RME DB-20 PRESELECTOR

OPERATING INSTRUCTIONS FOR THE RME TYPE CME-50063 RADIO FREQUENCY PRESELECTOR

The Type CME-50063 Preselector was designed to add to the radio frequency amplification of any receiver, and it was further designed to increase the preselection of radio receivers to the extent that a high value of image ratio could be built up. It has a rather uniform gain of approximately 20 to 25 db. over the entire frequency range, 550 to 32,000 KC, and provides an image frequency ratio, when used in conjunction with an average receiver, of approximately 50,000:1. When conditions are such as to produce a high noise level at the receiving location, the use of a selector will sometimes be of advantage in making the signal stand out more in contrast to the noise because of its high degree of radio frequency selectivity. However, the noise will be amplified in conjunction with the signal, and the effect will be that the noise is somewhat intensified also. Since we are interested principally in the ratio of signal to noise, the operator can retard the volume control on the receiver so that the background noise is, in effect, reduced. The Preselector has a finger-tip control and is completely calibrated throughout the entire range.

The Type CME-50063 Preselector is designed to feed into a low impedance input circuit. This impedance ranges around a value of 100 to 300 ohms. It will therefore not be successful in any connection with a receiver having a high input impedance such as a capacity coupled type of receiver. Any receiver which has a low impedance doublet input connection will have its operation materially improved by connection to the Preselector.

The Preselector carries its own power supply switch and also its own gain control. This gain control, when set at a maximum counter-clockwise position is set at a position of minimum gain. When this control is set at a position of minimum gain, with the Preselector connected to the receiver, there is an over-all gain of the combination approximating that of the receiver itself. When this gain control is set at a position of maximum clockwise rotation or maximum gain, the increase in amplification of the combined unit is approximately 20 to 25 decibels which represents a gain or amplification of 12 times. This additional gain is obtained in a stable circuit without the use of any regeneration, combined with greatly increased selectivity, provides, in conjunction with a good receiver, a receiving complement of excellent performance. Due to the separate gain control of the additional amplifier and the flexibility of a separate frequency control, the most flexible combination of a highly selective high gain receiver is provided.

Figure 1 shows the panel layout of the Preselector and indicates the various controls mounted thereon.

CONNECTION OF THE PRESELECTOR TO ASSOCIATED RECEIVER

The Preselector unit is housed in a furniture steel wrinkle finished cabinet. It is designed to be placed at the left side of the receiver. Figure 2 shows a sketch of the rear view of the Preselector placed alongside of the receiver. In order to make sure that the two cabinets are well bonded together, it is advisable to make sure that all paint is cleaned from the adjacent cabinet's bottom edges, and the two placed close together on a clean surface copper strip about three inches by ten inches long, or aluminum, or any metal of a non-ferrous kind with a clean surface.

The main factor to consider is that the two cabinets are properly connected to this ground. This prevents the possibility of any feedback due to the antenna of the Preselector getting close to the output wires of the Preselector and causing oscillation; and also reduces the effect of signal leakage direct to the receiver due to the fact that the units are at a high impedance above ground. When this location and placement of the two units has been achieved the connections can be made as indicated in Figure 2. The cable and plug indicated in the diagram are furnished with the Preselector unit. In this twisted pair will be found one black wire and one red wire. The red wire should be placed as indicated on the "ANT" terminal, if only Antenna and Ground terminals are

provided on the receiver. The black wire can be placed on the other antenna post or the ground, or both as the case may require. If it is certain that the bond is good, the ground as indicated on the Preselector will be sufficient for the entire system.

Any antenna which it is desired to connect into the Preselector unit may be used in the same manner as it would be used when connected directly to the receiver itself.

The Preselector is designed to be used in conjunction with either a doublet or Marconi antenna working against ground. The diagram in Figure 2 indicates the connection of a doublet antenna to the Preselector. It is used merely for the purpose of showing the antenna connection.

When the two units are connected as shown in Figure 2, the tubes should be placed in the positions indicated in Figure 3. Radio Mfg. Engineers, Inc., desire, whenever possible, to supply the equipment complete with tubes so that the over-all performance of the unit meets with our test specifications. However, in cases where the tubes are placed in the unit in the field, Figure 4 gives the various locations of the two types of tubes used. When all these details have been considered and the connections properly made, the unit may be turned on by the power switch "A" as indicated on Figure 1 of these instructions. This control is also the gain control of the amplifier and the gain is maximum when the control is in maximum clockwise position. It is essential, of course, that the Preselector be tuned to exactly the same frequency as the receiver so that the maximum response will be obtained. This can be easily done by checking the dial reading of the Preselector with that of the main tuning dial on the Receiver, and making certain that the band switch on the Preselector be set for a range to which the receiver is set. The range switch on the Preselector is designated control "B" (Figure 1). Control "A" may be varied from minimum to maximum at the discretion of the operator, and in accord with the requirements of receiving conditions.

It will be necessary, due to the high degree of selectivity embodied in the Preselector to vary the setting of the Preselector with the receiver tuning control. Special care should be taken around 30 MC to make certain that the Preselector tuning is made to follow any variation of the receiver tuning control or band-spread control, since it is possible by allowing the Preselector to remain at a fixed tuned frequency during rotation of the band-spread control to tune to the image in which case the image ratio will be very low.

Radio Mfg. Engineers, Inc. reserve the right to make any alterations or changes in future production models without obligation with respect to altering equipment already manufactured.

SERVICE NOTES FOR THE RME CME-50063 PRESELECTOR

The Type CME-50063 Preselector is a compact efficient design of a straightforward radio frequency amplifier cascade with a specified input and output impedance. The input impedance is of a low value varying between 100 and 300 ohms over the frequency range covered by the tuning elements of the instrument. The output impedance varies over the same range in the same manner so that the insertion of this amplifier between the antenna and an RME receiver incurs no mismatch in the coupling system and provides an increase in selectivity and gain due to its insertion.

The Preselector is calibrated on a scale in as close a manner as it is possible to calibrate such an instrument, and tuning of the instrument should be done so that the setting of the indicator on the Preselector scale is very close to the frequency being used. One check on this method is to set the tuning control of the Preselector to a position which gives a maximum meter reading on a given signal when used in conjunction with an RME receiver or any other receiver having a tuning indicator. In the absence of the tuning indicator, background noise or signal response, as measured by an output meter

on the receiver, may be used as an indication of optimum setting of the Preselector and this will compensate for small variations which are bound to occur in the calibration of the instrument.

For maximum selectivity and maximum gain proper voltage supply to the various power consuming circuits is an essential, in addition to optimum adjustment of the alignment components so that all circuits are resonating on the same frequency simultaneously.

Further it is essential that the tubes be up to standard insofar as their characteristics are concerned. The two 6K7 tubes used in this Preselector will be found to maintain their characteristics over a long period of time and when standard makes of tubes are used they will be found to be very consistent in their characteristics and therefore substitutions of these tubes can be made without noticeably changing the adjustment of the preselector.

The gain control of the Preselector is located in the cathode circuit of the second 6K7 radio frequency amplifier and there is a fixed resistance R_5 in series with the variable resistance R_4 which changes the resistance in the cathode circuit and hence the cathode potential can be adjusted to lower the mutual conductance of the tube and hence decrease the gain whenever the resistance R_4 is increased. Increase in R_4 is provided by counter-clockwise rotation of the control "A" (Figure 1). The maximum clockwise rotation of the control "A" (Figure 1) provides a minimum resistance of R_4 and hence a maximum gain.

A change over switch is provided and consists merely of a four pole double throw switch indicated in Figure 1. It can be wired in (See Drawing B-59) so that when it is thrown to the left the antenna is connected to the Preselector and the Preselector connected to the receiver input terminal. When the switch is thrown to the right the antenna is connected directly to the receiver and the Preselector circuits are entirely isolated from the system.

In combination with the control "A" is a line switch. This switch is off when the control "A" is in maximum counter-clockwise position of rotation and its operation can be ascertained by the sound of the snap-switch which actuates when this control is turned to the extreme counter-clockwise position.

One side of the output circuit of the Preselector is grounded and it is essential that the proper wire of the output cable be connected to the antenna post of the receiver with which it is used, in order to provide proper operation for the combination. The high side, or the ungrounded lead of the output cable, is a red wire and this should be normally connected to the antenna terminal which would be used in the connection of a Marconi Antenna against ground in normal receiver operation without the Preselector. On RME receivers this is the outside terminal of the three-terminal strip marked "A-A-G". The other lead, which is a plain black wire, is to be connected to the middle antenna terminal and a ground jumper can be used to connect "A" (center) to "G" on the terminal strip. In the case of a receiver being used with the Preselector which has only a two-terminal input, that is antenna and ground, the black wire connects, of course, to the ground and the red wire to the antenna terminal. A reversal of these leads will cause inefficient operation and probably no operation at all, even when the antenna switch is thrown so that the antenna is connected directly to the receiver. This can be a source of trouble when poor operation is experienced.

PROCEDURE FOR ALIGNMENT OF THE RADIO FREQUENCY CIRCUIT

As an indicating device for alignment changes a carrier meter on the RME-69 receiver can be used to indicate maximum signal being supplied the receiver from the Preselector. In the case of other communication receivers the same method may be used with their respective carrier level or R meter indication. In case the alignment is made with a receiver without carrier indicating devices, an output meter can be used in the regular

manner in which it is used for the alignment of receivers, but in this case, of course, it will be necessary to use a modulated signal input to the Preselector to supply an audio component which can be used to operate the output meter.

All adjustments described should be adjusted to, and left set at, maximum meter readings, be it carrier amplitude indicator or output as indicated on the output meter.

First set the receiver to 1000 KC and tune the Preselector to 1000 KC, which will be indicated on the main tuning dial. The band in which 1000 KC will be found is provided by setting the switch to Position 1. Set the pointer of the Preselector on 1 MC reading of the scale and supply 1 MC signal input to the antenna terminal to the Preselector, setting the selector switch on the Preselector (Figure 1) to the left position. When in this position adjust C_c, C_d and C_e for maximum meter reading.

Then switch to Band 2 and 3 successively and check the setting at 2, 3, 4 and 5 MC. These frequencies, of course, will be checked by placing the band switch in the proper position required for tuning to these frequencies. The receiver, of course, must also be adjusted to these frequencies simutaneously with the Preselector.

The calibration for these frequencies will be found to be dependent on the settings of C_c, C_d and C_e (Figure 4) which are made for 1000 KC on Band 1 and will be in adjustment if Band 1 is properly aligned.

Next turn the switch to Position 4 and feed a signal of 7 MC into the receiver and adjust the tuning control of the Preselector so that it sets on 7 MC. Under these conditions check the setting of C_g for peak output (Figure 3).

Next set the band switch to Position 5 and insert a signal of 14 MC into the receiver, adjusting the tuning control of the Preselector to 14 MC. Under these conditions adjust C_b, C_f and C_k (Figure 3) for maximum output.

Next set the band switch to Position 6 and set the tuning indicator to 30 MC on the scale and insert a signal of 30 MC into the Preselector. This condition obtained, adjust C_a, C_d and C_h (Figure 3 and 4) for maximum output.

During all of these settings and adjustments, of course, the receiver should be set to the same frequency as the Preselector so that it will be able to receive the output of the Preselector at the proper frequency.

The adujstments just described will assure maximum output due to alignment of the RF circuit in the Preselector.

The voltages to be expected at points indicated on the schematic diagram (Drawing B-161) are listed below.

	Volume Control Set At Minimum	Volume Control Set At Maximum
1 to ground	27.5 volts	3.1 volts
2 to ground	200.0 volts	230.0 volts
3 to ground	120.0 volts	83.0 volts
4 to ground	3.75 volts	2.45 volts
5 to ground	300.0 volts	290.0 volts
6 to ground	290.0 volts	210.0 volts
7 to ground	141.0 volts	97.0 volts
8 to ground	300.0 volts	290.0 volts
9 to ground	320.0 volts	310.0 volts

"A" to "A" 5.55 volts at 115 volts line voltage AC

The following continuity checks should be made:

	Band (1)	Band (2)	Band (3)	Band (4)	Band (5)	Band (6)	
11 to ground	3.8	1.4	0.6	0.2	0.2	0.2	(ohms)
12 to 13	0.2	0.2	0.2	0.2	0.2	0.2	(ohms)
14 to 15	0.2	0.2	0.2	0.2	0.2	0.2	(ohms)
16 to ground	3.8	1.4	0.6	0.2	0.2	0.2	(ohms)
17 to ground	3.8	1.4	0.6	0.2	0.2	0.2	(ohms)

All measurements made with output cable and antenna disconnected. Voltages greater or smaller than these values listed by an amount exceeding 15% may indicate difficulty in the power circuits of the receiver. Resistances greater or less by 15% than the resistances listed may indicate conditions other than normal in continuity in these circuits.

If the Preselector is dead as evidenced by a loss in signal strength on a given signal, the loss being compared with the signal receiver when the antenna is connected directly to the receiver, it may be due to a dead tube which is usually due to the fact that the heater is open and can be ascertained by placing the hand on the tube to see whether or not it is warm or cold. If it is warm, of course, the heater is continuous and probably the tube is satisfactory. If the tube is cold the heater is probably open and therefore the tube needs replacing. Of course, tubes can be defective from other reasons which cannot be detected in this manner but must be ascertained by checking on a regular tube checker.

Another reason for a dead Preselector may be due to lack of voltage on elements of the tube and can be checked by the voltage check.

Cause of no voltage on the plate or screen of the tube can be due to a short circuit in the by-passes of C7, C2, C4, C8, C10 or C1 or an open resistor R6, R2, R3 or an open choke T2 or a burned out 80 rectifier tube. An open circuit in the antenna coil or the output coils of the Preselector which can be checked by the continuity measurements listed above, may be the cause of inoperation.

If the Preselector has very little gain (the average gain should be 3R's over that of the receiver itself) it is probably due to misalignment and can be corrected by the procedure described on Page 4. Possibly a defective tube which is not providing gain that is standard is at fault. The tube can be checked and replaced by a tube having suitable characteristics.

Additional information regarding special cases of trouble can be obtained from the Radio Mfg. Engineers, Inc. by listing the details in a letter and writing direct to the factory.

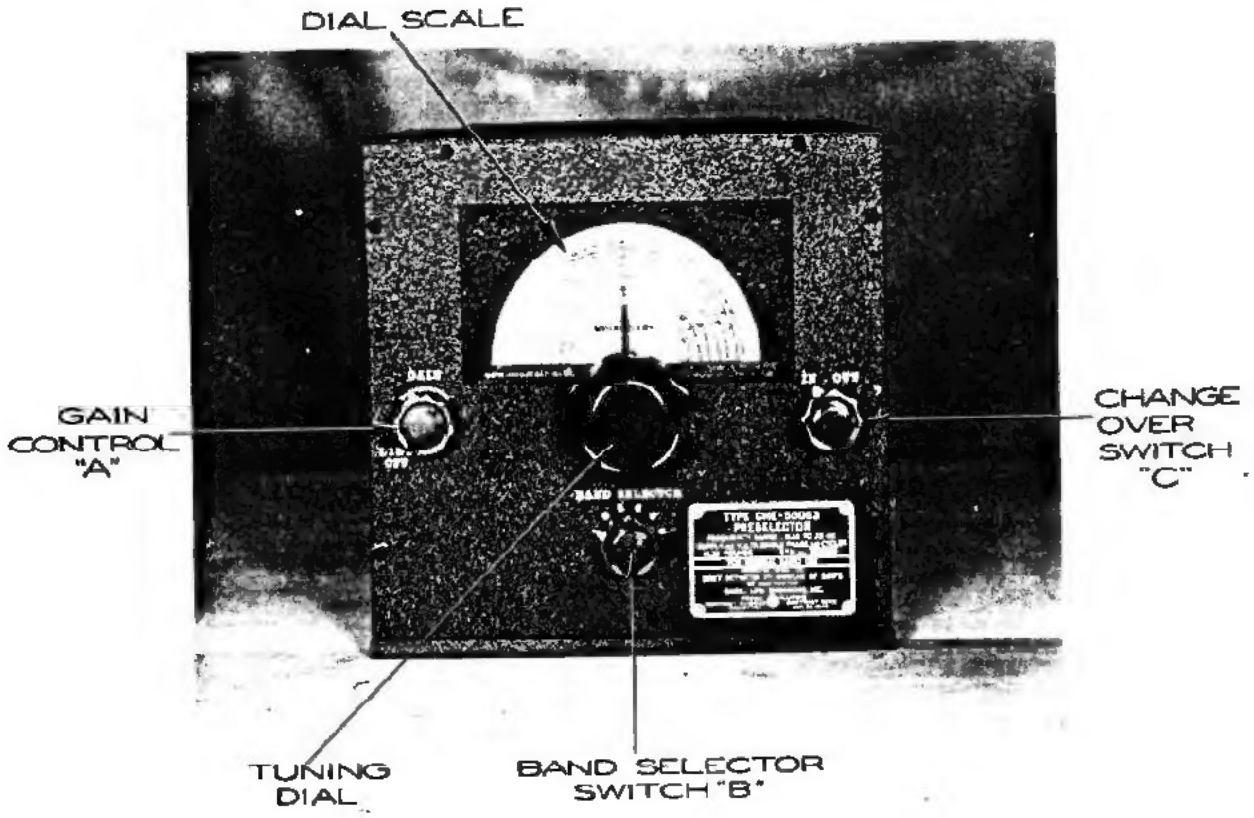

DIAL SCALE
GAIN CONTROL "A"
CHANGE OVER SWITCH "C"
TUNING DIAL
BAND SELECTOR SWITCH "B"

FIG.-1

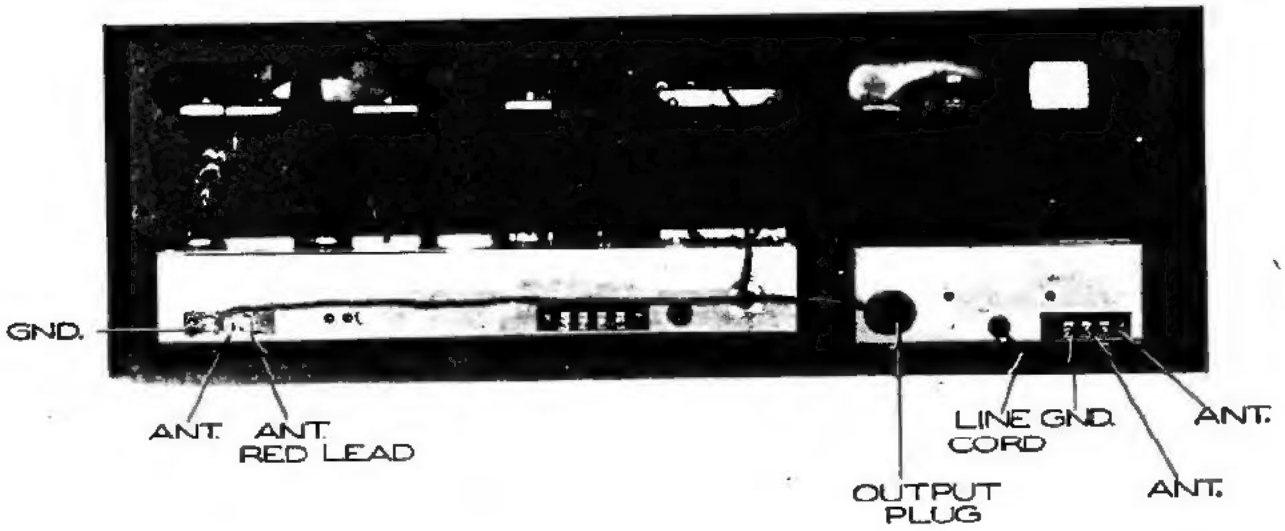

GND.
ANT.
ANT. RED LEAD
OUTPUT PLUG
LINE CORD
GND.
ANT.
ANT.

FIG.-2

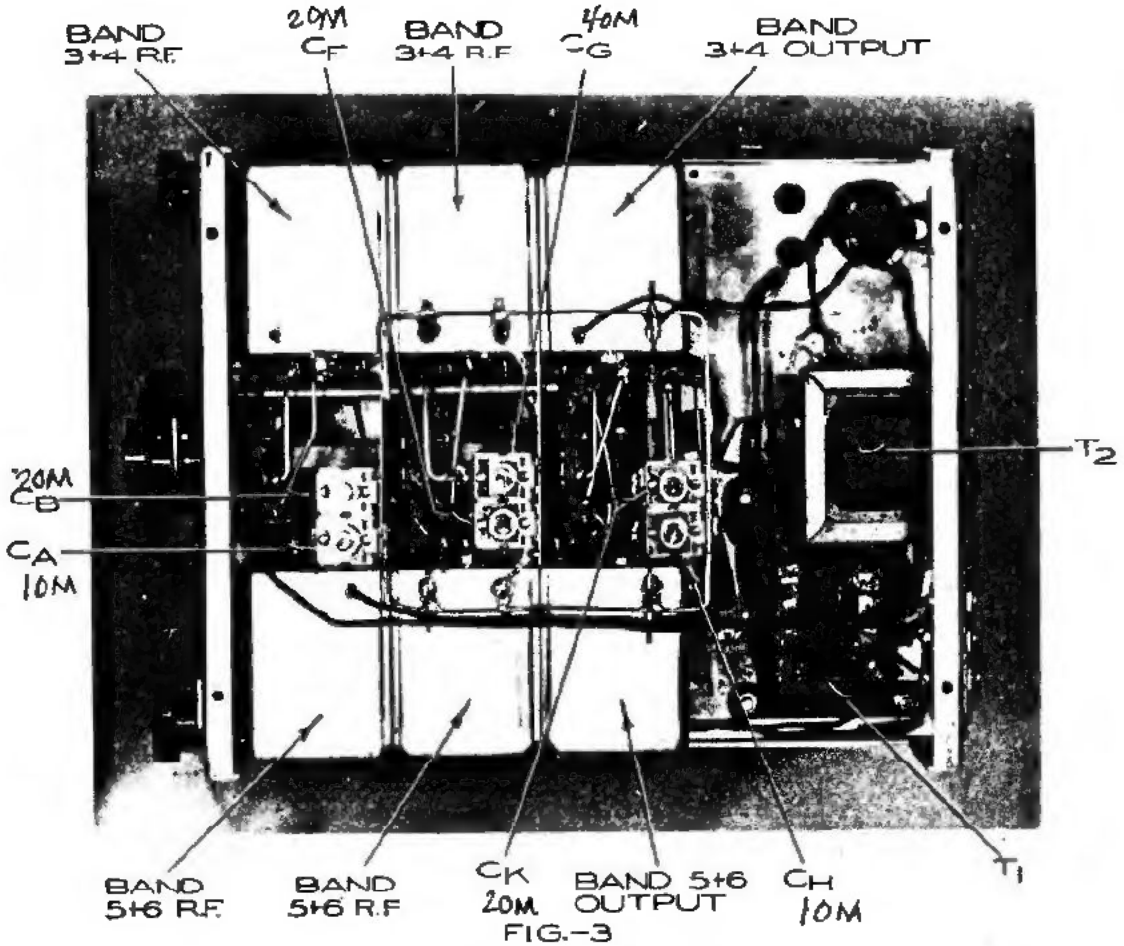

BAND 3+4 R.F.
20M C_F
BAND 3+4 R.F.
40M C_G
BAND 3+4 OUTPUT
T_2
20M C_B
C_A 10M
BAND 5+6 R.F.
BAND 5+6 R.F.
C_K 20M
BAND 5+6 OUTPUT
C_H 10M
T_1

FIG.-3

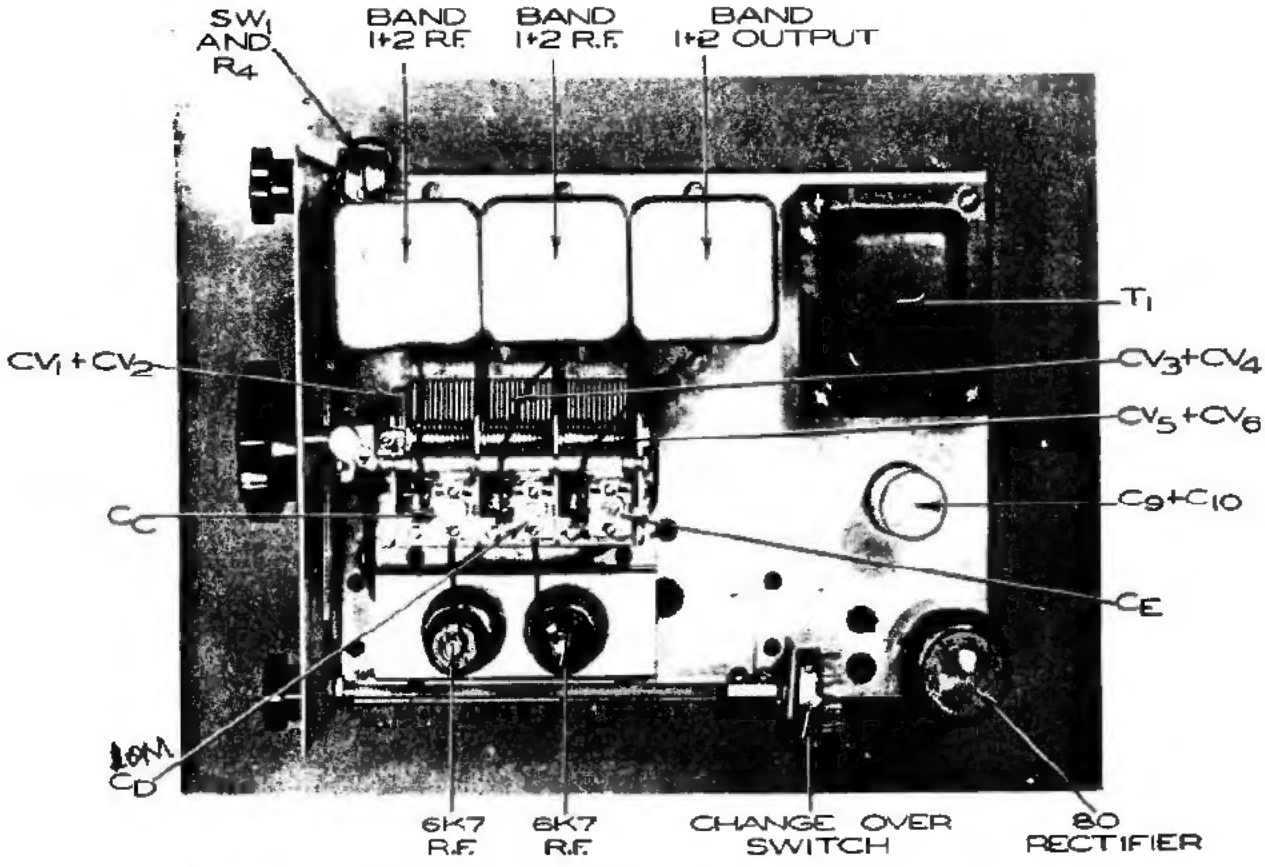
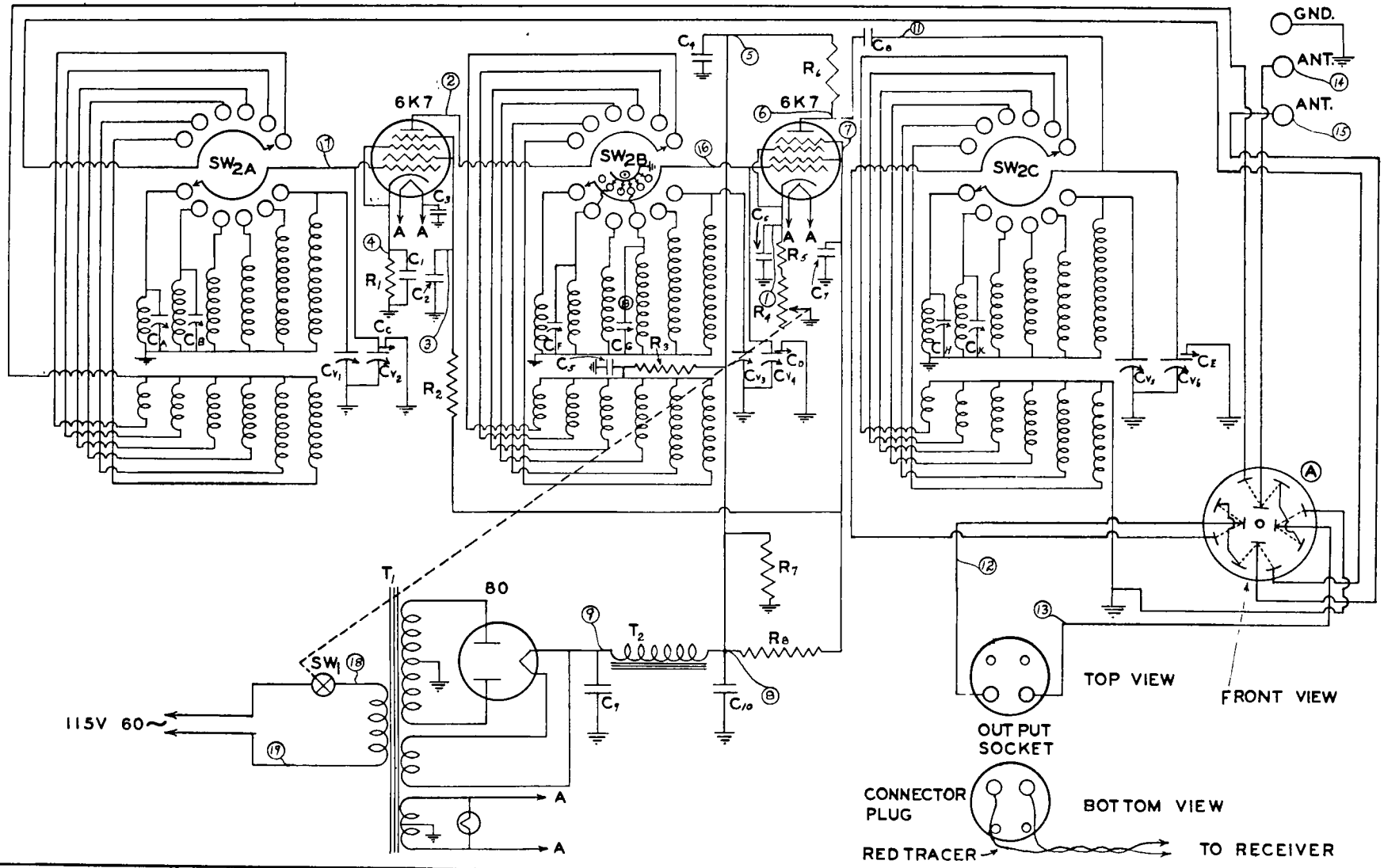
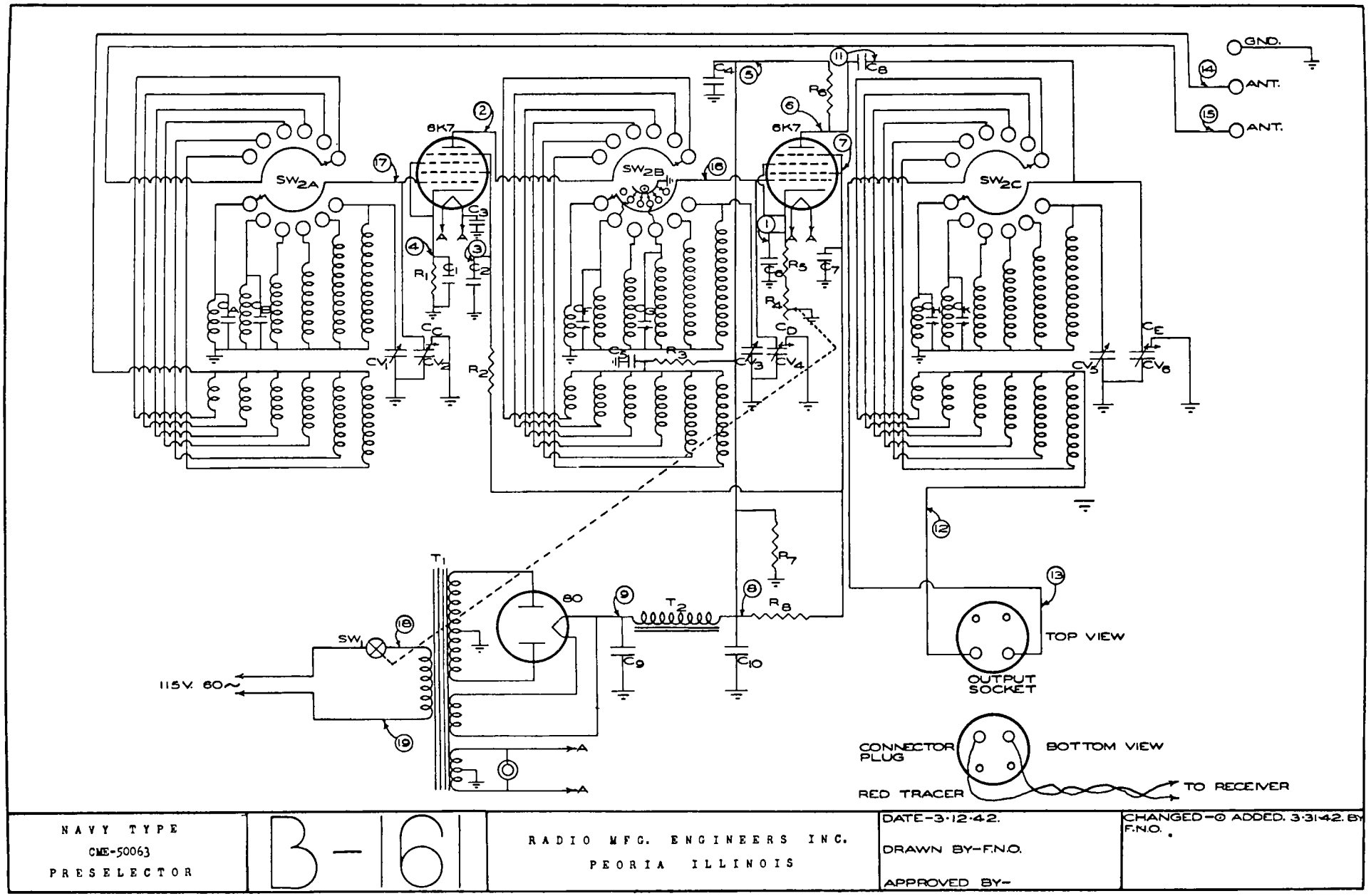

SW_1 AND R_4
BAND 1+2 R.F.
BAND 1+2 R.F.
BAND 1+2 OUTPUT
T_1
CV_1+CV_2
CV_3+CV_4
CV_5+CV_6
C_9+C_{10}
C_C
C_E
10M C_D
6K7 R.F.
6K7 R.F.
CHANGE OVER SWITCH
80 RECTIFIER

FIG.-4



CME-50063 WITH ANTENNA CHANGEOVER SWITCH	B-59	RADIO MFG. ENGINEERS INC. PEORIA ILLINOIS		



NAVY TYPE CME-50063 PRESELECTOR	B-161	RADIO MFG. ENGINEERS INC. PEORIA ILLINOIS	DATE-3-12-42. DRAWN BY-F.N.O. APPROVED BY-	CHANGED-0 ADDED. 3-31-42. BY F.N.O.

CME-5D063 PRESELECTOR PARTS LIST

RESISTORS:

R_1	300 ohm, 1/3 watt
R_2	10,000 ohm, 1/3 watt
R_3	10,000 ohm, 1 watt
R_4	30,000 ohm Variable Gain Control w/line switch SW_1
R_5	300 ohm, 1/3 watt
R_6	10,000 ohm, 1 watt
R_7	15,000 ohm, 10 watt
R_8	50,000 ohm, 1 watt

CONDENSERS:

C_1	.01 mfd. 400 volt bypass
C_2	.01 mfd. 400 volt bypass
C_3	.002 mfd. 600 volt bypass
C_4	.01 mfd. 600 volt bypass
C_5	.01 mfd. 400 volt bypass
C_6	.01 mfd. 400 volt bypass
C_7	.01 mfd. 400 volt bypass
C_8	.0001 mfd. 600 volt coupling
C_9	10 mfd. Filter) Dual Unit
C_{10}	10 mfd. Filter)
C_a	5 - 30 mmf. adjustable padder
C_b	5 - 30 mmf. adjustable padder
C_f	5 - 30 mmf. adjustable padder
C_g	5 - 10 mmf. adjustable padder
C_h	5 - 30 mmf. adjustable padder
C_k	5 - 50 mmf. adjustable padder
C_c, C_d, C_e	Variable condenser trimmers
C_{v1-6}	Variable tuning condenser

TRANSFORMER AND CHOKE:

T_1	Power Transformer
T_2	Filter Choke

SWITCHES:

SW_1	Line Switch
SW_{2a}, SW_{2b}, SW_{2c}	Band Change Switch Sections
A	Antenna Change-over Switch

TUBES

2	6K7
1	80