AN 08-30APR2-3

HANDBOOK OF MAINTENANCE INSTRUCTIONS

for

RADAR RECEIVING EQUIPMENT AN/APR-2

RESTRICTED

Approved 19 JULY 1944

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Destruction of Abandoned Materiel in the Combat Zone

In case it should become necessary to prevent the capture of this equipment and 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, machetes, or whatever heavy object is readily available.
3. Burning by means of incendiaries such as gasoline, oil, paper, or wood.
4. Grenades and shots from available arms.
5. Burying all debris or disposing of it in streams or other bodies of water, where possible and when time permits.

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, connections, and meters.
4. Rip out all wiring and cut interconnections of electrical equipment. Smash gas, oil, and water-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, phones, microphones, etc.
7. Destroy all classes of carrying cases, straps, containers, etc.
8. Bury or scatter all debris.

DESTROY EVERYTHING!

★

Unsatisfactory Report

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. Radio 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 instructions of the Bureau of Aeronautics. In addition to other distribution required, one copy shall be furnished to the inspector of Naval Materiel (location to be specified) 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.

SAFETY NOTICE

This equipment employs high voltages which are dangerous and may be fatal if contacted by personnel. Use extreme caution when working with the equipment.

SECTION I
GENERAL DESCRIPTION

1. GENERAL.

a. Radar Receiving Equipment AN/APR-2 is a receiver designed to scan either automatically (at a rate of 2 or 6 sweeps a second) or manually the frequency band of 90 to 1,000 megacycles and to indicate radar or radio signals received.

b. The receiver indicates visually in panoramic fashion on a dial and records on an electro-sensitive tape the approximate frequencies and time of the received signals. It also provides facilities for aural presentation of received signals.

c. This equipment is designed for use in areas where signal sources are relatively widespread and primarily as an indication of the frequency band in which the signal source exists, rather than an exact determination of the received frequency. Such information and that concerning the characteristics of the received signal should be obtained with other receiving equipment specifically designed for that purpose.

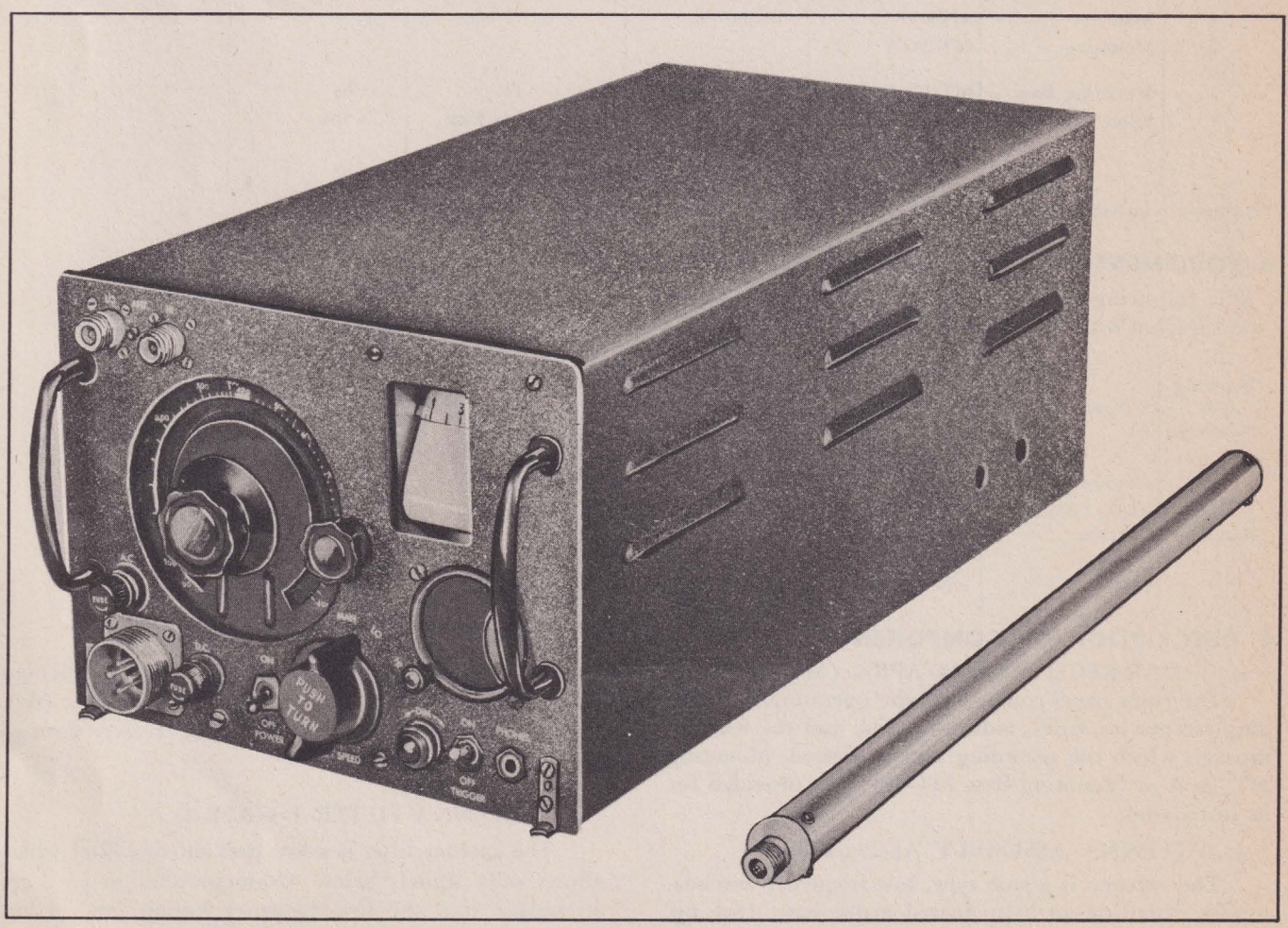


Figure 1-1. Radar Receiver R-34/APR-2 And Antenna Filter F-3/APR-2

2. EQUIPMENT SUPPLIED.

The following table lists the equipment supplied.

Quantity Per Equipment	*Name of Unit*	*Army Type Designation*	*Navy Type Designation*	*Overall Dimensions*	*Weight*	*Numerical Series of Reference Symbols*
1	Radar Receiver	R-34/APR-2	R-34/APR-2	21 inches long 10-1/2 inches wide 7-5/8 inches high	46.5 lbs.	1-405 for Radar Receiving Equipment AN/APR-2
1	Antenna Assembly	AS-25/APR-2	AS-25/APR-2	30 inches long (with mounting)	5.2 lb.	
1	Antenna Assembly	AS-26/APR-2	AS-26/APR-2	8 inches long (with streamlined blister)	3.6 lbs.	
1	Cover (Blister)	CW-3/APR-2	CW-3/APR-2	Included with AS-26/APR-2	Included with AS-26/APR-2	
1	Antenna Filter	F-3/APR-2	F-3/APR-2	21-1/8 inches long 1-1/4 inches diameter	1.4 lbs.	
7	Radio Frequency Plug	UG-21/U*	UG-21/U*	1-1/2 inches long 5/8 inch diameter	0.3 lbs. each	
1	Plug	PL-259		1-1/2 inches long 5/8 inch diameter	0.2 lbs.	
1	Plug	AN3108-22-4S (PL-Q230)	AN3108-22-4S	2-1/8 inches long 1-19/32 inches diameter	0.25 lbs.	
1	Adapter	AN3057-12	AN3057-12			
1 or 1	Mounting Mounting Base	MT-23/A MT-171/U	MT-171/U	Size 1/ATR	1.5 lbs.	
1	Filter	F-11/APR	F-11/APR	8-1/2 inches long 5/8 inch diameter	0.24 lbs.	

*Formerly referred to as Navy Type C-49268 or type N plugs.

3. EQUIPMENT REQUIRED BUT NOT SUPPLIED.

The following table lists the equipment required but not supplied with Radar Set AN/APR-2.

Quantity Per Equipment	*Name of Unit*	*Army Type Designation*	*Navy Type Designation*	*Required Characteristics*
1	Headset			
As Required	Radio Frequency Cable	RG-8/U or RG-31/U or (WC-549-( )	RG-8/U or RG-31/U	
2	Clips	AN-742-20C	AN-742-20C	Loop type tube clip

4. DESCRIPTION OF COMPONENTS.

a. RADAR RECEIVER R-34/APR-2. *(See figure 1-1.)*

The front panel contains all the operating controls, plug receptacles, fuses, indicating dial, and the window through which the recording tape is viewed. Mounting MT-23/A or Mounting Base MT-171/U is provided for its installation.

b. ANTENNA ASSEMBLY AS-25/APR-2.

The antenna is a stub type, low-frequency antenna, copper plated on an impregnated maple base. (See fig. 1-2.) It is connected to the receiver by a coaxial cable.

c. ANTENNA ASSEMBLY AS-26/APR-2.

The antenna assembly is a 60°/90° cone shaped, high frequency antenna inclosed in a streamlined blister (figs. 1-3 and 1-4). It is also connected to the receiver through a coaxial cable.

d. ANTENNA FILTER F-3/APR-2.

The antenna filter is a low pass antenna filter which allows only signals below 420-megacycles to pass unattenuated into the low-frequency tuning unit of the receiver. (See fig. 4-7.)

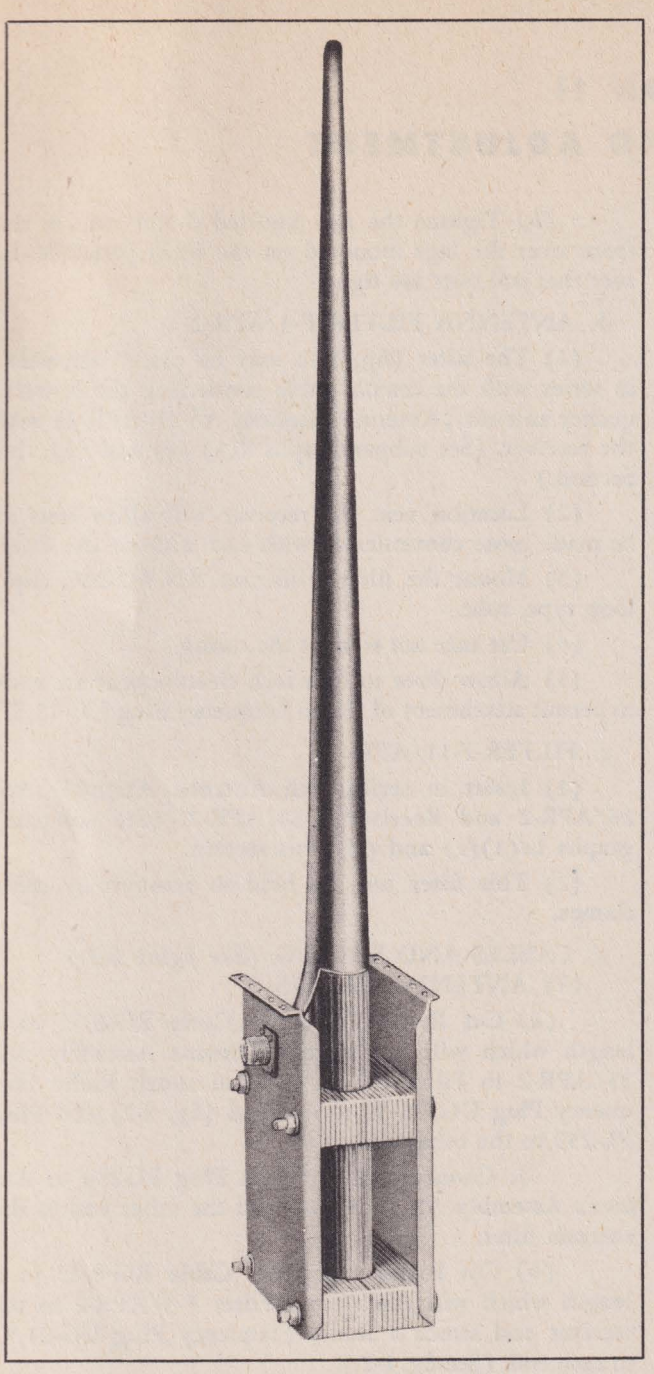


Figure 1-2. Antenna Assembly AS-25/APR-2

e. FILTER F-11/APR.

This is a low-pass filter, designed to attenuate signals over 1200-megacycles in a 50-ohm transmission lines. Each end has a female type "N" connector.

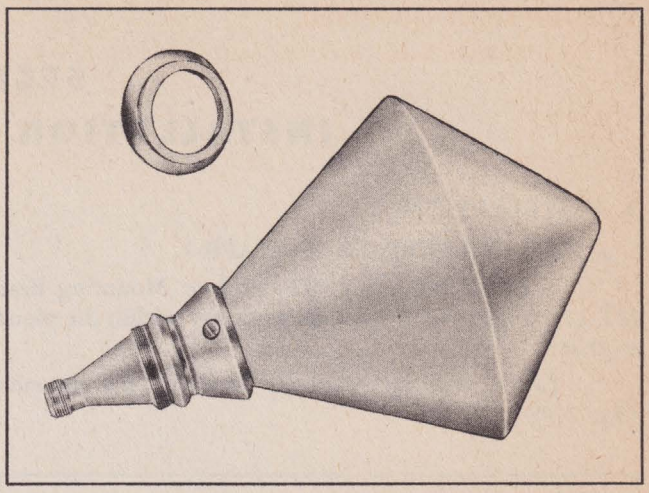


Figure 1-3. Antenna Assembly AS-26/APR-2— With Cover CW-3/APR-2 Removed

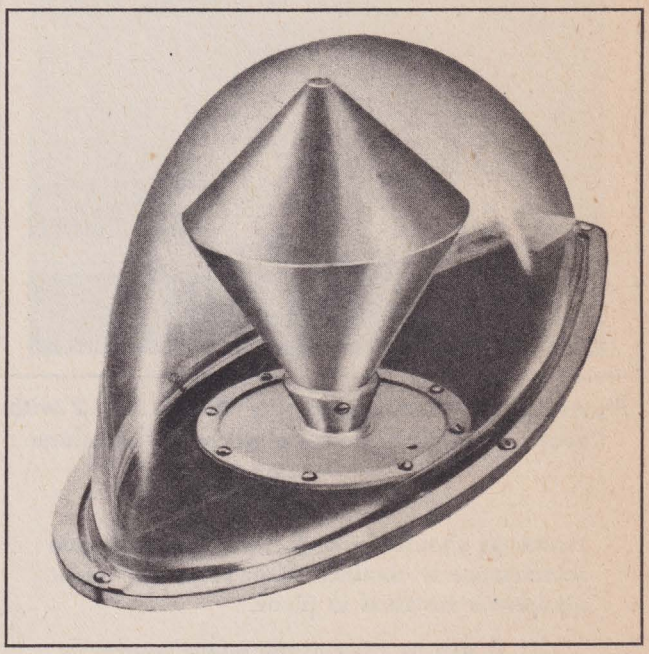


Figure 1-4. Antenna Assembly AS-26/APR-2— With Cover CW-3/APR-2.

5. POWER REQUIREMENTS.

a. Radar Receiving Equipment AN/APR-2 requires an a-c power source of either 75 to 85 or 105 to 125 volts whose frequency is maintained within the limits 400 to 2600 cps, and a d-c power source of 24 to 28 volts.

b. The power required from the a-c source is approximately 100 watts; that required from the d-c source is approximately 50 watts.

SECTION II
INSTALLATION AND ADJUSTMENT

1. INSTALLATION.

a. RADAR RECEIVER R-34/APR-2.

(1) Fasten Mounting MT-23/A or Mounting Base MT-171/U (see fig. 8-1 for dimensions) within the plane so that:

(a) It will be relatively close to the antenna (fig. 2-1).

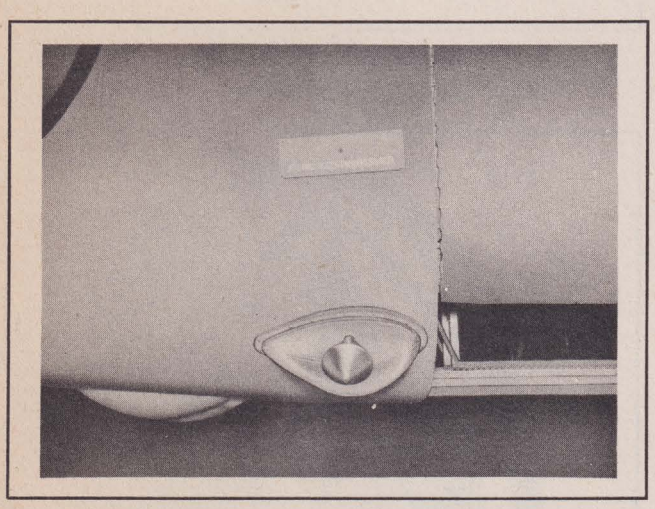


Figure 2-1. Antenna Assembly AS-26/APR-2 with Cover CW-3/APR-2—Installation on Airplane

Note

Antennas should be so located that minimum interference is obtained from radio and radar equipment installed in plane.

(b) It will be close to the power source.

(c) It will be in an approximately level position when the plane is in customary flight.

(d) Ventilation openings in chassis will not be obstructed. Allow at least two inches between fuselage and equipment.

(e) The front panel of the receiver when mounted must be accessible.

(f) The radar receiver may be quickly removed from the mounting.

(g) The dial is easily accessible and if it is desirable to watch for signal indication, select a spot where light is low, since the dial flash is not brilliant.

(2) Secure the receiver to Mounting MT-23/A or Mounting Base MT-171/U.

(a) Make sure the two horizontal pins at the rear of the mounting enter the chassis through holes in the receiver housing.

(b) Tighten the two knurled thumb nuts at the front over the lugs mounted on the front panel. Make sure that jam nuts are tight.

b. ANTENNA FILTER F-3/APR-2.

(1) The filter (fig. 1-1) may be placed anywhere in series with the coaxial cable connecting the low-frequency antenna (Antenna Assembly AS-25/APR-2) with the receiver. (See subparagraphs *d*(1) *(a)* and *(b)*, this Section.)

(2) Location near the receiver will allow tests to be made more conveniently with and without the filter.

(3) Mount the filter with two AN-742-20C clips, loop type, tube.

(4) Use care not to dent the casing.

(5) Allow three to four inch clearances at the ends to permit attachment of Radio Frequency Plug UG-21/U.

c. FILTER F-11/APR.

(1) Insert in series with Antenna Assembly AS-26/APR-2 and Receiver R-34/APR-2. (See sub-paragraphs 1*d*(1)*(c)* and *(d)*, this section.

(2) This filter may be held in position by cable clamps.

d. CABLES AND WIRING. *(See figure 8-3.)*

(1) ANTENNA CABLES.

(a) Cut Radio Frequency Cable RG-8/U to a length which will reach from Antenna Assembly AS-25/APR-2 to Filter F-3/APR-2 and attach Radio Frequency Plug UG/21/U to one end (fig. 8-2) and Plug PL-259 to the other end.

1. Connect the end with Plug PL-259 to Antenna Assembly AS-25/APR-2 and the other end to the antenna filter.

(b) Cut Radio Frequency Cable RG-8/U to a length which will reach from Filter F-3/APR-2 to the receiver and attach a Radio Frequency Plug UG-21/U to each end. (See fig. 8-2.)

1. Connect one end to the antenna filter and the other to the "ANT. LO" socket on the receiver.

(c) Cut Radio Frequency Cable RG-8/U to a length which will reach from Antenna Assembly AS-26/APR-2 to Filter F-11/APR and attach Radio Frequency Plug UG-21/U to each end. Connect one end to Antenna Assembly AS-26/APR-2 and the other end to Filter F-11/APR.

(d) Cut Radio Frequency Cable RG-8/U to a length which will reach from Filter F-11/APR to the receiver and attach a Radio Frequency Plug UG-21/U to each end. (See fig. 8-2.) Connect one end to the antenna filter and the other to the "ANT. HI" socket on the receiver.

(2) POWER WIRES.

(a) Cut power wires to the proper lengths to reach from the a-c and d-c power sources to the receiver. (See fig. 8-3.) Attach one end of all wires to Plug AN 3108-22-4S.

(b) Connect Plug AN3108-22-4S to the 4-pin socket on the receiver front panel. Connect the other ends of the wires to the a-c and d-c power sources.

2. ADJUSTMENTS AFTER INSTALLATION.

These adjustments should also be performed whenever false indications are present.

a. Turn the "POWER" switch to "ON."

b. Set "SPEED" switch to "MAN" position immediately.

c. Check to see that the pilot lamp lights and listen for operation of the motor.

d. Remove any signal to the receiver.

e. Set "TRIGGER" switch to "ON."

f. Set the gate screw adjustment (located at the rear of the right side of the receiver) so that all spurious signal indications are eliminated from the dial and recording tape. (See fig. 4-3.)

g. If it is impossible to eliminate spurious signal indications by means of the gate control, check the bias control (located next to the gate control), as follows:

(1) Turn the "TRIGGER" switch to "OFF."

(2) Set the bias control so that approximately 90 volts is measured at the grid of tube JAN-884 (gas tube).

Note

If it is not possible, on early models to eliminate false signal indications by means of the gate control and the proper setting of the bias control, it is possible that the commutator brushes and/or commutator may be worn and need replacement.

3. AFTER-INSTALLATION TEST.

Perform the preflight test given in section V, paragraph 1.

SECTION III
OPERATION

1. STARTING AND STOPPING.

a. TO START THE EQUIPMENT. *(See figure 3-1.)*

(1) Turn "POWER" switch to the "ON" position.

(2) Set "SPEED" switch to "MAN" position immediately.

(3) Check if the pilot lamp lights and listen for operation of motor.

b. TO STOP THE EQUIPMENT.

(1) Turn "SPEED" switch to "MAN" position.

(2) Turn "POWER" switch to the "OFF" position.

2. OPERATION.

(See figure 3-1.)

CAUTION

Maintain an accurate log of all types of operation of the equipment. Make suitable marks on tape to correlate with the log. This refers particularly to making a record of the time the "SPEED" switch positions are changed. (See sub-paragraph *d*(2), this section).

a. AUTOMATIC OPERATION.—Use automatic operation when an automatic record of all received signals is wanted.

(1) Observe the time when the set is put into automatic operation by the "SPEED" switch, record in log and mark on tape so that later analysis of the tape can correlate recorded frequencies with the aircraft's navigational log.

(2) Set "TRIGGER" switch to the "ON" position.

Note

If "TRIGGER" switch is in the "OFF" position there will be no dial indication or tape recording.

(3) Set "SPEED" switch to the "LO" or "HI" position depending upon the scanning rate desired.

(a) Preliminary use of the equipment has indicated that slow speed scanning ("LO" position of "SPEED" switch) gives satisfactory results. This also gives most economical use of the recording tape.

(b) High speed scanning ("HI" position of "SPEED" switch) may be used when it appears that radar systems with different pulse rates and speeds of antenna rotation will most likely be intercepted.

(c) Accuracy decreases for the wide, light bars appearing as dial indications but the frequency is within the limits.

b. MANUAL OPERATION. — Use manual tuning when it is desired to determine the frequency of received signals more accurately than can be obtained by the tape record.

(1) Set "SPEED" switch in the "MAN" position.

(2) Set "TRIGGER" switch in the "ON" position for visual presentation.

(3) Tune the main tuning dial manually by use of the main tuning knob or the vernier knob.

(a) It is necessary to push either knob toward the panel to cause engagement with the tuning shaft.

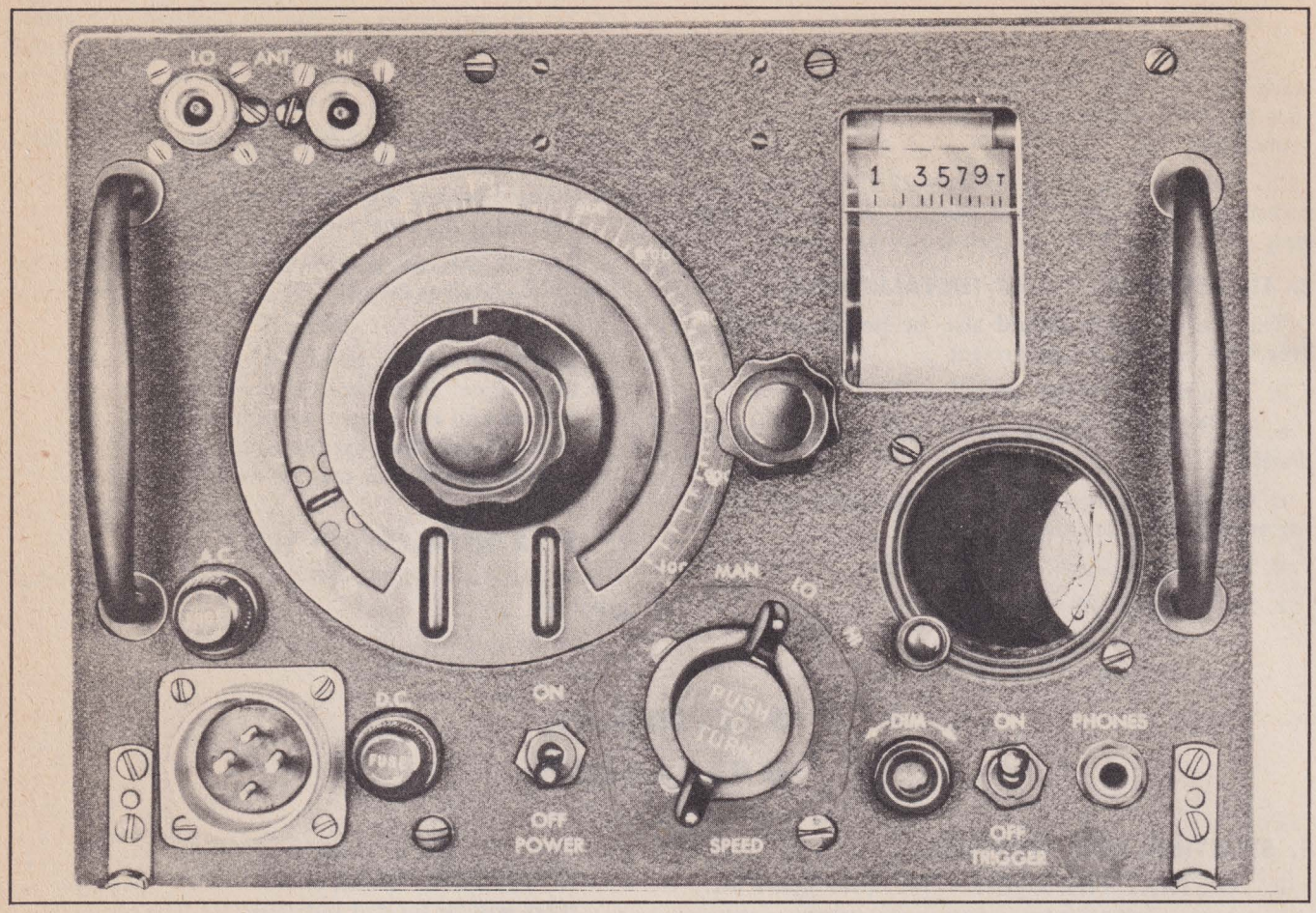


Figure 3-1. Radar Receiver R-34/APR-2—Front Panel View

c. AURAL PRESENTATION.

(1) Plug a headset into the "PHONE" jack.

(2) Set "SPEED" switch in the "MAN" position.

(3) Preliminary use of the equipment has indicated the following recommended use of the "TRIGGER" switch.

(a) For more accurately determining the frequency of a received signal, set the "TRIGGER" switch to the "OFF" position and tune for maximum signal intensity.

(b) For estimating the relative strength of the received signal in relation to others, set the "TRIGGER" switch to the "ON" position. Width of the light bar on the dial is an indication of signal strength. (See sec. IV, par. 8.)

d. INTERPRETATION.

(1) DIAL INDICATION (Visual Presentation).—When the "TRIGGER" switch is "ON," a light bar or illuminated slit will appear on the main dial at frequency positions corresponding to those of received signals.

(a) The width of the light bars will be roughly proportional to the signal strength. It should be noted, however, that in fields of strong signal intensity the frequency indication may become quite broad, therefore, *frequency determination should be made in areas of weak signal strength for more accurate information.*

(b) At some points on the dial, however, two light bars may alternately appear close to each other on the dial when only one signal is being received. Since a signal is tuned-in twice during one complete revolution of the tuner and since the two sections of the tuner are not always identical, the frequency indications will be displaced from each other at some points in the frequency range.

(c) In the low range (90-420 megacycles) the indications will be accurate with ± 10 megacycles, and within 15 megacycles in the high range (420-1000 megacycles) for the weakest detectable signals.

(2) RECORD ON TAPE (Visual Presentation).—Each received signal will make a mark on the recording tape at a point corresponding to the frequency of the signal. The width of the mark is, in rough, proportional to the signal strength as described above; the frequency indications for one signal may be slightly displaced, however tape recording indications should be accurate within ± 10 megacycles in the 90-420 megacycle range and 5% in the 420-1000 megacycle range.

(a) Time marks should be made along the margin of the tape. At the conclusion of the flight, comparison

of the time marks with the logged time of starting and stopping in the airplane log, makes it possible to determine the time when each radar signal was received and its approximate location.

1. A time mark of approximately one-half minute duration is made every minute.

2. Every fifteen minutes, the minute mark is omitted, except on the hour.

3. Every hour, a long mark, one and one-half minutes is made.

(b) A calibrated rule is supplied for use in reading the tape after it has been removed from the equipment.

(3) AURAL INTERPRETATION.

(a) Locate the exact frequency by listening to the maximum signal intensity while tuning the dial manually ("TRIGGER" switch in the "OFF" position).

(b) Determine the approximate signal strength of the received signals by noting the span of the tuning dial over which a given radar signal causes a response in the headset ("TRIGGER" switch in the "ON" position).

(c) Clicks will be heard in the headphones on automatic scanning when the time mark is being applied to the tape although no signals are present.

Note

The brightness of the pilot lamp may be adjusted by the "DIM" control on the panel.

SECTION IV
THEORY OF OPERATION

1. GENERAL.

a. UTILITY.

(1) Radar Receiving Equipment AN/APR-2 automatically tunes over a frequency band from 90 to 1000 megacycles and indicates radar or other signals received but does not distinguish between them. Manual tuning is also provided.

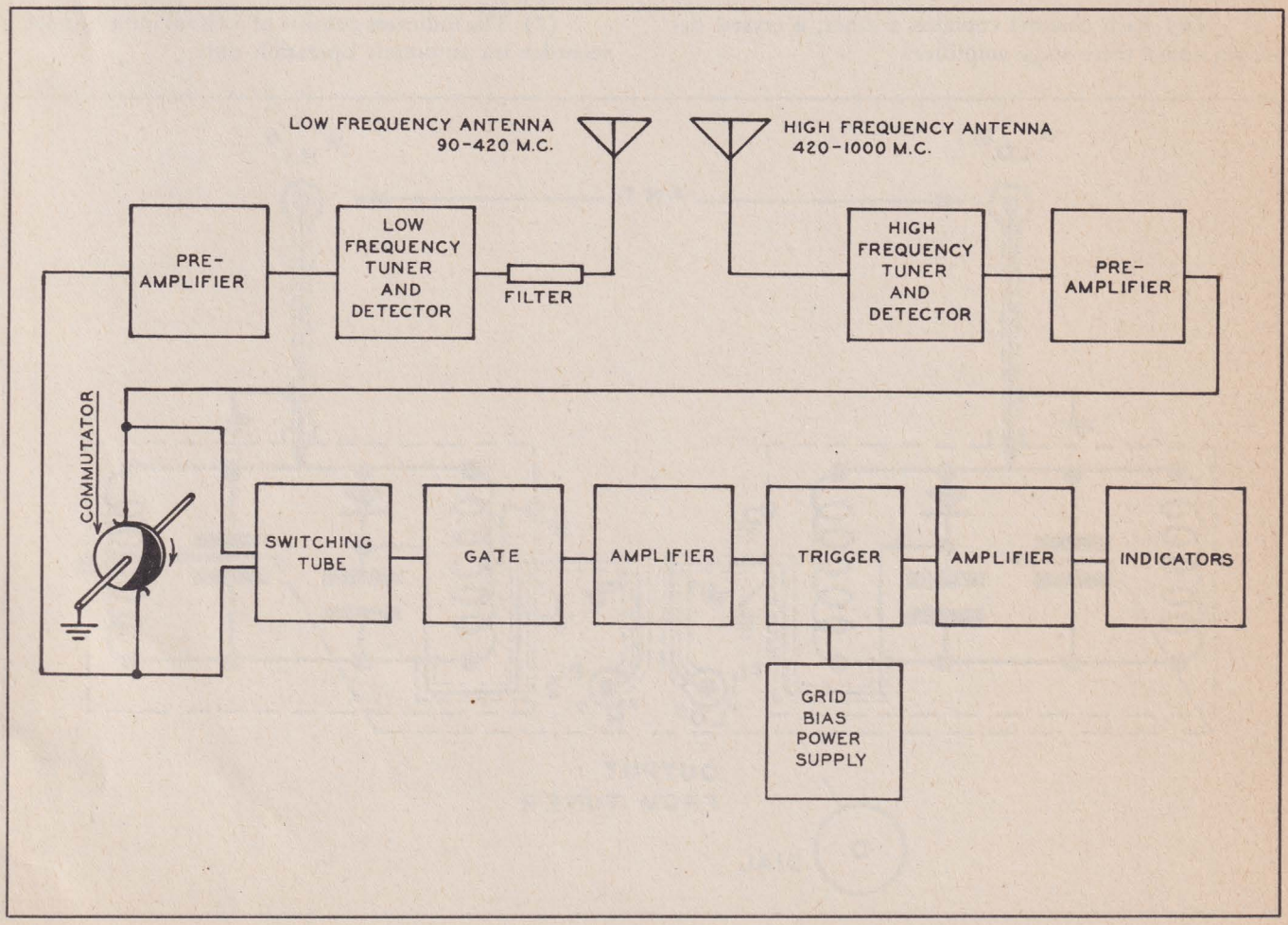


Figure 4-1. Radar Receiving Equipment AN/APR-2—Block Diagram

(2) The received signals are indicated visually on a dial, recorded on a tape, and may be heard in a headset.

(a) The dial indicates the frequency of the received signals; the tape indicates the frequency and time at which the signals appeared.

(3) Scanning rates of 2 or 6 sweeps per second may be selected so that radar systems with different pulse rates and speeds of antenna rotation will most likely be received.

b. FUNCTIONING.

(1) Radar Receiving Equipment AN/APR-2 consists of a special radar receiver used with two antennas. A headset may be used but is not necessary.

(2) The functioning of the equipment is indicated in the block diagram shown in figure 4-1.

(3) Two signal channels are provided which are identical except for the frequency coverage.

(a) Each channel receives signals from a separate antenna.

(b) The high frequency channel covers the frequency band from 420 to 1000 megacycles.

(c) The low-frequency channel covers the frequency band from 90 to 420 megacycles.

(d) Each channel contains a tuner, a crystal detector, and a three stage amplifier.

(4) The respective signals from the high and low-frequency channels are fed to separate grids of the switching tube stage.

(a) Two cam operated switches alternately short-circuit either signal while the other frequency band is being scanned. (See fig. 5-9.)

(b) Starting at 90 megacycles the low-frequency tuner tunes over the band up to 420 megacycles. During this time the high-frequency channel is short circuited.

(c) The high frequency tuner starts at 420 megacycles and tunes over the band up to 1000 megacycles. During this time the low-frequency channel is short circuited.

(d) A short period exists during which both channels are short circuited and the tuning dial completes rotation to the starting point of 90 megacycles.

(5) A clipper stage passes only the upper portion of the received pulses, thus eliminating hash. These pulses are amplified and applied to the trigger stage.

(6) The trigger stage is normally non-conducting and is keyed off by the pulse from the clipper amplifiers. The resulting signal is amplified and fed to the indicator circuit.

(a) The trigger circuit has a stabilized grid voltage supply.

(7) The indicator consists of a visual indicator and a recorder on automatic operation only.

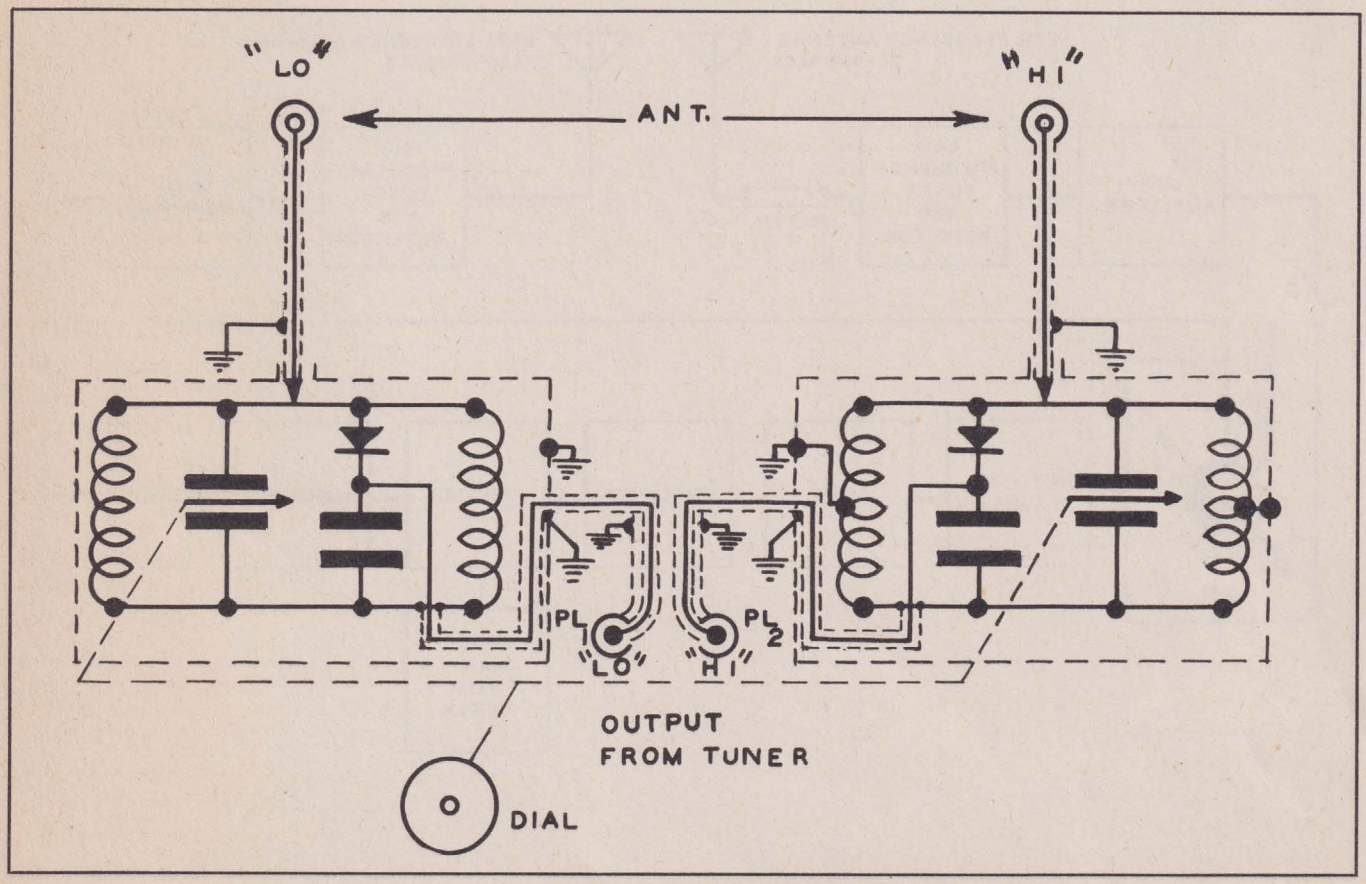


Figure 4-2. High and Low Frequency Tuner Circuits

(a) The visual indicator consists of a small neon lamp located behind a slit in the rotating dial. Each pulse causes the lamp to flash and appear as an illuminated slit or light bar at the corresponding frequency.

(b) At the same time the signal voltage is applied to the recorder and causes a dark trace on the electro-sensitive tape. The frequency of the signal and the time it was received can be read from this tape.

2. HIGH AND LOW FREQUENCY TUNER.

(See figs. 4-2 and 8-4.)

a. Two "butterfly" tuners are used to cover the frequency range which is too large for a single tuner.

b. The tuners are aligned on a common shaft and properly phased for continuous coverage.

c. A separate antenna feeds each tuner, a stub antenna for the low-frequency range, and a broad-band cone antenna for the high-frequency range.

d. Crystal detectors demodulate the r-f signal voltage appearing across these tuned circuits and this demodulated voltage is fed to two separate wide-band, high-gain amplifier channels.

3. PRE-AMPLIFIER CHANNELS.

a. Two identical pre-amplifier channels are provided; one for signals received on the high-frequency band 420 to 1000 megacycles, and one for those received on the low-frequency band 90 to 420 megacycles.

b. Each pre-amplifier circuit consists of three JAN-6SJ7 tubes (V-1, V-2, V-3, V-4, V-5, V-6) connected together in cascade by conventional resistance-capacity coupling.

c. All of the tubes are fed from the same plate voltage source and all are self-biased by individual cathode resistors.

d. Each pre-amplifier receives its input from a separate tuner circuit, coupled through an individual transformer (either T-1 or T-2).

e. The gain is greater than 90 db. The 3-db points of the frequency response are 10 and 50 kilocycles.

f. The two amplifiers are assembled on a single chassis directly behind the tuner.

g. The outputs of the pre-amplifiers are fed into a switching tube circuit.

4. SWITCHING TUBE AND AMPLIFIER.

a. The switching tube receives alternately the output of either of the two pre-amplifiers.

b. The output signals of the two pre-amplifiers are fed directly to the respective grids of the switching tube (JAN-6SN7/GT/G).

c. The grids of the switching tube are connected to contacts actuated by a special motor driven cam.

(1) The cam switch is so built that it alternately grounds each grid.

(2) The cam switch operates in synchronism with the tuner, being mounted on the same shaft.

(3) When the low-frequency tuner is tuning over the low-frequency band, (the first 72° rotation of the shaft or 144° rotation of the tuning dial since the tuning dial makes one complete revolution for each half revolution of the tuning assembly shaft) the output is fed through the low-frequency pre-amplifier channel direct to one grid of the mixer-amplifier. Simultaneously, the other grid of the switching tube is grounded through the commutating cam.

(4) When the low-frequency tuner reaches the end of its tuning cycle at 420 megacycles, and the high-frequency tuner starts to tune over its band (for 72° to 138° rotation of the shaft, or 144° to 276° of the tuning dial), the commutating cam reverses the connection to the grids, allowing the high-frequency signal to pass through to the switching tube and grounding the low-frequency channel.

(a) The high-frequency tuner slightly overlaps the low-frequency tuner at 420 megacycles to assure complete coverage.

(5) When the high-frequency tuner completes its tuning cycle, the commutating cam grounds both grids of the switching tube for a short period (from 138° to 180° rotation of the shaft) while the tuning dial rotates through the uncalibrated portion of its scale.

d. For adjustment and checking of the position of the commutating cam, see section V, paragraph 12.

e. The switching tube has its two plates connected together and operates into a single load.

(1) The signal is then capacity-coupled into the clipper tube V-8.

5. GATE CIRCUIT.

a. The purpose of the gate circuit is to prevent keying of the trigger tube by spurious noise accompanying the received impulses.

b. It consists of a twin diode tube V-8 (JAN-6H6-GT/G) with cathodes and plates respectively connected together.

c. The signal from the switching tube V-7 is coupled to the gate diode by capacitor C-15 and grid resistor R-27.

d. The output of the gate diode is developed across resistor R-28, in which the noise or hash has been eliminated and the amplitude of the pulse reduced slightly (see fig. 4-3).

e. To cause the desired clipping action, a d-c voltage is introduced in series with the gate diode.

(1) The d-c voltage is obtained from the voltage drop across potentiometer R-30 connected in the cathode circuit of the amplifier tube V-9 which follows the gate diode tube V-8.

(2) The input voltage to the gate diode plate must exceed this d-c voltage before any output is had from the circuit (see fig. 4-3).

(3) The d-c voltage is so adjusted that there is no output from the gate circuit except when a pulse occurs at the input, thus it is not affected by general noise level.

(a) The control is accessible at the rear right side, "GATE" screw.

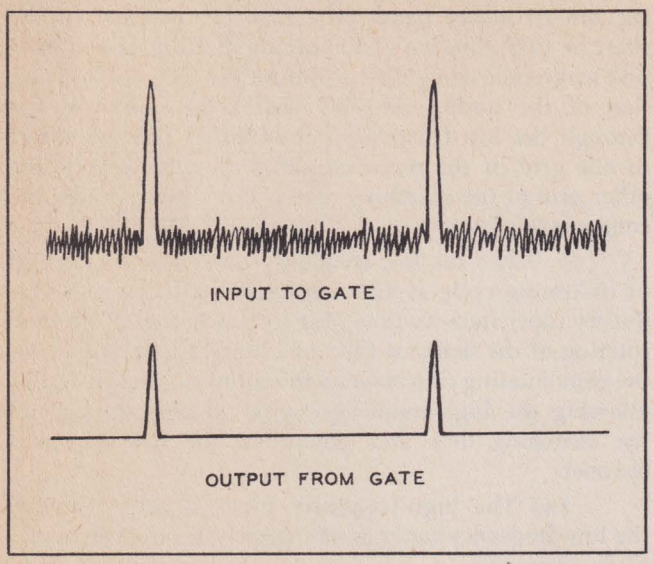


Figure 4-3. Gate Circuit Waveforms

6. GATE CIRCUIT AMPLIFIERS.

a. The output of the clipper tube V-8 is fed into one triode section of the twin-triode tube V-9 and then through the beam-power amplifier tube V-10.

b. These tubes operate as conventional resistance-capacity coupled amplifiers.

c. The first amplifier is biased by a very large cathode resistor R-30.

(1) The pulse which is fed to the grid of the first amplifier is positive, therefore the grid must be biased to a large negative value.

(2) The voltage drop across resistor R-30 must be large enough to bias the gate diode so that the noise signals are eliminated.

d. The second amplifier tube V-10 has a relatively small bias because the pulse signal drives the grid in the negative direction.

7. TRIGGER-AMPLIFIER.

a. The trigger circuit contains a JAN-884 gas trigger tube whose circuit is such that the resulting plate current is approximately the same, regardless of repetition rate of the incoming radar signal. This produces a uniform trace on the recording tape independent of the pulse rate.

b. The output of the trigger tube is amplified by the second section of tube V-9 and then is fed to the presentation or indicator circuits through cathode-follower tube V-12.

8. DIAL INDICATOR.

a. Whenever radar signals are received, a small neon lamp V-20 mounted in the rotating dial behind a small slit is flashed.

b. When the dial is rotating and the neon lamp flashes, an illuminated slit in the dial will appear in a stationary position. The width of the light bar will depend upon the length of time the lamp is lighted thus by the strength of the signal.

c. When numerous signals are received, a light bar will appear for each signal.

d. CW transmissions will also be indicated on the dial, for they are interrupted by the scanning operation (when automatic) and thus are shown on the dial as modulated carriers. There will be no indication when manually tuned.

9. INDICATION BY HEADSET.

a. Listening to received signals may be accomplished by plugging a headset into the "PHONES" jack.

b. When the "TRIGGER" switch is in the "ON" position, the headset is connected into the circuit of tube V-12 so the signal after the trigger circuit is heard.

c. When the "TRIGGER" switch is in the "OFF" position, the headset is connected into the circuit of tube V-10 ahead of the trigger circuit and the voltage is removed from the trigger tube so it does not operate.

(1) In this position, the exact frequency of the incoming signal can be determined by listening for the maximum signal intensity while tuning the dial manually.

(2) This is due to the fact that the selectivity curve of the tuner circuit has one distinct peak as with a typical single tuned circuit.

10. RECORDER.

a. To make a continuous record of received signals, a recording tape is used. This consists of paper used by Western Union Telegraph Company for facsimile service (Grade L, Teledeltos Paper).

(1) This is a light gray paper, the back of which is coated with a conducting material.

(2) Upon passage of current supplied through an electrode a dark trace is produced.

(3) A voltage of 120 to 130 volts is necessary to start the chemical action which causes the dark trace.

b. The capacity of one reel is approximately 600 feet of paper. This will last about 50 hours at maximum scanning rate. The slower scanning rate causes the paper to last proportionately longer.

c. The lawnmower is driven at same speed as the dial.

d. The recorder mechanism is driven from a d-c motor through a clutch and gear trains.

11. LAWNMOWER (RECORDING HEAD).

a. The recording head has a raised helical blade on its cylindrical surface.

b. As it rotates, the point of contact between the helical blade and the recording paper moves across the paper as illustrated for three positions in figure 4-4.

(1) Since the recording head runs at the same speed as the dial and in synchronism with it, each position of the head has a corresponding dial position or frequency. (See fig. 4-4.)

(2) The helix must present its center to the tape when the dial is at the crossover mark at 420-megacycles.

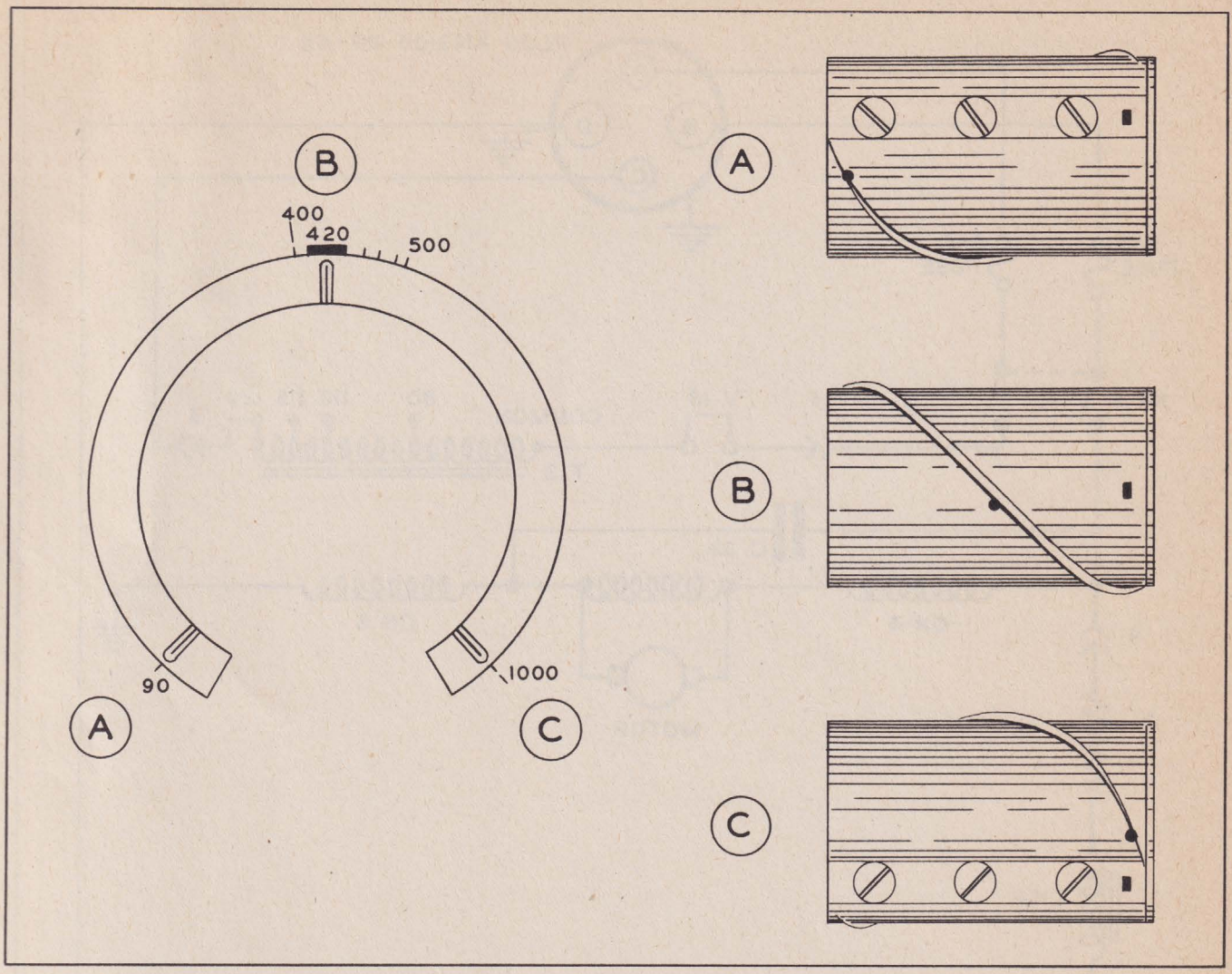


Figure 4-4. Lawnmower Positions with Respect to Dial

(3) Voltage applied between the recording head and the tape causes a dark trace on the tape.

c. A time pin is located in the center of the circumference not covered by the helical ridge. It will point to the recording tape just as the time spring contacts the dimple on the slip ring.

(1) A time mark of one-half minute duration is made every minute on the left edge of the recording tape.

(2) Fifteen, thirty and forty-five minute periods are identified by the absence of the minute mark.

(3) The one-hour period is identified by a long two-minute mark which lasts during the 59th and 60th minutes.

(4) The voltage for making the time marks is obtained from the 300 volt supply. A contactor operated by an eight-day, spring-wound clock controls the application of the voltage to the tape.

(5) The time mark is made during the interval when the receiver is not scanning.

12. POWER SUPPLY CIRCUITS.

(See figure 4-5.)

a. All power is supplied to the equipment through socket AN3102-22-4P.

b. The 28 volt d-c source operates the scanning motor. Chokes CH-4 and CH-5 and capacitor C-33 provide filtering to prevent motor noises from feeding back to other parts of the circuit.

c. The filaments of tubes V-1, V-2, V-3, V-4, V-5 and V-6 are operated from the d-c source in a series-parallel arrangement.

(1) Resistor R-56 is a voltage-dropping resistor to provide the proper filament voltage.

(2) Choke CH-2 provides filtering for the filament circuit.

d. The a-c source supplies transformer T-3 from which all other circuit voltages are supplied. This circuit passes through the jumper connection in tube V-18. Thus the transformer is de-energized if this tube is out of its socket.

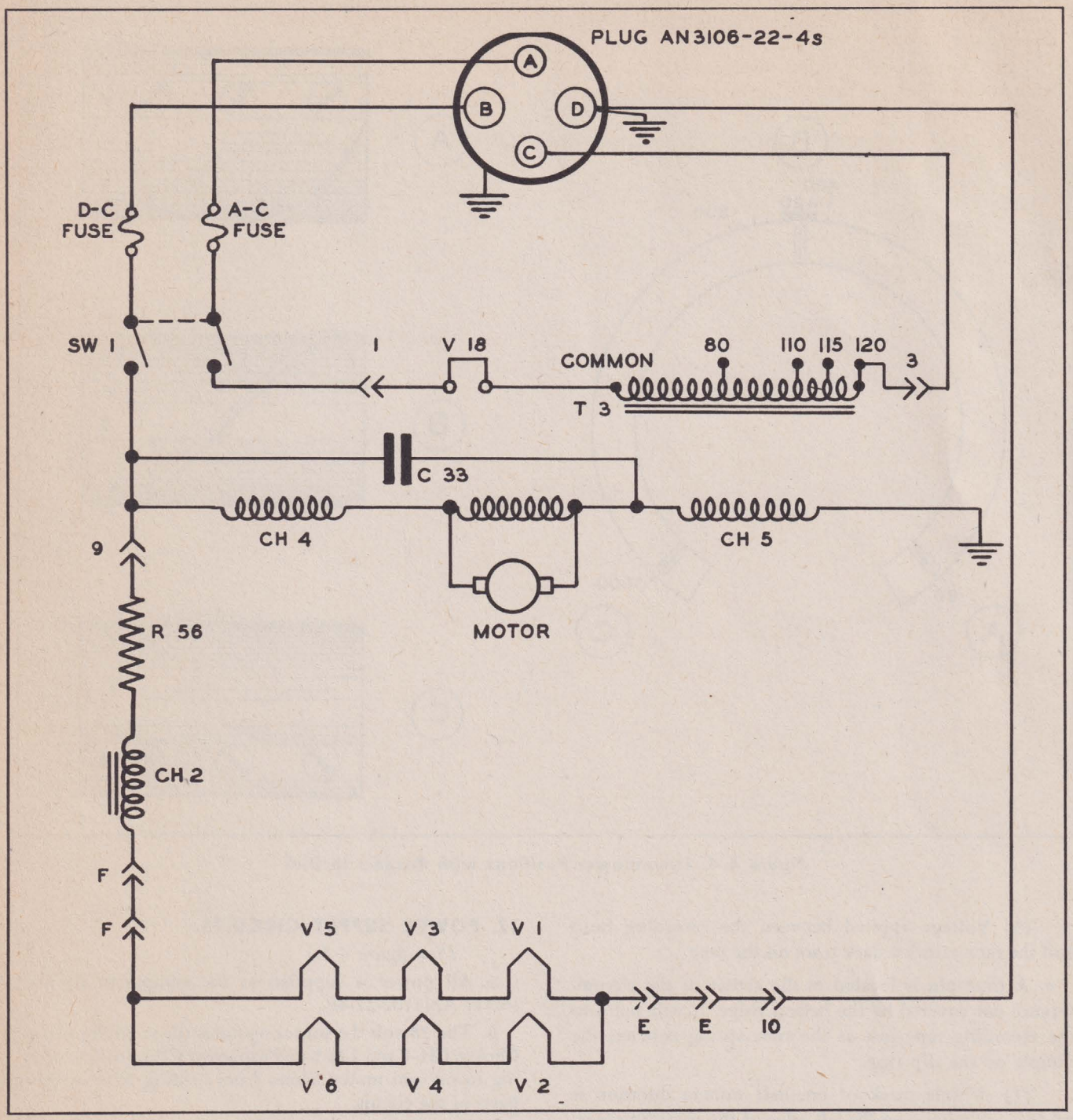


Figure 4-5. Radio Receiver R-34/APR-2—Functional Diagram of 24-Volt D-C Circuit, A-C Primary Circuit

13. D-C VOLTAGE STABILIZER CIRCUIT.

a. The purpose of this circuit is to maintain the d-c output voltage at a constant value in spite of variations in load current or voltage of the power source.

b. The stabilization of the d-c output voltage is accomplished by the use of triode tube V-16 connected in series with the load.

(1) Variations are absorbed by the voltage drop across this tube.

(2) If the input voltage rises, the voltage across tube V-16 is caused to rise and thus maintain the d-c output voltage constant.

(3) If the load current increases, the voltage drop across tube V-16 is caused to decrease so that the d-c output voltage remains constant.

c. The voltage drop across tube V-16 is controlled by its grid voltage which is dependent upon changes in the rest of the circuit.

d. Assume a change in load current which tends to increase the d-c output voltage.

(1) An increase in output voltage causes the voltage across resistor R-54 to increase because resistor R-54 is in series with resistor R-53 across the output.

(2) An increase in voltage across R-54 causes the grid voltage of tube V-17 to become less negative. This is because the grid voltage on tube V-17 is the difference between the voltages across tube V-18 and resistor R-54. The drop across tube V-18 tends to make the grid negative by a constant value since it is a voltage regulator tube. The drop across resistor R-54 varies with the output voltage and tends to make the grid positive.

(3) When the grid voltage of tube V-17 becomes less negative, the tube conducts more current. This current flows through resistor R-50 and increases the voltage drop across it.

(4) When the voltage across resistor R-50 increases, the grid of tube V-16 decreases in potential relative to its plate.

(a) At the same time, the cathode of tube V-16 has increased in potential relative to the plate when the initial change in output voltage occurred.

(b) An increase in cathode potential and a decrease in grid potential means more negative grid voltage on tube V-16.

(5) The more negative grid voltage on tube V-16 increases the voltage drop from plate to cathode. This decreases the output voltage to approximately its original value.

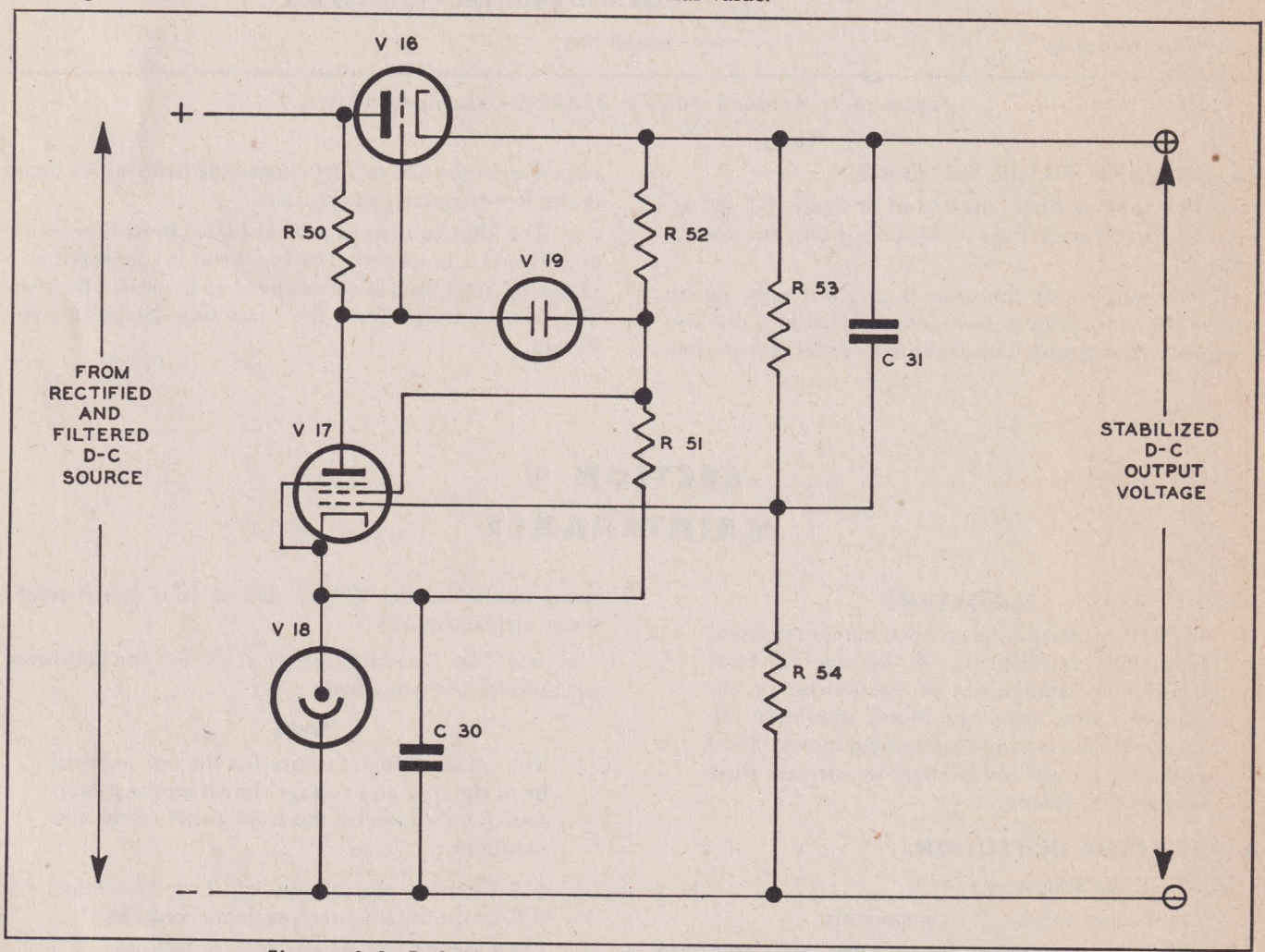


Figure 4-6. D-C Voltage Stabilizer Circuit—Schematic Diagram

e. Assume an increase in input voltage.

(1) When the voltage increases across the series circuit consisting of resistor R-50, tube V-17 and tube V-18, all of the voltage change is absorbed across tube V-17. This is because tube V-17 is connected as a pentode and its current is independent of plate voltage. Therefore its voltage changes but the current in this series circuit remains constant.

(2) Since the voltage across resistor R-50 does not change, then both the plate and grid of tube V-16 increase in potential with the initial voltage input change.

(a) The increase in grid potential means the grid is less negative, which tends to decrease the voltage drop across tube V-16, thus increasing the output voltage.

(b) However, any tendency to increase the output voltage results in the stabilizing action described in subparagraph 13*a* and *b*, thus the output voltage will stay constant.

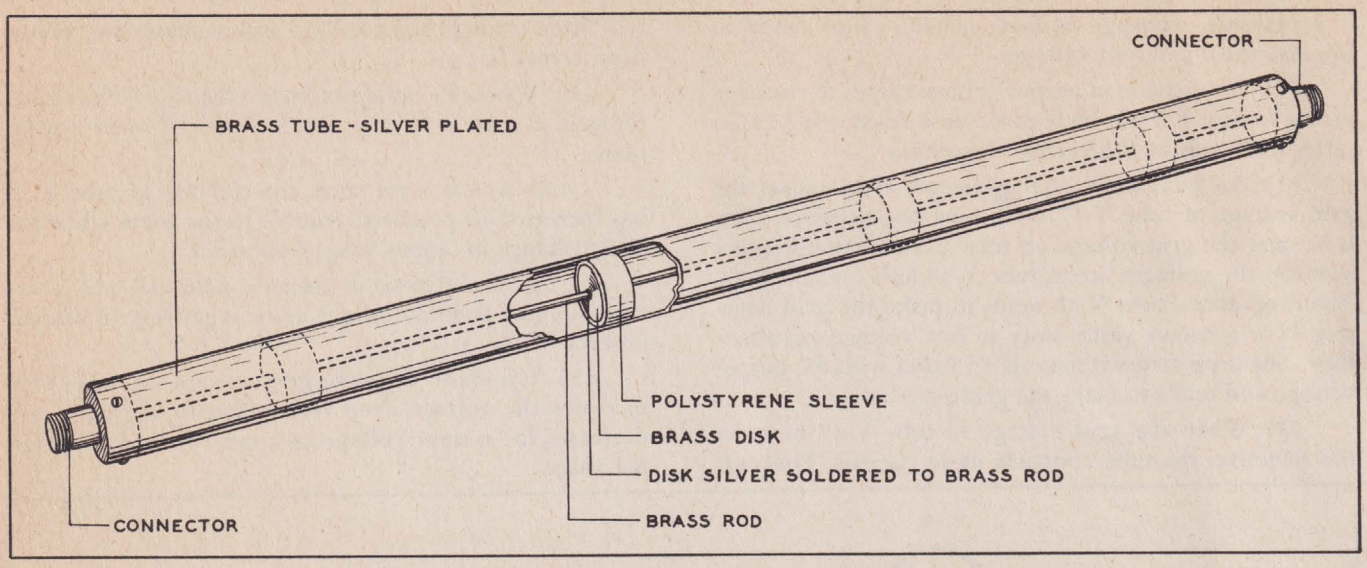


Figure 4-7. Antenna Filter F-3/APR-2—Cutaway View

14. ANTENNA FILTER F-3/APR-2.

a. The antenna filter, illustrated in figure 4-7, is connected in series with the low-frequency antenna coaxial cable.

b. The purpose of the filter is to allow only signals below 420-megacycles to pass unattenuated into the low-frequency tuning unit. This eliminates undesired spurious responses in the 420 to 1000-megacycle band which occur in the low-frequency tuning unit.

c. The filter consists of a silver-plated brass tube inside of which is a brass rod. The brass rod is supported at 6 points by brass discs silver-soldered to the rod. The brass discs are separated from the brass tube by polystyrene sleeves.

SECTION V
MAINTENANCE

IMPORTANT

Periodic inspections prescribed herein represent minimum requirements. If, because of local conditions, peculiarities of equipment, or abnormal usage, they are found insufficient to attain satisfactory operation of equipment, local authority should not hesitate to increase their scope of frequency.

1. PREFLIGHT INSPECTION.

a. Check the following:

(1) Proper securing of components.

(2) Cable connections for tightness and correctness (see fig. 8-3).

(3) The d-c and a-c fuses on front panel.

(4) Check to see if sufficient unused tape is available on the reel (remove dust cover for this inspection).

(a) To remove the dust cover, turn the screw located in the center of the back side a quarter or half turn. Then pull the chassis out by the handles on the front panel.

b. Wind the eight-day clock by the knob on the front panel just above the "DIM" control (this is a standard 8-day airplane clock).

c. Use Test Oscillator TS-47/APR for the following operational test procedure:

Note

The external power source for the test set must be of the type and voltage shown on the power-source indication on the front panel of the test oscillator.

(1) Connect the output of Test Oscillator TS-47/APR to the antenna receptacle marked "LO."

(2) Operate test set switches as follows:

(a) Turn the "POWER-OFF" switch to "POWER."

(b) Turn the "MODULATION" switch to "OFF."

(c) Set the "FREQUENCY" switch to the "115-500" megacycle range.

(d) Adjust the "OSCILLATOR FREQUENCY" dial to a frequency between 115 and 420-megacycles. This dial is direct reading in frequency.

(3) Operate the receiver switches as follows:

(a) Turn the "POWER" switch to "ON."

(b) Set "TRIGGER" switch to "ON."

(c) Set "SPEED" switch to "LO." This provides automatic operation of the radar receiving equipment. The blower and tuner driving motor should be operating; this should be evident by the noise of the motor and gears.

(4) Observe for results on the recording tape. This test is not for checking accuracy, but only for checking operation.

Note

If spurious signals are noted on dial and tape, check since this may be due to radar or other equipment operating near by.

(5) Repeat the above procedure with:

(a) The output of the test set connected to the antenna receptacle marked "HI."

(b) The test set "OSCILLATOR FREQUENCY" dial set to a frequency between 420 and 500 megacycles. (If desired a lower frequency can be used and the test made to a harmonic of that frequency.)

2. 25-HOUR MAINTENANCE INSPECTION.

a. Clean the slip ring for the dial light carbon brush with crocus cloth or very fine sandpaper.

b. Inspect the dial light carbon brush and replace if worn badly.

c. Clean lawnmower helix with carbon tetrachloride.

d. Test all tubes in a standard tube tester. If the replacement of the trigger tube is necessary, check the adjustments of section II, paragraph 2.

e. Complete the preflight inspection of paragraph 1 above.

3. OPERATIONAL TROUBLE.

In general, troubles in this set will be evidenced either by absence of signal indications with signal input or by the existence of spurious signals on the dial and tape with no signal input. The following are the most likely faults and causes:

a. Dial and tape covered with spurious signals with no signal input. This may be due to:

(1) Incorrect setting of gate and bias controls. For correct setting and procedure see section II, paragraph 2.

(2) Microphonic tubes in the preamplifier, particularly the first stages.

(3) Chattering of commutator contacts. See paragraph 2.*a.*, this section.

b. Spurious signals in either "HI" or "LO" frequency ranges with no signal input. This may be due to:

(1) Faulty cable connection between tuner and preamplifier. (See figs. 5-1, 5-2, and 5-3.)

(2) Microphonic tubes in that particular preamplifier channel.

c. No signal evident on tape or dial with test set signal input (pulsed or audio-modulated r-f) to antenna receptacles.

(1) If signal is audible in headset with "TRIGGER" switch in "ON" position, the fault exists in the indicator circuit following cathode follower (V-12).

(2) If signal is audible only when "TRIGGER" switch is in "OFF" position the fault exists at the JAN-884 gas tube (V-11) or in circuits following this tube.

(3) If signal is not audible when "TRIGGER" switch is "OFF" the fault exists in the circuits preceding the JAN-884 gas tube (V-11). In this case trouble should be isolated to either tuner or preamplifier by checking these outputs with oscilloscope; or to the trigger by elimination of the former components.

4. HANDLING AND REPLACING SPARE CRYSTALS.

a. HANDLING OF SPARE CRYSTALS.

(1) When not in use the crystals should be kept in a metal box or wrapped in metal foil. Large electrical overloads will be applied when the crystal cartridge is exposed to strong electrical and magnetic fields. Such fields exist around the antennas of powerful transmitters, near high voltage leads and near leads carrying large surges of current.

(2) In testing the crystals never use more than $1\frac{1}{2}$ volts across them.

(3) Before inserting the crystal in place, keep some part of your body in contact with the crystal socket. This will prevent static discharge through the crystal from one's body to the equipment or vice versa.

(4) Care should be taken to see that the crystals are not dropped. The ceramic crystal cartridge is also subject to breakage if the crystal is compressed too much or crushed in its holder.

b. REPLACEMENT OF CRYSTALS.

(1) When the sensitivity of the receiver is below average (see par. 16, this section) replace the crystals as a possible remedy.

Note

Sylvania IN29 crystals are the only type that have been found satisfactory for use in this receiver.

(2) Remove the chassis from the dust cover by turning the screw in the center of the back side one-quarter turn and withdraw the chassis by the handles on the panel.

(3) Disconnect the inside antenna cables from the butterfly tuner shields.

(4) Remove butterfly tuner shields.

(5) Remove crystals from their mounting where they are held in a friction fit.

(6) After replacing crystals, test the receiver sensitivity as in paragraph 16, this section.

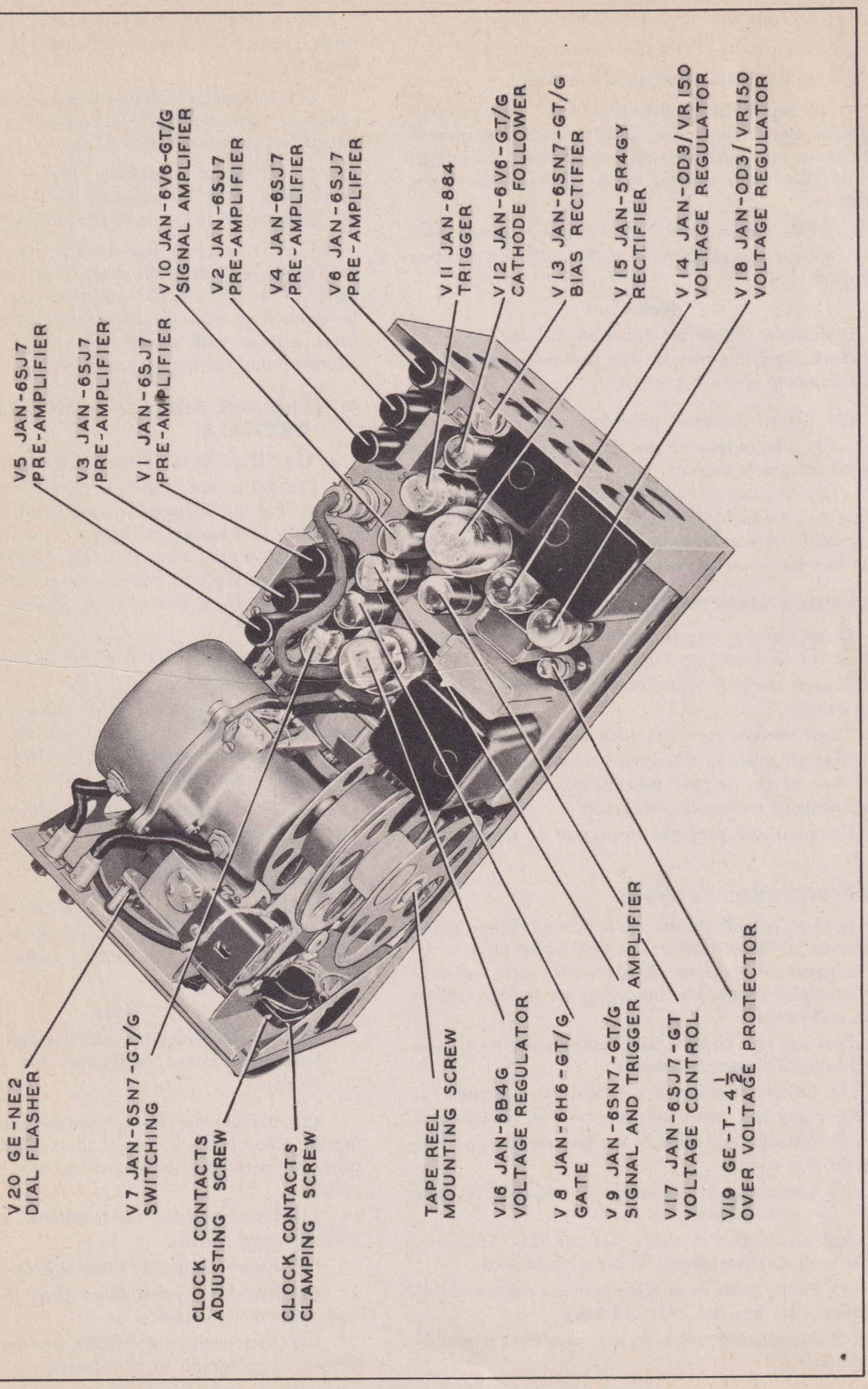


Figure 5-1. Radar Receiver R-34/APR-2—Top View with Dust Cover Removed

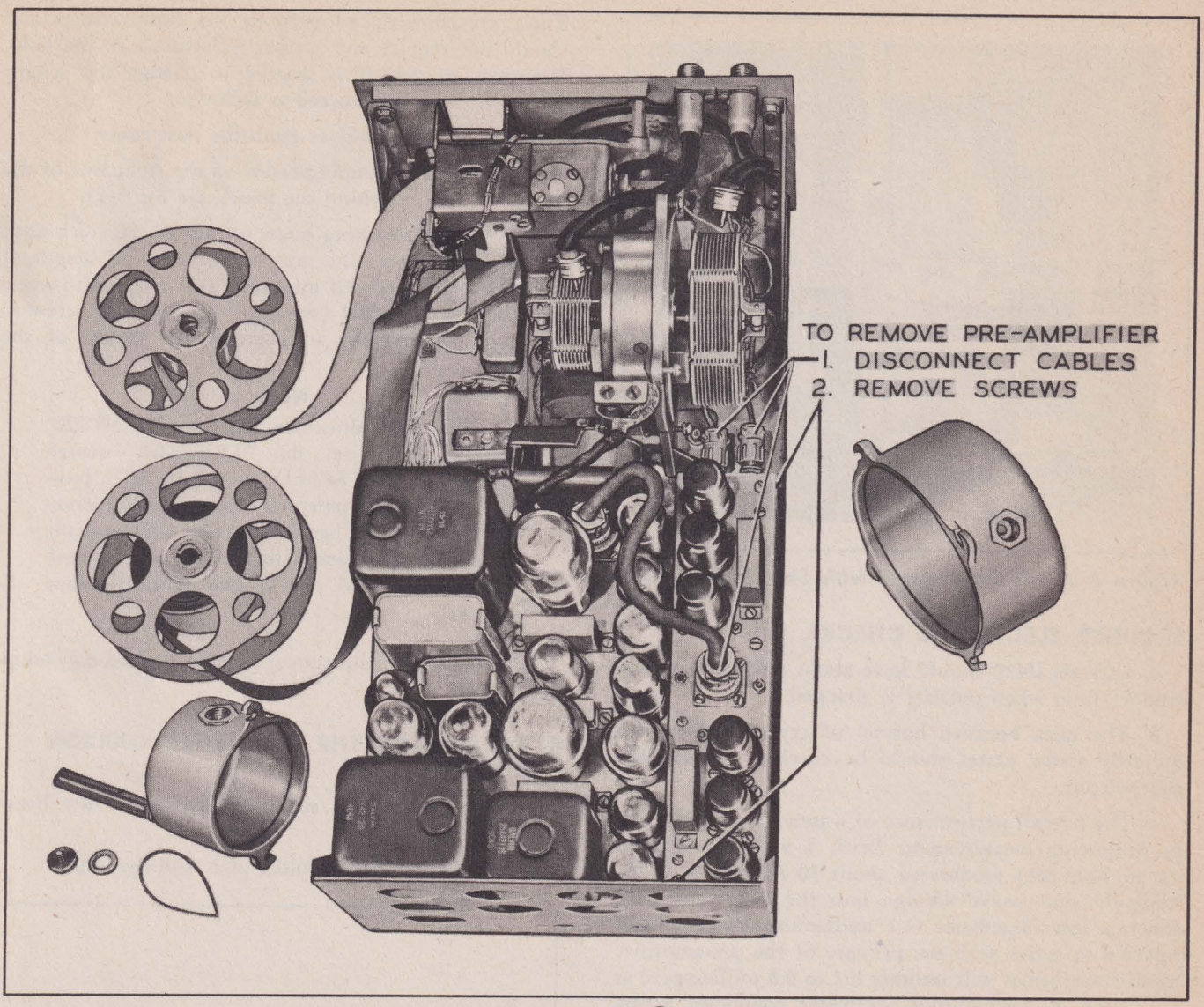


Figure 5-2. Radar Receiver R-34/APR-2—Top View with Dust Cover, Butterfly Tuner Shields and Tape Reels Removed

5. PROCEDURE TO REPLACE TUNER ASSEMBLY.

(See figures 5-1 to 5-4.)

a. Remove vernier tuning knob on front of panel by loosening set screw.

b. Drop front panel by:

(1) Removing two panel handles.

(2) Removing two panel hold-down brackets.

(3) Removing the 2-8/32 screws in the center of the panel.

(4) Releasing two antenna cables from the tuner.

c. Remove four heavy (1/4-20-3/4) bolts from the front bottom of the receiver.

d. Remove:

(1) Tuner preamplifier cable plugs from preamplifier chassis sockets.

(2) Commutator assembly cable plug from trigger chassis socket.

(3) Lead to signal spring contact (black, white, yellow) and lead to the time spring contact (orange, black, white) which ride on the recording drum. Cable clamp holding these leads in position.

(4) Leads from terminals of motor filter (1 ground lead—white, yellow and two hot leads—black, white, yellow).

e. Pull shear pin from the shaft of the speed control switch and remove two 5/40-1/4 screws releasing switch from tuner assembly.

f. Lift tuner assembly out of chassis.

g. When tuner is replaced, it should be pushed by the amount of any play to the left front of the chassis when facing the front panel.

h. Reverse above procedure for installation of tuner assembly.

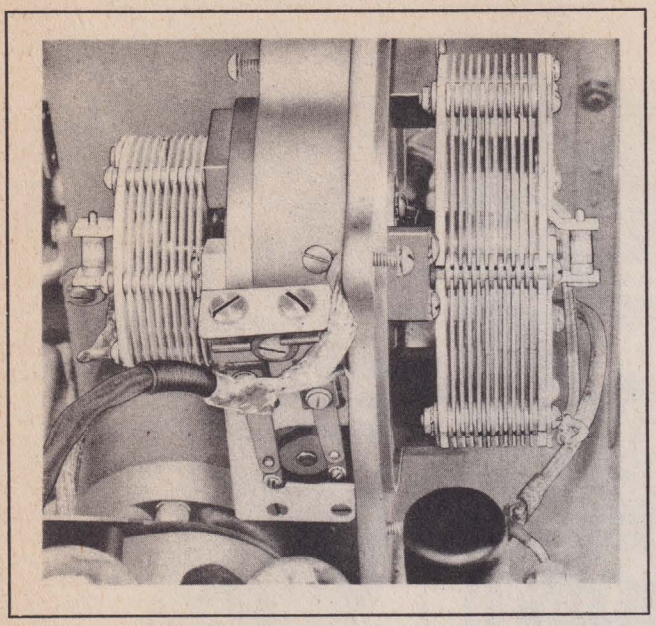


Figure 5-3. Butterfly Tuners with Shields Removed

6. TUNER ELECTRICAL CHECKS.

a. Crystals IN29 should have about a 10 to 1 d-c resistance ratio when polarity is changed.

b. The mica between bottom of crystal holder and butterfly stator plates should be checked for possible short-circuit.

c. The overall performance of a tuner can be checked by following measurement: With 1 volt of r-f (100 mc to 1000 mc) modulated about 50 percent by a 15-kilocycle sine—wave voltage into the "LO" or "HI" tuner, a low impedance O-1 milliammeter on a meter inserted in series with the primary of the pre-amplifier input transformer will indicate 0.2 to 0.8 milliampere at resonance. A vacuum-tube voltmeter connected across the secondary of this transformer will indicate about 0.5 Volt R.M.S.

d. If a tuner is especially noisy or unsensitive, and the crystals are O.K., it should be checked for a possible slight, butterfly-rotor-to-stator short by connecting a circuit meter between a stator and rotor. Turn the dial two revolutions and check for shorts.

7. TRIGGER AND GATE BIAS VOLTAGES.

a. In cases where the trigger bias is far out of adjustment, first set to about 90 volts, before making adjustments as instructed in section II, paragraph 2.

b. In cases where the gate bias is far out of adjustment, first set to about 4 to 7 volts, before making adjustments as instructed in section II, paragraph 2. This voltage is measured from the movable arm on resistor R-30 to ground.

8. ADJUSTMENT OF CLOCK CONTACTS.

a. The adjustment of the clock contacts determines the length of the time marks made on the recording tape. These are correctly adjusted by the manufacturer and should not require any further adjustment in the field. However, in case it is desired to change the length of the time marks, proceed as follows:

b. Remove the receiver from the dust cover.

c. Loosen the clamping screw on the right side of the clock (accessible behind the panel, see fig. 5-1).

d. Turn the adjusting screw on top of the clock until a mark is made on the tape for the desired length of time, generally one-half minute. This screw is also accessible behind the panel (see fig. 5-1). Turn the screw to the right (clockwise) to decrease the length of the mark.

Note

To check the adjustment, turn the "POWER" switch "ON," set the "TRIGGER" switch "ON," and set "SPEED" switch to "HI" position. Allow equipment to operate until a complete time mark has been made. Compare the length of this mark with the distance between marks. The total of the two represents one minute.

e. After correct adjustment is made, tighten the clamping screw.

9. TO REPLACE THE DIAL LIGHT CARBON BRUSH.

a. Remove the two screws which secure the brush holder plate.

b. Remove the brush holder plate and the brush.

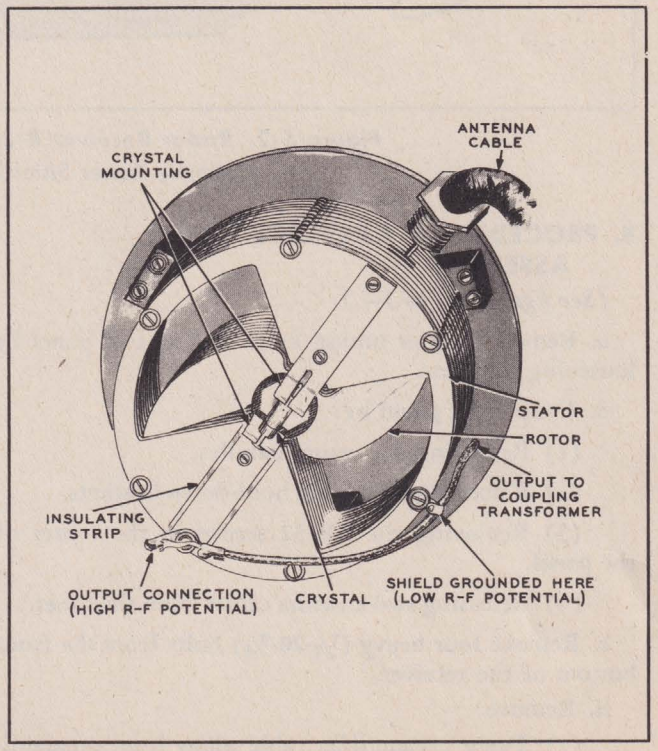


Figure 5-4. Butterfly Tuner

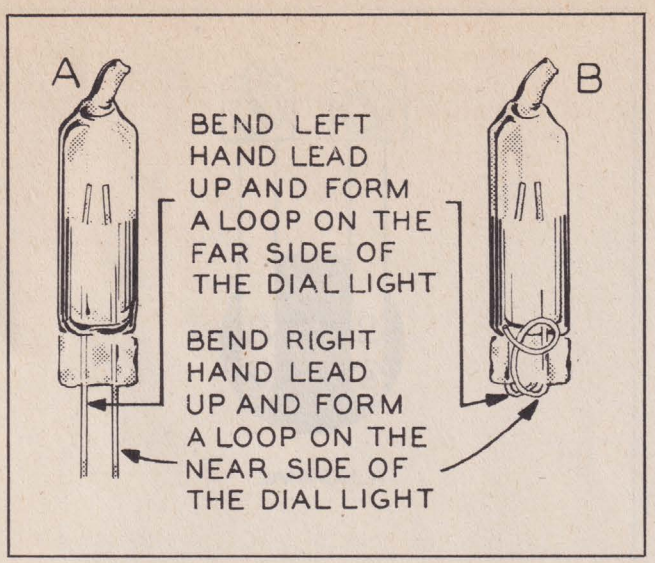


Figure 5-5. Dial Light—Preparation of Lead Wires When Replacing

10. TO REPLACE THE DIAL LIGHT.

a. Before replacing the dial light in its spring clip mounting, prepare the new light as follows, to obtain the correct polarity:

b. Hold the dial light as shown in figure 5-5A, with the two wires pointing down.

c. Bend the nearest wire to the right and form a loop as shown in figure 5-5B.

d. Bend the remaining wire to the left and form a loop similarly but on the opposite side of the light.

e. Push the light into the mounting carefully, making sure that the wire loops contact the spring clip.

11. TO INSTALL NEW ROLL OF RECORDING TAPE.

a. Remove tape-reel mounting screw and slide off both reels from the shaft. (See fig. 5-2.)

b. Disassemble each reel by turning the side toward you counterclockwise slightly (while holding the opposite side securely). This will unlock the two sides and they may be pulled apart. The locking device can be seen through the center of the reel.

c. Install the new roll of tape on the outer reel and thread through the recording mechanism as shown in figure 5-6. Make sure the tape is centered between the flanges of the guide rollers.

d. If necessary, splice the tape as shown in figure 5-7.

e. Fasten the free end of the tape to the inner or take-up reel (after removing the used tape) and assemble the reels on the shaft.

CAUTION

In assembling, be sure that the take-up reel engages the drive pulley.

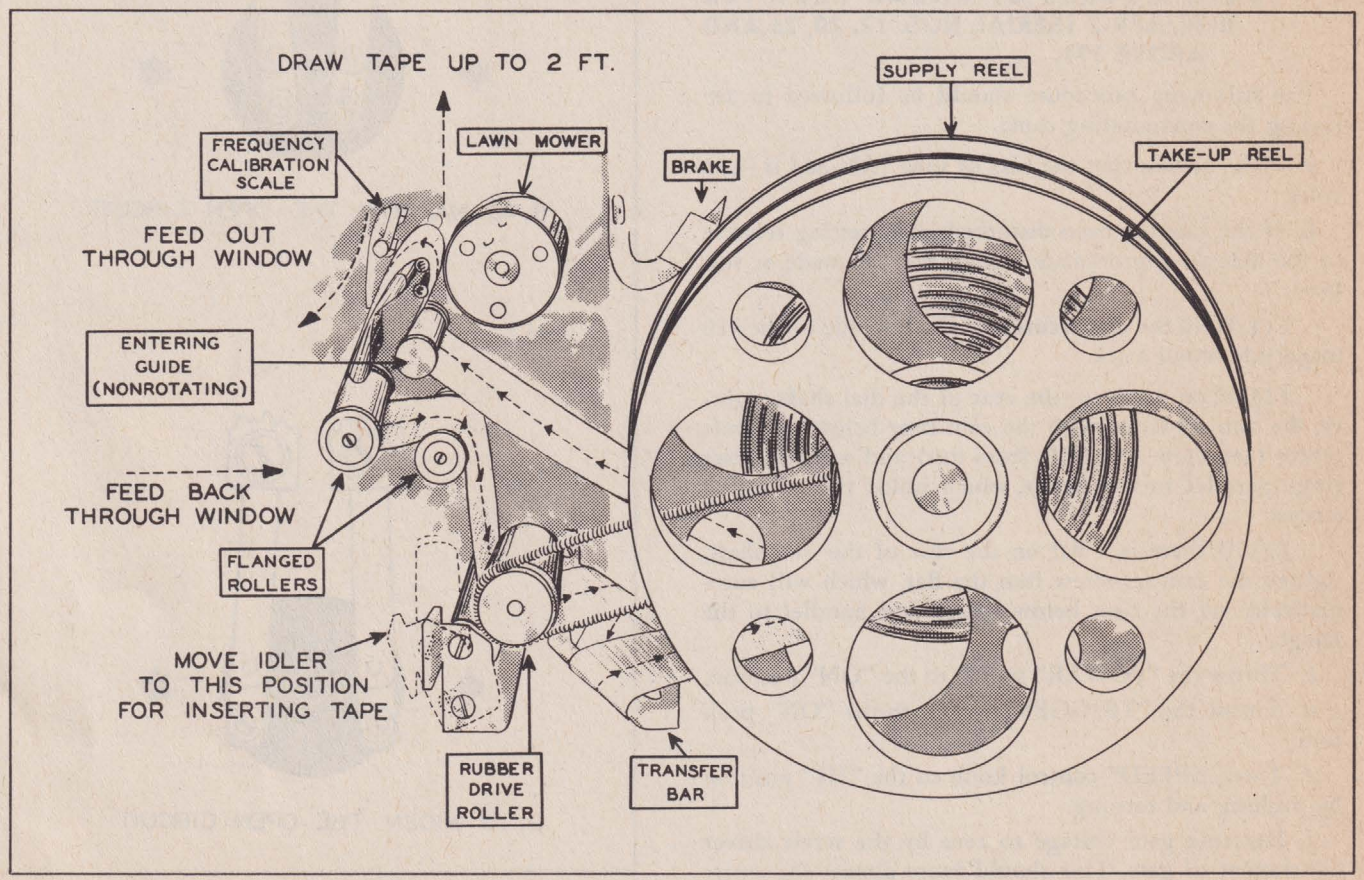


Figure 5-6. Drive Mechanism for Recording Tape

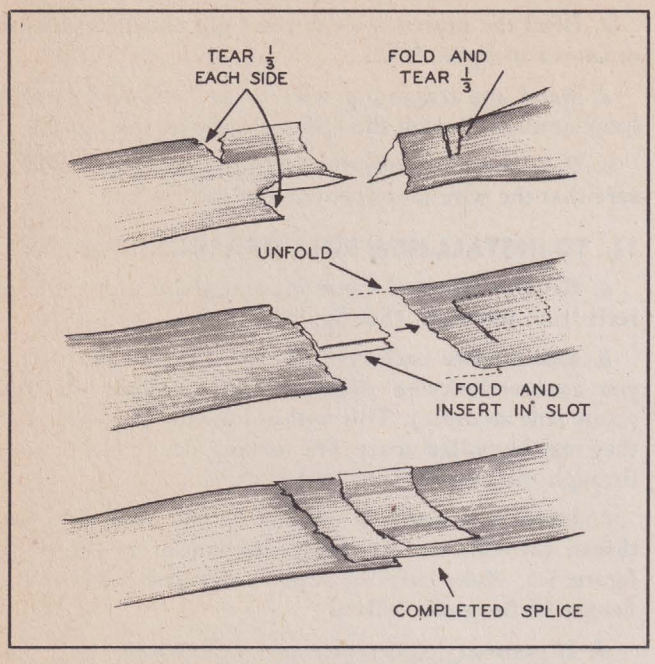


Figure 5-7. Method of Splicing Broken Tape Ends

f. Turn the equipment on in the automatic position and allow the tape to feed long enough to assure correct operation. Incorrect threading will cause the tape to tear.

12. ADJUSTMENT OF COMMUTATING CAM FOR LATE MODELS OF RADAR RECEIVER R-34/APR-2 (SERIAL NOS. 12, 20, 26 AND ABOVE 37).

The following procedure should be followed in adjusting the commutating cam:

a. Make certain that the bias of tube JAN-884 is —90 volts.

b. If the cam has been disturbed in its setting relative to the dial an approximate setting may be made as follows:

(1) Hold the dial securely at the low side of the 420 megacycle broad mark.

(2) If no flat is on the rear of the dial shaft, tighten the cam set-screw with the cam riser below the shaft center (set-screw accessible from top) and with the riser ridge parallel to the flange which holds the adjusting screws.

(3) If there is a flat on the rear of the dial shaft, tighten the cam set-screw into the flat, which will automatically set the riser below center and parallel to the flange.

c. Throw the "POWER" switch to the "ON" position.

d. Throw the "TRIGGER" switch to the "ON" position.

e. Turn "SPEED" control knob to the "HI" position by pushing and turning.

f. Decrease gate voltage to zero by the screw driver adjustment of gate. This should cause almost the entire dial to be covered with noise signal.

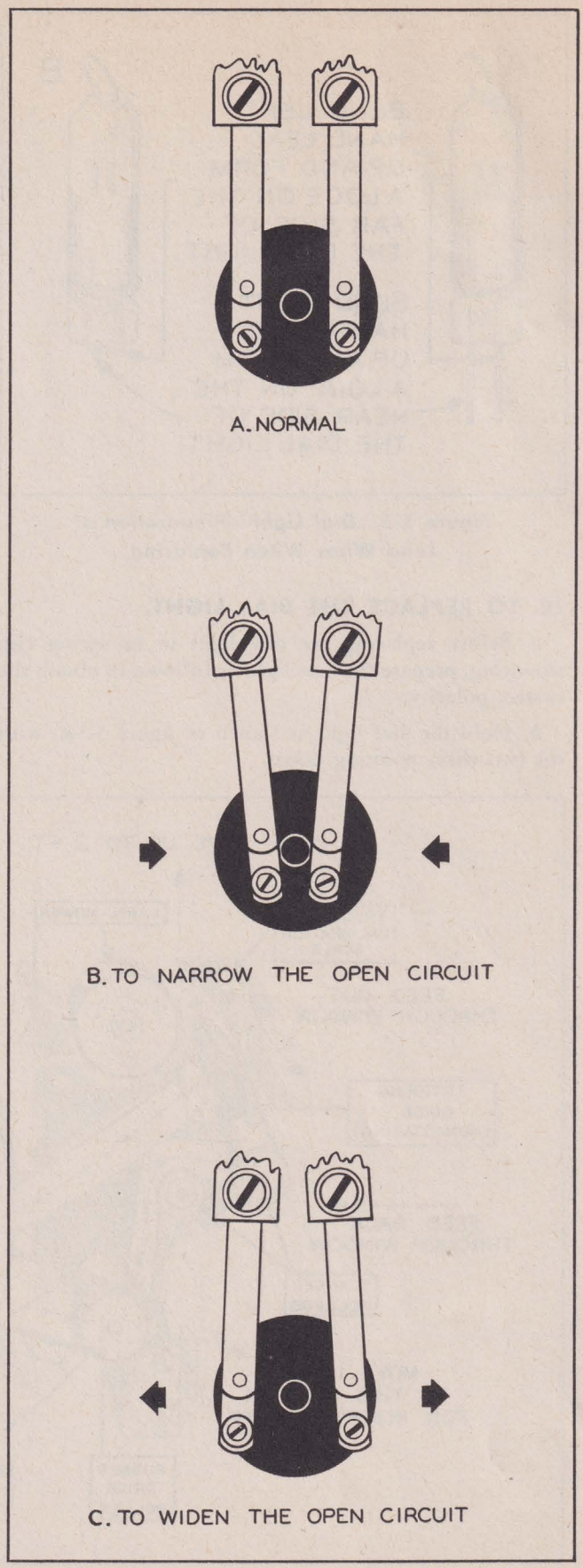


Figure 5-8. Adjustment of Commutating Cam

g. Looking into the front of the receiver the "HI" tuner screw adjustment is on the left and the "LO" tuner screw adjustment is on the right.

h. Turn "LO" screw clockwise until noise on dial cuts off below 420 megacycles. Turn "HI" screw counter-clockwise until noise on dial cuts off above 420 megacycles. Then reverse above procedure until noise is cut-off only between low and high marks of 420 megacycles.

i. Turn gate screw until the noise signal on the dial is eliminated.

j. After manual adjustment of the cam at the cross over point (420 megacycles), check the 90-megacycle or 1000-megacycle point. If these points do not automatically fall correctly, then the following adjustment should be made:

(1) Loosen slightly the two round head screws which hold the "pile-up" of commutation jack springs together. (See fig. 5-8A.)

(2) To narrow the open circuit span swing the jack spring toward the center of the cam by the amount of play. (See fig. 5-8B.)

(3) To widen the open circuit span swing the jack spring away from the center of the cam by the amount of play. (See fig. 5-8C.)

(4) Re-tighten the two round head screws.

(5) After this adjustment always readjust the gap between jack spring contacts (for open circuit) to about the thickness of jack spring.

(6) Readjust "LO" and "HI" screws as in sub-paragraph (8) above, if necessary.

13. REPLACEMENT OF BRUSHES AND COMMUTATOR FOR EARLY MODELS OF RADAR RECEIVER R-34/APR-2.

a. Brushes can be replaced by removing the grounding contact and unscrewing the knurled thumb screws (see sub-par. *d.* below).

b. Remove the commutator as follows:

(1) ROTATE the dial to approximately 100 megacycles.

(2) Loosen the commutator set screw which is accessible from the top.

(3) Rotate the dial to 420 megacycles and hold the dial in position.

(4) Loosen the other commutator set screw and remove the commutator.

c. Replace the commutator as follows:

(1) Set it so that the cut-away portion of the brass disc is on the bottom.

(2) Rotate the commutator approximately 35° clockwise when viewing it from the rear, and tighten the set screw. The surface of the brass disc should be flush with the end of the shaft.

(3) Release dial and rotate the dial so that the other set screw can be tightened.

d. If brushes and/or commutator are changed, brush positions must be checked to assure that they are grounding the high and low frequency channels properly, as follows: (See fig. 5-9.)

(1) Brush No. 1 should be set so that it is grounded at position 1, but is not grounded at position 2.

(2) Brush No. 4 should be set so that it is not grounded at position 1, but is grounded at position 2.

(3) Brush No. 2 should be set so that it is grounded just after position 3 is passed.

(4) Brush No. 3 should be set so that it is just grounded when position 4 is reached.

Note

Brush positions can be checked with an ohmmeter connected to the brush in question and the brass commutator.

14. REMOVAL OF RECORDING DRUM (LAWNMOWER).

a. Remove signal contact spring (white, yellow and black lead) and time contact spring (white, red and black lead) from mounting plate.

b. Rotate the dial to approximately 100-megacycles and loosen set screw.

c. Rotate the frequency dial to approximately 420-megacycles and loosen other set screw.

d. Slide the recording drum off the shaft.

e. Replace drum in the same relative position and tighten set screw at the 100-megacycle position.

f. Select a value of frequency such as 200-megacycles and feed the signal into the receiver which should be set on automatic operation.

g. Note recording-tape frequency indication. If incorrect, note discrepancy and place in manual operation.

h. Turn the equipment off and rotate dial to 100-megacycle position .

i. Loosen set screw and move the recording drum laterally on the shaft to correct the error and obtain correct frequency indication.

j. Tighten the second set screw and recheck correctness of recording drum position.

15. REPLACEMENT OF MOTOR AND FILTER.

Note

The motor and filter should be replaced as a unit.

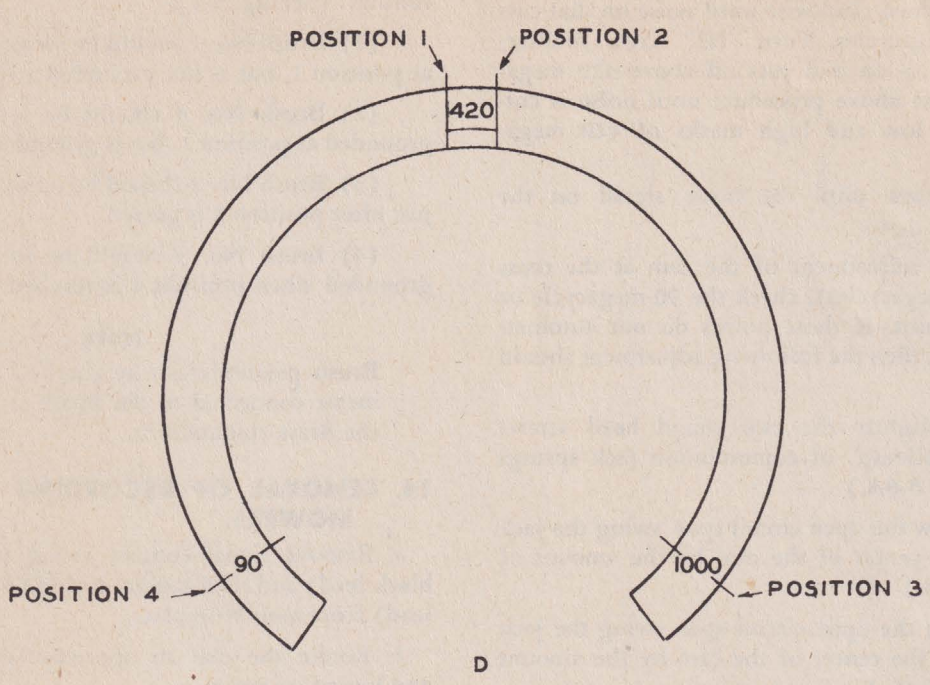
a. Remove the following plugs from trigger-chassis sockets:

(1) Preamplifier-trigger cable plug PL-4.

(2) Commutator cable plug PL-3.

(3) Plug PL-6. (See fig. 5-10.)

b. Remove trigger-chassis from the receiver. There are four bolts holding it in place. Two at the front of the



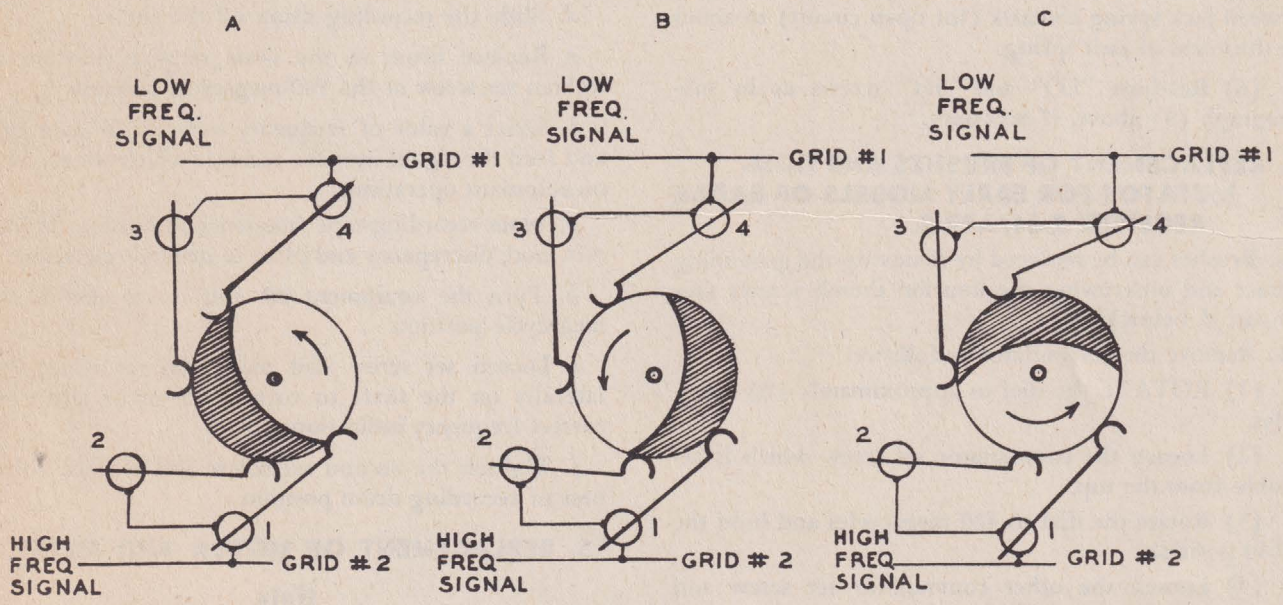


Figure 5-9. Correct Positions of Commutator Brushes

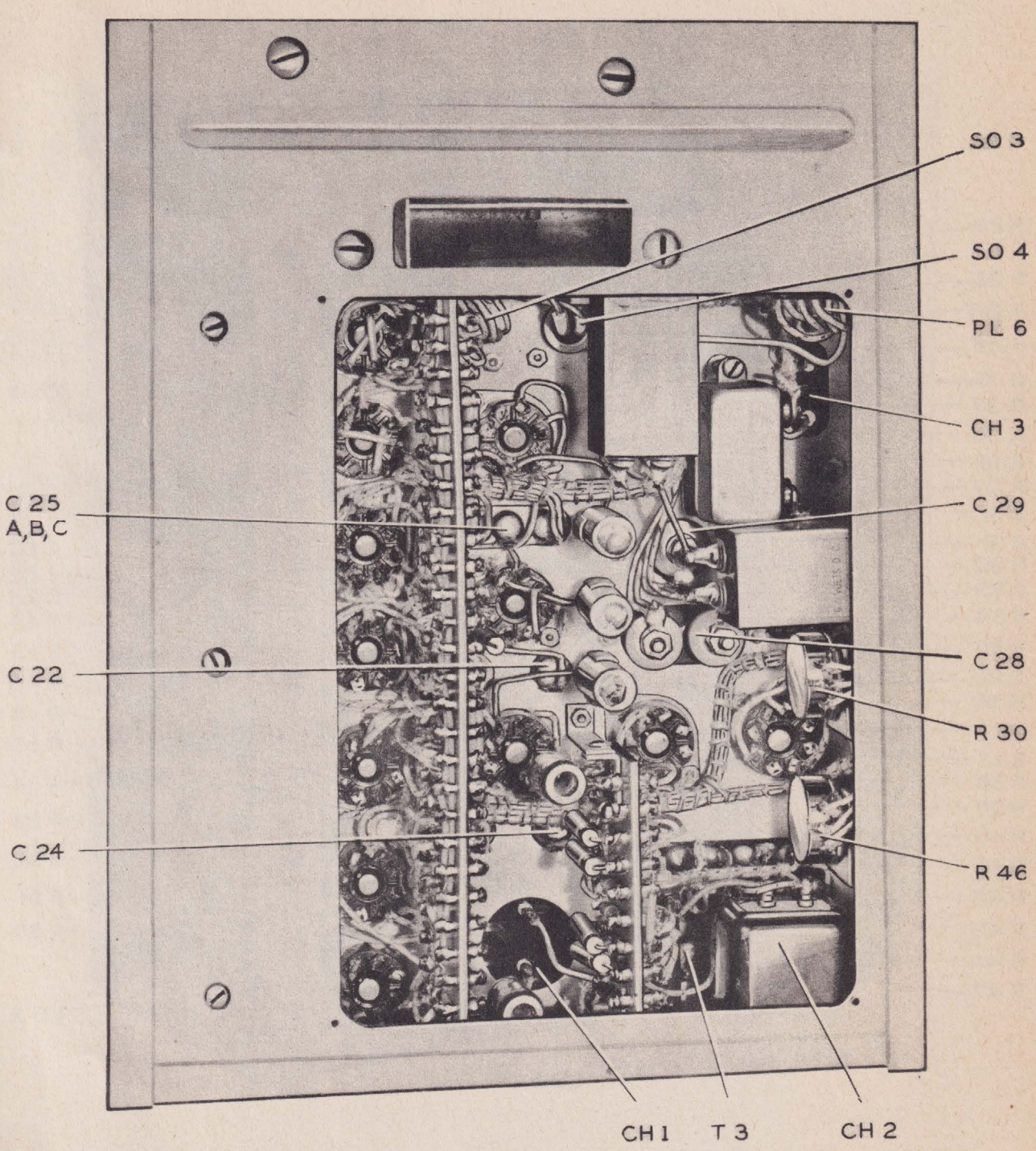


Figure 5-10. Radar Receiver R-34/APR-2—Bottom View with Cover Removed (Direct View)

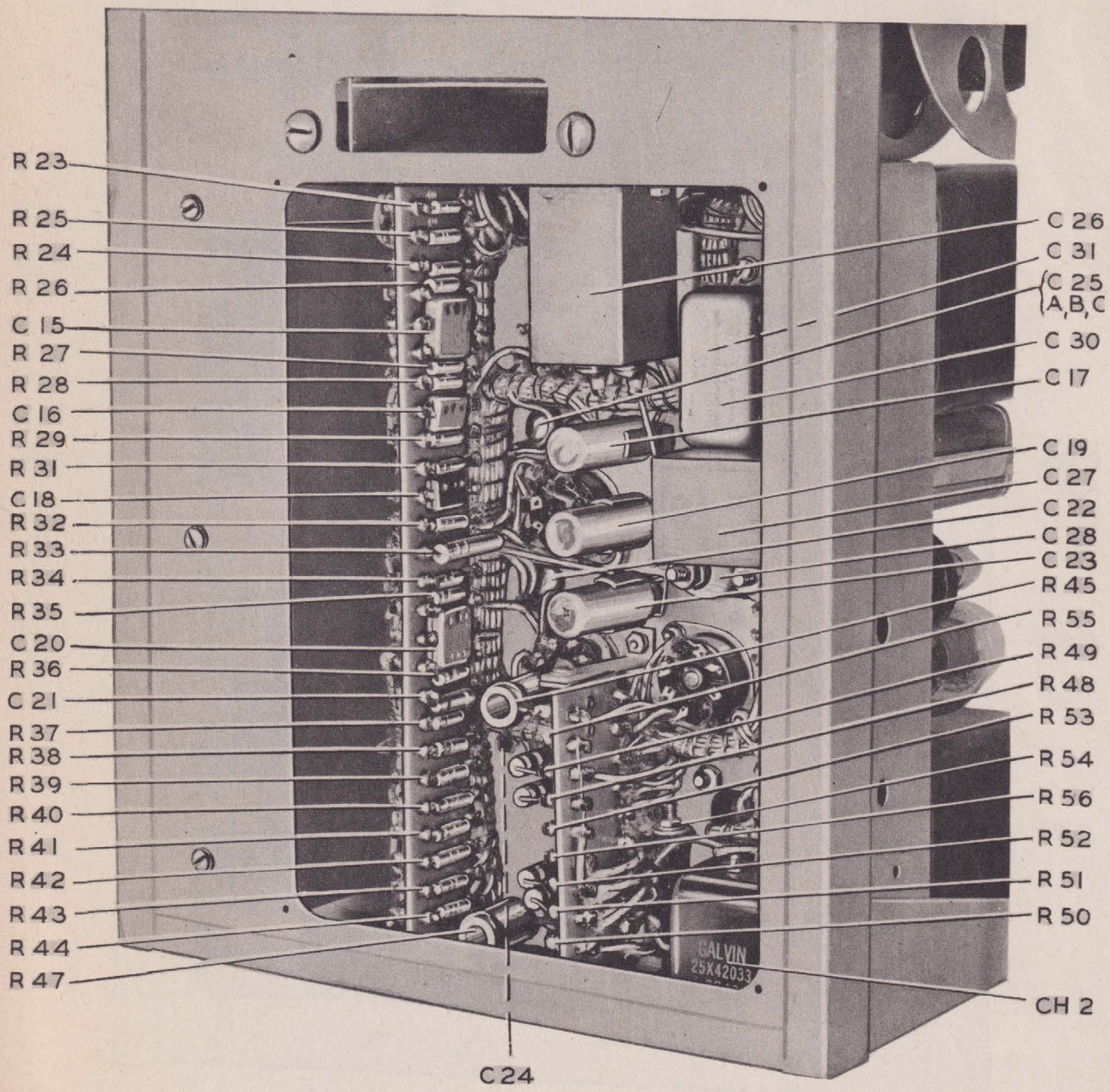


Figure 5-11. Radar Receiver R-34/APR-2—Bottom View with Cover Removed (45-Degree View)

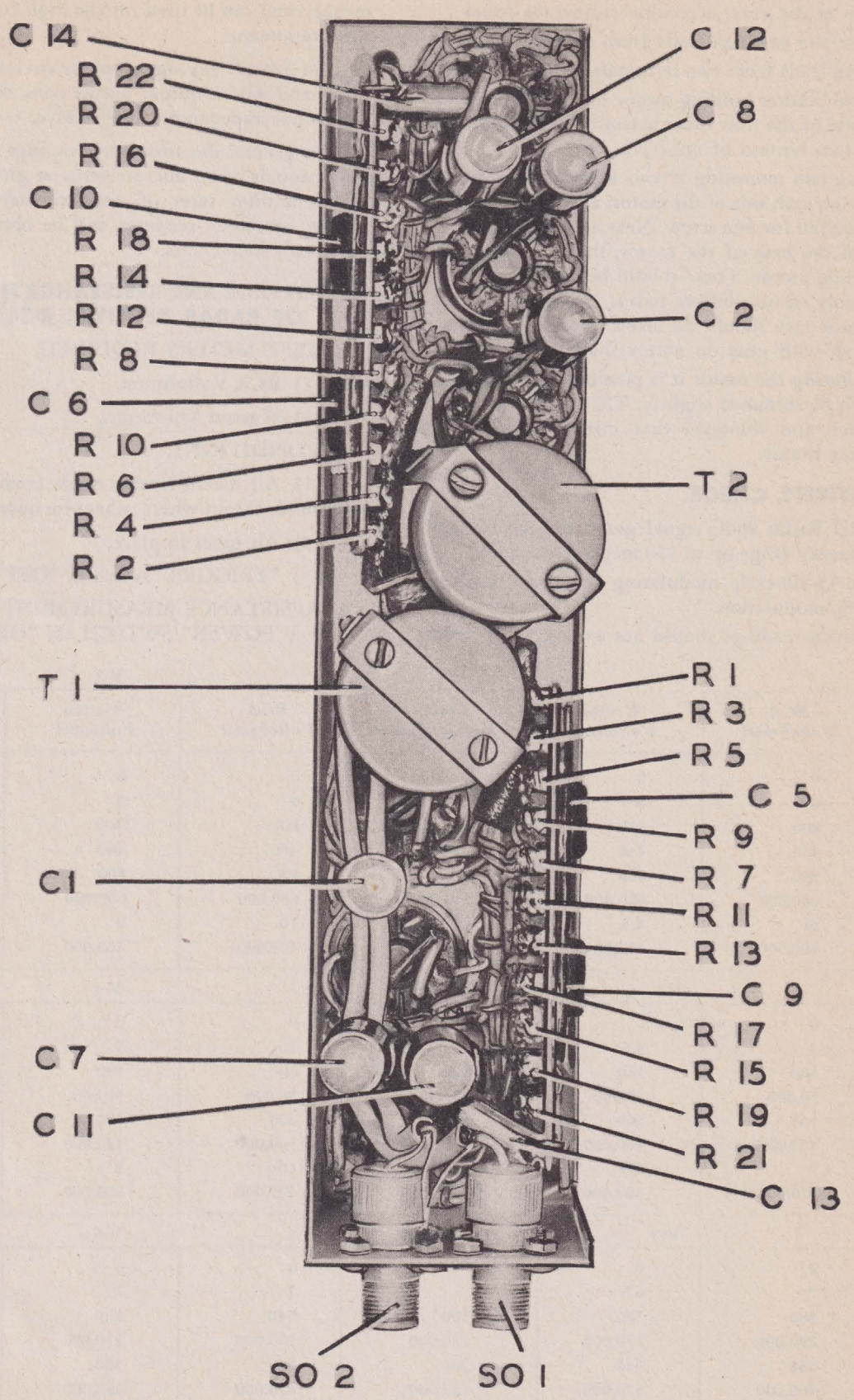


Figure 5-12. Radar Receiver R-34/APR-2—Pre-amplifier Chassis (Bottom View)

trigger-chassis, accessible from the bottom of the receiver chassis; two at the rear, accessible from rear panel.

c. Remove the two tape reels from tuner assembly.

d. Remove leads from two terminals of motor filter.

e. Remove bracket holding motor filter in place. This is held by one of the four tuner assembly mounting bolts accessible from bottom of receiver.

f. Remove two mounting screws from base of motor. There is one on each side of the motor; a right angle screw driver is required for one screw. Near each of the mounting holes in the base of the motor, there are two pins for positioning motor. These should be withdrawn from tuner assembly casting before motor is removed. In removing motor care should be taken to avoid damaging gear in mesh with gear on motor shaft.

g. In replacing the motor it is possible that the motor may have to be shimmed slightly. The motor should be so positioned and shimmed that minimum current is drawn by the motor.

16. SENSITIVITY CHECK.

a. General Radio 804C signal generator can be used in low-frequency range up to 350 megacycles.

b. Use a 15-kilocycle modulating sine wave voltage, 50% to 75% modulation.

c. Sensitivity readings should not exceed 5 millivolts.

d. Navy Type LAE Signal Generator (550 to 1300 megacycles) can be used for the high-frequency range of this equipment.

e. In general any signal source covering the frequency range and whose output circuit constants match the 50-ohm input impedance of the receiver will be satisfactory.

f. In general the sensitivity readings will be better for pulse signals of 25 microseconds or greater pulse width, and repetition rates of approximately 1.5 kilocycles. Poorer sensitivity readings will be obtained with lower pulse rate frequencies.

17. VOLTAGE AND RESISTANCE MEASUREMENTS OF RADAR RECEIVER R-34/APR-2.

a. TEST METERS REQUIRED.

(1) RCA Voltohmyst.

(2) Weston Voltmeter.

b. CONDITIONS.

(1) All measurements made from points indicated to ground, except where otherwise noted:

(2) All tubes in place.

(3) "TRIGGER" switch in "OFF" position.

c. RESISTANCE MEASUREMENTS IN OHMS ("POWER" SWITCH IN "OFF" POSITION).

	V-1			V-2		
Tube Pin	*RCA Voltohmyst*	*Weston Voltmeter*	*Circuit Diagram Value*	*RCA Voltohymst*	*Weston Voltmeter*	*Circuit Diagram Value*
1	0	0		0	0	
2	0	0		0	0	
3	800	800	750	800	800	750
4	450	440		460	440	
5	800	800	750	800	800	750
6	600,000	600,000	520,000	600,000	600,000	520,000
7	5	4.5		10	9	
8	400,000	400,000	370,000	400,000	400,000	370,000
	V-3			V-4		
1	0	0		0	0	
2	5	4.5		10	9	
3	560	560	560	600	580	560
4	50,000	47,000	50,000	50,000	50,000	50,000
5	560	560	560	600	580	560
6	450,000	460,000	440,000	500,000	480,000	440,000
7	7	6.5		10	9	
8	370,000	380,000	353,000	400,000	390,000	353,000
	V-5			V-6		
1	0	0		0	0	
2	7	6.5		7	7	
3	580	580	500	540	500	500
4	290,000	270,000	250,000	300,000	270,000	250,000
5	580	580	500	540	500	500
6	460,000	470,000	420,000	450,000	460,000	420,000
7	7	7		10	9	
8	370,000	380,000	353,000	400,000	390,000	353,000

V-7

Tube Pin	RCA Voltohmyst	Weston Voltmeter	Circuit Diagram Value
1	1	1	
2	350,000	340,000	350,000
3	520	520	500
4	1	1	
5	350,000	340,000	350,000
6	520	520	500
7	0	0	
8	0	0	

V-8

RCA Voltohymst	Weston Voltmeter	Circuit Diagram Value
		N.C.
0	0	
120,000	125,000	100,000
115,000 to 160,000[2]	112,000 to 170,000[2]	100,000 to 150,000[2]
120,000	125,000	100,000
		N.C.
0		
115,000 to 160,000[2]	112,000 to 170,000[2]	100,000 to 150,000[2]

V-9

250,000	245,000	250,000
350,000	340,000	350,000
49,000	49,000	50,000
31,000	30,000	30,000
390,000	380,000	400,000
3,000	3,000	2,500
0	0	
0	0	

V-10

		N.C.
0	0	
350,000	340,000	350,000
350,000	340,000	350,000
262,000	260,000	250,000
		N.C.
0	0	
950	960	1000

V-11

		N.C.
0	0	
INF[3]	INF[3]	INF[3]
		N.C.
95,000 to 290,000[4]	100,000 to 300,000[4]	100,000 to 300,000
		N.C.
0	0	0
0	0	

V-12

		N.C.
0	0	
315,000	320,000	300,000
315,000	320,000	300,000
500,000	520,000	500,000
		N.C.
0	0	
22,000	19,000	20,000

V-13

		N.C.
		N.C.
		N.C.
240,000	240,000	218,000
240,000	240,000	218,000
19,000	18,500	18,000
INF	INF	
INF	INF	

V-14

		N.C.
220,000	230,000	200,000
		N.C.
		N.C.
0	0	0
		N.C.
		N.C.
		N.C.

V-15

0	0	
INF	INF	
		N.C.
50	56	
		N.C.
60	60	
		N.C.
INF	INF	

V-16

		N.C.
320,000	320,000	300,000
INF	INF	
		N.C.
INF	INF	
46,000[4]	50,000[4]	
320,000	320,000	300,000
		N.C.

V-17

0	0	
325,000	340,000	314,000
325,000	340,000	314,000
170,000	180,000	150,000
325,000	340,000	314,000
350,000	340,000	307,000
325,000	340,000	314,000
INF	INF	

V-18

		N.C.
0	0	
INF	INF[6]	
		N.C.
325,000	340,000	314,000
		N.C.
INF	INF	
		N.C.

Note 1. The value depends on position of cam actuated, contacts and dial.

Position of dial	*Resistance*	
	pin 1	*pin 4*
90-420	0	50,000
420-1000	50,000	0
1000-90	0	0

Note 2. This value depends on position of "GATE" control.
Note 3. With "TRIGGER" switch in "ON" position 360,000 measured with Weston; 350,000 measured with RCA Voltohmyst.
Note 4. This value depends on position of control.
Note 5. No tube connection at this point. This is a terminal point.
Note 6. Infinity if not connected to power sources.

d. VOLTAGE MEASUREMENTS "POWER" SWITCH IN "ON" POSITION).

V-1			V-2		V-3	
Tube Pin	*RCA Voltohmyst*	*Weston Voltmeter*	*RCA Voltohymst*	*Weston Voltmeter*	*RCA Voltohmyst*	*Weston Voltmeter*
1	0	0	0	0	0	0
2	0	0	0	0	6.6	6.4
3	1.0	0.66	1.1	0.83	1.05	0.77
4	0	0	0	0	0	0
5	1.0	0.66	1.1	0.83	1.05	0.77
6	39	16	39	16	50	25
7	6.6	6.4	6.4	6.4	12.5	12.4
8	60	31.5	64	34	58	36
V-4			V-5		V-6	
1	0	0	0	0	0	0
2	6.4	6.4	19	19	19.4	19.5
3	1.1	0.95	1.3	1.1	1.14	0.95
4	0	0	0	0	0	0
5	1.1	0.95	1.3	1.1	1.14	0.95
6	50	26	50	26.5	48	26
7	13	13	12.5	12.4	13.5	13.4
8	61	36.5	60	37	53	31.5
V-7			V-8		V-9	
1	0	0	0	0	0	0
2	55	45	0	0	190	180
3	1.75	1.47	0	0	10.4	7.3
4	0	0	0-12v[1]	0-12v[1]	0	0
5	55	45	0	0	75	65
6	1.75	1.47	0	0	3.2	1.75
7	0	0	0	0	0	0
8	0	0	0-12v[1]	0-12v[1]	0	0
V-10			V-11		V-12	
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	44	36.5	205[2]	196[2]	310	305
4	44	36.5	0	0	310	305
5	0	0	-95[6]	-90[6]	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	2.8	2.19	0	0	23.5	21.3
V-13			V-14		V-15	
1	0	0	0	0	0	0
2	0	0	-156	-155	650	650
3	0	0	0	0	0	0
4	-235	-230	0	0	480[4]	460[4]
5	-235	-230	0	0	0	0
6	125[3]	120[3]	0	0	480[4]	460[4]
7	0	0	0	0	0	0
8	0	0	0	0	650	650
V-16			V-17		V-18	
1	0	0	10	2.5	0	0
2	310	305	112	103	0	0
3	640	620	112	103	0	0
4	0	0	110	102	0	0
5	115	105	112	103	156	155
6	10.5[5]	9.3[5]	158	150	0	0
7	310	305	110	103	0	0
8	0	0	115	105	0	0

Note 1. This value will depend on position of "GATE" control.
Note 2. This value is 0 when "TRIGGER" switch is in "OFF" position.
Note 3. A-C Voltage.
Note 4. A-C Voltage.
Note 5. No tube connection (terminal point).
Note 6. This value depends on position of control.

SECTION VI
SUPPLEMENTARY DATA

1. TUBE COMPLEMENT.

The following table lists the tubes used in Radar Receiver 5-34/APR-2.

Quantity	*Type Designation*	*Function*
6	JAN-6SJ7 (VT-116)	Pre-amplifiers
1	JAN-6SN7-GT/G (VT-231)	Switching tube
1	JAN-6H6-GT/G (VT-90-A)	Gate
1	JAN-6V6-GT/G (VT-107-A)	Signal amplifier
1	JAN-6SN7-GT/G (VT-231)	First section—signal amplifier Second section—Trigger amplifier
1	JAN-884 (VT-222)	Gas trigger tube
1	JAN-6V6-GT/G (VT-107-A)	Cathode follower
1	JAN-6SN7-GT/G (VT-231)	Rectifier for gas tube bias
1	JAN-6B4/G	Control, regulated power supply
1	JAN-6SJ7-GT (VT-116-A)	Control, regulated power supply
2	JAN-0D3/VR-150 (VT-139)	Voltage regulator
	JAN-5R4GY	Rectifier
1	G.E.T.-4-1/2	1/2-Watt Neon overvoltage protector
1	G.E.NE-2	1/10-Watt Neon dial flasher

2. FREQUENCY RANGE.

The frequency range is 90 to 1000-megacycles.

3. TUNING BANDS.

a. LOW FREQUENCY TUNER.—The low-frequency tuner covers the range between 90 and 420 megacycles.

b. HIGH FREQUENCY TUNER. — The high-frequency tuner covers the range between 420 and 1000-megacycles.

4. CRYSTALS.

Sylvania IN29 crystals are the only type that have been found satisfactory for use in this receiver.

5. TYPES OF INDICATION OF RECEIVED SIGNALS.

The types of signal indications are aural, electro-sensitive tape recorder, and rotating dial.

6. TIME MARKS ON RECORDER.

a. EVERY MINUTE.—A time mark of one-half minute duration is made every minute.

b. FIFTEEN, THIRTY AND FORTY-FIVE MINUTE.—These periods are identified by the absence of the minute mark.

c. HOUR.—Identified by a two-minute mark (59th and 60th minutes).

7. SCANNING RATES.

a. "SPEED" SWITCH ON "HI".—Scanning rate is six sweeps per second.

b. "SPEED" SWITCH ON "LO".—Scanning rate is two sweeps per second.

c. "SPEED" SWITCH ON "MAN."—Provides manual scanning.

8. RECORDING TAPE.

The recording tape is 600 feet long and will last for 50 hours with "SPEED" switch on "HI."

9. POWER REQUIREMENTS.

The power requirements are as follows:

D-C SUPPLY VOLTAGE.—24 to 28 volts.

A-C SUPPLY VOLTAGE.—75 to 85 or 105 to 125 volts.

A-C SUPPLY FREQUENCY.—400 to 2600 cps.

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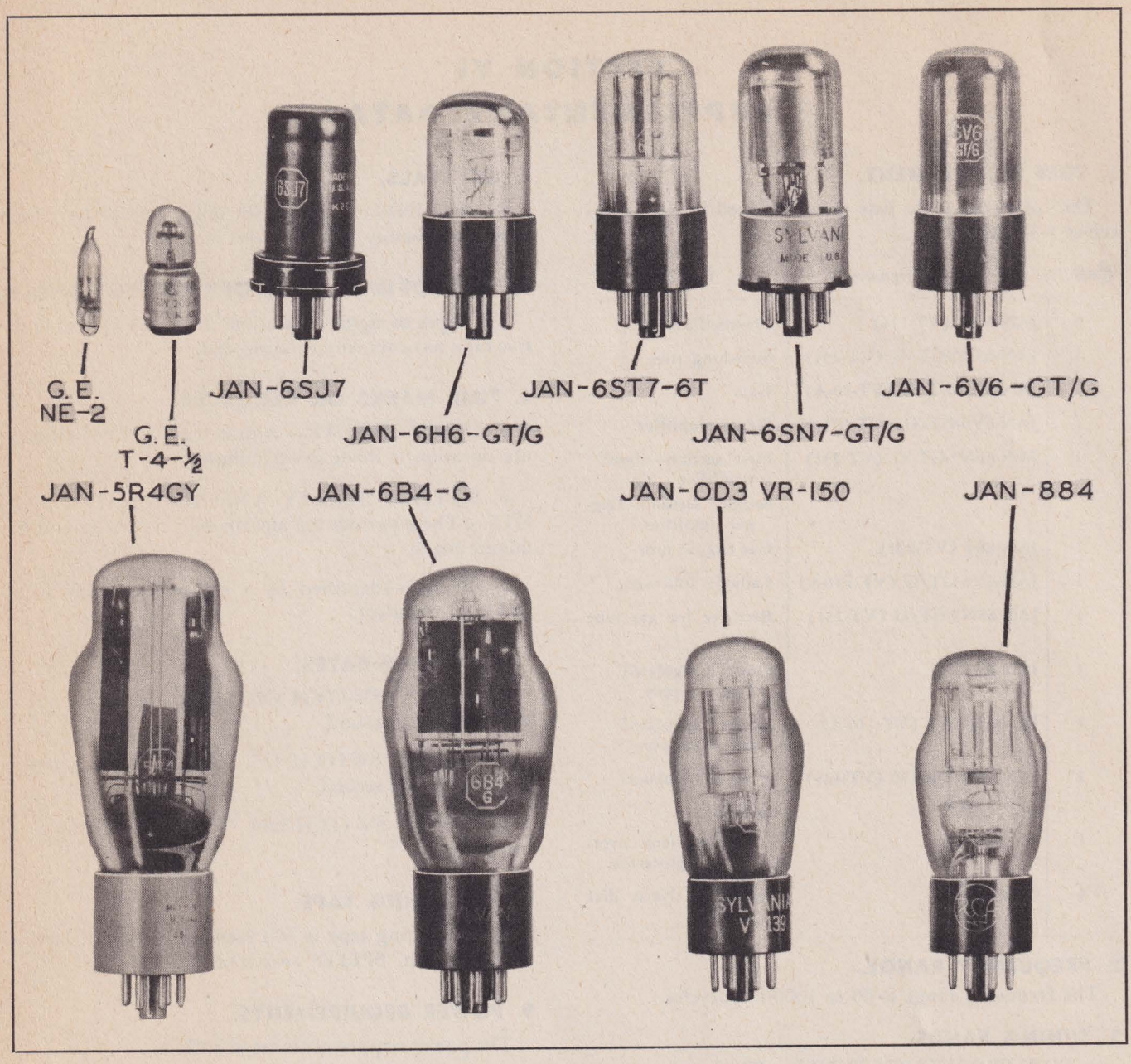

Figure 6-1. Tube Complement

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SECTION VII
PARTS CATALOGUE

Introduction

Table of Parts

The parts listed in this table do not constitute a complete electrical and mechanical breakdown of the equipment. The table lists all electrical parts together with such operative mechanical parts as are subject to loss or failure, with the exception of structural and minor parts such as standard bolts, screws, nuts, and the like. In some instances individual detail parts of a sub-assembly may not be listed as separate items, since replacement of such items is impractical.

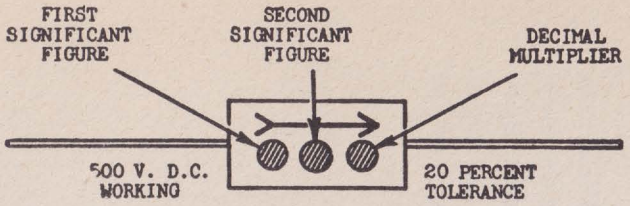
Ordering of Spare Parts

Each Service using this list has established certain depots and service groups for the storage and issue of spare parts to its organizations requiring them. The regulations of each Service should be studied to determine the method and source for requisitioning spare parts. The information in this list, as to manufacturer's or contractor's name, type, model, or drawing number, is not to be interpreted as authorization to field agencies to attempt to purchase identical or comparable spare parts directly from the manufacturer or a wholesale or retail store except under emergency conditions as covered by existing regulations of the Service concerned.

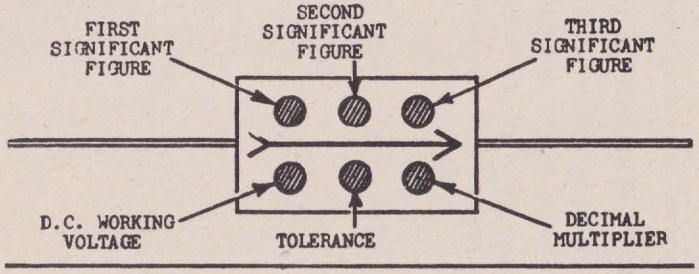
U. S. ARMY PERSONNEL: This table is for information ONLY and IS not to be used as a basis for requisitioning parts. Authorities for obtaining maintenance items are as follows: 1. For using organizations: applicable Service publications of the 00-30 series of AAF Technical Orders. 2. For higher maintenance and supply echelons: applicable Service publications of the 08-55 series of AAF Technical Orders.

RMA COLOR CODES

CAPACITORS (MMFD)



COLOR	NUMERAL	VOLTS	MULTIPLIER	TOLERANCE
BLACK	0		1	
BROWN	1	100	10	1%
RED	2	200	100	2%
ORANGE	3	300	1,000	3%
YELLOW	4	400	10,000	4%
GREEN	5	500	100,000	5%
BLUE	6	600	1,000,000	6%
VIOLET	7	700	10,000.000	7%
GRAY	8	800	100,000,000	8%
WHITE	9	900	1,000,000,000	9%
GOLD		1000	0.1	5%
SILVER		2000	0.01	10%
NO COLOR		500		20%

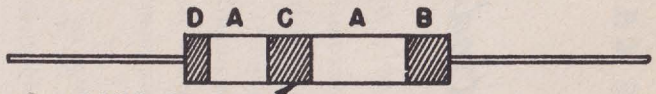


RESISTORS (OHMS)

COLOR	A 1ST DIGIT	B 2ND DIGIT	C MULTIPLIER
SILVER			0.01
GOLD			0.1
BLACK		0	1.0
BROWN	1	1	10
RED	2	2	100
ORANGE	3	3	1,000
YELLOW	4	4	10,000
GREEN	5	5	100,000
BLUE	6	6	1,000,000
PURPLE	7	7	10,000,000
GRAY	8	8	100,000,000
WHITE	9	9	

D - TOLERANCE CODE:

GOLD = 5% SILVER = 10% NO COLOR = 20%



OLD COLOR ARRANGEMENT

NEW COLOR ARRANGEMENT

BODY COLOR (NEW COLOR ARRANGEMENT ONLY) INDICATES TYPE OF RESISTOR, AS FOLLOWS:-

BLACK - COMPOSITION, NON-INSULATED
TAN, OLIVE OR WHITE - COMPOSITION, INSULATED
DARK BROWN - WIRE-WOUND, INSULATED

TABLE OF PARTS

NOTE—Parts listed which are indicated by a # sign in column two are not available as spare parts and are listed for reference purposes only.

MODEL: RADAR RECEIVING EQUIPMENT AN/APR-2

Reference Symbol	Army Stock Number Navy Stock Number British Ref. Number	Name of Part and Description	Function	Mfg. and Desig. or Standard Type	Cont. or Gov't. Dwg. or Spec. No.
BR-1	3H525GA-1	BRUSH: Carbon; rectangular shape; 0.125″ thick, 0.250″ wide, 0.457″ long; round stud at one end 0.100″ diameter, 0.093″ long; overall dimensions, 0.750″ x 0.250″ x 0.125″.	Contact dial plate	Stackpole LBP20 Type #1	39A42721
BR-2	2C4180-34/S1	SPRING: Upper contact; phosphor bronze; spring tempered; 0.015″ thick; shaped and cut to fit, 2 holes 0.166″ diameter, 1 hole 0.062″ diameter; overall dimensions, 2-5/16″ long, 1/4″ wide, 1/16″ high at curved end.	Signal and clock circuit to recorder	Galvin	41A42716
BR-3		SPRING: Same as Ref. BR-2.			
C-1	3DA130-1	CAPACITOR: Fixed; paper; 130,000-micromicrofarad ±20%; 100 volts DCW; 1-15/16″ long, 9/16″ diameter; shielded and oil filled; mounting bracket extruded and tapped; 6-32 full thread.	Cathode bypass, V-1	Fast, John E. Company	8A31212
C-2		CAPACITOR: Same as Ref. C-1.	Cathode bypass, V-2		
C-3A C-3B C-3C	3DA100-190	CAPACITOR: Fixed; 3 section; each section 100,000-micromicrofarad ±10%; 600 volts DCW; metal case; 1-9/16″ high, 1-3/4″ long, 1/2″ wide; bottom ends of case flanged for mounting.	Screen bypass, V-1 Screen bypass, V-3 Screen bypass, V-6	Aerovox #618	8X42198
C-4A C-4B C-4C		CAPACITOR: Same as Ref. C-3.	Screen bypass, V-2 Screen bypass, V-4 Screen bypass, V-6		
C-5	3D9200-38	CAPACITOR: Fixed; mica; 200-micromicrofarad ±10%; 400 volts DCW; 11/16″ long, 7/16″ wide, 11/64″ thick; axial leads; color coded; red, black, brown, and silver.	Grid coupling, V-3	Aerovox	21B6629
C-6		CAPACITOR: Same as Ref. C-5.	Grid coupling, V-4		
C-7		CAPACITOR: Same as Ref. C-1.	Cathode bypass, V-3		
C-8		CAPACITOR: Same as Ref. C-1.	Cathode bypass, V-4		
C-9		CAPACITOR: Same as Ref. C-5.	Grid coupling, V-5		
C-10		CAPACITOR: Same as Ref. C-5.	Grid coupling, V-6		
C-11		CAPACITOR: Same as Ref. C-1.	Cathode bypass, V-5		
C-12		CAPACITOR: Same as Ref. C-1.	Cathode bypass, V-6		
C-13	3DA1-13.1	CAPACITOR: Fixed; mica; 1000-micromicrofarad ±10%; color coded; brown, black, red; 3/4″ square, 1/4″ thick; 500 volts DCW.	Grid coupling, second section V-7		21B6663
C-14		CAPACITOR: Same as Ref. C-13.	Grid coupling, first section V-7		
C-15		CAPACITOR: Same as Ref. C-13.	Diode gate coupling capacitor, V-8	Aerovox Cornell-Dublier	
C-16	3D9500-50.1	CAPACITOR: Fixed; mica; 500-micromicrofarad ±10%; 400 volts DCW; color coded; green, black, brown, silver; 11/16″ long, 7/16″ wide, 11/64″ thick; axial leads.	Grid coupling, first section V-9	Aerovox 1468X Cornell-Dublier	21B6579
C-17		CAPACITOR: Same as Ref. C-1.	Cathode bypass, first section V-9		

C-18	3D9200-38	CAPACITOR: Fixed; mica; 200-micromicrofarad ±10%; color coded; red, black, brown; 7/16" wide, 11/16" long, 3/16" thick; 400 volts DCW.	Grid coupling, V-10	Aerovox	21B6629
C-19		CAPACITOR: Same as Ref. C-1.	Cathode bypass, V-10		
C-20		CAPACITOR: Same as Ref. C-13.	Grid coupling, V-11		
C-21	3DKA2-118	CAPACITOR: Fixed; ceramic; 2000-micromicrofarad ± 20%; 500 volts DCW; 0.850" long, 0.237" diameter.	Discharges through V-11 after it has acquired sufficient charge	Muter Company	21A83081
C-22	3DA100-305	CAPACITOR: Fixed; 100,000-micromicrofarad ±10%; 400 volts DCW; oil filled; metal case; 1" high, 1-11/16" long, 1/2" wide; bottom ends flanged for mounting.	Grid coupling, second section V-9	Aerovox #418	8X42199
C-23		CAPACITOR: Same as Ref. C-1.	Cathode bypass, second section V-9		
C-24		CAPACITOR: Same as Ref. C-22.	Grid coupling, V-12		
C-25A C-25B C-25C		CAPACITOR: Same as Ref. C-3.	Sections A & B are bias supply input and output filter capacitors respectively. Section C is preamplifier heater supply filter capacitor		
C-26	3DB2.602	CAPACITOR: Fixed; 2.0-microfarad ±10%; 600 volts DCW; oil filled; metal case; 2" high, 1-1/4" square; 2 insulated terminals; bottom ends flanged for mounting.	Decoupling capacitor, high pre-amplifier positive B	Toby-Duetschman #FM-602	8X42031
C-27		CAPACITOR: Same as Ref. C-26.	Decoupling capacitor, low pre-amplifier positive B		
C-28	3DB1.1124	CAPACITOR: Fixed; 1-microfarad ±10%; 1000 volts DCW; oil filled, metal case, 2-1/16" high, 1-3/4" long, 1" wide; insulated terminals.	Power supply filter input capacitor	Aerovox #1009MB	8X42197
C-29	3DB3.33	CAPACITOR: Fixed; 3-microfarad ±10%; 1000 volts DCW; oil filled; metal case; 3-1/2" high, 2-1/2" wide, 1-1/4" thick; 2 insulated terminals.	Power supply filter output capacitor	Cornell-Dublier TJU-100-30	8X42011
C-30	3DA500-97.3-1	CAPACITOR: Fixed; 500,000-micromicrofarad ±10%; 600 volts DCW; oil filled; metal case; 7/8" high, 1-3/4" long, 7/8" wide; 2 insulated terminals; bottom ends flanged for mounting.	Cathode bypass, V-17	Cornell-Dublier #DYR-100	8X42009
C-31	3DA100-104.1	CAPACITOR: Fixed; 100,000-micromicrofarad ±10%; 1000 volts DCW; oil filled; metal case; 3/4" high, 1-3/4" long, 7/8" wide; 2 insulated terminals; bottom ends flanged for mounting.	Dropping resistor bypass, V-17	Cornell-Dublier #DYR-605	8X42010
C-32		CAPACITOR: Same as Ref. C-31.	Phone coupling		
CH-1	3C317-36	CHOKE, AUDIO: Iron core; 21,285 turns of #42 gauge wire; paper insulation between and over windings; wax impregnated; metal case.	Wave form correction	Chicago Transformer Corp.	24C42135
CH-2	3C362-38	CHOKE, FILAMENT: Iron core; 182 turns of #25 gauge wire; paper insulation between and over windings; wax impregnated; metal case; 1-21/32" high, 2" wide, 1-3/8" wide; bottom flanged for mounting; 2 insulated terminals.	Pre-amplifier heater supply filter choke	Chicago Transformer Corp.	25B42033

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CH-3	2C4180-34/C2	CHOKE, FILTER: 3710 turns of #31 gauge wire on 26-gauge iron core; paper insulation over and between windings; 2 insulated terminals; wax impregnated; metal case; 3-7/8" high, 3-15/64" long, 2-31/32" wide; 4 studs 8-32 thread for mounting; 2 insulated terminals.	Power supply filter choke	Chicago Transformer Corp.	25C42119
F-1	3Z1937-37	FUSE: 3 amperes; 25 volts; glass enclosed; dimensions: 1-1/4" x 9/32".	Protection a-c overload	Bussman 4AG	65X42311
F-2	3Z1935	FUSE: 5 amperes; 25 volts; glass enclosed; dimensions: 1-1/4" x 9/32".	Protection d-c	Bussman 4AG	65X81441
J-1	2Z5570	JACK: Open circuit; 2 contacts; phosphor bronze spring; nickel silver finish; brass mounting bushing 3/8-32 thread, white nickel finish.	Connect headphones to receiver	Utah Radio products ST. 921	40A30453
LM-1	2Z5952	LAMP, PILOT: 6.3 volts; 0.15 amperes; miniature bayonet base.	Indicates a-c "ON"	Sylvania S-47	60X42292
PL-5	2Z7116.40	PLUG, CHASSIS: Molded; phenolic body; 6 prong contacts; shell, 5/8-20 thread; 9/16" high; mounting plate 1/16" thick, 1" square, 4 holes for #4 screw.	Power connector	American Phenolic AN3102 14S-6P	28X42738
PL-6	2Z7121	PLUG, CHASSIS: 11 pin plug; black bakelite body; overall dimensions: 7/8" high, 1-1/8" diameter; metal mounting plate, saddle type; 1-3/4" mounting centers; center locator.	Power plug	American Phenolic	28X52415
PL-7	2Z8799-160	PLUG, CHASSIS: Phenolic body; 4 prong; aluminum shell; 1-3/8-20 thread stud; aluminum mounting plate.	26 volts d-c and 80 to 120 volts at 400 to 2600 cps; power input	American Phenolic AN3102-22-4P	28X42125
R-1	3Z6075-23	RESISTOR: 750-ohms ±10%; 1/2 watt; fixed; carbon; insulated; 5/8" long 0.218" diameter; axial leads.	Cathode bias, V-1	Erie Stackpole International	6B5629
R-2		RESISTOR: Same as Ref. R-1.	Cathode bias, V-2		
R-3	3Z6720-6	RESISTOR: 200,000-ohms ±10%; 1/2 watt; fixed; carbon; insulated; 5/8" long, 0.218" diameter; axial leads.	Screen dropping, V-1	Erie Stackpole International	6B5630
R-4		RESISTOR: Same as Ref. R-3.	Screen dropping, V-2		
R-5	3Z6650-45	RESISTOR: 50,000-ohms ±20%; 1/2 watt; fixed; carbon; insulated; 1/2" long x 0.218" diameter; axial leads.	Plate loading, V-1	Erie Stackpole International	6B6499
R-6		RESISTOR: Same as Ref. R-5.	Plate loading, V-2		
R-7		RESISTOR: Same as Ref. R-5.	Grid shunt, V-3		
R-8		RESISTOR: Same as Ref. R-5.	Grid shunt, V-4		

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CH-3	2C4180-34/C2	CHOKE, FILTER: 3710 turns of #31 gauge wire on 26-gauge iron core; paper insulation over and between windings; 2 insulated terminals; wax impregnated; metal case; 3-7/8" high, 3-15/64" long, 2-31/32" wide; 4 studs 8-32 thread for mounting; 2 insulated terminals.	Power supply filter choke	Chicago Transformer Corp.	25C42119
F-1	3Z1937-37	FUSE: 3 amperes; 25 volts; glass enclosed; dimensions: 1-1/4" x 9/32".	Protection a-c overload	Bussman 4AG	65X42311
F-2	3Z1935	FUSE: 5 amperes; 25 volts; glass enclosed; dimensions: 1-1/4" x 9/32".	Protection d-c	Bussman 4AG	65X81441
J-1	2Z5570	JACK: Open circuit; 2 contacts; phosphor bronze spring; nickel silver finish; brass mounting bushing 3/8-32 thread, white nickel finish.	Connect headphones to receiver	Utah Radio products ST. 921	40A30453
LM-1	2Z5952	LAMP, PILOT: 6.3 volts; 0.15 amperes; miniature bayonet base.	Indicates a-c "ON"	Sylvania S-47	60X42292
PL-5	2Z7116.40	PLUG, CHASSIS: Molded; phenolic body; 6 prong contacts; shell, 5/8-20 thread; 9/16" high; mounting plate 1/16" thick, 1" square, 4 holes for #4 screw.	Power connector	American Phenolic AN3102 14S-6P	28X42738
PL-6	2Z7121	PLUG, CHASSIS: 11 pin plug; black bakelite body; overall dimensions: 7/8" high, 1-1/8" diameter; metal mounting plate, saddle type; 1-3/4" mounting centers; center locator.	Power plug	American Phenolic	28X52415
PL-7	2Z8799-160	PLUG, CHASSIS: Phenolic body; 4 prong; aluminum shell; 1-3/8-20 thread stud; aluminum mounting plate.	26 volts d-c and 80 to 120 volts at 400 to 2600 cps; power input	American Phenolic AN3102-22-4P	28X42125
R-1	3Z6075-23	RESISTOR: 750-ohms ±10%; 1/2 watt; fixed; carbon; insulated; 5/8" long 0.218" diameter; axial leads.	Cathode bias, V-1	Erie Stackpole International	6B5629
R-2		RESISTOR: Same as Ref. R-1.	Cathode bias, V-2		
R-3	3Z6720-6	RESISTOR: 200,000-ohms ±10%; 1/2 watt; fixed; carbon; insulated; 5/8" long, 0.218" diameter; axial leads.	Screen dropping, V-1	Erie Stackpole International	6B5630
R-4		RESISTOR: Same as Ref. R-3.	Screen dropping, V-2		
R-5	3Z6650-45	RESISTOR: 50,000-ohms ±20%; 1/2 watt; fixed; carbon; insulated; 1/2" long x 0.218" diameter; axial leads.	Plate loading, V-1	Erie Stackpole International	6B6499
R-6		RESISTOR: Same as Ref. R-5.	Plate loading, V-2		
R-7		RESISTOR: Same as Ref. R-5.	Grid shunt, V-3		
R-8		RESISTOR: Same as Ref. R-5.	Grid shunt, V-4		

R-9	3RC21BE561K 3RC20AE561K	RESISTOR: 560-ohms ±10%; 1/2 watt; fixed; carbon; insulated; 1/2" long x 0.218" diameter; axial leads.	Cathode bias, V-3	Erie Stackpole International	6B6291
R-10		RESISTOR: Same as Ref. R-9.	Cathode bias, V-4		
R-11	3RC21BE124K 3RC20AE124K	RESISTOR: 120,000-ohms ±10%; 1/2 watt; fixed; carbon; insulated; 1/2" long x 0.218" diameter; axial leads.	Screen dropping, V-3	Erie Stackpole International	6B5631
R-12		RESISTOR: Same as Ref. R-11.	Screen dropping, V-4		
R-13	3RC21BE332K	RESISTOR: 33,000 ohms ±10%; 1/2 watt; fixed; carbon; insulated; 1/2" long x 0.218" diameter; axial leads.	Plate loading, V-3	Erie Stackpole International	6B6410
R-14		RESISTOR: Same as Ref. R-13.	Plate loading, V-4		
R-15	3Z6725-17	RESISTOR: 250,000 ohms ±10%; 1/2 watt; fixed; carbon; insulated; 1/2" long x 0.218" diameter; axial leads.	Grid shunt, V-5		6B6047
R-16		RESISTOR: Same as Ref. R-15.	Grid shunt, V-6		
R-17	3Z4524	RESISTOR: 500 ohms ±10%; 1/2 watt; fixed; carbon; insulated; 1/2" long x 0.218" diameter; axial leads.	Cathode bias, V-5	Erie Stackpole International	6B5632
R-18		RESISTOR: Same as Ref. R-17.	Cathode bias, V-6		
R-19	3RC21BE104K 3RC20AE104K	RESISTOR: 100,000 ohms ±10%; 1/2 watt; fixed; carbon; insulated; 1/2" long x 0.218" diameter; axial leads.	Screen dropping, V-5	Erie Stackpole International	6B6031
R-20		RESISTOR: Same as Ref. R-19.	Screen dropping, V-6		
R-21		RESISTOR: Same as Ref. R-13.	Plate loading, V-5		
R-22		RESISTOR: Same as Ref. R-13.	Plate loading, V-6		
R-23		RESISTOR: Same as Ref. R-5.	Grid shunt resistor, first section V-7		
R-24		RESISTOR: Same as Ref. R-17.	Cathode bias resistor, V-7		
R-25		RESISTOR: Same as Ref. R-5.	Grid shunt resistor, second section, V-7		
R-26		RESISTOR: Same as Ref. R-5.	Plate loading, V-7		
R-27		RESISTOR: Same as Ref. R-19.	Diode plate resistor, V-8		
R-28		RESISTOR: Same as Ref. R-19.	Cathode resistor, V-8		
R-29	3Z6725-17	RESISTOR: 250,000 ohms ±20%; 1/2 watt; fixed; carbon; insulated; 1/2" long x 0.218" diameter; axial leads.	Grid resistor, first section V-9	Erie Stackpole International	6B6047
R-30	2Z7270.147	POTENTIOMETER: Overall resistance 50,000 ohms; 1-1/8" outside diameter 1/2" thick; 1/2-32 thread mounting stud, 5/16" long.	Gate control	Chicago Telephone and Supply	18X42003
R-31		RESISTOR: Same as Ref. R-5.	Plate loading, first section V-9		
R-32		RESISTOR: Same as Ref. R-29.	Grid shunt, V-10		

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R-33	3RC31BE102M	RESISTOR: 1,000 ohms ±10%; 1 watt; fixed; carbon; insulated; 7/8" long x 0.281" diameter; axial leads.	Cathode bias resistor, V-10	Erie Stackpole International	6B6327
R-34		RESISTOR: Same as Ref. R-5.	Plate loading, V-10		
R-35		RESISTOR: Same as Ref. R-19.	Phone dropping resistor, V-10		
R-36		RESISTOR: Same as Ref. R-19.	Grid resistor, V-11		
R-37		RESISTOR: Same as Ref. R-5.	Plate loading, V-11		
R-38	3RC21BE154K 3RC20AE154K	RESISTOR: 150,000 ohms ±10%; 1/2 watt; fixed carbon; insulated; 5/8" long x 0.218" diameter; axial leads.	Grid dropping resistor, second section, V-9	Erie Stackpole International	6B6398
R-39	3Z4540	RESISTOR: 30,000 ohms ±20%; 1/2 watt; fixed; carbon; insulated; 1/2" long x 0.218" diameter; axial leads.	Grid shunt resistor, second section, V-9	Erie Stackpole International	6B6319
R-40	3Z4663	RESISTOR: 2500 ohms ±20%; 1/2 watt; fixed; carbon; insulated; 1/2" long x 0.218: diameter; axial leads.	Cathode bias resistor; second section, V-9	Erie Stackpole International	6B6438
R-41		RESISTOR: Same as Ref. R-19.	Plate loading, second section, V-9		
R-42	3RC21BE474K 3RC20AE474K	RESISTOR: 470,000 ohms ±10%; 1/2 watt; fixed; carbon; insulated; 1/2" long x 0.218" diameter; axial leads.	Grid shunt resistor, V-12	Erie Stackpole International	6B6377
R-43	3Z6620-44	RESISTOR: 20,000 ohms ±10%; 1/2 watt; fixed; carbon; insulated; 1/2" long x 0.218" diameter; axial leads.	Cathode load resistor, V-12	Erie Stackpole International	6B5636
R-44	3RC21BE105K 3RC20AE105K	RESISTOR: 1 megohm ±10%; 1/2 watt; fixed; carbon; insulated; 1/2" long x 0.218" diameter; axial leads.	Phone dropping resistor, V-12	Erie Stackpole International	6B6046
R-45	3Z6618-38	RESISTOR: Fixed; wire wound; 18,000 ohms ±10%; 5 watt; porcelain tube; 1" long, 1/2" diameter; radial leads.	Cathode resistor, second section, V-13	Utah	17X42430
R-46	2Z727-83	POTENTIOMETER: Overall resistance 200,000 ohms; 1-1/8" outside diameter, 1/2" thick; 1/2-32 thread; mounting stud 5/16" long.	Bias control	Chicago Telephone and Supply	18X42002
R-47		RESISTOR: Same as Ref. R-45.	Dropping resistor, V-14		
R-48	3Z6620-47	RESISTOR: 20,000 ohms ±10%; 1 watt; fixed; carbon; insulated; 1/2" long x 0.218" diameter; axial leads.	Decoupling resistor, high pre-amplifier	Erie Stackpole International	6B5630

R-49		RESISTOR: Same as Ref. R-48.	Decoupling resistor, low pre-amplifier		
R-50		RESISTOR: Same as Ref. R-44.	Plate load, V-17		
R-51	3RC31AE682K	RESISTOR: 6800 ohms ±10%; 1 watt; fixed; carbon; insulated; 7/8" long x 0.218" diameter; axial leads.	Screen bleeder, V-17	Erie Stackpole International	6B5691
R-52		RESISTOR: Same as Ref. R-51.	Screen dropping resistor, V-17		
R-53		RESISTOR: Same as Ref. R-38.	Control grid dropping resistor, V-17		
R-54		RESISTOR: Same as Ref. R-38.	Control grid bleeder, V-17		
R-55	3Z6575-26	RESISTOR: 7,500 ohms ±20%; 1/2 watt; fixed; carbon; insulated; 1/2" long x 0.218" diameter, axial leads.	Dropping resistor time marking circuit	Erie Stackpole International	6B5750
R-56	3Z6001E5-2	RESISTOR: Fixed; porcelain tube; wire wound; 15 ohms ±10%; 10 watts; insulated; 13/32" outside diameter, 1-3/4" long; radial leads.	Pre-amplifier heater dropping resistor	Utah	17X80932
R-57		RESISTOR: Same as Ref. R-38.	Neon tube current limiter		
R-58	3RC20BE272J	RESISTOR: Fixed; carbon; 2700 ohms ±20%; 1/2 watt; 7/8" long, 0.281" diameter; axial leads, 1-1/2" long.	Current limiter for signal spring	Erie Stackpole International	6B5757
SO-1	2Z8671.68	RECEPTACLE, CHASSIS: Molded phenolic body; 1 contact receptacle; 3/8-32 thread, 9/16" high; mounting plate 1/16" thick, 7/8" square, 4 holes for 4-40 screw.	Low pre-amplifier input	American Phenolic AN3100-8S-1S	9X48451
SO-2		RECEPTACLE, CHASSIS: Same as Ref. SO-1.	High pre-amplifier input		
SO-3	2Z8676.54	CONNECTOR: Female contact; 6 contacts; straight; .906" long (without contacts) x 1.1875" diam. overall; (5 amp for #20 wire; aluminum alloy, sandblasted; bakelite insert, black finish; 4-.120" mtg holes on 0.906" mtg/c).		American Phenolic AN3102-14S-6S	9X42733
SO-4	2Z8671.34	CONNECTOR: Female contact; 2 contacts; straight .906" long (without contacts) 1.093" diam. overall; Amphenol #3102-12S-3S; (200 V peak, 5 amp for #20 wire; aluminum alloy, sandblasted; bakelite insert, black finish; 4-.120" mtg holes on .1875" mtg/c).		American Phenolic AN3102-12S-3S	9X42740
SO-6	2Z3072	RECEPTACLE: 11 contact; female; bakelite base; hole in center with key way for locating pin; pin numbers molded at terminal end; overall dimensions: 0.875" long, 1.250" diameter.	Signal and power cable from trigger chassis	American Phenolic #PF-11	9X48304
SW-1	3Z9849.117	SWITCH, TOGGLE: Double-pole single-throw; 15/32-32 thread; mounting stud.	Turns a-c and d-c power on and off	Cutler-Hammer	40X42335
SW-2	3Z8142.1-1	SWITCH: Double-pole double-throw, 15/32-32 thread; mounting stud.	Removes plate voltage from V-11 and transfers headphones from preceding to succeeding stages of V-11	Cutler-Hammer	40X42336

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SW-3	3Z9903E-16	SWITCH, SECTION, SPEED: Bakelite; wafer type, one side has 5 contacts; with one on and off position and 1 pole 2 position; other side has 4 live contacts, 2 pole "ON" and "OFF" position, and 2 dummy contact lugs; total of 9 live contacts and 2 dummy contacts; silver plated; contactor segments clamped to bakelite rotor with rounded rectangular shaft hole with keyway; 2 holes 0.125" diameter, with 1.562" mounting centers; overall dimensions: 1.875" x 1.750" x 0.500".	Signal, dial, recorder and clock circuit selector	Oak	40A42034
T-1	2Z9632.148	TRANSFORMER, AUDIO: Iron core; primary winding 560 turns of #41 gauge enameled wire; secondary winding 1970 turns of #41 gauge enameled wire; paper insulation between and over windings; wax impregnated; metal case; 2-1/16" high, 1-17/32" diameter; 5 insulated terminals.	Signal coupling from detector on low tuner	Audio Development Company	25B42015
T-3	2Z9616-98	TRANSFORMER, POWER: Iron core; 80, 110, 115 or 120 volts, 400 to 2600 cps. operation; #1 winding 1500 turns #33 gauge wire; #2 winding 115-1/2 turns #20 gauge wire; #3 winding 57-1/2 turns #23 gauge wire; #4 winding 7-1/2 turns #18 gauge wire; #5 winding 9-1/2 turns #18 gauge wire; #6 winding 9-1/2 turns #25 gauge wire; #7 winding 9-1/2 turns #25 gauge wire; #8 winding 9-1/2 turns #28 gauge wire; varnish and gummed paper insulation between and over windings; wax impregnated; metal case; 3-7/8" long, 3-15/16" wide, 2-31/32" high, 4 studs, 8-32 thread for mounting; 18 insulated terminals.	Power supply transformer	Chicago Transformer Company	25C42120
V-1	2J6SJ7GT	TUBE: Single ended; metal; standard octal base; heater cathode type triple grid.	Pre-amplifier		6SJ7
V-2		TUBE: Same as Ref. V-1.	Pre-amplifier		
V-3		TUBE: Same as Ref. V-1.	Pre-amplifier		
V-4		TUBE: Same as Ref. V-1.	Pre-amplifier		
V-5		TUBE: Same as Ref. V-1.	Pre-amplifier		
V-6		TUBE: Same as Ref. V-1.	Pre-amplifier		
V-7	2J6SN7GT	TUBE: Single ended; glass; heater cathode type; standard octal base; two triodes in one envelope.	Switching amplifier	Radio Corporation of America	6SN7GT
V-8	2J6H6GT/G	TUBE: Single ended; glass; heater cathode type; standard octal base; two diodes in one envelope.	Series gate	Radio Corporation of America	6H6GT/6
V-9		TUBE: Same as Ref. V-7.	Trigger amplifier, first section; sawtooth amplifier, second section		

V-10	2J6V6GT/G	TUBE: Single ended; glass; standard octal base; heater cathode beam type.	Trigger amplifier	Radio Corporation of America	6V6GT/G
V-11	2J884	TUBE: Single ended; glass; standard octal base; heater type.	Sawtooth generator	Radio Corporation of America	884
V-12		TUBE: Same as Ref. V-10.	Cathode follower		
V-13		TUBE: Same as Ref. V-7.	Bias rectifier		
V-14	2JOD3/VR150	TUBE: Single ended; glass; standard octal base; filament type.	Bias regulator	Radio Corporation of America	VR150
V-15	2J5R4GY	TUBE: Single ended; glass; standard octal base; filament type.	Power supply rectifier	Radio Corporation of America	5V4G
V-16	2J6B4G	TUBE: Single ended; filament type; standard octal base; single triode.	Series regulating	Radio Corporation of America	6B4G
V-17		TUBE: Same as Ref. V-1, except glass envelope.	Bias control for V-16	Radio Corporation of America	6SJ7GT
V-18		TUBE: Same as Ref. V-14.	Regulator		
V-19	2J991	NEON BULB: 1/4 watt; 105-125 volts; external resistance 30,000 ohms; bayonet type base. (No resistance used.)	Initial overvoltage control	General Electric T4-1/2	65X42006
V-20	2Z5954	LAMP, NEON: Contact wires on base, cemented in position; overall dimensions; 1" long, 1/4" diameter.	Signal indicator	Galvin	65A48471
101	3E4300-23	ASSEMBLY, TRIGGER TO PRE-AMP CABLE, PLUG AND RECEPTACLE: Made up of: 6 conductor (color coded) shielded cable with a 6-contact receptacle SO-5 at one end and a 6-contact plug PL-4 at the other end; each conductor is #20 stranded, tinned copper wire with "Arglas" insulation; brown tracer lead and black-brown tracer lead have individual shields of tinned copper braid sheath; red, red-black, yellow and yellow-black tracer leads, and the two individually shielded leads have an outer shield of tinned copper braid sheath; black cotton braid serving overall; overall length 9-1/2".	Trigger to preamplifier connector cable	Galvin	1X52657
118	6Z4860-1	GROMMET: Fibre; 0.500" outside diameter, 0.406" inside diameter, 0.206" high.	Lead protection	Spaulding	14A16304
145	2Z8654	SOCKET, TUBE: Molded black phenolic body; octal type 8 phosphor bronze contacts, silver plated; saddle type mounting plate; 1.312" between mounting holes; overall dimension of body: 1-1/16" diameter, 11/16" diameter, 11/16" high.	Mount tubes	American Phenolic #88-8-M	9A31229
209	2Z1612.27	CAP, RECEPTACLE: Aluminum; knurled head; overall dimensions; 3/4" diameter, 5/8" long; hole tapped in center for lead insert.	Lead guide and retainer	Aerovox #9760-8G-AL	15X48452
226	2Z8654	SOCKET, TUBE: Black molded phenolic; octal type; 8 contact receptacle; saddle type mounting plate, 1.312" between mounting holes; body: 1-1/16" diameter, 13/16" high.	Tube socket	American Phenolic #88-8TM	9A31229

TABLE OF PARTS

NOTE—Parts listed which are indicated by a # sign in column two are not available as spare parts and are listed for reference purposes only.

MODEL: RADAR RECEIVING EQUIPMENT AN/APR-2

Reference Symbol	Army Stock Number Navy Stock Number British Ref. Number	Name of Part and Description	Function	Mfg. and Desig. or Standard Type	Cont. or Gov't. Dwg. or Spec. No.
301	1F4F1-3.8	ASSEMBLY: Antenna cable and hardware; coaxial; flexible; characteristic impedance 50 ohms; copalene dielectric; Fed. Tele. & Rad. type 50-B452; (outer conductor copper shield; outer jacket blk vinylite) female connector; 1.4375" long, 1" x 1" diam overall; 0.625-24 thread; Selector Drawg #JNPT 5-2, (four 0.125" diam mtg holes). Fitting male insert; brass; silver plated finish, 0.468" ID, 0.750" hex nut; 0.375" long; 0.625" thread 0.2656" long; plug, pin; brass silver plated finish, 0.750" long; 0.125" diameter of overall body and 0.3125" long; pin 0.4375" long; bead; polystrene 0.250" long x 0.290" x 0.125" diam overall; cable bushing, brass silver plated; 0.546" diam overall; 0.625" long x 0.296" ID.	Connects antenna to tuner	Galvin "Special"	1X52651
304	2Z5842-30	ASSEMBLY, SHIFTER KNOB, HUB, AND LEVER ARM: Composed of: Gear Shifter Knob and Hub Assembly, Lever Arm and Pin Assembly, and Screw.	Actuating mechanism, index, off, low and high speeds	Galvin	1X106205
309	6Z1951-5	CLOCK, AIRCRAFT: Elgin converted type W. C. clock, with impulse wheel and electrical contacts.	Provides time indication on tape recorder	Elgin	59X42213
312	6Z5038-1	HANDLE: U shaped; 3-3/4" long, 15/32" wide, tapered at ends; ends #1/4-20 NC-2 thread; black zinc.	Carrying handle	American Cabinet Hardware Company #234	55A42666
326	3Z3285-3	RECEPTACLE: For fuse; black molded phenolic; spring contact at base; bayonet type contact at top; 1-3/4" long, 1/2" diameter, 1/2-24 thread for mounting.	Fuse holder	RCM	65A83336
337	2Z5883-96	SOCKET, LIGHT AND JEWEL: Mounts pilot light and red indicator lens; overall dimensions; 2-1/2" long; 15/16" diameter; external parts, black nickel finish; internal parts, white cadmium plated; polariod rotary lens.	Indicates when set is receiving a-c power	Drake #80	60A42288
338	2Z5842-9	SPRING, KNOB COMPRESSION: Spring steel; 4 turns AWG #16 wire; 49/64" inside diameter, 7/8" long; closed ends.	Gear changer tension spring	Galvin	41A102327
415	2Z8877.53	SPRING: Cowl fastener (floating); steel cadmium plated; 1.375" long x 1" wide x 0.28125" high; Shakeproof #98-5-MSF; (2-.128" diameter holes.)			41A48808
501	3E4300-24	ASSEMBLY: Commutator cable and plug; made up of: 2 color coded conductors, of #20 stranded, "Arglas"; 1 conductor, white with brown tracer; 1 conductor, white with brown and black tracers; each conductor has a shield of tinned copper; braided sheath; both conductors have an outer shield of tinned copper braid with a serving of black cotton braid overall; one end is clamped and soldered to an insulated, metal shell, 2 contact pin plug; plug has free turning retainer lock ring with a female 5/8-24 thread; overall length of cable, 7-1/4".	Commutator to trigger connector	Amphenol #9769-4	1X101171

502	3Z9823-1.1	ASSEMBLY, L-H SWITCH LEAF: 1 leaf 1.250″ long; 0.250″ wide with cam follower at end; other leaf 0.875″ long, 0.250″ with contacts 0.750″ from insulated end; bakelite insulators and spacers; overall dimensions; 1.375″ x 0.437″ x 0.343″.	Pre-amp. shorting switch at low-frequency output	Galvin	51A103914
503	3Z9823-1	ASSEMBLY, R-H SWITCH LEAF: 2 leaf, 0.250″ wide; one leaf 1.250″ long with cam follower at end; other leaf 0.718″ long; riveted contacts on each leaf; bakelite insulation; overall dimensions: 2.375″ x 0.437″ x 0.343″.	Pre-amp. shorting switch at high-frequency output	Galvin	51A103915
504	3H3100-1A	ASSEMBLY, MOTOR, GEAR AND FILTER: 27 volt; 1.5 ampere; 4″ oz. torque; 5400 rpm; shunt wound; die cast housing, 2.437″ diameter, 3″ long; 2 holes, 0.187″ diameter; 2.812″ mounting centers; 0.218″ diameter shaft 0.437″ long at one end; has an 18-tooth brass pinion gear wedged to bushing; bushing has shaft hole 0.219″ diameter, with a 6-32 thread set screw; shaft at other end is 1.187″ long; filter unit consists of two solenoid choke-coils; 2-2000 micromicrofarad ceramic capacitors; assembled in drawn metal capacitor case; riveted soldering terminals; connection of filter unit to motor with copper braid shielded leads; mounting bracket riveted to case; overall dimensions: 5″ x 3-3/8″ x 3-1/4″.	Part of tuner unit with ventilating fan	Galvin	1X101163
505	2CK4180-34/R2	ASSEMBLY, RECORDING DRUM: Linen bakelite body; 1.375″ long, 1.359″ diameter; stainless steel bushing through center for 0.187″ diameter shaft; 2 holes tapped in bushing for 8-32 thread set screws 120° apart; spiral recorder wrap of brass, cadmium plated, 0.390″ wide with ridge 0.078″ high attached to drum with flat brass plate, 0.093″ thick, 0.250″ wide, 1.375″ long; plate has pin at end nearest copper contact plate with 3 counter-sunk holes; and is attached to drum with 4-36 thread chrome plated flat head screws; copper contact plate has 3 holes, countersunk, 0.312″ long; and is electrically connected to spiral recorder by a strip of sheet brass under the clamping bar and the contact plate; overall dimensions: 1.437″ long x 1.500″ diameter.	Marks tape synchronously with dial indications of received signals	Amphenol	1A101423
506	3E4300-29	ASSEMBLY, TUNER TO PRE-AMP. CABLE: Made of: 2 color coded conductors, #20 stranded, "Arglas," individually shielded in tinned copper braid sheath; 1 white conductor with black and brown tracer; outer shield of tinned copper braid over both shielded conductors; each lead has a marker at plug end (one "LO," one "LO," one "HI") and is clamped and soldered to an insulated, metal shell, single contact, connector plug; plug has free turning retainer ring with a female 1/2-28 thread; overall length, 18″.	Tuner to pre-amplifier connector	Amphenol	1X101155
507	2CK4180-34/C1	CAM, COMMUTATOR: Stainless steel, center hole 0.197″ diameter; 1 hole on body tapped 6-32 thread; overall dimensions: 7/8″ outside diameter, 7/16″ long.	Lifts pre-amplifier output shorting springs 501 & 505, in synchronism with tuning range	Galvin	45A103864

TABLE OF PARTS

NOTE—Parts listed which are indicated by a # sign in column two are not available as spare parts and are listed for reference purposes only.

MODEL: RADAR RECEIVING EQUIPMENT AN/APR-2

Reference Symbol	Army Stock Number Navy Stock Number British Ref. Number	Name of Part and Description	Function	Mfg. and Desig. or Standard Type	Cont. or Gov't. Dwg. or Spec. No.
508	2J1N29	CRYSTAL: Brass bushing with shoulder; barrel of bushing 0.250″ diameter to 0.296″ diameter at shoulder; slotted flat head screw in end; ceramic sleeve; 0.187″ long brass stud at one end, 0.078″ diameter; overall dimensions: 0.296″ diameter, 0.812″ long.	Rectifies tuned signal	Sylvania #1N-29	48A48698
509		CRYSTAL, VIDEO (HIGH FREQUENCY): Same as Ref. 508.	Rectifies tuned signal		
510	3H525GA	GROUND SPRING, ROTOR SHAFT: Phosphor bronze, silver plated, 0.010″ thick, 2 holes 0.156″ diameter; slotted ends, 0.562″ diameter; shaped and bent to fit; overall dimensions: 3-1/16″ x 1-5/16″ x 3/8″.	Provides ground to shaft	Galvin	41A104673
511	2CK4180-34/P1	PULLEY, REEL: V-shape groove; brass; white silver plated; 0.217″ thick; 0.750″ outside diameter; 0.501″ inside diameter; 2 studs on one side 180° apart, 0.125″ long x 0.125″ x 0.093″; overall thickness 0.343″, overall diameter 0.750″.	Fits take-up tape reel; turns reel under pull of spring belt from pulley on rubber roller.	Galvin	49A42523
512	2CK4180-34/R2	REEL, TAPE: 2 end discs 6″ diameter; punched; 4 holes, 0.875″ diameter 90° apart; 4 holes, 1.750″ diameter 90° apart; aluminum 3S1/2 H or 52S1/2 H; center hole 0.500″ diameter with 2 slotted keyways 180° apart; 4 slots 90° apart around center hole for assembly to hub of reel; hub is cold rolled steel 0.050″ thick; white cadmium finish; slot through length of 1 side of hub; reel locks in by clockwise turn; overall dimensions: 6″ diameter x 1-11/16″.	Recorder tape holder	Northern Metal Products	49C42218
513	6L17504-65	SCREW, REEL: Stainless steel; flat head 0.093″ thick; 0.750″ diameter; knurled edge; 1/4-28″ thread at head; stud to threaded shank 0.203″ diameter, 0.125″ long; overall length 0.375″, overall diameter 0.750″.	Retains reels and pulleys on spindle	Galvin	3A42495
514	2Z8877.54	SPRING, BRUSH: Stainless steel wire; 0.010″ diameter; 19-1/4 turns; spiral; 0.095″ diameter, 1.046″ long.	Presses carbon brush against dial slip or contact plate	Stackpole	41A42719
515	2Z8877.56	SPRING, FRICTION: Phosphor bronzes 0.017″ thick; mounting section 1.125″ x 0.500″ with 2 holes 0.140″ diameter, spaced 0.500″ apart, bent section 0.812″ wide, cut to 0.500″ width at mounting section; white cadmium plated; overall dimensions: 1.437″ x 0.687″ x 1.250″.	Prevents unwinding of tape supply reel except as pulled	Galvin	41A103642
517	2C4180-34/T1	TUNER UNIT: Complete tuner unit with motor but less two reels; ready to replace the tuner as installed in the Receiver R-34/APR-2. Dial, tape calibrator strip and tape reader (for use on exposed tape) are calibrated to the individual tuner. All parts are assembled to aluminum die cast forms, brackets and housings; overall dimensions: 7.250″ x 10″ x 10″.	Tuner	Galvin	1X101150

518	6R57400-6	WRENCH, ALLEN "L" (NO. 6): Tempered steel; short shank, 0.625" long; long shank, 1.812" long.	Set screw wrench	Pedersen Brothers	66A10704
519	6R57400	WRENCH, ALLEN "L" (NO. 8): Tempered steel; short shank 0.750" long; long shank, 1.937" long.	Set screw wrench	Pedersen Brothers	66K21442
520	6R55496	WRENCH, ALLEN "L" (NO. 10): Tempered steel; short shank 0.750" long; long shank, 2" long.	Set screw wrench	Pedersen Brothers	66K81008
521	3H525GA	SPRING, ROTOR SHAFT GROUND: Phosphor bronze 0.010" thick; bent to shape; 2 mounting holes 0.156" diameter; slotted ends 0.562" x 0.312" white silver plated; overall dimensions; 1.312" x 3.062" x 0.406".	Grounding contact part of 517	Galvin	41A104673
527	6L4302-.1-1N	RIVET: Cold rolled steel; 0.187" long, 0.122" diameter; diameter of head 0.218"; polished nickel finish.	Part of 521	J. L. Thompson	557701

SECTION VIII

DRAWINGS

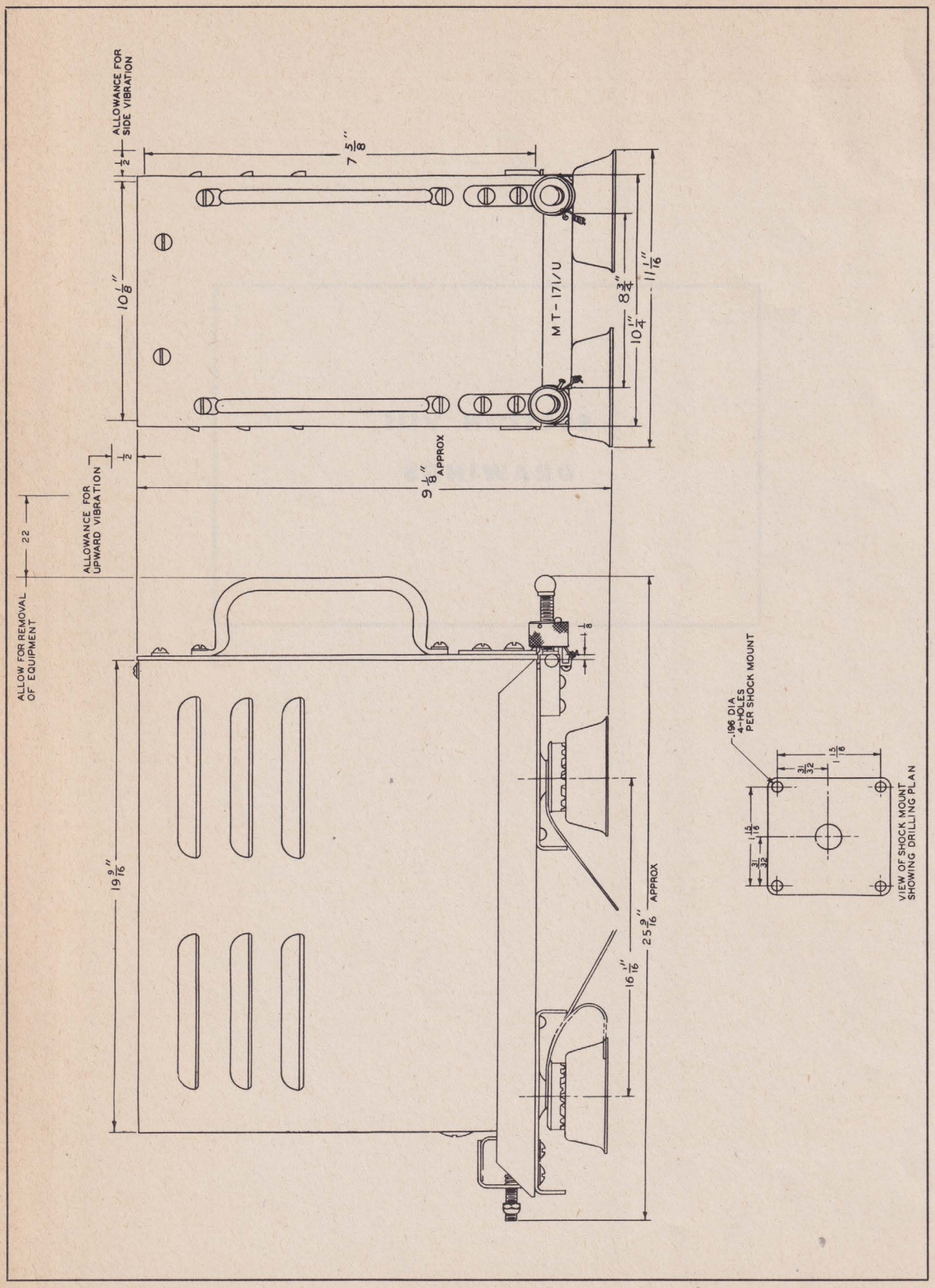
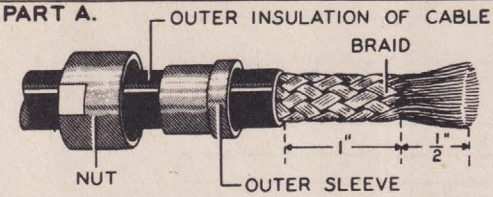


Figure 8-1. Radar Receiving Equipment AN/APR-2—Dimensional Diagram

INSTALLATION INSTRUCTIONS
RADIO FREQUENCY PLUG UG-21/U *

NOTE:- THESE PLUGS WILL CAUSE A MIS-MATCH OF IMPEDANCE IN THE CIRCUIT UNLESS THE INSTRUCTIONS GIVEN BELOW ARE FOLLOWED EXACTLY. EXTREME CARE MUST BE TAKEN IN CUTTING THE CABLE INSULATION SO THAT NO AIR GAPS EXIST BETWEEN THE INSULATION OF THE CABLE AND THE PLUG.

PART A.

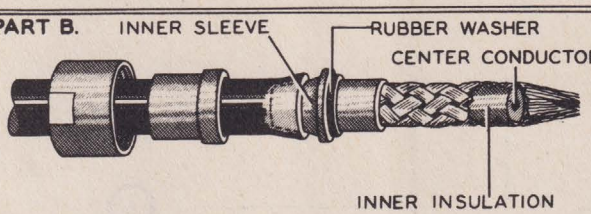


STEP 1. SLIDE NUT AND OUTER SLEEVE OVER CABLE.

STEP 2. CUT OFF OUTER INSULATION 1 1/2 INCHES FROM END OF CABLE.

STEP 3. FAN SHIELD BRAID 1/2 INCH IN FROM THE END.

PART B.



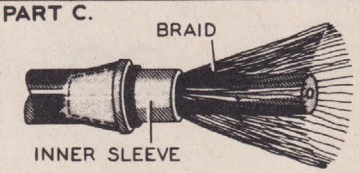
STEP 4. CUT INNER INSULATION AND CENTER CONDUCTOR 1/2 INCH IN FROM END OF BRAID.

STEP 5. TWIST FANNED END OF BRAID.

STEP 6. SLIDE INNER SLEEVE OVER BRAID AND UNDER OUTER INSULATION.

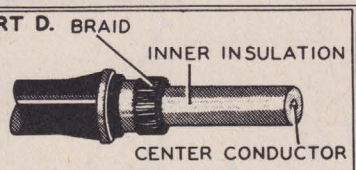
STEP 7. CHECK TO BE SURE RUBBER WASHER IS ON INNER SLEEVE.

PART C.



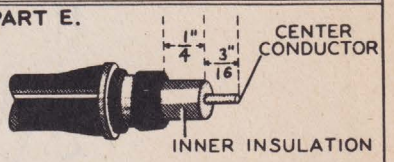
STEP 8. SEPARATE AND FAN THE BRAID BACK TO END OF INNER SLEEVE.

PART D.



STEP 9. FOLD BRAID BACK OVER SLEEVE AND TRIM AS SHOWN.

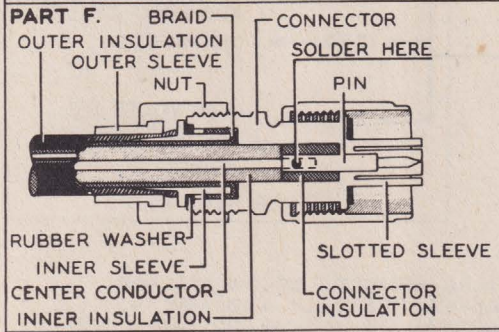
PART E.



STEP 10. CUT INNER INSULATION AND CENTER CONDUCTOR EXACTLY TO DIMENSIONS SHOWN. BE SURE INSULATION IS CUT EVENLY AND AT A 90° ANGLE TO CENTER CONDUCTOR.

STEP 11. TIN CENTER CONDUCTOR

PART F.

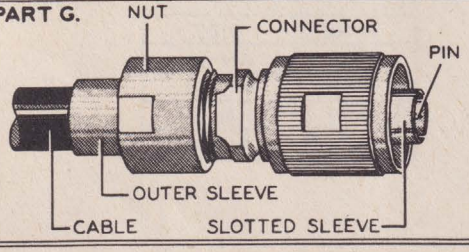


STEP 12. REMOVE PIN FROM CONNECTOR AND FIT OVER CENTER CONDUCTOR. SOLDER THROUGH HOLES IN THE SIDE. REMOVE ALL SOLDER FROM EXTERIOR OF PIN.

STEP 13. FORM BRAID BY FORCING INTO CONNECTOR.

STEP 14. ASSEMBLE PIN IN PLUG TO CHECK POSITION. THE TIP OF THE PIN SHOULD BE FLUSH WITH SLOTTED SLEEVE. OF CONNECTOR. SEE PART G.

PART G.



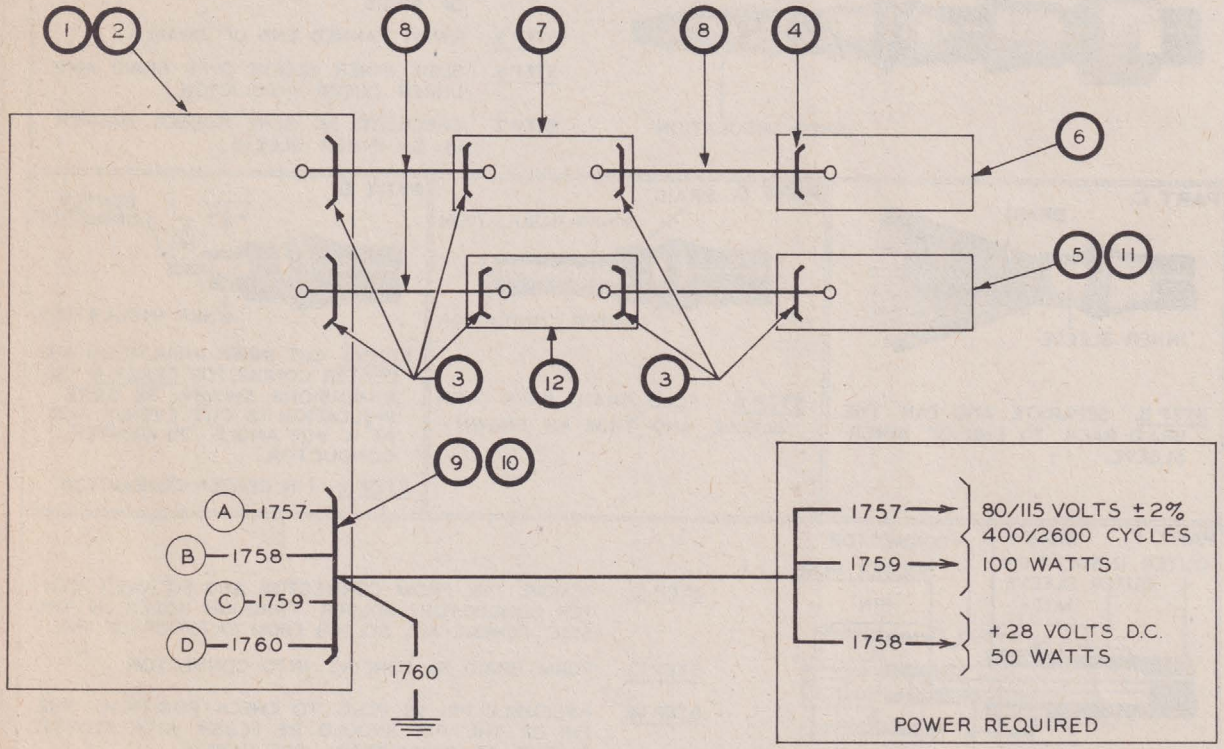
STEP 15. SLIDE CABLE INTO CONNECTOR AND TIGHTEN NUT WITH A WRENCH.

NOTE:- CONNECTOR MUST NOT BE ALLOWED TO TURN WHEN NUT IS TIGHTENED.

NOTE:- PLUG AND JACK ARE PUT ON CABLE IN THE SAME MANNER.

Figure 8-2. Installation of Radio Frequency Plug UG-21/U

ITEM	EQUIPMENT	NO. REQ'D	NOMENCLATURE	DRAWING OR SPECIFICATION
1	RADAR RECEIVER	1	R-34/APR-2	
2	MOUNTING	1	MT-23/A	
3	PLUG	7	UG-21/U (TYPE N)	
4	PLUG	1	PL-259	
5	ANTENNA ASSEMBLY	1	AS-26/APR-2	
6	ANTENNA ASSEMBLY	1	AS-25/APR-2	
7	ANTENNA FILTER	1	F-3/APR-2	
8	RADIO FREQUENCY CABLE	AS REQ'D	RG-8/U OR WC-549-( )	
9	PLUG	1	AN3108-22-4S	AN9534
10	ADAPTER	1	AN3057-12	AN3057
11	COVER	1	CW-3/APR-2	
12	FILTER	1	F-11/APR	



NOTES

1 ONE (1) VOLT DROP IS PERMISSIBLE BETWEEN POWER SOURCE AND EQUIPMENT, PER SPEC. 32310-B. RESISTANCE OF AN-18 WIRE IS .006 OHMS PER FOOT.

2 WIRE IS AIRCRAFT CABLE PER SPEC. AN-J-C-48, UNLESS OTHERWISE SPECIFIED.

3 WIRE NUMBERS BELOW ARE FOR REFERENCE ONLY AND MAY NOT APPEAR ON ACTUAL INSTALLATION.

WIRE	SIZE
1757	AN-18
1758	AN-18
1759	AN-18
1760	AN-18

WEIGHT OF ITEM (5), (6), (7) ..... 8.9 LBS

WEIGHT OF RECEIVER & MOUNTING .... 46.5 LBS

DIMENSIONS OF ITEMS (1) & (2) 10 1/4 W. X 9 1/4 H. X 19 1/2 D.

Figure 8-3. Radar Receiving Equipment AN/APR-2—Wiring Diagram

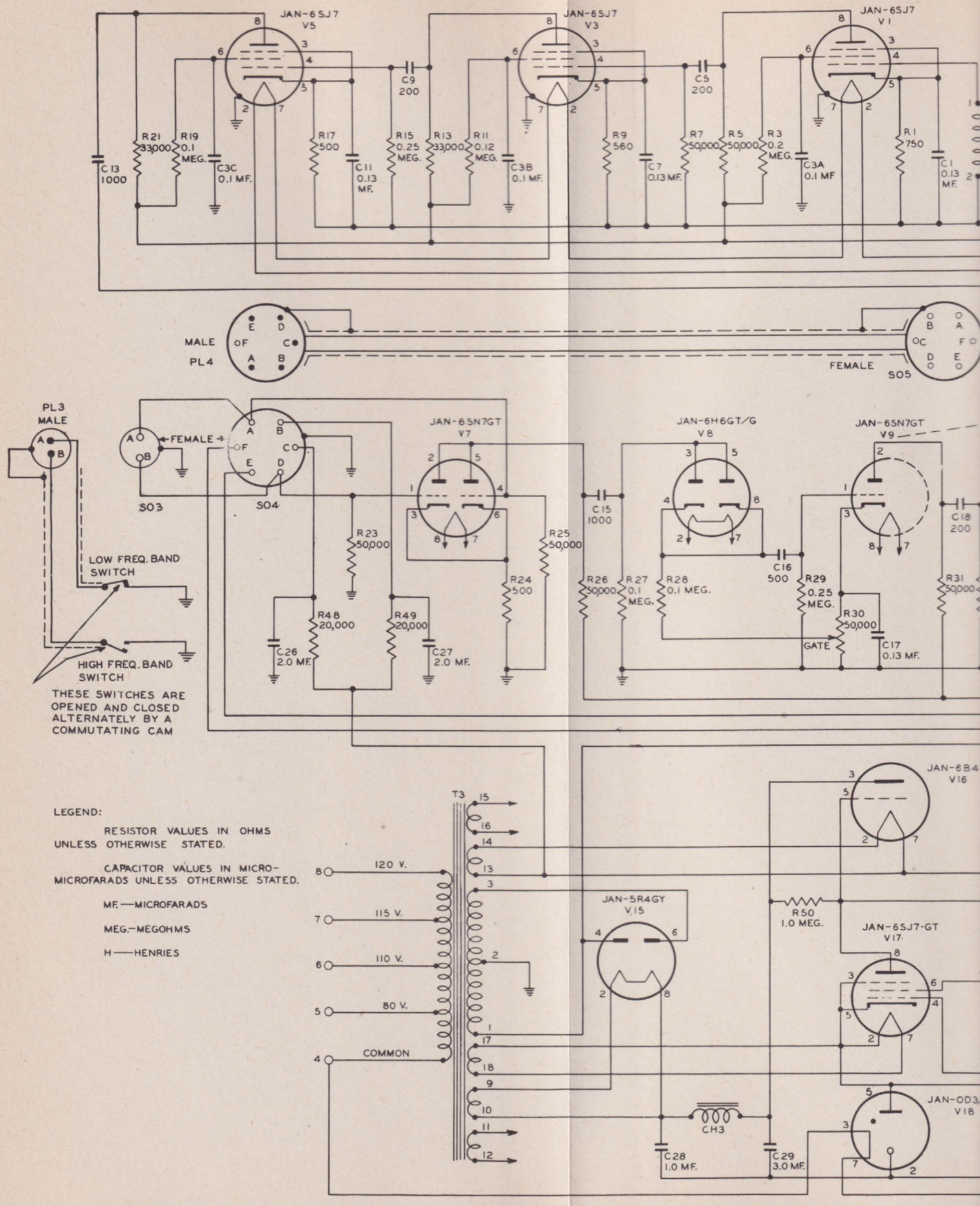


Figure 8-4. Radar

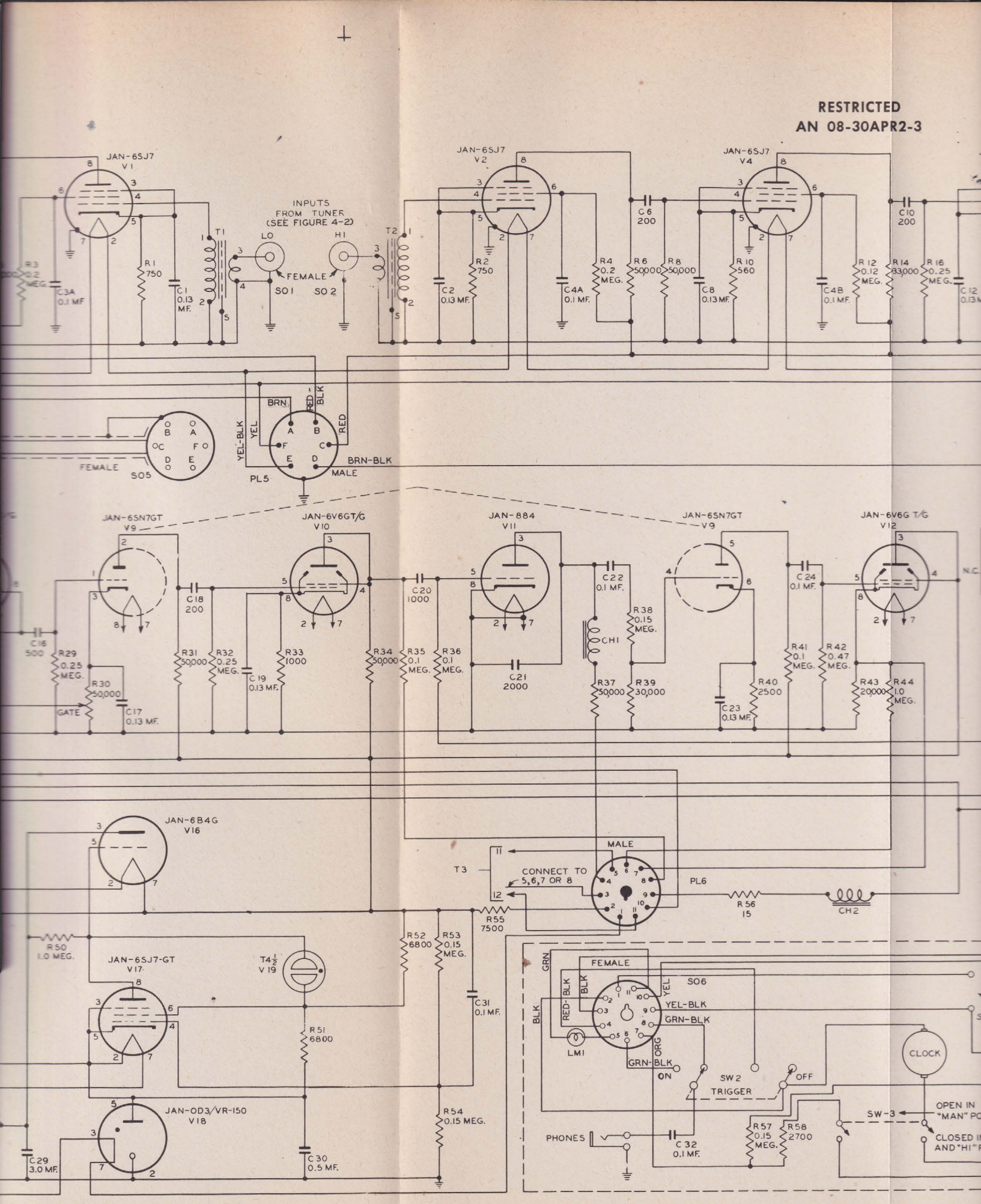
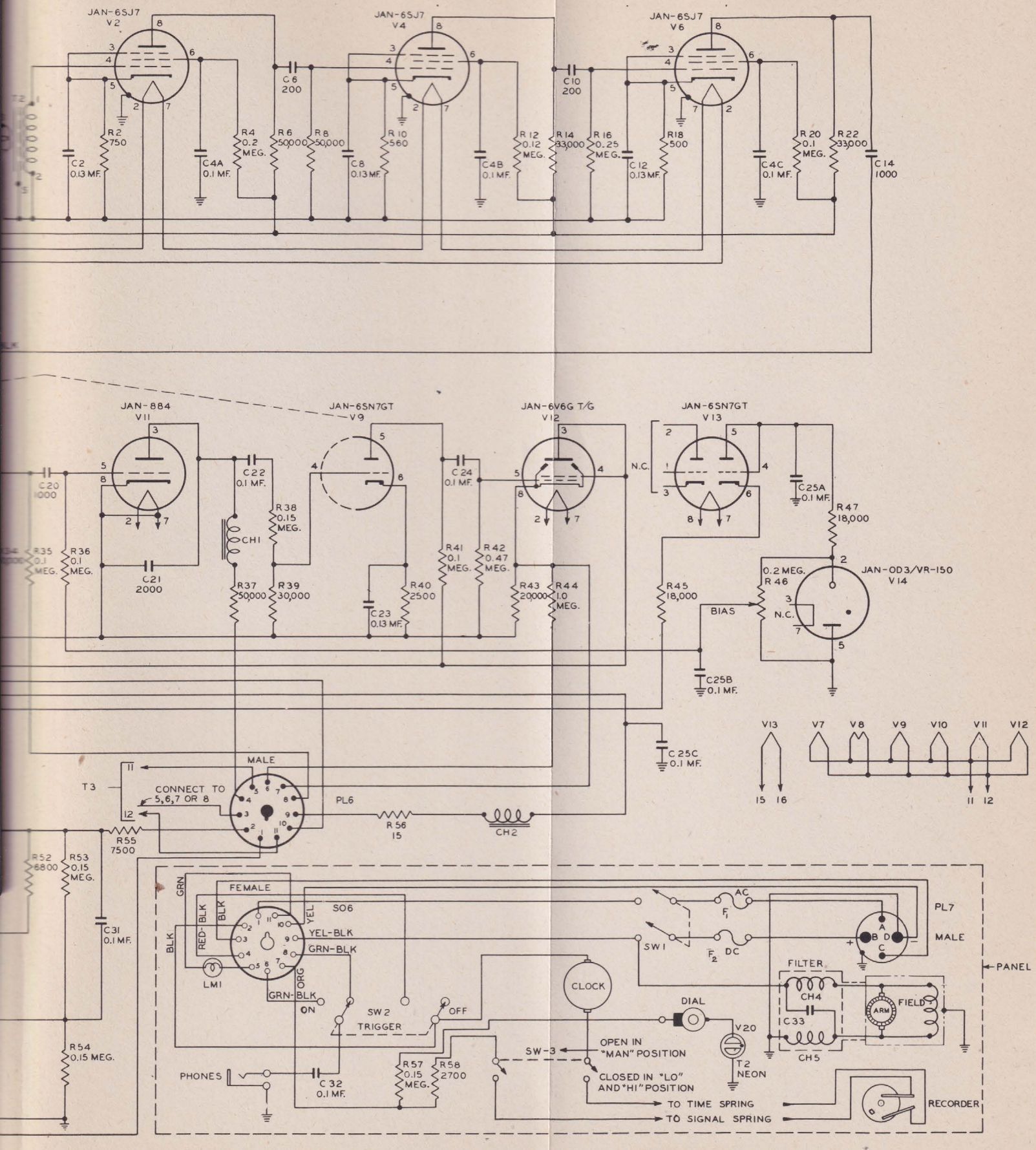


Figure 8-4. Radar Receiving Equipment AN/APR-2—Schematic Diagram


JAN-6SJ7
V2
JAN-6SJ7
V4
JAN-6SJ7
V6
C6
200
C10
200
R2
750
C2
0.13 MF.
C4A
0.1 MF.
R4
0.2
MEG.
R6
50,000
R8
50,000
C8
0.13 MF.
R10
560
C4B
0.1 MF.
R12
0.12
MEG.
R14
33,000
R16
0.25
MEG.
C12
0.13 MF.
R18
500
C4C
0.1 MF.
R20
0.1
MEG.
R22
33,000
C14
1000
JAN-884
V11
JAN-6SN7GT
V9
JAN-6V6G T/G
V12
JAN-6SN7GT
V13
C20
1000
C22
0.1 MF.
C24
0.1 MF.
N.C.
C25A
0.1 MF.
R47
18,000
R35
0.1
MEG.
R36
0.1
MEG.
C21
2000
CH1
R38
0.15
MEG.
R37
50,000
R39
30,000
R40
2500
C23
0.13 MF.
R41
0.1
MEG.
R42
0.47
MEG.
R43
20,000
R44
1.0
MEG.
R45
18,000
BIAS
0.2 MEG.
R46
N.C.
JAN-OD3/VR-150
V14
C25B
0.1 MF.
C25C
0.1 MF.
V13 V7 V8 V9 V10 V11 V12
15 16
11 12
T3
MALE
CONNECT TO
5,6,7 OR 8
PL6
R56
15
CH2
R55
7500
R52
6800
R53
0.15
MEG.
C31
0.1 MF.
R54
0.15 MEG.
FEMALE
GRN
BLK
RED-BLK
BLK
YEL
SO6
YEL-BLK
GRN-BLK
ORG
GRN-BLK
ON
LM1
SW2
TRIGGER
OFF
PHONES
C32
0.1 MF.
R57
0.15
MEG.
R58
2700
CLOCK
SW-3
OPEN IN
"MAN" POSITION
CLOSED IN "LO"
AND "HI" POSITION
TO TIME SPRING
TO SIGNAL SPRING
AC
F1
SW1
F2
DC
PL7
MALE
A
B
C
D
FILTER
CH4
C33
CH5
DIAL
V20
T2
NEON
ARM
FIELD
RECORDER
PANEL