C O N F I D E N T I A L

INSTRUCTIONS FOR INSTALLING AND OPERATING

MODEL XRAT

TWO-BAND RECEIVING EQUIPMENT

Manufactured Under Navy Contract NOs-67258
by
AIRCRAFT RADIO CORPORATION
Boonton, New Jersey

INSTRUCTIONS FOR INSTALLING AND OPERATING

MODEL XRAT

TWO-BAND RECEIVING EQUIPMENT

GENERAL

This equipment is designed for the simultaneous reception of MCW or CW signals in two adjacent high frequency bands, 13.5-20 MC. and 20-27 MC. The units of the equipment closely resemble the corresponding units of Type K equipment recently supplied to the Navy under Contract NOs-64476, and the units are interconnected in much the same way. The following units, designated XRAT, are supplied as preliminary samples of Model RAT equipment as required by Contract NOs-67258.

Quantity	Item
2	Receiver Units (13.5-20MC) with vacuum tubes
2	Receiver Units (20-27 MC) with vacuum tubes
4	Switch Panels
4	Switch Panel Adapters
4	Receiver Dynamotor Units
4	Local Tuners (2 crank-type and 2 knob-type)
2	Racks (each for two Receiver Units) with two wired plugs each
2	Mountings (each for a two-Receiver Unit Rack)
2	Control Boxes (each for two Receiver Units; one with crank-type tuning controls, and one with knob-type tuning controls)
2	Cables, each 10 ft. long (Receiver Rack to Battery)
4	Cables, each 5 ft. long (Receiver Rack to Control Box)
4	Linkages, each 5 ft. long (Receiver Unit to Control Box)
* 2	Cables, each 5 ft. long (Receiver Rack to associated Transmitter Equipment)
* 1	Right angle Linkage Coupling
4	12K8 Vacuum Tubes (Spares)
4	12SR7 Vacuum Tubes (Spares)
4	12A6 Vacuum Tubes (Spares)
12	12SK7 Vacuum Tubes (Spares)

*Not required by Contract NOs-67258.

Since the association of the various Model XRAT units for remote or local control is substantially the same as for similar Type K units, no detailed description of this association will be given here. There are, however, a few changes in Model XRAT equipment from its prototype which will now be described.

CONNECTIONS FOR LOCAL CONTROL

For local control the Switch Panels are mounted in the fronts of the Receiver Units and the wired plugs (#6420) are screwed into receptacles located on the top of the rack junction box. The Local Tuners are screwed to the threaded tuning studs on the Receiver Units. Telephones are connected to the A LINE and/or B LINE jacks located on the front of the Receiver Rack.

CONNECTIONS FOR REMOTE CONTROL

For remote control, the Switch Panel Adapters are mounted in the fronts of the Receiver Units and the control box cables are screwed into the receptacles located on the top of the rack junction box and into the Control Box. The mechanical linkages are screwed to the threaded tuning studs on the Receiver Units and on the Control Box. Telephones are connected to the A LINE and/or B LINE jacks located on the bottom surface of the Control Box. The switches on the front of the Receiver Rack must be placed in their disconnected positions.

TYPE OF GAIN CONTROL

Model XRAT Receiver Units include a single kind of gain control, so that the AUTO-MANUAL switches used in Type K are not required. This new type of gain control is essentially a manual gain control for signals of such magnitude as not to produce serious overload, and is a kind of automatic gain control, arranged to prevent blocking of the receiver, for stronger signals.

PROVISION FOR TWO OPERATORS

By providing two telephone line jacks (A LINE and B LINE) at the Control Box and Receiver Rack, two operators may use one receiving equipment with some degree of independence. Under each Receiver Unit on a Receiver Rack is a three-position switch, through which the output of this receiver may be impressed on the A LINE jack, the B LINE jack, or left disconnected from either. A similar selector switch on the Control Box performs the same function for remotely controlled receivers.

In addition to the A LINE and B LINE jacks, there is provided on the front of each Receiver Unit a jack through which an operator may obtain the output of the Receiver Unit independent of the position of its A LINE--B LINE selector switch and of its cut-off relay.

It might be mentioned here that the possibility for more flexible receiving procedure which the provision for two operators affords, is not nearly so apparent when using the two-receiver combination of Model XRAT as it would be for a more extensive receiving equipment including a greater number of Receiver Units.

CONTROL BOX

In the Control Box used in Type K equipment, electrical cables and mechanical linkages were attached to the back of the box, and the telephone jacks were on the bottom surface. Through a change in the proportions of this box and the introduction of slightly more complicated gear trains in the tuning units, the Model XRAT Control Box has been designed for all electrical and mechanical connections on its bottom surface.

SWITCH PANEL ADAPTER AND RECEIVER RACK

The junction box on the back of the Receiver Rack has been somewhat enlarged. This box now includes receptacles for the Receiver Rack--Receiver Control Box cables (in Type K located on the Switch Panel Adapters); A LINE and B LINE telephone jacks; and two receptacles (wired in parallel), one of which may be used to connect two Receiver Racks together, and the other to provide circuits from the Receiver Rack to any associated transmitter equipment. This rack box includes relays, the windings of which should be connected, by way of this last mentioned receptacle, across the coils of the keyed relays in the associated transmitter equipment in order to provide for receiver cut-off during transmission. A single side-tone connection from the transmitter will, by virtue of extra contacts on these same relays, supply side-tone to both telephone lines.

AIRCRAFT RADIO CORPORATION
Boonton, New Jersey.
December, 1939.

RESTRICTED

SERIAL NUMBER 118

PRELIMINARY

Instruction Book

for

Model RAT
Aircraft Radio Telegraph and Telephone Receiving Equipment

AIRCRAFT RADIO CORPORATION
BOONTON, NEW JERSEY

CONTRACT NOs-67258,
Dated June 24, 1939

RESTRICTED

PRELIMINARY
INSTRUCTION BOOK
FOR

Model RAT
Aircraft Radio Telegraph and Telephone Receiving Equipment

Frequency Range: 13.5 to 27 Megacycles (MC)

●

This instruction book is furnished for the information of commissioned, warranted, enlisted and civilian personnel of the Navy whose duties involve design, instruction, operation, and installation of radio and sound equipment. The word "RESTRICTED" as applied to this instruction book signifies that this instruction book is to be read only by the above personnel, and that the contents of it should not be made known to persons not connected with the Navy.

●

AIRCRAFT RADIO CORPORATION
BOONTON, NEW JERSEY

CONTRACT NOs-67258,
Dated June 24, 1939

OPERATION OF THIS EQUIPMENT INVOLVES THE USE OF HIGH VOLTAGES WHICH ARE DANGEROUS TO LIFE. OPERATING PERSONNEL MUST AT ALL TIMES OBSERVE ALL SAFETY REGULATIONS. DO NOT CHANGE TUBES OR MAKE ADJUSTMENTS INSIDE EQUIPMENT WITH HIGH VOLTAGE SUPPLY ON. DO NOT DEPEND UPON DOOR SWITCHES OR INTERLOCKS FOR PROTECTION BUT ALWAYS SHUT DOWN MOTOR GENERATORS OR OTHER POWER EQUIPMENT. UNDER CERTAIN CONDITIONS DANGEROUS POTENTIALS MAY EXIST IN CIRCUITS WITH POWER CONTROLS IN THE OFF POSITION DUE TO CHARGES RETAINED BY CAPACITORS, ETC. TO AVOID CASUALTIES ALWAYS DISCHARGE AND GROUND CIRCUITS PRIOR TO TOUCHING THEM.

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

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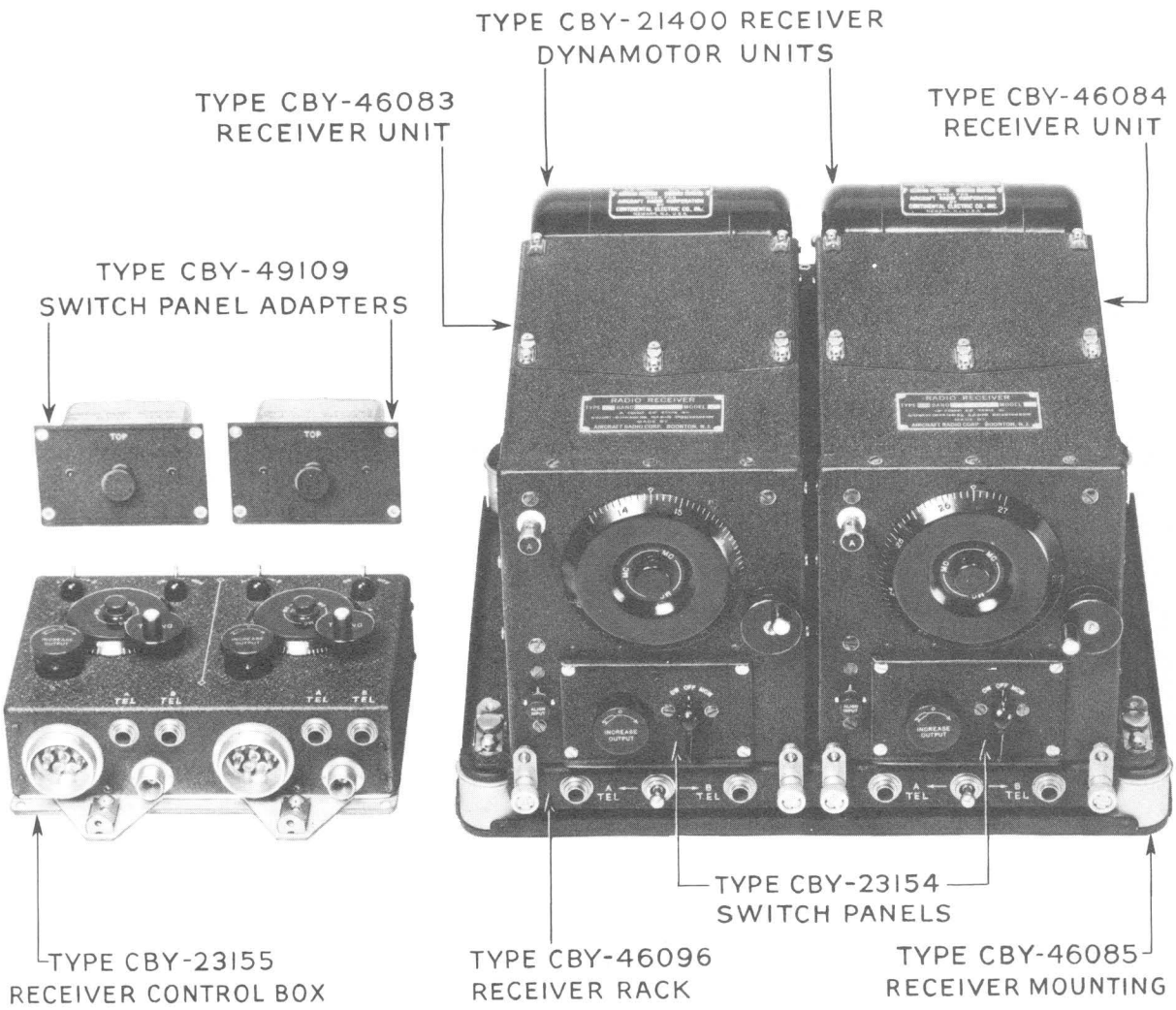


FIG. 1—PRINCIPAL UNITS, MODEL RAT EQUIPMENT

Model RAT Aircraft Radio Receiving Equipment

I. DESCRIPTION

GENERAL

Model RAT Aircraft Radio Receiving Equipment consists of two complete superheterodyne aircraft radio receivers designed for individual or simultaneous operation in the frequency bands of 13.5 to 20 megacycles and 20 to 27 megacycles. The equipment may be described generally as follows:

(1) Primary power is obtained from the 12-volt dc supply on the airplane.
(2) Six 12-volt, octal-base, metal tubes are employed in each receiver.
(3) The receivers may be operated one at a time or simultaneously. Either may be remotely or locally controlled.
(4) The output of both receivers may be paralleled on a single headset, or may be separated for split or double headset operation.
(5) Continuous wave or modulated radio signals may be received.
(6) Both receivers may be connected to a single antenna of the fixed or trailing-wire type.
(7) Manual control of sensitivity is employed, aided by an auxiliary circuit which prevents strong radio signals from blocking reception.
(8) Tuning dials are calibrated directly in megacycles.
(9) The schematic circuit diagrams of both receivers are alike. The capacitance and inductance values of the antenna input, radio amplifier, and oscillator circuits differ in the two receivers, but all other circuits are alike mechanically and electrically. The intermediate frequency of both receivers is 4.2 megacycles.

The following is a list of Major Units and Accessories supplied with each Model RAT Equipment on Contract NOs-67258.

TABLE I

Navy Type Designation	*Name of Major Unit or Accessory*	*Quantity per Equipment*	*Mfrs. Designation*
21400	Receiver Dynamotor Unit	2	5206
23154	Switch Panel	2	6434
23155	Receiver Control Box (two receiver)	1	6546
46083	Receiver Unit (13.5–20 MC) with set of tubes	1	6716
46084	Receiver Unit (20–27 MC) with set of tubes	1	6717
46085	Receiver Mounting	1	5694
46096	Receiver Rack	1	6593
49109	Switch Panel Adapter	2	6433
	Local Tuner	2	6743
	Wired Plug	2	6787
	Cable, Receiver Rack to Battery, 10 feet	1	6694
	Cables, Receiver Rack to Receiver Control Box, 5 feet	2	6693
	Cable, Patch (to external equipment), 10 feet	1	5808
	Mechanical Linkages, 5 feet	2	6151
	Slip Cover (two receiver)	1	6939
	Preliminary Instruction Books	2	
	*Operating Spare Parts	1 set	
	**Operating spare parts include:*		
	Fuses	8	4414
	Relay contacts (relay 6318), ready for assembly to relay frame	1 set	
	Vacuum tubes. One set consists of three 12SK7, one 12K8, one 12SR7, and one 12A6 tubes	1 set	
	Control grid clips	1	6343
	Receiver mounting shockproof cup assembly	1	5185
	Dynamotor shockproof ring assembly	1	4681
	Maintenance tools:		
	Bristo set screw wrench #6	1	8021
	Phillips screw driver #1	1	8020
	Tube-extractor	1	7489

NOMENCLATURE

In the following text, Type CBY-46083 Receiver Unit (13.5-20 MC) or Type CBY-46084 Receiver Unit (20-27 MC) may be referred to as "the receiver" together with an indication of the frequency range if significant; the Type CBY-46096 Receiver Rack may be referred to as "the rack"; the Type CBY-46085 Receiver Mounting as "the mounting"; the Type CBY-21400 Receiver Dynamotor Unit as "the dynamotor"; the Type CBY-23155 Receiver Control Box as "the receiver control box"; the Type CBY-23154 Switch Panel as "the switch panel"; the Type CBY-49109 Switch Panel Adapter as "the switch panel adapter".

The abbreviation "RF" will be used throughout the text to denote the "radio frequency" of the incoming signal, or the "radio frequency" of the oscillator associated with the mixer tube. "IF" will be used to indicate the resonant "intermediate frequency" of the three tuned circuits following the mixer. This frequency is "intermediate" between the "RF" and the frequencies of the audible signals.

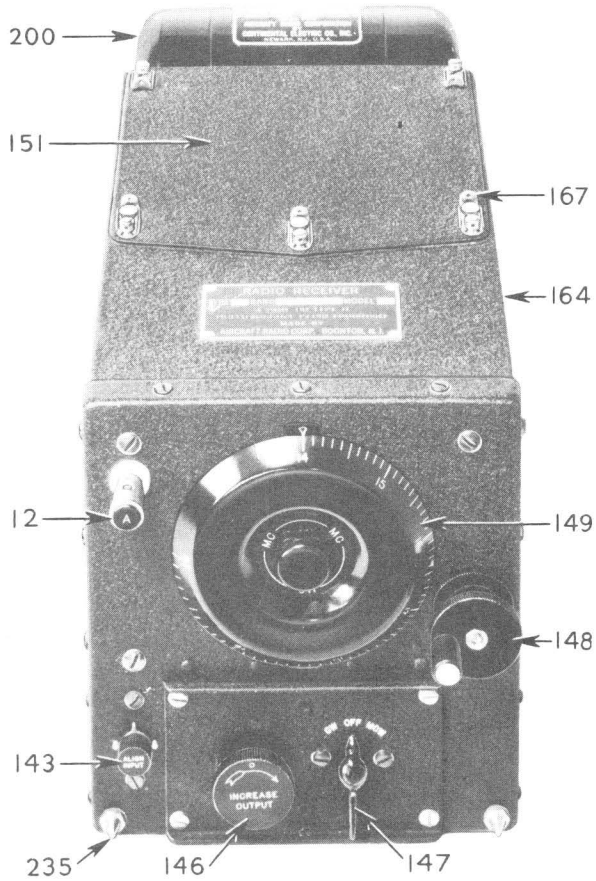


FIG. 2—TYPICAL RECEIVER UNIT

SYMBOL AND DRAWING NUMBERS

The symbol numbers used in the following discussion refer to parts shown and similarly numbered in the photographs and schematic drawings of this book (Figs. 1 to 10, inclusive). These two or three digit numbers are also shown in the Parts Reference List, at the end of the text. Figs. 11 to 20, inclusive, are exact copies of manufacturing drawings, and show only Aircraft Radio Corporation drawing numbers.

SERIAL NUMBERS

Serial numbers appear on all units having Navy Type designations. In one Model RAT equipment there are *two* each of Type CBY-21400 Receiver Dynamotor Units, Type CBY-23154 Switch Panels, Type CBY-49109 Switch Panel Adapters, and *one* each of the remaining units. An example of the serial numbering of 50 Model RAT equipments follows: Receiver Dynamotor Units will be numbered 1-100, and likewise Switch Panels and Switch Panel Adapters. All other units will be numbered 1-50.

The nameplates on the bases of the Dynamotor Units are hidden from view when these units are mounted on the receivers. In order to aid in checking the dynamotor serial number without dismounting these units from installed equipment, additional serial-number plates have been provided, which are mounted conspicuously on the tops of the dynamotor machines. These plates are of the "write-in" type, so that if it becomes necessary to mount a new machine on the base, the proper number may be inscribed on the "write-in" plate. *The Number engraved on the Dynamotor Unit nameplate is the permanent serial number of that unit.*

POWER SUPPLY

The equipment is designed to operate from a primary source of 11 to 15 volts dc. The current drain is 3 amperes per receiver at 14 volts input.

VACUUM TUBES

Six octal-base metal tubes are employed in each receiver as follows: one 12SK7 as a radio frequency (RF) amplifier, one 12K8 as a "mixer" or "converter", two 12SK7 as intermediate frequency (IF) amplifiers, one dual purpose 12SR7 as a detector and CW oscillator, and one 12A6 as an audio amplifier. The heaters of all of these tubes are rated at 12.6 volts, but may be operated from an 11-15 volt source. All tubes terminate in a standard octal base and, except for the 12K8 which has its signal grid brought out at a top cap, are of the single-ended type. The 12SK7 is a "triple-grid, super-control" RF amplifier tube. It is sometimes referred to as a "remote cut-off" or "variable-mu" tube. The 12K8 is a combination "triode-hexode" used to perform the functions of oscillation and of

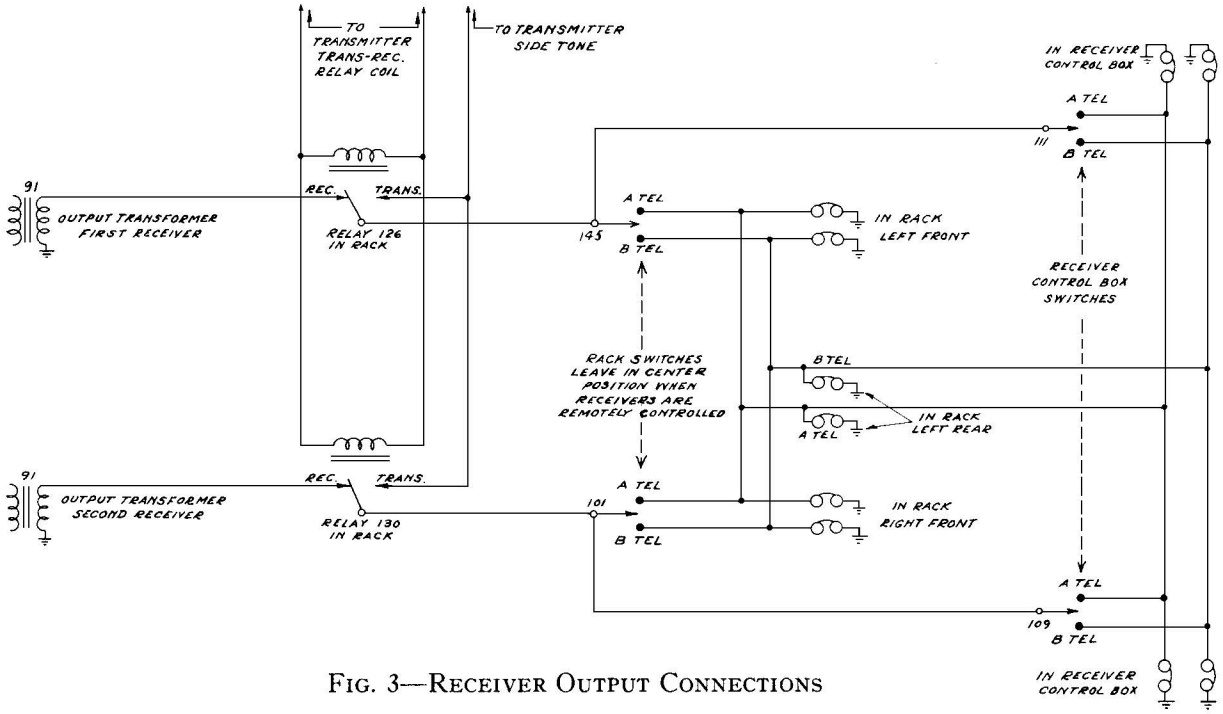


FIG. 3—RECEIVER OUTPUT CONNECTIONS

modulating or "mixing" this oscillation with the incoming RF signal to produce the IF. In early superheterodynes these functions were performed by two tubes called the "first detector" and the "RF oscillator". The 12SR7 is a "duodiode-triode", that is, it consists of two diode plates, plus a triode. One diode plate is used as a detector, the second diode is grounded externally, and the triode is used as a heterodyne oscillator for CW reception. The 12A6 is an audio amplifier power output tube, sometimes referred to as a "beam" power tube. Table II lists the electrical characteristics and terminal arrangements for each of the four types of tubes used in the equipment.

RECEIVER OUTPUT CONNECTIONS

By means of a three-position toggle switch associated with each receiver, the output of one or both receivers may be connected to either of two telephone lines terminated at jacks marked "A Tel" or "B Tel", or may be left disconnected from all telephone jacks (three-position switch left in the center position).

The schematic circuit arrangement is shown in Fig. 3. For local control operation, the receiver control box switches shown, are not employed, and the wired plug, 103, (Fig. 10) is assumed to be in place. It will be noted that a switch on the rack connects the first receiver output to the "A Tel" line, or to the "B Tel" line, or leaves the output disconnected, and similarly, a second switch connects the second receiver output to the "A Tel" line, or to the "B Tel" line, or leaves the output disconnected. The switch which controls the output of a receiver, is on the front of the rack directly under that receiver. If the equipment is to be operated by remote control, all switches shown in Fig. 3 are in the circuit, *but the switches on the rack must be left in the center or neutral position. When this is done, the disposition of receiver outputs is controlled by the two control box "A-B" switches.* Here also, it is possible to connect either or both receivers to "A Tel" or "B Tel" jacks, or to leave the output of either or both receivers disconnected.

Fig. 3 shows a relay associated with each receiver. The function of each relay is to connect the telephone line either to the side tone line from an external transmitter, or to the output of the receiver. These relays are designed and connected to operate simultaneously with the keying relay of the transmitter.

ANTENNA

A single antenna of the trailing-wire or fixed type may be connected to both receivers. Any convenient length of wire greater than 5 feet may be used. Separate antennas may be used, if desired.

GAIN CONTROL

The gain control is a variable resistor in the cathode to ground circuit of the radio frequency (RF) amplifier tube and the first intermediate frequency (IF) amplifier tube. In addition to this manual gain control, a kind of automatic gain control is added, which comes into action only when signals otherwise strong enough to overload the radio amplifiers, are present, and which thereby

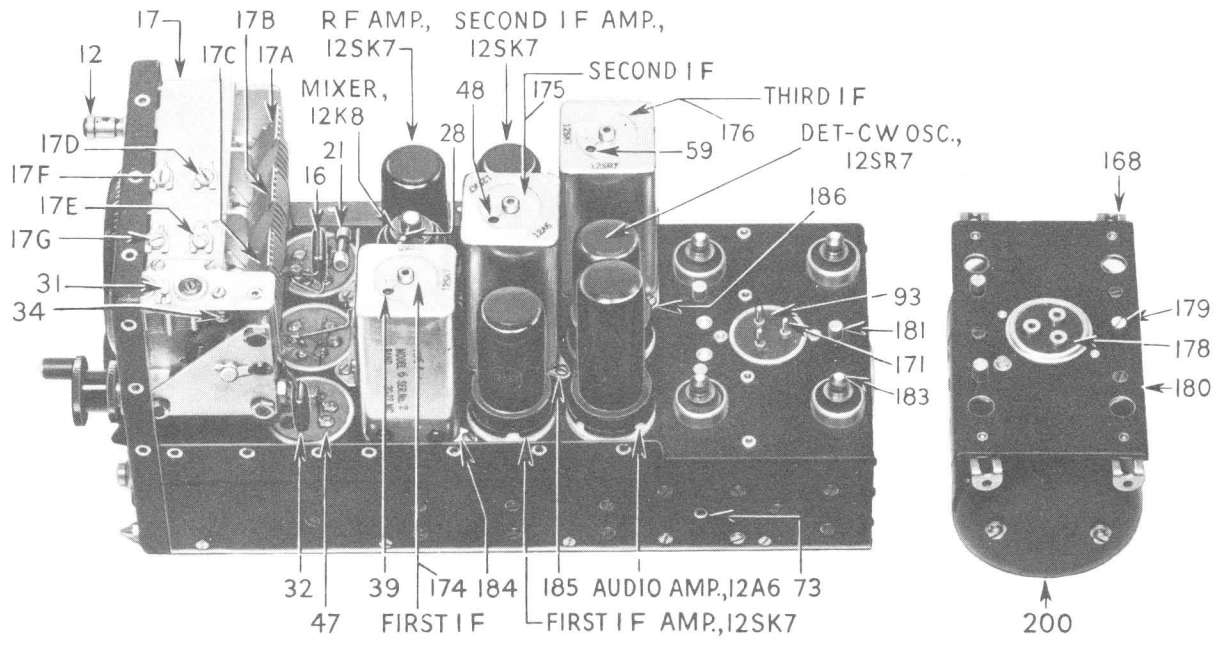


FIG. 4—TYPICAL RECEIVER UNIT, TOP VIEW, INSIDE AND BOTTOM VIEW OF RECEIVER DYNAMOTOR UNIT

prevents blocking of reception. The result is that regardless of the setting of the manual gain control resistor, strong signals will not block the receiver, and at the same time the sensitivity for weak signals will not be less than that for which the manual control is set.

DIALS

Dials on both the receivers and receiver control box are direct reading in megacycles (MC). The mechanical design of the receiver control box is such that the dials may be adjusted for correspondence with the dials on the receivers, after all units, cables, and mechanical linkages have been installed.

SIMILARITY OF THE TWO RECEIVER UNITS

The coils and gang capacitors associated with the antenna, RF amplifier, and RF oscillator circuits of the two receivers, and the tuning dials, are not alike, but all other mechanical and electrical parts are identical. The intermediate frequency of both receivers is 4.2 megacycles.

TYPE CBY-46083 RECEIVER UNIT

The Type CBY-46083 Receiver Unit is a six-tube superheterodyne aircraft radio receiver designed for the reception of amplitude modulated or unmodulated (MCW or CW) signals in the frequency range of 13.5 to 20 megacycles. A photograph of this receiver is shown in Fig. 2, top and bottom views are shown in Figs. 4 and 5, a schematic circuit diagram is shown in Fig. 10, an outline drawing showing dimensions and weights is shown in Fig. 12, and a wiring diagram is shown in Fig. 13.

The "radio frequency" (RF) part of the receiver consists of a preselector, comprising a tuned antenna circuit followed by a tuned "radio frequency" (RF) amplifier stage feeding the mixer tube signal grid (top cap), and a "radio frequency" (RF) oscillator circuit. Each of these three circuits is tuned by a section of the 3-section gang capacitor. The "intermediate frequency" (IF) part of the receiver consists of three 4.2 megacycle tuned circuits, one following the mixer and one after each of the intermediate frequency amplifier tubes. A diode detector follows the third IF circuit. The audio output from the diode detector is resistance coupled to an audio amplifier and the output from this amplifier is coupled to the telephone line through a transformer. A CW oscillator, tuned to 4.2 megacycles, is coupled loosely to the input to the second IF amplifier tube by means of capacitance 56, to obtain a beat note for CW reception.

Current from the 11-15 volt primary source is fed to the heater terminals of all tubes, and to the input side of a small dynamotor. The high voltage dc from the dynamotor supplies plate and screen voltages to all six tubes. No other source of dc supply is used.

Cathode current from the RF and first IF amplifier tubes is fed through fixed resistors 19 and 40 respectively, to the manual gain control resistor 98 in the switch panel (or to a similar resistor in the control box, if the receiver is remotely controlled). Increase in resistance of the

gain control resistor causes the voltage between cathode and ground to increase, and since the grids of these tubes are at ground potential for dc, the grids become more negative with respect to cathode. The amplification (or gain) of each of these tubes is reduced as its grid becomes more negative, and thus the basic radio gain of the receiver is manually adjustable.

If the setting of the manual gain control is left fixed, signals strong enough to produce control grid current in the 2nd I.F. tube develop a dc voltage across resistor 54. This voltage increases with further increase in signal strength. In order to prevent blocking of the RF and IF amplifier by such strong signals, the amplification of the RF and first IF tubes is reduced by completing the grid circuits of these tubes to ground through resistor 54. As the voltage across resistor 54 tends to increase, the grids of the two amplifier tubes become more negative, and their gain is reduced. The result of this action is that signal voltages as high as 2 volts in the antenna will not overload the radio and IF amplifier, regardless of the setting of the manual gain control.

To receive modulated signals, the "CW-OFF-MCW" switch controlling that receiver, should be on "MCW", in which position the plate of the CW oscillator is grounded. To receive unmodulated signals this switch should be on "CW". In this position the CW oscillator operates at the intermediate frequency of 4.2 megacycles and produces a beat note as the receiver is tuned to resonance. A very small coupling capacitance, 56, between the plate of the CW oscillator and the grid of second I.F. amplifier, formed by the capacitance between pin plugs in the 2nd IF receptacle, is sufficient to produce the level of CW oscillator voltage at the diode detector necessary for adequate beat audio output.

The small tube, 10, is a neon lamp across the antenna input tuned circuit, which glows at approximately 80 volts. The lamp acts as a voltage limiting device, and prevents a voltage higher than 80 from being developed across the tuned circuit by extremely strong local signals or electrical disturbances. Tube 89 is a similar protective device across half of the primary of the output transformer. Strong signals or static crashes cause the lamp to glow and thus limit the maximum voltage that can be developed across the terminals.

Capacitor 11 is a small fixed unit of approximately 6.5 micromicrofarads capacitance. Capacitor 14 is an adjustable air capacitor used for trimming the antenna input circuit. The capacitances of 11 and 14 are so designed that the antenna circuit can be aligned for any antenna which may be connected to terminal A.

17A, B, C, are three equal tuning sections of the gang capacitor. 17A tunes the antenna circuit, 17B tunes the RF amplifier circuit, and 17C

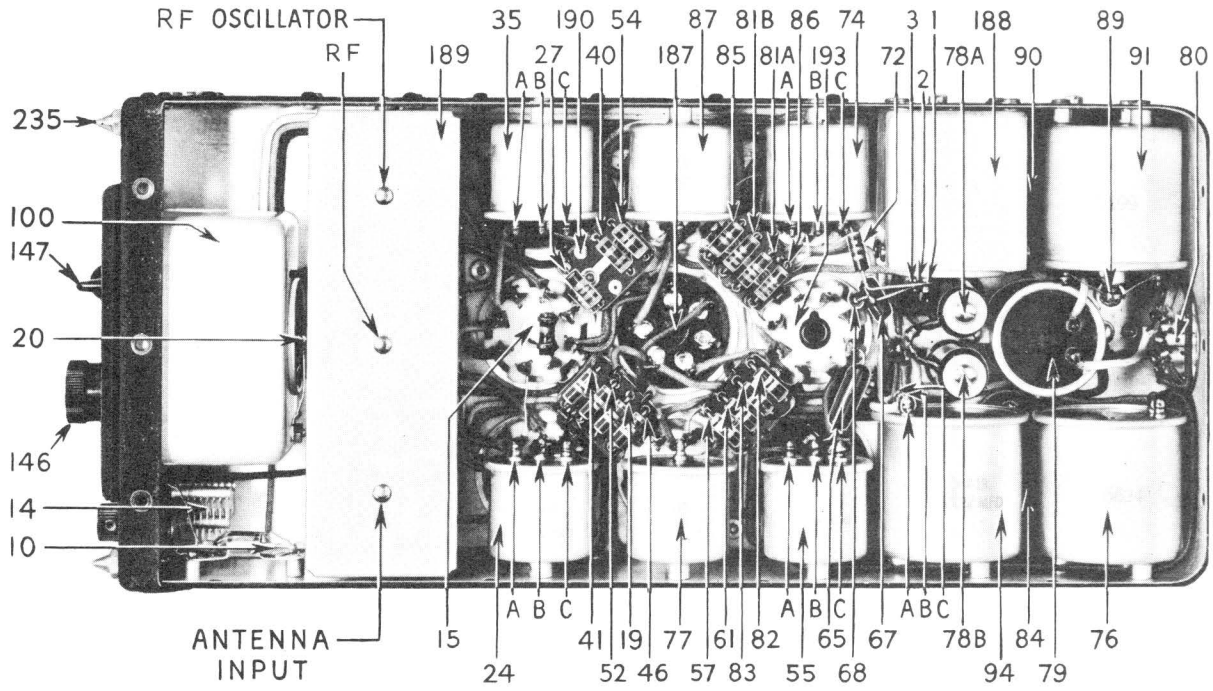


FIG. 5—TYPICAL RECEIVER UNIT, BOTTOM VIEW, INSIDE

tunes the RF oscillator. 17D, E are adjustable air aligning capacitors which are in parallel with the sections 17B and 17C of the gang capacitor. 17F and 17G are additional variable air capacitors in sections 17B and 17C.

Coil 13 is the antenna tuning inductor. 23 is an RF transformer. The secondary of this transformer is tuned by 17B and 17D to the signal frequency. 33A, B are the grid and plate coils of the RF oscillator.

Capacitor 34 is in series with the RF oscillator tuning capacitor 17C and the oscillator plate coil 33B. The capacitance of 31 is adjusted to a value such that the sum of the capacitances of 31 and 34 is sufficient to cause the RF oscillator to oscillate over the entire tuning range at a frequency 4.2 MC higher than the resonance frequency of the antenna and RF amplifier circuits. 32 is the RF oscillator grid capacitor, and 29 is the RF oscillator grid resistor. 43A, 51A and 64A are IF tuning coils. They are tuned to 4.2 MC by fixed mica capacitors 42, 49, and 62 in parallel with air trimmer capacitors 39, 48, and 59 respectively. Coils 43B, 51B, and 64B are RF choke coils and have only incidental magnetic coupling to tuning coils 43A, 51A and 64A.

Audio voltage is developed across diode resistor 82, which is applied to the grid of the audio amplifier tube through resistor 83 and capacitor 84. Resistor 83, with the aid of capacitor 65, acts as a filter to prevent IF voltage from reaching the grid of the audio amplifier. The amplified audio voltage is transformed by 91 so that several standard Navy 600 ohm headsets may normally be connected across the secondary. Capacitors 90 and 55B, together with the leakage reactance in the transformer 91, form an audio filter which attenuates frequencies above 3500 cycles per second.

TYPE CBY-46084 RECEIVER UNIT

The Type CBY-46084 Receiver Unit is like the Type CBY-46083 Receiver Unit described above except in the tuned circuit capacitances and inductances associated with the antenna input, RF amplifier, and RF oscillator circuits. The description of the circuits will not be repeated. A wiring diagram of this receiver is shown in Fig. 14.

TYPE CBY-23155 RECEIVER CONTROL BOX

The Type CBY-23155 Receiver Control Box may be seen in Figs. 1 and 6. A schematic circuit diagram of the unit is shown in Fig. 10, and a wiring diagram in Fig. 15. Its dimensions and weight may be found in Fig. 12.

This control box contains all of the electrical circuits and controls for the remote operation of the two receiver units in this equipment. An engraved line down the center of the control box face, separates the controls for the two receivers.

The "A-B" switch, the "CW-OFF-MCW" power switch, the gain control, and the tuning control, perform the same functions in remote operation that the "A Tel, B Tel" switch on the rack, the "CW-OFF-MCW" power switch, and the gain control on the control panel, and the local tuning knob on the receiver, perform in local operation of the equipment.

The remote tuner dial may be adjusted to correspondence with the dial on the receiver which it controls, by unscrewing the knurled nut in the center, and rotating the dial to give the same indication as the receiver dial, at which position it should be locked *by hand tightening only* of the knurled nut.

Headset plugs may be inserted into either of the "A Tel" or 'B Tel" jacks without regard to location of these jacks. The "A-B" switch associated with each of the receiver controls, determines whether that receiver shall be connected to either of the "A Tel" or "B Tel" jacks. See Fig. 3 for the schematic circuit arrangement.

TYPE CBY-46096 RECEIVER RACK

A photograph of the Type CBY-46096 Receiver Rack is shown in Fig. 7. A schematic and a wiring diagram of it is shown in Figs. 10 and 15. Two receivers may be slid into stalls and locked in place by means of two screw clamps on the rack. In

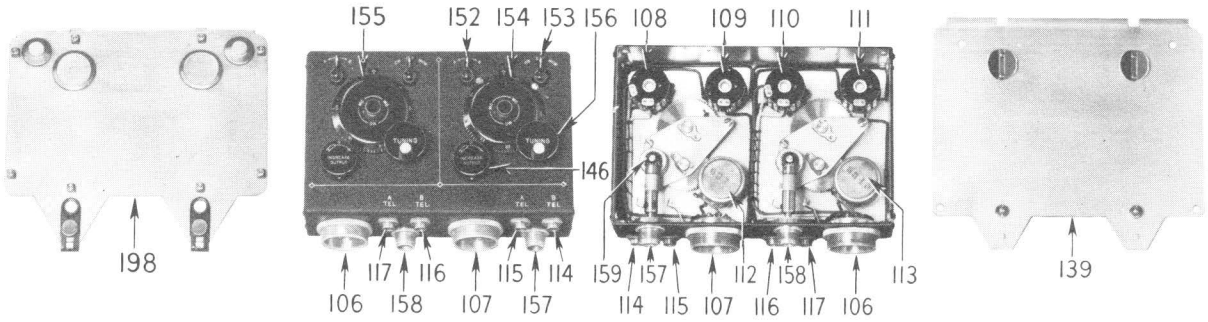


FIG. 6—TYPE CBY-23155 RECEIVER CONTROL BOX, FRONT AND REAR VIEWS, WITH BASE AND MOUNTING

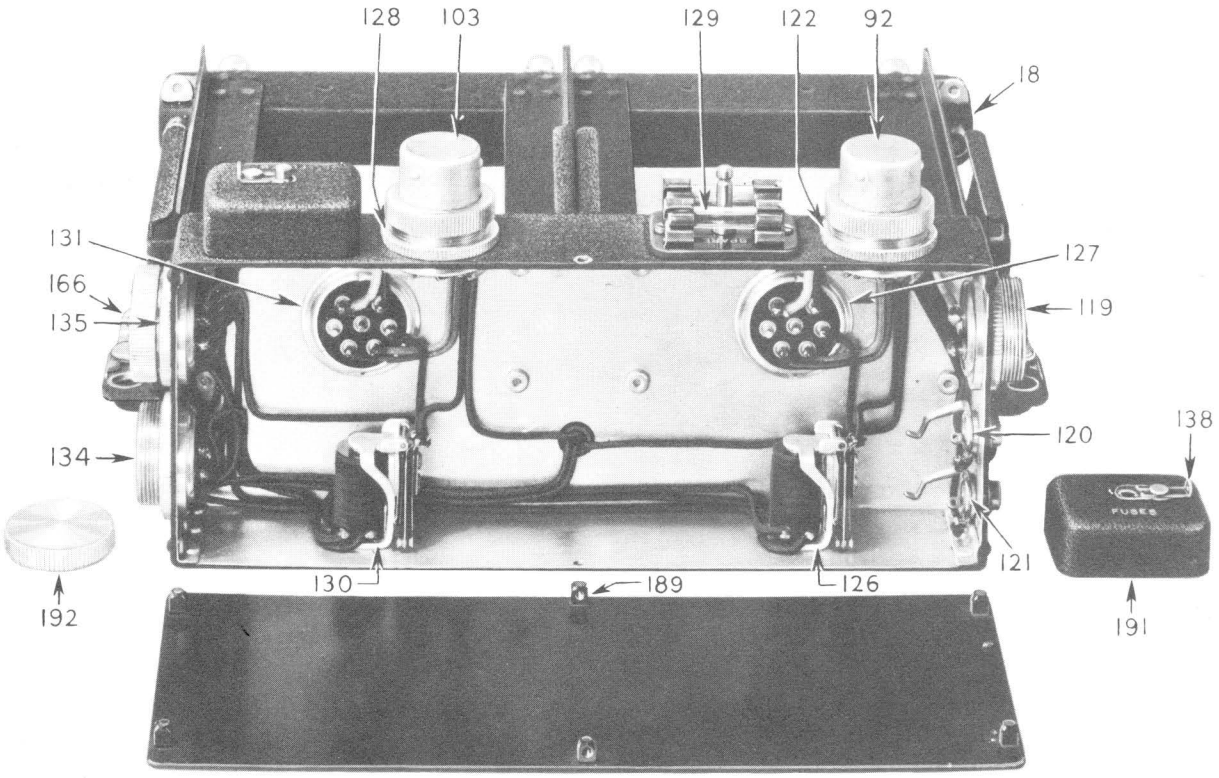


FIG. 7—TYPE CBY-46096 RECEIVER RACK, REAR VIEW, WITH REAR COVER REMOVED

addition to the receptacles necessary for interconnecting the several units of the equipment, the rack includes two relays 126 and 130 and a pair of telephone jacks 120 and 121. The relays are designed to be operated simultaneously with a transmitter keying relay when connected to a transmitter through cable 136 (Fig. 10), and to connect either the receiver output or transmitter side tone to the headphone circuits. An "A Tel" and a "B Tel" jack are located on the left rear of the rack. These jacks are connected in parallel with the other "ATel" and "B Tel" jacks in the equipment. Fuses 123 and 129 are in the positive battery line to the two receivers. *A wired plug, 103, must be connected to receptacle 128 if the receiver is to be operated locally at the switch panel.* (A similar wired plug must be connected to receptacle 122 if the second receiver is also to be operated locally.) A jumper from terminal 1 to terminal 6 on plug 103 completes the battery circuit up to terminal 1 of the receiver.

TYPE CBY-23154 SWITCH PANEL

The Type CBY-23154 Switch Panel contains a manual gain control resistor 98, a "CW-OFF-MCW" switch 97, and a coupling plug 96. It is connected into receptacle 20 for local control of the receiver into which it is plugged. A photograph of the unit may be seen in Fig. 8. Fig. 10 shows the schematic circuit diagram and Fig. 15 shows the wiring diagram.

TYPE CBY-49109 SWITCH PANEL ADAPTER

The Type CBY-49109 Switch Panel Adapter is shown in Figs. 1 and 8. It is used only when a receiver is to be controlled remotely. Its function is to replace the switch panel and to connect terminals 1 and 2 on coupling receptacle 20.

TYPE CBY-21400 RECEIVER DYNAMOTOR UNIT

The Type CBY-21400 Receiver Dynamotor Unit is shown in Figs. 1 and 4. A schematic circuit diagram and a photograph of the component parts may be seen in Figs. 10 and 9. The dynamotor generates the high-voltage direct current only for the receiver to which it is attached. Each receiver is therefore independent of the other, but in an emergency, due to failure of one dynamotor, the other may be substituted in its place. Coupling plug 178 on the dynamotor is designed to be loose, so that motion of the dynamotor relative to the receiver will not place an undue strain on the pin plugs of the receiver coupling receptacle 93. Bumper studs on the dynamotor mounting plate

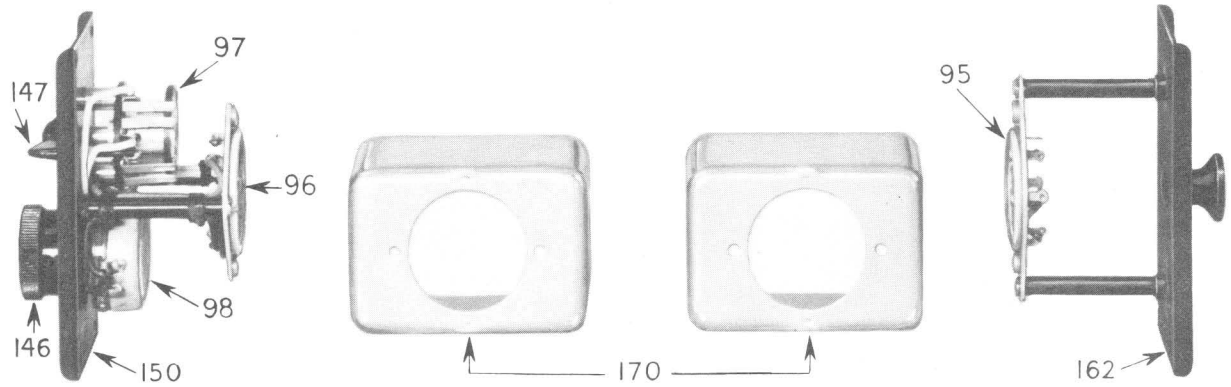


FIG. 8—TYPE CBY-23154 SWITCH PANEL AND TYPE CBY-49109 SWITCH PANEL ADAPTER

and chassis act as shock "limiters", and also prevent damage to pin plugs on the receiver coupling receptacle due to improper insertion of the dynamotor.

A capacitor 140 across the motor brush terminals, acts as an RF filter. The high voltage audio filter is a part of the receiver unit (see choke 76 and capacitors 94B and 77 in Fig. 10).

DYNAMOTOR RATING

Input	*Output*
14.0 volts dc	250 volts dc
2.2 amperes	0.06 amperes

II. INSTALLATION

GENERAL

Fig. 12 shows the dimensions and weights of the several units comprising the equipment. Fig. 11 shows the cabling of all units of the equipment for local and for remote control installations. As may be seen from this diagram, the following units are required for *local control* operation: 2 dynamotors, 2 receivers, 2 switch panels, 1 mounting, 1 rack, 2 local tuners, 2 wired plugs, and 1 battery cable. For *remote control*, the following units are required: 2 dynamotors, 1 receiver control box, 2 receivers, 1 mounting, 1 rack, 2 switch panel adapters, 1 battery cable, 2 receiver control box cables, and 2 mechanical linkages. For interconnection with a transmitter, a cable, 136, is required for either local or remote control installations. Cable 136 is not essential to the operation of this equipment by itself. In case additional similar receiving equipment is installed in the airplane, a cable similar to 136 (not supplied on this contract) may be used to interconnect the first and second racks, thus eliminating the necessity for an additional transmitter cable, and in addition, connecting the new receivers to the "A Tel" or "B Tel" lines of the first receivers. A battery cable will be required for the second rack, however. This method of connection can be extended to any number of receiver racks.

It is recommended that the equipment be installed for local operation wherever possible, not only to reduce weight and space requirements, but to eliminate the backlash that exists in tuning by mechanical linkage. If local control is not possible, the receiver mounting should be so located as to reduce the length of the mechanical linkages and to require as few bends as possible.

ANTENNA

A single antenna, five feet or longer, and of either the fixed or trailing-wire type, should be connected to the antenna binding posts of both receivers. (Separate antennas *may* be used if for any reason it is desirable). A satisfactory antenna connection may be made to the "Receive" binding post on the antenna relay of the transmitting equipment, thereby making use of the transmitting antenna when the relay is in the "receive" position.

For protection of the receivers from exceptionally strong atmospherics it is recommended that a 1 megohm, 2 watt, carbon resistor be connected between antenna and ground at some convenient point between the antenna binding post on the receiver and where the antenna comes into the airplane. This prevents extremely high voltages from being built up which might damage the antenna series capacitors.

DISPOSITION OF UNITS

If the equipment is to be locally controlled, it should be mounted on a bench in front of the operator where he can easily read the dials and operate the controls on the switch panels. Care should be taken to see that plenty of slack exists in all cables near the point of attachment to the rack. Reduction in shockproofing will result if this precaution is not taken. When the receivers are locally controlled, wired plugs similar to 103 must be plugged into control box outlets 122 and 128. See Figs. 10 and 11.

If the equipment is to be remotely controlled, cables and mechanical linkages must be installed with sufficient slack near the units that the shockproofing is not destroyed. The mechanical linkage should not be bent to a sharper radius than 5 inches. The location of the receiver control box should be such that the calibrated dials may be easily read and the switches and gain controls be accessible.

Make certain that the mechanical linkages connect the receiver and receiver control box having the same frequency range on their direct-calibrated dials, and that the receiver control box cables likewise connect the corresponding units.

A cable, indicated by 136 in Fig. 10, may be used to connect the transmitter side tone and transmit-receive relay into this equipment. The "A Tel" and "B Tel" lines in this cable are not used. Fig. 10 indicates the proper transmitter connections. For installations where side tone and relay operation are not desired, this cable may be omitted.

A patch cable, indicated by 137 in Fig. 10, may be used to link together additional similar racks. Cable 137 is not supplied on this contract. Transmitter side tone, transmit-receive relay, and "A Tel" and "B Tel" lines may be "patched" over to the corresponding outlet on a second similar rack. A battery cable on the second equipment is necessary. Outlets 134 and 135 are alike and corresponding terminals are paralleled.

All cables have a tough outside covering to protect the shielding braid. However, it is recommended that the cable be kept away from sharp metal edges which might chafe through the coating to the shielding. If it appears necessary to violate this precaution, a layer or two of rubber or friction tape should be used at these points as additional protection.

INPUT ALIGNMENT

The final installation adjustment is the alignment of the antenna input circuit for the particular antenna used. The alignment knob 143 is on the lower left front of the receiver and is marked

"Align Input". Both receivers should be connected to the antenna. Turn the receiver on to "CW" and adjust the gain control for maximum gain with the receiver tuned to the high frequency end of the dial. Adjust the alignment knob for maximum background noise. Do the same for the second receiver. The adjustment is not critical but there should be a maximum amount of background noise at some point. If the length of the antenna happens to be near a half wavelength, the noise will be about equal for any setting of this "trimmer". If this situation is encountered, tune to the middle of the receiver dial and repeat the operation.

III. OPERATION

Operation of this equipment involves the use of High Voltages which are dangerous to life. Operating personnel must at all times observe all safety regulations. See safety instructions on page 2 of this book.

LOCAL CONTROL OPERATION

There are two switches, a gain control knob, and a tuning control associated with the operation of each receiver whether operated locally or remotely. In the center (OFF) position of the switch panel switch, all power is off. In the "MCW" position, power is on the vacuum tube heaters and dynamotor. In the "CW" position the same is true, and in addition the CW oscillator is turned on. A three-position toggle switch is mounted on the rack under each receiver. When this switch is thrown to the left to "A Tel", the output of the receiver directly above is connected to "A" telephone line, and when thrown to the right it is connected to the "B" telephone line. When the switch is in the center position, the receiver output is connected to neither line (see Fig. 3). Thus the output of each receiver may be connected to either or neither line by means of these switches.

REMOTE CONTROL OPERATION

To change to remote operation of both receivers, replace the switch panels with the switch panel adapters, remove the wired plugs from the receiver control box outlets on the rack, connect the control box and rack with two cables as shown in Fig. 11, and set the toggle switches on the rack to the center position, and replace the local tuning controls with the mechanical linkages. At this time, the precautions as to cable, dial, and linkage correspondence under "Disposition of Units" should be observed, and the dial settings at the remote control box established, as described above under "Receiver Control Box". The lever switch marked "A-B" associated with each receiver, now performs exactly the same switching function between "A Tel" and "B Tel" that the toggle switch on the rack did for local control (*but the rack toggle switches must be in the center position*). The gain control and "CW-OFF-MCW" switches operate as indicated above for local control operation.

The design of the receivers is such that under "stand by" conditions the gain control may be left in the maximum gain position without fear of losing a signal from a nearby transmitter in the same squadron. This is due to the automatic gain control action on the RF and first IF amplifiers which prevents RF overload.

The RF oscillator of the 13.5-20 MC receiver oscillates at a frequency 4.2 MC higher than the indicated frequency on the dial, so that in tuning from 13.5-20 MC, the RF oscillator is tuned from 17.7 to 24.2 MC. If the 20-27 MC receiver is operating on "CW" in the region of 20-24.2 MC, a beat note will be heard caused by the first receiver. If such an interference should occur, a slight retuning of the first receiver will eliminate the difficulty.

The output from an RU receiver may be plugged into any "A Tel" or "B Tel" jack in either local or remote controlled installations. In this way the RU receiver may be paralleled with one or two of the receivers in this equipment, or it may be alone on either line.

IV. MAINTENANCE

INSPECTION BEFORE EACH FLIGHT

An aural check on the operation of the receiver can be made by listening (1) to a low pitch tone with the gain control retarded (2) to a slight hissing noise with the controls on CW and at maximum gain. If each receiver responds normally as indicated above, no further test is necessary. If it does not, then an examination of all external circuits and plug connections should be made, followed if necessary, by a check on the tubes and dynamotor. A good set of tubes, and a dynamotor, should be available for a quick substitution test. If the fault appears to be within a receiver, it should be removed and bench tested as outlined below.

GENERAL MAINTENANCE OPERATIONS

A systematic service inspection should be performed on the equipment at approximately sixty day intervals. If an aural check on the operation of the equipment indicates that it is performing normally, this check should include: (1) a microphonic test of all tubes, (2) removal of carbon dust from the dynamotor by use of an air hose, (3) a check on the condition of the brushes and commutators of the dynamotor, (4) a check on dynamotor bearing noise (do not grease bearings oftener than once in about 1000 hours of operation), (5) a check on tightness of all plug locking rings and snapslides.

SERVICING FAULTY RECEIVERS

If an aural check indicates that the equipment is *not* operating properly, *first look for all the simple causes of failure* such as battery voltage, cabling, plug connections, switch positions (including "A Tel", "B Tel" switches), tubes and dynamotors. It is suggested that a standard set of specially marked tubes be kept handy for a quick check. A dynamotor from another receiver known to be operating properly may be used as a dynamotor check. If these simple tests do not reveal the trouble, the receiver should be removed from the rack and bench tested for more serious faults.

Disassembly of such parts as may be required for servicing faulty receivers.

(1) *Receiver from the rack.*

Disconnect the antenna lead from the receiver antenna binding post, remove the mechanical linkage (if present), unscrew the two knurled nuts far enough to allow the lugs to be disengaged from the pointed studs. Slide the receiver out of the rack.

(2) *Cover for bottom of the chassis.*

Remove the fourteen bright screws around the bottom edge of the chassis and front panel.

(3) *RF coil assembly.*

After removing the bottom cover of chassis, as above, remove the two black screws, one at each side of the chassis at approximately the center of the RF coil set assembly, and then lift the coil assembly out squarely so as not to damage the pin plugs.

(4) *Outer receiver shield.*

First unfasten the four dynamotor snapslides and lift out the dynamotor. Remove the eight bright screws, (four rearmost screws along the top edge of the tie strap on each side of the chassis) and slide the outer shield back and off. *This outer shield is not fastened by the three foremost black screws along the top edge of the tie strap on each side of the chassis, nor by the black screws around the outer edge of the front panel.*

(5) *IF coil assemblies and tubes.*

These components may be removed without taking off the outer receiver shield. Each IF coil assembly is secured by two bright screws at its base. Remove these screws and pull the assembly out squarely so as not to damage the pin plugs.

Location of Faults.

One or both of the following methods may be used to locate trouble in the receiver.

(1) After removal of the chassis bottom cover, a systematic measurement of the voltages at each of the tube terminals listed in Table III will determine which of the dc circuits, if any, is defective. This measurement will also check continuity or shorts in the RF and IF plate circuits. If the trouble is not located at the conclusion of the above test, use an ohmmeter to check the continuity of the coils in the grid and plate circuits of all RF and IF circuits by removing IF and RF coil assemblies.

Check the secondary of the output transformer for continuity.

Example: All voltages check closely to those shown in Table III except that 0 voltage is measured at terminal 8 (plate) on the first IF tube. Fault: either the resistor 61 or IF coil 64A is open, probably caused by a short circuit from plate to ground in the first IF tube or by a short in variable capacitor 48 across coil 64A. An ohmmeter check on the coil assembly and resistor will quickly locate the unit or units affected. The cause of breakdown should then be determined and the condition rectified.

(2) A second method of locating faults in the receiver is to measure the microvolts, at each of several points, required to produce 10 milliwatts output. Table IV lists the test points and shows a value of "sensitivity" in microvolts which may be considered normal for each of these points. By

systematically applying the signal generator to the points indicated, the stage in which the fault lies may be quickly determined. Specific instructions follow: *Note the general precautions to observe in the application of Table IV. This table is meant merely as a guide, and departures of 2 to 1 from these figures do not necessarily indicate a fault.*

Equipment required: (1) A standard signal generator which covers the tuning range of the receivers as well as the intermediate frequency of 4.2 megacycles, and which may be modulated 30% at 400 cps., (2) an output meter of the copper oxide rectifier or vacuum tube voltmeter type, (3) a resistor of such value that combined with that of the headphones and the voltage measuring instrument across it, the effective load resistance will be close to 300 ohms, (4) a bench test set, Aircraft Radio Corporation #7369, or equivalent, consisting of necessary cables, meters, jacks, gain control, and power switch. (5) a crystal frequency indicator (or equivalent) for accurately determining test frequencies. (The variable portion of the alignment tuning capacitors in this equipment is so small, that unless the signal generator frequency is precise, it may not be possible to find a resonant point within the range of the aligning capacitor.) The receiver may be connected to this equipment for convenient inspection and adjustment in any position. In lieu of this special equipment, a bench test of a receiver may be made by connecting the battery + to terminal 6 (see Fig. 10) and battery — to the chassis. The headphones, output meter, and load resistor, may be connected to terminal 2 and the chassis. The receiver may then be operated with a switch panel on the front of the receiver.

Order of test. (It is not necessary to remove the outer receiver shield for these tests):

(1) Connect the ground lead from the signal generator output to the receiver chassis.

(2) Connect the other lead from the signal generator output direct to the antenna binding post. See that the lengths of both leads from the signal generator are no greater than necessary (less than one foot) and that these leads are kept close together.

(3) Set the signal generator modulation to 30% at 400 cps, set the signal generator microvolts to 200, set the receiver indicated frequency to the lowest calibrated value, switch to MCW position, turn the gain control to maximum, and vary signal generator frequency through the indicated receiver frequency and far enough on either side to avoid errors in signal generator frequency calibration. Use head telephones in the receiver output circuit. If a 400 cycle output is heard, retune the receiver to the highest calibrated frequency (20 or 27 MC) and retune the signal generator through this frequency. Keeping the signal generator output microvolts adjusted to produce not more than 10 milliwatts output, tune the signal generator and "align input" knob, 143, to produce maximum output. If not more than twice the number of microvolts listed in Table IV is now required to produce 10 milliwatts output, the receiver sensitivity is not abnormally low, and any serious defect apparent in MCW operation must be found elsewhere. If the MCW sensitivity is satisfactory as indicated above, check the CW position, and consider the CW sensitivity satisfactory if not more than one half the MCW microvolts is required on CW to produce a maximum beat audio output of 10 milliwatts.

(4) If the receiver sensitivity on MCW is abnormally low, measured at the antenna post, determine whether the fault lies ahead of, within, or following the "mixer" stage, by checking the sensitivity at the mixer grid (top cap of type 12K8 tube).

(5) Set the signal generator modulation to 30% at 400 cps, and tune its frequency through the indicated receiver frequency as before. If not more than twice the microvolts indicated in Table IV is required for 10 milliwatts output, the fault lies between the antenna binding post and the output of the RF amplifier stage. If three or four times the number of microvolts indicated in the table is required in this RF test, change the signal generator frequency to 4.2 MC and vary its frequency and output level progressively to obtain a maximum output of 10 milliwatts. If the normal number of microvolts is now required, the fault lies in the oscillator tube elements, or oscillator circuit of the mixer stage.

(6) Check the mixer tube voltages, and if these are normal, replace the mixer tube with one known to be operative.

(7) If considerably more than the normal microvolts at 4.2 MC on the mixer grid is required, the fault lies further along the amplifier including, or in, the mixer tube elements not used for oscillation.

(8) Continue with the signal generator sensitivity checks at 4.2 MC on the control grid of the first IF tube. Wrap a wire around the control grid terminal, (fourth terminal clockwise from the locating pin as viewed from the bottom) for connection to the signal generator.

(9) If this check still shows faulty sensitivity, repeat the measurement in a similar manner on the control grid of the second IF tube, checking the terminal voltages of the tubes and circuits involved, in order to locate the position of the fault more exactly. Abnormally low sensitivity at the second IF grid indicates trouble between this point and the audio output circuit. The signal generator is not useful beyond the second IF grid.

Using this method, the source of the trouble may be quickly narrowed down. It is then possible to use an ohmmeter to check the components between the tube which was found to give correct sensitivity, and the first one toward the antenna which failed to do so.

(10) After the fault has been removed, recheck the CW operation at 4.2 MC by returning the signal generator to the mixer grid (top cap) to see if less than half the MCW microvolts are there required to produce maximum beat audio output when in the CW receiver position. The signal generator tuning which here produces maximum MCW output should agree closely with that required to produce zero beat on CW.

RECEIVER STAGE AND OSCILLATOR ALIGNMENT:

THIS OPERATION SHOULD NOT BE ATTEMPTED WITHOUT PROPER EQUIPMENT AND AUTHORITY

If the sensitivity of a receiver is found to be low, and the tubes, dynamotor, and circuit elements are normal, it may be necessary to realign ("trim") the several stages. The equipment required for this operation is the same as that indicated above for "location of faults", plus a small metal screwdriver. *Do not attempt to improve the alignment on an outside radio signal unless the alignment is very bad or unless the signal is a continuous tone.* The alignment operation should be performed in the following order:

(1) Set the signal generator to 4.2 MC modulated 30% at 400 cps. The 4.2 MC should be as precise as possible. Use a crystal frequency indicator. The receiver should be operating on "MCW" at maximum position of the gain control.

(2) Connect the signal generator leads to the control grid of the 12K8 mixer tube and to the chassis of the receiver, as described under "Location of Faults". Do not remove the grid cap.

(3) Increase the signal generator input to the smallest amount which will produce an easily readable level in the output meter (say 10 milliwatts).

(4) Tune capacitor 59 for maximum output, using a metal screwdriver inserted in the hole in the top of IF assembly 176. As the output increases, reduce the signal generator input to the amount necessary to keep the output level approximately 10 milliwatts. It should be possible to obtain a *maximum* in each of the following alignment operations, i.e., the output should be a *maximum* at some point on the trimmer other than at the maximum or minimum capacitance points.

(5) Tune capacitor 48 of IF assembly 175 for maximum output using the method of (4).

(6) Tune capacitor 39 of IF assembly 174 for maximum output in a similar manner. If further alignment appears necessary, remove the outer receiver shield 164. (It is necessary that shield 164 be removed in order to gain access to RF amplifier trimmer 17D and to RF oscillator trimmer capacitors 17E and 31).

(7) Switch to "CW" and tune the CW oscillator trimmer capacitor 73 for zero beat. Capacitor 73 may be tuned with a small metal screwdriver through the hole in the right rear side of the chassis.

(8) Next, set the tuning dial of the 13.5-20 MC receiver to 20 MC (or the 20-27 MC receiver to 27 MC) and set the signal generator as accurately as possible to the corresponding frequency. (Use crystal frequency indicator).

(9) With the signal generator lead still attached to the control grid (top) of the mixer tube, tune the RF oscillator shunt trimmer capacitor 17E for maximum output. If two *different capacitance* settings of 17E can be found at which the output is a maximum, be sure to use only the setting corresponding to the higher capacitance. The maximum capacitance position of the rotors of all air trimming capacitors (except auxiliary trimmers under gang capacitor shield) in the equipment is obtained when the top of the "cross" or "arrow" on the rotor shaft is lined up with the fixed fiducial mark on the dust shield, IF can, or chassis. Turning the rotor 180° in either direction reduces the capacitance to a minimum.

(10) Next, connect the signal generator to the antenna post, and leaving its frequency and the receiver dial setting unchanged, align the RF amplifier trimmer 17D, and the antenna input ("align input" knob).

(11) Next, tune the 13.5-20 MC receiver to 13.8 MC (or the 20-27 MC receiver to 20 MC) and the signal generator to the corresponding frequency.

(12) Tune the RF oscillator series trimmer capacitor 31 for the maximum output which can be obtained by tuning the receiver slowly back and forth between trial settings of trimmer 31.

(13) Return the signal generator and receiver to the settings indicated in (8) above and repeat the tuning adjustment of (9). If appreciable retuning is here necessary repeat procedure (12), then (8) and (9) until no more improvements are obtained.

Auxiliary aligning capacitors 17F and 17G are in parallel with aligning capacitors 17D and 17E. 17F and 17G may be tuned only after removal of the gang capacitor shield. These are adjusted at the factory either to maximum of half capacity, depending on the receiver and the capacitor, and should not be altered subsequently. The correct settings follow:

	17F (Mixer Input)	*17G (RF Oscillator)*
13.5–20 MC.....	Half	Max.
20–27 MC.....	Half	Half

Anyone charged with servicing of the equipment should make it a point to learn the plate,

screen, and cathode voltages to be expected at the terminals of the several tubes. He should be able to identify on sight each RF and IF coil assembly, the function of the several tubes, the sections of the gang capacitor, and the several terminals of each tube. The above knowledge, plus a systematic approach, will expedite trouble shooting.

Again,—LOOK FOR THE SIMPLE CAUSES OF FAILURE FIRST.

TABLE II

ELECTRICAL CHARACTERISTICS AND TERMINATIONS OF RECEIVER VACUUM TUBES.

Type	*12SK7*	*12K8*	*12SR7*	*12A6*
Heater voltage	12.6 v	12.6 v	12.6 v	12.6 v
Heater current	.15 a	.15 a	.15 a	.15 a
Control grid voltage	−3 v	−3 v	−9 v	−12.5 v
Plate voltage	250 v	250 v	250 v	250 v
Screen grid voltage	100 v	100 v	..	250 v
Plate current	9.2 ma	2.5 ma	9.5 ma	30 ma
Screen grid current	2.4 ma	6.0 ma	..	4.0 ma
Oscillator plate voltage (12K8)	..	100 v	..	..
Oscillator plate current (12K8)	..	3.8 ma	..	..
Cathode current	11.6 ma	12.5 ma	9.5 ma	34 ma
Conversion conductance	..	350 micromhos	..	..
Transconductance	2000 micromhos	(hexode) 570 micromhos (triode) 3000 micromhos	1900 micromhos	3000 micromhos
Plate resistance	0.8 megohm	(hexode) 0.6 megohm (triode) 8300 ohms	8500 ohms	50000 ohms
Amplification factor	1600	(hexode) 342 (triode) 24.9	16	150
Output load resistance	..	..	..	7500 ohms
Power output	..	..	..	2.5 watts (10% total harmonic distortion)
*Base Connections	#1 Shell (S)	Shell (S)	Shell (S)	Shell (S)
	#2 Heater (H)	Heater (H)	Control grid (G)	Heater (H)
	#3 Suppressor grid (Su)	Plate (hexode) (P)	Cathode (K)	Plate (P)
	#4 Control grid (G)	Screen grid (hexode) (Gs)	Diode plate (2) (Dp2)	Screen grid (Gs)
	#5 Cathode (K)	Control grid (osc) and grid #1 hexode (Go)	Diode plate (1) (Dp1)	Control grid (G)
	#6 Screen grid (Gs)	Plate (osc) (Po)	Plate (triode) (P)	..
	#7 Heater (H)	Heater (H)	Heater (H)	Heater (H)
	#8 Plate (P)	Cathode (K)	Heater (H)	Cathode (K)
	Top cap	Control grid (hexode) (G)	..	..

* Base connections are numbered clockwise from the locating pin as viewed from the bottom.

TABLE III

VACUUM TUBE TERMINAL VOLTAGES

Normal dc voltages between each of the tube socket terminals and the chassis. Input voltage 14.0. Receiver in the "CW," maximum gain condition. Variations of as much as ±10% from the following values may be obtained due to differences in tubes, resistors, dynamotors, and measuring equipment. Some terminals are accessible only with a bent voltmeter prod. Reference to the wiring diagram, Fig. 13 or Fig. 14, will indicate more accessible points which connect directly to these terminals.

Tube	*RF* *12SK7*	*Mixer* *12K8*	*First IF* *12SK7*	*Second IF* *12SK7*	*Detector-CW Osc.* *12SR7*	*Audio Amp.* *12A6*
*Base Connection #1	0	0	0	0	0	0
*Base Connection #2	0	0	0	0	**No test	13.4
*Base Connection #3	4.0	227	4.4	3.0	0	230
*Base Connection #4	0	85	0	0	0	229
*Base Connection #5	4.0	**No test	4.4	3.0	0	0
*Base Connection #6	87	40	87	85	..	..
*Base Connection #7	13.4	13.4	13.4	13.4	13.4	0
*Base Connection #8	227	4.0	227	227	0	16.7
Top Cap	..	0	..	..	..	..

*Base connections are numbered clockwise from the locating pin as viewed from the bottom.
**Under oscillating conditions a small dc voltage exists between these terminals and ground, but the application of voltmeter leads may stop oscillations, resulting in unreliable voltmeter readings.

TABLE IV

SENSITIVITY

Microvolts, modulated 30 percent at 400 cps, required to produce 10 milliwatts, (1.74 volts) into 300 ohms resistive load, is shown for six points in each of the two receivers operating independently. The frequencies at which the measurements must be made are in parentheses. Input voltage, 14.

	13.5–20 MC Receiver	*20–27 MC Receiver*
Terminal #4 (control grid) of Second IF amp	90,000 microvolts (4.2 MC)	90,000 microvolts (4.2 MC)
Terminal #4 (control grid) of Firsst IF amp	4,000 microvolts (4.2 MC)	4,000 microvolts (4.2 MC)
Top cap (control grid) of Mixer	1,200 microvolts (4.2 MC)	1,200 microvolts (4.2 MC)
Top cap (control grid) of Mixer	1,100 (20 MC)	1,000 (27 MC)
Terminal #4 (control grid) of RF amp	250 (20 MC)	200 (27 MC)
Antenna Post	25 (20 MC)	20 (27 MC)

The above table of sensitivities is presented for use as a guide in servicing the receiver units. It applies to undamaged and perfectly-aligned receivers, under reasonable climatic conditions. These values are to be regarded as "desired," to be obtained if possible when adjusting the equipment after overhaul or long service use. Departures from these values are not necessarily cause for major operations on the equipment, and they should be employed with caution and discretion, particularly in the case of measurements carried out under extreme conditions of temperature or humidity, or with a signal generator whose accuracy is not definitely known.

TABLE V
RESISTOR COLOR CODE

Small composition resistors are color coded by one of two methods to indicate the resistance in ohms. The first method is as follows: first digit by body color, second digit by tip color, the number of zeros after the second digit by a dot painted on the body. The second method is as follows: three narrow rings are painted around the body, starting at one end. The color of the end ring represents the first digit, the second ring the second digit, and the third ring the number of zeros after the second digit. A fourth ring represents the tolerance, ±5% by gold and ±10% by silver. The body color represents the power rating, black for ¼ watt and brown for ½ watt.

0—Black	3—Orange	7—Violet
1—Brown	4—Yellow	8—Gray
2—Red	5—Green	9—White
	6—Blue	

EXAMPLE: 350,000 ohms. First method: body orange, tip green, dot yellow. Second method: orange, green and yellow rings, starting at one end. If the second method were used and the body were brown and the fourth ring silver, it would indicate a ½-watt resistor of ±10% tolerance from nominal.

See table below for nominal and acceptable operating limits for all composition resistors used in this equipment.

TABLE VI
CAPACITOR COLOR CODE

Fixed-capacitance molded mica capacitors, which are too small to be conveniently marked with capacitance values, are color coded by the use of three dots. Colors represent the same numbers as listed above for resistors. Reading from left to right in the direction of the arrow, the micromicrofarads capacitance is indicated by the following: first color, first digit; second color, second digit; third color the number of zeros after the second digit.

EXAMPLE: 350 micromicrofarads (0.00035 mfd.) would have an orange dot, a green dot, and a brown dot, reading from left to right.

TABLE VII
EQUIPMENT OPERATING RESISTANCE TOLERANCE FOR COMPOSITION RESISTORS

Symbol No.	*ARC Type No.*	*Nominal Resistance*	*Equipment* Operating Resistance Tolerance*
19, 27, 40	6004	620 ohms	±20%
21	4439	2 megohms	±30%
29	4569	0.051 megohm	±20%
38, 54, 68, 83	4501	0.1 megohm	±20%
41, 46, 61	4497	200 ohms	±20%
52	4502	0.2 megohm	±30%
57	6006	390 ohms	±20%
72	6001	5100 ohms	±30%
81A, 81B	4569	0.051 megohm	±20%
82	4570	0.51 megohm	±20%
85	4503	2 megohms	±30%
86	4506	1500 ohms	±20%

*Equipment is still satisfactorily operable if resistance is within these limits.

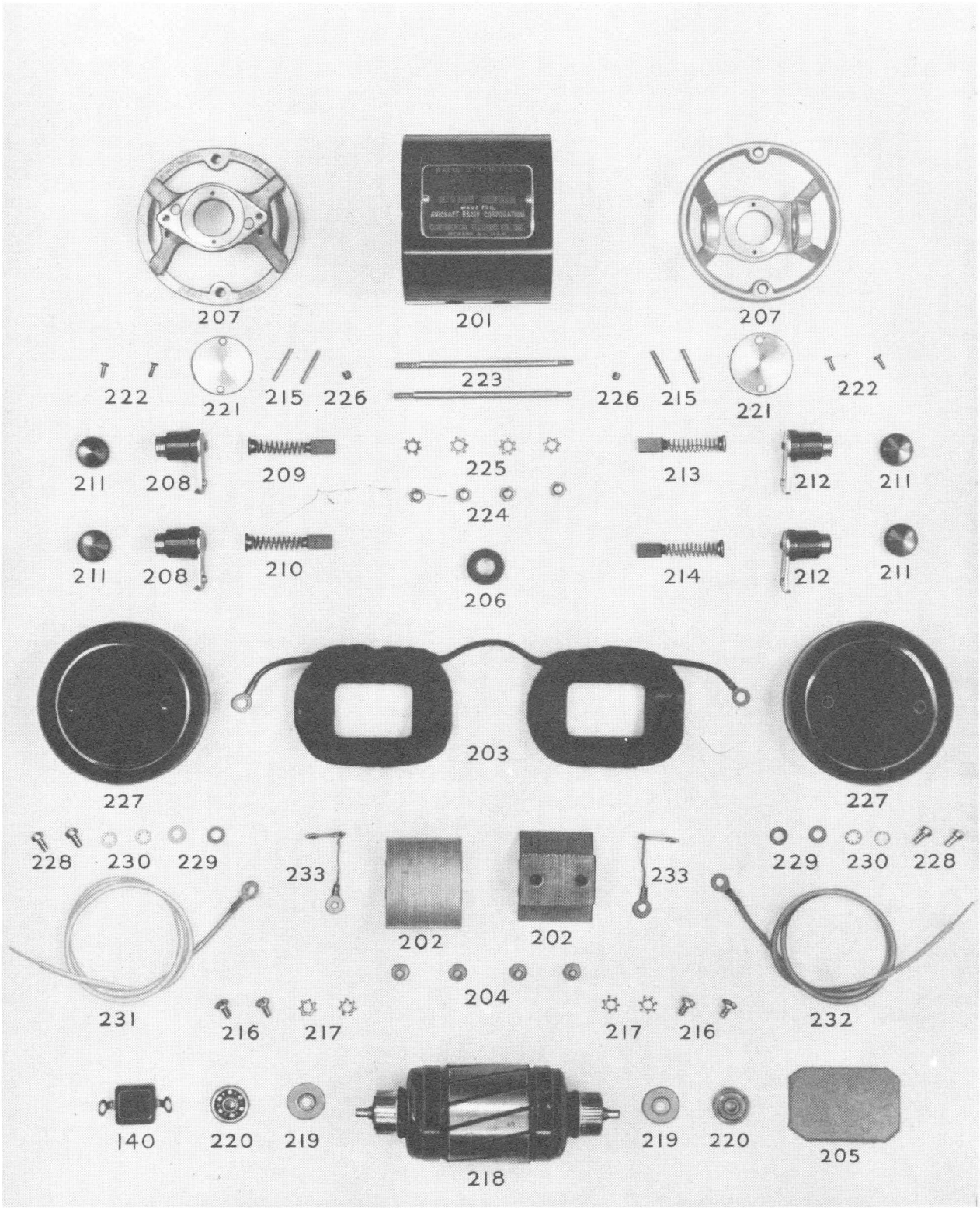


FIG. 9—PARTS OF DYNAMOTOR FOR TYPE CBY-21400 RECEIVER DYNAMOTOR UNIT

TABLE VIII

PARTS LIST BY SYMBOL DESIGNATION

Parts of Type CBY-46083 and CBY-46084 Receiver Units

Symbol	*Function*	*Description*	*Navy Type*	*Mfr.*	*Mfr's. Desig.*	*Dwg. and Part No.*
10	Input voltage limiter	Neon lamp		GE	T2 modified	5913
11	Antenna coupling	Capacitor, approximately 6.5 mmfd., fixed, mica		A		5603
12		Antenna binding post		A		4667
13	Tuning inductor	Input tuning coil, part of assembly 189				
14	Input alignment	Capacitor, variable, air, $\triangle$C approximately 15 mmfd.		A		5676
15	Osc. tube drift compensator	Capacitor, compensator, 3 mmfd. $\pm\frac{1}{2}$ mmfd., temp. coefficient, minus 0.00075 mmfd. per mmfd. per degree Centigrade, $\pm 15\%$		C	807	7020
16	RF amp. grid blocking	Capacitor, 0.0001 mfd. $\pm 5\%$, 400 volts, mica	48674-5	CD	5	4520
17	Tuning capacitor	Gang capacitor assembly, including parts 17A to 17G inclusive:				
		For Receiver Unit Type CBY-46083		A		6558
		For Receiver Unit Type CBY-46084		A		4609
19	First RF cathode auto bias	Resistor, 620 ohms $\pm 10\%$, $\frac{1}{4}$ watt	63433	AB	E	6004
20		Receptacle assembly, 8 circuit (to switch panel or switch panel adapter)		A		4724
21	RF amp. grid resistor	Resistor, 2 megohms $\pm 10\%$, $\frac{1}{3}$ watt		IRC	F $\frac{1}{3}$	4439
22	RF amp.	12SK7 triple grid, super-control RF amp. vacuum tube	12SK7	HS	12SK7	
23	RF transformer	RF amplifier transformer, part of RF coil assembly 189				
24A	Mixer plate by-pass	Capacitor, 0.05 mfd. $\pm 15\%$, 300 volts, paper (0.05/0.05/0.05 mfd.)		A		5414
24B	Gain control line by-pass	Same as 24A				
24C	First RF cathode by-pass	Same as 24A				
27	Mixer cathode resistor	Same as 19				
28		Grid clip			A	4754
29	RF oscillator grid resistor	Resistor, 0.051 megohm $\pm 10\%$, $\frac{1}{4}$ watt, part of assembly 189	63433	AB	E	4569
30	Mixer tube	12K8 triode-hexode, "mixer" vacuum tube	12K8	RCA	12K8	
31	Osc. series trimmer	Capacitor, variable, air, $\triangle$C approximately 40 mmfd.		A		3865
32	RF osc. grid blocking	Capacitor, 0.0002 mfd. $\pm 5\%$, 400 volts, mica	48675-5	CD	5	4513
33	RF osc.	RF oscillator coil, part of RF coil assembly 189				
34	RF osc. series	Capacitor, fixed, 400 volts, mica:				
		For Receiver Unit Type CBY-46083 340$\pm$5 mmfd.		A		6701
		For Receiver Unit Type CBY-46084 300$\pm$5 mmfd.		A		6701
35A	Mixer screen by-pass	Same as 24A				
35B	Mixer cathode by-pass	Same as 24A				
35C	AGC line by-pass	Same as 24A				
38	RF osc. plate decoupling	Resistor, 0.1 megohm $\pm 10\%$, $\frac{1}{4}$ watt, part of assembly 189		AB	E	4501
39	First IF trimmer	Capacitor, variable, air, $\triangle$C approximately 17 mmfd., part of assembly 174				
40	First IF cathode auto bias	Same as 19				
41	Mixer plate decoupling	Resistor, 200 ohms $\pm 10\%$, $\frac{1}{4}$ watt	63433	AB	E	4497
42	Fixed capacitance part of first IF tuning	Capacitor, 180$\pm$2.5 mmfd., 400 volts, mica, part of assembly 174		A		5145
43	First IF coil assembly	Coil assembly, part of assembly 174. "a" is plate and "b" is grid winding.		A		6168
44	Stage coupling	Capacitor, 170$\pm$20 mmfd., 400 volts, mica, part of assembly 174		A		5145
45	First IF amplifier	Same as 22				
46	RF amp. and mixer screen decoupling	Same as 41				
47		Typical RF coil receptacle assembly		A		4722
48	Second IF trimmer	Same as 39, but part of assembly 175				

TABLE VIII—PARTS LIST BY SYMBOL DESIGNATION—Continued
Parts of Type CBY-46083 and CBY-46084 Receiver Units—Continued

Symbol	*Function*	*Description*	*Navy Type*	*Mfr.*	*Mfr's. Desig.*	*Dwg. and Part No.*
49	Fixed capacitance part of second IF tuning	Same as 42, but part of assembly 175				
50	Stage coupling	Same as 44, but part of assembly 175				
51	Second IF coil assembly	Same as 43, but part of assembly 175				
52	Connects high voltage to gain control resistor	Resistor, 0.2 megohm ±10%, ¼ watt	63433	AB	E	4502
54	AGC resistor	Resistor, 0.1 megohm ±10%, ¼ watt	63433	AB	E	4501
55A	Second IF amp. cathode by-pass	Capacitor, 0.05 mfd. ±15%, 300 volts, paper (0.05/0.01/0.05 mfd.)		A		5415
55B	Output filter	Capacitor, 0.01 mfd. ±15%, 300 volts, paper (0.05/0.01/0.05 mfd.), part of same assembly as 55A		A		5415
55C	Second IF amp. plate by-pass	Same as 55A				
56	CW osc. coupling	Capacitor, formed by proximity of CW osc. plate lead and lead to second IF control grid				
57	Second IF catnode auto bias	Resistor, 390 ohms ±10%, ¼ watt	63433	AB	E	6006
58	Second IF amplifier	Same as 22				
59	Third IF trimmer	Same as 39, but part of assembly 176				
61	Second IF plate decoupling	Same as 41				
62	Fixed capacitance part of third IF tuning	Same as 42, but part of assembly 176				
63	Stage coupling	Same as 44, but part of assembly 176				
64	Third IF coil assembly	Same as 43, but part of assembly 176				
65	Diode series resistor by-pass	Same as 32				
66	Detector and CW oscillator	Duodiode-triode vacuum tube	12SR7	HS	12SR7	
67	CW osc. grid blocking	Capacitor, 0.0001 mfd. ±5%, 400 volts, mica	48674	CD	5	4520
68	CW osc. grid resistor	Same as 54				
69	CW osc. grid and plate inductors	Coil, part of CW oscillator assembly 188. "a" is grid and "b" is plate winding				
70	Fixed capacitance part of CW osc. tuning	Capacitor, 180±2.5 mmfd., 400 volts, mica, part of CW oscillator assembly 188		A		5145
71	CW osc. plate by-pass	Capacitor, 0.001 mfd. ±5%, 400 volts, mica, part of CW oscillator assembly 188		CD	5	4157
72	CW osc. plate dropping and decoupling	Resistor, 5100 ohms ±10%, ¼ watt	63433	AB	E	6001
73	CW osc. trimmer	Capacitor, variable, air, △C approximately 17 mmfd., part of CW oscillator assembly 188				
74A	First IF cathode by-pass	Same as 24A				
74B	Not used	Same as 24A				
74C	CW osc. plate filter	Same as 24A				
76	Audio filter choke	Choke, approximately 3H with .05 ampere dc, dc resistance 325 ohms ±15%		A		5634
77	Audio filter capacitor	Capacitor, 5 mfd. −30% +80%, 300 volts, electrolytic		A		6350
78A	High voltage bleeder	Resistor, 7000 ohms ±2%, wire wound, 7 watts		WL		5895
78B	Same as 78A	Same as 78A				
79	RF choke	Choke, 112 microhenries ±5%, dc resistance 0.13 ohm ±10%		A		5546
80	Coupling receiver to rack	Coupling plug, 7 circuit (to rack)		A		5488
81A	CW osc. plate dropping	Resistor, 0.051 megohm ±10%, ¼ watt	63433	AB	E	4569
81B	Same as 81A	Same as 81A				
82	Diode series resistor	Resistor, 0.51 megohm ±10%, ¼ watt	63433	AB	E	4570
83	RF decoupling	Same as 54				
84	Audio coupling	Capacitor, 0.006 mfd. ±5%, 400 volts, mica	48672	AV	1461	4091
85	Grid resistor	Resistor, 2 megohms ±10%, ¼ watt	63433	AB	E	4503
86	Audio amp. cathode auto bias	Resistor, 1500 ohms ±10%, ¼ watt	63433	AB	E	4506
87	Audio amp. cathode by-pass	Capacitor, 15 mfd. −0%, +200%, 35 volts, electrolytic		A		5416
88	Audio amp.	Audio amplifier "beam" power vacuum tube	12A6	HS	12A6	

TABLE VIII—PARTS LIST BY SYMBOL DESIGNATION—Continued
Parts of Type CBY-46083 and CBY-46084 Receiver—Continued

Symbol	*Function*	*Description*	*Navy Type*	*Mfr.*	*Mfr's. Desig.*	*Dwg. and Part No.*
89	Output voltage limiter	Same as 10				
90	Output filter capacitor	Capacitor, 0.001 mfd. ±5%, 400 volts, mica	48695	AV	1461	4114
91	Output transformer	Transformer, turns ratio 8 to 1, primary resistance 1000 ±15%, secondary resistance 16 ohms ±15%		A		5631
93		Coupling receptacle, three circuit (to dynamotor)		A		4718
94A	Second IF screen by-pass	Capacitor, 0.22 mfd. ±20%, 300 volts, paper (0.22/0.22/0.22 mfd.)		A		5413
94B	Dynamotor high voltage filter	Same as 94A				
94C	Dynamotor low voltage filter	Same as 94A				
100		Switch case		A		5691
143	Input alignment control	Knob		A		4713
148	Local tuning control	Knob		A		6743
149	Frequency indicator	Dial:				
		For Type CBY-46083 Receiver Unit		A		5616
		For Type CBY-46084 Receiver Unit		A		6345
151	Covers tubes and IF coil assemblies	Cover		A		6266
164	Covers tubes, IF coil assemblies, and gang capacitor	Shield		A		6276
167		Snapslide		A		3888
		Other parts of the mechanism include:				
		Snapslide guide (on cover)		A		3887
		Snapslide button (on cover)		A		3890
		Snapslide stud (on shield)		A		4708
		Washers (on cover)		A		3889
171		Pin plug (on dynamotor receptacle assembly)		A		3995
173	Covers gang capacitor	Shield		A		5738
174		First IF coupling unit assembly		A		6165
175		Second IF coupling unit assembly		A		6169
176		Third IF coupling unit assembly		A		6172
177		Screw cap (part of assemblies 174, 175, 176)		A		4664
181		Bumper stud (on chassis)		A		5480
183		Shock absorber assembly (for dynamotor)		A		4681
184		Mounting plate		A		4638
185		Mounting plate		A		5220
186		Same as 184				
187		Typical IF coupling unit receptacle assembly		A		4723
188		CW oscillator assembly, 4.2 megacycles		A		5857
189		RF coil set assembly:				
		For Type CBY-46083 Receiver Unit		A		6248
		For Type CBY-46084 Receiver Unit		A		6175
190		Typical resistor panel assembly		A		5452
191		Cover (under side of chassis)		A		5508
193		Typical socket (does not include bakelite washer 6566). (Make replacements with socket 6559 made of Micanol instead of Steatite)		AMPH		6559
195		Bakelite washer for use with socket 6559		A		6566
235		Conical stud for receiver locking		A		4710

TABLE VIII—PARTS LIST BY SYMBOL DESIGNATION—Continued

Parts of Type CBY-21400 Receiver Dynamotor Unit

Symbol	*Function*	*Description*	*Navy Type*	*Mfr.*	*Mfr's. Desig.*	*Dwg. and Part No.*
140	RF filter	Capacitor, 0.001 mfd. ±5%, 400 volts, mica		AV	1465	4251
141		Receiver Dynamotor Unit	21400	A		
168		Snapslide		A	5206	2540
		Other parts of the mechanism include:				
		Snapslide guide		A		4750
		Snapslide button		A		5172
		Washer		A		5171
178		Coupling plug, 3 circuit (to receiver)		A		5211
179		Bumper stud (on dynamotor base)		A		5219
180		Mounting base assembly (including casting)		A		5722
The following dynamotor parts are manufactured by Continental Electric Company, Newark, New Jersey.						
200		Dynamotor		CE	Type DM-310 Assembly 25926-WS6328	5324
201		Frame		CE	22944	
202		Pole, field		CE	21667	
203		Coil, field		CE	21668-WS6328	
204		Screw, pole		CE	25926-17	
205		Guard, wire		CE	12077	
206		Grommet		CE	25926-18	
207		Bearing bracket, L. V. and H. V.		CE	26201	
208		Brush holder, L. V.		CE	23610-1-X	
209		Brush assembly, L. V. (+)		CE	23609-3(+)	
210		Brush assembly, L. V. (−) (209 and 210 are alike except for the + and − marking)		CE	23609-3(−)	
211		Screw cap brush holder, L. V. and H. V.		CE	23607-2	
212		Brush holder, H. V.		CE	23610-2-X	
213		Brush assembly, H. V. (+)		CE	23609-4(+)	
214		Brush assembly, H. V. (−) (213 and 214 are alike except for the + and − marking)		CE	23609-4(−)	
215		Lock pin, brush holder, L. V. and H. V.		CE	25926-19	
216		Screw, connecting L. V. and H. V.		CE	25926-20	
217		Lock washer, connecting screw		CE	25926-21	
218		Armature		CE	27829-WS6328	
219		Grease slinger		CE	21666	
220		Ball bearing assembly		CE	25926-10	
221		Cover plate		CE	26207	
222		Screw, bearing cover		CE	25926-23	
223		Tie rod		CE	25926-13	
224		Nut, tie rod		CE	25926-24	
225		Lock washer, tie rod		CE	25926-25	
226		Dowel, bracket locking		CE	25926-26	
227		Cover, enclosing		CE	19964-1	
228		Screw, cover holding		CE	25926-14	
229		Plain washer, cover screw		CE	25926-27	
230		Lock washer, cover screw		CE	25926-28	
231		Connecting lead and terminal, L. V. (+) (#20 gauge, white)		CE	25926-31	
232		Connecting lead and terminal, H. V. (+) (#20 gauge, red)		CE	25926-32	
233		Ground lead and terminals, L. V. (−) and H. V. (−) (#20 gauge, bare)		CE	25926-33	

Parts of Type CBY-23154 Switch Panel

96		Coupling plug, 8 circuit, (to receiver)		A		3929
97	CW-OFF-MCW Switch	Switch, rotary		A		6536
98	Gain control	Resistor, variable, 50,000 ohms max., ±20%		AB	J	6310
146		Gain control knob		A		6749
147		Lever, for "CW-OFF-MCW" switch		A		3912
150		Switch panel	23154	A		6434
170		Switch panel cover		A		5199

Parts of Type CBY-49109 Switch Panel Adapter

95		Coupling plug, 8 circuit (to receiver)		A		3929
162		Switch panel adapter	49109	A		6433
170		Switch panel adapter cover		A		5199

TABLE VIII—PARTS LIST BY SYMBOL DESIGNATION—Continued

Parts of Type CBY-23155 Receiver Control Box

Symbol	*Function*	*Description*	*Navy Type*	*Mfr.*	*Mfr's. Desig.*	*Dwg. and Part No.*
106		Coupling receptacle, 8 circuit (to control box cable)		A		6418
107		Same as 106				
108		Same as 97 in switch panel				
109	"A Tel, B Tel" switching	Switch, rotary		A		6540
110		Same as 97 in switch panel				
111		Same as 109				
112		Same as 98 in switch panel				
113		Same as 98 in switch panel				
114		Headset jack		A		4691
115		Same as 114				
116		Same as 114				
117		Same as 114				
139		Receiver control box mounting		A		6831
146		Gain control knob (same as 146 in switch panel)		A		6749
152		Switch lever		A		5444
153		Same as 152				
154		Dial, 20 to 27 mc		A		6193
155		Dial, 13.5 to 20 mc		A		6056
156		Knob, remote tuning		A		6747
157		Mechanical linkage outlet (part of control box assembly)				
158		Same as 157				
159		Remote tuning gearing unit assembly		A		6550
198		Receiver control box base (with studs and snapslide)		A		6833

Parts of Type CBY-46096 Receiver Rack

18		Ground binding post		A		6067
92		Wired plug		A		6787
103		Same as 92				
119		Coupling receptacle, 2 circuit (to battery cable)		A		6485
120		Headset jack, same as 114 in receiver control box)		A		4691
121		Same as 120				
122		Coupling receptacle, 8 circuit (to control box cable)		A		6418
123		Fuse, 10 amperes		LIT	3AG	4414
124		Same as 120				
125		Same as 120				
126	Side tone—receiver output switching	Relay, 12 volt operation, coil resistance 100 ohms ±10%		A		6318
127		Coupling receptacle, 7 circuit (to receiver)		A		5842
128		Same as 122				
129		Same as 123				
130		Same as 126				
131		Same as 127				
132		Same as 114				
133		Same as 114				
134		Coupling receptacle, 6 circuit (to cable 5808)		A		5577
135		Same as 134				
138		Snapslide (on fuse cover)		A		3888
		Other parts of the mechanism include:				
		Snapslide guide		A		3887
		Snapslide button		A		3890
		Snapslide stud		A		5134
		Washer		A		3889
166		Snapslide (on rack)		A		2540
		Other parts of the mechanism include:				
		Snapslide guide		A		4750
		Snapslide button		A		5172
		Washer		A		5171
189		Rear cover plate		A		6415
191		Fuse cover assembly		A		6414
192		Cap for receptacle 134		A		5319

TABLE VIII—PARTS LIST BY SYMBOL DESIGNATION—Concluded

Parts of Type CBY-46085 Receiver Mounting

Symbol	*Function*	*Description*	*Navy Type*	*Mfr.*	*Mfr's. Desig.*	*Dwg. and Part No.*
36		Absorber assembly, shock		A		5185
37		Mounting frame (less absorber assemblies)		A		5695

Cable and Mechanical Linkage Assemblies

104		Cable assembly, control box to receiver rack, 5 feet, consisting of:		A		6693
		Bulk cable, 5 feet		GC		6711
		Plug assembly (2)		A		6577
		Identification tag		A		6803
105		Same as 104				
118		Cable assembly, battery to receiver rack, 10 feet, consisting of:		A		6694
		Bulk cable, 10 feet		GC		6712
		Plug assembly (1)		A		6578
		Ferrule at battery end		A		6780
		Nut at battery end		A		6781
		Identification tag		A		6804
136		Cable assembly, external equipment to receiver rack, 10 feet, consisting of:		A		5808
		Bulk cable, 10 feet		GC		6794
		Plug assembly (2)		A		6784
		Identification tag		A		6941
137		Same as 136				
140		Mechanical linkage assembly, receiver to receiver control box, 5 feet, consisting of:		A		6151
		Shafting		WT		1174
		Casing		WT		3406
		Sleeves (2)		A		6585
		Nuts (2)		A		1167
		Splines (2)		A		6788
		Identification tag		A		6789

Miscellaneous Parts

		Slip cover (2 receiver)		A		6939
		Bristo set screw wrench #6		A		8021
		Phillips screw driver #1		A		8020
		Tube extractor		A		7489
		Screws apt to be required in servicing the equipment;				
		Binding head, brass, #3–48 x 3/16", nickel plated		AS		4058
		Binding head, brass, #3–48 x 1/8", nickel plated		AS		4134
		Set screw, Bristo, cup pointed, #6–32 x 1/8"		AS		4140
		Binding head, brass, #3–48 x 1/4", nickel plated		AS		4168
		Binding head, brass, #2–56 x 1/8", nickel plated		AS		4378
		Binding head, brass, #4–40 x 1/4" nickel plated		AS		6008
		Phillips, flat head, brass, #3–48 x 3/16", black oxidized		AS		6010
		Phillips, flat head, brass, #3–48 x 5/16", black oxidized		AS		6015
		Binding head, brass, #3–48 x 7/32", black oxidized		AS		6017
		Binding head, brass, #3–48 x 7/16", nickel plated		AS		6018
		Binding head, brass, #4–40 x 3/16", black oxidized		AS		6019
		Binding head, brass, #3–48 x 5/32", black oxidized		AS		6020
		Lock washers apt to be required in servicing the equipment;				
		Shakeproof #1902, for size #2 screw, phosphor bronze, nickel plated		SH	1902	7001
		Shakeproof #1903, for size #3 screw, phosphor bronze, nickel plated		SH	1903	4558
		Shakeproof #1904, for size #4 screw, phosphor bronze, nickel plated		SH	1904	4242

TABLE IX

IDENTIFICATION OF MANUFACTURERS

Code Letters in Table VIII	*Name*
A	Aircraft Radio Corporation, Boonton, N. J.
AB	Allen-Bradley Company, Milwaukee, Wis.
AMPH	American Phenolic Corporation, Chicago, Ill.
AS	American Screw Co., Providence, R. I.
AV	Aerovox Corporation, New Bedford, Mass.
C	Centralab, Milwaukee, Wis.
CD	Cornell-Dubilier Corporation, South Plainfield, N. J.
CE	Continental Electric Company, Newark, N. J.
GC	General Cable Corporation, 205 East 42nd Street, New York, N. Y.
GE	General Electric Vapor Lamp Co., Hoboken, N. J.
HS	Hygrade Sylvania Corporation, Emporium, Pa.
IRC	International Resistance Company, Philadelphia, Pa.
LIT	Littelfuse Laboratories, Chicago, Ill.
RCA	RCA Manufacturing Company, Harrison, N. J.
SH	Shakeproof Lock Washer Co., Chicago, Ill.
WL	Ward Leonard Electric Company, Mount Vernon, N. Y.
WT	Walker-Turner Company, Plainfield, N. J.

TYPE CBY-46083 OR TYPE CBY-46084 RECEIVER UNIT

R F AMP. 12SK7 · MIXER 12K8 · FIRST I F AMP. 12SK7 · SECOND I F AMP. 12SK7 · DET.-C W OSC. 12SR7 · AUDIO AMP. 12A6

TO TRANSMITTER CABLE 5808

3 BLACK (GROUND)
6 WHITE (TRANS. RELAY +)
5 YELLOW (KEY)
1 BLUE (SIDETONE)
2 RED (A TEL)
4 GREEN (B TEL)

PATCH CABLE 5808 NOT SUPPLIED WITH THIS EQUIPMENT

TYPE CBY-49109 SWITCH PANEL ADAPTER

COUPLING PLUG

COUPLING RECEPTACLE FOR SWITCH PANEL (LOCAL CONTROL) OR SWITCH PANEL ADAPTER (REMOTE CONTROL)

COUPLING RECEPTACLE

COUPLING PLUG

TYPE CBY-23154 SWITCH PANEL

GAIN CONTROL

TYPE CBY-21400 RECEIVER DYNAMOTOR UNIT

WIRED PLUG TO REPLACE CABLE PLUG FOR LOCAL CONTROL

THE SECOND RECEIVER UNIT CONNECTS HERE

CABLE 6693

CABLE 6693

B TEL · A TEL

TYPE CBY-46096 RECEIVER RACK

CABLE 6694

PRIMARY SOURCE 11-15 VOLTS

TYPE CBY-23155 RECEIVER CONTROL BOX

GAIN CONTROL · GAIN CONTROL

A TEL · B TEL · A TEL · B TEL

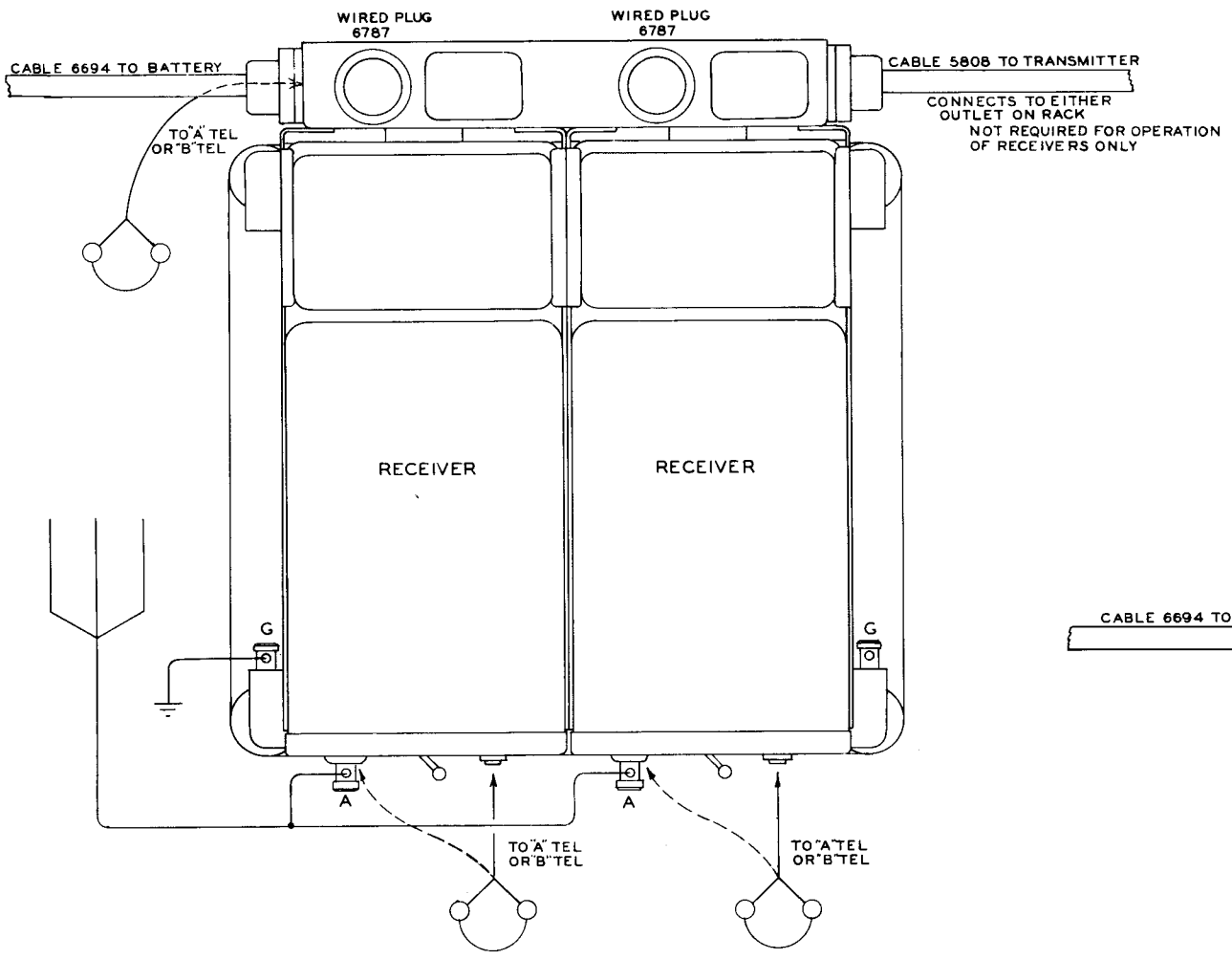
NOTES
1. ALL PLUGS AND RECEPTACLES ARE SHOWN AS VIEWED FROM THE OUTSIDE.
2 EACH RELAY IS SHOWN IN ITS NON-ENERGIZED POSITION.
3 THE SCHEMATIC CIRCUIT DIAGRAMS FOR TYPE CBY-46083 AND TYPE CBY-46084 RECEIVER UNITS ARE THE SAME.

DIAGRAM SCHEMATIC CIRCUIT

AIRCRAFT RADIO CORP | DWN M.E. 8-22-40 | CK. A.W.P. 9-25-40 | APP. H.E. 8-25-40 | DWG NO. 642/3-C

Fig. 10—Schematic Circuit Diagram, Model RAT Equipment

CABLE CONNECTIONS FOR LOCAL CONTROL



NOTES:

BOTH OUTLETS ON THE RIGHT REAR OF THE RACK ARE IDENTICAL AND ARE WIRED IN PARALLEL. ONE OF THESE CONNECTS THE TRANSMITTER SIDETONE AND POWER RELAY CIRCUITS (SEE SCHEMATIC CIRCUIT DIAGRAM) INTO THIS EQUIPMENT. THE OTHER MAY BE USED AS A "PATCH" OUTLET FOR CONNECTION TO THE CORRESPONDING OUTLET IN A SECOND SIMILAR RECEIVER RACK. WHEN THIS IS DONE, THE OUTPUT OF ALL RECEIVERS MAY BE CONNECTED TO EITHER "A" OR "B" TELEPHONE LINES AND NO ADDITIONAL CABLE TO TRANSMITTER IS REQUIRED.

CABLE CONNECTIONS FOR REMOTE CONTROL

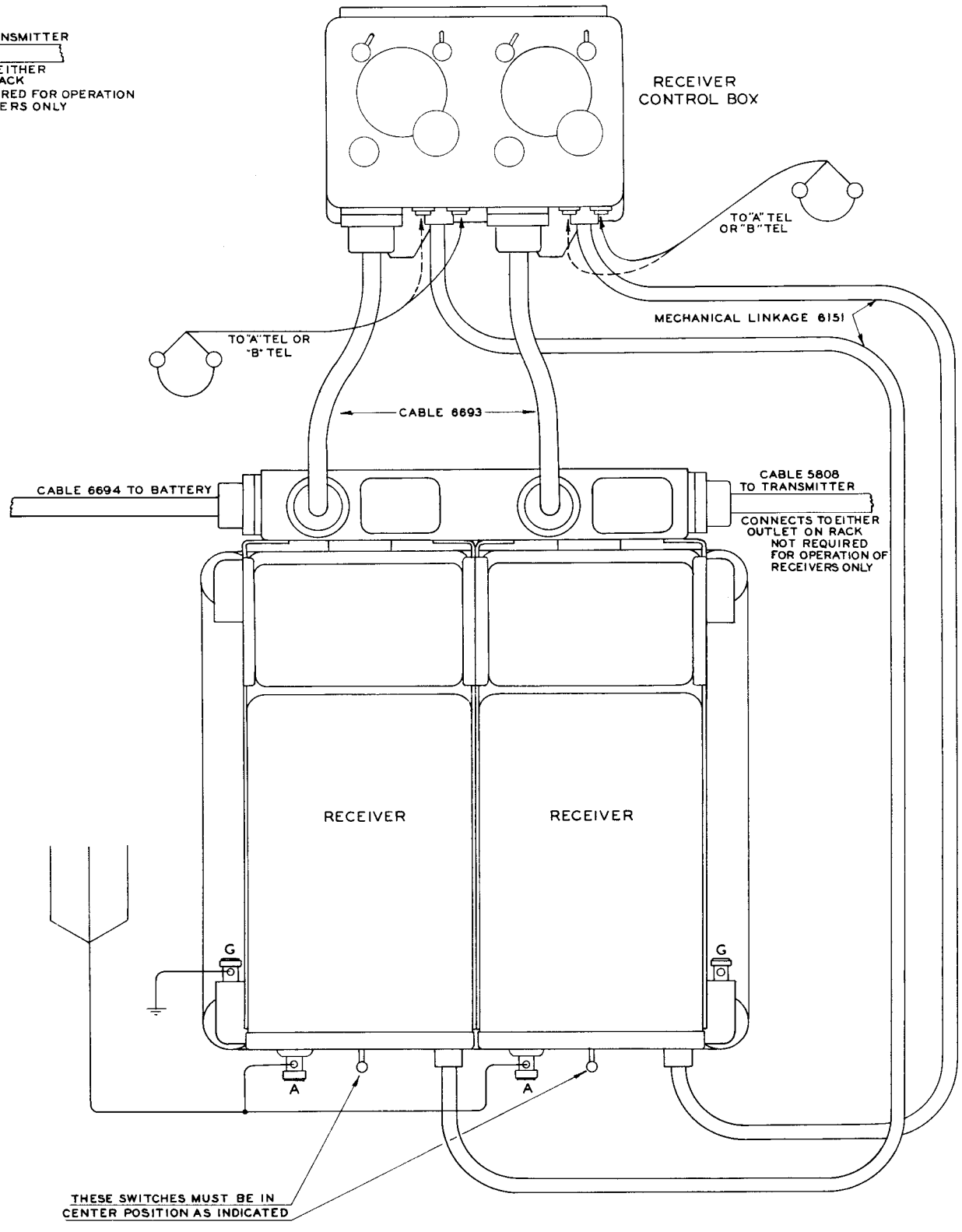


DIAGRAM CABLING

AIRCRAFT RADIO CORP | DWG. NO. 73/9-3-A

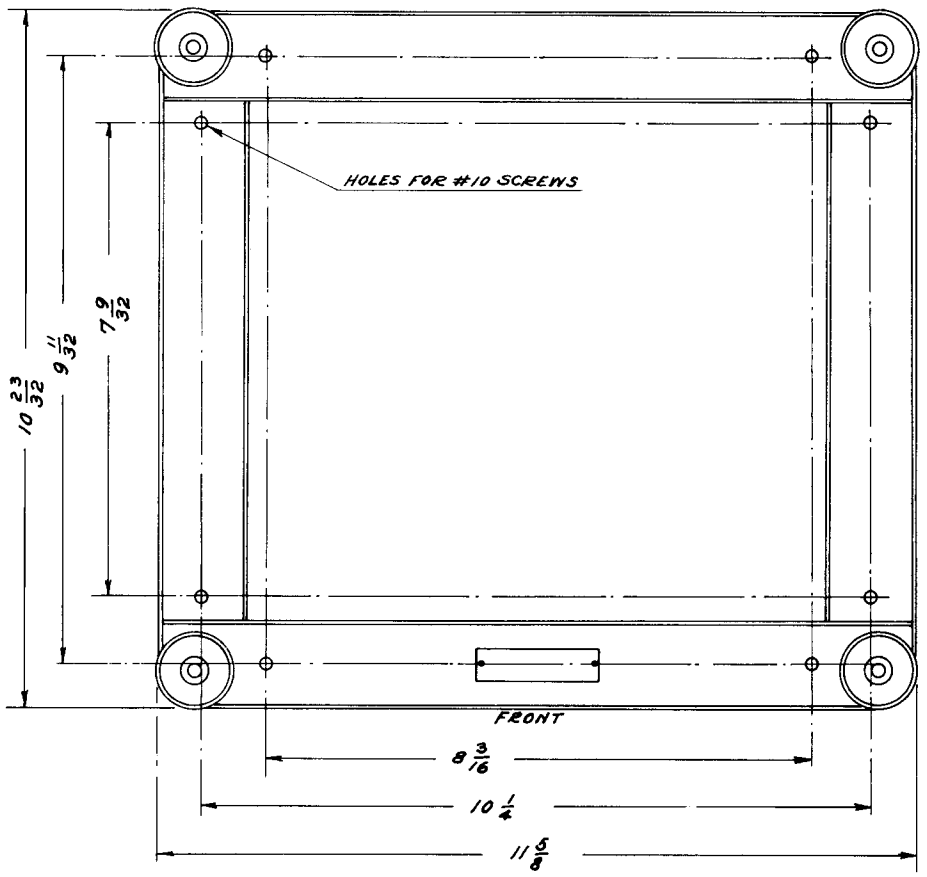
DWN 8-21-40 W.F. | CK. 8-24-40 A.W.P. | APP. 8-27-40 H.F.

Fig. 11—Cabling Diagram of Model RAT Equipment

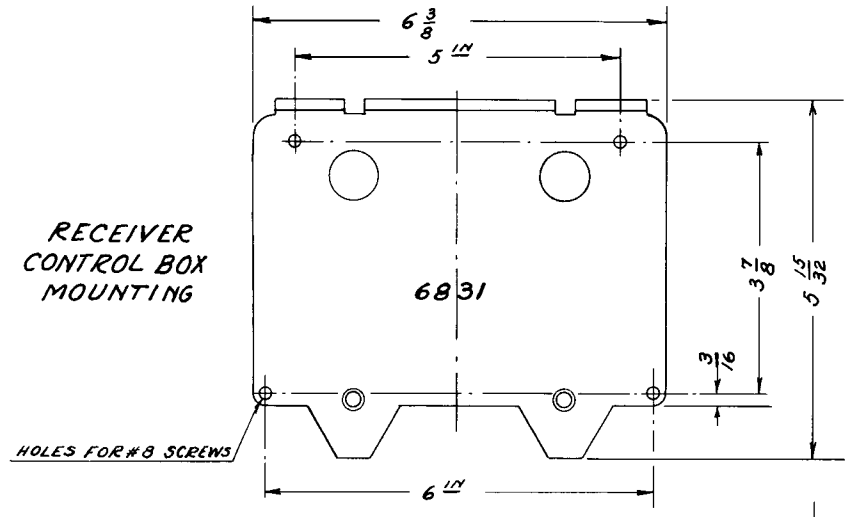
INSTALLATION DIMENSIONS

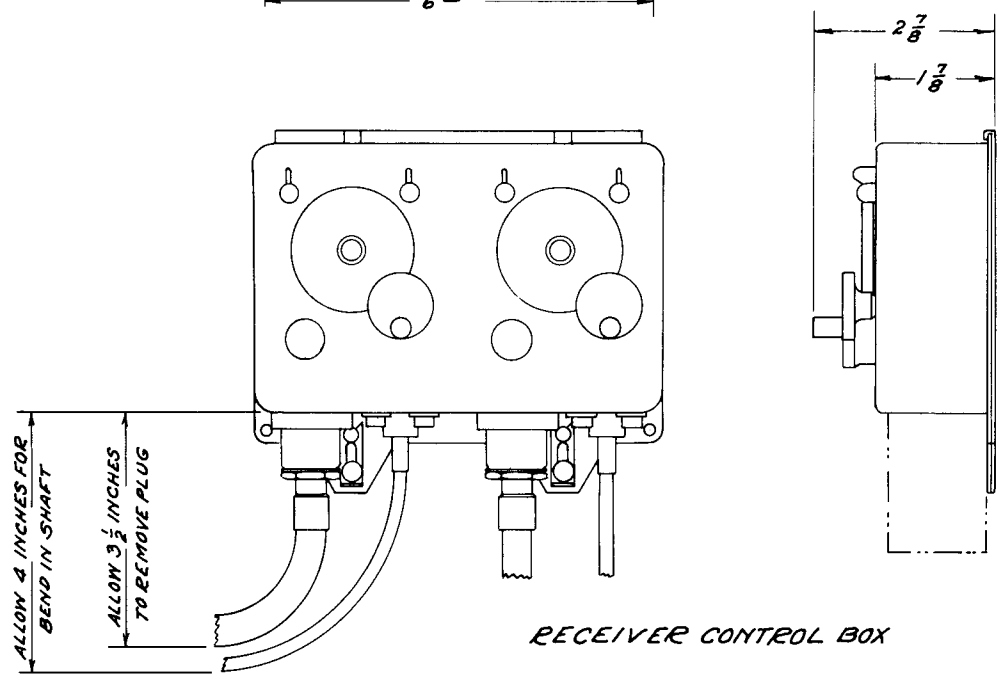
AIRCRAFT RADIO CORP | DWG. NO. 64233-D
DWN. K.W.P. 8-23-40 | APP. A.F.C. 8-26-40 8-27-40

RECEIVER MOUNTING



RECEIVER CONTROL BOX MOUNTING

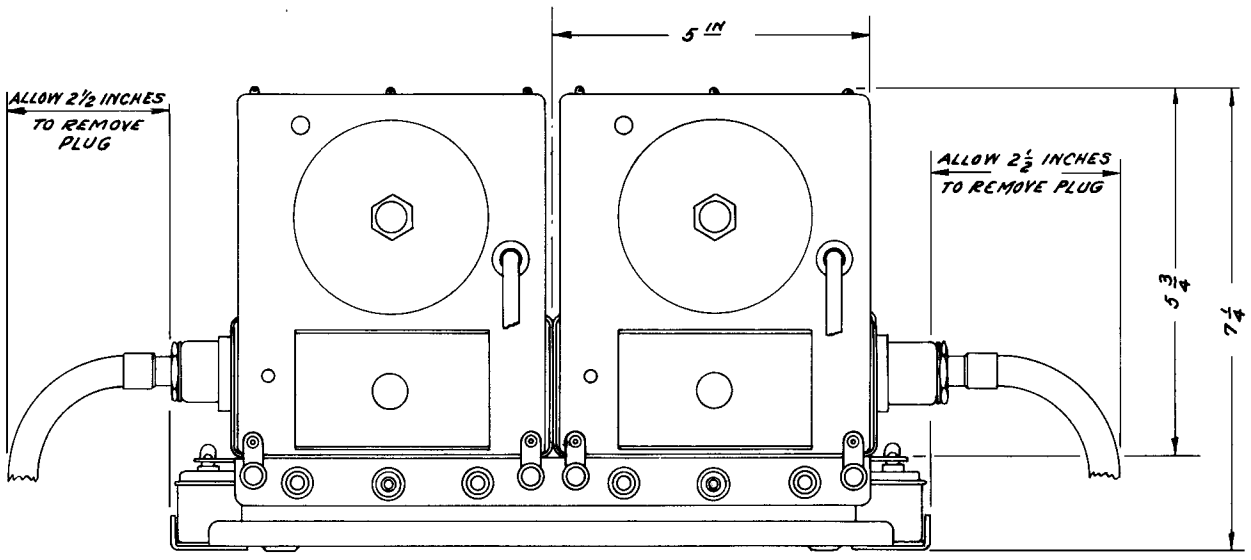




RECEIVER CONTROL BOX

WEIGHTS OF COMPONENT UNITS

WEIGHT OF COMPLETE EQUIPMENT FOR LOCAL CONTROL, LESS CABLE	22.0 LBS.
WEIGHT OF COMPLETE EQUIPMENT FOR REMOTE CONTROL, LESS CABLES	23.6 LBS.
ONE RECEIVER UNIT (LESS TUBES, DYNAMOTOR, SWITCH PANEL)	5.7 LBS.
ONE SET TUBES	0.3 LBS.
ONE DYNAMOTOR UNIT	3.0 LBS.
ONE SWITCH PANEL	0.2 LBS.
ONE SWITCH PANEL ADAPTER	0.15 LBS.
RECEIVER RACK	2.7 LBS.
RECEIVER MOUNTING	0.8 LBS.
RECEIVER CONTROL BOX AND MOUNTING	1.8 LBS.
ONE WIRED PLUG	0.05 LBS.
SHIELDED CABLES, AVERAGE WEIGHT PER FOOT	0.17 LBS.
MECHANICAL LINKAGE, WEIGHT PER FOOT	0.12 LBS.



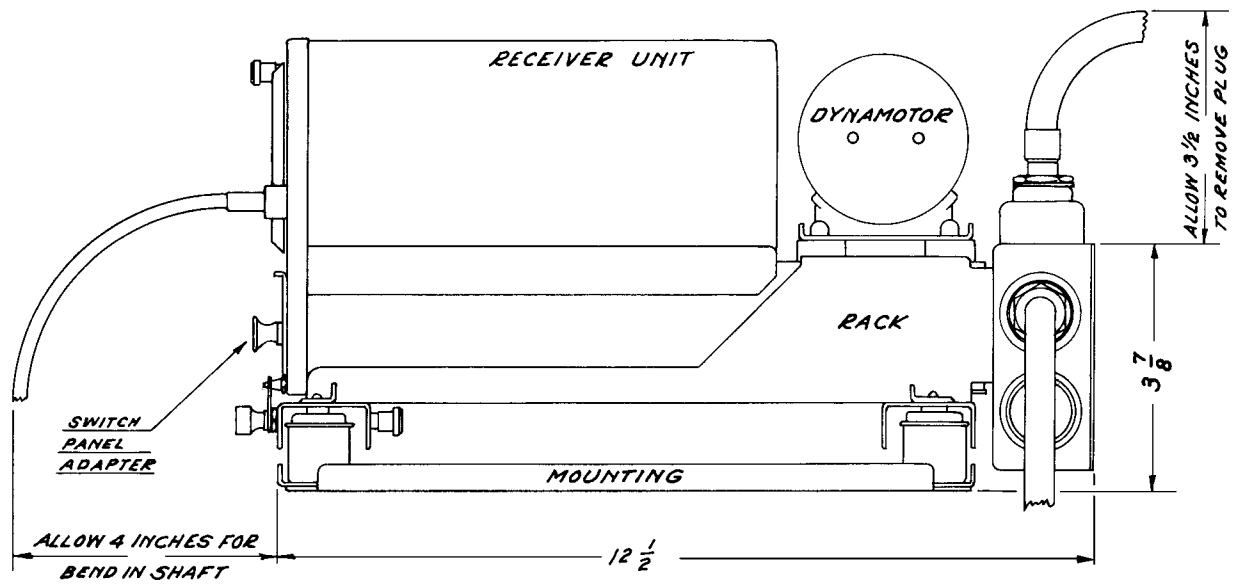
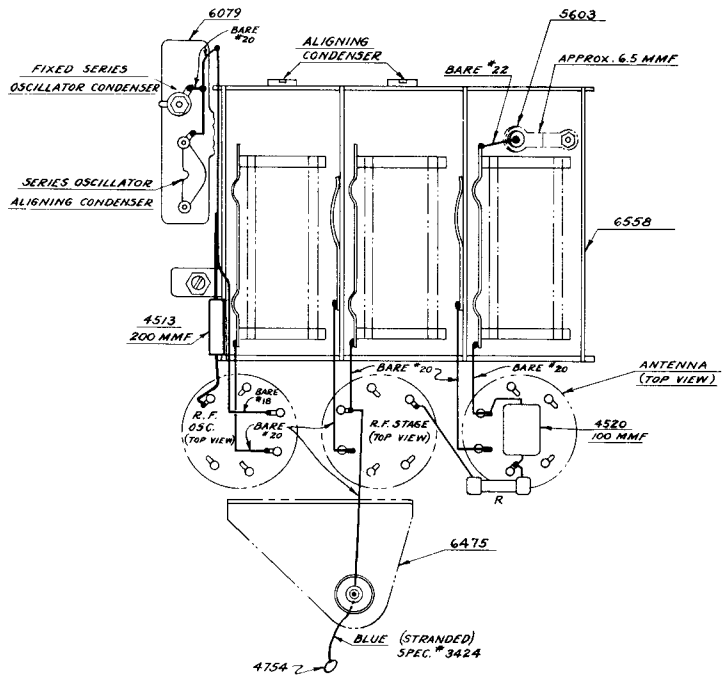
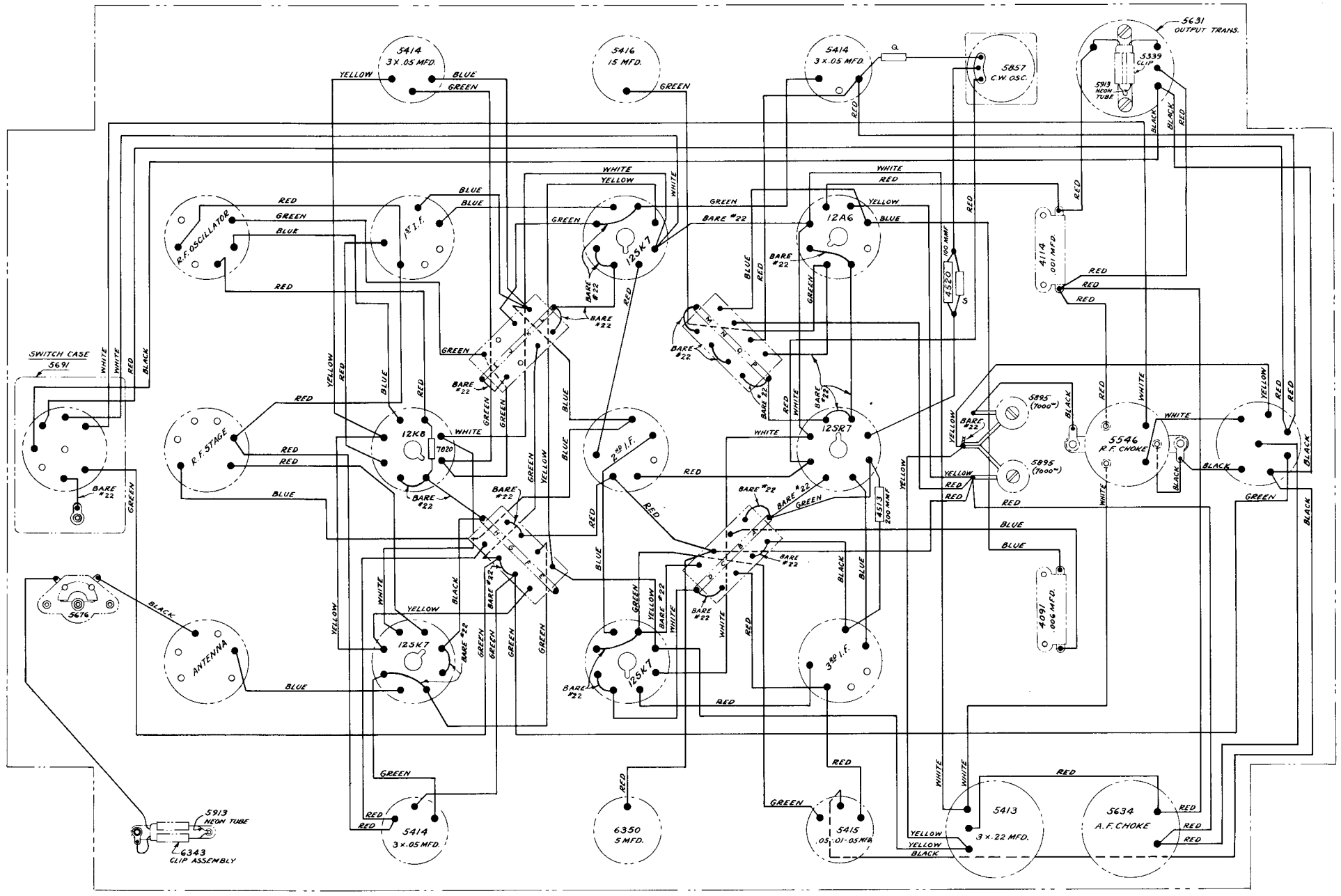


Fig. 12—Installation Dimensions and Weights, Units of Model RAT Equipment

WIRING ABOVE TUBE DECK



NOTES:
1. ALL WIRES MARKED WITH COLOR NOTE ARE #22 SOLID COPPER; WIRE SPECIFICATION #4424 EXCEPT AS NOTED.
2. BARE WIRES ARE TINNED COPPER WITH SIZES AS SHOWN.
3. SEAL ALL SOLDERED CONNECTIONS WITH RED LACQUER.



WIRING BELOW TUBE DECK

LOCATION	A.R.C. DWG. OF COMPONENT	ITEM	LOCATION	A.R.C. DWG. OF COMPONENT	ITEM
A	4570	510,000	P	4506	1,500
B	4501	100,000	Q	6001	5,100
C	4497	200	R	4439	2,000,000
D	6006	390	S	4501	100,000
E	4497	200			
F	6004	620			
G	4502	200,000			
H	4497	200			
I	6004	620			
J					
K	6004	620			
L	4501	100,000			
M	4503	2,000,000			
N	4569	51,000			
O	4569	51,000			

DIAGRAM, WIRING (RECEIVER; BAND 13.5-20.0 MC)

MAT: | FINISH: | SCALE:

DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

CHANGE	DATE	APP.	CHANGE	DATE	APP.
(1) RESISTORS REVISED	8-21-40	R.O.F.			

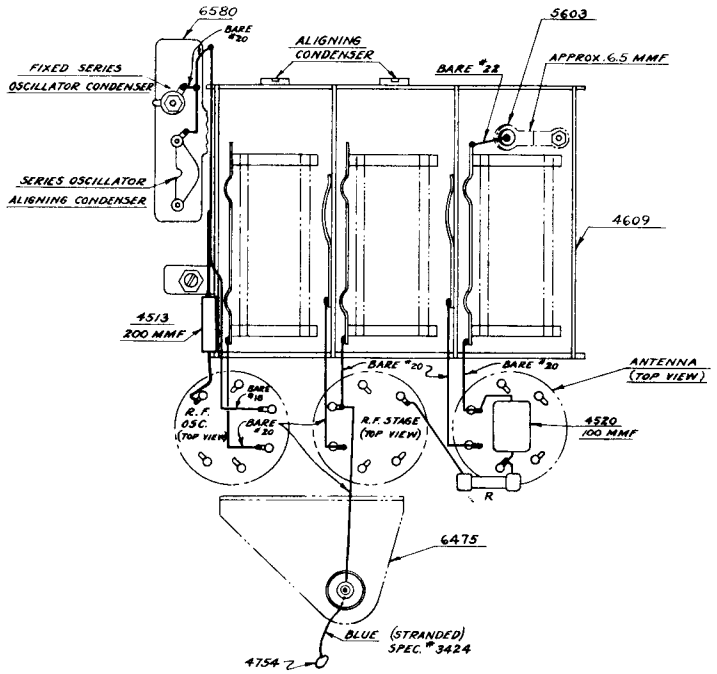
AIRCRAFT RADIO CORP.
BOONTON, N. J.

TR. BY W.A.P. DATE 11-15-39
CHK. BY R.O.F. DATE 8-12-40
APP. BY F.H.D. DATE 8-12-40

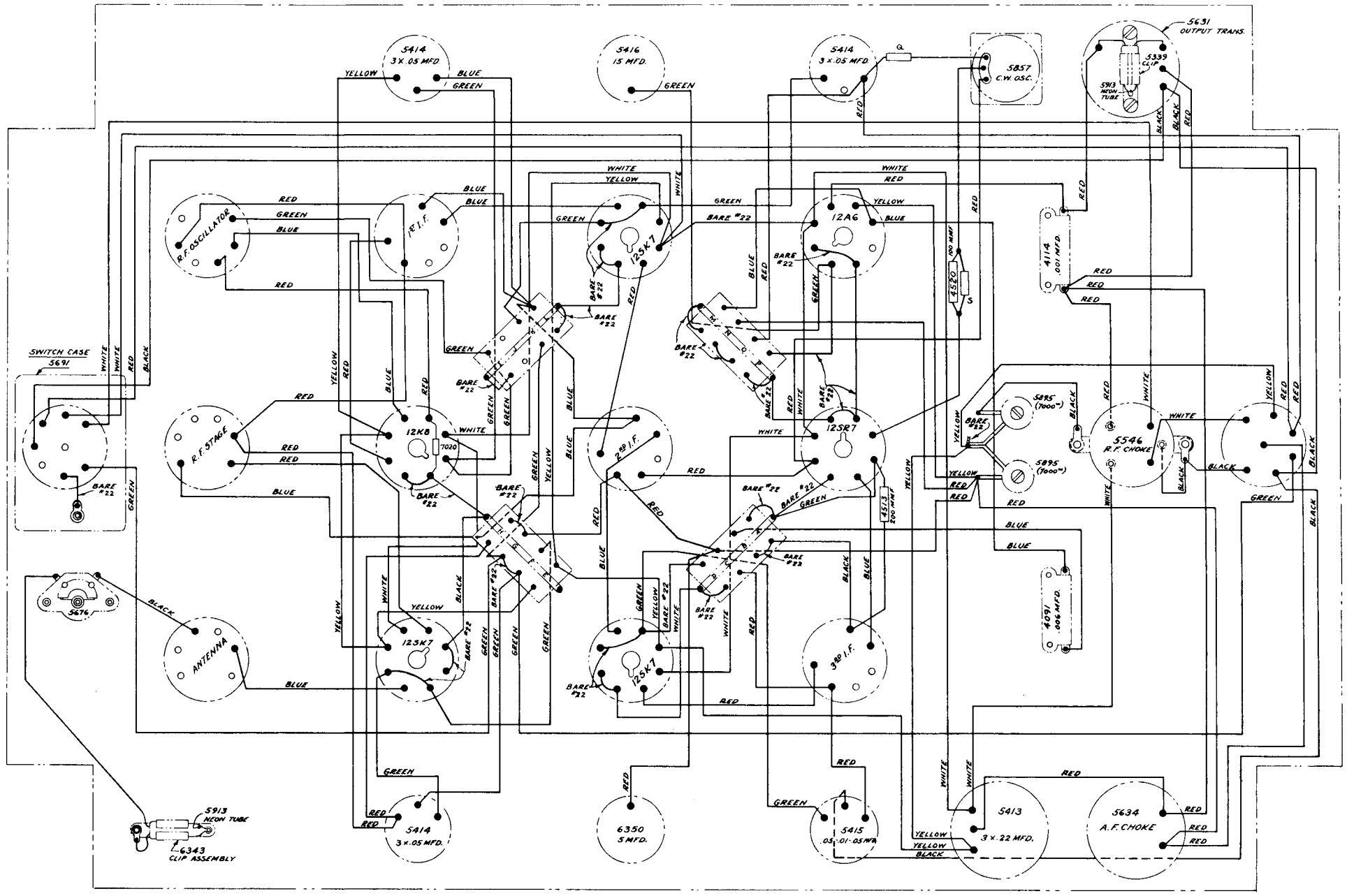
DWG. NO. 6422-4-B

Fig. 13—Wiring Diagram, Type CBY-46083 Receiver Unit, (13.5-20 MC)

WIRING ABOVE TUBE DECK



NOTES:
1. ALL WIRES MARKED WITH COLOR NOTE ARE #22 SOLID COPPER; WIRE SPECIFICATION #6424 EXCEPT AS NOTED.
2. BARE WIRES ARE TINNED COPPER WITH SIZES AS SHOWN.
3. SEAL ALL SOLDERED CONNECTIONS WITH RED LACQUER.



WIRING BELOW TUBE DECK

LOCATION	A.R.C. DWG. OF COMPONENT	ITEM	LOCATION	A.R.C. DWG. OF COMPONENT	ITEM			
A	4570	510,000	P	4506	1,500			
B	4501	100,000	Q	6001	5,100			
C	4497	200	R	4439	2,000,000			
D	6006	390	S	4501	100,000			
E	4497	200						
F	6004	620						
G	4502	200,000						
H	4497	200						
I	6004	620						
J								
K	6004	620						
L	4501	100,000						
M	4503	2,000,000						
N	4569	51,000						
O	4569	51,000						

DIAGRAM, WIRING (RECEIVER; BAND 20-27 MC)
MAT: FINISH: SCALE:
DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

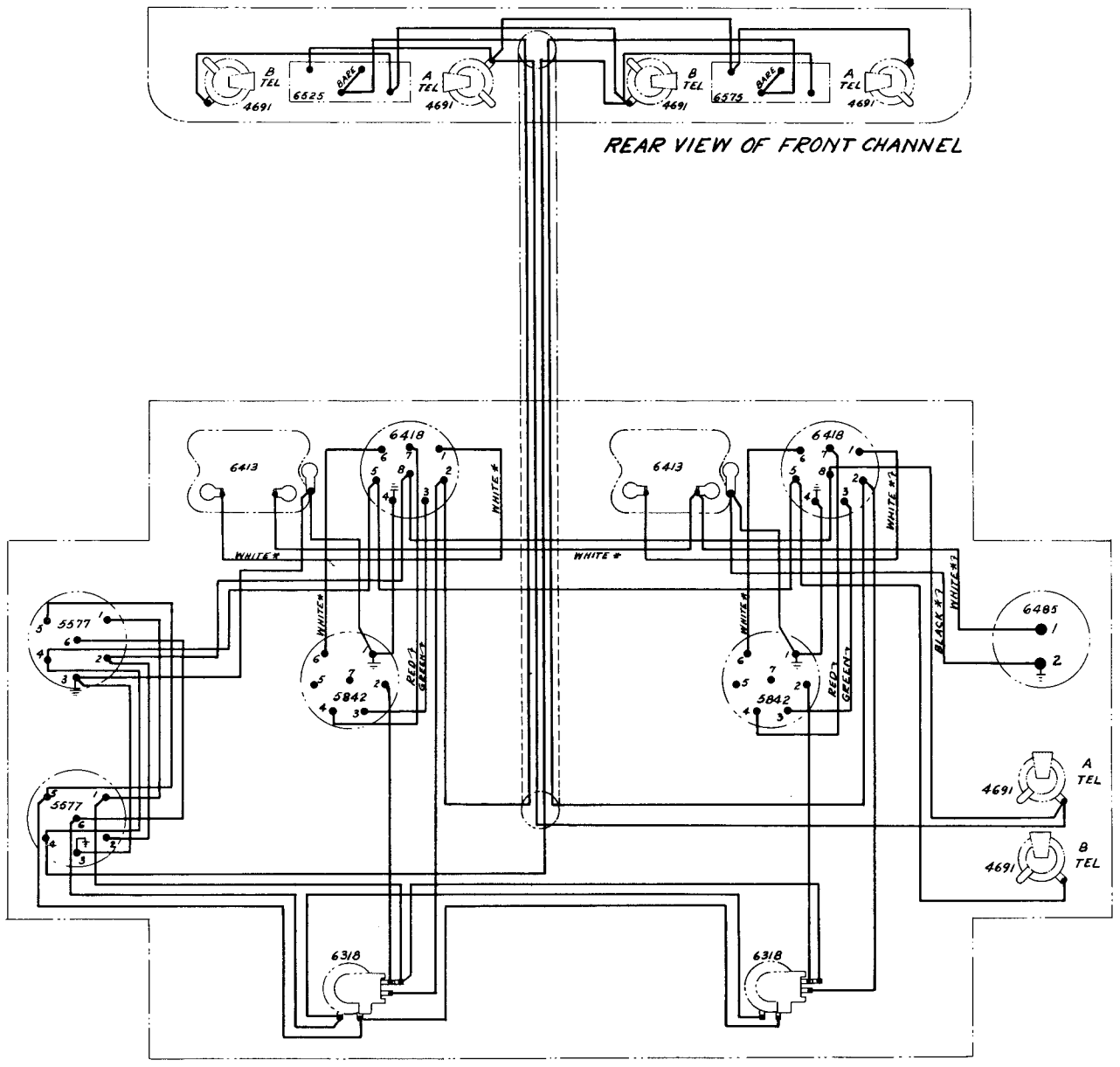
CHANGE	DATE	APP.	CHANGE	DATE	APP.

AIRCRAFT RADIO CORP.
BOONTON, N. J.

TR BY W.A.P. DATE 11-15-39
CHK BY R.O.F. DATE 8-21-40
APP. BY FHD DATE 8-21-40

DWG. NO. 6425-4-A

Fig. 14—Wiring Diagram, Type CBY-46084 Receiver Unit, (20-27 MC)



REAR VIEW OF FRONT CHANNEL

REAR VIEW OF COUPLING BOX

NOTES:
1. ALL WIRES MARKED (#) TO BE #18 STRANDED COPPER (SPEC. #3423).
2. ALL BARE WIRES TO BE #22 TINNED COPPER.
3. ALL OTHER WIRES TO BE #22 SOLID COPPER (SPEC. #3425).
4. ALL WIRES TO BE BLACK EXCEPT AS OTHERWISE INDICATED.
5. SEAL ALL SOLDERED JOINTS WITH RED LACQUER (SPEC. #4593)
6. BIND LEADS IN GROUPS WHERE REQUIRED FOR MECHANICAL STABILITY.

RECEIVER RACK

DIAGRAM, WIRING		
MAT:	FINISH:	SCALE:

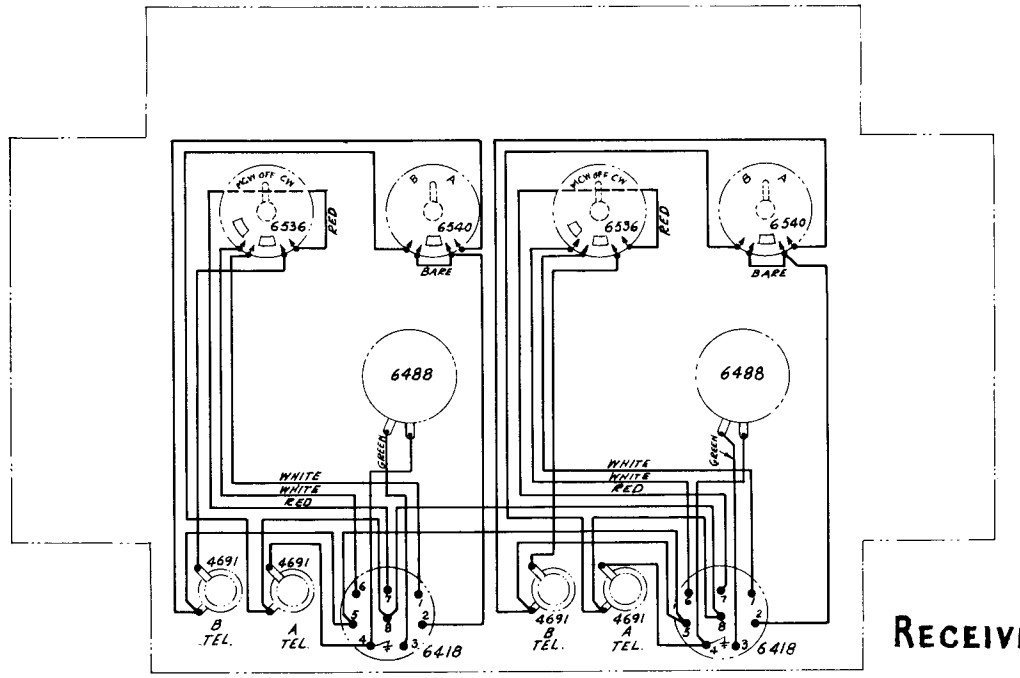
DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

CHANGE	DATE	APP.	CHANGE	DATE	APP.

AIRCRAFT RADIO CORP.
BOONTON, N. J.

TR. BY W.E.	DATE 7-1-40
CHK. BY POF	DATE 8-12-40
APP. BY FHD	DATE 8-12-40

DWG. NO. 6594-3-A



VIEW FROM REAR OF UNIT

NOTES:
1. ALL WIRES TO BE #22 STRANDED COPPER (SPEC. #3424).
2. ALL WIRES TO BE BLACK EXCEPT AS OTHERWISE INDICATED.
3. SEAL ALL SOLDERED JOINTS WITH RED LACQUER (SPEC. #4593).
4. BIND LEADS IN GROUPS WHERE REQUIRED FOR MECHANICAL STABILITY.

RECEIVER CONTROL BOX

DIAGRAM, WIRING		
MAT:	FINISH:	SCALE:

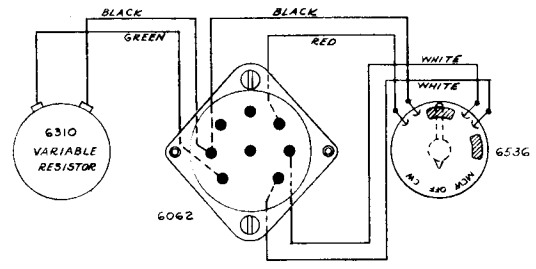
DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

CHANGE	DATE	APP.	CHANGE	DATE	APP.

AIRCRAFT RADIO CORP.
BOONTON, N. J.

TR. BY W.E.	DATE 7-1-40
CHK. BY POF	DATE 8-12-40
APP. BY FHD	DATE 8-12-40

DWG. NO. 6547-2-A



VIEW FROM REAR OF UNIT

NOTES:
1. SEAL ALL SOLDERED CONNECTIONS WITH RED LACQUER. (SPEC. #4593)
2. ALL WIRES ARE #22 SOLID COPPER. (SPEC. # 3425).

SWITCH PANEL

DIAGRAM, WIRING		
MAT:	FINISH:	SCALE:

DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

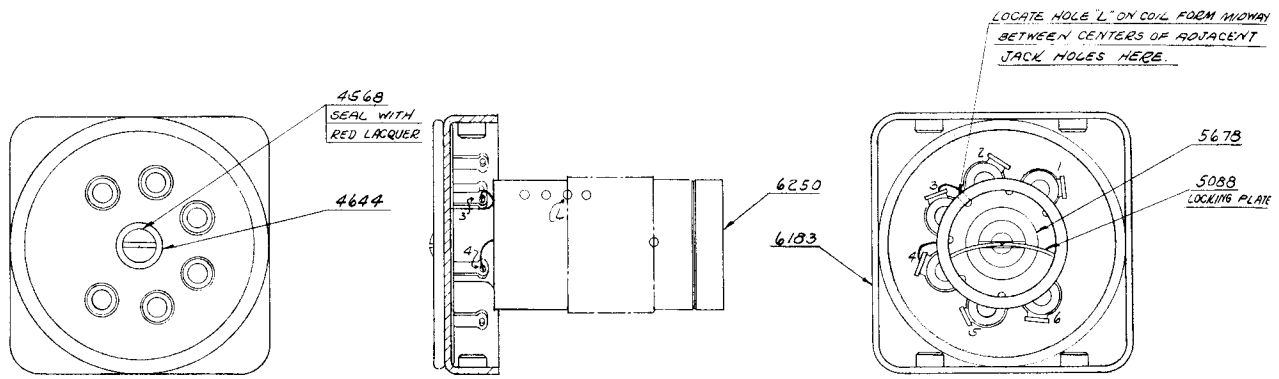
CHANGE	DATE	APP.	CHANGE	DATE	APP.
① 3425 WAS 6929	8-19-40	FHD			

AIRCRAFT RADIO CORP.
BOONTON, N. J.

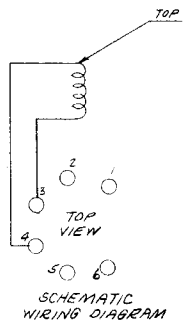
DWN. BY W.A.P.	DATE 3-11-40
CHK. BY H.C.	DATE 6-13-40
APP. BY FHD	DATE 6-13-40

DWG. NO. 6446-1-B

Fig. 15—Wiring Diagrams, Receiver Control Box, Receiver Rack, and Switch Panel



NOTES:
1. USE ROSIN FLUX FOR ALL SOLDERING
2. COVER ALL SOLDERED CONNECTIONS WITH RED LACQUER (SPEC. #4593)
3. AFTER ADJUSTMENT OF CORE, INSERT LOCKING PLATE AND SEAL THIS PLATE TO COIL FORM AND TO SLOT OF CORE ASSEMBLY WITH SUPERLA WAX.



SCHEMATIC WIRING DIAGRAM

COIL ASSEMBLY		
MAT:	FINISH:	SCALE: 2:1

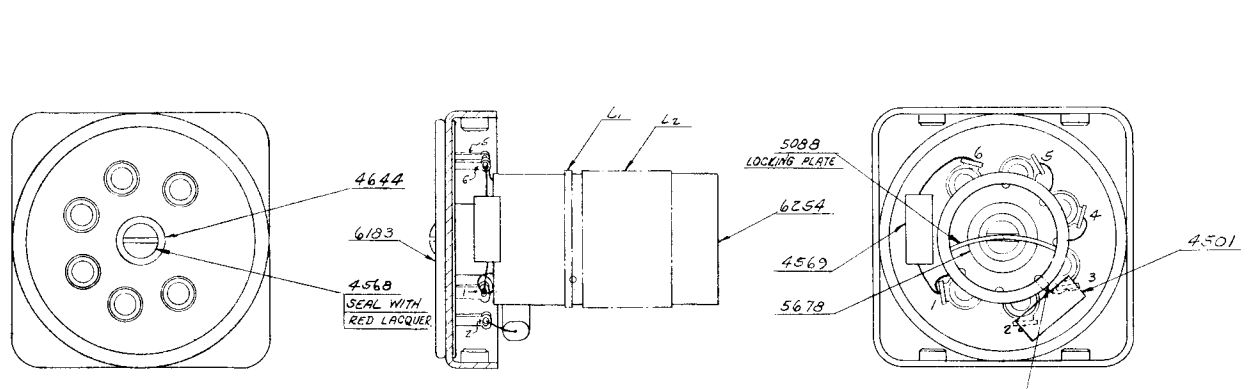
DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

CHANGE	DATE	APP.	CHANGE	DATE	APP.

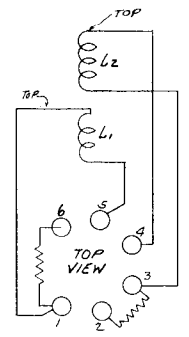
AIRCRAFT RADIO CORP.
BOONTON, N. J.

DWN. BY A.D.G.	DATE 4-4-39
CHK. BY H.C.	DATE 8-6-40
APP. BY P.O.F.	DATE 8-6-40

DWG. NO. 6249-2-A



NOTES:
1. USE ROSIN FLUX ONLY FOR ALL SOLDERING
2. COVER ALL SOLDERED CONNECTIONS WITH RED LACQUER (SPEC. #4593)
3. AFTER ADJUSTMENT OF CORE, INSERT LOCKING PLATE AND SEAL THIS PLATE TO COIL FORM AND TO SLOT OF CORE ASSEMBLY WITH SUPERLA WAX.



SCHEMATIC WIRING DIAGRAM

COIL ASSEMBLY		
MAT:	FINISH:	SCALE: 2:1

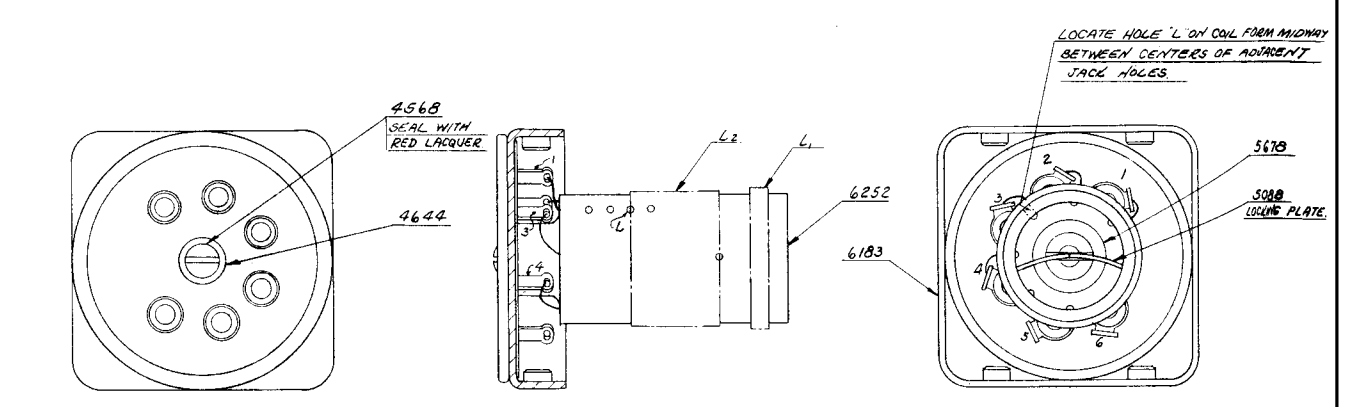
DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

CHANGE	DATE	APP.	CHANGE	DATE	APP.

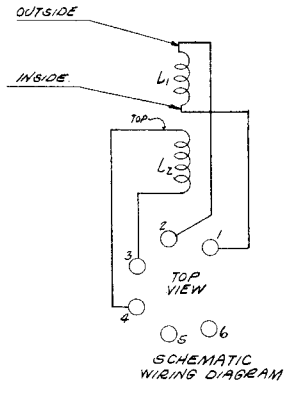
AIRCRAFT RADIO CORP.
BOONTON, N. J.

DWN. BY A.D.G.	DATE 4-4-39
CHK. BY H.C.	DATE 8-6-40
APP. BY P.O.F.	DATE 8-6-40

DWG. NO. 6253-2-A



NOTES:
1. USE ROSIN FLUX FOR ALL SOLDERING.
2. COVER ALL SOLDERED CONNECTIONS WITH RED LACQUER (SPEC. #4593)
3. AFTER ADJUSTMENT OF CORE, INSERT LOCKING PLATE AND SEAL THIS PLATE TO COIL FORM AND TO SLOT OF CORE ASSEMBLY WITH SUPERLA WAX



SCHEMATIC WIRING DIAGRAM

COIL ASSEMBLY		
MAT:	FINISH:	SCALE: 2:1

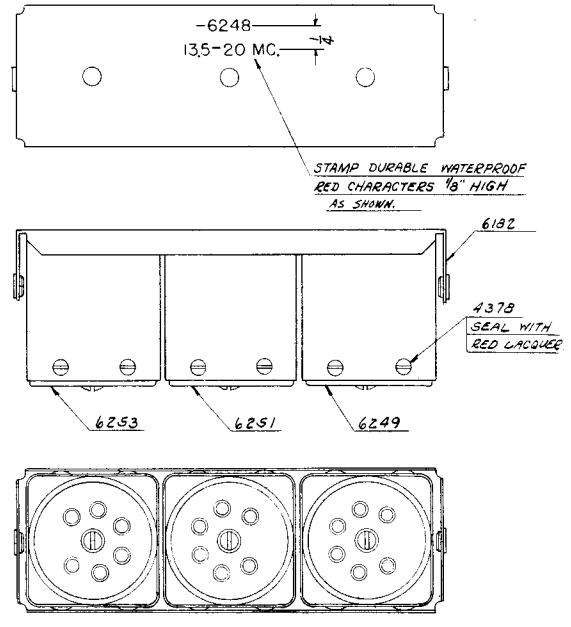
DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

CHANGE	DATE	APP.	CHANGE	DATE	APP.

AIRCRAFT RADIO CORP.
BOONTON, N. J.

DWN. BY A.D.G.	DATE 4-4-39
CHK. BY H.C.	DATE 8-6-40
APP. BY P.O.F.	DATE 8-6-40

DWG. NO. 6251-2-A



COIL SET ASSEMBLY		
MAT:	FINISH:	SCALE: 1:1

DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

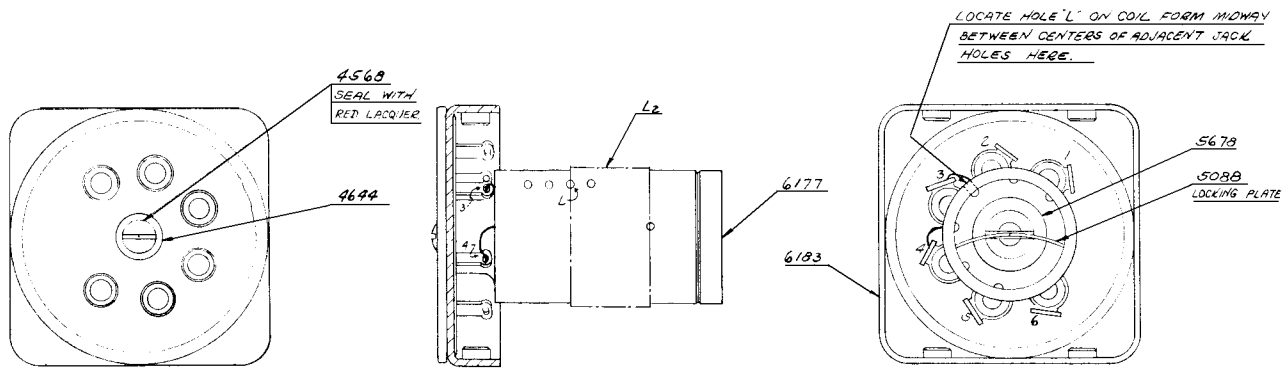
CHANGE	DATE	APP.	CHANGE	DATE	APP.

AIRCRAFT RADIO CORP.
BOONTON, N. J.

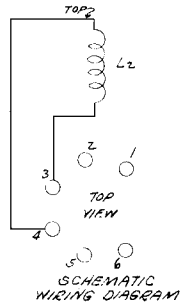
DWN. BY A.D.G.	DATE 4-6-39
CHK. BY H.C.	DATE 8-6-40
APP. BY P.O.F.	DATE 8-6-40

DWG. NO. 6248-1-A

Fig. 16—RF Coil Set Assembly 6248, (13.5-20 MC) with Wiring Diagrams



NOTES:
1. USE ROSIN FLUX FOR ALL SOLDERING.
2. COVER ALL SOLDERED CONNECTIONS WITH RED LACQUER (SPEC #4593)
3. AFTER ADJUSTMENT OF CORE, INSERT LOCKING PLATE AND SEAL THIS PLATE TO COIL FORM AND TO SLOT OF CORE ASSEMBLY WITH SUPERLA WAX.



SCHEMATIC WIRING DIAGRAM

COIL ASSEMBLY		
MAT:	FINISH:	SCALE: 2:1

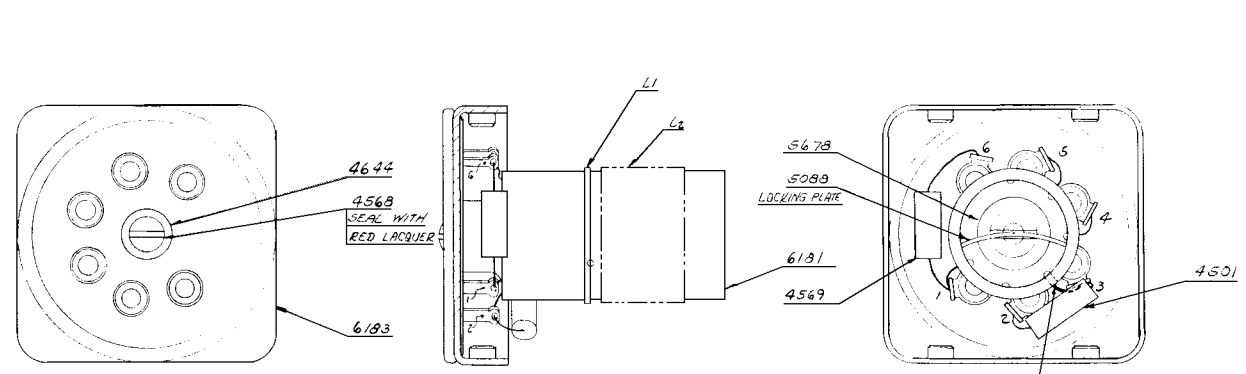
DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

CHANGE	DATE	APP.	CHANGE	DATE	APP.

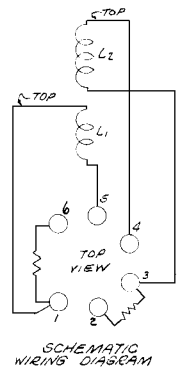
AIRCRAFT RADIO CORP.
BOONTON, N. J.

DWN. BY A.O.G	DATE 4-11-39
CHK. BY H.C	DATE 8-6-40
APP. BY P.C.F	DATE 8-6-40

DWG. NO. 6176-2-A



NOTES:
1. USE ROSIN FLUX FOR ALL SOLDERING.
2. COVER ALL SOLDERED CONNECTIONS WITH RED LACQUER (SPEC #4593)
3. AFTER ADJUSTMENT OF CORE, INSERT LOCKING PLATE AND SEAL THIS PLATE TO COIL FORM AND TO SLOT OF CORE ASSEMBLY WITH SUPERLA WAX.



SCHEMATIC WIRING DIAGRAM

COIL ASSEMBLY		
MAT:	FINISH:	SCALE: 2:1

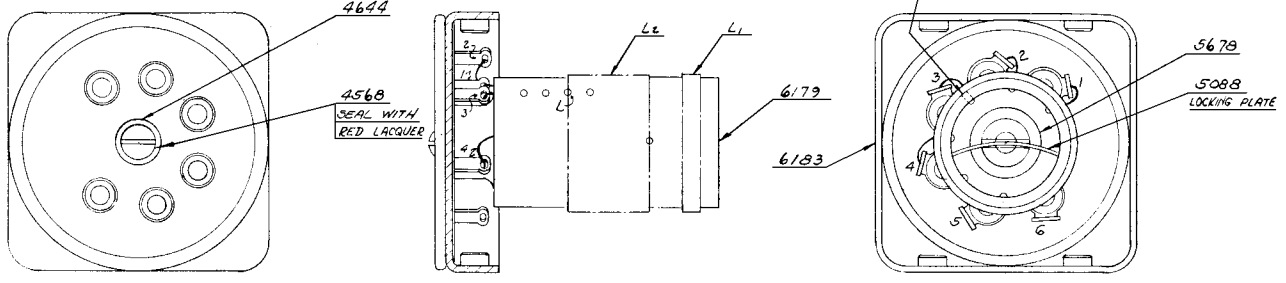
DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

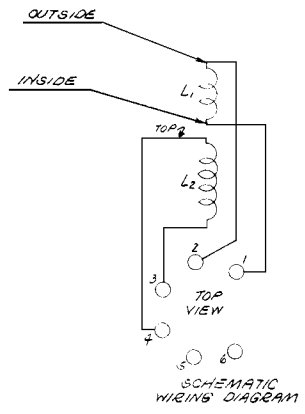
CHANGE	DATE	APP.	CHANGE	DATE	APP.

AIRCRAFT RADIO CORP.
BOONTON, N. J.

DWN. BY A.D.S	DATE 4-11-39
CHK. BY H.C.	DATE 8-6-40
APP. BY P.C.F	DATE 8-6-40

DWG. NO. 6180-2-A





SCHEMATIC WIRING DIAGRAM

NOTES:
1. USE ROSIN FLUX FOR ALL SOLDERING.
2. COVER ALL SOLDERED CONNECTIONS WITH RED LACQUER (SPEC #4593)
3. AFTER ADJUSTMENT OF CORE, INSERT LOCKING PLATE AND SEAL THIS PLATE TO COIL FORM AND TO SLOT OF CORE ASSEMBLY WITH SUPERLA WAX.

COIL ASSEMBLY		
MAT:	FINISH:	SCALE: 2:1

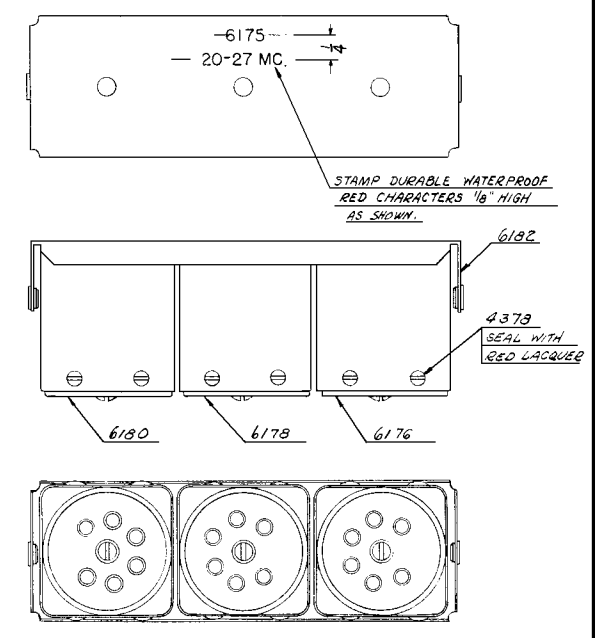
DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

CHANGE	DATE	APP.	CHANGE	DATE	APP.

AIRCRAFT RADIO CORP.
BOONTON, N. J.

DWN. BY A.O.G	DATE 4-11-39
CHK. BY H.C.	DATE 8-6-40
APP. BY P.C.F	DATE 8-6-40

DWG. NO. 6178-2-A



COIL SET ASSEMBLY		
MAT:	FINISH:	SCALE: 1:1

DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

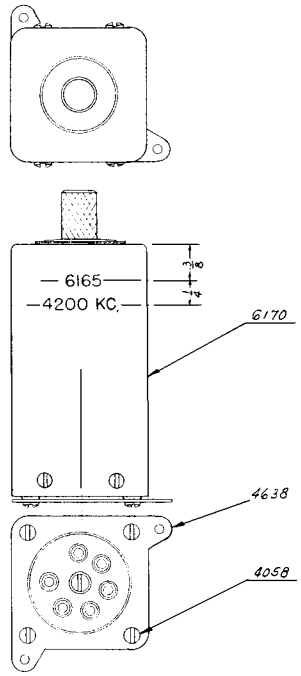
CHANGE	DATE	APP.	CHANGE	DATE	APP.

AIRCRAFT RADIO CORP.
BOONTON, N. J.

DWN. BY A.O.G.	DATE 4-6-39
CHK. BY H.C.	DATE 8-6-40
APP. BY P.C.F	DATE 8-6-40

DWG. NO. 6175-1-A

Fig. 17—RF Coil Set Assembly 6175, (20-27 MC) with Wiring Diagrams



NOTES:
1. SEAL ALL SCREWS WITH RED LACQUER.
2. STAMP DURABLE WATERPROOF RED CHARACTERS 1/8 HIGH AS SHOWN.

COUPLING UNIT ASSEMBLY

MAT: | FINISH: | SCALE: 1:1

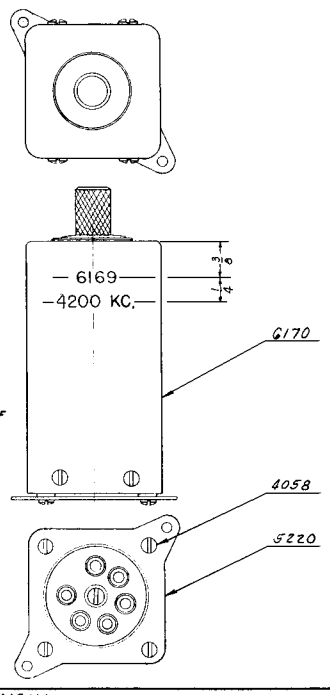
DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

CHANGE	DATE	APP.	CHANGE	DATE	APP.
1 STAMPING ADDED	8-5-40	PCF			

AIRCRAFT RADIO CORP.
BOONTON, N. J.

DWN. BY A.D.G DATE 2-7-40
CHK. BY H.C. DATE 2-9-40
APP. BY FHD DATE 2-9-40

DWG. NO. 6165-1-B



NOTES:
1. SEAL ALL SCREWS WITH RED LACQUER.
2. STAMP DURABLE WATERPROOF RED CHARACTERS 1/8 HIGH AS SHOWN.

COUPLING UNIT ASSEMBLY

MAT: | FINISH: | SCALE: 1:1

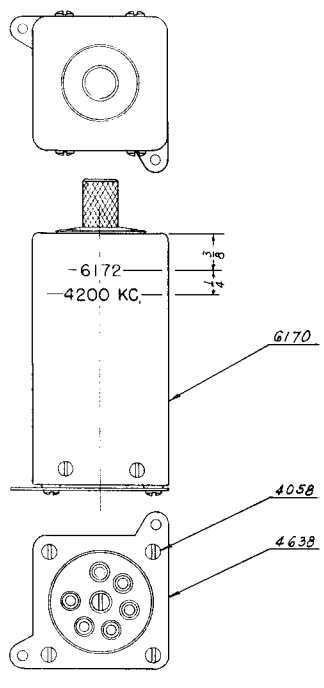
DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

CHANGE	DATE	APP.	CHANGE	DATE	APP.
1 STAMPING ADDED	8-5-40	PCF			

AIRCRAFT RADIO CORP.
BOONTON, N. J.

DWN. BY A.D.G DATE 2-8-40
CHK. BY H.C. DATE 2-9-40
APP. BY FHD DATE 2-9-40

DWG. NO. 6169-1-B



NOTES:
1. SEAL ALL SCREWS WITH RED LACQUER
2. STAMP DURABLE WATERPROOF RED CHARACTERS 1/8 HIGH AS SHOWN.

COUPLING UNIT ASSEMBLY

MAT: | FINISH: | SCALE: 1:1

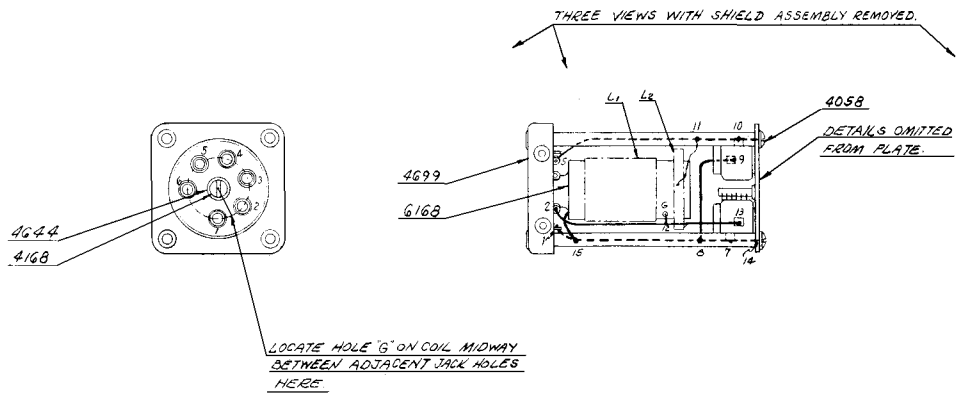
DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

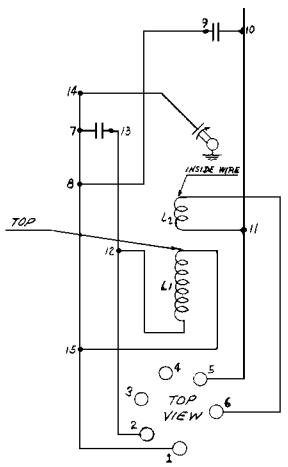
CHANGE	DATE	APP.	CHANGE	DATE	APP.
1 STAMPING ADDED	8-5-40	PCF			

AIRCRAFT RADIO CORP.
BOONTON, N. J.

DWN. BY A.D.G DATE 2-8-40
CHK. BY H.C. DATE 2-9-40
APP. BY FHD DATE 2-9-40

DWG. NO. 6172-1-B





WIRING DIAGRAM

NOTES:
1. USE #20 TINNED COPPER WIRE FOR CONNECTIONS BETWEEN TERMINALS.
2. COVER ALL SOLDERED JOINTS WITH RED LACQUER (SPEC. #4593)
3. SEAL ALL NUTS & SCREWS WITH RED LACQUER (SPEC. #4593)

COUPLING ASSEMBLY

MAT: | FINSH: | SCALE: 1:1

DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

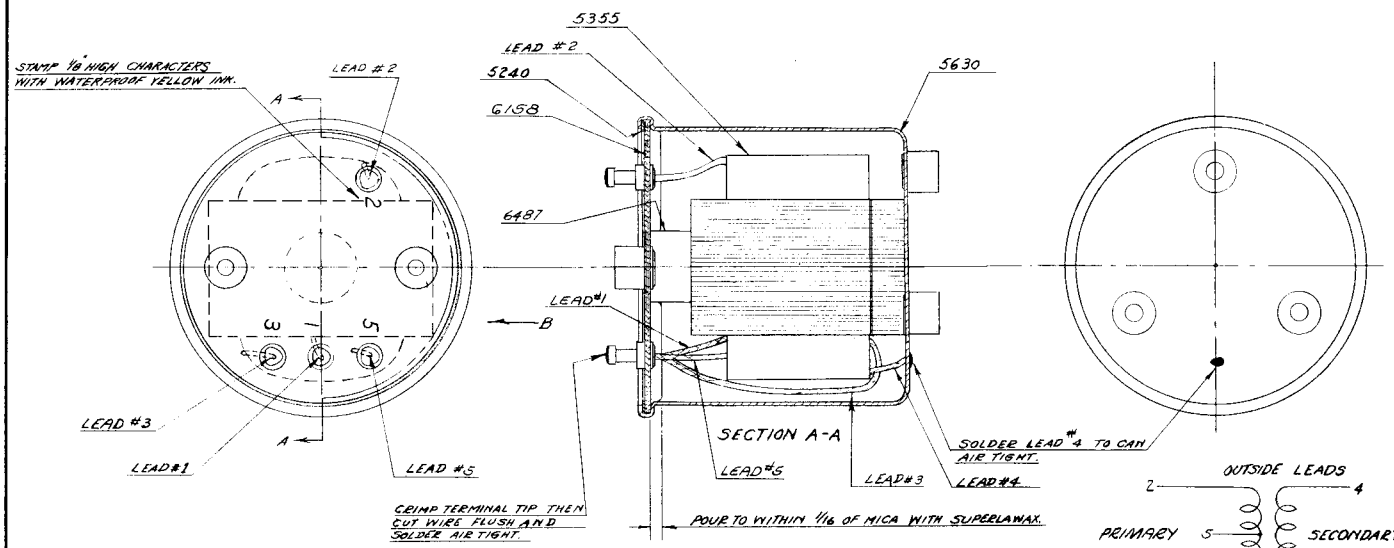
CHANGE	DATE	APP.	CHANGE	DATE	APP.

AIRCRAFT RADIO CORP.
BOONTON, N. J.

DWN. BY A.D.G DATE 3-27-39
CHK. BY H.C. DATE 2-9-4
APP. BY FHD DATE 2-9-40

DWG. NO. 6170-2-A

Fig. 18—IF Coupling Unit Assemblies 6165, 6169, 6172, with Wiring Diagram

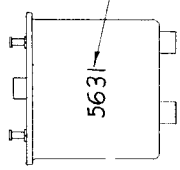


SPECIFICATIONS

TURNS RATIO: 8 TO 1, PRIMARY TO SECONDARY.
PRIMARY CENTER TAPPED AT LEAD #5

D.C. RESISTANCE LIMITS:

PRIMARY - 9.41 - 11.84 OHMS
SECONDARY - 14.6 - 18.4 OHMS
PROTECT LEADS WITH INSULATING TUBING AS REQUIRED



VIEW IN DIRECTION OF ARROW "B"
SCALE 1:1

TRANSFORMER ASSEMBLY

MAT: | FINISH: | SCALE: 2:1

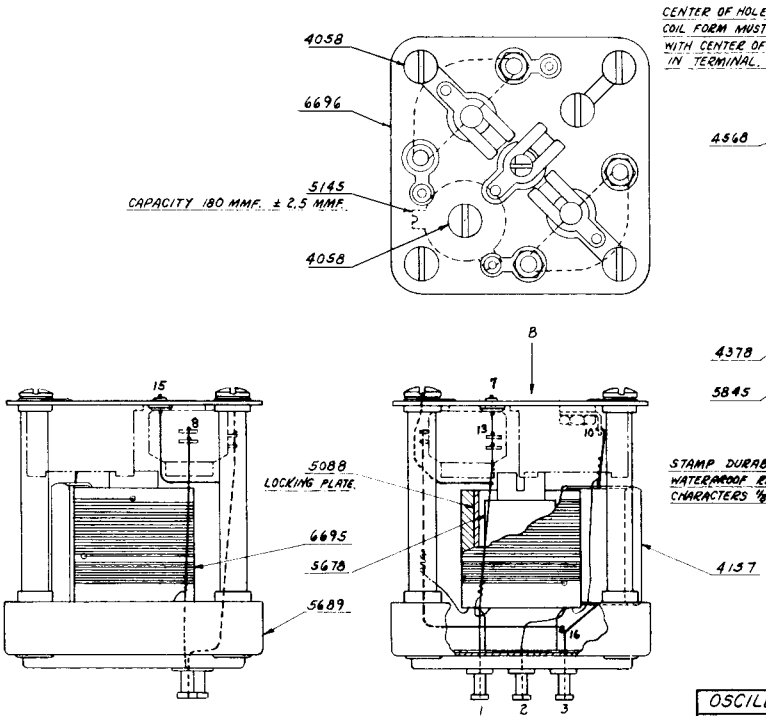
DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

CHANGE	DATE	APP.	CHANGE	DATE	APP.
1) LEAD #5 ADDED	9-22-39	FHD			
2) 6158 WAS 3713, 3909, 5235	9-22-39	FHD			
3) LEADS 1, 3 & 5 RELOCATED	9-22-39	FHD			
4) MODED PRIMARY & SECONDARY		FHD			
NOTES	10-18-39	"			
5) REMOVED WAX NOTE	10-20-39	"			
6) ADDED "5687"	12-29-39	"			
7) REMOVED "LEAD #5 ADDED" AND "3"	9-11-40	"			
8) STAMPING NOTE ADDED	9-17-40	"			

AIRCRAFT RADIO CORP.
BOONTON, N. J.

DWN. BY W. E. DATE 10-20-38
CHK. BY A. N. DATE 10-24-38
APP. BY FHD DATE 10-24-38

DWG. NO. 5631-2-D



NOTES:

1. SEAL ALL SCREWS AND NUTS WITH RED LACQUER.
2. USE #21 TINNED COPPER WIRE FOR CONNECTIONS BETWEEN TERMINALS.
3. COVER ALL SOLDERED JOINTS WITH RED LACQUER (SPEC. #4593)
4. AFTER ASSEMBLY OF CORE, INSERT LOCKING PLATE BETWEEN CORE AND COIL FORM AND SEAL WITH SUPERLA WAX.

OSCILLATOR ASSEMBLY, C.W.

MAT: | FINISH: | SCALE: 2:1

DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

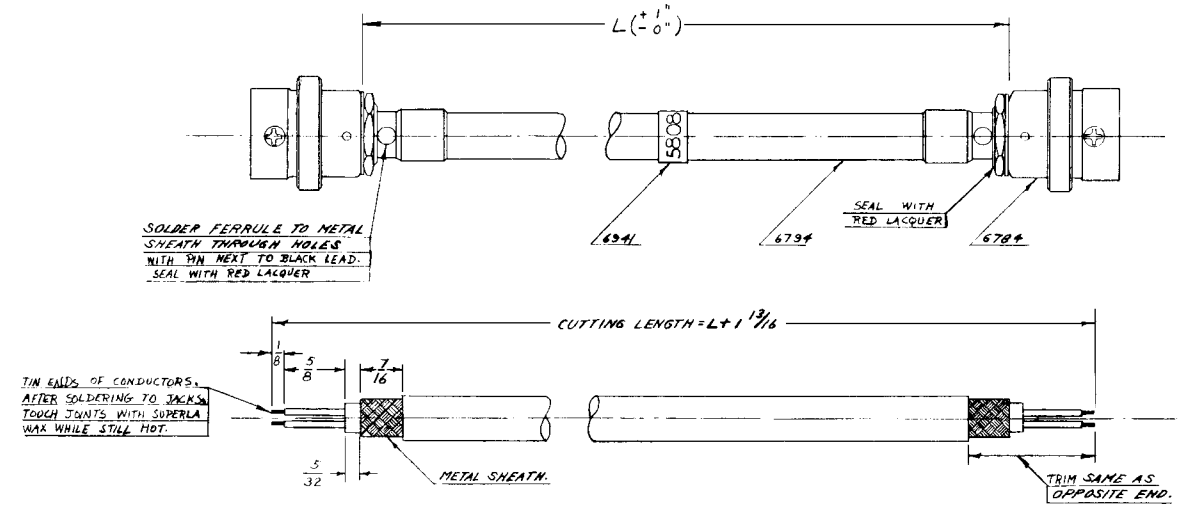
CHANGE	DATE	APP.	CHANGE	DATE	APP.

AIRCRAFT RADIO CORP.
BOONTON, N. J.

DWN. BY A.D.G. DATE 2-16-40
CHK. BY POF DATE 8-7-40
APP. BY FHD DATE 8-7-40

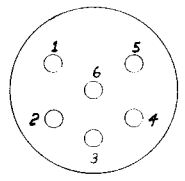
DWG. NO. 5857-2-A

Fig. 19—CW Oscillator Assembly 5857 and Output Transformer Assembly 5631, with Wiring Diagrams



WIRING COLOR CODE

1 BLUE
2 RED
3 BLACK
4 GREEN
5 YELLOW
6 WHITE



REAR VIEW OF PLUG

CABLE ASSEMBLY		
MAT:	FINISH:	SCALE: 1:1

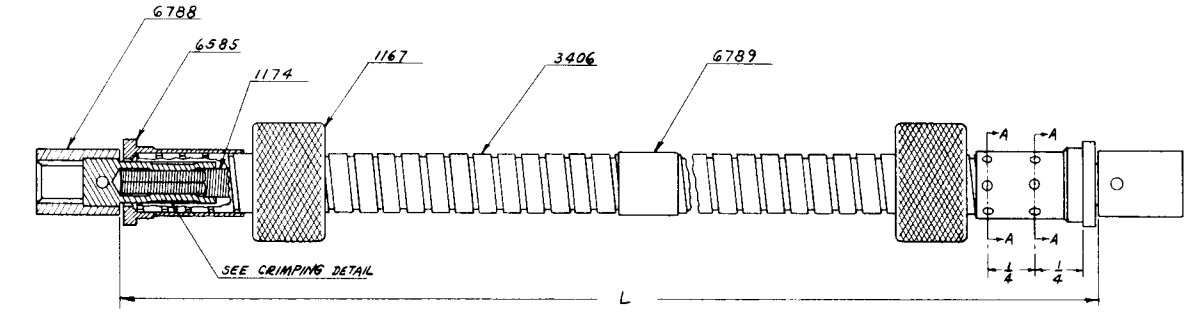
DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

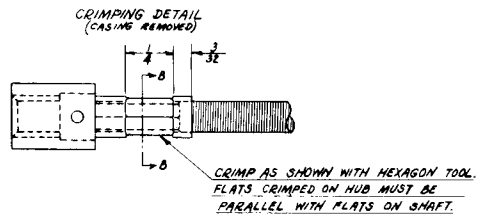
CHANGE	DATE	APP.	CHANGE	DATE	APP.

AIRCRAFT RADIO CORP.
BOONTON, N. J.

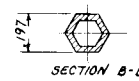
DWN. BY P.T.M.	DATE 7-11-40
CHK. BY H.C.	DATE 7-27-40
APP. BY F.H.D	DATE 7-31-40

DWG. NO. 5808-2-A

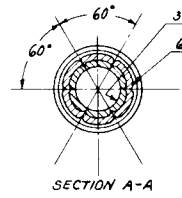




LUBRICATION:
FOR SHAFT; D-41-C GREDAG
FOR THREADS OF NUTS; ZINC DUST + PETROLATUM (SPEC. #3102)



SECTION B-B



SECTION A-A

STAKE ITEM 6585 TO CASING AT BOTH ENDS OF SHAFT AS SHOWN. WHEN STAKING USE PILOT OF SUITABLE SIZE TO MAKE FINAL INSIDE DIAMETER OF CASING: 4.242 +.005 -.000.

MECHANICAL LINKAGE		
MAT:	FINISH:	SCALE: 2:1

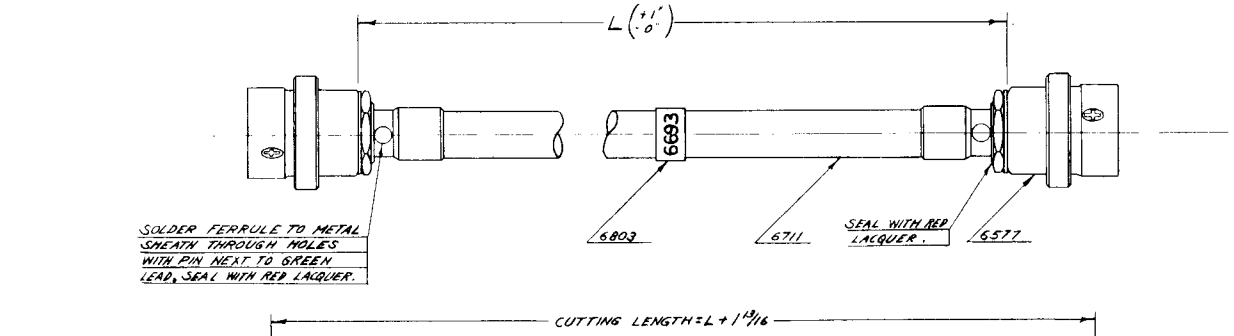
DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

CHANGE	DATE	APP.	CHANGE	DATE	APP.

AIRCRAFT RADIO CORP.
BOONTON, N. J.

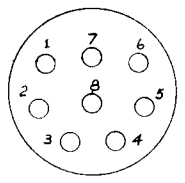
DWN. BY A.D.G.	DATE 4-29-40
CHK. BY H.C.	DATE 5-15-40
APP. BY F.H.D	DATE 6-28-40

DWG. NO. 6151-2-A



WIRING COLOR CODE

1 WHITE
2 RED
3 BLUE
4 GREEN
5 YELLOW
6 BLACK
7 BROWN
8 ORANGE



REAR VIEW OF PLUG

CABLE ASSEMBLY		
MAT:	FINISH: NONE	SCALE: 1:1

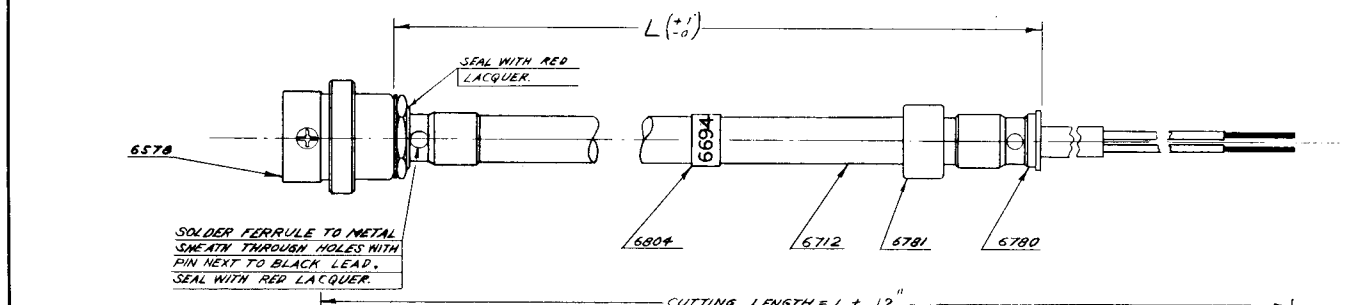
DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

CHANGE	DATE	APP.	CHANGE	DATE	APP.

AIRCRAFT RADIO CORP.
BOONTON, N. J.

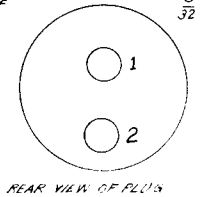
DWN. BY P.T.M.	DATE 5-24-40
CHK. BY H.C.	DATE 7-27-40
APP. BY F.H.D	DATE 7-31-40

DWG. NO. 6693-2-A



WIRING COLOR CODE

1 WHITE
2 BLACK



REAR VIEW OF PLUG

CABLE ASSEMBLY		
MAT:	FINISH:	SCALE: 1:1

DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± 1/64

CHANGE	DATE	APP.	CHANGE	DATE	APP.

AIRCRAFT RADIO CORP.
BOONTON, N. J.

DWN. BY P.T.M.	DATE 5-27-40
CHK. BY H.C.	DATE 7-27-40
APP. BY F.H.D	DATE 7-31-40

DWG. NO. 6694-2-A

Fig. 20—Mechanical Linkage and Cable Assemblies