitivity be made as follows (this assumes that the i-f and r-f stages have been properly aligned and that the i-f response is known to be satisfactory):

(1) Operate the receiver in the MVC condition with the INCREASE OUTPUT control adjusted for maximum volume. Do not have anything attached to the antenna jack.

(2) Tune the receiver through crystal-controlled channel A (104 mc) by operating the frequency dial on the face. There should be a noticeable increase in background noise as the dial is moved past the 104 point.

(3) Repeat step (2) on channel B (120 mc), channel C (144 mc) and channel D (156 mc). The same result should be obtained on each channel.

If it is known that the signal generator can be modulated with negligible frequency modulation, the over-all sensitivity can be measured as follows:

(1) Connect the receiver to Test Unit I-104-A and to the output power meter. Also connect it, through the artificial antenna, TS-79-U or its equivalent, to the signal generator.

(2) Operate the receiver on crystal-controlled channel A (104 mc) in the MVC condition, with the INCREASE OUTPUT control set for maximum audio output.

(3) Adjust the signal generator for an output of 104 mc modulated 30 per cent at 400 or 1,000 cps. Carefully tune the frequency of the generator about its 104 calibration point until a peak reading is obtained on the output meter.

(4) Vary the voltage of the signal generator until the a-f output of the receiver is 10 milliwatts. The voltage of the signal required to produce this output should not be more than 10 microvolts.

(5) Repeat steps (2), (3) and (4) on channel B (120 mc), channel C (144 mc) and channel D (156 mc). In each case the signal voltage required to obtain an a-f output of 10 milliwatts should be 10 microvolts or less.

19. OTHER TESTS AND MEASUREMENTS

In addition to the tests and measurements described in the preceding paragraphs, there are a number of procedures which can be used in checking the performance of the VHF components. However, many of them require apparatus and techniques which are seldom available for field maintenance and are of doubtful value in connection with practical servicing. Therefore, the detailed methods involved are not given in this text. Some of the requirements are included in the tables of supplementary data in Section VI. In this connection it should be pointed out that these requirements are intended to apply at the time of manufacture; they do not necessarily apply, in all particulars, to equipment which has been in service, and which has been subjected to the deterioration which results from wear and tear, shipping, handling, operation, etc.

SECTION VI—SUPPLEMENTARY DATA

TABLE 1

AUDIO-FREQUENCY RESPONSE CHARACTERISTICS

The audio-frequency response characteristics (fidelity) of the VHF receiver should be tested under the following conditions:

Input:	100 microvolts
Modulation:	30 per cent
Volume Control:	Retarded to limit the output to 50 milliwatts when using 400-cycle modulation.
Reference Level:	50 milliwatts (3.87 volts) when using 400-cycle modulation.
Load Impedance:	300 ohms, resistive.

The response characteristics should then be within the following limits:

400 cps:	50 milliwatts (3.87 volts).
90 cps:	greater than 10 milliwatts (1.73 volts).
3500 cps:	greater than 18 milliwatts (2.32 volts).
6000 cps:	less than 12.5 milliwatts (1.94 volts).

TABLE 2

FREQUENCY STABILITY DATA

The frequency of the carrier transmitted by the VHF transmitter does not deviate more than 0.02% from the assigned frequency under any condition likely to be encountered in service. These conditions include ambient temperatures from −30 to +40 degrees Centigrade.

The resonant frequency of the VHF receiver does not deviate more than 0.04% from the assigned frequency under any condition likely to be encountered in service.

TABLE 3

AUDIO-FREQUENCY OUTPUT POWER

The receiver is capable of delivering the power indicated below into a 300-ohm resistive load under the conditions of input signal and operation shown in the table below, when operated at maximum sensitivity and audio gain, at any frequency between 100 and 156 megacycles:

Condition of Operation	*Signal Input, Microvolts*	*Modulation*		*Output*	
		Percentage	*Frequency*	*Milliwatts*	*Volts*
MVC	100	30%	400 cps	340	10.10
MVC	100,000	30%	400 cps	450	11.62
AVC	1,000	30%	400 cps	150	6.71

On MVC, at one-tenth normal sensitivity, or on AVC at normal sensitivity, and with the standard input signal adjusted for 150 milliwatts (6.71 volts) the total harmonic distortion in the audio-frequency output of the receiver does not exceed 15 per cent.

TABLE 4

VACUUM TUBE DATA

VALUES SHOWN ARE CHARACTERISTIC RATINGS FOR THE TYPE OF TUBE; THEY ARE NOT NECESSARILY THE VALUES AT WHICH THE TUBES ARE OPERATED IN THE EQUIPMENT

TYPE	*JAN-*	*717A*	*12SH7*	*12SL7GT*	*12A6**	*1625*	*832A*
	VT-	*269*	*288*	*289*	*134*	*136*	*286*
CIRCUIT REFERENCE SYMBOL		V-101 V-102 V-109 V-110	V-103 V-104 V-108	V-105 V-106	V-107	V-301 V-302	V-303 V-304
Heater Volts		6.3	12.6	12.6	12.6	12.6	12.6
Heater Amp.		0.160 to 0.190	0.138 to 0.162	0.138 to 0.162	0.138 to 0.162	0.405 to 0.495	0.72 to 0.88
Control Grid Volts		−2	−1	−2	−12.5	−29	−35
Plate Volts		120	250	250	250	600	250
Screen Volts		120	150		250	300	250
Plate Milliamps.		3.0 to 12.0	8.2 to 13.4	**1.4 to 3.2	22 to 38	24 to 48	□ 18 to 42
Screen Milliamps.		0.8 to 4.0	2.0 to 6.0	—	1.0 to 6.0	0 to 3.5	□0 to 5.5
Transconductance—Micromhos		2700 to 5200	3920 to 5880	**1200 to 2000	2200 to 3800		
Emission, Minimum, Milliamps.		†20	††95	†††**40	††††65	§300	□§§80

* Or 12A6-GT.
** Test each unit separately.
† $E_p = E_g = E_{sg} = +10$ volts.
†† $E_p = E_g = E_{sg} = +20$ volts.
††† $E_p = E_g = +30$ volts.
†††† $E_p = E_g = E_{sg} = +30$ volts.
§ $E_p = E_g = E_{sg} = +50$ volts.
§§ $E_p = E_g = E_{sg} = +25$ volts.
□ Test each unit separately. Control grid not under test shall be connected to −100 volts.

TABLE 5

TABLE OF REPLACEABLE PARTS

For

MODEL AN/ARC-5

AIRCRAFT RADIO EQUIPMENT

VHF COMPONENTS

NOTES

1. This Table does not contain a complete list of components of Model AN/ARC-5 Aircraft Radio Equipment but covers only those components furnished on Contract NXsa-40001 and which differ from the LF, MF and HF components of Model AN/ARC-5 Aircraft Radio Equipment. The principal components of the latter equipment are covered in Volume 1.

2. Four-digit drawing numbers shown in the column headed DRAWING OR SPEC NO. of this Table are Western Electric Co. drawing numbers. Components covered by these drawings are, in general, interchangeable with, but may not be identical to components covered by drawings of the same number manufactured by the Aircraft Radio Corp. Drawings of the two manufacturers may be distinguished from each other by the name and address of the manufacturer which appears in the title box of each drawing.

3. The sign #, when shown in the second column of this Table, indicates that the part is not included in the Spare Parts List for components furnished on U. S. Navy Contract NXsa-40001.

TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO TRANSMITTER T-23/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
300-399 Series		RADIO TRANSMITTER T-23/ARC-5 Channel A 100-124 MC Channel B 122-146 MC Channel C 122-146 MC Channel D 132-156 MC	For voice or tone radio transmission on any one of 4 preset frequencies	WECO D-151925 D-151759	B-35112 B-32616
A-301	#	COVER: Cover and ventilator top over chassis. 15-3/8 by 5-1/2 by 5-1/2 in. approx. overall dimensions. 0.063 in. 1/4 hard aluminum sheet.	Protection of parts on upper side of chassis	WECO	ES-691704
A-302	#	COVER ASSEMBLY: Bottom cover (without chart) 11-3/4 by 5-1/2 by 5/8 in. overall.	Encloses lower part of chassis	WECO	ES-693010
A-303	#	COVER: Cover and mounting for J-302 and J-309. Aluminum sheet 0.064 in. thick 3-7/8 by 2-1/4 in. 4 holes 0.125 in. at corners. 2 holes 1.130 in. dia. on horizontal center.	Access to lower front of chassis and terminals of J-307 and J-309	WECO	ES-692015
A-304		COVER: Cap and chain assembly for J-307. Cap 1-7/32 in. dia. by 0.250 in. high. 11S-T3 aluminum or bright red phenol plastic.	Protection against exposure of high voltage at contacts of J-307	WECO	ES-693585
A-305		ADAPTER PLATE: 0.0937 in. steel by 1-11/16 by 1-11/16 in. 4 holes 0.152 dia., 6 holes 0.152 in. dia. Counterbore 0.312 in. dia. assembled as part of Z-301.	To mount B-301 in Z-301	WECO	ES-692352
B-301		MOTOR: 28V DC ball bearing shunt wound 3000 rpm 1/60 hp intermittent duty, totally enclosed, equipped with worm. Worm 5/8 in. long. Motor 1-1/2 in. dia. by 3-29/32 in long including shaft on both ends and gear on one end. Shaft 3/16 in. dia. assembled as part of Z-301.	Drives channel selecting mechanism	Oster KS-5968 List 01	ES-691677
B-301A		BRUSH ASSEMBLY: Positive, Stackpole grade LX-84-S	Conducts current to armature	Oster Part No. 853	
B-301B		BRUSH ASSEMBLY: Negative, Stackpole grade LX-84-S	Conducts current to armature	Oster Part No. 854	
B-301C		CAP: Screw cap	Retains brush in holder	Oster Part No. 765	
		Note: # sign, inserted in column 2, indicates that the part is not included in the Spare Parts List.			

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TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO TRANSMITTER T-23/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
C-301		CAPACITOR: Fixed, molded, silvered mica, 30 MMF ± 2%, 500 WVDC, 15/32 by 51/64 by 7/32 in. (max.) leads No. 20 wire 1 in. long.	Osc. grid coupling	CD 5R EL-MENCO 603M	B-40038
C-302		CAPACITOR: Fixed, molded silvered mica, 300 MMF ± 2%, 500 WVDC, 15/32 by 51/64 by 7/32 in. (max.), leads No. 20 wire 1 in. long.	Osc. cathode coupling	CD 5R EL-MENCO 603M	B-40035
C-303		CAPACITOR: Fixed, molded mica, 3000 MMF, 800 WVDC, 53/64 by 53/64 by 11/32 in. (max.), leads No. 18 wire 1 in. long.	Osc. screen by-pass	CD 1W or 1D EL-MENCO 502L	B-40034
C-304		CAPACITOR: Same as C-303; assembled as part of Z-302.	Osc. plate circuit by-pass		
C-305		CAPACITOR: Fixed, molded, silvered mica, 25 MMF ± 5%, 800 WVDC, 15/32 by 51/64 by 7/32 in. (max.) leads No. 20 wire 1 in. long.	1st h-g grid coupling	CD 5W EL-MENCO 503M	B-40037
C-306		CAPACITOR: Same as C-303	1st h-g cathode by-pass		
C-307		CAPACITOR: Same as C-303	1st h-g screen by-pass		
C-308		CAPACITOR: Same as C-303, assembled as part of Z-303.	1st h-g plate circuit by-pass		
C-309		CAPACITOR: Same as C-303	1st h-g filament by-pass		
C-310		CAPACITOR: Fixed, silvered mica button, 500 MMF ± 10%, 500 WVDC, assembled as part of X-303. 0.450 in. dia. by 17/32 in. high, overall. Wax impregnated.	2nd h-g cathode by-pass	Erie	ES-691628
C-311		CAPACITOR: Same as C-310	2nd h-g term. 1 heater by-pass		
C-312		CAPACITOR: Same as C-310	2nd h-g term. 7 heater by-pass		
C-313		CAPACITOR: Same as C-310	2nd h-g screen by-pass		

TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO TRANSMITTER T-23/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
C-314		CAPACITOR: Fixed, silvered ceramic, 500 mmf ± 10%, 1500 WVDC, wax impregnated. Temperature coefficient negative 750 x 10^{-6} MMF/MMF/°C, 15/16 in. dia. by 7/8 in. high.	2nd h-g plate circuit by-pass	Erie	ES-692151
C-315		CAPACITOR: Fixed, silvered ceramic, 3 MMF ± 0.25 MMF, 750 WVDC. Temperature coefficient negative 750 x 10^{-6} MMF/MMF/°C ± 15%, 3/4 in. long by 7/32 in. dia., leads No. 20 wire 1 in. long.	R-F amp. term. 2 grid coupling	Erie	ES-692190
C-316		CAPACITOR: Same as C-315	R-F amp. term. 6 grid coupling		
C-317		CAPACITOR: Same as C-310 except assembled as part of X-304.	R-F amp. cathode r-f by-pass		
C-318		CAPACITOR: Same as C-310	R-F amp. term. 1 heater by-pass		
C-319		CAPACITOR: Same as C-310	R-F amp. term. 7 by-pass		
C-320		CAPACITOR: Same as C-310	R-F amp. screen by-pass		
C-321		CAPACITOR: Dry electrolytic, 15 MF, 35 WVDC, 1-1/8 in. dia. by 1-3/8 in. high	R-F amp. cathode a-f by-pass	CD, Mallory Sprague	ES-692646
C-322		CAPACITOR: Same as C-314	R-F amp. plate circuit by-pass		
C-323		CAPACITOR: Variable, air, 5.0-17.5 MMF, assembled as part of Z-301.	Antenna coupling adjustment, one for each channel		
C-325		CAPACITOR: Same as C-321	Supply voltage a-f noise filter		
C-329A,B		CAPACITOR: Fixed, silvered mica buttons, 2000/2000 MMF ± 20%, 500 WVDC, assembled as part of Z-301	C-329A motor field r-f by-pass C-329B motor armature r-f by-pass	Erie	ES-692835
C-330	#	CAPACITOR: Fixed, silvered mica button, 500 MMF ± 10%, 500 VDC test, assembled with B-301.	Motor armature r-f by-pass	Erie Type 370	
C-331		CAPACITOR: Same as C-321	Motor switching r-f interference reduction		
C-332		CAPACITOR: Fixed, paper, single section, 50,000 MMF ± 15%, 600 WVDC. Oil impregnated. 1-3/16 in. dia. by 1-5/8 in. high.	Spark suppressor at plate circuit relay contacts	CD, Mallory Sprague	ES-692652

TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 **MAJOR UNIT** RADIO TRANSMITTER T-23/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
C-333	#	CAPACITOR: Fixed, molded mica, 1000 MMF ± 20%, 300 WVDC, assembled as part of X-303, 11/16 by 7/16 by 13/64 in. thick (max.).	2nd h-g cathode to screen by-pass	CD Type 5W Solar Type MO	ES-692325
C-334	#	CAPACITOR: Same as C-333, except assembled as part of X-304.	R-F amp. cathode to screen by-pass		
C-335	#	CAPACITOR: Adjustable, air, 0.2 - 1.2 MMF, assembled as part of Z-302.	Tuning capacitor		
E-301		TERMINAL STRIP: Riveted assembly of contacts on steatite insulation at forward side of Z-302. Has 2 springs and 4 contactors, 3-1/2 by 1-3/8 by 3/4 in.	Contacts for grids of V-304	WECO	ES-693025
E-302		TERMINAL STRIP: Similar to E-301, except at rear of Z-302.	Contacts for S-301, S-302, S-307, S-308 and plates of V-303 and C-335	WECO	B-33491
E-304		TERMINAL STRIP: Similar to E-301, except part of Z-303.	Contacts for S-303, S-304, S-305, S-306 and grids of V-303	WECO	B-33735
E-306		INSULATOR: Glazed steatite, stand-off insulator. Tapped, 6-32 thread, 1/4 in. deep at each end, 3/8 by 5/8 in.	Supports terminals for R-323	Isolantite No. 395	ES-693308
E-307		TERMINAL STRIP: Similar to E-301, except part of Z-301, 4 contact springs, 2 terminals, 2-1/2 by 7/8 by 7/8 in.	Contacts for S-309, S-310, and plates of V-304	WECO	ES-692812
E-308		MOUNTING PLATE: Riveted assembly, contact on steatite, forward side of Z-301. 1-3/8 by 7/8 by 13/16 in.	Contacts for S-312	WECO	ES-692765
E-309		SPRING: Spring plate, assembled as part of Z-302, 0.020 phosphor bronze, silver plated, 1.875 by 0.250 by 0.500.	Grounds body of X-304	WECO	ES-692914
E-310		SPRING: Same as E-309, except part of Z-303.	Grounds body of X-303		
E-311	#	ADAPTER: Knurled knob, extension of shaft of B-101. (This part integral with motor shaft in later models) 0.250 dia. by 1/4 in. high, steel.	Manual operation of channel switching	WECO	ES-693897
E-312		SPRING: Contact spring, assembled as part of Z-302. 5/8 by 5/8 by 7/16 in., 0.010 in. phosphor bronze, silver plated.	Grounds shield between L-302 and L-308	WECO	ES-692924

TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO TRANSMITTER T-23/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
E-313		SPRING: Same as E-312, except assembled as part of Z-303.	Grounds shield between L-303 and L-305		
H-301		STUD: Conical locking stud	Securing transmitter in rack	WECO	4710
H-302	#	NUT: 5/8 in. - 24 ring nut, furnished with K-301. 3/4 in. O.D. 5/8 in. - 24 tap. 1/8 in. high. Nickel plate or zinc plate finish.	Fits J-301 and J-302 securing K-301 to panel	WECO	ES-693600
H-303		SPRING YOKE: Spring yoke furnished with Z-301. Phosphor bronze 0.020 in. thick 1-1/2 by 0.032 by 1/4 in.	Secures L-311 coil forms in rotor of Z-301	WECO	ES-695684
H-304		SPRING ASSEMBLY: Spring yoke, screw and washer assembly, furnished with Z-302. 1-1/2 by 7/16 in. high.	Secures coil forms in rotor of Z-302	WECO	ES-693131
H-305		SPRING ASSEMBLY: Same as H-304 except part of Z-303.	Secures coil forms in rotor of Z-303		
H-306		CABLE CLAMP: Small cable clamp, sheet steel 0.0312. 3/8 by 3/8 by 3/16 in. overall, cadmium plated.	Secures cable from K-301 to front panel	WECO	ES-693478
H-307		CABLE CLAMP: Large cable clamp, sheet steel 0.0312 in. thick, cadmium or zinc plated. 1-5/32 by 3/8 by 9/16 in.	Secures cable	WECO	B-31401
H-308		CABLE CLAMP: Same as H-307	Secures cable		
H-309		RETAINER: Retainer ring 0.632 O.D. 0.375 I.D. 0.291 in. high, 0.010 in. aluminum or sheet brass. Assembled between coil forms and front rotor plate of turret Z-301.	Prevents complete withdrawal of cores in L-311	WECO	ES-693091
J-301	#	JACK: Receptacle; part of K-301, accepts plug PL-259.	Antenna connection		
J-302	#	JACK: Same as J-301	Antenna connection to receiver		
J-303		JACK: 4-contact, receptacle assembly, 1-3/8 by 1 by 1/2 in.	Takes plug P-303 (part of X-303)	WECO	ES-691995
J-304		JACK: Same as J-303	Takes plug P-304 (part of X-304)		

TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO TRANSMITTER T-23/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
J-307		RECEPTACLE: 8-contact receptacle, equivalent to ARC No. 6418	To test unit I-155-A	WECO	6418
J-308		PLUG 7-CONTACT ASSEMBLY: Equivalent to ARC No. 9302-1-A, wax impregnated. 1-3/16 in. dia. by 1/2 in. high, spun in and staked to chassis.	To transmitter rack	WECO	B-32634
J-309		RECEPTACLE: 8-contact, equivalent to ARC No. 7026.	To control unit, channel selection, voltage regulator circuits	WECO	B-32818
K-301		RELAY: Relay assembly, transfer for coaxial line, coil 300 ohms ± 10%, armature operate in any position on 18 VDC. Separation between make contacts min. 0.045 in., 2-7/8 by 1-3/4 by 1-21/32 in. overall.	Transfers antenna from receiver to C-323, grounds receiver while transmitting	WECO D-163467	ES-693595
K-302		RELAY: Relay assembly, makes two circuits, coil resistance 300 ohms ± 10%, gaps between contacts shall be 0.020 in. +0.006, -.000 non-energized position, 18 volts applied to coil must draw armature into contact with pole face. 14 V. must not close either pair of contacts, 1-5/8 by 1 by 1-1/8 in. overall.	Plate and screen voltage control	WECO	ES-692774
K-303		RELAY: Same as K-302	Audio and keying control		
K-304		RELAY: Relay, transfers two circuits, coil resistance 250 ohms ± 5%, relay shall operate at any voltage between 18 and 32 V. DC. All contacts have a break of 0.015 min., 2-5/16 by 1-1/2 by 1 in.	Control for B-301	Allied No. BJ6-36 DPDT	ES-692868
K-305		RELAY: Same as K-302, windings paralleled, contacts in series.	Aux. high voltage control, for circuit protection at high altitude		
K-306		RELAY: SPDT plus SPST, 1-1/2 by 2-1/4 by 1-5/8 in. 2 coils, series aiding, each 2500 turns No. 35 AWG enamelled copper wire, 90-ohms ± 10%.	Plate voltage and voltage regulator control	WECO	7735
L-301		INDUCTOR: Universal wound choke, 0.5 MH. 1-1/8 in. high, 1/2 in. dia.	Osc. cathode circuit impedance	WECO Type 200A	ES-693405

TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO TRANSMITTER T-23/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
L-302 and L-308		INDUCTORS: Coil assemblies, windings on molded phenolic form, with adjustable cores of powdered iron and silver plated copper, for assembly in middle turret Z-302.	Tuning of oscillator plate and 2nd h-g plates		
		100-124 MC range Channel A (middle turret)		WECO	ES-695797
		122-146 MC range Channels B and C (middle turret)		WECO	ES-695836
		132-156 MC range Channel D (middle turret)		WECO	ES-695837
L-303 L-304 L-305		INDUCTORS: Coil assemblies. Similar to L-302 and L-308 except for assembly in rear turret Z-303.	Double tuned coupling circuit between 1st h-g plate and 2nd h-g grids		
		100-124 MC range Channel A (rear turret)		WECO	ES-695798
		122-146 MC range Channels B and C (rear turret)		WECO	ES-695838
		132-156 MC range Channel D (rear turret)		WECO	ES-695839
L-306 L-307		INDUCTORS: Matched pair of choke coils assembled with mounting. The inductance of the coils within 2% of each other. 1-1/2 by 1-3/4 by 5/8 in. overall.	2nd h-g plate feed units No. 1 and No. 2	WECO	ES-692150
L-309 L-310		INDUCTORS: Same as L-306, L-307	Voltage feed for plates of r-f amp. units No. 1 and No. 2		
L-311		INDUCTOR: Coil assembly wound on ceramic forms with adjustable cores of powdered iron and silver plated copper; assembles in front turret Z-301.			
		100-124 MC range Channel A (front turret)		WECO	ES-693863
		122-146 MC range Channels B and C (front turret)		WECO	ES-693864
		132-156 MC range Channel D (front turret)		WECO	ES-693865
L-312		INDUCTOR: 3/4 turn, 0.886 I.D. No. 14 AWG silver plated copper wire assembled as part of Z-301.	Output coupling to L-311, one for each channel	WECO	ES-693866
L-313		INDUCTOR: Choke coil, 2.1 - 2.5 mh. Current rating 125 MA. Resistance 26 - 50 ohms. Distributed capacity 1 MMF.	Osc. grid bias reactance	Hammarlund No. CHX National No. R100 Miller No. 4537	ES-695557
0-305		COUPLING: 6 position coupling 0.312 in. O.D., 0.215 in. I.D. by 17/32 in. long, has 6 holes 0.067 in. dia. Slot on one end 0.156 in. deep by 0.067 in. wide. Made of half hard brass.	Coupling between 0-307 and drive shaft of Z-301	WECO	ES-691722

TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO TRANSMITTER T-23/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
O-306		PIN: Annealed steel wire 0.0625 in. by 1 in. c.p.	Secures O-305 to O-307	WECO	ES-691719
O-307		SHAFT: Flexible shaft assembly 2-7/16 in. long. 2-5/32 in. between set screws, slot on one end, 0.0635 in. wide by 5/32 in. deep. Shaft 3/16 in. dia.	Coupling between Z-301 and Z-302	White No.3594X-Q	ES-691718
O-309		COUPLING: Same as O-305	Coupling between O-311 and drive shaft of Z-302		
O-310		PIN: Same as O-306	Secures O-309 to O-311		
O-311		SHAFT: Same as O-307	Coupling between Z-302 and Z-303		
P-303		PLUG: 4 contact assembly part of X-303. 1-7/16 by 15/16 by 5/8 in. overall.	Connects socket to J-303	WECO	ES-692601
P-304		PLUG: Same as P-303, except part of X-304.	Connects socket to J-304		
R-301		RESISTOR: Composition, 24,000 ohms ± 5%, 1/2 watt, molded phenolic insulation, IRC, 5/8 in. long by 7/32 in. dia., leads No. 20 wire 1 in. long. Allen Bradley, 3/8 in. long by 9/64 in. dia.	Osc. grid	AB Type EB-2435 IRC Type BT-1/2	ES-692193
R-302		RESISTOR: Composition, 200 ohms ± 5%, 1/2 watt, molded phenolic insulation, IRC, 5/8 in long by 7/32 in. dia., leads No. 20 wire 1 in. long. Allen Bradley, 3/8 in. long by 9/64 in. dia.	Osc. grid current measuring	AB Type EB-2015 IRC Type BT-1/2	ES-695688
R-303		RESISTOR: Wire wound, 500 ohms ± 5%, 8 watts, vitreous enamel insulation, 1-1/2 in. long by 5/16 in. dia., lugs, 17/32 in. long by 3/16 in. wide.	Osc. cathode bias	WL 1-1/2Z No. 206 term.	ES-692195
R-304		RESISTOR: Composition, 27,000 ohms ± 10%, 1 watt, molded phenolic insulation, 9/16 in. long by 7/32 in. dia., leads No. 18 wire 1-1/2 in. long.	1st h-g grid	AB Type GB-2731	ES-692297
R-305		RESISTOR: Composition, 51 ohms ± 5%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia., leads No. 20 wire, 1 in. long.	1st h-g grid current measuring	AB Type EB-5105 IRC Type BT-1/2	ES-695679
R-306		RESISTOR: Same as R-303.	1st h-g cathode bias		
R-307		RESISTOR: Same as R-305, except assembled as part of Z-303.	2nd h-g grid current measuring		

TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO TRANSMITTER T-23/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
R-308		RESISTOR: Composition, 51,000 ohms ± 5%, 1/2 watt, molded phenolic insulation; part of Z-303, IRC, 3/8 in. long by 9/64 in. dia., leads No. 20 wire 1 in. long.	2nd h-g grid, unit No. 1	AB Type EB-5135 IRC Type BT-1/2	ES-692196
R-309		RESISTOR: Same as R-308.	2nd h-g grid, unit No. 2		
R-310		RESISTOR: Same as R-303.	2nd h-g cathode bias		
R-311		RESISTOR: Composition, 47 ohms, ± 20%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia., leads No. 20 wire 1-1/2 in. long.	2nd h-g plate circuit oscillation suppressor	AB Type EB-4702 IRC Type BT-1/2	ES-692197
R-312		RESISTOR: Composition, 20,000 ohms ± 5%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia. leads No. 20 wire 1 in. long.	R-F amp. grid, unit No. 1	AB Type EB-2035 IRC Type BT-1/2	ES-692198
R-313		RESISTOR: Same as R-312	R-F amp. grid, unit No. 2		
R-314		RESISTOR: Same as R-305	R-F amp. grid current measuring		
R-315		RESISTOR: Wire wound, 300 ohms ± 2%, 12 watts, vitreous enamel insulation. 2 in. long by 5/16 in. O.D. by 5/32 in. I.D., 2 terminals, 17/32 in. high by 3/16 in. wide.	R-F amp. cathode bias	WL Special Type 2" Z No. 206 Term.	ES-692617
R-316		RESISTOR: Same as R-311	R-F amp. plate circuit oscillation suppressor		
R-319		RESISTOR: Wire wound, 15,000 ohms ± 5%, 10 watts, vitreous enamel insulation, 1-3/4 in. long by 5/16 in. O.D. by 5/32 in. I.D., 2 lugs, 17/32 in. long by 3/16 in. wide.	Potential divider for screen biases	WL Type 1-3/4 Z No. 206 Term.	ES-692613
R-320		RESISTOR: Wire wound, 2000 ohms ± 5%, 8 watts, vitreous enamel insulation, 1-1/2 in. long by 5/16 in. O.D. by 5/32 in. I.D., 2 lugs, 17/32 in. long by 3/16 in. wide.	Potential divider for screen biases	WL Type 1-1/2 Z No. 206 Term.	ES-692615
R-321		RESISTOR: Wire wound, 3000 ohms ± 5%, 8 watts, vitreous enamel insulation, 1-1/2 in. long by 5/16 in. O.D. by 5/32 in. I.D., 2 lugs, 17/32 in. long by 3/16 in. wide.	Potential divider for screen biases	WL Type 1-1/2 Z No. 206 Term.	ES-692614
R-322		RESISTOR: Wire wound, 7500 ohms ± 5%, 10 watts, vitreous enamel insulation, 1-3/4 in. long by 5/16 in. O.D. by 5/32 in. I.D., 2 lugs, 17/32 in. long by 3/16 in. wide.	Potential divider for screen biases	WL Type 1-3/4 Z No. 206 Term.	ES-692616

TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO TRANSMITTER T-23/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
R-323		RESISTOR: Composition, 18 ohms ± 10%, 1/2 watt, molded phenolic insulation; 3/8 in. long by 9/64 in. dia., leads No. 20 wire 1 in. long.	Spark suppression at relay contacts in plate circuit	AB Type EB-1801	ES-692618
R-324		RESISTOR: Wire wound, 20 ohms ± 10%, carries 1/4 amp. continuously, 3/4 in. long by 1/4 in. dia. lead wires 1-1/2 in. long. Special.	Plate circuit fuse	Sprague S-11-10	8044
R-326		RESISTOR: Same as R-324	Plate circuit fuse		
R-327		RESISTOR: Composition, 3600 ohms ± 5%, 1 watt, molded phenolic insulation, 49/64 by 19/64 in. dia., leads No. 18 wire, 1 in. long.	Screen voltage divider resistor	AB Type GB-3625	B-32753
R-328		RESISTOR: Composition, 33,000 ohms ± 5%, 1 watt, molded phenolic insulation 49/64 by 19/64 in. dia. leads No. 18 wire, 1 in. long.	Screen voltage divider resistor	AB Type GB-3335	B-32754
R-329		RESISTOR: Wire wound, 15,000 ohms ± 3%, 15 watts, terminals type B7, varnish coated, 5/8 in. dia. by 2 in. high term. 13/32 in. high.	Audio freq. load resistor	WL Ohmite	5986
R-330		RESISTOR: Composition, 10 ohms ± 20%, 1 watt, 9/16 in. long by 7/32 in. dia. leads No. 18 wire 1 in. long.	Spark suppressor	AB Type GB-1002 IRC Type BT-1	B-34813
S-301	#	SPRING: Formed spring, 0.010 in. phosphor bronze, silver plate finish. Part of E-302	L-302 wiper contact, to plate of V-301	WECO	Part of E-302
S-302	#	SPRING: Similar to S-301, opposite hand. Part of E-302.	L-302 wiper contact, to C-304	WECO	Part of E-302
S-303	#	SPRING: Formed spring, 0.010 in. phosphor bronze, silver plate finish. Part of E-304.	L-303 wiper contact, to plate of V-302	WECO	Part of E-304
S-304	#	SPRING: Similar to S-303, opposite hand. Part of E-304.	L-303 wiper contact, to C-308	WECO	Part of E-304
S-305	#	SPRING: Formed spring, 0.010 in. phosphor bronze, silver plate finish. Part of E-304.	L-305 wiper contact, to grid (unit No. 2) of V-303	WECO	Part of E-304
S-306	#	SPRING: Similar to S-305, opposite hand. Part of E-304.	L-305 wiper contact, to grid (unit No. 1) of V-303	WECO	Part of E-304
S-307	#	SPRING: Formed spring, 0.010 in. phosphor bronze, silver plate finish. Part of E-302.	L-308 wiper contact, to plate (unit No. 2) of V-303	WECO	Part of E-302

TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO TRANSMITTER T-23/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
S-309	#	SPRING: Formed spring, 0.010 in. phosphor bronze, silver plate finish. Part of E-307.	L-311 wiper contact, to plate (unit No. 1) of V-304	WECO	Part of E-307
S-308	#	SPRING: Similar to S-307, opposite hand. Part of E-302.	L-308 wiper contact, to plate (unit No. 1) of V-303	WECO	Part of E-302
S-310	#	SPRING: Similar to S-309. Part of E-307.	L-311 wiper contact, to plate (unit No. 2) of V-304	WECO	Part of E-307
S-311	#	CONTACT SPRING: Formed contact shoe, 0.012 in. phosphor bronze, silver plate finish.	L-312 wiper contact, to ground	WECO	ES-692942
S-312	#	CONTACT SPRING: Similar to S-311, insulated. Part of E-308.	C-323 contact, to antenna relay K-301	WECO	Part of E-308
S-313		SWITCH: 4-section, double-make contact assembly; cam operated, assembled as part of Z-302.	Crystal unit switching and channel selection control	WECO	ES-693157
S-314		SPRING: Formed spring, 0.010 in. phosphor bronze, silver plate finish. Part of Z-302.	Grounds and shorts unused L-311, adjacent to the coil in use.	WECO	ES-695680
S-315		SPRING: Same as S-314.	Grounds and shorts unused L-311, adjacent to the coil in use.	WECO	
V-301		VACUUM TUBE: JAN-1625 (VT-136) beam tetrode	Osc. and harmonic generator	RCA Sylvania	JAN-1625
V-302		VACUUM TUBE: Same as V-301	1st harmonic generator		
V-303		VACUUM TUBE: JAN-832A (VT-286) vhf, push-pull beam power.	2nd harmonic generator	RCA Nat-Union	JAN-832A
V-304		VACUUM TUBE: Same as V-303	R-F amplifier.		
W-301		CONNECTOR: Bead insulated, flexible connector with grid clip No. 2313, assembled as part of Z-302, 2-5/8 in. long, exclusive of grid clip, 3/16 in. dia.	To plate of V-301	WECO	ES-693218
W-302		CONNECTOR: Flexible connector, with grid clip No. 2313, assembled as part of Z-303. 1-1/2 in. long exclusive of grid clip, 1/16 in. dia.	To plate of V-302	WECO	ES-693251

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO TRANSMITTER T-23/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
X-301		SOCKET: Large, 7-contact assembly, spun into chassis. 1-5/8 in. high by 2 in. dia.	Socket for vacuum tube V-301	WECO	5068
X-302		SOCKET: Same as X-301	Socket for vacuum tube V-302		
X-303		SOCKET: Socket assembly, includes by-pass capacitors for heater, screen and cathode and plug P-303 for vacuum tube V-286, 4-5/8 by 2-5/8 by 2-1/2 in.	Socket for vacuum tube VT-286 used as 2nd h-g	WECO	ES-691613
X-304		SOCKET: Same as X-303, except includes P-304 instead of P-303.	Socket for vacuum tube VT-286 used as r-f amp.		
X-306		SOCKET: Socket assembly, 4 unit, 2-5/8 by 1-1/4 by 9/16 in.	Receptacle for four Crystal Units DC-30	Cinch Exp No. 7355	ES-691935
Y-301	#	CRYSTAL UNIT DC-30: Quartz crystal, piezo-electric oscillator.	Frequency control Channel A	WECO	D-151430
Y-302	#	CRYSTAL UNIT: Same as Y-301, except for frequency.	Frequency control Channel B		
Y-303	#	CRYSTAL UNIT: Same as Y-301, except for frequency.	Frequency control Channel C		
Y-304	#	CRYSTAL UNIT: Same as Y-301, except for frequency.	Frequency control Channel D		
Z-301		TURRET: Front turret assembly, less coils and motor.	R-F amplifier tuning and antenna coupling adjustment	WECO	ES-691706
Z-302		TURRET: Middle turret assembly, less coils, but including crystal switch S-313.	Osc. plate and 2nd h-g plate tuning	WECO	ES-691707
Z-303		TURRET: Rear turret assembly, less coils	1st h-g plate and 2nd h-g grid tuning	WECO	ES-691708

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO RECEIVER R-28/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
		RADIO RECEIVER R-28/ARC-5			
100-299 series		D-151857 and D-151926 are equipped with Selector 0-101 per ES-693249. D-152015 and D-152016 are equipped with Selector 0-102 per D-151866.	Reception tone or voice radio transmission of any one of the four pre-set frequencies between 100 and 156 MC	WECO D-151857 D-151926 D-152015 D-152016	B-33595 B-35206 B-36128 B-36127
A-101	#	COVER: Top cover assembly	Drip proof cover over top of chassis	WECO	ES-692840
A-102	#	COVER: Bottom cover assembly	Covers bottom of chassis	WECO	ES-692132
A-103	#	COVER: Right side cover assembly	Access to i-f and a-f tubes and crystal units	WECO	ES-692841
A-104	#	COVER: Left side cover assembly	Access to wiring	WECO	ES-692846
A-105	#	FRAME: Rear frame assembly	Rear cover and assembly with J-102 and J-104	WECO	ES-692131
A-106	#	BRACKET: Front panel assembly	Front panel, including door assembly	WECO	ES-693113
A-107	#	BRACKET: Partition assembly	Shield and grounding springs between Selector and tuning unit	WECO	ES-692856
A-108	#	SHIELD: Right side internal shield	Access to r-f tubes supplementary r-f shielding	WECO	ES-693951
A-109	#	SHIELD: Left side internal shield	Reduction of radiation from osc. and harmonic generator	WECO	ES-696497
B-101		MOTOR: 28 V. DC shunt wound, 3000 rpm, 1/60 hp intermittent duty. Ball bearing, totally enclosed, equipped with worm. 3/16 in. dia. shaft 1-11/16 in. dia. by 3-29/32 in. long including worm. Used with Selector 0-101 per ES-693249.	Drives channel selector mechanism	Oster KS-5968 List 01	ES-691677
B-101A		BRUSH ASSEMBLY: Positive, Stackpole grade LX-84-S (part of KS-5968 List 01 motor, B-101).	Conducts current to armature	Oster Part No. 853	
B-101B		BRUSH ASSEMBLY: Negative, Stackpole grade LX-84-S (part of KS-5968 List 01 motor, B-101).	Conducts current to armature	Oster Part No. 854	

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO RECEIVER R-28/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR AND DESIGNATION	DRAWING OR SPEC. NO.
B-101C		CAP: Screw cap for brush holders B-101A and B-101B (part of KS-5968 List 01 motor B-101).	Retains brush in brush holder	Oster Part No. 765	
B-250		MOTOR: Reversible, otherwise same as B-101. Used with new selector 0-102 per D-151866.	Drives channel selector mechanism	Oster KS-5968, List 02	B-32427
B-250A		BRUSH ASSEMBLY: Positive, Stackpole grade LX-84-S (part of KS-5968 List 02 motor B-250).	Conducts current to armature	Oster Part No. 853	
B-250B		BRUSH ASSEMBLY: Negative, Stackpole grade LX-84-S (part of KS-5968 List 02 motor B-250)	Conducts current to armature	Oster Part No. 854	
B-250C		CAP: Screw cap for brush holders B-250A and B-250B, (part of KS-5968 List 02 motor B-250)	Retains brush in brush holder	Oster Part No. 765	
C-102	#	CAPACITOR: Fixed, silvered mica button, 2000 ± 100 MMF, 500 WVDC, has hole for antenna connection, 0.766 in. ± 0.010 in. by 0.438 in. wax impregnated. Assembled as part of Z-101. C-112 may be used as replacement.	R-F amplifier grid by-pass	Erie	ES-692952
C-103	#	CAPACITOR: Variable, silvered ceramic, 1.7 to 8 MMF. Basic unit for assembly of Z-101. 1-1/2 by 2 by 3/4 in.	R-F amplifier grid tuning trimmer	Erie	ES-691911
C-104	#	CAPACITOR: Ceramic, 6.0 ± 0.25 MMF, 500 WVDC. Temperature coefficient 0 ± 30 x 10^{-6}/°C. Part of Z-101. 7/16 in. long by 7/32 in. dia., leads 1 in. long.	R-F amplifier grid tuning pad	Erie Type NPOK CENT 932	ES-691932
C-105	#	CAPACITOR: Variable air 9-gang, 2-section, each unit 7.5 to 43.5 MMF; basic unit for assembly of Z-113. 5-17/32 by 5-1/32 by 3-7/8 in.	Main r-f tuning capacitor	GICO Eastman	ES-691871
C-105A	#	CAPACITOR: Part of C-105	R-F amp. grid tuning with Z-101		
C-105B	#	CAPACITOR: Part of C-105	R-F amp. plate tuning with Z-102		
C-105C	#	CAPACITOR: Part of C-105	Mixer grid tuning with Z-103		
C-105D	#	CAPACITOR: Part of C-105	Osc. plate tuning with Z-107		

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO RECEIVER R-28/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
C-105E	#	CAPACITOR: Part of C-105	1st h-g grid tuning with Z-108		
C-105F	#	CAPACITOR: Part of C-105	1st h-g plate tuning with Z-109		
C-105G	#	CAPACITOR: Part of C-105	2nd h-g grid tuning with Z-110		
C-105H	#	CAPACITOR: Part of C-105	2nd h-g plate tuning with Z-111		
C-105I	#	CAPACITOR: Part of C-105	Harmonic selector tuning with Z-112		
C-106	#	CAPACITOR: Fixed, silvered mica button, 500 MMF ± 10%, 500WVDC. 0.450 in. max. dia. 17/32 in. high, mineral wax impregnated.	R-F amp. term. 3 cathode by-pass	Erie	ES-693179
C-107		CAPACITOR: Same as C-106	R-F amp. heater by-pass		
C-108		CAPACITOR: Same as C-106	R-F amp. term. 5 cathode by-pass		
C-109		CAPACITOR: Same as C-106	R-F amp. screen by-pass		
C-110	#	CAPACITOR: Fixed, ceramic, 7.0 ± 0.25 MMF, 500 WVDC, 7/16 in. long by 7/32 in. dia. leads 1 in. long. Part of Z-102. Zero temperature coefficient.	R-F amp. plate tuning pad	Erie NPOK CENT 932	ES-693921
C-111	#	CAPACITOR: Variable, silvered ceramic, 1.7 - 8 MMF, basic unit for assembly of Z-102, 1-1/2 by 2 by 3/4 in.	R-F amp. plate tuning	Erie	ES-691910
C-112	#	CAPACITOR: Same as C-102, except omitting hole in terminal and assembled as part of Z-102.	R-F amp. plate circuit by-pass	Erie	ES-692952
C-113	#	CAPACITOR: Fixed, silvered mica button, 500 MMF ± 10%, 500 WVDC, assembled as part of Z-114.	R-F amp. coupling to mixer	Erie	ES-693758
C-114	#	CAPACITOR: Same as C-112, except assembled as part of Z-103.	Mixer grid bias by-pass		
C-115	#	CAPACITOR: Same as C-103, except assembled as part of Z-103.	Mixer grid tuning trimmer		
C-116	#	CAPACITOR: Fixed, ceramic, 2.0 ± 0.25 MMF, 500 WVDC, zero temperature coefficient 7/16 in. long by 7/32 in. dia. leads 1 in. long, mineral was coated, part of Z-103.	Mixer, grid tuning pad	Erie Type NPOK CENT 932	ES-691930

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO RECEIVER R-28/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
C-117		CAPACITOR: Assembly of 2 capacitors		WECO	ES-692566
C-117A		CAPACITOR: Fixed, silvered mica button, 500 MMF ± 10%, 500 WVDC, 0.450 in. dia. by 1/16 in. thick, assembled as part of C-117 and used also in C-128 and C-182.	MVC control lead r-f by-pass	Erie	ES-692558
C-117B		CAPACITOR: Same as C-117A	R-F amp. heater lead by-pass		
C-118		CAPACITOR: Fixed, molded mica, 6000 MMF, ± 20%, 300 WVDC, 3/4 by 3/4 by 1/4 in.	Mixer, term. 3 cathode by-pass	CD Type 1W or 1D WECO 403A EL-MENCO Type 502L	ES-692324
C-119	#	CAPACITOR: Same as C-106	Mixer term. 5 cathode by-pass		
C-120		CAPACITOR: Fixed, molded mica, 1,000 MMF ± 20%, 300 WVDC, 51/64 by 15/32 by 7/32 in. thick (max.)	Mixer screen by-pass	CD 5W EL-MENCO 503M	B-40033
C-121	#	CAPACITOR: Fixed, ceramic, 30 ± 1.5 MMF, 500 WVDC temperature coefficient neg. 80 ± 30 x 10^{-6}/°C, 11/16 in. long by 7/32 in. dia. Part of Z-104.	Mixer plate tuning, parallels C-122	Erie Type N080L	ES-692632
C-122	#	CAPACITOR: Same as C-121. Part of Z-104	Mixer plate tuning, parallels C-121		
C-123		CAPACITOR: Same as C-118, except assembled as part of Z-104.	Mixer plate circuit by-pass		
C-124		CAPACITOR: Same as C-118, except assembled as part of Z-104.	1st i-f amp. grid by-pass		
C-125	#	CAPACITOR: Same as C-121, except assembled as part of Z-104.	1st i-f amp. grid tuning parallels C-126		
C-126	#	CAPACITOR: Same as C-121, except assembled as part of Z-104.	1st i-f amp. grid tuning parallels C-125		
C-127		CAPACITOR: Fixed, molded mica, 6000 MMF, ± 20%, 300 WVDC, 53/64 by 53/64 by 11/32 in. thick (max.)	1st i-f amp. term. 3 cathode by-pass	CD EL-MENCO WECO	B-34811
C-128		CAPACITOR: Assembly of 3 units, each unit same as used in C-117, 2 by 11/16 by 5/8 in.		WECO	ES-692564

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REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
C-128A		CAPACITOR: Part of C-128, same as C-117A	AVC control lead r-f by-pass	WECO	
C-128B		CAPACITOR: Part of C-128, same as C-117A	Squelch control lead r-f by-pass	WECO	
C-128C		CAPACITOR: Part of C-128, same as C-117A	Squelch control lead r-f by-pass	WECO	
C-129		CAPACITOR: Same as C-127	1st i-f amp. term. 5 cathode by-pass		
C-130		CAPACITOR: Same as C-120	1st i-f amp. screen by-pass		
C-131		CAPACITOR: Paper, assembly of 3 units in metal container, each unit 50,000 MMF ± 15%, 300 WVDC.		WECO	ES-692644
C-131A		CAPACITOR: Part of C-131	AVC filter, second section with R-120		
C-131B		CAPACITOR: Part of C-131	AVC filter, second section with R-123		
C-131C		CAPACITOR: Part of C-131	Squelch circuit grid filter		
C-132	#	CAPACITOR: Same as C-121, except assembled as part of Z-105.	1st i-f amp. plate tuning, parallels C-133		
C-133	#	CAPACITOR: Same as C-121, except assembled as part of Z-105	1st i-f amp. plate tuning, parallels C-132		
C-134		CAPACITOR: Same as C-118, except assembled as part of Z-105.	1st i-f amp. plate circuit by-pass		
C-135		CAPACITOR: Same as C-118, except assembled as part of Z-105.	2nd i-f amp. grid bias by-pass		
C-136	#	CAPACITOR: Same as C-121, except assembled as part of Z-105.	2nd i-f amp. grid tuning, parallels C-137		
C-137	#	CAPACITOR: Same as C-121, except assembled as part of Z-105.	2nd i-f amp. grid tuning, parallels C-136		
C-138		CAPACITOR: Same as C-127	2nd i-f amp. term. 5 cathode by-pass		
C-139		CAPACITOR: Same as C-127	2nd i-f amp. term. 3 cathode by-pass, parallels C-197		

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REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
C-140		CAPACITOR: Same as C-120	2nd i-f amplifier screen by-pass		
C-141	#	CAPACITOR: Same as C-121, except assembled as part of Z-106.	2nd i-f amp. plate tuning, parallels C-142		
C-142	#	CAPACITOR: Same as C-121, except assembled as part of Z-106.	2nd i-f amp. plate tuning, parallels C-141		
C-143		CAPACITOR: Same as C-118, except assembled as part of Z-106.	2nd i-f amp. plate circuit by-pass		
C-144		CAPACITOR: Fixed, molded mica, 100 MMF ± 20%, 500 WVDC, 51/64 by 15/32 by 7/32 in. thick (max.) Part of Z-106.	Detector circuit by-pass	CD 5W EL-MENCO 503M WECO 405A	B-40032
C-145	#	CAPACITOR: Same as C-121, except assembled as part of Z-106.	Detector input tuning, parallels C-146		
C-146	#	CAPACITOR: Same as C-121, except assembled as part of Z-106.	Detector input tuning, parallels C-145		
C-147		CAPACITOR: Same as C-144	Detector circuit by-pass		
C-148		CAPACITOR: Same as C-118	Squelch amp. grid filter, first section with R-129		
C-149		CAPACITOR: Same as C-127	1st a-f amplifier, input coupling		
C-150		CAPACITOR: Same as C-127	Detector cathode by-pass		
C-151		CAPACITOR: Fixed, molded mica, 50 MMF ± 5%, 500 WVDC, 51/64 by 15/32 by 7/32 in. thick (max.)	AVC diode res. by-pass	CD 5W EL-MENCO 503M WECO 405A	B-40036
C-152		CAPACITOR: Same as C-151	Squelch rectifier diode resistance by-pass		
C-153		CAPACITOR: Paper, assembly of 3 units in metal container, each unit 220,000 MMF ± 20%, 300 WVDC		CD Mallory Sprague	ES-692643
C-153A		CAPACITOR: Part of C-153	Squelch amplifier plate resistance by-pass		
C-153B		CAPACITOR: Part of C-153	Dynamotor LV filter		
C-153C		CAPACITOR: Part of C-153	Dynamotor HV filter		

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO RECEIVER R-28/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
C-154		CAPACITOR: Same as C-127	2nd a-f amp. grid coupling		
C-155		CAPACITOR: Same as C-144	Audio fidelity shaping		
C-156		CAPACITOR: Dry electrolytic, 5 MF, non-polarized	Output audio screen	WECO	ES-692649
C-157		CAPACITOR: Fixed, molded mica, 1000 MMF ± 10%, 800 WVDC, 53/64 by 53/64 by 9/32 in. thick (max.)	Audio fidelity shaping	CD 1W or 1D EL-MENCO 502L	B-40031
C-158		CAPACITOR: Fixed, silvered mica button, 2000 MMF ± 20%, 500 WVDC	Noise filter on term. 6 of J-102	EF1s	ES-692998
C-159		CAPACITOR: Same as C-158	Noise filter on term. 4 of J-102		
C-160		CAPACITOR: Same as C-158	Noise filter on term. 7 of J-102		
C-161		CAPACITOR: Same as C-158	Noise filter on term. 2 of J-102		
C-162		CAPACITOR: Same as C-158	Noise filter on term. 3 of J-102		
C-163		CAPACITOR: Same as C-151	Osc. grid coupling		
C-164		CAPACITOR: Same as C-151	Osc. cathode coupling		
C-165		CAPACITOR: Same as C-120	Osc. screen by-pass		
C-166	#	CAPACITOR: Same as C-111, except part of Z-107	Osc. plate circuit trimmer		
C-167	#	CAPACITOR: Same as C-112, except part of Z-107	Osc. plate circuit by-pass		
C-168		CAPACITOR: Same as C-120	Coupling between osc. plate (Z-107) and 1st h-g grid (Z-108)		
C-169	#	CAPACITOR: Same as C-112, except part of Z-108	1st h-g grid circuit by-pass		
C-170	#	CAPACITOR: Same as C-111, except part of Z-108	1st h-g grid circuit trimmer		
C-171	#	CAPACITOR: Same as C-116, except part of Z-108	1st h-g grid circuit pad		

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO RECEIVER R-28/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
C-172	#	CAPACITOR: Same as C-106	1st h-g heater by-pass		
C-173	#	CAPACITOR: Same as C-106	1st h-g screen by-pass		
C-174		CAPACITOR: 4.0 ± 0.25 MMF, temperature coefficient 0 ± 30 x 10^{-6}/°C, 500 WVDC, ceramic covered, 7/16 in. long by 7/32 in. dia. Assembled as part of Z-109.	1st h-g plate circuit pad	Erie Type N P0K CENT 932	ES-691931
C-175	#	CAPACITOR. Same as C-111, except part of Z-109	1st h-g plate circuit trimmer		
C-176	#	CAPACITOR: Fixed, silvered mica button, 2000 MMF ± 5%, 500 WVDC. Assembled as part of Z-109	1st h-g plate circuit by-pass	WECO	ES-693884
C-177		CAPACITOR: Same as C-120	Plate voltage blocking and coupling between 1st h-g plate (Z-109) and 2nd h-g grid (Z-110)		
C-178	#	CAPACITOR: Same as C-176, except part of Z-110	2nd h-g grid circuit by-pass		
C-179	#	CAPACITOR: Same as C-111, except part of Z-110	2nd h-g grid circuit trimmer		
C-180	#	CAPACITOR: Same as C-116, except part of Z-110	2nd h-g grid circuit pad		
C-181	#	CAPACITOR: Same as C-106	2nd h-g heater by-pass		
C-182		CAPACITOR: Assembly of two capacitors		WECO	ES-692565
C-182A		CAPACITOR: Part of C-182, same as C-117A	R-F filter plate voltage lead		
C-182B		CAPACITOR: Part of C-182, same as C-117A	R-F filter heater voltage lead		
C-183	#	CAPACITOR: Same as C-106	2nd h-g screen by-pass		
C-184		CAPACITOR: Same as C-174, except part of Z-111	2nd h-g plate circuit pad		
C-185	#	CAPACITOR: Same as C-111, except part of Z-111	2nd h-g plate circuit trimmer		
C-186	#	CAPACITOR: Same as C-112, except part of Z-111	2nd h-g plate circuit by-pass		
C-187	#	CAPACITOR: Same as C-113, except part of Z-115	Plate voltage blocking part of coupling between 2nd h-g plate and (Z-112)		

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO RECEIVER R-28/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
C-188	#	CAPACITOR: Same as C-112, except part of Z-112	Harmonic output circuit by-pass		
C-189	#	CAPACITOR: Same as C-112, except part of Z-112	Harmonic output circuit trimmer		
C-190	#	CAPACITOR: Fixed, ceramic, 8.0 ± 0.25 MMF, 500 WVDC, temperature coefficient 0 ± 30 x 10^{-6}/°C. 0.766 by 7/32 in. dia. Assembled as part of Z-112	Harmonic output circuit pad	Erie NOPK CENT 932	ES-691933
C-191	#	CAPACITOR: Fixed, silvered mica button, 560 MMF ± 10%, 500 WVDC, 17/32 by 0.450 in. dia. Assembled as part of B-101.	Motor noise filter	Erie Special	ES-691628
C-192	#	CAPACITOR: Same as C-191	Noise filter on term. 2 of J-103		
C-193	#	CAPACITOR: Same as C-191	Noise filter on term. 1 of J-103		
C-194	#	CAPACITOR: Same as C-191	Noise filter on term. 5 of J-103		
C-195	#	CAPACITOR: Same as C-191	Noise filter on term. 4 of J-103		
C-196		CAPACITOR: Fixed, dry electrolytic, 15 MF, 35 WVDC, 1-1/8 in. dia. by 1-3/8 in. high.	2nd a-f amp. cathode by-pass	CD Mallory Sprague	ES-692646
C-197		CAPACITOR: Same as C-156	2nd i-f amp. cathode by-pass		
C-198		CAPACITOR: Same as C-118	Squelch amp. grid filter second section with R-135		
C-199		CAPACITOR: Same as C-118	Motor noise filter		
C-200		CAPACITOR: Same as C-118	Motor noise filter		
C-201		CAPACITOR: Same as C-127	MVC control lead i-f by-pass		
C-202		CAPACITOR: Same as C-144	2nd a-f amp. grid fidelity shaping		
C-203		CAPACITOR: Same as C-127	Detector heater by-pass		
C-251		CAPACITOR: Same as C-127 used with motor B-250	Motor noise filter		
C-250	#	CAPACITOR: Silvered mica button, 500 MMF ± 10%, 500 V. DC test, assembled with Motor B-250.	Motor noise filter	Erie Type 370	

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO RECEIVER R-28/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
C-252		CAPACITOR: Same as C-127 used with motor B-250	Motor noise filter		
CR-101		VARISTOR: Thyrite crystal voltage limiter, (See R-168) 1-3/8 by 5/16 by 3/4 in., with leads 1-1/4 in. long, grey lacquer finish.	Protects T-101 against no-load and surge potential	WECO D-167176	B-32846
E-101		TERMINAL: 5-circuit terminal assembly 7/8 by 27/32 by 7/16 in. approx.	Terminates d-c circuits of r-f amp.	WECO	ES-692156
E-102		TERMINAL: Same as E-101	Terminates crystal selector relay windings and crystal connection to V-108		
E-104		CAP: Plug button, one used as part of each i-f filter assembly Z-104, Z-105 and Z-106. 1-5/32 in. dia. by 19/64 in. high	Shielding and dust cover	WECO	ES-692328
E-105		SHIELD: One used as part of each i-f filter assembly Z-104, Z-105 and Z-106.	Shielding and dust cover	WECO	ES-691943
E-106		CLIP: Spring clip, one used with each X-101, X-102, X-109 and X-110. 1.328 in. dia. by 3/4 in. high.	Grounds base of tubes JAN-717A (VT-269) used as V-101, V-102, V-109 and V-110	WECO	ES-692026
E-250		TERMINAL ASSEMBLY: 13 terminals on strip, 2 supporting brackets. 4.0 by 1.0 by 7/8 in. overall. (Part of selector D-151866)	Support for terminals	WECO	B-32257
H-101		WRENCH: For No. 6 socket head cap screws	For adjustment of selector cams, and squelch sensitivity R-167	WECO	ES-693794
H-102		CLAMP: Formed metal strip, c.p. 3/4 by 5/16 by 0.031 in.	Secures cable W-101 against O-101	WECO	ES-693778
H-103		STUD	Dynamotor mounting	WECO	ES-692085
H-104		STUD: Brass c.p. or z.p. 0.250 in. dia. by 0.219 in. high + 0.125 in. dia. by 0.094 in.	Dynamotor orientation	WECO	5480
H-105		CLAMP: Same as H-102	Secures cable W-101 in Z-113		
H-106		SPRING: DZUS "S" shaped spring	Chassis side of right side cover fastening	DZUS No. S3-150	ES-692845

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO RECEIVER R-28/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
H-107		FASTENER: DZUS fastener, oval head, bayonet dotted steel, 5/16 in. O.D. by 0.250 in. long nickel steel, c.p. or z.p.	Fastener on right side cover A-103	DZUS No. A3-25	ES-692363
H-108		SPRING: Single mounting for DZUS fasteners	Used on right side cover A-103	WECO	ES-692743
H-109		SPRING: Dual mounting for DZUS fasteners	Used on right side cover A-103	WECO	ES-692741
H-110		RIVET: 0.101 by 3/32 in. b.h. brass c.p.	Secures H-108 and H-109 to cover	TRS No. 2280	ES-692847
H-111		RIVET: Special head 0.218 in. dia. by 0.188 in. high, shank 0.100 in. dia. by 0.094 in. long, corrosion resistant steel	Centers receiver in rack channels	WECO	ES-692744
H-112		RIVET: 0.090 in. dia. by 11/64 in. b.h. brass c.p.	Secures H-106 to sides and bottom covers	TRS No. 2281	ES-693186
H-113		WASHER: 0.203 in. O.D. by 0.094 in. I.D. by 0.020 in. C.R. steel c.p.	Used between H-106 and upset end of H-112	WECO	ES-693213
J-101		SOCKET: Receptacle for coaxial cable WC-549 termination, assembled as part of W-101, 1.0 by 1.0 by 1-1/16 in.	Antenna transmission line connection	WECO D-164459	ES-695893
J-102		PLUG: 7-contact receptacle assembly, spun in and staked to chassis, 1-1/8 in. dia. by 1/2 in. high.	To receiver rack (power, audio and gain control circuits)	WECO	5488
J-103		RECEPTACLE: 6-contact receptacle assembly, 1-5/16 in. dia. by 3/4 in.	To radio control box (channel selection and antenna relay control circuits)	WECO	5577
J-104		RECEPTACLE: 3-contact receptacle assembly. 1-3/16 in. dia. by 9/16 in. high.	To dynamotor *DY-2/ARR-2	WECO	4718
K-101		RELAY: Single make contacts, coil resistance 300 ohms ± 10%. 18 volts applied to coil must draw armature into contact with pole face, 1-5/8 by 1-5/16 by 3/4 in.	Crystal unit connection for Channel A	WECO	ES-692094
K-101A		CONTACT ASSEMBLY: Riveted assembly of contact and insulator parts. 1-1/16 by 3/4 by 3/8 in.	Replacement unit for contacts of K-101	WECO	ES-692106
K-102		RELAY: Same as K-101	Crystal unit connection for Channel B.		

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 **MAJOR UNIT** RADIO RECEIVER R-28/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR.AND DESIGNATION	DRAWING OR SPEC. NO.
K-103		RELAY: Same as K-101	Crystal unit connection for Channel C		
K-104		RELAY: Same as K-101	Crystal unit connections for Channel D		
K-105		RELAY: Selector latching relay assembly; coil resistance 23 ohms ± 10%, 2-5/8 by 2-3/16 by 1-3/8 in. overall. Used with Selector 0-101.	Selector control for Channel A	WECO	ES-693245
K-105A		CONTACT ASSEMBLY: Single transfer contact springs and insulating group; replacement parts are held together with wire which is to be discarded before assembly in relay. 1-1/2 by 9/16 by 1/2 in. overall.	Control of Motor B-101 and crystal unit relays K-101 to K-104 incl.	WECO	ES-693330
K-105B		CONTACT ASSEMBLY: Single break contact spring and insulator group; operated by latch bar of Selector 0-101, to which unit contacts are mounted; replacement parts are held together with wire which is to be discarded before assembly on Selector 0-101. 1-1/4 by 3/8 by 3/8 in. overall.		WECO	ES-695878
K-106		RELAY: Same as K-105	Selector control for Channel B		
K-107		RELAY: Same as K-105	Selector control for Channel C		
K-108		RELAY: Same as K-105	Selector control for Channel D		
K-250		RELAY ASSEMBLY: One set of transfer contacts on the right side, and one set of transfer contacts and one set of break contacts, on left side. Coil resistance 270 ohms to 330 ohms, contact clearance 0.015 to 0.025, contact pressure 30 grams, contacts are No. 14GA palladium.1-1/2 by 1-1/4 by 1 in. Used with Selector 0-102.	Motor control relay	CLARE Type K	B-32442
L-101	#	INDUCTOR: Air core, 2 turns at 12 turns per inch, 0.234 I.D. silver plated copper wire 0.050 in. dia., assembled as part of Z-101.	Input tuning	WECO	ES-693924
L-102	#	INDUCTOR: Air core, 2-1/2 turns at 12 turns per inch, 0.188 in. I.D. silver plated copper wire 0.050 in. dia. Assembled as part of Z-102.	R-F interstage coupling	WECO	ES-691914

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO RECEIVER R-28/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR, AND DESIGNATION	DRAWING OR SPEC. NO.
L-103	#	INDUCTOR: Air core, 3 turns at 12 turns per inch, 0.188 in. I.D. silver plated copper wire 0.050 in. dia. Assembled as part of Z-103.	R-F interstage coupling	WECO	ES-691915
L-104	#	INDUCTOR: Air core, 6-1/2 turns 0.201 in. I.D. silver plated copper wire 0.050 in. dia. Assembled as part of Z-114.	R-F interstage coupling used with C-113	WECO	ES-693889
L-105	#	INDUCTOR ASSEMBLY: Slug tuned coil (bottom plate and coil assembly) Coil has 33-3/4 turns of No. 26 wire (coil form 1-3/16 in. high by 3/8 in. O.D.). Part of Z-104.	1st i-f band pass	WECO	ES-692736
L-106	#	INDUCTOR ASSEMBLY: Slug tuned coil (top plate and coil assembly) Coil has 33-3/4 turns of No. 29 wire, coil form 1-3/16 in. high by 3/8 in. O.D. Part of Z-104.	1st i-f band pass	WECO	ES-692735
L-107	#	INDUCTOR ASSEMBLY: Same as L-105. Part of Z-105.	2nd i-f band pass		
L-108	#	INDUCTOR ASSEMBLY: Same as L-106. Part of Z-105.	2nd i-f band pass		
L-109	#	INDUCTOR ASSEMBLY: Same as L-105. Part of Z-106.	2nd i-f band pass		
L-110	#	INDUCTOR ASSEMBLY: Same as L-106. Part of Z-106.	2nd i-f band pass		
L-111	#	COIL: Air core, 22 turns of No. 28 D.C. wire, close wound. 15/32 in. dia. by 15/16 in. high. Part of Z-107.	Interstage coupling	WECO	ES-692052
L-112	#	COIL: Same as L-111. Part of Z-108	Interstage coupling		
L-113	#	COIL: Air core, 7 turns at 14 turns per inch, 0.312 in. I.D. silver plated copper wire. 0.050 in. dia. Assembled as part of Z-109.	Part of trimmer unit Z-109	WECO	ES-691912
L-114	#	COIL: Air core, one turn (open), 0.160 in. I.D. silver plated copper wire. 0.050 in. dia. Assembled as part of Z-109.	Part of trimmer unit Z-109	WECO	ES-693886
L-115	#	COIL: Same as L-113. Assembled as part of Z-110.	Part of trimmer unit Z-110		
L-116	#	COIL: Same as L-114. Part of Z-110.	H-G circuit coupling		
L-117	#	COIL: Air core, 3 turns at 12 turns per inch, 0.201 in. I.D., silver plated copper wire. 0.050 in. dia. assembled as part of Z-111.	Interstage coupling	WECO	ES-691913

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REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
L-118	#	COIL: Air core, 3 turns at 12 turns per inch, 0.211 in. I.D., silver plated copper wire 0.050 in. dia., assembled as part of Z-112.	Interstage coupling	WECO	ES-696667
L-119	#	COIL: Air core, 3-1/2 turns, 0.320 in. to 0.201 in. I.D., silver plated copper wire. 0.050 in. dia., assembled as part of Z-115.	Output h-g coupling used with Z-118	WECO	ES-693890
L-120		CHOKE COIL: Retardation coil, d-c resistance 288-363 ohms, inductance 3.0 henrys at 60 cycles with 3V AC across winding and 50 milliamperes DC through coil. 1-11/16 in. dia. by 1-15/16 in. high.	H-V choke	WECO	5634
L-121		CHOKE COIL: Retardation coil, d-c resistance 0.186 ohms ± 10%. Ind. 0.100 mh ± 10% at 60 cycles. 1-1/16 in. dia. by 1-5/32 in. high.	L-V choke	WECO	5546
0-101		SELECTOR: Assembled drive for C-105 includes B-101, K-105 to K-108 inclusive, and R-167. Used in Radio Receivers per D-151857 and D-151926.	Channel selecting mechanism	WECO	ES-693249
0-102		SELECTOR: Assembled drive for C-105. Includes B-250, K-250, and R-250. Used in Radio Receivers per D-152015 and D-152016.	Channel selecting mechanism	WECO D-151866	B-33697
0-103	#	GEAR: Double split gear and hub, assembled as part of Selector 0-101, includes two speed gears 1.792 in. O.D. 84 teeth, 48 pitch brass, one with shaft dia. 0.562 in. and one with 0.343 in. shaft dia.	Drives gear 0-104 from selector cam shaft; driven manually by 0-106	WECO	ES-693244
0-104		GEAR: Gear and hub assembly, assembled as part of C-105. Gear has 84 teeth, 48 pitch, 1.791 in. O.D. 1.750 in. P.D. 1/8 in. thick. Hub 9/16 in. O.D. by 0.239 in. I.D. by 0.225 in. thick, set screw .138-32.	Operates 3-section part of capacitor C-105 from gear 0-103	WECO	ES-693896
0-105		GEAR: Split gear and hub assembly, assembled as part of C-105 shaft, dia. 0.239 in. includes one gear 84 teeth, 48 pitch 1.791 in. O.D., 1.750 in. P.D. brass, hard temper. One gear 84 teeth, 48 pitch, 1.791 in. O.D., 0.500 I.D. Hub 9/16 in. O.D., 0.239 in. I.D., 0.376 in. thick, set screw .138-32.	Operates 6-section part of capacitor C-105 from gear 0-104	WECO	ES-693872
0-106		DIAL AND GEAR ASSEMBLY: Scale, gear, bearing and mounting.	Frequency calibration and manual operation of selector 0-101	WECO	ES-696377

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REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
0-252		GEAR ASSEMBLY: Same as 0-103 except used with new selector 0-102 (D-151866)	Drives gear 0-104		
0-253		DIAL AND GEAR ASSEMBLY: Scale gear, bearing and mounting same as 0-106 except used with new selector 0-102 (D-151866)	Frequency calibration and manual operation of Selector 0-102		
R-101	#	RESISTOR: Composition, 100,000 ohms ± 20%, 1/2 watt, molded phenolic insulation. 3/8 in. long by 9/64 in. dia., 0.766 in. between lead end centers.	R-F amp. grid filter	AB Type EB-1042 Erie No. 524	ES-694907
R-102		RESISTOR: Composition, 220 ohms ± 10%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia., leads No. 20 wire 1 in. long.	R-F amp. cathode decoupler and bias	AB Type EB-2211	ES-691921
R-103		RESISTOR: Composition, 39,000 ohms ± 10%, 1 watt, molded phenolic insulation, 49/64 in. long by 19/64 in. dia., leads No. 18 wire 1 in. long.	R-F amp. screen decoupler and volt drop	AB Type GB-3931	ES-692299
R-104		RESISTOR: Composition, 12 ohms ± 10%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia., leads No. 20 wire 1 in. long.	R-F amp. oscillation suppressor	AB Type EB-1201	ES-692321
R-105	#	RESISTOR: Composition, 10,000 ohms ± 10%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia. leads No. 20 wire.	R-F amp. plate filter	AB Type EB-1031 Erie No. 524	ES-693923
R-106	#	RESISTOR: Composition, same as R-105, except leads formed differently.	R-F amp. plate filter	AB Type EB-1031 Erie No. 524	ES-692722
R-107	#	RESISTOR: Composition, 100,000 ohms ± 10%, 1/2 watt, molded, phenolic insulation, 3/8 in. long by 9/64 in. dia., leads No. 20 wire.	Mixer grid resistor	AB Type EB-1041 Erie No. 524	ES-692723
R-108	#	RESISTOR: Composition, same as R-105, except leads formed differently.	Mixer grid current meas.	AB Type EB-1031 Erie No. 524	ES-692718
R-109		RESISTOR: Same as R-102	Mixer cathode res		
R-110		RESISTOR: Same as R-103	Mixer screen decoupler and volt drop		

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO RECEIVER R-28/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
R-111		RESISTOR: Composition, 5600 ohms ± 10%, 1 watt, molded phenolic insulation, 49/64 in. long, 19/64 in. dia., leads 1 in. long	Mixer plate filter	AB Type GB-5621	ES-692598
R-112		RESISTOR: Composition, 4.7 megohms ± 10%, 1/2 watt, molded phenolic insulation, 3/8 in. long, 9/64 in. dia., leads No. 20 wire 1 in. long.	1st i-f amp. grid filter and voltage divider	AB Type EB-4751	ES-692304
R-113		RESISTOR: Composition, 1.8 megohms ± 10%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia., leads No. 20 wire 1 in. long.	1st i-f amp. grid AVC voltage divider	AB Type EB-1851	ES-692303
R-114		RESISTOR: Composition, 1000 ohms ± 10%, 1 watt, molded phenolic insulation, 49/64 in. long, 19/64 in. dia., leads No. 18 wire 1 in. long.	1st filament circuit padding	AB Type GB-1021	ES-692287
R-115		RESISTOR: Same as R-114	1st filament circuit padding		
R-116		RESISTOR: Same as R-102	1st i-f amp. cathode decoupler and bias		
R-117		RESISTOR: Same as R-103	1st i-f amp. screen VD and decoupler		
R-118		RESISTOR: Composition, 270,000 ohms ± 10%, 1 watt, molded phenolic insulation, 49/64 in. long by 19/64 in. dia., leads No. 18 wire, 1 in. long.	Gain control bleeder	AB Type GB-2741	ES-693849
R-119		RESISTOR: Composition, 1000 ohms ± 20%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia., leads No. 20 wire, 1 in. long.	1st i-f amp. plate filter	AB Type EB-1022	ES-695583
R-120		RESISTOR: Composition, 560,000 ohms ± 10%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia., leads No. 20 wire, 1 in. long.	AVC filter, r-f amp. + 1st i-f amp.	AB Type EB-5641	ES-695586
R-121		RESISTOR: Composition, 100 ohms ± 20%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia., leads No. 20 wire 1 in. long.	R-F mixer; i-f amp. screen supply VD	AB Type EB-1012	ES-695582

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REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
R-122		RESISTOR: Same as R-119	2nd i-f amp. grid filter		
R-123		RESISTOR: Same as R-120	AVC constant filter		
R-124		RESISTOR: Same as R-102	2nd i-f amp. cathode res. and voltage divider		
R-125		RESISTOR: Composition, 3900 ohms ± 10%, 1 watt, molded phenolic insulation, 49/64 in. long by 19/64 in. dia., leads No. 18 wire 1 in. long.	Same as R-124	AB Type GB-3921	ES-695364
R-126		RESISTOR: Composition, 27,000 ohms ± 10%, 1 watt, molded phenolic insulation, 49/64 in. long by 19/64 in. dia., leads No. 18 wire, 1 in. long.	2nd i-f amp. screen de-coupler and VD	AB Type GB-2731	ES-692297
R-127		RESISTOR: Same as R-119	2nd i-f amp. plate filter		
R-128		RESISTOR: Composition, 10,000 ohms ± 20%, 1/2 watt, molded phenolic insulation 3/8 in. long by 9/64 in. dia., leads No. 20 wire, 1 in. long.	Detector diode filter	AB Type EB-1032	ES-695584
R-129		RESISTOR: Composition, 1.0 megohm ± 20%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia., leads No. 20 wire 1 in. long.	Squelch grid tune, constant filter	AB Type EB-1052	ES-695587
R-130		RESISTOR: Composition, 180,000 ohms ± 10%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia., leads No. 20 wire 1 in. long.	Detector diode load	AB Type EB-1841	ES-691927
R-131		RESISTOR: Composition, 2200 ohms ± 10%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia., leads No. 20 wire 1 in. long.	Detector diode measuring	AB Type EB-2221	ES-692290
R-132		RESISTOR: Composition, 560,000 ohms ± 10%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia., leads No. 20 wire 1 in. long.	AVC delay bias voltage divider	AB Type EB-5641	ES-691929
R-133		RESISTOR: Composition, 15,000 ohms ± 10%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia., leads No. 20 wire 1 in. long.	AVC delay bias voltage divider. AVC and squelch	AB Type EB-1531	ES-695365

TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO RECEIVER R-28/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
R-134		RESISTOR: Composition, 68,000 ohms ± 10%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia., leads No. 20 wire 1 in. long	AVC limiter	AB Type EB-6831	ES-695366
R-135		RESISTOR: Composition, same as R-129	Squelch grid tune constant filter		
R-136		RESISTOR: Composition, 1.0 megohm ± 10%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia., leads No. 20 wire 1 in. long.	Coupling diode 1st a-f grid	AB Type EB-1061	ES-692302
R-137		RESISTOR: Same as R-118	AVC delay bias voltage divider		
R-138		RESISTOR: Same as R-120	AVC diode load res.		
R-139		RESISTOR: Composition, 270,000 ohms ± 10%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia., leads No. 20 wire 1 in. long.	1st a-f amp. plate	AB Type EB-2741	ES-691928
R-140		RESISTOR: Same as R-130	1st a-f amp. grid		
R-141		RESISTOR: Same as R-129	Squelch plate		
R-142		RESISTOR: Composition, 3300 ohms ± 10%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in., leads No. 20 wire 1 in. long.	1st a-f amp. cathode bias	AB Type EB-3321	ES-692293
R-143		RESISTOR: Same as R-136	Output 1st a-f amp.		
R-144		RESISTOR: Composition, 470,000 ohms ± 10%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in., leads No. 20 wire 1 in. long.	Output 1st a-f amp. freq. network	AB Type EB-4741	ES-692301
R-145		RESISTOR: Composition, 1500 ohms ± 10%, 1 watt, molded phenolic insulation, 49/64 in. long by 19.64 in. dia., leads No. 18 wire 1 in. long.	Output 1st a-f amp. cathode	AB Type GB-1521	ES-692289
R-147		RESISTOR: Same as R-120	Osc. grid		
R-148		RESISTOR: Composition, 8200 ohms ± 10%, 1 watt, molded phenolic insulation, 49/64 in. long by 19/64 in. dia., leads No. 18 wire 1 in. long.	Osc. cathode res.	AB Type GB-8221	ES-692296

TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO RECEIVER R-28/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
R-149		RESISTOR: Same as R-114	Osc. fil. circuit padding		
R-150		RESISTOR: Same as R-114	Osc. fil. circuit padding		
R-151		RESISTOR: Same as R-126	Osc. screen		
R-152	#	RESISTOR: Composition, 1000 ohms ± 20%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia., leads No. 20 wire, 1 in. long.	Osc. plate filter	AB Type EB-1022 Erie No. 524	ES-695588
R-153	#	RESISTOR: Composition, 560,000 ohms ± 10%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia., leads No. 20 wire, 1 in. long.	1st h-g grid	AB Type EB-5641 Erie No. 524	ES-692726
R-154	#	RESISTOR: Same as R-108.	1st h-g grid measuring		
R-155		RESISTOR: Composition, 68,000 ohms ± 10%, 1 watt, molded phenolic insulation, 49/64 in. long by 19/64 in. dia., leads No. 18 wire 1 in. long.	1st h-g screen res.	AB Type GB-6831	ES-692300
R-156		RESISTOR: Same as R-104	1st h-g osc. suppressor		
R-157	#	RESISTOR: Composition, 22,000 ohms ± 10%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia.	1st h-g plate filter	AB Type EB-2231 Erie No. 524	ES-693891
R-158	#	RESISTOR: Composition, 22,000 ohms ± 10%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia.	1st h-g plate filter	AB Type EB-2231 Erie No. 524	ES-692721
R-159	#	RESISTOR: Composition, 560,000 ohms ± 10%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia.	2nd h-g grid filter	AB Type EB-5621 Erie No. 524	ES-692724
R-160	#	RESISTOR: Same as R-108	2nd h-g grid measuring		
R-161		RESISTOR: Same as R-155	2nd h-g screen		
R-162		RESISTOR: Same as R-104	2nd h-g osc. suppressor		
R-163	#	RESISTOR: Same as R-157	2nd h-g plate filter		
R-164	#	RESISTOR: Same as R-158	2nd h-g plate filter		
R-165	#	RESISTOR: Composition, 180,000 ohms ± 10%, 1/2 watt, molded phenolic insulation, 3/8 in. long by 9/64 in. dia.	Mixer grid res.	AB Type EB-1841 Erie No. 524	ES-692725

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO RECEIVER R-28/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
R-166	#	RESISTOR: Same as R-108	Mixer grid current meas.		
R-167		POTENTIOMETER: Composition, 30-250,000 ohms ± 20%, 2 watts, corrosion resistant, 1-1/16 in. dia. by 15/16 in. Assembled as part of selector 0-101; coupling provides socket for adjustment with wrench A-101.	Squelch circuit sensitivity adjustment	AB Type J Mod. No. 2094-CR	ES-693647
R-168		VARISTOR: Silicon carbide, two discs, 100,000 ohms at 500 V DC, 1-3/8 by 5/16 by 3/4 in., terminals approx. 1-1/4 in., extending from either end. Early production sets employed a 100,000 ohm ± 20%, 1 watt, Allen-Bradley resistor type GB-1042 in circuit position R-168. Varistors only should be used for replacement purposes.	Protects T-101 against no load and surge potentials	WECO D-167176	B-32846
R-250		POTENTIOMETER: Similar to R-167, except shaft slotted for screwdriver adjustment, and assembled as part of 0-102	Squelch circuit sensitivity adjustment	AB Type J Mod. No. 2094-CR special	B-32426
S-250		CONTACT ASSEMBLY: Part of selector 0-102, contact pile-up consists of one transfer and one make. Contacts C and D adjusted to break before contacts A and B. Contact gap 0.015 in. min. Contacts A and B to be No. 18 AWG palladium. Contacts C, D, and E to be No. 14 AWG palladium.	Provides dynamic braking for motor and completes crystal relay circuit	CLARE	B-32199
S-251		SWITCH ASSEMBLY: 1-section stator and rotor, 5/64 in. thick, phenol fibre stator shall be standard Oak 10-point, rotor. Blades and contacts shall be silver.	For channel selection	OAK	B-32215
S-252		SWITCH ASSEMBLY: 1-section similar to S-251 with different contact arrangement.	For protection against motor runaway	OAK	B-34183
S-253		SWITCH ASSEMBLY: 1-section. Similar to S-251 with different contact arrangement.	Crystal relay selecting switch	OAK	B-34184
T-110		Transformer: Primary terminals 1-2, 4000 turns No. 40 AWG enameled wire 1028 to 1300 ohms d-c resistance. Secondary terminals 3 - case, 1800 turns No. 38 AWG enameled wire 292 to 370 ohms d-c resistance. Secondary tap 6 to case, 1325 turns 86 to 110 ohms d-c resistance. Primary inductance: Min. 20 henrys at 400 cycles with 10 milliamperes d-c flowing through primary and with secondary open. Insulation between primary winding and case shall withstand 1000 V. DC for 5 seconds. 1-5/8 in. dia. by 1-3/4 in. high overall case dimensions.	Output transformer	WECO	ES-692327

TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO RECEIVER R-28/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
V-101		VACUUM TUBE: JAN-717A (VT-269) VHF pentode amplifier.	R-F amplifier	WECO Tungsol	JAN-717A
V-102		VACUUM TUBE: Same as V-101	Mixer		
V-103		VACUUM TUBE: JAN-12SH7 (VT-288) H-F pentode amplifier.	1st i-f amplifier	RCA	JAN-12SH7
V-104		VACUUM TUBE: Same as V-103	2nd i-f amplifier		
V-105		VACUUM TUBE: JAN-12SL7GT (VT-289) Twin triode amplifier.	DET-AVC	RCA	JAN-12SL7GT
V-106		VACUUM TUBE: Same as V-105	1st a-f amplifier		
V-107		VACUUM TUBE: JAN-12A6 or JAN-12A6GT (VT-134) Beam tetrode audio power amplifier.	2nd a-f amplifier	RCA	JAN-12A6 or JAN-12A6GT
V-108		VACUUM TUBE: Same as V-103	Osc.		
V-109		VACUUM TUBE: Same as V-101	1st harmonic generator		
V-110		VACUUM TUBE: Same as V-101	2nd harmonic generator		
W-101		CABLE: Coaxial transmission line assembly including J-101 coaxial conductor. 3-3/16 in. long by 3/8 in. O.D. One end supported by bracket. Other end has J-101 attached.	Antenna circuit connection from J-101 to C-101	WECO	ES-693836
X-101 to X-110 incl.		SOCKET: Octal-base tube socket Note - Socket per drawing 6559 can be used as emergency replacement by bending soldering terminals to suit wiring.	Used for all tubes in receiver	Amphenol S-8 modified Cinch	ES-692852
X-111 A/B		SOCKET: Dual sockets	Mounting for two (each) crystal units DC-31, Y-101 and Y-102	Amphenol Special	ES-695336
X-112 A/B		SOCKET: Same as X-111 Note - Either socket per drawing ESL-692852 or 6559 can be used as emergency replacement, if terminals 1 and 3 are used for one crystal unit, and terminal 5 and 7 are used for the other.	Mounting for two crystal Units DC-31, Y-103 and Y-104		

TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO RECEIVER R-28/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
Y-101		CRYSTAL UNIT: Crystal unit DC-31, quartz crystal oscillator.	Osc. freq. control for channel A	WECO DC-31	D-151431
Y-102		CRYSTAL UNIT: Same as Y-101	Osc. freq. control for channel B		
Y-103		CRYSTAL UNIT: Same as Y-101	Osc. freq. control for channel C		
Y-104		CRYSTAL UNIT: Same as Y-101	Osc. freq. control for channel D		
Z-101		TRIMMER UNIT: Assembly of C-102, C-103, C-104, L-101 and R-101	R-F input circuit tuning	WECO	ES-691907
Z-102		TRIMMER UNIT: Assembly of C-110, C-111, C-112, L-102, R-105 and R-106.	R-F amp. plate tuning	WECO	ES-691908
Z-103		TRIMMER UNIT: Assembly of C-114, C-115, C-116, L-103, R-107 and R-108.	Mixer grid tuning	WECO	ES-691909
Z-104		FILTER: Assembly of C-121, C-122, C-123, C-124, C-125, C-126, L-105, L-106, R-111, R-112 and R-113 (red dot on shield).	1st i-f amp. tuning	WECO	ES-692532
Z-105		FILTER: Assembly of C-132, C-133, C-134, C-135, C-136, C-137, L-107, L-108, R-119 and R-122 (yellow dot on shield).	2nd i-f amp. tuning	WECO	ES-692533
Z-106		FILTER: Assembly of C-141, C-142, C-143, C-144, C-145, C-146, L-109, L-110, R-127 and R-128 (Blue dot on shield).	3rd i-f amp. tuning	WECO	ES-692534
Z-107		TRIMMER UNIT: Assembly of C-166, C-167, L-111 and R-152.	Oscillator plate tuning to 4th harmonic of crystal	WECO	ES-691901
Z-108		TRIMMER UNIT: Assembly of C-169, C-170, C-171, L-112, R-153 and R-154.	Tripler grid tuning to 4th harmonic of crystal	WECO	ES-691902
Z-109		TRIMMER UNIT: Assembly of C-174, C-175, C-176, L-113, L-114, R-157 and R-158.	Tripler plate tuning to 12th harmonic of crystal	WECO	ES-691903
Z-110		TRIMMER UNIT: Assembly of C-178, C-179, C-180, L-115, L-116, R-159 and R-160.	Doubler grid tuning to 12th harmonic of crystal	WECO	ES-691904
Z-111		TRIMMER UNIT: Assembly of C-184, C-185, C-186, L-117, R-163 and R-164.	Doubler plate tuning to 24th harmonic of crystal	WECO	ES-691905

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT RADIO RECEIVER R-28/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
Z-112		TRIMMER UNIT: Assembly of C-188, C-189, C-190, L-118, R-165 and R-166.	Harmonic generator output tuning to 24th harmonic of crystal	WECO	ES-691906
Z-113		TUNING UNIT: Complete assembly of C-105, E-101, W-101, X-101, X-108, X-109, X-110, Z-101, Z-102, Z-103, Z-107, Z-108, Z-109, Z-110, Z-111, Z-112, Z-114, Z-115.	Replacement assembly of complete r-f and h-g assemblies	WECO	ES-691900
Z-114		COUPLING UNIT: Assembly of C-113 and L-104	R-F amplifier coupling to mixer between Z-102 and Z-103	WECO	ES-693892
Z-115		COUPLING UNIT: Assembly of C-187 and L-119	2nd h-g filter coupling between Z-111 and Z-112	WECO	ES-693893

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 **MAJOR UNIT** CONTROL UNIT C-30/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
400 to 409 series		CONTROL UNIT C-30/ARC-5 (Push button type)	Complete control of modulator with one Radio Transmitter T-23/ARC-5, 2 Radio Transmitters T-15 to T-22/ARC-5, and channel selection of one Radio Receiver R-28/ARC-5	WECO D-151760 D-151927	B-32611 B-35208
E-401		KNOB: Molded red bakelite knob for push button controls. 1/2 to 7/16 in. O.D. by 15/32 in. high.	Push buttons	K-K Part No. S-332-30 Dwg. P-10802-A	ES-692570
E-402		LEVER: Tone-CW-Voice for switch S-401. Aluminum alloy, black enamel finish. 1-3/32 by 13/32 by 3/8 in. overall approx.	Switch Lever	WECO	3912
H-401		SNAPSLIDE: Formed, comprises	Fastener		
		SNAPSLIDE:		Scoville	2540
		GUIDE		Patton	4750
		BUTTON		Thomson	5172
		WASHER: 2 req'd.		Wallace	5171
J-401		RECEPTACLE: 12-contact assembly, equivalent to ARC No. 7025, includes locking ring per drawing 5310, 1-7/8 in. dia. by 13/16 in. high overall.	To VHF transmitter and receiver for channel selection	WECO	7025
J-402		RECEPTACLE: 18-contact assembly, equivalent to ARC No. 5571.	To Modulator MD-7/ARC-5	WECO	B-32857
S-401		SWITCH ASSEMBLY: Multi-circuit, 3-position, switch. 2-1/16 by 1 by 1-5/16 in. overall approx. Outer springs adjusted for 0.015 in. ± 0.005 in. follow up at contacts. At half-way between operating positions of switch, all pairs of contacts are simultaneously open by at least 0.005 in.	TONE-CW-VOICE selector	WECO	ES-693294
S-402		SWITCH: Push-button assembly, 6 channels and OFF, 4-1/4 by 3 by 2 in. overall.	Channel and transmitter selection, and heater circuit control	WECO	ES-692231

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT CONTROL UNIT C-42/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
460 to 469 series		CONTROL UNIT C-42/ARC-5: Electrical and mechanical equivalent to the VHF (right-hand) section of Control Unit C-43/ARC-5.	Controls Radio Receiver R-28/ARC-5	WECO D-151806 D-151928	B-33131 B-35207
C-460		CAPACITOR: Dry electrolytic, 3 MF 300 WVDC, 3/4 in. dia. by 1-3/4 in. high.	Audio filter capacitor	CD Mallory Sprague	ES-692651
E-460		LEVER: Switch, aluminum alloy, black enamel finish. 21/32 by 3/8 by 3/8 in. overall, approx.	For A-B and AVC-MVC switch	WECO	5444
E-461		KNOB: Molded black bakelite No. 14316, stamped "INCREASE OUTPUT" with directional arrow. 0.671 in. dia. by 0.531 in. high, 250 in. dia. mtg. hole, 6-32 set screw.	For volume control	WECO	ES-690538
H-460		SNAPSLIDE: Formed, comprises	Fastener		
		SNAPSLIDE		Scoville	2540
		GUIDE		Patton	4750
		BUTTON		Thomson	5172
		WASHER: 2 req'd.		Wallace	5171
J-460		RECEPTACLE: 8-contact assembly, equivalent to ARC No. 6418, with nut No. 5131.	To receiver rack	WECO	6418
J-461		JACK: 9/16 in. dia. by 1-5/16 in. overall.	A TEL	WECO	4691
J-462		JACK: Same as J-461	B TEL		
J-463		RECEPTACLE: 2-contact, 7/8 in. dia. by 13/16 in. high, with nut No. 1094.	To receiver rack for side tone injection	WECO	2674
R-460		POTENTIOMETER: Composition, 3-section, each rated at 2 watts, useful rotation of shaft 313° corrosion resistant, 11/16 in. dia. by 2-15/16 in. long.	Gain or volume control for Radio Receiver R-28/ARC-5	AB Type JJJ	ES-694799
R-460A		PART OF R-460: Panel Section, term. 1 and 2. 50,000 ohms ± 20%.	Gain control		
R-460B		PART OF R-460: Middle Section, term. 3, 4, 5, and 6. 60,000 ohms ± 20%.	High impedance volume control		
R-460C		PART OF R-460: Rear Section, term. 7, 8, 9, 10. 4600 ohms ± 20%.	Low impedance volume control		

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT CONTROL UNIT C-42/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
R-461		RESISTOR: Composition, 820 ohms ± 10%, 1 watt, molded phenolic insulation, 7/32 in. dia. by 9/10 in. long, leads No. 18 wire 1-1/2 long.	For volume control network	AB Type GB-8211	ES-696707
R-462		RESISTOR: Composition, 2200 ohms ± 10%, 1 watt, molded phenolic insulation, 7/32 in. dia. by 9/16 in. long, leads No. 18 wire 1-1/2 long.	For volume control network	AB Type GB-2221	ES-696708
R-463		RESISTOR: Composition, 68 ohms ± 10%, 1 watt, molded phenolic insulation, 7/32 in. dia. by 9/16 in. long, leads No. 18 wire 1-1/2 in. long.	For volume control network	AB Type GB-6801	ES-696709
R-464		RESISTOR: Composition, 180 ohms ± 10%, 1 watt, molded phenolic insulation, 7/32 in. dia. by 9/16 in. long, leads No. 18 wire 1-1/2 in. long	For volume control network	AB Type GB-1811	ES-696710
S-460		SWITCH: (A-OFF-B) Single current, 3-position	A TEL - B TEL switching	WECO	6540
S-461		SWITCH: (MVC-OFF-AVC) Multiple circuit, 3-position	MVC-OFF-AVC switching	WECO	ES-692210
S-462		SWITCH: Contacts single pole, normally closed. Gap 0.020 in., 24 V, 10 amp., molded plastic housing, 1-3/4 by 19/32 by 1/2 in. overall.	ON-OFF switching of receiver filaments and dynamotor	GE No. CR-1070C103	ES-692306

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT CONTROL UNIT C-43/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
410 to 419 series		CONTROL UNIT C-43/ARC-5	Controls two Radio Receivers R-20 to R-27/ARC-5 and one Radio Receiver R-28/ARC-5 (excepting channel selection) (See Control Unit C-30/ARC-5)	WECO D-151807	B-33090
C-410		CAPACITOR: Dry electrolytic 3 MF, 300 WVDC, 3/4 in. dia. by 1-3/4 in. high.	Audio filter capacitor	CD Mallory Sprague	ES-692651
E-410		LEVER: Switch, aluminum alloy, black enamel finish. 21/32 by 3/8 by 3/8 in. overall.	Lever for A-B, CW-MCW, and AVC-MVC switches	WECO	5444
E-411		KNOB: Stamped "INCREASE OUTPUT" with directional arrow. Molded black bakelite No. 14316. 0.671 in. dia. by 0.531 in. high, 0.250 in. dia. mounting hole. 6-32 set screw.	For gain or volume control	WECO	ES-690538
E-412		CRANK: Knob 21/32 in. dia. by 17/32 in. high, with crank 1-1/4 by 1-1/8 by 5/8 in. overall approx.	For remote tuning	WECO	7955
H-410		SNAPSLIDE: Formed, comprises	Fastener		
		SNAPSLIDE		Scoville	2540
		GUIDE		Patton	4750
		BUTTON		Thomson	5172
		WASHER: (2 req'd.)		Wallace	5171
J-410		RECEPTACLE: 8 contact, equivalent to ARC No. 6418, with nut No. 5131.	To receiver rack	WECO	6418
J-411		RECEPTACLE: Same as J-410	To receiver rack		
J-412		RECEPTACLE: Same as J-410	To receiver rack		
J-413		JACK: 9/16 in. dia. by 1-5/16 in. overall	A TEL	WECO	4691
J-414		JACK: Same as J-413	B TEL		
J-415		JACK: Same as J-413	A TEL		
J-416		JACK: Same as J-413	B TEL		

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT CONTROL UNIT C-43/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
J-417		RECEPTACLE: 2 contact, 7/8 in. dia. by 13/16 in. high.	To receiver rack for side-tone injection	WECO	2674
0-410		GEARING UNIT	For remote tuning	WECO	6550
0-411		SLEEVE: Aluminum alloy - no finish 0.687 in. O.D., 0.380 I.D. by 9/16 in. long approx. 0.594 in. dist. between 2 mtg. holes. 1/2 - 27 U.S. thread.	Fastening for tuning shaft	WECO	6397
0-412		NUT: Hex., brass, cad. plated, 11/16 in. on side by 1/16 in. thick.	Fastens sleeve to chassis	WECO	1285
0-413		SPLINE: Part of 0-410 assembly	Connects with tuning shaft MC-215	WECO	6403
0-414		SET SCREW: 6-32 by 5/32 in, Bristo, cup point, steel, blued.	Secures spline (0-413) to shaft of 0-410 assembly	WECO	4140
0-415		GEAR: Bevel, 18 teeth, 48 pitch, made from Boston Gear No. G-461, or equivalent 0.312 in. dia. by 0.406 in. high, 2 used in 0-410.	Tuning shaft drive	WECO	6392
0-416		GROOV-PIN: Type 1, 3/64 by 5/16 in. steel, z.p., 2 used in 0-410.	Secures bevel gears to shafts	GROOV Type 1	6012
R-410		POTENTIOMETER: Composition, 0-50,000 ohms ± 20%, 300° useful rotation. Cover and face plates, monel; shaft and other steel parts, 18-8 stainless. Brass parts nickel plated, 1-1/16 in. dia. by 1-17/32 in. high. Shaft 0.250 in. dia. by 5/16 in. long, includes 3/8-32 threaded section.	Gain control for Radio Receivers R-20 to R-27/ARC-5	AB Type J	6488
R-411		POTENTIOMETER: Same as R-410	Volume control		
R-412		POTENTIOMETER: Composition, 3-section, each rated at 2 watts. Useful rotation of shaft 313°. Corrosion resistant, 11/16 in. dia. by 2-15/16 in. long. Shaft 0.250 in. dia., 7/32 in. long, 1/4 in. bushing, 3/8-32 thread.	Control for Radio Receiver R-28/ARC-5	AB Type JJJ	ES-694799
R-412A		Part of R-412: Panel Section, term. 1 and 2. 50,000 ohms ± 20%.	Gain control		
R-412B		Part of R-412: Middle Section, term. 3, 4, 5 and 6. 60,000 ohms ± 20%.	High impedance volume control		
R-412C		Part of R-412: Rear Section, term. 7, 8, 9, 10. 4,600 ohms ± 20%.	Low impedance volume control		

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TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT CONTROL UNIT C-43/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR, AND DESIGNATION	DRAWING OR SPEC. NO.
R-413		RESISTOR: Composition, 820 ohms ± 10%, 1 watt, molded phenolic insulation, 7/32 in. dia. by 9/16 in. long, leads No. 18 wire 1-1/2 in. long.	For volume control network	AB Type GB-8211	ES-696707
R-414		RESISTOR: Composition, 2200 ohms ± 10%, 1 watt, molded phenolic insulation, 7/32 in. dia. by 9/16 in. long, leads No. 18 wire 1-1/2 in. long.	For volume control network	AB Type GB-2221	ES-696708
R-415		RESISTOR: Composition, 68 ohms ± 10%, 1 watt, molded phenolic insulation, 7/32 in. dia. by 9/16 in. long, leads No. 18 wire 1-1/2 in. long.	For volume control network	AB Type GB-6801	ES-696709
R-416		RESISTOR: Composition, 180 ohms ± 10%, 1 watt, molded phenolic insulation, 7/32 in. dia. by 9/16 in. long, leads No. 18 wire 1-1/2 in. long.	For volume control network	AB Type GB-1811	ES-696710
S-410		SWITCH: (A-OFF-B) 1-1/16 in. dia. by 1-3/8 in. long.	A TEL - B TEL switching	WECO	6540
S-411		SWITCH: (CW-OFF-MCW) 1-1/16 in. dia. by 1-3/8 in. long.	CW-OFF-MCW switching	WECO	6536
S-412		SWITCH: Same as S-410	A TEL - B TEL switching		
S-413		SWITCH: Same as S-411	CW-OFF-MCW switching		
S-414		SWITCH: Same as S-410	A TEL - B TEL switching		
S-415		SWITCH: (MVC-OFF-AVC) 1-1/16 in. dia. by 1-3/8 in. long approx.	MVC-OFF-AVC switching	WECO	ES-692210
S-416		SWITCH: Contacts single pole, normally closed, gap 0.020 in, 24 V, 10 amp., molded bakelite housing, 1-3/4 by 19/32 by 1/2 in. overall.	ON-OFF switching	GE No. CR-1070C-103	ES-692306

TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT TEST EQUIPMENT 1E-35-A

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
		TEST EQUIPMENT 1E-35-A			
620 to 659 series		Note: Units of Test Equipment 1E-35-A are identified as indicated by their AN or Army nomenclature. The component parts of each unit are described following the unit identification.	Squadron use for tuning VHF units	WECO D-150974	ES-694920
		ANTENNA A-85-A, TS-78/U			
		LAMP TYPE ARTIFICIAL ANTENNA: Terminates in coaxial fitting for direct attachment to socket S-239 or its equivalent Navy receptacle No. 49194 Includes three lamps I-640.	Visual aid in tuning VHF radio transmitters	WECO D-150729	ES-692891
I640	#	LAMP: 28-volt, 0.17 ampere, airplane type, bayonet base, interchangeable with Signal Corps Lamp 1M-38.	Load resistance, approx 50 ohms	GE Type 313	ES-693114
	#	LAMP KIT: Comprises six spare lamps for Antenna A-85-A, TS-78/U in cardboard container.	Replacements for lamps	GE Type 313	ES-693114
		INDICATOR I-106-A			
	#	RADIATION INDICATOR: Assembly. Includes items A-620 to N-620, inclusive, below.	VHF field strength and freq. indicator	WECO D-150731	ES-694514
A-620		TIP: Soft black rubber tip, 23/32 O.D. by 7/64 in. I.D. with 9/32 in. recess, 3/16 in. deep.	Mounting and shock absorber	Masback Type 137	ES-693124
A-621	#	MOUNTING: Pivoted mounting for antenna, phosphor bronze, 1-5/8 by 1-5/8 by 7/8 in.	Mounting for antenna E-620	Ward Type BLA	ES-694937
C-620		CAPACITOR: Variable air, 4.5-18 MMF, 3 plates. 2-1/2 by 1-3/4 by 1-3/8 in. Zero temperature coefficient.	Tunes circuit	Bud Mod. Type MC-1850	ES-694373
C-621		CAPACITOR: Silvered ceramic, 1.0 ± 0.25 MMF, 500 WVDC, 7/32 in. dia. by 7/16 in. long. Leads No. 20 wire, 1 in. long.	Tunes circuit	Erie Type NPOK	ES-692323
CR-620		SILICON RECTIFIER: Crystal rectifier, 9/32 in. dia. by 27/32 in. long.	Rectifies VHF to operate meter M-620	WECO D-164389	B-31926

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TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT TEST EQUIPMENT 1E-35-A

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR AND DESIGNATION	DRAWING OR SPEC. NO.
		INDICATOR I-106-A (Cont'd.)			
E-620	#	ANTENNA: Telescoping antenna, 5/8 in. dia., collapsed length / in., extended length 27 in.	Antenna	Ward Type BRA	ES-694462
H-620	#	METER GUARD: Molded polystyrene, three 0.160 in. dia. mounting holes, 120° apart on 1-37/64 in. radii, 0.095 in. thick in central section, 3-1/2 in. overall dia.	Protection to meter M-620	Injection	B-31086
H-621		SPRING: Antenna mounting tension, 1/2 in. by 1-3/16 in., .020 spring steel, .277 dia. hole.	Antenna stud tension	WECO	ES-694377
H-622		STUD: Antenna mounting, 1.094 in. long, steel.	Maintains position of antenna	WECO	ES-694475
M-620		METER: 0-200 microamperes d-c, 3-1/2 in. dia. by 2 in. high. 3 mounting holes for 6-32 screws, 120° apart. Accuracy 2% at full scale, 3-1/2 in. metal case.	Indicates amplitude of circulating current in tuned circuit	Weston 301 GE DO-41 WSTH NX-35 Triplett 321 Hickok 46 Simpson 25	ES-692420
N-620		DIAL: "Plano-Vernier" knob and dial assembly, 2-3/4 in. O.D. by 2-1/8 in. high, scale calibrated in megacycles, mounting hole 41/64 in. radius.	Vernier adjusting device for capacitor C-620	Crowe No. 298 Plano-Vernier Type	ES-692421
		TEST UNIT I-155-A	Tuning VHF radio transmitter	WECO D-150730	ES-693070
A-630		TIP: Rubber tip. Same as A-620	Mounting and shock absorber		
E-630		KNOB: Black with white filled pointer, 8-32 set screw cadmium plated, knob 3/4 in. dia. by 5/8 in. high, pointer 1-1/4 in. long.	For meter transfer switch	K-K Type S-292-1L	ES-694358
H-630	#	WRENCH ASSEMBLY: Hexagonal, includes tube and bushing, 7/16 dia. by 3/8 in. approx.	VHF transmitter tuning	WECO	ES-693997

TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT TEST EQUIPMENT 1E-35-A

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
		TEST UNIT I-155-A (Cont'd.)			
M-630		METER: 0-1.0 milliamperes d-c, ± 2% accuracy at full scale, 3-1/2 in. O.D. by 27/32 in. high, 3 mounting holes 0.145 in. dia., 120° apart. Bakelite case. These meters require a steel ring per Drawing B-40090 when nameplate panels are non-ferrous material instead of steel, as in later production. This ring is furnished with all meters in spare parts.	Multirange indicator	Triplet 321 Hickok 46 Simpson 25 Weston 301	ES-693084 (Meter alone) B-40217 (Incl. ring)
P-630		PLUG ASSEMBLY: Plug PL-152. 8-contact cord termination, 1-5/16 in. O.D. by 2-1/16 in. high.	To fit test receptacle of VHF transmitter	WECO	6577
R-630		RESISTOR: Wire wound, 100 ohms ± 5%, 1 watt, 1/2 in. dia. by 1 in. long.	Meter multiplier	WECO D-122907	ES-696671
R-633		RESISTOR: Wire wound, 30,000 ohms ± 2%, 1 watt, 5/16 in. dia. by 1 in. long.	Meter multiplier	WECO D-122881	ES-696678
R-634		RESISTOR: Wire wound, 50,000 ohms ± 2%, 1 watt, 9/16 in. dia. by 1 in. long.	Meter multiplier	WECO IRC WW4	ES-694983
R-635		RESISTOR: Wire wound, 1.0 megohm ± 1%, 1 watt, 7/8 in. dia. by 2-7/8 in. long.	Meter multiplier	WECO	ES-696699
S-630		SELECTOR SWITCH: 2-gang, 7-position, 2 in. dia. by 1-11/16 in. overall.	Meter transfer	Triplett	ES-694729
W-630		CORD: 8-conductor cord with anchor braid.	Connection to P-630	WECO	ES-694808
		R-F NOISE GENERATOR			
		BUZZER ASSEMBLY: Comprises a small adjustable buzzer, mounted in a tubular flashlight case. Two batteries BA-30 or equivalent (not furnished with buzzer) are required for its operation.	For tuning receiver	WECO D-150975	ES-694313
	#	BUZZER: Operation on 6 to 8 v. 1-1/2 by 1-5/8 by 1/2 in. approx.	Generates r-f noise	Edwards modified No. 15, Size 0	ES-694320
		SET OF TOOLS (Part of Test Equipment 1E-35-A)			
	#	SCREWDRIVER: 3 in. blade, fluted conical point, wood or bakelite handle, Phillips size No. 1.	For Phillips head screws	WECO	8020

TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT TEST EQUIPMENT 1E-35-A

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
		TEST UNIT (Cont'd.)			
	#	WRENCH: Hexagonal, L-shaped, 2-1/32 by 15/16 in.	For hex. socket head No. 6 cap screws in rec. tuning selector	WECO	ES-693794
	#	WRENCH: Hexagonal, L-shaped, 3/4 by 2-1/4 in.	For hex. socket head No. 8 cap screws in rec. drive unit mounting	Allen Bristol	ES-694745
	#	WRENCH: Hexagonal, L-shaped, 9/16 by 1-3/4 in.	For hex. socket head No. 6 set screws in trans. crystal switch	Allen Bristol	ES-694747
	#	WRENCH: 4-spline, L-shaped, 9/16 by 1-3/4 in.	For No. 6 Bristo 4-spline set screws	Allen Bristol	ES-694746
	#	WRENCH ASSEMBLY: Hexagonal, includes tube and bushing, 7/16 dia. by 5-3/8 in. approx.	For trans. tuning	WECO	ES-693997
	#	TUBE EXTRACTOR: U-shaped spring strip with hook ends, 4-1/2 in. long.	Removal of rec. type tubes	WECO	ES-696299

TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT TEST EQUIPMENT AN/GRM-1

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
600 to 679 series		TEST EQUIPMENT AN/GRM-1 Note: Units of Test Equipment AN/GRM-1 are identified as indicated by their AN or Army nomenclature. The component parts of each unit are described following the unit identification.	Depot use for maintenance	WECO D-151766 D-152018	B-33598 B-35707
		ANTENNA A-61-A	For testing LF, MF, HF radio transmitters	WECO	7777
		CAPACITOR: Vacuum type unit, 100 MMF ± 5%, 1-5/8 in. dia. by 3 in. long, including terminals 0.562 in. dia., 4-9/10 in. long.	Antenna capacitor	GE Type ZA-31 or equiv.	8046
		METER: R-F thermocouple type, 0-4 amperes, with wide flange metal case	Current indicator	Weston Type 507	7781
		RESISTOR: Wire wound resistor assembly, 4.7 ohms ± 0.1 ohm, 9 required in each antenna assembly; winding A-A' No. 32 DSC manganin wire, 13 turns; winding B-B' same, windings 2-11/32 in. long on form. Connected in series parallel.	Load resistance	WECO	2994
		ANTENNA A-68-A	For testing VHF radio transmitters	WECO D-150978	ES-694259
J-660		JACK: Coaxial receptacle, interchangeable with Signal Corps Socket SO-239. 1 by 1 by 1-1/16 in.	Input connection	WECO D-164459 Selector CSX-49194	ES-695893
M-660		METER: Thermocouple type, 0-500 milliamperes r-f, 1.5 ohm impedance, 100-156 mc, bakelite case	Current indicator	Triplett Special No. 341	ES-694296
R-660		RESISTOR: Assembly of 12 units connected in parallel, composition type, each 620 ohms ± 5%, 1 watt, 1-5/16 in. dia. by 3/4 in. high.	Load resistance, approx. 52 ohms	WECO	ES-694264
R-661		RESISTOR: Composition, 51 ohms ± 5%, 1/2 watt, molded phenolic insulation, leads No. 20 wire 1 in. long.	Meter calibration correction	AB Type EB-5105 IRC Type BT-1/2	ES-695679

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TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT TEST EQUIPMENT AN/GRM-1

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
		ANTENNA A-69-A, TS-79/U			
		ARTIFICIAL ANTENNA: Coaxial plug and 50-ohm resistor. Terminals provided for soldering.	Matches input impedance of VHF radio rec. to signal generator	WECO D-150892	ES-692884
		SHUNTING UNIT			
		SHUNTING UNIT: 1500 ohm resistor and .006 MF capacitor connected in series. Has 2 insulators, 2 crocodile clips. 2-9/16 by 4 by 11/16 in. overall approx.	Alignment of i-f stages of VHF radio rec.	WECO D-150984	ES-694608
		TEST UNIT TS-58/GRM-1	Testing LF, MF, HF or VHF radio transmitter	WECO D-151782 D-151929	B-32928 B-35170
E-610		KNOB: Molded black bakelite, 3/4 in. dia. by 5/8 in. high. White filled pointer 1-1/4 in. long.	For meter transfer switch	K-K No. S-292-1L	ES-694358
J-610		RECEPTACLE: 12-contact assembly, includes No. 5130 nut. 1-7/8 in. dia. by 7/8 in. high. Similar to ARC No. 9417.	Connects to modulator	WECO	B-32828
J-611		RECEPTACLE: Same as J-610	Connects to transmitter rack or adapter		
M-610		METER: 0-1.0 milliampere d-c, 0-100 scale, 150 ohms ± 1%, 3-1/2 in. bakelite case. These meters require a steel ring per Drawing B-40090 when nameplate panels are non-ferrous material. This ring is furnished with all meters in spare parts per Drawing B-40217.	Multi-range indicator	Weston Type No. 301 Triplett Type No. 321 Simpson Type No. 25 Hickok Type No. 46	ES-693084
R-610		RESISTOR: Wire wound, 50,000 ohms ± 1%, 9/16 in. dia. by 1 in. long. 2 lugs, 5/16 in. long	Meter multiplier	IRC Type WW4	ES-694983
R-611		RESISTOR: Case 13/16 in. dia. by 2-13/16 in. long, contains one WECO resistor per D-163450-A, 500,000 ohms ± 1%, 1 watt, 11/16 in. dia. by 3-1/16 in. long including lead wires.	Meter multiplier	WECO	ES-696700

TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT TEST EQUIPMENT AN/GRM-1

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
		TEST UNIT TS-58/GRM-1 (Cont'd.)			
R-612		RESISTOR: Case 11/16 in. dia. by 2-17/32 in. long, contains one WECO resistor per D-163450-A, 1.0 megohm ± 1%, 1 watt, 11/16 in. dia. by 3-1/16 in. long including lead wires.	Meter multiplier	WECO	ES-695699
R-613		RESISTOR: Wire wound, 0.6 ohm ± 1/2%, 1 watt, 9/16 in. dia. by 1 in. long, 2 lugs 5/16 in. long.	Meter shunt	IRC Type WW4	ES-695295
R-614		RESISTOR: Wire wound, 3.0 ohms ± 1/2%, 1 watt, 9/16 in. dia. by 1 in. long, 2 lugs 5/16 in. long.	Meter shunt	IRC Type WW4	ES-695296
S-610		SWITCH: 2-gang, 5-position 2 in. dia. by 1-11/16 in. high overall approx.	Meter transfer	Triplett	ES-694984
		TEST UNIT I-104-A	Test of LF, MF, HF or VHF radio receiver	WECO D-150727	ES-693934
C-601		CAPACITOR: Dry electrolytic, 3 MF, 300 WVDC, 3/4 in. dia. by 1-13/16 in. long approx. in sealed aluminum container.	By-pass capacitor	CD Mallory Sprague	ES-692651
E-600		KNOB: Molded black bakelite 3/4 in. dia. by 5/8 in. high. White filled pointer 1-1/4 in. long, No. 8-32 set screw.	Knob for switches and volume control	K-K S-292-IL	ES-694358
E-601		BINDING POST: Spring type, engraved "-", 1/2 in. dia. by 1-1/2 in. long threaded section 3/4 in. long with 0.138-32 thread, polished nickel plate finish.	For test leads	ARH modified No. 1755	ES-694420
E-602		BINDING POST: Spring type, engraved "+", otherwise same as E-601.	For test leads	ARH modified No. 1755	ES-694408
F-600		FUSE: Cartridge type, 10 ampere, 5 second delay. (Interchangeable with Signal Corps FU-21).	For L.V. + line	Littelfuse No. 1081C Bussman Type MDL	4414
J-600		JACK: Telephone, 5/8 in. dia. by 1/2 in. high, approx.	To headset or output meter	WECO	4691
J-601		RECEPTACLE: 6-contact includes No. 5131 nut.	To J-103 of radio receiver R-28/ARC-5	WECO	5577

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT TEST EQUIPMENT AN/GRM-1

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
		TEST UNIT I-104-A (Cont'd.)			
J-602		RECEPTACLE: 12-contact includes No. 5131 nut. 1-7/8 in. dia. by 7/8 in. high.	To cord CD-524 to 8-channel VHF receiver	WECO	7025
J-603		RECEPTACLE: 2-contact includes No. 5131 nut.	To primary source	WECO	6485
J-604		RECEPTACLE: 8-contact includes No. 5131 nut. 1-3/8 in. dia. by 3/4 in. high	To cord CD-533, or cord CD-532 to rec. rack	WECO	6418
J-605		JACK: Same as J-600	For L.V. line		
M-600		METER: 0-50 microamperes d-c, resistance 2200 ohms ± 1%, 3-1/2 in. dia. by 2 in. high, bakelite case, 3 mounting holes, 1/8 in. dia., 120° apart. Accuracy 2% at full scale.	Meter readings when testing LF-MF-HF and VHF receivers	Weston 301 Simpson 25	ES-694429
R-600A,B		POTENTIOMETER: 2-gang unit, 1st section 50-50,000 ohms, 2nd section 30-30,000 ohms, tolerance each section ± 20%, 2 watts per section.	MVC gain control for MF or VHF radio receiver and AVC volume control	AB Type JJ	ES-693937
R-601		RESISTOR: Wire wound, 10 ohms ± 1%, 1 watt, 2-1/2 by 3/8 by 1/16 in.	Meter shunt	Nilsson	ES-694772
R-602		RESISTOR: Wire wound, 2800 ohms ± 1%, 1 watt, 1 in. max. by 5/8 in. high.	Meter multiplier	Nilsson No. 2072	ES-694773
R-603		RESISTOR: Film type, 4 megohms ± 1%, 2 watt. Leads 1-1/2 in. long, No. 18 wire, 9/32 in. dia. by 1-3/4 in. long.	Meter multiplier	CC CO Type X-2	ES-694775
R-604		RESISTOR: Film type, 10 megohms ± 1%, 5 watt. Leads 1-1/2 in. long, No. 18 wire, 1/2 in. dia. by 2 in. long.	Meter multiplier	CC CO Type X-5	ES-694774
R-605		RESISTOR: Same as R-602	Meter multiplier		
R-606		RESISTOR: Wire wound, 0.025 ohm + 1/2%, - 1-1/2% to carry 10 amp., 2-1/2 by 1/4 by 1/4 in. 4 lead wires No. 16 insulated copper 12 in. long. 2 mounting holes tapped No. 4-40, 1/4 in. deep.	Meter shunt	Nilsson No. D-2700	ES-694777
R-607		RESISTOR: Film type, 1.0 megohm ± 1%, 1 watt. Leads 1-1/2 in., No. 18 wire, 9/32 in. dia. by 1 in.	Meter multiplier	CC CO Type X-1	ES-694776
S-600A,B		SWITCH ASSEMBLY: 4-pole, 5-position switch assembled with SPST filament switch. 2-1/2 by 2 by 1-1/2 in.	CW MCW OFF MVC AVC switch	WECO	ES-694400
S-601		SWITCH: 2-section, 7-position switch	Meter transfer switch	Mallory Special RM	ES-694401

TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT TEST EQUIPMENT AN/GRM-1

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
		TEST UNIT I-104-A (Cont'd.)			
S-602		SWITCH: Single-pole, 8-position switch	Channel selection	Mallory Special RM	ES-694779
		TEST UNIT I-155-A	Tuning VHF radio transmitters	WECO D-150730	ES-693070
		See replaceable parts list for Test Equipment IE-35-A			
		CRYSTAL UNIT DC-30			
		CRYSTAL UNIT: Pressure type or plated type, BT-cut. Frequency accuracy ± 0.025%, for temperature range -50°C to +90°C. Molded bakelite holder 1-13/64 by 1-1/8 by 7/16 in. deep, with two-pin base. Six crystals are furnished with each Test Equipment AN/GRM-1, calibrated in kilocycles, as indicated on the nameplate of each holder.	For servicing VHF transmitters	Philco WECO D-151430 D-151429	ES-691811 ES-696395
		Crystal Freq. in Kilocycles / Carrier Freq. in Megacycles: 5,555.555 / 100; 6,222.222 / 112; 6,833.333 / 123; 7,333.333 / 132; 8,111.111 / 146; 8,666.666 / 156			
		CRYSTAL UNIT DC-31			
		CRYSTAL UNIT: Pressure type, BT-cut, or plated type, AT-cut. Frequency accuracy ± 0.025%, for temperature range -50°C to +90°C. Molded bakelite holder, 1-13/64 by 1-1/8 by 7/16 in. deep, with two pin base. Four crystals are supplied with each Test Equipment AN/GRM-1, calibrated in kilocycles, as indicated by the nameplate on each holder.	For servicing VHF receivers	Philco WECO D-151431 D-151432	ES-691811 ES-696395
		Crystal Freq. in Kilocycles / Carrier Freq. in Megacycles: 4,045.833 / 104; 4,712.500 / 120; 5,712.500 / 144; 6,212.500 / 156			

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT TEST EQUIPMENT AN/GRM-1

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR, AND DESIGNATION	DRAWING OR SPEC. NO.
		+TEST EQUIPMENT CORDS			
	#CD-525	CORD: 2-conductor cable, one Plug PL-148, assembled per drawing No. 7548.	Battery to modulator	WECO	B-34136
	#CD-527	CORD: 6-conductor cable, two Plugs PL-151, assembled per drawing No. 5808.	Sidetone injection	WECO	B-34140
	#CD-528	CORD: 5-conductor cable, two Plugs PL-156, assembled per drawing No. 5810.	Antenna relay unit control	WECO	B-34142
	#CD-531	CORD: 2-conductor cable, one Plug PL-147, assembled per drawing No. 7547.	Battery to rec. rack	WECO	B-34146
	#CD-532	CORD: 8-conductor, cable, two Plugs PL-152, assembled per drawing No. 6693.	Receiver control	WECO	B-34148
	#CD-706	CORD: 8-conductor cable, terminated on one end in Plug PL-152 and on other end in receptacle assembly No. 7874 and special shell and bracket assembly. Modification of Cord CD-533 per drawing No. 7382.	Receiver rack adapter	WECO	ES-694605
	#CD-745	CORD: Coaxial transmission line, 52-ohms impedance, coaxial fittings on either end.	VHF transmitter to Antenna A-85-A	WECO	ES-694606
	#CD-905	CORD: 2-conductor cable, Plug PL-151 and Plug PL-157.	Sidetone test	WECO	ES-696728
	#CX-31/GRM-1	CORD: 12-conductor cable, two plugs No. 9377. Similar to ARC No. 9376.	Power supply to trans. rack	WECO	ES-696347
	#CX-32/GRM-1	CORD: 18-conductor cable, 2 plugs No. 6962. Similar to ARC No. 5803.	ON-OFF control and emission selection	WECO	ES-696348
	#CX-33/GRM-1	CORD: 8-conductor cable, terminated on one end in plug No. 9599 and on other end in receptacle assembly No. 9296. Similar to ARC No. 9557.	Transmitter rack adapter	WECO	B-33692
	#CX-34/GRM-1	CORD: Y-cord, consisting of two 6-conductor cables, each made from cable per drawing No. 6794. Common end terminated in Plug PL-154. Other terminations are Plug PL-151 and Plug No. 6966.	Channel selection for Trans. and Rec.	WECO	B-32937
		+Test equipment cords are furnished in 5 ft. lengths unless otherwise specified.			

TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT TEST EQUIPMENT AN/GRM-1

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
		SET OF TOOLS (Part of Test Equipment AN/GRM-1)	Radio set maintenance	WECO D-150979	ES-694612
	#	SCREWDRIVER: 3 in. blade, fluted conical point, wood or bakelite handle, Phillips size No. 1.	For Phillips head screws	WECO	8020
	#	WRENCH: Hexagonal, L-shaped, 21/32 by 2-5/16 in.	For No. 6 hex. socket head cap screws in rec. tuning selector	WECO	ES-693794
	#	WRENCH: Hexagonal, L-shaped, 3/4 by 2-1/4 in.	For No. 8 hex. socket head cap screws in rec. drive unit mounting	Allen Bristol	ES-694745
	#	WRENCH: Hexagonal, L-shaped, 9/16 by 1-3/4 in.	For No. 6 hex. socket head set screws in trans. crystal switch	Allen Bristol	ES-694747
	#	WRENCH: 4-spline, L-shaped, 9/16 by 1-3/4 in.	For No. 6 Bristo 4-spline set screws	Allen Bristol	ES-694746
	#	WRENCH: Hexagonal, L-shaped, 11/32 by 2-3/32 in.	For No. 6 socket head cap screws in rec. selector motor mounting	WECO	ES-695728
	#	WRENCH ASSEMBLY: Hexagonal, includes spring, tube and bushing, 7/16 by 5-3/8 in. approx.	For trans. tuning	WECO	ES-693997
	#	TUBE EXTRACTOR: U-shaped spring strip with hook ends, 4-1/2 in. long.	Removal of rec. type tubes	WECO	ES-696299
	#	ALIGNING TOOL: Fibre handle with 0.122 in. wide by 0.018 in. thick blade at one end and 0.122 in. wide by 0.032 in. thick blade at other end.	For rec. trimmers and filters	Insuline No. 1006 WECO	ES-694743
	#	THICKNESS GAUGE: 25 leaves, first leaf 0.0015 in., remaining 24 leaves in consecutive thicknesses from 0.002 to 0.025 in., 1/2 by 7/16 by 2-7/8 in.	Contact gap measurements	Hanson No. 25 Goodell No. 25	ES-695312
	#	TOOL: Contact burnisher, sandblasted steel blades, hard rubber handle, 4-31/32 in. overall length.	For cleaning relay contacts	WECO 2650	
	#	TOOL: Slotted end blade, hard rubber handle, 3-7/8 in. overall length	For adj. relay springs	WECO 270	

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TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT TEST EQUIPMENT AN/GRM-1

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR AND DESIGNATION	DRAWING OR SPEC. NO.
		SET OF TOOLS (Cont'd.)			
	#	TOOL: Slotted end blade, insulated handle 4 in. overall length.	For adj. relay springs	WECO 363	
	#	TOOL: Offset slotted end blade, insulated handle 3-25/32 in. overall length	For adj. relay springs	WECO 535A	
	#	TOOL: Slotted end blade, 3-1/32 in. long.	For adj. relay springs	WECO 303	
		Note: The following items comprise the remaining components of Test Equipment AN/GRM-1. They are shown here to complete the apparatus list for this Test Equipment. Control Units C-30/ARC-5 and C-43/ARC-5 are described in the foregoing part of this table covering VHF components. The remaining items are principal components of the LF-MF-HF operating equipment and are described in Volume 1.			
	#	CONTROL UNIT C-30/ARC-5	ON-OFF trans. control and channel selection	WECO D-151760	B-32611
	#	CONTROL UNIT C-43/ARC-5 (with name plate and dials for 190-550 kc and 3-6 mc).	Rec. control	WECO D-151807	B-34151
	#	ANTENNA RELAY UNIT BC-442-A, RE-2/ARC-5. Similar to ARC No. 5017.	Antenna switching	WECO	5017
	#				B-33690
	#	CONTROL UNIT MC-237. Similar to ARC No. 6743	Local tuning control of rec.	WECO	6743
	#	CRYSTAL UNIT: 3000 kc. Similar to ARC No. 7785	Dial calibration	WECO 7785	B-38056
	#	CRYSTAL UNIT: 4000 kc. Similar to ARC No. 7785	Dial calibration	WECO 7785	B-38056
	#	CRYSTAL UNIT: 5300 kc. Similar to ARC NO. 7785	Dial calibration	WECO 7785	B-38056
	#	CRYSTAL UNIT: 7000 kc. Similar to ARC No. 7785	Dial calibration	WECO 7785	B-38056
	#	CRYSTAL UNIT: 9100 kc. Similar to ARC No. 7785	Dial calibration	WECO 7785	B-38056

TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT TEST EQUIPMENT AN/GRM-1

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
	# #	DYNAMOTOR DM-33-A, DY-8/ARC-5 (Dynamotor Unit assembly, including mounting base).	Provides d-c high voltage to transmitting equipment	CONT WECO GE WSTH	5168
	#	MODULATOR MD-7/ARC-5 (With tubes - similar to ARC No. 9313)	Provides A-F power to trans.	WECO	B-33691
	# #	MOUNTING BASE FT-279-A, MT-62/ARC-5 (Similar to ARC No. 5694)	For 2 rec. rack	WECO	5694 B-33603
	# #	MOUNTING BASE FT-227-A, MT-70/ARC-5 (Similar to ARC No. 7062)	For 2 trans. rack	WECO	7062 B-33604
	# #	MOUNTING BASE FT-225-A, MT-76/ARC-5 (Similar to ARC No. 7058)	For modulator	WECO	7058 B-33605
	# #	MOUNTING BASE FT-229-A, MT-77/ARC-5 (Similar to ARC No. 7056)	For antenna relay unit	WECO	7056 B-33606
	# #	MOUNTING PLATE FT-228-A, MT-80/ARC-5 (Similar to ARC No. 7083)	For Control Unit C-30/ARC-5	WECO	7083 B-33588
	# #	MOUNTING PLATE FT-222-A, MT-98/ARC-5 (Similar to ARC No. 7054)	For Control Unit C-43/ARC-5	WECO	7054 B-33592
	# #	MOUNTING RACK FT-277-A, MT-63/ARC-5 (Similar to ARC No. 5018)	For 2 rec.	WECO	5018 B-33607
	#	MOUNTING RACK MT-71/ARC-5 (Similar to ARC No. 9307)	For 2 trans.	WECO	B-33679

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT DYNAMOTOR *DY-2/ARR-2

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR, AND DESIGNATION	DRAWING OR SPEC. NO.
		DYNAMOTOR: *DY-2/ARR-2			
A-9	#	BASE: Base assembly	Holds dynamotor and fittings	WECO	5722
	#	BASE CASTING: Base, die cast, part of above		WECO	5208
A-15	#	END SHIELD: Bearing bracket, L.V. and H.V. ends	Holds bearing		
		Bracket Assembly, L.V. end	Holds bearing	CONT 26201 GE K-8128685AB2 (Includes E-17) WSTH 1-C-5435 Assm. 1 includes brush holders RD 25B14A-2	
A-15	#	Bracket Assembly, H.V. end	Holds bearing	GE K-8128685AB3 (Includes E-22) WSTH 1-C-5433 Assm. 1 includes brush holders RD 25B32A-1	
A-16	#	YOKE: Stator shell	Holds A-20	CONT 22944 GE K-8100672AA1 WSTH 1-C-5431 Assm. 1 RD 8B6A	
A-17		END COVER: Cover	Covers, brushes, etc.	CONT 19964-1 GE K-5859161AD-PT2 WSTH 5-D-7098 Item 2 RD 33A6-2	

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TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT DYNAMOTOR *DY-2/ARR-2

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
A-20	#	POLE: Field pole assembly	Part of magnetic path	CONT 21667 GE K-8100682AA1 WSTH 5-D-7113 Assm. 1 RD 3A3A	
C-34		CAPACITOR: Fixed, mica, 0.001 MF, ±20%, 500 WVDC	R-F filter	CM25A102M AEROVOX 1465 GE K-8104077AA-PT1 WSTH 93-D-287 Item 3 RD 49A6-1	
D-1	#	DYNAMOTOR MACHINE: Dynamotor machine	H-V for receiver	WECO KS-5572 CONT 25926-WS-7610 GE M-5845839 (5DY82AB1) WSTH 957972A RD B5044	
E-2	#	ARMATURE: Armature assembly	Rotor	CONT 27829-WS-7610 GE K-8128612AA3 WSTH 6-B-9580 Assm. 2 RD 4B13A-2	
E-16		CAP: Screw cap for L.V. and H.V. brush holders	Keeps brush in holder	CONT 23607-2 GE K-8100698AA1 WSTH 4-D-9423 Assm. 1 RD 29A10	

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT DYNAMOTOR *DY-2/ARR-2

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
E-17	#	HOLDER: Brush holder L.V.	For L.V. brushes	CONT 23610-X GE K-8100707AA3 (Included in A-15) WSTH 1-C-5434 Assm. 2 RD 38A25A-1	
E-18		BRUSH: Brush assembly, L.V. (+)	Collects current from armature	CONT 23609-3(+) GE K-8100699AC Gr. 1 (Incl. one + and one - brush) WSTH 7-D-8756 Assm. 5 RD 24A22A-1	
E-19		BRUSH: Brush assembly, L.V. (-)	Collects current from armature	CONT 23609-3(-) GE (Included in E-18) WSTH 7-D-8756 Assm. 4 RD 24A22A-2	
E-20		BRUSH: Brush assembly, H.V. (+)	Collects current from armature	CONT 23609-4 (+) GE K-5893583AD Gr. 1 (Incl. one + and one - brush) WSTH 7-D-8755 Assm. 3 RD 24A23A-1	
E-21		BRUSH: Brush assembly, H.V. (-)	Collects current from armature	CONT 23609-4 (-) GE (Included in E-20) WSTH 7-D-8755 Assm. 4 RD 24A23A-2	

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TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT DYNAMOTOR *DY-2/ARR-2

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
E-22	#	HOLDER: Brush holder H.V.	For H.V. brushes	CONT 23610-2-X GE K-8100708AB3 (Included in A16) WSTH 1-C-5434 Assm. 1 RD 38A25A-2	
E-23	#	SLOT WEDGE: Insulation (wire guard)	Prevents chafing of leads	CONT 12077 GE K-8100729AA-PT2 WSTH 6-D-6418 Item 1 RD 20A33-1	
H-9		SNAPSLIDE: Formed snapslide. Parts of the mechanism include: Snapslide, formed Snapslide guide Snapslide button Washer (2 req'd.)	Fastener	 Scoville Patton Thomson Wallace	 2540 4750 2116 5171
H-11	#	SCREW: Screw for bearing retainer (M.S.F.H. 2-56 by 1/4 in., steel, nickel plated).	Holds H-12	CONT 25926-23 GECO (describe) WSTH 6-B-9601 Item 4 RD 10A22	
H-12	#	RETAINER: Bearing retainer	Protects O-1	CONT 26207 GE K-8100689AA-PT2 WSTH 5-D-7097 Item 2 RD 46A11	

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT DYNAMOTOR *DY-2/ARR-2

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
H-13	#	PIN: Lock pin for brush holder, L.V. and H.V.	Locks E-17 and E-22 to A-15	CONT 25926-19 GE K-586929BAE-PT3 WSTH 836146 Item 15 RD 56A5-3	
H-14	#	DOWEL: Dowel pin for locking end shield	Locks end shield A-15	CONT 25926-26 GE K-812784AA-PT1	
H-15	#	BOLT: Clamp bolt	Connects end shields	CONT 25926-13 GE K-810685AA-PT10 WSTH 5-D-7104 Item 1 RD 10A35-1	
H-16	#	WASHER: Lockwasher for clamp bolt	Locks H-15	CONT 25926-25 GE K-585283AB-PT11 WSTH 2-D-743 Item 12 RD 39A1-2	
H-17	#	NUT: Nut for clamp bolt, hex. 6-32 by 7/64 in., brass, nickel plated.	Holds H-15	CONT 25926-24 WSTH 6-B-9601 Item 6 GE (describe) RD 15A10-1	

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT DYNAMOTOR *DY-2/ARR-2

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
H-18		GROMMET: Grommet, circular	Prevents chafing of lead wires	CONT 25926-18 GE K-8104169AA-PT1 WSTH 5-D-7168 Item 1 RD 9A3	
H-19		SCREW: Screw, cover holding	Holds end cover	CONT 25926-14 GE K-5863363AB-PT4 WSTH 4-D-9508 Item 1 RD 10A23-3	
H-20		WASHER: Lockwasher for cover screw, No. 6, internal tooth, non-ferrous	Locks H-19	CONT 25926-28 GE K-5852837AB-PT10	
H-21		WASHER: Plain washer for cover screw	Used with H-20	CONT 25926-27 GE K-5863757AA-PT7 WSTH 93-D-397 Item 2 RD 21A25	
H-22	#	SCREW: Screw, connects L.V. and H.V. leads	Holds leads to connecting lug	CONT 25926-20 GE K-5828728AA-PT5 WSTH 23-D-531 Item 15 RD 10A30-1	

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT DYNAMOTOR *DY-2/ARR-2

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
H-23	#	WASHER: Lockwasher for connecting screw	Used with H-22	CONT 25926-21 GE K-5855039A-PT21 WSTH 2-D-743 Item 12 RD 39A5	
H-24	#	SCREW: Screw for field pole (M.S.F.H. 8-32 by 3/8 in. steel, nickel plated)	Holds pole A-20	CONT 25926-17 WSTH 1-C-5493 Item 5 GE (describe) RD 10A16-3	
H-25	#	THROWER: Oil thrower	Prevents oil from reaching commutators	CONT 21666 GE K-8100691AA1 WSTH 4-D-4769 Item 7 RD 21A24-1	
H-26		STUD: Stud (on dynamotor base), 4-40 thread	Dynamotor orientation	WECO	5219
H-31A	#	WASHER: Washer, 0.002 in. shim	Shim for bearing	GE K-5852841AB-PT4	
H-31B	#	WASHER: Washer, 0.003 in. shim	Shim for bearing	GE K-5852841AB-PT5	
H-32	#	WASHER: Spring washer	End play spring	GE K-5852841AC-PT1 WSTH 6-D-6780 Item 1	
J-5		PLUG: Plug assembly, 3-contact	Connects to receiver	WECO	5211

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT DYNAMOTOR *DY-2/ARR-2

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR, AND DESIGNATION	DRAWING OR SPEC. NO.
L-16	#	COIL: Field coil (2 sections)	Field coil	CONT 21668-WF-7610 GE V-5872743 WSTH 1-C-2150 Assm. 3 RD 2B19@1	
O-1	#	BALL BEARING: Ball bearing assembly	Anti-friction	CONT 25926-10 GE K-589658AC-PT2 WSTH 5-D-7158 Item 2 RD 37A6	
W-1	#	GROUNDING STRIP: Ground lead and terminals, L.V. (-) and H.V. (-) (tinned copper).	Ground connection for L.V. (-) and H.V. (-)	CONT 25926-33 GE K-813438AA-PT1 WSTH 6-D-6538 Item 1 RD 17A17	
W-2	#	WIRE: Connecting lead and terminal L.V. (+) (No. 20 AWG, white).	L.V. (+)	CONT 25926-31 GE K-8100716AA3 WSTH 5-D-7125 Assm. 1 RD 18A36-5	
W-3	#	WIRE: Connecting lead and terminal H.V. (+) (No. 20 AWG, red).	H.V. (+)	CONT 25926-32 GE K-8100716AA1 WSTH 5-D-7125 Assm. 2 RD 18A37-4	
		INSULATION: Insulation under coil	Protects coil from yoke	GE K-5855318G-PT1	

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT DYNAMOTOR DY-8/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
		DYNAMOTOR: DY-8/ARC-5			B-33602 B-35162
A-59	#	END SHIELD: Bearing bracket, L.V. end	Holds bearing, L.V. end	CONT 23371-3 GE K-8128686AA3 (Includes E-76) WSTH 1-C-5413 Assm. 1 (with brushes)	
A-60	#	YOKE: Stator shell	Holds A-63	CONT 27825 GE K-8100599AA1 WSTH 6-B-9595 Assm. 1	
A-61	#	END SHIELD: Bearing bracket, H.V. end	Holds bearing, H.V. end	CONT 23371-1 GE K-8128686AA4 (Includes E-77) WSTH 1-C-5414 Assm. 1 (with brushes)	
A-62	#	END COVER: Cover	Covers brushes, etc.	CONT 16576-1 GE K-8100677AA1 WSTH 5-D-7117 Assm. 1	
A-63	#	POLE: Field pole assembly	Part of magnetic circuit	CONT 24284 GE K-8109891AA1 WSTH 5-D-7110 Assm. 1	
A-71	#	BASE: Base, including casting	Holds dynamotor and fittings	WECO	5723
	#	BASE CASTING: Base, die cast, part of above		WECO	5174

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT DYNAMOTOR DY-8/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
C-50	#	CAPACITOR: Fixed, mica, 0.006 MF ± 20%, 500 WVDC	R-F filter	CM40A622M CONT 27824-32 GE K-8104076AA-PT1 WSTH 5-D-7140 Item 1 CD 3L	
D-50	#	DYNAMOTOR MACHINE: Dynamotor machine	H.V. for transmitter	WECO KS-5571 CONT 27824-WS-7666 GE M-5845843 (5DY83AB1) WSTH 957971-A	
F-75	#	CAP: Screw cap for L.V. brush holder	Keeps L.V. brush in holder	CONT 23607-1 GE K-8100712A A1 WSTH 5-D-7005 Assm. 1	
E-76	#	HOLDER: Brush holder, L.V.	For L.V. brushes	CONT 23610-7-X GE K-8100700AA-3 (Included in A-59) WSTH 5-B-8277 Assm. 2	
E-77	#	HOLDER: Brush holder, H.V.	For H.V. brushes	CONT 23610-4-X GE K-8100708AA3 (Included in A-61) WSTH 6-B-9568 Assm. 2	

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TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT DYNAMOTOR DY-8/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
E-78	#	CAP: Screw cap for H.V. brush holder	Keeps H.V. brush in holder	CONT 23607-2 GE K-8100698AA1 WSTH 4-D-9423 Assm. 1	
E-79	#	BRUSH: Brush assm. L.V. (+)	Collects current from armature	CONT 23609-9(+) GE K-5859146AD Gr.1(Incl. one + and one - brush) WSTH 7-D-8601 Assm. 3	
E-80	#	BRUSH: Brush assembly, L.V. (-)	Collects current from armature	CONT 23609-9(-) GE (Included in E-79) WSTH 7-D-8601 Assm. 4	
E-81	#	BRUSH: Brush assembly, H.V. (+)	Collects current from armature	CONT 23609-6(+) GE K-5893583AD Gr.3 (Incl. one + and one - brush) WSTH 7-D-8601 Assm. 1	
E-82	#	BRUSH: Brush assembly, H.V. (-)	Collects current from armature	CONT 23609-6(-) GE (Included in E-81) WSTH 7-D-8601 Assm. 2	

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MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT DYNAMOTOR DY-8/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR, AND DESIGNATION	DRAWING OR SPEC. NO.
E-83	#	SLOT WEDGE: Insulation (wire guard)	Prevents chafing of lead wires	CONT 12061-424 GE K-8100729AA-PT1 WSTH 53-D-923 Item 19	
E-84	#	GROMMET: Grommet, circular	Prevents chafing of lead wires	CONT 27824-19 GE K-8104169AA-1 WSTH 5-D-7168 Item 1	
E-85	#	ARMATURE: Armature assembly	Rotor	CONT 12836-WS-7666 GE K-8128609AA3 WSTH 6-B-9598 Assm. 2 (with ball bearing)	
H-60	#	RETAINER: Bearing retainer	Protects O-50	CONT 23100 GE K-8100680AA-PT2 WSTH 5-D-7042 Item 2	
H-61	#	SCREW: Screw for bearing retainer (M.S.F.H. 4-40 by 1/4 in. steel, nickel plated)	Holds H-60	CONT 27824-24 WSTH 6-B-9605 Item 4 GE (describe)	
H-62	#	DOWEL: Dowel pin for locking end shield	Locks end shields A59 and A-61	CONT 27824-27 GE K-8127844AA-PT1	

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TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT DYNAMOTOR DY-8/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
H-63	#	NUT: Nut for clamp bolt, hex. 6-32 by 7/64 in. thick brass, nickel plated.	Holds H-65	CONT 27824-25 WSTH 6-B-9605 Item 6 GE (describe)	
H-64	#	WASHER: Lock washer for clamp bolt	Locks H-63	CONT 27824-26 GE K-5852837AB-PT11 WSTH 2-D-743 Item 12	
H-65	#	BOLT: Clamp bolt	Connects end shield	CONT 17042-424 GE K-8100685AA-PT13 WSTH 5-D-7064 Item 1	
H-66	#	SCREW: Screw, connects L.V. and H.V. leads	Holds leads	CONT 27824-21 GE K-5828728AA-PT-5 WSTH 23-D-531 Item 9	
H-67	#	WASHER: Lock washer for connecting screw	Used with H-66	CONT 27824-22 GE K-5855029AA-PT21 WSTH 2-D-743 Item 12	
H-68	#	SCREW: Set screw for brush holder	Locks brush holder	CONT 27824-20	

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TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT DYNAMOTOR DY-8/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
H-68	#	PIN: Lock pin for brush holder	Locks brush holder	WSTH 836146 Item 4	
H-70	#	THROWER: Oil thrower	Prevents oil from reaching commutator	CONT 25230 GE K-8100719AA-PT1 WSTH 5-D-7139 Item 3	
H-71	#	WASHER: Lock washer for cover screw	Used with H-72	CONT 27824-29 GE K-5852837AA-PT10	
H-72	#	SCREW: Screw, cover holding	Holds end cover	CONT 17043-400 GE K-5863363AB-PT4 WSTH 4-D-9508 Item 1	
H-73	#	WASHER: Plain washer for cover screw.	Used with H-72	CONT 27824-28 GE K-5863757AA-PT7 WSTH 93-D-937 Item 2	
H-74	#	SCREW: Screw for field pole (10-24 by 1/2 in., steel, plated).	Hold pole A-63	CONT 27824-18 WSTH 1-C-5455 Item 4 GE (describe)	
H-80	#	STUD: Stud	Dynamotor orientation	WECO	5182

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TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT DYNAMOTOR DY-8/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
H-83	#	SNAPSLIDE: Formed snapslide. Parts of the mechanism include	Fastener		
	#	Snapslide		Scoville	2540
	#	Snapslide guide		Patton	4750
	#	Snapslide button		Thomson	2116
	#	Washer (2 req'd.)		Wallace	5171
H-85A	#	WASHER: Washer, 0.002 in. shim	Shim for bearing	GE K-8132367AA-PT1	
H-85B	#	WASHER: Washer, 0.003 in. shim	Shim for bearing	GE K-8132367AA-PT2	
H-86	#	WASHER: Spring washer	End play spring	GE K-8132367AB-PT1 WSTH 6-D-6780 Item 2	
J-50	#	PLUG: Plug assembly, three contact	Connects to modulator unit	WECO	5173
L-53	#	COIL: Field coil A - Left B - Right	Field coil (two sections)	CONT 26210-3 & 26210-4 GE V-5872740 WSTH 1-C-5443 Assm. 3	
O-50	#	BEARING: Ball bearing assembly	Anti-friction	CONT 27824-11 GE K-5893659AC-PT2 WSTH 5-D-7158 Item 1	
W-50	#	GROUNDING STRIP: Ground lead and terminals L.V. (-) and H.V. (-). Tinned copper.	Ground connection for L.V. (-) and H.V. (-)	CONT 27824-30 GE K-8132438AA-PT2 WSTH 6-D-6538, Item 2	

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TABLE OF REPLACEABLE PARTS

MODEL AIRCRAFT RADIO EQUIPMENT AN/ARC-5 MAJOR UNIT DYNAMOTOR DY-8/ARC-5

REFERENCE SYMBOL	ARMY STOCK NUMBER NAVY TYPE NUMBER BRITISH REFERENCE NUMBER	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. AND DESIGNATION	DRAWING OR SPEC. NO.
W-51	#	WIRE: Connecting lead and terminal, H.V. (+) (No. 20 AWG, red).	H.V. (+)	CONT 27824-31 GE K-8100716AA4 WSTH 5-D-7180 Assm. 1	
W-52	#	WIRE: Connecting lead and terminal, L.V. (+) (No. 20 AWG, white). Part of L-53B	L.V. (+)	CONT (See L-53) GE (See L-53) WSTH 5-D-7180 Assm. 2	
	#	WIRE: Wire for screw	Locks screw	GE K-5855123AA-PT1	
	#	INSULATION: Insulation under coil	Protects coil L-53 from yoke A-60	GE K-5855318CJ-PT2	

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TABLE 6

SCREWS, WASHERS AND NUTS, ETC. USED ON AN/ARC-5 VHF EQUIPMENT

DESCRIPTION	DRAWING NO.
SCREWS	
Binding head, brass, #2-56 x 9/32, silver plated	ES-693941
Flathead, brass, #2-56 x 3/16, cadmium plated	ES-693347
Flathead, steel, #2-56 x 5/16, cadmium plated	ES-694748
Binding head, steel, #2-56 x 1/2, cadmium plated	ES-696245
Binding head, steel, #2-56 x 9/16, cadmium plated	ES-692634
Flathead, steel, #2-56 x 13/16, black nickel plated	ES-692339
Round head, Phillips, self-tapping, steel, #2 x 5/32, cadmium plated	ES-690832
Binding head, steel, #3-48 x 1/8, cadmium plated	ES-694647
Flathead, Phillips, #3-48 x 3/16, black nickel	6010
Binding head, steel, #3-48 x 3/16, cadmium plated	ES-693265
Flathead, brass, #3-48 x 3/16, cadmium plated	ES-693268
Slotted head, set screw, steel, #4-40 x 1/8, nickel plated	ES-693221
Binding head, steel, #4-40 x 1/4, cadmium plated	ES-693379
Binding head, brass, #4-40 x 1/4, nickel plated	6008
Flathead, steel, #4-40 x 9/32, cadmium plated	ES-693394
Binding head, brass, #4-40 x 13/32, cadmium plated	ES-693052
Set, Bristo, cup point, steel, #6-32 x 1/8, blued	ES-690676
Set, Bristo, cup point, steel, #6-32 x 5/32, blued	4140
Set, Bristo, cup point, steel, #6-32 x 3/16, blued	4139
Binding head, steel, #6-32 x 1/4, cadmium plated	ES-693528
Socket head, steel, #6-32 x 1/4, cadmium plated	ES-693374
Binding head, steel, #6-32 x 7/16, cadmium plated	ES-693557
Socket head, hexagonal, #6-32 x 7/16, cadmium plated	ES-693373
Binding head, steel, #6-32 x 9/16, cadmium plated	ES-695884
Binding head, steel, #6-32 x 1-7/8, cadmium plated	ES-693347

SCREWS, WASHERS AND NUTS, ETC. USED ON AN/ARC-5 VHF EQUIPMENT (Cont'd.)

DESCRIPTION	DRAWING NO.
SCREWS (Cont'd.)	
Binding head, steel, #6-32 x 2-1/8, cadmium plated	ES-693480
Binding head, steel, #6-32 x 2-3/8, cadmium plated	ES-693479
Socket cap, hexagonal, steel, #8-7/16, cadmium plated	ES-693783
Fillister head, steel, #8-32 x 7/32, cadmium plated	6016
Socket cap, hexagonal, steel, 8-32 x 9/32, cadmium plated	ES-693375
Special head, brass, #8-32 x 1.302, silver plated	ES-692212
Special head, brass, #8-32 x 1.474, diam. red to .132 for 1/2, silver plated	ES-692213
Special head, brass, #8-32 x 1.474, silver plated x .188 dia.	ES-693861
WASHERS	
Paper, red rope, 3/8 O.D. x 5/32 I.D. x .015	ES-693482
Paper, red rope, 7/32 O.D. x .105 I.D. x 1/64	ES-693054
Paper, red rope, 9/32 O.D. x .120 I.D. x .015	ES-692805
Western Electric #P-210736, cold rolled, steel	ES-692144
Steel, cold rolled, .203 O.D. x .094 I.D. x .020, cadmium plated	ES-693213
Brass, 7/32 O.D. x .105 I.D. x .020, cadmium plated	ES-693529
Steel, 1/4 O.D. x 7/64 I.D. x 1/32, cadmium plated	ES-692341
Brass, 9/32 O.D. x .132 I.D. x .025, cadmium plated	ES-693047
Phenol fibre, 5/16 O.D. x .152 I.D. x 1/32	ES-693398
Steel, 3/8 O.D. x .172 I.D. x .032, cadmium plated	ES-693402
Steel, .187 O.D. x .094 I.D. x .020, cadmium plated	ES-693309
Shakeproof lockwasher, #1206, cadmium plated	ES-692839
Shakeproof lockwasher, #1202, cadmium or zinc plated	ES-691998
Shakeproof lockwasher, #1220-2, cadmium plated	ES-692307
Shakeproof lockwasher, #1902, cadmium plated	ES-693348
Split #2, bronze, .094" x .187" x .031 thick, no finish	8030

SCREWS, WASHERS AND NUTS, ETC. USED ON AN/ARC-5 VHF EQUIPMENT (Cont'd.)

DESCRIPTION	DRAWING NO.
WASHERS (Cont'd.)	
Shakeproof lockwasher, #1203, cadmium or zinc plated	ES-692453
Lockwasher #3, bronze, int. tooth, no finish	ES-693130
Lockwasher #4, steel, cadmium plated	ES-692214
Lockwasher #4, phosphor bronze, int. tooth	ES-693845
Lockwasher #4, steel, int. tooth, cadmium plated	ES-692224
Lockwasher #4, brass, ext. tooth, cadmium plated	ES-692370
Shakeproof lockwasher, #1904, nickel plated	4242
Shakeproof lockwasher, #1904, no finish	ES-692147
Shakeproof lockwasher, #1104, cadmium plated	ES-692224
Steel, #6, non-linking, cadmium plated	ES-693688
Bronze, #6, int. tooth, no finish	4042
Shakeproof lockwasher, #1106, cadmium plated	ES-692438
Steel, #8, non-linking, cadmium plated	ES-693785
Brass, .187 O.D. x .089 I.D. x .016, no finish	3876
NUTS	
Nut, hexagonal, steel, #2-56 x 3/16 x 1/16, cadmium plated	ES-692340
Nut, hexagonal, brass, #2-56 x .156 x .050, cadmium plated	4376
Nut, hexagonal, brass, #2-56 x .186 x .062, cadmium plated	ES-693008
Nut, hexagonal, steel, #3-48 x 3/16 x 1/16, cadmium plated	ES-692256
Nut, hexagonal, brass, #3-48 x 3/16 x 1/16, cadmium plated	ES-693269
Nut, hexagonal, steel, #4-40 x 1/4 x 3/32, cadmium plated	ES-692572
Nut, hexagonal, brass, #4-40 x 1/4 x 3/32, cadmium plated	ES-692148
Nut, hexagonal, steel, #4-40 x 3/16 x 1/16, cadmium plated	ES-692225
Nut, hexagonal, steel, #4-40 x 1/4 x 3/32, cadmium plated	ES-692572
Nut, hexagonal, steel #6-32 x 5/16 x 7/64, cadmium plated	ES-692442

SCREWS, WASHERS AND NUTS, ETC. USED ON AN/ARC-5 VHF EQUIPMENT (Cont'd.)

DESCRIPTION	DRAWING NO.
NUTS (Cont'd.)	
Nut, hexagonal, brass, #6-32 x 1/4 x .078, nickel plated	4041
Nut, hexagonal, brass #6-32 x 3/16 x 3/32, cadmium or zinc plated	ES-696668
Nut, hexagonal, steel, #8-32 x 11/32 x 1/8, cadmium plated	ES-692443
Nut, hexagonal, steel, #1/4-28 x 7/16 x 3/32, cadmium plated	ES-693851
Nut, hexagonal, brass, #1/2-27 x 11/16 x 1/16, cadmium plated	1285
Nut, ring, brass, #3/8-32, .515 O.D. x .094, nickel plated	4697
Nut, ring, aluminum alloy, 1.812 dia. x .125 thick, no finish	5310
CLAMPS	
Cable, formed, steel, 1-5/32 x 3/8 x .0312, cadmium or zinc plated	B-31401
Cable, formed, steel, 1-3/16 x .375 x .0375, cadmium plated	B-33164
Cable, formed, steel, 1 x 3/8 x .0312, cadmium plated	ES-693307
Cable, formed, steel, 3/4 x 3/8 x .0312, cadmium plated	ES-693478
Cable, formed, steel, 3/4 x 5/16 x .031, cadmium plated	ES-693778
FASTENERS	
Sems, 3-48 x 5/32, binding head, steel, cadmium plated, int. tooth	ES-692222
Sems, 3-48 x 3/16, binding head, steel, cadmium plated, int. tooth	ES-692074
Sems, 3-48 x 7/32, binding head, steel, black nickel, int. tooth	ES-692223
Sems, 3-48 x 1/4, binding head, steel, cadmium plated, int. tooth	ES-693115
Sems, 4-40 x 5/32, binding head, steel, cadmium plated, int. tooth	ES-693210
Sems, 4-40 x 3/16, binding head, brass, nickel plated, int. tooth	ES-692698
Sems, 4-40 x 3/16, binding head, steel, cadmium plated, int. tooth	ES-692073
Sems, 4-40 x 3/16, binding head, steel, black nickel, int. tooth	ES-694848
Sems, 4-40 x 7/32, binding head, steel, cadmium plated, int. tooth	ES-693959
Sems, 4-40 x 1/4, binding head, steel, cadmium plated, int. tooth	ES-693079
Sems, 4-40 x 1/4, binding head, brass, black nickel, int. tooth	ES-693641

SCREWS, WASHERS AND NUTS, ETC. USED ON AN/ARC-5 VHF EQUIPMENT (Cont'd.)

DESCRIPTION	DRAWING NO.
FASTENERS (Cont'd.)	
Sems, 4-40 x 5/16, binding head, steel, cadmium plated, int. tooth	ES-693362
Sems, 4-40 x 11/32, binding head, steel, cadmium plated, int. tooth	ES-693209
Sems, 4-40 x 13/32, binding head, steel, cadmium plated, int. tooth	ES-693393
Sems, 6-32 x 5/32, binding head, steel, cadmium plated, int. tocth	ES-693779
Sems, 6-32 x 3/16, binding head, steel, cadmium plated, int. tooth	ES-692354
Sems, 6-32 x 7/32, binding head, steel, cadmium plated, int. tooth	ES-694582
Sems, 6-32 x 1/4, binding head, steel, black nickel, int. tooth	ES-695859
Sems, 6-32 x 1/4, binding head, steel, cadmium plated, int. tooth	ES-692089
Sems, 6-32 x 9/32, binding head, steel, cadmium plated, int. tooth	ES-693780
Sems, 6-32 x 9/32, binding head, steel, black nickel, int. tooth	ES-694656
Sems, 6-32 x 5/16, binding head, steel, cadmium plated, ext. tooth	ES-692354
Sems, 6-32 x 5/16, binding head, steel, cadmium plated, int. tooth	ES-692764
Sems, 6-32 x 3/8, binding head, steel, cadmium plated, int. tooth	ES-694855
Sems, 6-32 x 3/8, binding head, steel, cadmium plated, int. tooth	ES-692257
Sems, 6-32 x 9/16, binding head, steel, black nickel, int. tooth	ES-695620
Sems, 6-32 x 1-1/8, binding head, brass, cadmium plated, int. tooth	ES-693721
Sems, 8-32 x 3/16, binding head, steel, cadmium plated, int. tooth	ES-693372
Sems, 8-32 x 9/32, binding head, steel, cadmium plated, int. tooth	ES-693855
Sems, 8-32 x 3/8, binding head, steel, cadmium plated, int. tooth	ES-693212
Dzus, 5/16 head, shank .187 dia., 3/8 long, cadmium or zinc plated	ES-692363
PINS	
Groov, steel, 3/4 x 3/16, zinc plated	4166
Groov, steel, 3/64 x 5/32, zinc plated	4165
Groov, steel, 3/64 x 1/4, zinc plated	4156
Groov, steel, 3/64 x 5/16, zinc plated	6012
Groov, steel, 1/16 x 9/32, cadmium plated	ES-693222

SCREWS, WASHERS AND NUTS, ETC. USED ON AN/ARC-5 VHF EQUIPMENT (Cont'd.)

DESCRIPTION	DRAWING NO.
PINS (Cont'd.)	
Groov, steel, 1/16 x 1/4, zinc plated	4541
Groov, steel, 1/16 x 5/16, zinc plated	4542
Groov, steel, 1/16 x 3/8, zinc plated	4543
Groov, steel, 1/16 x 7/16, zinc plated	4158
Groov, steel, 1/16 x 3/4, zinc plated	ES-693481
Pin, steel, 1/16 x 1, annealed, cadmium plated	ES-691719
Pin, brass, .062 x .797 x .125, nickel plated	7463
RIVETS	
Tubular, brass, .062" x 5/64, nickel plated	4567
Special head, steel, .063 x .094 corrosion resistant	ES-692744
Tubular, brass, .101 x 3/32, cadmium plated	ES-692847
Tubular, brass, 11/64 x .090, cadmium plated	ES-693186
SPRINGS	
Spiral, 15 turns, close wound, right-hand, 13/32 long x .090 dia.	3984
Formed, phosphor bronze, .750 dia. x 1/8 high x .020 thick, nickel plated	6834
Formed, phosphor bronze, 1.534 x 3/4 x 1/32 thick, cadmium plated	B-35365
Formed, phosphor bronze, 47/64 x 1-1/2 x 15/32, 1/2 thick, silver plated	B-36596
Formed, 1.344 x 33/64 x .015, beryllium copper or phosphor bronze, cadmium plated	ES-692741
Formed, 3-3/8 x .343 x 33/64, copper beryllium or phosphor bronze, cadmium plated	ES-692743
Spiral, 19/32 x .300 dia., .016 music wire, cadmium or zinc plated	ES-692826
Formed, has one Dzus fastener, 1" long, x 1/32 thick	ES-692843
Formed, music wire, .045 dia., 5/8 long x .150, cadmium plated	ES-692845
Formed, phosphor bronze, .875 x .250 x .020, silver plated	ES-692914
Formed, phosphor bronze, 1/2 x 7/32 x .009, silver plated	ES-692924

SCREWS, WASHERS AND NUTS, ETC. USED ON AN/ARC-5 VHF EQUIPMENT (Cont'd.)

DESCRIPTION	DRAWING NO.
SPRINGS (Cont'd.)	
Formed, 1-1/2 x 7/16 over-all	ES-693131
Spiral, .145 dia. x .093 wide, 2-3/8 turns, .013 stainless steel music wire	ES-693241
Spiral, .109 dia. x 5/16 long, 7-1/4 turns, .011 music wire, cadmium plated	ES-693593
Formed, .026 dia. steel music wire, 13/16 x .390 dia. x 1/8	ES-694910
Formed, phosphor bronze, 1-3/4 x 15/32 x 1/2, .012 thick, silver plated	ES-695680
Formed, phosphor bronze, 1-1/2 x .032 x 1/4, .020 thick, no finish	ES-695684
TERMINALS	
Brass, .187 bet. holes of .094 and .047 r. x 1/4 x .016, silver plated	3873
Brass, 21/32 x 1/4 x 1/8, .025 thick, tin dipped	4023
Brass, 45° bend, hole at either end, .144 dia. and .081 dia., tin dipped	5837
Brass, 90° bend, hole at either end, .144 dia. and .081 dia., tin dipped	5838
Formed, 1/2 x 1/4 x 1/8, 1/32 thick	7710
Screw, #4, soldering lug	CP-82844
Hex. head, brass, #4-40 x 3/16, 9/16 long, cadmium plated	ES-692084
Insulated, #4-40 mtg. stud, 9/32 x 61/64 long	ES-692153
Lock, phosphor bronze, .281 x 5/8 x .018, tin dipped	ES-692440

TABLE 7—IDENTIFICATION OF MANUFACTURERS

Code Letters	*Name of Manufacturer*	*Address*
AB	Allen-Bradley Co.	118 W. Greenfield Ave., Milwaukee, Wis.
AEROVOX	Aerovox Corp.	742 Belleville Ave., New Bedford, Mass.
ALLEN	Allen Manufacturing Co.	133 Sheldon St., Hartford, Conn.
ALLIED	Allied Control Co.	2 East End Ave., New York, N. Y.
AMPHENOL	American Phenolic Corp.	1830 S. 54th St., Chicago, Ill.
ARC	Aircraft Radio Corp.	Boonton, N. J.
ARH	American Radio Hardware Co.	476 Broadway, New York, N. Y.
BRISTOL	Bristol Co.	117 Bristol Road, Waterbury, Conn.
BUD	Bud Radio Co.	5205 Cedar Ave., Cleveland, Ohio
BUSSMAN	Bussman Manufacturing Co.	2538 W. University Ave., St. Louis, Mo.
CCCO	Continental Carbon, Inc.	13900 Lorain Ave., Cleveland, Ohio
CD	Cornell Dubilier Corp.	1000 Hamilton Blvd., So. Plainfield, N. J.
CENT	Centralab, Div. of Globe Union, Inc.	900 E. Keefe Ave., Milwaukee, Wis.
CH	Cutler-Hammer, Inc.	1401 W. St. Paul St., Milwaukee, Wis.
CINCH	Cinch Manufacturing Co.	2339 W. Van Buren St., Chicago, Ill.
CLARE	C. P. Clare Co.	4719 Sunnyside Ave., Chicago, Ill.
CONT	Continental Electric Co.	325 E. Ferry St., Newark, N. J.
CROWE	Crowe Nameplate & Mfg. Co.	259 W. 14th St., New York, N. Y.
DZUS	Dzus Fastener Co.	John St., Babylon, L. I.
EASTMAN	Eastmen Kodak Co.	347 State St., Rochester, N. Y.
EDWARDS	Edwards Co.	1128 Leggett St., New York, N. Y.
EL-MENCO	Electro-Motive Mfg. Co.	Willimantic, Conn.
ERIE	Erie Resistor Corp.	644 W. 12th St., Erie, Pa.
GE	General Electric Co.	1 River Road, Schenectady, N. Y.
GICO	General Instrument Co.	829 Newark Ave., Elizabeth, N. J.
GOODELL	Goodell Pratt Co.	Greenfield, Mass.
GROOV	Groov-Pin Corp.	411–13 Kerrigan Ave., Union City, N. J.
HAM	Hammarlund Mfg. Co.	424 W. 33rd St., New York, N. Y.
HANSON	Hanson, Einar, B.	Worcester, Mass.
HICKOK	Hickok Electric Instrument Co.	DuPont & Williams St., Cleveland, Ohio
INJECTION	Injection Molding Corp.	115 4th Ave., New York, N. Y.
INSULINE	Insuline Corp. of America	30–32 Northern Blvd., Long Island City, N. Y.
ISOLANTITE	Isolantite, Inc.	343 Cortlandt St., Belleville, N. J.
IRC	International Resistance Corp.	401 N. Broad St., Philadelphia, Pa.
K-K	Kurz-Kasch	1415 S. Broadway, Dayton, Ohio
LITTELFUSE	Littelfuse Laboratories	4765 Ravenswood Ave., Chicago, Ill.
MALLORY	Mallory, P. R. Co., Inc.	1941 Thomas St., Indianapolis, Ind.

TABLE 7—INDENTIFICATION OF MANUFACTURERS—Continued

Code Letters	*Name of Manufacturer*	*Address*
MASBACK	Masback Hardware Co.	326 Hudson St., New York, N. Y.
MILLER	Miller Co., J. W.	5917 S. Main St., Los Angeles, Calif.
NATIONAL	National Radio Products	61 Sherman St., Malden, Mass.
NAT. UNION	National Union Radio Corp.	57 State St., Newark, N. J.
NILSSON	Nilsson Electric Lab.	103 Lafayette St., New York, N. Y.
OAK	Oak Manufacturing Co.	1260 N. Claybourn Ave., Chicago, Ill.
OHMITE	Ohmite Manufacturing Co.	4837 Flournoy St., Chicago, Ill.
OSTER	Oster Manufacturing Co., John	Main & West Sts., Genoa, DeKalk County, Ill.
PATTON	Patton MacGuire Co.	Providence, R. I.
PHILCO	Philco Corp.	Tioga & C Sts., Philadelphia, Pa.
RCA	Radio Corp. of America (Radiotron Div.)	Harrison, N. J.
RD	Redmond, A. G., Co.	1941 Hodde St., Owosso, Mich.
SCOVILLE	Scoville Manufacturing Co.	Waterbury, Conn.
SELECTAR	Selectar Manufacturing Corp.	21-10 49th Ave., Long Island City, N. Y.
SIMPSON	Simpson Electric Instrument Corp.	5216 Kinzie St., Chicago, Ill.
SOLAR	Solar Manufacturing Co.	588 Avenue A, Bayonne, N. J.
SPRAGUE	Sprague Specialties Corp.	189 Beaver St., No. Adams, Mass.
SYLVANIA	Sylvania Electric Products, Inc.	500 Fifth Ave., New York, N. Y.
THOMSON	Thomson, J. L., Manufacturing Co.	Waltham, Mass.
TRIPLETT	Triplett Electric Instrument Co.	Bluffton, Ohio
TRS	Tubular Rivet & Stud Co.	Wollaston, Mass.
TUNGSOL	Tung-sol Lamp Works, Inc.	95 Eighth St., Newark, N. J.
WALLACE	Wallace Barnes Co.	Newtonville, Mass.
WARD	Ward Products Corp.	1523 East 45th St., Cleveland, Ohio
WECO	Western Electric Co.	120 Broadway, New York, N. Y.
WESTON	Weston Electrical Instrument Co.	690 Frelinghuysen Ave., Newark, N. J.
WHITE	White, S. S., Dental Mfg. Co.	10 E. 40th St., New York, N. Y.
W-L	Ward Leonard Co.	6 South St., Mt. Vernon, N. Y.
WSTH	Westinghouse Electric & Mfg. Co.	East Pittsburgh, Pa.