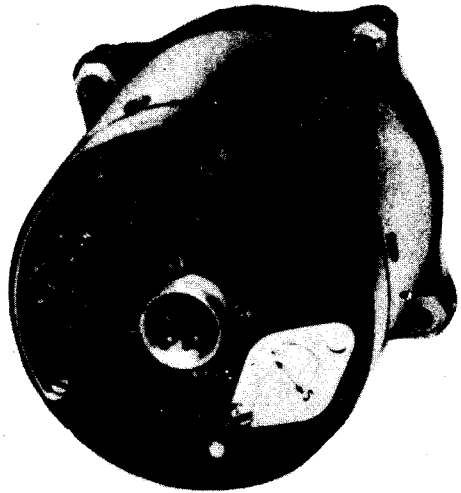
CHAPTER II

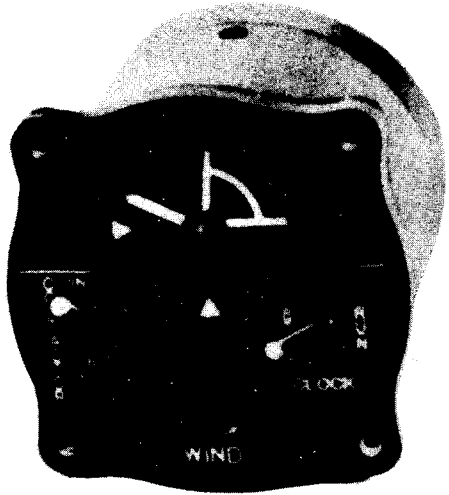
SECTION II

# Contactor Unit BC-608-A

1. General. - Contactor Unit BC-608-A is part of Contactor Equipment RC-96-A. It is designed for use in U. S. Army Aircraft to control a radio transmitter so that it will automatically transmit a predetermined type of signal on a predetermined carrier frequency for a period of approximately 14 seconds of each minute. The control circuit in the contactor unit consists of a cam-driven set of contacts and must be used in conjunction with suitable relays in order to provide the above described control function. In some cases, the necessary relays are an integral part of the transmitter, while in others they are assembled in a relay box which is inserted in the control circuit between the transmitter and its remote control box. The contactor units are delivered fully adjusted and regulated. Adjustments should not be attempted in the field.



REAR VIEW




FRONT VIEW

CONTACTOR UNIT BC-608-A; FRONT AND REAR VIEWS

Figure 1.

Defective contactor units should be replaced and returned to a designated repair station. This technical manual may be used for Contactor Units BC-608-T2 and BC-608-T3. Contactor Unit BC-608-T3 is identical with Contactor Unit BC-608-A. Contactor Unit BC-608-T2 has a RADIO, SPECIAL-NORMAL switch that performs the same functions as the CONTACTOR, IN-OUT switch on Contactor Unit BC-608-A.

2. Characteristics. - The mechanical clock mechanism of the Contactor Unit BC-608-A has been designed for use in aircraft and with normal use will provide satisfactory service over a long period of time. The accuracy of the clock is plus or minus one second per hour under all conditions. The contactor unit has a thermostat and heater assembly to provide a uniform temperature in the contactor unit case when operating in low temperatures. The power for the heater and thermostat can be obtained from the 12-14 volt or 24-28 volt airplane generator-battery system. The current drain will be approximately 0.5 ampere at 12-14 volts and 0.25 ampere at 24-28 volts.

3. Description. - a. Weight and dimensions of the contactor unit see figure 2.

b. Components. - The major component parts of the Contactor Unit BC-608-A are the mechanical clock movement, a set of cam-driven contacts, a thermostat and heater assembly, the CONTACTOR IN-OUT switch, and the CLOCK STOP-RUN switch. The above components are mounted in the contactor unit case. Socket SO-88 is mounted on the rear of the contactor unit case.

4. Care in handling. - a. Caution. Care should be taken in unpacking or handling this unit, as the clock mechanism may be damaged by rough handling. When removed from the shipping box, the outside of the contactor unit should be visually inspected for damage that might have occurred during shipment.

5. Preparation for use. - Place CLOCK STOP-RUN switch in RUN position. Turn the winding stem, located under the dial in the indicated direction until clock spring is wound. Care should be exercised to prevent overwinding of the spring. The indicator should revolve in the clockwise direction. Place CLOCK switch in STOP position. The indicator will continue to run until it has reached the zero or 12 o'clock position and then it will stop.

6. Installation. - a. Accessory equipment. The following equipment is required for each contactor unit installation:

1 plug PL-108.
1 fuse clip. *
1 2-ampere fuse *

In addition to the above, one approved type on-off toggle switch may be * required, depending upon the method of controlling the heater circuit.

* Fitted in PHO/E/1.a

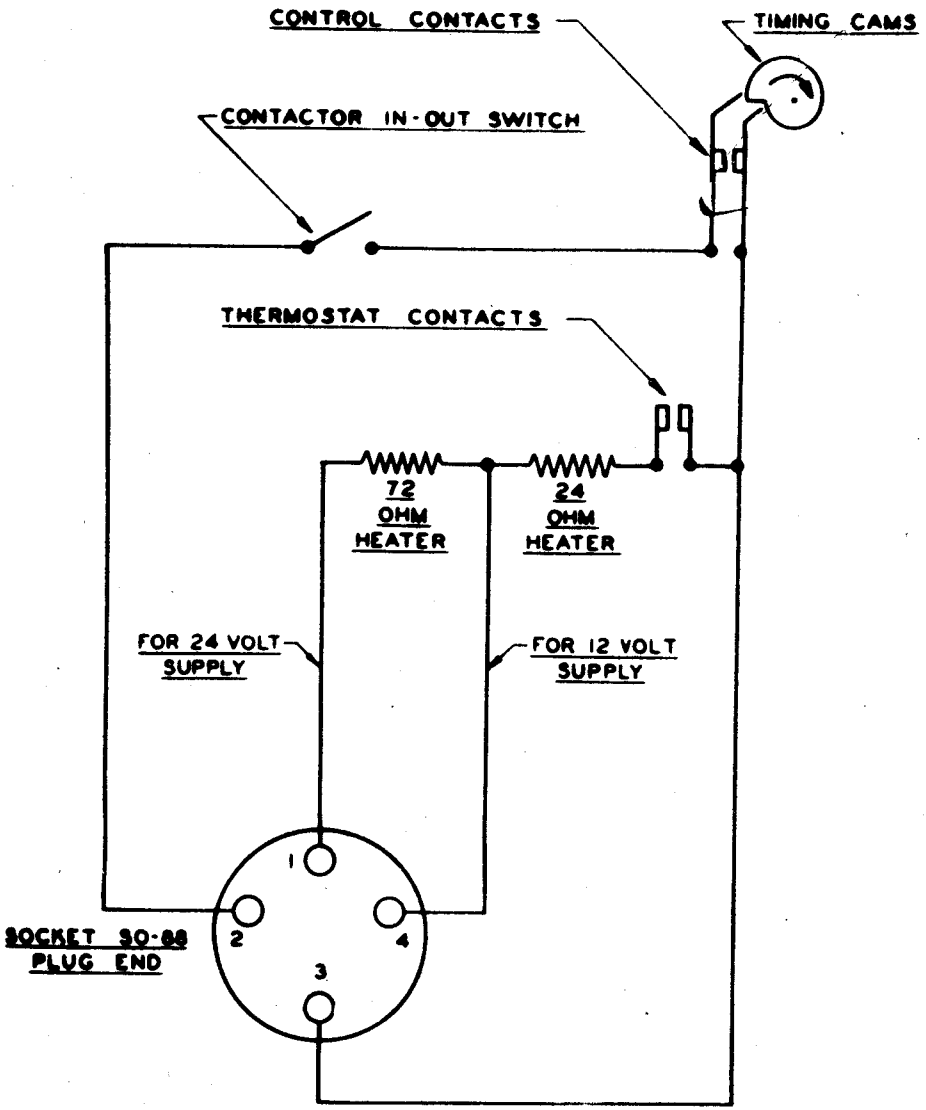



FIG. 2
CONTACTOR UNIT BC-608-A
SCHEMATIC WIRING DIAGRAM

b. Mounting. Contactor Unit BC-608-A is designed to mount in a standard 3 1/8 inch instrument mounting space on the airplane instrument panel. It may be mounted in a bracket attached to the panel. THE CONTACTOR UNIT HAS BEEN DESIGNED FOR USE ON A SHOCK-PROOF INSTRUMENT PANEL AND WILL NOT OPERATE SATISFACTORILY IN AN AIRPLANE IF RIGIDLY MOUNTED. Check the contactor unit when mounted to see that vibration will not cause it to strike any adjacent object. Check cord for length. The cord and plug should be so arranged that they do not place a strain on the contactor unit or transmit vibration to it.

c. Connections. Connections are made by means of a plug PL-108 to socket SO-88 located at the rear of the contactor unit. See figures 2. and 3, for the proper connections and wire size. Figure 3-1., shows the connections to use when it is desired to control the contactor unit heater by means of the airplane main-line switch. This connection should be used in airplanes in which it is possible to leave the main-line switch on for long periods of time without running the battery down. For airplanes in which the normal battery drain is large, or for some other reason the main-line switch cannot be left on for extended periods, a separate CONTACTOR HEATER ON-OFF switch should be provided, as shown in figure 3-2. This switch should be an approved type single pole, single throw, toggle switch. Only one of the contactor unit heater connections (either pin No.1, or pin No. 4) is used at any one time depending upon the primary battery supply voltage.

7. Precautions. - Before operation the following precautions will be observed:

a. Winding of clock spring. The contactor unit should be fully wound with the RUN-STOP switch in the RUN position and allowed to run for at least two minutes. This two minute run-down period insures more positive starting. After this run-down period the RUN-STOP switch should be placed in the STOP position. The indicator will continue to run until it has reached the zero or 12 o'clock position, at which point it will stop. When the clock spring has been fully wound the contactor unit will run for 24 hours, but it is recommended that the spring be wound every 12 hours when the contactor unit is being used continuously. If the contactor unit is not to be used for a great length of time it should be permitted to run down. CARE SHOULD BE EXERCISED NOT TO "OVER-WIND" CLOCK SPRING.

8. Operation. - a. The following procedure will be observed in placing Contactor Unit BC-608-A in operation:

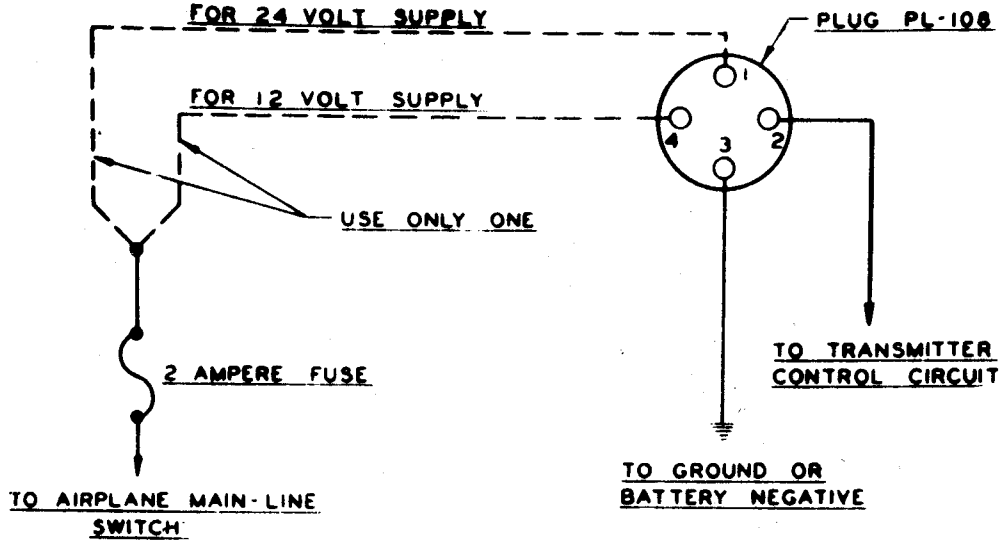
(1) The remote CONTACTOR-HEATER CONTROL switch or main-line switch should be ON.

(2) Turn radio equipment ON.

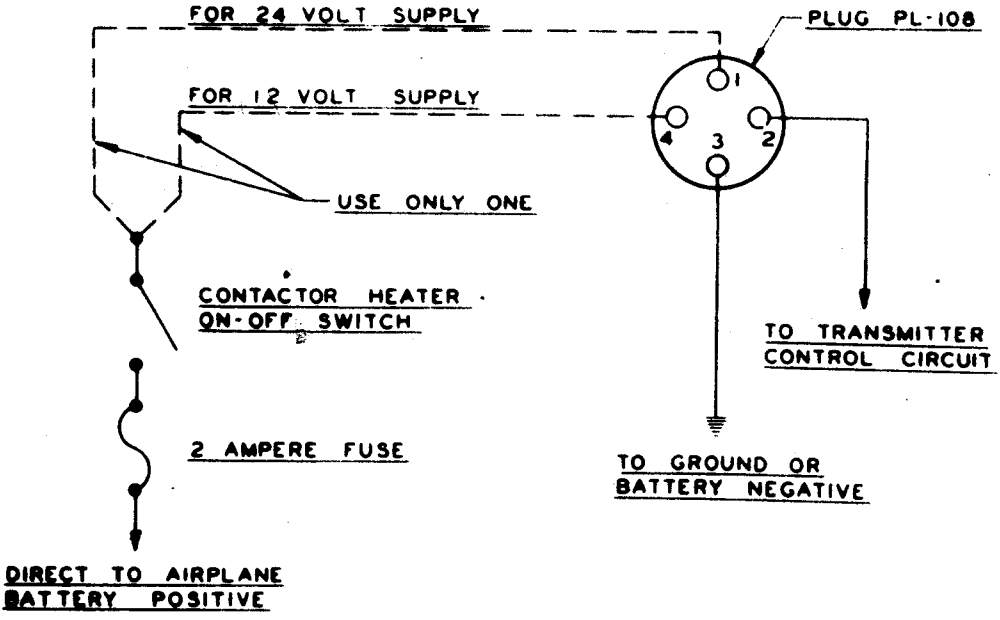
(3) The clock spring of the contactor unit should be wound.

(4) The CONTACTOR IN-OUT switch should be in the IN position.

(5) The CLOCK RUN-STOP switch should be in the STOP position. The indicator should be in the zero or 12 o'clock position.




A. HEATER CONTROLLED BY MAIN-LINE SWITCH




B. HEATER CONTROLLED BY SEPARATE "CONTACTOR HEATER ON-OFF" SWITCH

NOTE:
ALL WIRES TO BE AN APPROVED AIR CORPS TYPE, SIZE A.W.G. #22 OR LARGER

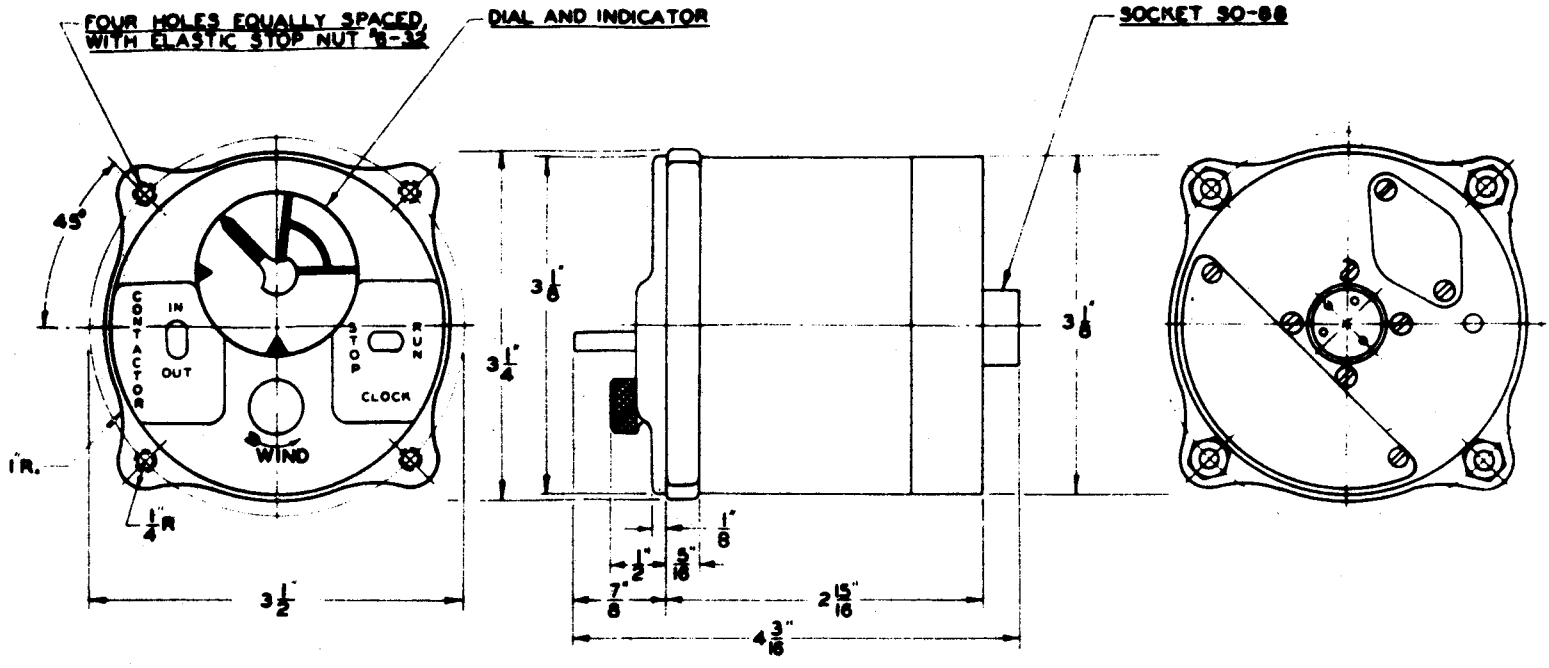
FIG. 3
CONTACTOR UNIT BC-608-A
EXTERNAL CONNECTIONS

b. The contactor unit is now ready for operation. Upon receiving the starting signal the pilot or operator has only to place the CLOCK RUN-STOP switch in the RUN position. This will start the clock mechanism. About a second to a second and a half after the clock mechanism has started the cam-operated contacts of the contactor unit will close. This will energize the control relays which in turn will operate the transmitter. The transmitter will be on as long as the contactor unit indicator is over the marked portion of the dial (first quadrant). When the indicator reaches the unmarked portion of the dial, the contactor unit contacts will open, the control relays will be released, and the transmitter will revert to the conditions indicated on the control boxes. That is, when the CONTACTOR IN-OUT switch is in the IN position and the indicator is over the marked portion of the dial, the contactor unit automatically controls the transmitter, and when the indicator is over the unmarked portion of the dial, control reverts to the pilot or observer and the radio set may be used for transmission or reception in the normal manner. The indicator of the contractor unit revolves at one revolution per minute. The contactor unit will keep the transmitter on for approximately 14 seconds and off for 46 seconds. This cycle of operation is repeated as long as the contactor unit is running, the radio equipment is turned on, and the CONTACTOR IN-OUT switch is in the IN position. Under the above conditions the operator should look at the contactor unit occasionally so that he can tell when he can use the radio equipment and when he cannot use it; also he can hear a signal in his headset so he will know he is on "fixing" frequency; for example, if the transmitter is being used on "VOICE" when the contactor unit indicator comes to the marked segment, the voice modulation will be removed immediately and the operator will not be able to continue his transmission until the end of the contact period.

c. Since the action of the contactor unit is somewhat like that of the SEND-RECEIVE switch located on the microphone or stick, the radio receiver will be inoperative while the contactor unit is controlling the transmitter.

d. If at any time it is desired to have the contactor unit run without controlling the radio set, it is only necessary to place the CONTACTOR IN-OUT switch in the OUT position. In this case the control circuit is opened in series with the control contacts. The heater and clock mechanism continue to operate as before.

e. If the pilot or observer desires to stop the contactor unit, this can be done by placing the CLOCK STOP-RUN switch in the STOP position. The indicator will continue to revolve until it has reached the zero or 12 o'clock position and then it will stop. The control contacts will be open and therefore the radio set will not be controlled by the contactor unit when the indicator remains in this position.




WEIGHT - 0.75 LB

FIGURE 4
CONTACTOR UNIT BC-606-A
OUTLINE DIMENSIONS

f. A summary of operation for radio set ON,"CLOCK RUN-STOP" switch at RUN, is as follows:

(1) Contactor IN-OUT switch at IN. Contactor unit will automatically take over control of the radio equipment and key transmitter for 14 seconds each minute as indicated on contactor unit dial. Normal operation of radio set during remaining period.

(2) CONTACTOR IN-OUT switch at OUT position. Normal operation of radio set at all times.

9. Detailed functioning of parts. - a. Clock mechanism. The clock mechanism of Contactor Unit BC-608-A is a spring-powered movement. This mechanism has special mechanical parts which have been designed to provide a very accurate clock movement under the severe conditions encountered in operation of combat airplanes.

b. Heater and thermostat. The heater and thermostat in the contactor unit have been designed to provide heat in the contactor unit case when the unit is being operated in temperature below plus 23 degrees centigrade (73 degrees fahrenheit). The thermometer energizes the heater circuit whenever the internal temperature of the contactor unit case falls below 23 degrees centigrade, and opens the circuit whenever the temperature rises above 33 degrees centigrade (91 degrees fahrenheit). See figure 4. for heater connections.

c. Contacts. The contacts of the contactor unit are opened and closed at a definite time by a pair of cams attached to the clock mechanism. THE CAM MOVEMENT AND THE CONTACTS ARE ADJUSTED AT THE FACTORY AND MUST NOT BE DISTURBED. The contacts are designated to make or break 3.5 watts (approximately 250 milliamperes at 14 volts or 125 milliamperes at 28 volts). Larger current values will severely damage the contacts. See figure 4. for contact connections to socket SO-88.

d. IN-OUT switch. This switch is in series with the cam operated contacts of the contactor unit. When the switch is in the OUT position, the contactor unit is permitted to run without controlling the transmitter. When the switch is placed in the IN position, the transmitter will be controlled and will be automatically placed in operation for 14 seconds out of every minute by the contactor unit. See figure 2, for connections.

e. RUN-STOP switch. The RUN-STOP switch controls a lever which stops the clock mechanism when the indicator arrives at the zero or 12 o'clock position. The clock mechanism will continue to run after the switch is placed in the STOP position until the indicator has reached the zero position. When the switch is placed in the RUN position, the lever is removed and the clock mechanism should start to run immediately.

f. Indicator and dial. The indicator of the contactor is attached to the clock mechanism and revolves at one revolution per minute. The dial is divided into quadrants; the first or marked quadrant indicates the period which the contacts are closed; the remaining three or unmarked quadrants indicate the period during which the contacts are open. Both the dial and indicator are designed for use with fluorescent lighting.

10. Adjustments. - THE CONTACTOR UNITS ARE DELIVERED FULLY ADJUSTED AND REGULATED. ADJUSTMENT SHOULD NOT BE ATTEMPTED IN THE FIELD. IN CASE OF IMPROPER OPERATION, REPLACE THE ENTIRE CONTACTOR UNIT AND RETURN THE DEFECTIVE UNIT TO A DESIGNATED REPAIR STATION. DO NOT BREAK SEALS ON OUTSIDE OF CONTACTOR UNIT CASE.

11. Repairs. - All repairs on Contactor Unit BC-608-A will be made at designated repair stations and only qualified watchmakers, equipped with the necessary tools and replacement parts, will do the repair work. All work requiring the contactor unit to be opened will be done in clean and dust-free surroundings.

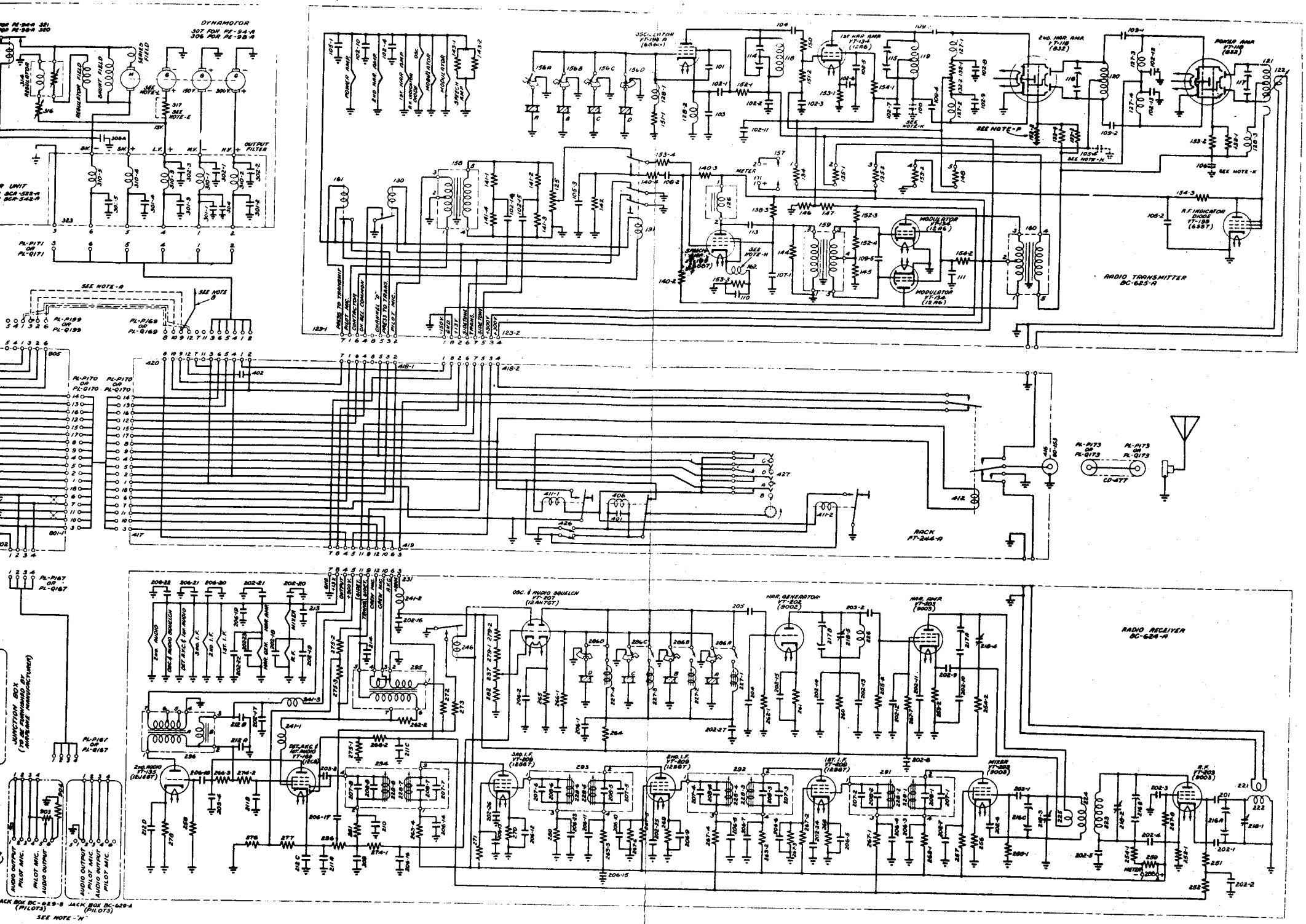
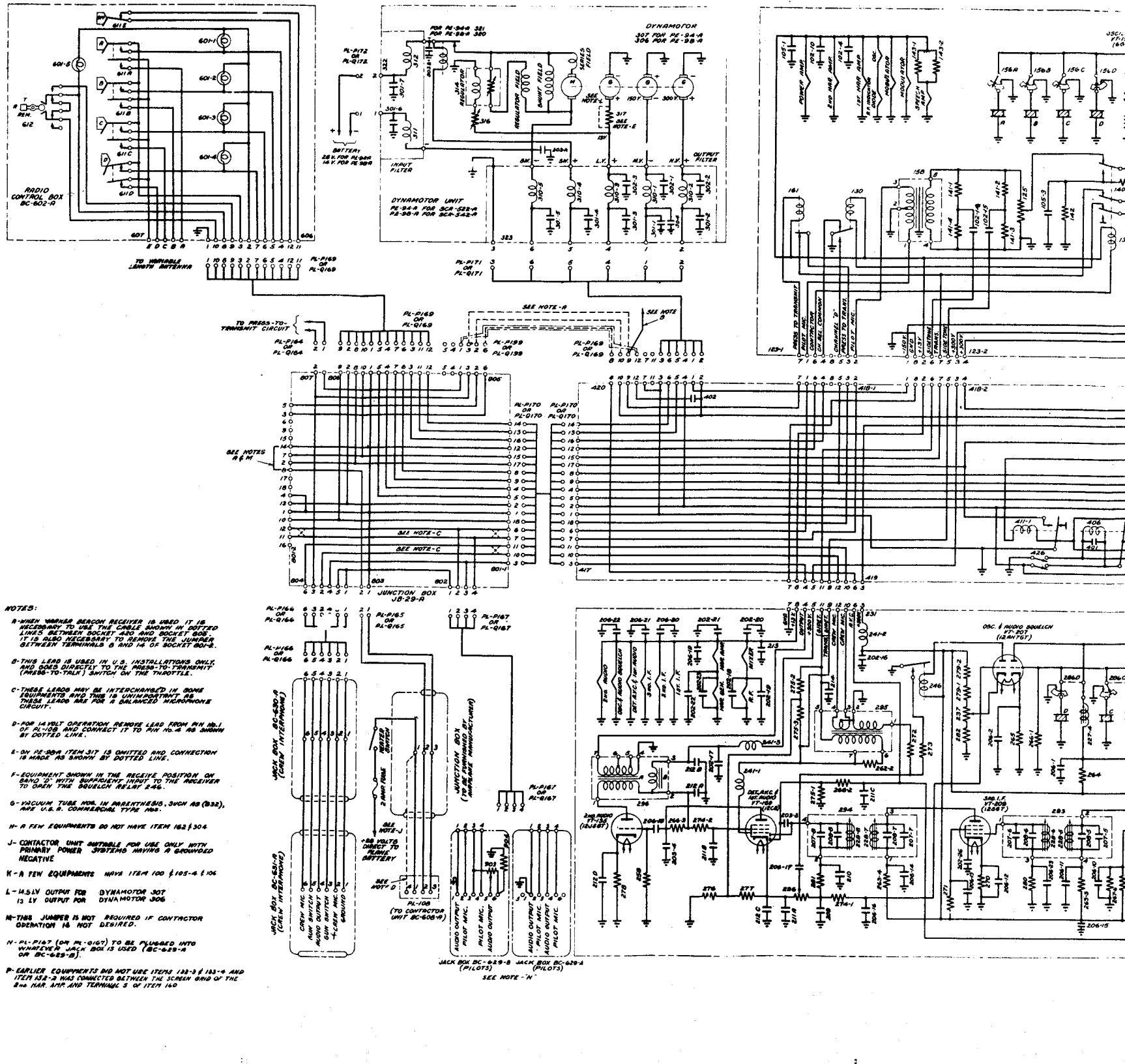



FIGURE 70 — RADIO TRANSMITTER BC-625-A, WIRING DIAGRAM




NOTES:

A - WHEN "HOOKER" BEACON RECEIVER IS USED IT IS NECESSARY TO USE THE CABLE SHOWN IN DOTTED LINES BETWEEN SOCKET 420 AND SOCKET 805. IT IS ALSO NECESSARY TO REMOVE THE JUMPER BETWEEN TERMINALS 8 AND 14 OF SOCKET 801-S.

B - THIS LEAD IS USED IN U.S. INSTALLATIONS ONLY, AND GOES DIRECTLY TO THE "PRESS-TO-TRANSMIT" (PRESS-TO-TALK) SWITCH ON THE THROTTLE.

C - THESE LEADS MAY BE INTERCHANGED IN SOME EQUIPMENTS AND THIS IS UNIMPORTANT AS THESE LEADS ARE FOR A BALANCED MICROPHONE CIRCUIT.

D - FOR 14 VOLT OPERATION REMOVE LEAD FROM PIN NO.1 OF PL-108 AND CONNECT IT TO PIN NO.4 AS SHOWN BY DOTTED LINE.

E - ON PE-98-A ITEM 317 IS OMITTED AND CONNECTION IS MADE AS SHOWN BY DOTTED LINE.

F - EQUIPMENT SHOWN IN THE RECEIVE POSITION ON BAND "D" WITH SUFFICIENT INPUT TO THE RECEIVER TO OPEN THE SQUELCH RELAY 246.

G - V=2 CUUM TUBE MOL IN PARENTHESIS, SUCH AS (6B32), ARE U.S.A. COMMERCIAL TYPE NOS.

H - A FEW EQUIPMENTS DO NOT HAVE ITEM 162 & 304.

J - CONTACTOR UNIT SUITABLE FOR USE ONLY WITH PRIMARY POWER SYSTEMS HAVING A GROUNDED NEGATIVE

K - A FEW EQUIPMENTS HAVE ITEM 100 & 105-A & 106

L - 14.5 LV OUTPUT FOR DYNAMOTOR 307
13 LV OUTPUT FOR DYNAMOTOR 306

M - THIS JUMPER IS NOT REQUIRED IF CONTACTOR OPERATION IS NOT DESIRED.

N - PL-P167 (OR PL-0167) TO BE PLUGGED INTO WHENEVER JACK BOX IS USED (BC-629-A OR BC-629-B).

P - EARLIER EQUIPMENTS DID NOT USE ITEMS 133-3 & 133-4 AND ITEM 132-3 WAS CONNECTED BETWEEN THE SCREEN GRID OF THE 2nd HAR. AMP. AND TERMINAL 5 OF ITEM 140