Restricted # NAVAER 08-5Q-270

MODEL DZ-2

AIRCRAFT RADIO DIRECTION FINDER EQUIPMENT

FREQUENCY RANGE: 15-70 KC and 100-1750 KC

24 VOLT DIRECT-CURRENT OPERATION

INSTRUCTIONS

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.

IN SOME CASES IT HAS BEEN FOUND NECESSARY TO MAKE SUBSTITUTIONS OF ORIGINAL MATERIALS. HOWEVER, ALL NECESSARY FACTORS HAVE BEEN MAINTAINED, SO THAT REPLACEMENTS CAN BE MADE, AND WHEREVER SPARE PARTS ARE INVOLVED IN THE SUBSTITUTIONS, THE SPARES ARE IDENTICAL TO THE PARTS MOUNTED IN THE EQUIPMENT. IF IT IS FOUND THAT THE LATTER CANNOT BE MET, SPECIAL INSTRUCTIONS WILL BE ISSUED AND SUPPLIED FOR ALL SHIPMENTS SO AFFECTED.

Manufactured for

NAVY DEPARTMENT—BUREAU OF SHIPS

by

RCA VICTOR DIVISION OF RADIO CORPORATION OF AMERICA

Camden, New Jersey, U. S. A.

CONTRACT NXsa-19698
CONTRACT DATE: 24 Dec., 1942
CONTRACT NXsa-23437
CONTRACT DATE: 13 Feb., 1943

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RESTRICTED

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CONTRACTUAL GUARANTEE

The equipment, including all parts and spare parts, except tubes, is guaranteed for a service period of ONE YEAR with the understanding that, as a condition of this contract, all items found to be defective as to design, material, workmanship or manufacture will be replaced without delay and at no expense to the Government; provided that such guarantee and agreement will not obligate the contractor to make replacement of defective material unless the failure, exclusive of normal expected shelf life deterioration, occurs within a period of TWO YEARS from the date of delivery of the equipment to and acceptance by the Government, and provided further, that if any part or parts (except vacuum tubes) fail or are found defective to the extent of ten per cent (10%) or more, but not less than two, of the total number of similar units furnished under the contract (exclusive of spares), such part or parts, whether supplied in the equipment or as spares, will be conclusively presumed to be of defective design, and as a condition of contract subject to one hundred per cent (100%) replacement by suitable redesigned units.

Failure due to poor workmanship while not necessarily indicating poor design, will be considered in the same category as failure due to poor design. Redesigned replacements which will assure proper operation of the equipment will be supplied promptly, transportation paid, to the Naval activity using such equipment, upon receipt of proper notice and without cost to the Government.

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

The above period of TWO YEARS and the Service period of ONE YEAR will not include any portion of the time that the equipment fails to give satisfactory performance due to defective items and the necessity for replacement thereof. All replacement parts will be guaranteed to give ONE YEAR of satisfactory service.

REPORT OF FAILURE

Report of failure of any part of this equipment during its life shall be made on form N. Aer. 4112 "Report of Unsatisfactory or Defective Material," in accordance with latest instructions issued by the Bureau of Aeronautics; 3 copies of this report shall be forwarded to the Bureau of Ships and 1 copy to the Inspector of Naval Material at Philadelphia, Pa.* Such reports of failure shall include:

(a) **CONTRACT NXsa-19698** — **CONTRACT DATE: 24 Dec., 1942**
CONTRACT NXsa-23437 — **CONTRACT DATE: 13 Feb., 1943**

(b) Equipment Model ....

(c) Serial No. of Equipment ....

(d) Date of Acceptance by Navy ....

(e) Date of delivery to contract destination ....

(f) Date placed in service ....

(g) Part which failed ....

(h) Nature and cause of failure ....

(i) Covered by contract guarantee ....

Yes or No

(j) Replacement needed ....

Yes or No

(k) Remedy used or proposed ....

* Copies required for other activities shall be forwarded in accordance with existing instructions.

AIRCRAFT RADIO DIRECTION FINDER EQUIPMENT

MODEL DZ-2

FREQUENCY RANGE: 15-70 KC and 100-1750 KC

24 VOLT DIRECT-CURRENT OPERATION

NAVAER 08-5Q-270

I

INTRODUCTION

1.1 The Model DZ-2 Aircraft Radio Direction Finder Equipment consists essentially of a rotatable loop antenna, a radio receiver, and a dynamotor-filter*. The equipment is intended for installation in all types of Naval heavier-than-air aircraft whose space limitations are such as to permit access for operation of the receiver and loop controls, and which, by absence of closed loops or other obstructions, permit successful direction finding. The equipment is designed for operation from an aircraft's 24-volt battery and serves either for radio reception or for direction finding. The Model DZ-2 equipment differs from the Model DZ-2a, only in respect to the position in which the loop antenna is mounted. The equipment covered by this instruction book is intended to be mounted in the position described in Paragraph 1.3.

1.2 The loop antenna consists of the Loop Antenna Assembly, Type CRV-69065, and the Loop Drive Assembly, Type CRV-69064. The Loop Antenna Assembly is comprised of two center-tapped, shielded loop windings contained within a streamlined, waterproof housing. One loop winding is mounted inside of the other, and the two windings are so adjusted that their planes intersect at an angle of 90 degrees in order to prevent intercoupling. The inner winding is used for reception on frequencies between 100 kc and 1750 kc, the outer on frequencies between 15 kc and 70 kc. The two windings are rotated as a unit by a central shaft actuated by means of the loop drive assembly. The loop drive assembly consists of an azimuth scale, handwheel and brake assembly, and the loop drive extension. One end of the loop drive extension fastens securely in the base of the loop antenna assembly.

1.3 The loop antenna assembly is intended to be rigidly mounted on the fuselage of the aircraft, the loop drive extension protruding down through the skin of the aircraft, serving as a support for the loop drive assembly. Bearings are read by means of one of two indices and azimuth scales. The proper index and scale are at all times automatically selected by means of a relay. A vernier drive and brake are incorporated to permit minute adjustment and locking of the loop antenna in any desired position.

1.4 The Radio Receiver, Type CRV- or CEX-46152, covers in six bands frequencies between 15 kc and 70 kc and between 100 kc and 1750 kc. On frequencies below 200 kc the selectivity characteristic of the receiver is very sharp, adapting it primarily for the reception of cw or low-frequency tone-modulated signals. On frequencies between 200 kc and 1750 kc the selectivity characteristics is sufficiently broad to permit reception of either voice or tone modulated signals. The receiver is shock-mounted by means of the Receiver Mounting Base, Type CRV- or CEX-46087, supplied with the equipment.

1.5 The Dynamotor-Filter, Type CRV- or CEX-21562 consists of a dynamotor and a filter unit. The dynamotor converts d-c power derived from the aircraft's 24-volt battery into the 205-volt d-c potential required for operation of the radio receiver. The filter is contained in the base of the unit and consists of a high-voltage filter (C303A, C303B, C305) and a line filter (L301, C301, C302). A Dynamotor-Filter Mounting Base, Type CRV- or CEX-21422 is supplied with the equipment.

1.6 All cable lengths depend on installation details. Some of the cables are furnished in bulk and must be cut to the required length for each installation.

* Refer to Paragraph 2.4 for list of additional equipment required but not supplied on contract.

II

EQUIPMENT

2.1 MAJOR UNITS—The Model DZ-2 Aircraft Radio Direction Finder Equipment consists of the following major component units:

Quantity	Navy Type No.	Description	Overall Dimensions	Weight
1 1	***-46152 ***-46087 See Note 1	Radio Receiver Mounting Base	10⅝″ H, 12″ W, 19⅝″ L	37.7 lbs.
1 1	***-21562 ***-21422 See Note 1	Dynamotor-Filter Mounting Base	6$\frac{1}{16}$″ H, 4$\frac{5}{16}$″ W, 7⅞″ L	7.2 lbs.
1	CRV-69064	Loop Drive Assembly	7½″ Max. Dia., Height 6⅛″	14.4 lbs.*
1		Loop Drive Extension**	1¼″ Dia.	0.8 lb. per ft.
1	CRV-69065	Loop Antenna Assembly	12⅝″ H, 25⅜″ L, 9$\frac{5}{16}$″ dia.	9.2 lbs.*
1		Loop Cable** (7 conductor)		0.43 lb. per ft.
1		Relay Cable**		0.1 lb. per ft.
1		Dynamotor Cable** (3 conductor)		0.25 lb. per ft.
1		Power Cable** (2 conductor)		0.25 lb. per ft.

* Weight indicated on nameplate of the Loop Drive Assembly includes the weight of the Loop Antenna Assembly and the weight of the Loop Drive Assembly. The Loop Drive Extension is not included in the weight shown.

** Length of cable depends on installation. Cable supplied in bulk.

*** For DZ-2 equipments manufactured on contract NXsa-23437 several of the component units have been manufactured by the Emerson Radio and Phonograph Company. The units so manufactured will be identified, **on the nameplates**, by the Navy number prefix "CEX." They are identical with those manufactured by RCA on the earlier contract NXsa-19698 carrying the Navy number prefix "CRV."

NOTE, 1: The total weight of the equipment will be approximately 61 pounds, plus the weight of the required Loop Drive Extension, Loop Cable, Dynamotor Cable and Power Cables as computed from the weights given in table above.

2.2 TUBE COMPLEMENT—The following Navy standard vacuum tubes are required and supplied with each equipment:

Quantity	Navy Type	Function	Former Navy Type
3	–6D6	1st R-F Amplifier (V102), 1st I-F Amplifier (V105), and 2nd I-F Amplifier (V106)	–38646
2	–6C6	1st Detector (V103), and 2nd Detector (V107)	–38636
2	–76	R-F Oscillator (V104), and I-F Oscillator (V108)	–38076
1	–41	Audio Amplifier (V109) (Output)	–38041

2.3 The following spare parts are supplied with each equipment:

2 Sets of spare tubes

1 Set of spare parts. (See table IV.)

Total weight of spare parts (box included), 27 pounds.

Weight of spare parts box, 16 pounds 5 oz.

2.4 ADDITIONAL EQUIPMENT REQUIRED

—The following additional equipment is required for a complete installation, but is not supplied under the terms of this contract.

Quantity	Description
1	600-ohm headset (including standard telephone plug)
8	8-32 round-head machine screws of suitable length for mounting the Receiver Mounting Base, Type CRV-46087
4	8-32 flat-head machine screws of length suitable for mounting the Dynamotor-Filter Mounting Base, Type CRV-21422
12	8-32 hexagon nuts
4	¼-28 round-head screws of suitable length for mounting the Loop Antenna Assembly, Type CRV-69065
4	¼-inch lockwashers
1	Set of brackets for securing the loop drive extension mounting clamps. Quantity and design of brackets to be determined by installation requirements.

2.5 A fixed, vertical "sense" antenna is also necessary for proper operation of the equipment. This antenna is not supplied with the equipment but sufficient information is given in Paragraph 4.23 to permit construction of a satisfactory antenna.

2.6 POWER SOURCE REQUIREMENTS—The equipment is designed to operate from a 24-volt storage battery "floating" across a generator the output of which varies from 22 to 30 volts. This system must be grounded on the negative side. The current drawn from the power source at varying supply voltages is as follows:

1.3 amperes at 22 volts
1.5 amperes at 26 volts
1.7 amperes at 30 volts

NOTE—An additional one-tenth ampere is required to hold the azimuth scale selector relay (K401) in position when required for operation on any one band. A momentary current of 3.5 amperes is required to actuate the relay in changing scales, after which only the one-tenth ampere holding current is required.

III

DESCRIPTION

3.1 DIRECTIONAL CHARACTERISTICS OF LOOP ANTENNAS—The function of a loop antenna as a unit of a direction finder equipment can best be understood by studying the loop signal voltage pattern as the loop is rotated about its vertical axis. The electro-magnetic flux lines of the incoming signal wave flow at right angles to the direction of signal travel. Consequently, when the loop is linked by the greatest number of lines of the magnetic component of the flux, its plane is at right angles to this flux component and hence lies in the direction of signal travel. This is the condition for maximum received loop voltage. When the loop is at right angles to the direction in which the intercepted signal is traveling, it is linked with minimum flux, and this produces a minimum signal in the receiver connected to the loop. The loop voltage thus varies with loop rotation as tabulated below, maximum loop voltage being taken as unity:

RELATIVE LOOP ANGLE

With Signal Direction	With Flux Lines	Loop Voltages
0°	90°	1.000
30°	120°	0.866
60°	150°	0.500
90°	180°	0
120°	210°	–0.500
150°	240°	–0.866
180°	270°	–1.000
210°	300°	–0.866
240°	330°	–0.500
270°	0°	0
300°	30°	0.500
330°	60°	0.866
0°	90°	1.000

3.2 The values in the table may be plotted as illustrated in Figure 37A, where the loop voltage is laid out on polar coordinates for relative angles of the loop plane to the direction of signal. This is known as a "figure eight" diagram.

3.3 It will be seen from the "figure eight" diagram that there are two maxima and two minima of signal voltage induced in the loop as the angle between its plane and the direction of signal travel changes through a complete 360 degrees. The minima are used for direction finding, because the signal output varies more rapidly per degree of rotation at a minimum point, hence a much sharper indication is obtained. Such a minimum is obtained when the plane of the loop is at right angles to the direction of signal.

3.4 Theoretically a vertical wire antenna has no directive effect. An identical signal voltage is induced in such an antenna regardless of the direction from which the signal emanates; in other words, its theoretical voltage pattern is a circle. It is likewise true that any loop may have some of the characteristics of such an ordinary untuned vertical antenna. This would induce voltages in quadrature (90 degrees out of phase) in the loop circuit and so affects the directive properties of the loop by broadening the minimum points, thus rendering observations difficult. Neighboring objects such as wires and struts induce similar effects into the loop, and further complicate matters by producing in-phase voltages, which in turn cause deviation in the indicated direction of the incoming signal.

3.5 "Antenna Effect," however, may be used in another way; namely, to determine the "sense" or absolute direction of a received signal. When a loop is properly balanced, two minima of signal voltage will be obtained indicating the "line" of signal direction. Should there be any question as to which one of the two minima indicates the direction to the signal source, the "sense" of the signal may be found by the method described in Paragraph 3.6.

3.6 If a signal voltage of proper magnitude and phase relation is introduced into the loop circuit from a vertical wire antenna, it will change the "figure eight" pattern into the cardioid, or heart-shaped pattern shown in Figure 37B. Here E_L represents the voltage produced in the loop, E_A the voltage from a resonant antenna and $E_A + E_L$ the sum of the two voltages. Minimum voltage in the cardioid figure occurs at only one point throughout a revolution of the loop, as does the maximum voltage. These minimum and maximum points are displaced 90 degrees from those of the "figure eight" diagram. Therefore, it is necessary to rotate the loop 90 degrees in one direction or the other to find the "sense" of the received signal. As has been explained, the minimum signal is more accurate for obtaining bilateral bearings. Similarly, minimum of the cardioid is used for obtaining "sense" indications. To determine "sense," the indication need not be sharp, therefore, the voltage E_A need not be of the exact value and phase required to produce a true cardioid diagram.

3.7 RECEIVER CRV- or CEX-46152—The receiver used in the Model DZ-2 Aircraft Radio Direction Finder Equipment is a superheterodyne, employing eight tubes. The circuit functions of the several tubes are shown in tabulated form in Paragraph 2.2. A schematic drawing of the entire equipment is shown in Figure 14, and a connection diagram in Figure 15. In tracing the receiver circuit by means of the connection diagram, reference must be made to the individual connection diagrams for the Antenna, Loop, R-F, Detector and Oscillator shields shown in Figures 17 to 21 inclusive. Photographs of these individual units are included in Figures 6 to 10 inclusive.

3.8 The receiver unit has a frequency range of 15 kc to 70 kc, and 100 kc to 1750 kc, these frequencies being covered in six bands as follows:

Band No.	Frequency Range in kc
1	15.0 kc to 32.5 kc
2	32.5 kc to 70.0 kc
3	100.0 kc to 200.0 kc
4	200.0 kc to 400.0 kc
5	400.0 kc to 800.0 kc
6	800.0 kc to 1750.0 kc

3.9 Selection of Frequency Range—Selection of the desired wave-band or frequency range is accomplished by means of a six-position 18-deck switch (S102A, B; S104A, B, C, D, E, F; S105A, B; S106A, B, C; S107A, B, C, D, E) actuated from the front panel by means of the control marked "FREQUENCY RANGE."

3.10 Non-Directional, Bilateral, and Unilateral Reception—The "SELECTOR" switch (S101, S103) controlled from the front panel and marked "NON-DIR.," "BILAT.," and "UNI-LAT.," serves in each of its three positions, to couple in at the r-f amplifier input the loop and vertical antenna signal voltages in the manner and relation necessary for the type of operation selected. Thus, with the control in the "NON-DIR." position, the vertical antenna is connected to the grid of the r-f amplifier tube, Type-6D6 (V102), through an adjustable coupling capacitor (C105), and the connections normally completed to the loop antenna are transferred to a dummy loop (coils L107 to L112, inclusive) to maintain the r-f tuned circuits in resonance. The essential circuit is then that shown in the functional diagram for non-directional operation, Figure 22.

3.11 These switches also are part of the circuit for controlling the operation of a relay (K401) in the Loop Drive Assembly, Type CRV-69064, selecting the proper azimuth scale for the band and type of reception desired. This action is covered specifically in Paragraphs 3.43 and 3.44.

3.12 When the "SELECTOR" switch is turned to the "BILAT." position the tuner loop windings (L113B to L118B) are connected to the loop antenna and the vertical antenna is disconnected and grounded. On bands 1, 3, 4, 5 and 6 one of two dummy antenna capacitors (C104) and (C124) is substituted for the capacity effect of the antenna in order to maintain resonance. On Band 2 neither of these capacitors is used; the characteristics of the loop circuit compensating for the effect of the antenna capacity. In either case the receiver is prepared for bilateral direction finding, i. e., the accurate determination of a line of bearing. A functional diagram of the circuit involved is shown in Figure 23.

3.13 When the "SELECTOR" switch is turned to the "UNILAT." position, the loop antenna is coupled to the loop tuner grid windings (L113C to L118C). Through the sense antenna capacitor (C101) the vertical antenna is coupled to the sense coils (L101 to L106), tuned by the "A" section of the main tuning capacitor (C123). By means of the loop tuner sense windings (L113A to L118A) and the "UNILATERAL ADJUSTMENT" resistor (R102) this sense antenna voltage is combined with the loop signal voltage in such phase and amplitude as will provide a cardioid directional pattern. This enables the operator to determine which bilateral bearing is correct—to determine the sense of the received signal. A functional diagram of the circuit required for unilateral reception is shown in Figure 24.

3.14 The control marked "UNILATERAL ADJUSTMENT" on the front panel is provided to facilitate obtaining a definite cardioid pattern. A variable resistor (R102), operated by this control, adjusts the amplitude of the voltage induced from the sense circuit to equal that produced by the loop at the common point of coupling (coils L113C to L118C).

3.15 The three trimmers marked "UNILAT. COUP.," "UNILAT. TRIM.," and "ANT. TRIM." (unilateral coupling, unilateral trimmer and antenna trimmer) are provided behind a slide on the front panel. These trimmers are used at the time of initial installation or when the sense antenna is changed in order to adjust the vertical antenna capacitance for unilateral and non-directional reception. See Figures 6 and 17.

3.16 Adjustment of the "ANT. TRIM." (C105) is operative only when the "SELECTOR" switch is in the "NON-DIR." position, the capacitor being used to adjust the antenna input circuit in order to compensate for variances in antenna capacitance.

3.17 The adjustments for the "UNILAT. COUP." (C101) and the "UNILAT. TRIM." (C102) are operative only when the "SELECTOR" switch is in the "UNILAT." position. The "UNILAT. COUP." is used to adjust the sense input network for sense antennas of various effective heights, while the "UNILAT. TRIM." is used to adjust this network for sense antennas of various capacities. These two controls are interlocking to some extent since an increase in capacitance of either trimmer necessitates a decrease in capacitance of the other.

3.18 **All necessary connections between the Loop Antenna, Type CRV-69065 and the Receiver, Type CRV- or CEX-46152 are established when the loop cable (W501) is plugged into the "LOOP" receptacle (J101) on the receiver front panel. Vertical antenna and ground connections are made by means of binding posts marked "A" (J-105) and "G" (J-106) respectively.**

3.19 **All connections to the Dynamotor-Filter, Type CRV- or CEX-21562, and to the power source (aircraft battery) are made by plugging the respective cables (W502 and W503) into the "DYNAMOTOR" and "POWER" receptacles (J102 and J103) provided on the receiver front panel. Operation of the "POWER" switch (S111) then controls both the receiver and the dynamotor, no current being drawn from the aircraft battery system when this switch is in the "OFF" position. Filtered d-c plate voltage only, is supplied by the dynamotor-filter, the tube heaters being supplied directly from the battery system. The circuit arrangement is such that proper filament voltage is supplied to each tube. The overall current is maintained within safe limits by the current limiting resistor (R137).**

3.20 Tuning—Tuning is accomplished by means of a gear-driven, five-gang variable capacitor (C123) which is controlled from the front panel by means of the knob and dial assembly marked "TUNING." Frequency is indicated by arbitrary dial divisions, there being a total of one thousand divisions for a complete sweep of the tuning capacitor.

3.21 The dial reading, which is the sum of the readings of the upper and lower dials appearing in the window, is calibrated against the frequency for each of the six bands as tabulated on the chart in the upper right-hand corner of the receiver panel.

3.22 The tuning mechanism is kept free from backlash by the use of spring-loaded split gears. It is also protected against accidental mis-alignment by means of a clutch on the tuning-knob shaft which slips when the knob is rotated beyond that point at which the capacitor rotor is engaged by the stop.

3.23 **R-F Input System—The loop tuner grid windings (L113C to L118C) are tuned by the "B" section of the main tuning capacitor (C123) and by the loop trimmer capacitors (C114 to C119, refer to Figures 14 and 18.) The grid of the r-f amplifier tube is shunted by a neon lamp (V101) as a protection against overloads. A gain-equalizing resistor (R103) controlling the bias on the r-f amplifier tube is geared to the tuning capacitor in such a manner that an approximately constant gain is afforded over each band.**

3.24 R-F Amplifier and First Detector—The r-f amplifier tube, Type-6D6 (V102) is coupled to the first detector Type-6C6 (V103) by means of a double tuned system. The r-f amplifier plate section consists of the r-f tuner coils (L119 to L124) and the r-f trimmer capacitors (C127 to C132), tuned by the "C" section of the tuning capacitor (C123). The detector-grid section consists of the first detector tuner coils (L125 to L130) and the first detector trimmer capacitors (C138 to C143), tuned by the "D" section of the main tuning capacitor (C123).

3.25 The signal is fed into the control grid of the first tube and the cathode is inductively coupled to a local oscillator (see Paragraph 3.26) generating a signal either 88 kc or 89 kc higher than that of the received signal, depending upon the frequency range being tuned. See Paragraphs 3.28 and 3.29. The detector tube is operated on such a portion of its characteristic as to cause the sum and difference between the frequencies of the local oscillator and the received signal to appear in its plate circuit. Since the plate circuit is tuned to either 88 kc or 89 kc which is the intermediate frequency, this frequency is passed while the undesired sum of the two original frequencies is effectively rejected. Connection diagrams of the R-F Amplifier and First Detector shields are shown in Figures 19 and 20, respectively.

3.26 R-F Oscillator—The local (r-f) oscillator which supplies this second r-f signal for the mixing operation described in Paragraph 3.25 is comprised of an oscillator tube, Type 76 (V104), the circuit involving switch decks, S107B, S107C, S107D, and S107E, and the associated coils and capacitors. For each frequency band covered by the receiver one complete set of coils (A, B and C sections of coils L131 to L136) is cut into the circuit by the action of S107C, S107D and S107E. The grid circuit consists of the untuned oscillator grid coils (L131A to L136A). Coupling of the oscillator to the detector is provided by the untuned oscillator output coils (L131B to L136B), inserted in the cathode return of the detector tube (V103), by the action of switch S107C and the oscillator plate circuit consists of the oscillator plate coils (L131C to L136C) and the associated oscillator plate tank capacitors C152 to C161, C210, section "E" of the main tuning capacitor (C123), and the fixed series padder capacitors (C162 to C167).

3.27 Coils L131C to L136C are individually flux-tuned. On the four low-frequency bands (15 kc to 70 kc and 100 kc to 400 kc) fixed padder capacitors C152, C154, C156, C158, and C210 are required in addition to the respective variable trimmer capacitors (C153, C155, C157 and C159). On band 5, the fixed padder (C210) and the trimmer (C160) are used. On band 6, only the trimmer (C161) is used. By means of switch S107B the "E" section of the tuning capacitor (C123) is connected across the oscillator plate coil for the band in use, the oscillator series capacitors (C162, C163, C164, C165, C166 and C167) being provided respectively for each of the six frequency ranges.

3.28 I-F Amplifier—The first i-f amplifier stage consists of the flux-tuned i-f input transformer (T101), the first i-f amplifier tube, Type 6D6 (V105), switch wafer S107A (actuated by the "FREQUENCY RANGE" switch), and the associated circuit. Coupling from the first detector or conversion tube is conventional. The transformer is designed to permit two degrees of selectivity, the overall selectivity characteristic of the i-f system being largely determined by this first i-f amplifier stage. Switch wafer S107A is so wired that on bands 1, 2 and 3 (frequencies below 200 kc) only the normal primary and secondary are employed. This secondary is loosely coupled to the primary and therefore provides an extremely sharp selectivity characteristic. On Bands 4, 5 and 6 (200 kc to 1750 kc) a tertiary winding is included in the secondary circuit, greatly increasing the coupling between primary and secondary providing, consequently, a relatively broad pass-band. Thus, on frequencies below 200 kc, the receiver provides a sharp selectivity characteristic particularly adapted for the reception of cw signals. The effect upon mcw signals is to attenuate sharply the higher modulation frequencies. Reception of mcw signals on frequencies below 200 kc is limited therefore to signals bearing low-frequency tone modulation.

3.29 Introduction of the tertiary coupling coil (Paragraph 3.28) lowers the resonant frequency of the first i-f transformer (T101). It is for this reason that the r-f oscillator is adjusted to a frequency 89 kc higher than the r-f and first detector input frequency on Bands 1, 2 and 3 where sharp selectivity is desired, and 88 kc higher than the tuned input circuits on Bands 4, 5, and 6.

3.30 The second i-f stage consists of the transformer T102, the 2nd i-f amplifier tube, Type-6D6 (V106) and the associated circuit. The transformer is flux-tuned by means of adjustable cores and the coupling between primary and secondary is sufficient to provide a relatively wide pass-band. The transformer is tuned to 88 kc, the pass-band being sufficiently wide to accept without undue attenuation the 89 kc signal developed on Bands 1, 2 and 3, when sharp selectivity is introduced by the first i-f stage.

3.31 Second Detector—The second detector tube, Type-6C6 (V107) operates as a conventional biased-pentode detector. Coupling to the grid of this tube from the second i-f stage is accomplished by means of the third i-f transformer (T103). This transformer has similar characteristics, and is adjusted in the same manner as T102.

3.32 For satisfactory reception of cw signals it is necessary that a second signal, at a frequency adjacent to that of the i-f signal be introduced from a cw oscillator. (See Paragraph 3.33). The detector then demodulates the heterodyne or beat note of the two frequencies, producing an audible tone.

3.33 CW Oscillator—The cw oscillator consists of the cw oscillator tube, Type-76 (V108) and the transformer assembly T104. All essential circuit components are assembled and wired within the transformer assembly. The oscillator output is introduced into the i-f channel at the primary of the third i-f transformer (T103) by means of the capacitor C177. The cw oscillator is controlled from the front panel by means of the switch marked "CW-MCW."

3.34 The cw oscillator is tuned by adjusting the core of the oscillator transformer (T104). This core should be so adjusted that the oscillation frequency is exactly 88 kc. Thus, in receiving cw signals on Bands 1, 2 and 3, the audible signal, using the cw oscillator, will be a note of approximately 1000 cycles when the received signal is tuned to exact resonance (the beat note equals the difference between i-f and oscillator frequencies). This signal will have single-signal characteristics, i. e., it will appear at only one point on the dial under normal operating conditions. In receiving cw signals on Bands 4, 5 and 6, the frequency of the audible tone will increase symmetrically on either side of zero beat (exact resonance with a received signal).

3.35 Audio Filter Band-pass—Two degrees of audio selectivity are afforded by an audio filter band-pass network comprised of the a-f filter band-pass transformer (T106), the ganged "AUDIO" toggle switches (S108 and S109) and the associated resistors and capacitors. The use of this filter is optional; with S108/S109 in the "BROAD" position a portion of the a-f filter band-pass transformer (T106), the ganged circuit as is the a-f equalizing resistor (R128) and the a-f equalizing capacitor (C178). The overall effect is to form an equalizer for a frequency of approximately 2000 cycles. With S108 and S109 in the "SHARP" position the equalizer resistor and capacitor are removed from the circuit and the entire a-f filter band-pass transformer is employed. This filter is very sharply peaked at 1020 cycles and greatly attenuates all frequencies except those comprising a narrow band centered at this frequency. The effect is to provide additional discrimination against background noise in the reception of cw signals or mcw signals modulated with 1020-cycle tone.

3.36 Power Amplifier—The audio system consists of the audio amplifier power tube, Type-41 (V109), the output transformer (T105). The grid of the amplifier tube is coupled to the preceding filter band-pass unit by means of the coupling capacitor (C179). Capacitors C180 and C204, and resistor R129 provide audio compensation. The system is capable of delivering more than 300 milliwatts into a non-inductive, 600-ohm load with less than 10% total distortion. The output system terminates at the jacks (J104, J105) on the front panel of the receiver.

3.37 Volume and Sensitivity Control—Provision is made for controlling the sensitivity and output of the receiver by means of a dual volume control (R135A, R135B), front panel mounted, and marked "VOLUME." Clockwise rotation of the control increases the sensitivity of the receiver. The potentiometer R135A increases the sensitivity of the receiver by decreasing the bias on the r-f amplifier tube (V102) and the second i-f amplifier tube (V106). However, the gain of the r-f tube is further controlled by the action of the gain equalizer resistor (R103). (See Paragraph 3.23.) The second section of the manually operated dual control circuit consists of R135B, the first i-f amplifier cathode resistor (R117), the antenna equalizer resistor (R139), and the antenna attenuator resistor (R140) and the bias bleeder resistor (R141). These, in conjunction with sections of the selector switch and frequency range switch, cause the first i-f amplifier tube (V105) to be operated at maximum gain for bilateral or unilateral reception and at a predetermined gain adjusted by means of R139 (the control marked "ANTENNA EQUALIZER") when used for non-directional reception. Resistor R139 serves to vary the cathode bias on the second i-f amplifier tube (V106). The potentiometer R135B serves to shunt this resistor as the volume control is advanced, thus maximum sensitivity can be attained regardless of the adjustment of the antenna equalizer resistor R139.

3.38 Plate Supply Filtering—Additional filtering of the d-c plate voltage supplied the receiver is provided by the filter capacitors, C183A, C183B, C184A, C184B, C185A and C185B contained in the receiver unit.

3.39 DYNAMOTOR FILTER, TYPE CRV- OR CEX-21562—The Dynamotor Filter, Type CRV- or CEX-21562, is designed for continuous duty with a rated power output of 220 volts d.c., at 70 milliamperes. The required power input to the low voltage winding under this condition is 1.23 amperes at 27.9 volts d.c. The armature is supported upon ball bearings and turns at 4400 r.p.m. A high voltage filter consisting of capacitors C303A, C303B and C305, is incorporated in the unit. See the schematic drawing, Figure 14 and the connection drawing, Figure 27. Additional filter capacitors are contained in the radio receiver. (Refer to Paragraph 3.38.)

3.40 A low-voltage filter, consisting of the capacitors C301, C302 and C304, and the low-voltage filter coil L301 are provided to prevent the dynamotor from feeding interference into the receiver by way of the heater circuits. Radiated interference, which might be introduced into the loop at frequencies below 50 kc. is minimized by means of a shield which is mounted upon the dynamotor-filter base, completely shielding the unit.

3.41 LOOP ANTENNA EQUIPMENT—The loop antenna and loop mounting assembly consists essentially of two complementary units, i.e., the loop antenna assembly, Type CRV-69065, and the loop drive assembly, Type CRV-69064. These two units are connected mechanically by the loop drive extension.

3.42 LOOP ANTENNA ASSEMBLY, TYPE CRV-69065—The loop antenna, Type CRV-69065, consists of two loop windings, one designed for use on frequencies between 15 kc and 70 kc, and the other for use on frequencies between 100 kc and 1750 kc. Each loop antenna is individually shielded and both are contained within a light, streamlined housing. The proper loop winding for operation on any frequency band is selected by sections S104D and E of the "FREQUENCY RANGE" switch and sections S103A and B of the "SELECTOR" switch.

3.43 A schematic diagram of the loop antenna unit is shown in Figure 14. The low-frequency antenna consists of coils L401A and L401B, and the high-frequency antenna of coils L402A and L402B, the mid-point of each pair being grounded to provide a symmetrical loop circuit with respect to ground. The axis of the high-frequency winding is at right angles to that of the low-frequency winding. Attached to the shaft used to rotate the loop are two azimuth scales, one above the other, their zero points displaced by 90° with respect to each other. This is necessary for two reasons: (1) to take into account the 90-degree relationship of the two loop windings, and (2) to compensate for the 90-degree relationship between minimums for "BILAT." and "UNILAT." types of operation. An index and mask is shifted vertically from one scale to the other so that the proper scale is visible for the type of operation and the loop winding being used. This is accomplished automatically by a relay (K401) in the loop drive assembly energized by grounding the relay circuit through a portion of the "FREQUENCY RANGE" switch (terminals 7 and 11 of S104D, terminals 8 and 9 of S104C and terminals 6, 7 and 8 of section S103A of the selector switch). Shown below are the scale and relay positions obtained for all combinations of "SELECTOR" and "FREQUENCY RANGE" switch settings.

Selector	Visible Scale Bands 1 & 2	Visible Scale Bands 3 to 6, incl.
NON-DIR. Relay inoperative (See Note)		
BI-LAT.	UPPER	LOWER
UNI-LAT.	LOWER	UPPER

NOTE—Under this condition the relay is not energized on any of the frequency bands and the upper scale is visible. However, the loop is not used in the "NON-DIR." position and therefore the visible azimuth scale has no significance.

3.44 The selection of the proper loop winding is accomplished by means of the "FREQUENCY RANGE" switch. Three sections of this ganged switch are involved: S104A, S104D, and S104E. Section S104A transfers the loop cable compensating capacitor (C202) from one loop winding to the other and connects the loop cable padder capacitor (C206) in the circuit for all bands except Band 6 (800 kc to 1750 kc.) Sections S104D and S104E connect the proper loop winding to the respective loop primaries of the loop tuner coils (L113B to L118B, inclusive). By means of sections S103A and S103B of the "SELECTOR" switch, the loop windings are disconnected from the loop primaries of the loop tuner coils and grounded when the "SELECTOR" switch is in the "NON-DIR." position. The azimuth scale relay (K401) is located in the upper part of the azimuth scale housing (loop drive assembly). Connections from the receiver to the loop antenna and relay are brought out at the loop cable receptacle (J101). Cable W501 connects from J101 to J401, the loop cable connector located in the base of the loop antenna assembly. Two leads for the relay (K401) are brought out at J402 and from this point cable W504 is used to inter-connect from the loop antenna assembly to receptacle J403 and relay K401 in the loop drive assembly.

3.45 The underside of the loop antenna assembly is rigidly bolted to the reinforced skin of the aircraft. The loop housing and base are mounted above the fuselage and the shaft or loop drive extension is extended down inside the aircraft. Two mounting clamps are provided on the loop drive extension so that the loop drive assembly can be rigidly mounted by means of straps when excessive vibration is encountered. Normally, the use of these straps is not required. Electrical connections between the loop windings and the loop cable connector (J401) are completed by means of the slip-rings and brushes, permitting continuous electrical circuits as the loop is rotated through 360 degrees. See Figure 32.

3.46 The loop mounting pedestal is supplied with a shaft of sufficient length to place the bottom of the handwheel at 36½ inches, 34 inches or 12 inches, as required, from the bottom of the loop antenna assembly.

3.47 LOOP DRIVE ASSEMBLY, TYPE CRV-69064—The loop drive assembly, Type CRV-69064, constitutes a means for rotating the loop windings, locking them in any desired position, and determining the indicated azimuth by means of one of two indices and azimuth scales contained in the pedestal base. A handwheel is provided to facilitate rotation of the loop antenna. The indices and azimuth scales are located just above the handwheel, enclosed in a protective housing and visible through a glass window. A brake lever, conveniently located, serves to engage a vernier adjustment. When this vernier is brought into play the loop can be rotated only by means of the vernier adjustment. An adjustable detent mechanism prevents drifting of the vernier control under sustained vibration.

3.48 The azimuth scales are graduated in 1-degree steps from 0 to 360 degrees, each 10-degree interval being numerically indicated.

3.49 The azimuth scale and brake housing may be set at any of four positions with respect to the loop drive extension. This is accomplished by repositioning a Bristo screw (exposed by unscrewing the threaded collar on the top of the housing) and setting it in any one of the four holes provided in the outer sleeve of the loop drive extension.

NOTE: Before making this adjustment it is necessary either to release the brake or to loosen the squeeze nut locking the azimuth scales assembly to the vertical shaft of the assembly.

3.50 The azimuth scales and drive assembly is positioned with respect to the loop antennas by loosening the squeeze nut on the bottom of the vertical shaft. This squeeze nut is located underneath the handwheel and is easily accessible. This adjustment and the operation described in Paragraph 3.49 are fully explained under "Installation," Paragraphs 4.14 to 4.16.

3.51 EQUIPMENT CABLES—A seven-conductor loop cable (W501), from 5 to 10½ feet long, as required for a specific installation, is used for making connections between the loop antenna and the receiver. The two pairs of conductors for the loop are each separately shielded from the ground wire and the relay-supply wire. The entire group of wires is enclosed in a synthetic-rubber-covered, flexible, metallic conduit. This cable is equipped with two 7-contact plugs for connection to the receptacle (J401) at the loop drive assembly and to the receptacle marked "LOOP" (J101) on the receiver front panel. Threaded connectors serve to retain the plugs in their respective jacks.

3.52 A two-conductor cable (W504) of proper length for the specific installation is supplied for completing the relay connections between sockets J403 at the azimuth scale housing and J402 at the top of the loop drive extension.

3.53 The three-conductor dynamotor cable (W502), for making connection between the receptacle (J102) marked "DYNAMOTOR" on the front panel of the receiver and the receptacle J301 on the dynamotor-filter, must be fabricated, using the bulk cable and fittings provided. Similarly, a two-conductor power cable (W503) must be fabricated for making connection between the "POWER" socket (J103) on the receiver panel and the junction box where primary power is to be derived. These cable assemblies are shown in Figures 33, 34, 35 and 36.

3.54 LINE FILTER—In order to reduce noise in the equipment due to interference entering through the battery cable a filter is provided which should be connected as shown in Figures 14, 47, 48 and 49. It consists of coils L138 and L139 and capacitors C212 and C213 which are completely shielded. In some DZ-2 equipments this filter was not installed at time of shipment. Instructions for installing the filter in such units are given in paragraph 4.41. If the filter is not supplied with the equipment for which this instruction book is provided, modifications in the circuits as indicated by comparing Figures 14 and 15 with Figures 47 and 48 should be particularly noted.

IV
INSTALLATION

4.1 RECEIVER, TYPE CRV- OR CEX-46152—Unlock the snapslides and remove the receiver mounting base CRV- or CEX-46087.

4.2 Secure the mounting base to a principal structure of the aircraft using eight No. 8-32 round-head screws and nuts. The location should be such as to allow normal operating access to the panel controls. The required clearances and mounting hole dimensions are shown in Figure 29.

4.3 Replace the receiver on the mounting base and close the snap slides. Lock the snap slides in place using safety wire.

4.4 DYNAMOTOR-FILTER, CRV- OR CEX-21562—Unlock the snapslides and remove the dynamotor-filter mounting base CRV- or CEX-21422.

4.5 Secure the base to a principal structure of the aircraft using four No. 8-32 flat-head screws and nuts. The location chosen should be at some point within a reasonable distance of the receiver location but as far as possible from the loop antenna. Allowance must be made for accessibility to the cable receptacle. All necessary clearances and mounting dimensions for the base are shown in Figure 31.

4.6 Replace the dynamotor-filter unit on its base and close the snapslides. Lock the snapslides in place using safety wire.

4.7 LOOP DRIVE ASSEMBLY, TYPE CRV-69064, LOOP DRIVE EXTENSION, AND LOOP ANTENNA ASSEMBLY, TYPE CRV-69065—The loop antenna assembly should be mounted on the center line of the ship or as close thereto as is possible. The location chosen should be such that convenient access to the handwheel and brake controls, and unobstructed visibility of the azimuth scales are provided for the operator controlling the receiver. Also, the location chosen should be such that the loop antenna assembly when mounted above the fuselage will be well removed from any closed loops or other obstructions which might interfere with successful direction finding.

4.8 With such a location selected, mounting holes, as shown in Figure 30 should be cut through the skin of the aircraft and the skin reinforced preparatory to installation of the loop assembly.

4.9 Refer to Figure 32 and disassemble the loop drive assembly in the following manner:

(a) Loosen the collar (G) using short lengths of 1/4-inch drill rod as a wrench.

(b) Remove the Bristo teat-screw (I) normally covered by the collar (G).

(c) Loosen the squeeze nut (B) on the under side of the handwheel which secures the handwheel to the inner or driving shaft (H).

(d) Drop the assembly off the shafts.

4.10 Under certain installation conditions an alternative method of disassembly may be necessary as follows:

(a) Loosen the collar (K) using the 1/4″ drill rods.

(b) Remove the screw (L) from the inner shaft through the exposed hole in outer shaft.

(c) Remove the Bristo teat-screw (O) using the wrench which is supplied.

(d) Pull the shafts (H) and (J) from the base of the loop assembly.

NOTE: The method outlined in Paragraph 4.9 is to be preferred.

4.11 It is not recommended that the loop housing be disassembled from the metal base. The two loop antennas are at right angles to each other and must be folded to the same plane before the housing can be removed. This procedure is fully described under "Service" Paragraphs 6.81 and 6.82 and requires no description here as nothing is gained by such disassembly at this time.

4.12 To install the loop antenna assembly and loop drive assembly, proceed as follows:

(a) Bolt the loop antenna assembly to the aircraft structure, using the four 1/4-28 bolts provided. The center line of the streamlined loop housing should be parallel to the longitudinal center line of the aircraft.

4.13 Re-assemble the loop drive extension shafts and the loop antenna assembly by proceeding in reverse order with the operations described in Paragraph 4.9 (a) to (d) or 4.10 (a) to (d).

NOTE: **The inner shaft has an offset slot milled in its upper end. This slot engages an offset blade on the end of the drive shaft so that the two can be assembled only in one relation to each other. To reassemble the shafts slowly rotate the shaft until the offset blade engages in the slotted shaft. Both shafts engage within a sleeve. If at any time it should become necessary to remove the upper shaft, this may be accomplished after removing the set-screw (N) permitting withdrawal of the upper shaft.**

4.14 If the loop drive assembly (handwheel azimuth scales and brake housing) was not disassembled from the loop drive extension shafts previous to installation, it is possible that partial removal of same will now be necessary in order to procure the proper angular position of the azimuth scales and index window. Proceed as follows:

(a) Loosen the collar (G) using two pieces of 1/4-inch drill rods as a wrench.

(b) Remove the Bristo screw (I) normally covered by the collar.

(c) Release the brake lever (C) and rotate the housing assembly to any of the four positions determined by the four holes (in quadrature) which are provided. If an intermediate position is required, drill a new hole in the outer shaft at the desired position.

(d) Replace the Bristo screw (I) and the collar (G).

4.15 To complete the installation it is necessary to set the zero-azimuth scale calibration with respect to the index and the loop antennas. To do this it is necessary to know the position of the loops inside the housing. This is determined by inserting a small rod or the shank of a number 6 drill in the small hole (M) located just below the threaded bushing and which passes through the outer shaft under the collar (K). Rotate the loop shaft slowly until this rod drops into place and locks the shaft (H) in the proper position.

4.16 This position is zero-azimuth and the azimuth scale should be set to 0 azimuth if the shutter relay is energized, or to 9 (90°) if the shutter relay is de-energized. To position the azimuth scale, loosen the squeeze nut (B) beneath the handwheel and rotate the handwheel until the index coincides with the zero calibration on the scale. Tighten the nut, keeping the scale as close to zero as is possible taking care that the handwheel is held against the wrench pressure. If pressure is applied to this squeeze nut without holding the handwheel, the inner shaft will be twisted with resultant damage. Final and precise setting of the scale is accomplished by loosening the four screws (A) in the elongated slots near the outer edge of the under side of the handwheel, and moving these screws until the index (D) coincides with the proper setting of the azimuth scale as given above. Retighten the four screws.

See the note following Paragraph 4.24.

4.17 Should it be necessary to shorten the loop drive extension, refer to Figure 32 and disassemble the extension shafts from both the loop antenna assembly and the loop drive assembly, following the instructions outlined in Paragraph 4.9 and 4.10. Using a lathe to insure a perpendicular cut-off, remove a sufficient length from the lower end of the outer tubing (J) to reduce the extension to the required length. Cut a similar length from the lower end of the inner tubing (H), taking care to remove all burrs from the cut.

Reassemble the extension shafts to the loop assembly. Place the loop drive assembly on the shafts and rotate the housing to the desired angular position. Drill a new hole through the outer tubing and bolt the housing to the shaft. Note the instructions outlined in Paragraph 4.14.

4.18 INSTALLATION OF CABLES—CAUTION! AVOID ALL BENDS HAVING A RADIUS LESS THAN SIX INCHES: The plugs on all cables are fastened into their corresponding receptacles by means of a threaded coupling ring which is part of each plug. To remove the plug from the receptacle, the coupling ring must be loosened.

4.19 Connect the loop cable (W501) to the receptacle on the loop pedestal (J401) and run it by any convenient route to the "LOOP" receptacle on the receiver unit (J101). Anchor the cable to the aircraft structure at as many points as are necessary to keep the cable from whipping about. Be particularly careful not to run the cable where it might interfere with the controls of the aircraft. Protect the cable against abrasion at any points where it touches aircraft structural members, either by anchoring the cable firmly at such points, or binding the cable with tape.

CAUTION: The equipment was aligned for a definite length of loop cable before shipment from the factory. Refer to Maintenance, Paragraph 6.86. If the cable length does not agree with the cable data given in Paragraph 6.86, the realignment procedure given therein should be followed.

4.20 The dynamotor cable (W502), which connects the "DYNAMOTOR" receptacle on the receiver unit (J102) to the receptacle on the dynamotor unit (J301), must be fabricated as shown in Figure 34.

4.21 The power cable (W503) must be fabricated (refer to Figure 35) of sufficient length to connect at a junction box from which 24 volts may be obtained. (Preferably the junction box nearest to the aircraft battery.) A ⅜-inch coupling should be used for entering the junction box. Connect the black wire to the grounded, negative side of the 24-volt circuit and the red wire to the positive, 24-volt terminal in the junction box. Run the cable to the receiver, observing the same precautions as are outlined in Paragraph 4.19, and connect to the "POWER" receptacle (J103). The dynamotor-filter should be mounted as far from the loop antenna as possible and still convenient of access from the receiver.

4.22 A 600-ohm headset (not supplied with the equipment) should be connected at either of the "PHONES" jacks (J104, J107).

4.23 SENSE ANTENNA—The sense antenna should be of the common forms of aircraft antenna having an effective height of from 0.25 meter to 2.5 meters and a capacitance of from 150 mmfd. to 800 mmfd. provided that the following precautions are observed:

(a) The sense antenna and loop should be symmetrical with respect to the fore and aft center line of the aircraft if horizontal pick-up is to be avoided, and if the same quadrantal error is to be obtained on either side of the aircraft.

(b) It must not be so close to the loop as to cause distortion of the field pattern of received signals as intercepted by the loop. A minimum of 2 feet is necessary.

(c) If good indications on radio range cones-of-silence are desired, the sense antenna should be mounted below the structure of the aircraft and should be a vertical antenna or a symmetrical antenna of the inverted "T" type.

CAUTION: Burn-out of UNILATERAL ADJUSTMENT controls may result from excessive pick-up, on UNILATERAL operation, from transmitters operating on the aircraft. It is suggested, in conditions when such excessive pick-up is encountered, that a relay be installed to disconnect the sense antenna from the direction finder equipment or to ground the direction finder antenna post, when the aircraft transmitter is turned on. This troublesome effect occurs only when the direction finder is in the UNILATERAL operating position, whether the equipment is turned "ON" or "OFF." If a relay cannot be conveniently installed, it is suggested that a placard be posted requiring that the set be kept in the BI-LAT or NON-DIR position when not in use.

4.24 The sense antenna should be connected to the antenna post "A" (J105) of the radio receiver.

NOTE: If the antenna position in relation to the aircraft structure is reversed with respect to the initial calibration (i.e., a change is made from an antenna above the ship to one below, or vice versa) the "sense" will be reversed from that of the initial calibration. See paragraph 6.85.

4.25 The ground post "G" (J106) should be connected to a good ground on a principal metallic structure of the aircraft. As is necessary with all aircraft in which radio apparatus is installed, all structural members of the aircraft must be well bonded together. In all cases the ground lead should be as short as possible.

4.26 ADJUSTMENT FOR NON-DIRECTIONAL RECEPTION—To adjust the equipment for non-directional operation proceed as follows:

(a) Turn the "POWER" switch "ON," the "SELECTOR" switch to "NON-DIR." and the "FREQUENCY RANGE" switch to the "800-1750" position.

(b) Tune in a signal at approximately 1750 kilocycles.

(c) Adjust the "VOLUME" control to a comfortable level below that at which overloading occurs.

(d) Open the slide cover on the three adjustments ("ANT. TRIM.," "UNILAT. TRIM.," and "UNILAT. COUP.") near the center of the receiver panel.

(e) Using an insulated alignment screwdriver, adjust the "ANT. TRIM." capacitor (C105) for maximum volume, reducing the output by means of the "VOLUME" control if the receiver shows signs of overloading. If an output meter is available, it should be plugged into either of the two "PHONES" jacks to obtain a more accurate indication for optimum adjustment.

4.27 ADJUSTMENT FOR DIRECTION FINDER OPERATION—Adjustment of the "UNILAT. TRIM." and "UNILAT. COUP." controls is accomplished as follows:

(a) Leaving the "POWER" switch, "TUNING" dial and "VOLUME" control in their respective positions as outlined in Paragraph 4.26 (a), turn the "SELECTOR" switch to "BILAT." the "FREQUENCY RANGE" switch to Band 3 (100 kc to 200 kc) and tune in a signal at approximately 200 kilocycles. The position of the signal source with respect to the bearing of the ship must be known.

(b) Swing the loop to obtain the signal bearing as indicated by the correct rather than the reciprocal of the two nulls obtained. It is essential that the **correct** bearing rather than the reciprocal be used for further reference.

(c) Set the "SELECTOR" switch to "UNILAT." and rotate the loop 90 degrees so that the azimuth scale reading is the same as that of the previously indicated bearing. See Paragraph 4.27 (b). (The index and shutter will have automatically shifted so that a scale displaced by 90 degrees with respect to the first will now be visible.)

(d) Turn the "UNILATERAL ADJUSTMENT" (R102) and attempt to obtain a minimum signal. If the signal does not decrease, turn the loop 180 degrees from the last setting and vary the "UNILATERAL ADJUSTMENT" until a minimum signal is obtained.

(e) The minimum signal should occur at a reading on the visible scale which is the same as the correct bearing rather than the reciprocal. If it occurs at the latter setting, it will be necessary to reverse the azimuth scale to correct this 180-degree ambiguity before proceeding further. Refer to Paragraph 4.16.

(f) Using an insulated alignment screwdriver, adjust the "UNILAT. COUP.," capacitor (C101) and the "UNILAT. TRIM.," capacitor (C102) to get the best unilateral null. Since these two controls are electrically interlocking they should be adjusted alternately. In general, the "UNILAT. COUP." is used to compensate for antennas of various effective heights, and the "UNILAT. TRIM." is used to maintain circuit resonance when the "UNILAT. COUP." is changed. The "UNILATERAL ADJUSTMENT" (R102) should be varied simultaneously with the adjustment of these two capacitors, as it has a very marked effect on the unilateral (front-to-back) ratio.

4.28 It will be seen that there are many adjustment combinations which will give a good unilateral ratio at any one frequency. The adjustments should be checked on all bands to make certain that the best average combination of adjustments is attained. Careful alignment at 200 kilocycles on the "100-200" band will normally give acceptable performance on all bands.

4.29 The setting of the "UNILATERAL ADJUSTMENT" (resistor R102) should be observed. It will be noted that increasing the capacitance of the "UNILAT. COUP.," capacitor (C101) increases the required amount of resistance for R102. Capacitor C101 should be so adjusted that the "UNILATERAL ADJUSTMENT" control operates around mid-scale on Band 2 (32.5 kc to 70 kc) and does not reach "O" on Band 6 (800 kc to 1750 kc) or "50" on Band 1 (15 kc to 32.5 kc).

4.30 Close the slide cover over the trimmers after completing the adjustment.

4.31 ANTENNA EQUALIZER ADJUSTMENT—The "ANTENNA EQUALIZER" resistor (R139) should be adjusted as follows:

(a) Set the "SELECTOR" switch on "BILAT." and the "FREQUENCY RANGE" switch on Band 4 (200 kc to 400 kc) and tune in a signal at approximately 400 kilocycles. Choose a signal with a known field strength of about 500 microvolts per meter. Orient the loop for maximum signal pick-up.

(b) Adjust the "VOLUME" control for a comfortable volume in the headphones (approximately 10 milliwatts).

(c) Turn the "SELECTOR" switch to the "NON-DIR." position.

(d) Open the "ANTENNA EQUALIZER" cover and with a screwdriver adjust R139 until the same volume is obtained in the headphones on both bilateral and non-directional reception.

4.32 QUADRANTAL ERROR CALIBRATION—The wave front of a signal arriving at the loop is distorted by the structure of the airplane on which the loop is mounted, resulting in errors in the bearing taken on the signal. The error known as a Quadrantal Error is usually maximum on signals arriving from directions at approximately odd multiples of 45° (45°, 135°, 225°, and 315°) as measured clockwise around the plane from a line through the nose and the tail of the aircraft. Zero degrees is defined as the arrival angle of signals from stations dead ahead of the aircraft. The error is usually zero at zero degrees, 90°, 180°, and 270°. The effect of the metal airplane structure is to distort the radio waves along the length of the ship so that signals from stations forward of the wings are crowded closer to the ship's heading, while signals from stations aft of the wings are crowded closer to the ship's tail. An error curve plotted in rectangular coordinates (error angle as ordinate; signal arrival angle as abscissa) usually approaches a double frequency sine wave in appearance. However, in the case of large wing areas, the effect of the wings is similar to that of the fuselage and the error curve is more irregular.

4.33 Symmetrical placement of the loop and sense antenna (and any other antenna) is desirable. With such an arrangement, the error curve more closely repeats the errors obtained from zero degrees to 180° over the region from 180° to 360°.

4.34 If many planes of one type are to have the direction finder equipment installed, uniformity of installation is important. It has been found practical to take one set of data for the error curve and apply it to all direction finders installed on like planes having like installations. The advantages are obvious.

4.35 The error curve will be found to change as the radio frequency is changed. Thus, if the equipment is to be used over its entire frequency range, data must be taken at several frequencies. The error is usually small at the lower radio frequencies, being in some cases negligible, but increases as the radio frequency is increased. A practical method of applying the proper correction at any frequency is that of plotting on one chart error curves for several frequencies over the frequency range of the equipment, thus enabling the operator to interpolate between the curves for the specific frequency of the signal on which the bearing is taken. The number of curves required will depend upon the order of change of the error curve as frequency is changed which in turn will depend upon the type of airplane and the installation. It is suggested that data be taken for the following frequencies:

Band	Frequency	Band	Frequency
1 . . .	20 kc	5 . . .	800 kc
2 . . .	50 kc	6 . . .	1000 kc
3 . . .	100 kc	6 . . .	1500 kc
4 . . .	200 kc		
5 . . .	400 kc		

4.36 The data for the error curve should be taken with the aircraft in flight. Data taken with the ship on land or floating on water are usually not applicable for bearings taken during flight. Direction finder equipment to be used on seagoing aircraft while the ship is afloat on water should have a separate calibration of quadrantal error with the ship afloat. The difference between flight data and the stationary position data increases with frequency. The difference is usually much greater when the loop is mounted beneath the aircraft than when the loop is above.

4.37 One method of obtaining flight data for the error curves is as follows:

(a) Use the direction finder equipment as a homing device (loop set at zero degrees azimuth) with the equipment tuned to a station at least 100 miles distant. The signal strength of the station must be sufficient to allow bearing accuracies better than plus or minus one-half degree. While flying in the homing direction set the ship's directional gyro at zero degrees.

(b) Keep the aircraft approximately horizontal and fly in a circle of one to one and one-half miles in diameter. At given intervals take simultaneous readings of the directional gyro compass and the observed bearing taken with the direction finder equipment.

(c) The differences between the simultaneously recorded readings should be plotted as the ordinate on rectangular coordinates against the observed direction finder bearing as the abscissa. For example, if the gyro reading should be 45° and the observed d-f bearing should be 42.5°, the d-f bearing must be corrected by adding 2.5° to give the true 45° bearing. Thus at 42.5° on the abscissa a point would be plotted as **ADD 2.5°**. The ordinate scale should have an "ADD" scale above the zero reference line and a "SUBTRACT" scale below the zero reference.

4.38 An alternative method of obtaining flight data for the error curves is similar to that outlined in Paragraph 4.37, except that the station may be closer to the point of bearing observation (about 5 to 10 miles) and the ship flown over a marker on the ground (such as a readily identified building or a crossing of two roads). The ship is flown over the marker while homing on the station. The gyro compass is set to zero and checked at the time the marker is crossed. Thereafter different angles of flight approach are made to the marker. At each crossing of the marker, simultaneous readings of the gyro and the d-f azimuth are taken. The differences between the gyro and d-f bearings are plotted as outlined in Paragraph 4.37 (c).

4.39 The data for error curves of aircraft afloat may be taken by swinging the ship about a point of anchorage as an axis and observing differences between the d-f bearings and pelorus readings taken on a shore point in line with the ship and the station if the station is ashore. Alternately, the station may be on a vessel provided for the purpose in which case pelorus readings are taken directly on the vessel. The pelorus sight should be made in either case on the reference at a distance of at least 3 miles and with the pelorus located as near to the loop as possible so as to minimize errors of observation. The errors observed are plotted on an error curve, as outlined in Paragraph 4.37 (c).

CAUTION: Two causes of abnormal quadrantal error and of abnormal operation are given below:

a. Antenna systems of both transmitting and receiving sets installed on the aircraft may cause reradiation, resulting in erratic quadrantal error versus frequency; that is, a smooth interpolation between quadrantal error calibration curves at two frequencies is not possible. At the same time, sense indications for UNILATERAL operation are usually very poor, and sometimes impossible to obtain. If quadrantal error correction calibrations are made at too widely spaced frequency intervals, a relatively sharp effect of another resonant antenna system may be missed. However,

the effect on UNILATERAL operation, mentioned above, is stressed here as a warning that the resonant effect may be present. Alternate grounding and reconnecting the antenna suspected of being the cause, and noting the effect on UNILATERAL operation, is suggested as a quick means of detection. All antenna systems, affecting operation of the direction finder equipment or known to be resonant within or near its tuning range (15 kc to 1750 kc), should be disconnected from their respective equipments or grounded at the time quadrantal error calibrations are being made, and also when the direction finder is being used for taking bearings. Further investigation of the effect of varying the antenna tuning of transmitters and of changing the band settings of receivers is suggested, if it is desirable that the antennas of these equipments remain normally connected. The posting of placards, giving operational requirements, is suggested.

b. The presence of closed structural loops near the loop antenna of the direction finder may necessitate abnormal quadrantal error corrections at some azimuth angles. Such closed loops may be in the form of electrical supply wiring, piping, supporting frames of other apparatus and the like. The influence of small loops diminishes more rapidly with respect to their distance from the loop antenna of the direction finder than that of loops of larger dimensions. A general rule is to avoid closed structural loops near the antennas, wherever possible, especially within a distance twice the diameter of such closed loops.

4.40 The RADIO MATERIEL school pamphlet on RADIO DIRECTION FINDERS (Chapters 7 and 8) is suggested as a source for detailed information on the subject of deviation errors. The subject is covered in detail for shipboard use but is nevertheless applicable for aircraft use if used intelligently, keeping in mind that errors are generally much less on aircraft installations.

4.41 LINE FILTER INSTALLATION — In DZ-2 Equipments bearing serial numbers 1 to 350 inclusive, as given on the receiver cabinet, the line filter was not installed at the point of manufacture. In cases where the line filter has not been installed or if a replacement must be made the instructions given below should be followed.

(a) Remove receiver chassis from case. Place chassis on bench with top up and panel towards observer.

(b) Unsolder the red lead and the red and black lead attached to the fuse terminals located in back of the panel (behind the dial-frequency chart).

(c) Cut off the two leads at the point where the lacing ends.

(d) Bend the two terminals with the aid of long-nosed pliers so that the terminals are at nearly right angles to the fuse block for their entire length.

(e) Turn the receiver over with bottom up and panel still towards the observer.

(f) Remove the knob attached to the tuning drive shaft. Use the Bristo wrench supplied with the receiver for loosening the two knob set screws.

(g) Remove the four large screws holding the two handles to the panel and chassis. Use a large screw driver with a width of blade nearly the full width of the screw slot so as to avoid burring of the screw head.

(h) Remove the two binder-head screws located on the front panel between the dynamotor cable connector and the selector knob.

(i) The front panel may now be pulled away from the remainder of the receiver sufficiently for access to connection points and further work as described in the following.

(j) Unsolder the red lead from the power cable connector plug. Run the solder out of the connector pin for free entry of another lead to be inserted later. Cut off the red lead at point of entrance of the chassis cable.

(k) The red and black lead attached to the power switch should be unsoldered next. A soldering iron with a long point of about ¼ inch diameter cross-section may be used to work the lead loose from its connection point at the switch. As an alternative, the knurled nut holding the switch to the panel may be removed making the switch connection accessible for unsoldering with an ordinary iron. Care must be taken to avoid scarring of the panel while removing the nut; a thin shield with a cut-out having a diameter approximately that of the knurled nut may be used for protection. A pair of pliers with a broad nose is better than a sharp-end, long-nose type of pliers for loosening the nut. After unsoldering the red and black lead cut it at the point of entrance to the chassis cable.

(l) Two countersunk holes for mounting of the line filter must be drilled on the side of the chassis frame near the phone jack. See Figure 48 for location of holes. Dress the vertical portion of the chassis cable near the location for the foremost mounting hole inward away from the chassis frame for clearance for drilling and subsequent mounting of the line filter.

(m) The cabled leads running vertically along the chassis frame between the cable clamp indicated in Figure 48 and the fuse block should be worked in between the chassis frame and the condenser drive mounting bracket.

(n) Use the two flat-head screws furnished with the kit for mounting the filter. The longest braided pair should be dressed parallel to the cabled leads described in (m) and similarly dressed between the chassis frame and the condenser drive bracket. Pull this cable snug towards the top of the chassis. Thread the red and black lead from the line filter through chassis channel support (used for mounting of compartment boxes) at point where chassis cable passes this support. Pull through and solder to switch connection point from which the red and black lead was disconnected (Paragraph k). Replace the switch on front panel.

(o) Reassemble the front panel, handles and tuning control knob (removed as per Paragraphs f, g, h and i).

(p) Solder the red lead of the short braided pair to the connector pin of the power plug from which a red lead was removed (see Paragraph (j)). Solder the black lead of this pair to the horizontal bus wire used for ground near the power plug.

(q) Turn the receiver over, top up. Solder the red lead of the long braided pair (see Paragraph n) to the fuse block terminal away from the top of the panel. The red and black lead of this pair is to be soldered to the top terminal of the fuse block. It is important that these two leads be as direct as possible from the body of the braided cable to the points of connection on the terminals, and that these points be as near to the fuse clips as possible. Otherwise an inductance loop is formed consisting of the two leads, the terminals and the fuse. This loop may radiate noise to the remainder of the receiver. After connection of the two leads dress them towards the fuse. Dress the cable towards the front panel. Tie the filter cable to the chassis cable at point where the two leads were cut as per Paragraph (c), using lacing twine or similar strong cord.

(r) Replace receiver in case and check operation.

V

OPERATION

5.1 NON-DIRECTIONAL RECEPTION — To adjust the receiver for non-directional reception, proceed as follows:

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

(b) Set the "SELECTOR" switch in the "NON-DIR." position.

(c) Turn the "FREQUENCY RANGE" switch to the band desired.

(d) Tune in the desired signal by means of the "TUNING" control.

5.2 Adjust the "VOLUME" control to obtain the desired volume in the headphones. If overloading occurs, as evidenced by a loss in output when the control is advanced beyond a certain point (output in excess of 300 milliwatts), the "VOLUME" control should be moved back to some point below that setting at which the overloading occurs. It should be kept in mind that no automatic volume control is provided to reduce automatically the gain on strong signals.

5.3 If a tone-modulated or telephone-modulated signal is being received, turn the "CW-MCW" switch to "MCW." If an unmodulated signal is to be received, turn this switch to the "CW" position.

5.4 For unmodulated signals and for signals modulated with a 1020-cycle tone, it is possible to secure a great reduction of background noise and certain types of interference by turning the "AUDIO" switch to "SHARP." This places the 1020-cycle audio filter band-pass in operation. For the reception of other types of signals, this switch should be left on "BROAD."

5.5 BILATERAL RECEPTION (DIRECTION FINDING)—Operate the controls as outlined in Paragraph 5.1 (a to d), except that the "SELECTOR" switch should be turned to the "BILAT." position.

5.6 Release the brake on the azimuth control and rotate the loop to determine definitely the two points of minimum signal strength. These points are called nulls, and, indicate the bearing in degrees with a 180-degree ambiguity with respect to the nose of the aircraft.

5.7 If **homing flight** is desired, set the loop azimuth at "O" degrees and fly the aircraft so as to maintain a minimum signal as heard in the headphones. The method for determining whether the flight is toward or away from the transmitter is described under "UNILATERAL RECEPTION," Paragraphs 5.8 and 5.9. The loop may be locked at other angles to compensate for the drift caused by a cross wind.

5.8 UNILATERAL RECEPTION (SENSE)—After obtaining the line of direction as outlined in section on "BILATERAL RECEPTION," turn the "SELECTOR" switch to the "UNILAT." position. The azimuth scale index and shutter should shift between bilateral and unilateral types of reception. Rotate the loop so that the azimuth scale reading is the same as the bilateral bearing obtained previously. Turn the "UNILATERAL ADJUSTMENT" throughout its range and notice whether there is a minimum response at any position of the control.

If no definite minimum response is obtained, turn the loop 180 degrees from its present setting.

5.9 If the minimum unilateral output is obtained when the azimuth scale reading is the same as for bilateral reception, the azimuth reading obtained is correct. If the minimum unilateral output is obtained when the azimuth scale reading is 180 degrees different than the reading obtained for bilateral reception, the reciprocal bearing is correct.

VI

MAINTENANCE

6.1 GENERAL—This Model DZ-2 Aircraft Radio Direction Finder Equipment was carefully adjusted at the factory and should retain these adjustments over a reasonably long period of time. Adjustments and repairs, unless of a minor nature, should be made in a well-equipped laboratory. Adjustments of any of the r-f circuits should not be changed until it is ascertained that the difficulty experienced is not the result of external causes, or normal deteriorating influences, such as worn-out vacuum tubes, improper operating voltages, blown fuses, external noises, and so on. Circuit details are shown in the schematic drawing, Figure 14. The receiver connections drawing, Figure 15 and the several individual connection drawings, Figures 17 to 21. 21.

NOTE: DO NOT REMOVE ANY OF THE TUBES FROM THEIR SOCKETS WHILE THE EQUIPMENT IS TURNED ON. TO DO SO MIGHT SUBJECT CERTAIN TUBES TO ABNORMAL FILAMENT VOLTAGE.

6.2 ROUTINE INSPECTION—Prior to each flight a routine inspection should be made sufficiently thorough to determine that the equipment is in working order. The inspection may be made on the landing field preferably at least 200 feet from hills, buildings, towers, power lines, telephone lines and other large conductive objects which are likely to distort the wave front of signals picked up on the equipment.

(a) Check the mounting of the Loop Antenna Assembly and Drive Assembly, the Dynamotor-Filter, and the Radio Receiver.

(b) Check all plugs of connecting cables for mechanical tightness. The outer collar on each connector should be sufficiently tight so as to prevent rotation of the flexible cable with respect to the connector. Check phone cords for loose connections in the phone plugs and for abrasion or wear which may result in noise during operation.

(c) Operate the equipment on NON-DIR position of the SELECTOR switch. Tune in stations in each band, selecting stations giving weak signals as a check on receiver sensitivity. Check operation of the CW-MCW switch and the AUDIO-SHARP-BROAD switch. Check the approximate frequency of each signal tuned against the frequency-dial chart on the front panel.

(d) Operate the equipment as a direction finder on the stations used in Paragraph (c). Bearings and reciprocal bearings should be taken on BILAT position of the SELECTOR switch, thereafter checking sense operation on the UNILAT position. Check the bearings against known bearings. The sense check on UNILAT should be correct according to the instructions given on the azimuth scale shutter cover.

6.3 Periodic servicing at **500** hours of operation should include the following:

(a) Check the receiver while installed in the ship as outlined in Paragraph 6.2. Note especially any noisy effects when the volume control and tuning capacitor control are turned. On UNILAT position check for noise in the UNILATERAL ADJUSTMENT control while checking sense operation. Replacement of any components should be made only when the noise hinders proper operation of the equipment.

(b) The UNILATERAL ADJUSTMENT control can be expected normally to produce some noise near a null under those conditions when an absolute null adjustment may be possible on a strong station. The criterion as to whether the control should be replaced should be whether the noisy conditions are present on all stations and prevents the taking of definite sense indications.

(c) After the preliminary checks of the equipment as installed in the ship, the receiver portion of the equipment should be removed to a workshop bench equipped with a 28-volt source. The dynamotor cable, the battery cable and dynamotor may be auxiliary ones. A loop drive assembly and loop need not be used during subsequent testing if no auxiliary one is available, in which case the receiver may be operated in the NON-DIR position.

(d) Noise which is discernible only during rotation of the variable capacitor may be due either to a noisy Gain Equalizer Resistor R103, which is rotated through a gear train by the tuning control, or the variable capacitor. Noise effects in either case are most likely to occur near maximum capacity of the variable capacitor. If noise is present, the resistor R103 should be short-circuited temporarily and a recheck be made for noise effect. If noise effects cease, the R103 is at fault. It should be changed only if the amount of noise hinders proper operation of the equipment. If noise effects continue during the recheck, the cause is likely to be dust or foreign matter between the variable capacitor plates. **Removal of dust from the variable capacitor requires EXTREME care.** Excessive pressure from a compressed air stream or inept attempts to wipe the plates may result in bent plates thus permanently destroying the alignment of one or more sections with respect to the others and requiring replacement of the variable capacitor. A compressed-air stream is usually most satisfactory but the adjustment of the stream should be made so that a **minimum** force required for blowing out the dust is used.

NOTE: It is imperative that the air stream should be free from oil, water, and dust and should be so determined before use in cleaning the variable capacitor or any other portion of the equipment. The air stream, properly adjusted, should enter the variable capacitor parallel to the plates. Isolated particles may be removed by using a narrow strip of paper between the plates while observing the action under a strong light.

THE VARIABLE CAPACITOR PLATES MUST NOT BE TOUCHED IN ANY OTHER MANNER.

(e) Remove the tubes from the receiver and check them on a tube analyzer. If the tube current is less than 80% of normal plate current (with 6.3 volts on the heater) the tube should be replaced. Be sure that all tubes are replaced tightly in their sockets and that all shields are tightly in place.

(f) Inspect all wiring in the chassis and check all screws and nuts for tightness. Check all connections for corrosion. Do not disturb alignment adjustments or the location of any radio-frequency wiring.

(g) Remove the dynamotor-filter unit from its mounting. Remove the case of the dynamotor, and thereafter remove the end bells of the dynamotor. Remove each brush to ascertain that adequate length of brush exists. Replace brushes in the holder from which it was removed with the same side up as before removal. If a brush is required to be changed, the new brush should be worn in until at least 75 per cent of the contact area makes contact with the commutator. Wearing-in may be done by slipping fine sandpaper between the brush and the commutator, thereafter rocking by hand the armature and sandpaper as one through as much angle of rotation as possible. Be sure to replace safety wiring. Other information pertaining to the servicing of the dynamotor is given in Paragraphs 6.74 to 6.79.

(h) Clean the connection pins for all connectors at receiver, dynamotor, and loop with fine "crocus cloth" if signs of corrosion are apparent or if slight movement of connector plug results in noise or inoperation.

6.4 After each period of 1000 hours of actual service, additional servicing shall be done as follows:

(a) Lubricate the tuning control gears and shafts and the dynamotor as described in Paragraphs 6.72 to 6.74 inclusive. Other information pertaining to the servicing of the dynamotor is continued through Paragraph 6.79.

(b) Ordinarily the loop drive assembly requires little servicing and will not require any service even at the 1000-hour point. Unless electrical noise as indicated in the output of the receiver occurs, the loop mechanism should not be opened for servicing. Follow instructions regarding the Loop Drive Assembly and Loop Antenna Assembly as given under Paragraphs 6.80 to 6.84 inclusive. See also Paragraph 6.85 for further details.

(c) Replace all tubes which have been used over all or substantially all of the 1000-hour period.

(d) No realignment of the receiver should normally be required. Realignment should not be attempted unless it has been definitely established that the source of trouble is due to misalignment. Alignment should be done only with a completely equipped test position (see Paragraph 6.9) and the person doing the alignment should be familiar or familiarize himself with the alignment procedure given under Maintenance (VI). Voltage and resistance measurements given therein should be checked to ascertain that the trouble does not result from faulty voltages and connections.

6.5 PROBABLE OPERATING FAILURES—The following service hints are given as an additional aid to servicing the equipment, supplementing the regular maintenance instructions.

6.6 Dead receiver may result from:

(a) Open fuse, dead battery, faulty connection of battery cable at battery or receiver.

(b) Faulty cables or connectors of cables.

(c) Open phone cord or disconnection of cord in phone plug.

(d) Burned-out or faulty tubes.

(e) Disconnected wires or short circuits in receiver.

(f) Worn brush in dynamotor.

Follow service information under VI Maintenance, check tubes, voltages, and continuity. Inspect receiver chassis for loose wires, etc.

6.7 No signal pick-up may result from:

(a) Antenna disconnected, or antenna grounded (on NON-DIR. position).

(b) Loop disconnected or shorted, or faulty loop cable on "BI-LAT." position.

Check connections, loop cables, and items under 6.6.

6.8 No sense indication possible.

(a) Antenna disconnected or grounded.

(b) Loop disconnected or shorted, or faulty loop cable.

(c) Defective UNILATERAL ADJUSTMENT control, R102 check connections and loop cable.

6.9 EQUIPMENT REQUIRED—In order to service the equipment properly the following apparatus should be available:

(a) A signal generator covering at least 15 to 1750 kilocycles and capable of external modulation; Navy Type LN or General Radio Type 605-BS2 Signal Generator.

(b) A frequency modulator; RCA, Type TMV-128-A or equivalent consisting of a rotating capacitor driven by a synchronous motor.

(c) A cathode-ray oscilloscope, preferably one incorporating means of synchronizing the horizontal sweep to an external voltage.

(d) An output meter consisting of a milliameter or a voltmeter across a 600-ohm non-inductive load, the meter being capable of handling a load of at least 300 milliwatts; Navy Type CV-22195 output meter or equivalent.

(e) A high-resistance 20,000-ohms-per-volt, multi-range type of d-c volt-meter, 250 volts maximum. Navy type OE test equipment.

(f) Ohmmeter. Navy Type OE test equipment.

(g) Direct-current microammeter, 0-500 range.

(h) A 0.1 mfd capacitor and two non-inductive resistors; one of 15,000 ohms and another of 50,000 ohms. Small carbon resistors are adequate.

(i) Standard alignment tools.

6.10 LOW SENSITIVITY—Low sensitivity may be due to various causes which include misalignment and faulty circuits as well as worn-out tubes and improper operating voltages.

6.11 Test for Low Sensitivity—Place the receiver in operation, using a 200-mmfd dummy antenna, and have the cw oscillator on. With a non-inductive 600-ohm resistor load, the input required to obtain a 10-milliwatt output with a 4-to-1 signal-noise (power) ratio should normally be less than 5 microvolts. No attempt should be made to realign the receiver unless this value is exceeded.

6.12 Worn-Out Tubes—If unsatisfactory results are obtained upon making the "Test for Low Sensitivity," the vacuum tubes should be tested. It is advisable to keep a log of the hours of operation between tube changes to insure maximum performance at all times. The tubes should be replaced if a test indicates that their values do not compare favorably with those in Table A "Vacuum Tube Data."

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

THE TUBES MUST BE OPERATED AT A VOLTAGE WITHIN 5 PER CENT OF THEIR RATED FILAMENT VOLTAGE. THE USE OF FILAMENT VOLTAGE LESS THAN THAT RECOMMENDED WILL, IN TIME, RESULT IN LOSS OF FILAMENT EMISSION DUE TO THE LOW RATE OF DIFFUSION OF THE ACTIVE MATERIAL TO THE FILAMENT SURFACE. VOLTAGE HIGHER THAN THAT RECOMMENDED WILL SHORTEN THE LIFE OF THE TUBE BY CAUSING TOO RAPID EVAPORATION OF THE ACTIVE MATERIAL FROM THE FILAMENT SURFACE.

TABLE A
VACUUM TUBE DATA

Operating Voltages and Currents:

Type No.	E_f (volts)	I_f (amps.)	E_p (volts)	I_p (ma)	E_{g1} (volts)	E_{g2} (volts)
–6C6	6.3	0.3	250	2.0	– 3.0	100
–6D6	6.3	0.3	250	8.2	– 3.0	100
–76	6.3	0.3	250	5.0	–13.5	...
–41	6.3	0.4	250	32.0	–18.0	250

Operating Characteristics:

Type No.	Ampl. Factor	Plate Resis. (ohms)	Transconductance—Gm (micromhos)		Emission Current* (ma)	
			Normal	Minimum	Normal	Minimum
–6C6	..	1 meg.	1225	920	160	60
–6D6	..	800,000	1600	1200	180	60
–76	13.8	9,500	1450	700	130	60
–41		68,000	2200	1300	200	70

* Plate and grids connected together and operated at 50 volts.

6.13 VOLTAGE AND CONTINUITY TESTS (Terminal Voltages)—Should the sensitivity remain low after making certain that the tubes in the receiver are in good condition, measurement should be made of the voltages between ground and the terminals of the component parts as indicated in Table B. In checking these voltages, use a multi-range d-c voltmeter, 20,000-ohms-per-volt (Navy Type OE Test Equipment), and determine that the "A" battery is delivering 28 volts and the "B" source is supplying 230 volts, approximately.

TABLE B

VOLTAGES BETWEEN TERMINALS INDICATED AND GROUND

Unless otherwise noted, the following conditions are to be used:

"SELECTOR" switch set on "NON-DIR";

"FREQUENCY RANGE" switch set on Band #1;

"ANTENNA EQUALIZER" set at maximum clockwise position;

"AUDIO" switch thrown to "BROAD";

"TUNING" dial set at 0°;

"VOLUME" control set at maximum sensitivity position;

"CW-MCW" switch thrown to "MCW";

It should be noted that the tabulated voltages are representative and that actual readings are subject to some deviation because of normal variations in components and battery supply voltage.

Part or Symbol	Terminal	Volts
T101	A E	210 210
T102	F D	200 200
T103	F D	200 200
T104	A C	40* 40*
T105	2 3 4	215 230 170
T106	3 4	215 215
Antenna Shield Box	1, 2, 3, 4, 5, 6	0
Loop Shield Box	1, 2, 3 4 5 to 10	0 ‡ 0
R-F Shield	1 2 3 4, 5	*** 6.7 90 70
1st Detector Shield Box	1 2 3 4 5 6 7	210 6.7 75 13.4 70 4 70
Osc. Shield Box	1 2 3, 4, 5 6	50 6.7 0 4
J101	B	‡
J102	A B C	230 28 0
J103	A	28
C183	A, B	215
C184	A, B	215
C185	A, B	215

* Measured with "CW-MCW" Switch on "CW."

‡ 28 volts on "NON-DIR," Bands 1 and 2 on "BILAT," Bands 3 to 6 on "UNILAT." No voltage on Bands 1 and 2 on "UNILAT" or Bands 4 to 6 on "BILAT."

*** 0.0 volts at low freq. end of band; 4.0 volts at high freq. end of band.

6.14 TUBE SOCKET VOLTAGES—If all terminal voltages are of proper value, then refer to Table C and check the tube socket voltages. The same conditions of operation as for Table B apply to Table C.

6.15 Circuit Test for **Non-Directional Operation**—Measurement of the terminal voltages as shown in Tables B and C (with reference to the connection drawing shown in Figure 15), should disclose most circuit faults. Should this test procedure fail to determine the cause of the trouble, it will be necessary to make continuity tests of the various circuits. Such tests should be made with the "POWER" switch "OFF," and the "SELECTOR" switch in the "NON-DIR." position and the "CW-MCW" switch on "MCW." Refer to Figure 3 and use the following data as reference to show proper operating conditions:

(a) T105, terminal "1" to terminal "5"—80.0 ohms.

(b) T105, terminal "5" to spring terminal of J104 or J107—30 ohms.

(c) Grid of tube V106 to ground—200,000 ohms.

(d) Grid of tube V107 to ground—100,000 ohms.

(e) Grid of tube V105 to T101, terminal "B"—18 ohms.

(f) Grid of tube V105 to T101, terminal "C"—23 ohms.

(g) Grid of tube V108 to ground—470,000 ohms.

(h) Grid of tube V109 to ground—560,000 ohms.

(i) The resistance between the arm of R135A and the arm of R135B, will decrease from approximately 30,000 ohms at the minimum sensitivity setting of the volume control to zero ohms at the maximum setting, with the antenna equalizer control in the maximum counter-clockwise position. In other positions of the equalizer, the maximum resistance values will drop to as low as 16,000 ohms (when equalizer is in the maximum clockwise position).

TABLE C
TUBE SOCKET VOLTAGES

Tube Type	Function	Heater Voltages		Plate	Screen	Suppressor	Cathode
		First Terminal	Second Terminal				
V102 -6D6	R-F Ampl.	0	6.7	70	40	1.3†	1.3†
V103 -6C6	1st Det.	13.4	6.7	210	70	4	4
V104 -76	Osc.	6.7	0	30	—	—	0
V105 -6D6	1st I-F Ampl.	13.4	6.7	200	60	4‡	4‡
V106 -6D6	2nd I-F Ampl.	20.1	13.4	200	60	4†	4†
V107 -6C6	2nd Det.	20.1	13.4	200	20	1.3	1.3
V108 -76	CW Osc.*	20.1	26.8	40*	—	—	—
V109 -41	Audio Ampl.	20.1	26.8	170	215	—	14

* Measured with "CW-MCW" Switch on "CW."
† After checking as above, switch to Band #3 and set VOLUME control at minimum. The voltage should be approximately 45.
‡ After checking as above, switch to Band #3 and set VOLUME control at minimum. The voltage should be approximately 11.
NOTE: Each heater voltage, as measured across the heater terminals, should read 6.7 volts. Voltages from the terminals to ground are tabulated.

(j) Across R135A—20,000 ohms approximately.

(k) Across R135B—300,000 ohms approximately (maximum sensitivity setting).

(l) Grid of tube V104 to ground—220,000 ohms.

(m) Grid of tube V103 to ground—1 megohm.

(n) First detector or r-f shield boxes, terminal "7" to ground—at least 60,000 ohms.

(o) Grid of tube V102 to ground—should indicate the resistance value of the tuned-circuit-coil for that particular band being used, Table D showing the correct value.

(p) Terminal "9" of the loop shield to the grid of V102 should show direct continuity.

TABLE D
D-C RESISTANCE OF TUNED-CIRCUIT COILS

Band	Ohms
1	330
2	115
3	17
4	8
5	3
6	1.5

6.16 The tests outlined above should reveal most sources of trouble. It is possible, however, that some trouble may exist on bilateral or unilateral reception, and further checking would therefore be required.

6.17 Circuit Test for **Bilateral Operation**—Turn the "FREQUENCY RANGE" switch to Band 1 (15 kc to 32.5 kc) and the "SELECTOR" switch to the "BILAT." position.

(a) The tests described in Paragraphs 6.15 (a) to (o), inclusive, also apply here. Test described under 6.15 (p) should show terminal "9" grounded. In addition, the relay action and loop continuity should be checked. To check the loop relay circuit use the information given in Paragraph 3.43 and in Paragraphs (e) and (f) below. To check the loop circuit continuity proceed as follows:

(b) Disconnect the wires attached to terminals "5," "6," "7" and "8" of the loop box. Measure with an ohmmeter across leads "5" and "6." The resistance should be approximately 68 ohms for Bands 1 and 2 (15 kc to 70 kc). Then connect the ohmmeter across leads "7" and "8." The resistance should measure approximately 0.2 ohms for Bands 3, 4, 5 and 6 (100 kc to 1750 kc).

(c) With the wires still detached from terminals "5" and "6," connect the ohmmeter across these terminals. With the "FREQUENCY RANGE" switch on Band 1, the resistance indicated should be approximately 85 ohms. On Band 2 the indicated resistance should be approximately 60 ohms.

(d) Connect the ohmmeter across terminals "7" and "8." Approximately one ohm resistance should be indicated on Bands 3, 4, 5 and 6.

(e) To check the relay switching circuit, disconnect the lead attached to terminal "4" of the loop shield and check for continuity between terminal "4" and ground. On Bands 1 and 2 the circuit should be open with the "SELECTOR" switch in the "BILAT." position, and grounded in the "UNILAT." position. On Bands 3, 4, 5 and 6, the circuit should be open on "UNILAT." and grounded on "BILAT."

(f) To check the relay, connect across the lead which was previously disconnected from terminal "4" and the "A" terminal of J102. The resistance indicated should be 8.5 ohms. Take out the seven screws holding the azimuth scale cover in place, remove the cover and actuate the relay by pushing upward on the right-hand side of the gear-meshed lever assembly. The resistance should increase to 280 ohms.

6.18 The loop and its respective cable and plugs should be checked to ascertain that the terminal connections are correct.

6.19 Circuit Test for **Unilateral Operation**—Upon completion of the foregoing tests, set the "SELECTOR" switch in the "UNILAT." position and the "UNILATERAL ADJUSTMENT" control at the extreme counter-clockwise position, and proceed as follows:

(a) Connect the ohmmeter across terminals "2" and "5" of the antenna shield. The resistance of the respective antenna coil for the band in use should correspond to the value shown in Table E.

(b) When it has been ascertained that the resistance value for these coils are as outlined in Table E, the adjustment of the "UNILAT. COUP." and the "UNILAT. TRIM." capacitors should be checked. See Paragraph 4.27.

(c) Check the relay circuit. See Paragraph 6.17 (d), (e) and (f).

TABLE E
D-C RESISTANCE OF ANTENNA COILS

Band	Ohms
1	300
2	120
3	14
4	6.5
5	3
6	1.5

Note: Whenever it may be necessary to repair or to replace any of the wafer-type band switches, be sure that the switch wafers are positioned in one of the six angular positions normally used. If the rotors are not so positioned they may be dislodged when the switch shaft is inserted.

6.20 ALIGNMENT OF I-F STAGES (VISUAL METHOD)—Throughout the following alignment procedure it should be kept in mind that transformers T102 and T103 are designed to provide a relatively broad, double-peaked response. The first i-f transformer (T101) provides two degrees of coupling; one a double-peaked response used on Bands 4, 5 and 6 (2100 kc to 1750 kc) and the other a sharply-peaked response at 89 kc, used on Bands 1, 2 and 3 (15 kc to 200 kc).

Note: In the following instructions for alignment of the various circuits the words "track" and "tracking" are frequently used. A circuit may be said to be properly aligned for tracking when the resonant frequency at any dial setting (of the variable tuning control) agrees with that required by other properly aligned circuits being tuned simultaneously by the same tuning control. These conditions must be met without any other tuning adjustment than that provided by the tuning control. In practical terms, a trimmer capacitor is usually adjusted for circuit resonance when the tuning control is set at the high-frequency end of the tuning range, and the inductance (by means of a core adjustment) at the low-frequency end, thereafter the trimmer and core are further readjusted in alternate order (at their respective proper tuning control dial settings) until finally no further readjustment of these is required to bring the circuit into proper resonance at either end of the tuning control range.

6.21 For the visual method of alignment the following equipment is required:

(a) A General Radio Type-605-BS2 signal generator, or the equivalent.

(b) A frequency modulator; RCA Type, TMV-128-A or the equivalent.

(c) A cathode-ray oscilloscope, preferably one incorporating means for synchronizing the horizontal sweep to an external voltage.

(d) A well-damped microammeter of 0-500 range.

(e) A 50,000-ohm resistor, and a 0.1 mfd capacitor.

(f) Standard alignment tools.

6.22 For resonance indications connect a 0-500-range microammeter between ground and the cathode resistor of the second detector (R125). The negative side of the meter should be connected to ground and the positive side to the resistor.

6.23 Remove the grid clip from the first detector tube, Type 6C6 (V103), and connect the grid to ground through a 50,000-ohm resistor. Connect the output of the signal generator to the first detector grid through a 0.1 microfarad capacitor.

6.24 The procedure for alignment of the i-f system is then as follows:

(a) Set the "FREQUENCY RANGE" switch on Band 3 (100 kc to 200 kc) and the "SELECTOR" switch for "NON-DIR." operation. The cw oscillator should be turned off and the r-f oscillator should be made inoperative by disconnecting the lead from terminal "1" of the oscillator shield.

(b) Feed an unmodulated 89-kc signal to the first detector grid. Refer to Figures 3 and 4, and by alternate adjustments of the cores T101-A and T101-B align the first i-f transformer (T101) for maximum deflection of the microammeter.

NOTE: This adjustment completed, transformer T101 must be left untouched throughout the balance of the alignment procedure.

(c) The vertical input leads of a cathode-ray oscilloscope should then be connected across the second detector cathode resistor (R125).

(d) Set the "FREQUENCY RANGE" switch on Band 4 (200 kc to 400 kc), and the "SELECTOR" switch for "NON-DIR." reception.

(e) Use the mechanical sweep on the signal generator. A sweep-frequency band width of approximately 20 kc is required, the horizontal-sweep-frequency of the oscilloscope being adjusted to the frequency of the synchronizing voltage.

(f) Adjust the signal generator to produce a signal of approximately 88 kc and feed this frequency-modulated signal into the first detector (V103) grid. Refer to Figures 3 and 4 and align the second i-f transformer (T102) by means of the adjustable cores T102-A and T102-B; and the third i-f transformer (T103) by means of the cores T103-A and T103-B. Adjust for symmetry of the curve as shown by the oscillograph. The signal generator frequency may be shifted slightly to provide the best symmetry, but the adjustment of the first i-f transformer (T101) must be left unchanged.

6.25 Compare selectivity obtained with the data shown in Table F. When interpreting this information bear in mind that on Bands 1, 2 and 3 a sharp selectivity characteristic is obtained and the i-f system operates at 89 kc. On Bands 4, 5 and 6 a broad curve is obtained and the i-f system operates at 88 kc. Under normal conditions an input of approximately 200 microvolts should be sufficient to produce a 2nd detector cathode current of 100 microamperes with the band switch set for broad selectivity (Band 4). An input of 250 microvolts should produce a similar cathode current value with the band switch set for a sharp characteristic (Band 3). The values shown must be considered as representative values only. The attenuation factor of 1.0 is arbitrarily assigned to that portion of the double-peaked curve which provides maximum sensitivity. Values of 1.5 and 1.2 represent the resonance dip and the lesser second peak, respectively. The other attenuation values shown are obtained in exploring the sides of the resonance curve to obtain overall bandwidths.

6.26 ALIGNMENT OF I-F STAGES (METER METHOD)—If a cathode-ray oscilloscope is not available for visual alignment of the i-f system, it is possible to adjust the i-f channel by making use of the alignment data tabulated in Table G. However, it is recommended that whenever possible the alignment process described in Paragraph 6.24 be used.

6.27 Except for the use of the oscilloscope and the frequency modulator, the same general procedure and the same equipment is required for this method as is outlined under "Visual Alignment."

6.28 During this alignment procedure, the cw oscillator should be turned off, and the r-f oscillator should be made inoperative by disconnecting the lead from terminal "1" of the oscillator shield. See Figure 15.

6.29 Referring to Table G, the first column denotes the transformer to be adjusted. The second shows the setting of the "FREQUENCY RANGE" switch. (Broad or sharp selectivity characteristic.) The third denotes the signal input (in microvolts) necessary to produce a cathode current of 100 microamperes at the second detector.

6.30 Alignment of T101 is accomplished in the following manner:

(a) Remove the grid clip from the second detector tube, Type-6C6 (V107) and substitute the grid clip normally connected to the first i-f amplifier tube, Type-6D6 (V105). Ground the grid of the latter tube. Connect the signal generator to the grid of the first detector tube, Type-6C6 (V103), and a 50,000-ohm resistor between the detector tube grid and ground. Connect the 0-500 microammeter as for visual alignment, Paragraph 6.22.

(b) Adjust the signal generator for an output of exactly 89 kc (see "Mid-Band Frequency," Table "G") and set the receiver "FREQUENCY RANGE" switch for Band 3 operation (100 kc to 200 kc).

TABLE F

OVERALL I-F SELECTIVITY

I-F Transformers	Remarks	Approx. Input in Micro-volts	Signal Generator Input Factor	Mid-Band Frequency (kc)	Total Band Width (kc)
T101, T102 and T103	"FREQUENCY RANGE" switch on Band 4 (Broad selectivity characteristic)	200	1.0		2.7*
			1.5	88	
			1.2		
			2.0		4.2
			10.0		5.7
			100.0		8.1
			1000.0		11.6
T101, T102 and T103	"FREQUENCY RANGE" switch on Band 3 (Sharp selectivity characteristic)	250	1.0	89	
			2.0		1.3
			10.0		3.5
			100.0		5.8
			1000.0		8.3

* Band width between peaks. Peaks are represented by 1.0 and 1.2 input factors.

(c) Refer to Figures 3 and 4 and align the first i-f transformer (T101) by means of cores T101-A and T101-B, adjusting the cores alternately until maximum current is obtained at exact resonance as indicated by the meter in the second detector cathode circuit. The adjustment of this transformer (T101) must then remain unchanged throughout the remaining alignment procedure.

(d) The individual selectivity characteristic of T101 should then be checked by referring to Table G. A signal input of approximately 75,000 microvolts will be required to produce a cathode current of 100 microamperes at the second detector tube (V107). This value of 100 microamperes is established as an arbitrary output level with attenuation multiplied by a factor of 1.0. Referring to the data in Table G, it will be seen that a total band width of 1.63 kc should be covered for an attenuation factor of 2.0 (two times down), 2.84 kc for an attenuation factor of 5.0 and 4.16 kc for an attenuation factor of 10.0.

(e) Set the "FREQUENCY RANGE" switch on Band 4 (200 kc to 400 kc, broad selectivity characteristic). The resonance characteristic of T101 will be found to consist of a double-peaked curve at approximately 88 kc. The signal generator should be adjusted as closely as is possible to this frequency and be left unchanged during the balance of the alignment process. It is very important, however, that the signal generator be set exactly at the dip of the resonance curve of T101 rather than at either peak.

(f) The broad selectivity characteristic of T101 can then be explored, checking against the attenuation values and total band widths shown in Table G. (Broad selectivity characteristic.)

6.31 The signal generator should then be connected to the grid of the second i-f amplifier tube, Type-6D6 (V106) again providing a 50,000-ohm grid leak. The output of the third i-f transformer (T103) should be coupled to the grid of the second detector tube (V107) by placing the grid clip on the grid cap. Transformer T103 is then aligned by means of the adjustable cores (T103-A and T103-B). See Figures 3 and 4.

6.32 At resonance the selectivity characteristic of T103 is represented by a double-peaked curve. It is essential that the peak resonance dip of this curve be placed at exactly the frequency of the signal generator. Under this condition the sides of the curve will be symmetrical and the selectivity characteristic, (total band width) will be essentially that shown in Table G. This is ascertained by the same procedure as that described for checking transformer T101. Refer to Paragraph 6.30 (d).

6.33 Remove the grid clip from the second detector tube (V107) and replace with the clip normally connected to the second i-f amplifier tube (V106). Ground the grid of V106. The signal generator is then coupled to the grid of the first i-f amplifier tube, Type-6D6 (V105).

main tuning capacitor. The alignment frequencies tabulated in Table H are predicated upon this assumption.

6.36 Circuit alignment is accomplished by first setting the cw oscillator at the proper intermediate frequency, then adjusting the r-f oscillator until zero beat is obtained between the cw oscillator and the difference-frequency of the r-f oscillator and signal generator. It should be noted therefore that when aligning the r-f oscillator on Bands 4, 5 and 6 the cw oscillator must be adjusted to 88.0 kc. Similarly, when aligning the r-f oscillator on Bands 1, 2 and 3, the cw oscillator must be adjusted to 89.0 kc, since the i-f system then peaks at this frequency.

TABLE G

INDIVIDUAL I-F SELECTIVITY

I-F Transformer	Remarks	Input in Micro-Volts	Signal Generator Input Factor	Mid-Band Frequency (kc)	Total Band Width (kc)
T101	"FREQUENCY RANGE" switch on Band 3 (Sharp selectivity characteristic)	75,000	1.0		. . .
			2.0		1.6
			5.0		2.8
			10.0	89	4.2
T101	"FREQUENCY RANGE" switch on Band 4 (Broad selectivity characteristic)	37,500	1.0	(approxi-	4.0
			2.0	mately)	6.1
			5.0		8.1
			10.0	88	10.1
T103	"FREQUENCY RANGE" switch setting immaterial	25,000	1.0	(approxi-	3.7
			2.0	mately)	6.8
			5.0		9.4
			10.0	88	13.6
T102	"FREQUENCY RANGE" switch setting immaterial	15,000	1.0	(approxi-	2.3
			2.0	mately)	4.6
			5.0		7.0
			10.0	88	9.0

6.34 The second i-f transformer (T102) is then aligned to the signal generator frequency in the same manner prescribed for T103 in paragraph 6.32 adjusting the transformer cores (T102-A and T102-B). The selectivity characteristic of T102 should then coincide with the data shown in Table G.

6.35 R-F OSCILLATOR ALIGNMENT—It is essential that the r-f oscillator be aligned at dial settings of 0 and 1025 in order that all necessary frequencies may be covered for each band. Actually, dial indications of 0 and 1025 should closely coincide with the limits of travel of the

6.37 The procedure for alignment of the r-f oscillator is as follows:

(a) Set the "FREQUENCY RANGE" switch on Band 4 (200 kc to 400 kc).

TABLE H

DIAL SETTINGS AND CORRESPONDING FREQUENCIES FOR USE IN ALIGNMENT OF R-F OSCILLATOR

Band	I-F Frequency (kc)	Receiver Dial	Osc. Frequency (kc)	Tuning Adjustment
1	89	0 1025	14.91 32.8	L. F., Adjust L131 H. F., Adjust C153
2	89	0 1025	32.23 70.9	L. F., Adjust L132 H. F., Adjust C155
3	89	0 1025	98.97 202.4	L. F., Adjust L133 H. F., Adjust C157
4	88	0 1025	198.0 405.0	L. F., Adjust L134 H. F., Adjust C159
5	88	0 1025	396.6 811.0	L. F., Adjust L135 H. F., Adjust C160
6	88	0 1025	795.0 1780.0	L. F., Adjust L136 H. F., Adjust C161

NOTE—The "0" and "1025" dial settings are predicated on the supposition that the receiver dial is set at "0" when the tuning condenser is fully meshed. The actual minimum and maximum settings should be used.

(b) Unless the resonant frequency of the i-f system for Bands 4, 5 and 6 is already known, determine same by coupling a signal generator to the first detector grid (V103), (see Paragraph 6.23) and inserting a resonance indicating 0-500 microammeter in the cathode circuit of the second detector (V107). (See Paragraph 6.22). The resonant frequency should be very close to 88 kc.

(c) Turn on the cw oscillator and adjust it to zero beat with the signal generator at this frequency by adjusting the core of the cw oscillator transformer (T104). See Figure 4.

(d) Place the r-f oscillator in operation, reconnecting the B+ lead to terminal 1 of the oscillator shield box if this lead has been previously disconected.

(e) Set the receiver dial at 1025 and the frequency generator dial at the frequency specified in Table H for this receiver dial reading (405 kc). The signal generator should be coupled to the first detector grid as outlined in Paragraph 6.23.

(f) Refer to Figure 5 and adjust the oscillator plate trimmer capacitor (C159) for zero beat in the headphones.

(g) Set the receiver dial at 0 and the signal generator at the frequency specified for this setting.

(h) Remove the bottom cover from the oscillator shield. See Figure 4. Adjust the r-f oscillator transformer L134 for zero beat by means of the variable core.

(i) Repeat these adjustments at 0 and 1025 dial readings alternately until oscillator tracks over the full range, adjusting capacitance at the high-frequency end of the band and inductance at the low-frequency end.

(j) Retune to the low-frequency end of the band. Replace the bottom cover and note the resultant change in the beat note.

(k) Remove the cover and adjust the coil to an increased inductance sufficient to produce the same change in beat note. The effect of the cover when replaced should be to restore the circuit to resonance (zero beat).

(l) Readjust the oscillator plate trimmer capacitor at the high-frequency end of the band if necessary. This method of compensating for the effect of the cover is used on each band.

(m) Set the receiver dial at 57 and then at 925. Record the signal generator dial calibration required to produce zero beat in the headphones at each of these receiver dial settings. These values are used later in aligning the detector, r-f, loop and antenna stages and are to be recorded for each band after alignment of the band is completed.

6.38 Set the "FREQUENCY RANGE" switch on Band 5 (400 kc to 800 kc) and referring to Table H, align Band 5 in the same manner prescribed for Band 4, adjusting the oscillator plate trimmer capacitor (C160) at the high-frequency end of the band, and the adjustable core (L135) at the low-frequency end.

6.39 Align the r-f oscillator for Band 6 (800 kc to 1750 kc) in the same manner, adjusting the oscillator plate trimmer capacitor (C161) and the oscillator coil core (L136).

6.40 Set the "FREQUENCY RANGE" switch on Band 3 (100 kc to 200 kc). Set the signal generator to 89 kc (peak resonance with the i-f system as indicated by the meter in the second detector cathode), and adjust the cw oscillator (T104) to zero beat at the frequency of the indicated peak.

6.41 Align the r-f oscillator for Band 3 (100 kc to 200 kc) with the same procedure as was used in aligning Bands 4, 5 and 6, adjusting the oscillator plate trimmer capacitor (C157) and the oscillator coil core (L133).

6.42 Remove the top cover of the oscillator shield. The r-f oscillator is aligned on Band 2 (32.5 kc to 70 kc) by means of the oscillator plate trimmer capacitor (C155) and the oscillator coil core (L132). See Figure 3.

6.43 The r-f oscillator is aligned on Band 1 (15 kc to 32.5 kc) by means of the oscillator plate trimmer capacitor (C153) and the oscillator coil core (L131).

6.44 ALIGNMENT OF CW OSCILLATOR—The cw (i-f) oscillator is adjusted in the following manner:

(a) Set the "FREQUENCY RANGE" switch on Band 1, 2 or 3. (15 kc to 200 kc.)

(b) Adjust the signal generator to the frequency of the i-f system as indicated by maximum current in the second detector (V107) cathode circuit. See Paragraph 6.22.

(c) Turn the cw oscillator on and adjust the core of the cw oscillator transformer (T104, Figure 4) until the frequency of the cw oscillator is 1000 cycles lower than the resonant frequency of the i-f system. Properly adjusted, the cw oscillator will provide a 1000-cycle beat note with signals on Band 1, 2 and 3, and will be at zero beat with signals tuned to exact resonance on Bands 4, 5 and 6.

6.45 ALIGNMENT OF 1st DETECTOR AND R-F AMPLIFIER—In aligning the detector and r-f circuits it is necessary that the signal generator settings previously recorded as corresponding to dial settings of 57 and 925 for each particular band be used. Refer to Paragraph 6.37 (m), (oscillator alignment).

6.46 To facilitate proper alignment to the detector and r-f stages it is recommended that the first detector tube, Type-6C6 (V103) be connected in the following manner:

(a) Remove the grid lead from the r-f amplifier tube (V102), connect a 50,000-ohm resistor from the tube grid to ground and couple the signal generator to the grid by means of a small tubular type 0.1 mfd capacitor.

(b) Connect a 0-500 microammeter between the first detector (V103) cathode resistor (R112) and ground. (This resistor is contained within the oscillator shield.) See Figure 10.

(c) Make the r-f oscillator inoperative by disconnecting the B+ lead from terminal 1 of the oscillator shield (Figure 15). The first detector tube (V103) can then be used as a vacuum-tube voltmeter.

6.47 Proceed to align the first detector and r-f circuits in the following manner:

(a) Set the "FREQUENCY RANGE" switch on Band 1 (15 kc to 32.5 kc) and remove the top covers from the first detector and r-f shield. See Figure 3.

(b) Set the signal generator at the calibration previously recorded for a dial setting of 925. See Paragraph 6.37 (m). Refer to Figure 5 and adjust the first detector trimmer capacitor (C138), and the r-f trimmer capacitor (C127), tuning for maximum first detector cathode current.

(c) Set the receiver dial at 57 and the signal generator at the calibration previously recorded for that setting. Refer to Figure 3 and adjust the core of the first detector tuner coil (L125) and the core of the r-f tuner coil (L119), again tuning for maximum meter deflection.

(d) Repeat alternately the adjustments outlined in the preceding paragraphs (b) and (c) until proper tracking of the tuned circuits is secured. Then replace the top covers on the r-f and detector shields and determine the amount of signal generator dial change necessary to re-resonate the circuit at the low-frequency end of the band. (Receiver dial setting 57.0)

(e) Shift the signal generator an equal amount on the opposite side of the original setting, remove the covers and adjust coils L125 and L119 to resonance.

(f) Replace the covers and readjust the capacitors C138 and C127 at the high-frequency setting to complete the alignment procedure. This method of compensating for the effect of the cover is used on each band.

6.48 The same procedure is applicable for the alignment of Band 2 (32.5 kc to 70 kc) tuned circuits. At the high-frequency setting of the signal generator the first detector trimmer capacitor (C139) and the r-f trimmer capacitor (C128) are adjusted. At the low-frequency reference calibration, the first detector tuning coil (L126) and the r-f tuning coil (L120) are adjusted.

6.49 The procedure for Band 3 alignment is the same except that the bottom covers are removed from the r-f and detector shield. See Figure 5. The detector and r-f trimmer capacitors (C140 and C129) are aligned at the high-frequency reference point and the detector and r-f coils (L127 and L121) are adjusted at the low-frequency setting. See Figure 4.

6.50 On Bands 4, 5 and 6 (200 kc to 1750 kc) the first detector and r-f coils are so coupled as to produce the desired double-peaked band pass resonance curve. To facilitate alignment of these coils, a means is employed for loading one coil of a pair with a resistance while the other is being tuned to peak resonance.

6.51 This means consists essentially of a small 15,000-ohm carbon resistor connected to a 15-inch lead. The free end of this lead is connected to the jumper between terminal 7 of the first detector shield and terminal 4 of the r-f shield (common terminal of the detector and r-f coils, see Figure 15. When adjusting the first detector inductances (L128, L129 and L130), the free end of the resistor is connected to terminal 5 of the r-f box, shunting the resistance across section "C" of the main tuning capacitor (C123). When adjusting the r-f inductances (L122, L123 and L124), the resistor end is connected at the stator terminal of section "D" of the tuning capacitor.

6.52 In all other details the alignment procedure for Bands 4, 5 and 6 is the same as that outlined for Band 1, 2 and 3. For Band 4 (200 kc to 400 kc) the procedure is as follows:

(a) Remove the bottom covers from the first detector and r-f shields. Set the receiver dial at 925 and the signal generator at the setting previously recorded for that alignment point.

(b) Adjust the first detector trimmer capacitor, (C141) and the r-f trimmer capacitor (C130).

(c) Set the receiver dial at 57 and the signal generator at the low-frequency reference point, connect the free end of the resistor to terminal 5 on the r-f shield, and adjust the first detector tuning coil (L128).

(d) Change the resistor to the stator of section "D" of the tuning condenser (C123) and adjust the r-f tuning coil (L122).

(e) Repeat alternately the adjustments outlined in Paragraphs (b), (c) and (d) until proper tracking of the tuned circuits is obtained. Then replace the bottom covers on the detector and r-f shields. Set the receiver dial at 57. Connect the resistor to either of the points previously used and adjust the signal generator dial for maximum output indication. The signal generator dial will be found to have changed to a higher-frequency setting. Note the difference between this and the original setting.

(f) Shift the signal generator an equal amount on the opposite side of the original setting, remove the covers and adjust the detector and r-f coils (L128 and L122) to an increased inductance with the same precedure as outlined in Paragraphs (c) and (d).

(g) Replace the covers and readjust the capacitors C141 and C130 at the high-frequency alignment point to complete the adjustment.

6.53 Band 5 (400 kc to 800 kc) is aligned in the same manner except that the first detector and r-f trimmer capacitors (C142 and C131), and the first detector and r-f coils (L129 and L123) are adjusted.

6.54 Band 6 (800 kc to 1750 kc) is aligned by adjusting the first detector and r-f trimmer capacitor (C143 and C132), and the detector and r-f coils (L130 and L124), using the same procedure.

6.55 ALIGNMENT OF LOOP TUNER COILS—Before shipment from the factory the loop tuning circuits were adjusted for best performance with the length of loop cable supplied. These cable lengths are given in Paragraph 6.86. A change in cable length will require realignment in accordance with procedure given in Paragraph 6.86, but not the full alignment procedure given in Paragraph 6.57. Only when misalignment of loop trimmers and cores is evident will the procedure given in Paragraph 6.57 be required, in which case, alignment should be made using the cable to be employed with the equipment.

6.56 For alignment of the loop tuning coils an equipment set up as shown in Figure 25 is required. The signal generator should be loosely coupled to the loop antenna by means of a few turns of wire as shown. Monitor the receiver output with headphones and an output meter plugged into the "PHONES" jack (J104 and J107).

NOTE—The coupling between the auxiliary loop and the loop antenna must be sufficiently loose that the inductance of the loop antenna is not affected. It is essential therefore, that a relatively high level of signal-generator output be used, that the "SENSITIVITY" control be well advanced and that the coupling between the loops be kept at a minimum.

6.57 The alignment procedure is then as follows:

(a) Set the "SELECTOR" switch on "BILAT." and the "FREQUENCY RANGE" switch on Band 5 (400 kc to 800 kc).

(b) Connect the loop antenna to the receiver.

(c) Set the receiver dial at 925 and the signal generator at the calibration determined during the process of aligning the r-f oscillator. See Paragraph 6.37 (m). The signal generator should be used with 400-cycle, 30 per cent. modulation. Use headphones and an output meter (plugged in at J104 and J107) to monitor the receiver output. The signal generator frequency may be shifted slightly, if necessary to provide maximum receiver output.

(d) Refer to Figure 5 and set the loop trimmer capacitor (C118) at mid-position.

(e) The loop compensating capacitor (C202) should then be adjusted for a maximum indication on the output meter.

(f) Set the receiver dial at 57 and the signal generator at the corresponding calibration and adjust the core of the loop tuner coil (L114). See Figure 4.

(g) Repeat the adjustments outlined in Paragraphs (e) and (f) until the maximum response is obtained at each dial setting without further adjustment of the compensating capacitor or core.

(h) Temporarily replace the bottom cover. A slight decrease in receiver output will be observed. The inductance of the coil must then be altered slightiy to compensate for the effect of the cover. By alternately adjusting the core and checking with the cover replaced, an adjustment providing maximum receiver output with the cover in place will be found. This method of compensating for the effect of the cover will be required in adjusting the loop tuner coils for all bands.

6.58 The same general procedure is applicable in adjusting the loop tuner coil for Band 6 (800 kc to 1750 kc), with the exception that the loop compensating capacitor is left as previously adjusted. At the high-frequency end of the band (receiver dial 925) the circuit is adjusted by means of the loop-tuner trimmer capacitor (C119), and at the low-frequency setting by means of the loop tuner coil core (L113).

6.59 Set the "FREQUENCY RANGE" switch on Band 4 (200 kc to 400 kc) and adjust the loop trimmer capacitor (C117) and the loop tuner coil (L115).

6.60 Set the "FREQUENCY RANGE" switch on Band 3 (100 kc to 200 kc) and remove the top cover from the loop shield. For this band and Bands 1 and 2, the signal generator should be unmodulated. A beat note is obtained by means of the cw oscillator. The signal generator settings may be shifted slightly to provide maximum receiver output. See Figure 3. Adjust the loop trimmer capacitor (C116), and the loop tuner coil (L116).

6.61 Set the "FREQUENCY RANGE" switch on Band 2 (32.5 kc to 70 kc), adjust the loop trimmer capacitor (C115) and the loop tuner coil (L117).

6.62 Set the "FREQUENCY RANGE" switch on Band 1 (15 kc to 32.5 kc) and adjust the loop trimmer capacitor (C114) and the loop tuner coil (L118).

NOTE A—For each band, the final adjustment outlined in Paragraph 6.57 (h) should be carried out.

NOTE B—If the receiver has been aligned properly on all bands for one length of loop cable and a change is made to another length, the loop circuit should be aligned in accordance with the procedure given in Paragraph 6.86. No other adjustment need be made.

6.63 ALIGNMENT OF DUMMY LOOP COILS—For alignment of the dummy loop coils (non-directional reception) the equipment is set up as shown in Figure 26. This requires that the signal generator be connected to the antenna terminal binding post J105 through a 200-mmfd capacitor.

6.64 To align the dummy loop coils for effective non-directional operation use the following procedure:

(a) Set the "FREQUENCY RANGE" switch on Band 5 (400 kc to 800 kc), and the receiver dial at 925 and the signal generator at the calibration previously determined for this setting. The signal generator should be adjusted to produce a 400-cycle, 30-per cent. modulated signal. Monitor the output of the receiver with headphones and an output meter. Re-set the signal frequency slightly if necessary to give the maximum receiver output.

(b) Loosen the two screws in the center of the front panel and open the slide covering the "UNILAT. COUP.," "UNILAT. TRIM.," and "ANT. TRIM.," adjustments. Use an alignment screwdriver and adjust the "ANT. TRIM." capacitor (C105) for a maximum receiver output as indicated on the output meter.

(c) Remove the top cover from the loop shield. Set the receiver dial at 57 and the signal generator at the low-frequency reference calibration. As in Paragraph (a) set the signal frequency for maximum receiver output. Refer to Figure 3 and adjust the dummy loop (L108) for maximum output.

(d) Repeat adjustment of the "ANT TRIM." capacitor (C105) and the dummy loop (L108). The "ANT. TRIM." adjustment may then be considered as requiring no further change for any band.

6.65 The dummy loop coils for the remaining bands are then adjusted as follows:

(a) Set the "FREQUENCY RANGE" switch on Band 6 (800 kc to 1750 kc). Set the receiver dial at 512, and adjust the signal generator frequency for maximum receiver output (approx. 1216 kc). Adjust the core of the dummy loop (L107) for resonance as indicated by maximum output.

(b) Set the "FREQUENCY RANGE" switch on Band 4 (200 kc to 400 kc) and the receiver dial at 512. Adjust the signal generator for maximum receiver output (approx. 293 kc). Then adjust the dummy loop (L109) to resonance. Replace the top cover.

(c) Set the "FREQUENCY RANGE" switch on Band 3 (100 kc to 200 kc). Remove the bottom cover from loop shield. Use an unmodulated signal and turn the cw oscillator "ON." Refer to Figure 4 and adjust the dummy loop (L110) to resonance at the 512 dial setting. (Receiver dial at 512 and signal generator frequency adjusted for maximum receiver output—approx. 146 kc).

(d) Set the "FREQUENCY RANGE" switch on Band 2 (32.5 kc to 70 kc), adjust the signal generator for maximum receiver output (approx. 49 kc) at the 512 dial setting, and adjust the dummy loop (L111) to resonance in the same manner as was outlined for Band 3. Replace the bottom cover.

(e) With "FREQUENCY RANGE" switch on Band 1, remove the top cover and adjust the dummy loop (L112) to resonance at the 512 dial setting (signal generator approx. 23 kc), while holding part of the cover in place over that portion of the loop shield containing the loop tuner coil (L118). Replace the top cover.

6.66 ALIGNMENT OF SENSE ANTENNA COILS—The following paragraphs refer specifically to the method of adjusting the sense antenna coils and trimmer capacitors. For instructions relative only to the adjustment of the receiver for operation with a given vertical antenna refer to Paragraph 4.27.

6.67 Alignment of the antenna stage for "UNILAT." operation requires the use of a calibrated transmission line,* and an antenna of 0.25 meters effective height. An output meter (OE Test Equipment or equivalent) is also required. The equipment is set up and aligned in the following manner:

(a) Place the loop antenna, vertical pick-up antenna, and the receiver beneath the calibrated transmission line.* Use an unmodulated input to the receiver from the signal generator. Monitor the output with headphone and output meter (plugged in either phone jack).

NOTE—In aligning the sense coil circuits it is advisable to set the loop winding parallel to the transmission line, so oriented that the minimum of the cardioid pattern is obtained. All adjustments are made thereafter to obtain the greatest attenuation of the signal. It is recommended that a field strength of at least 1000 microvolts per meter be used and that the volume control be so set that overloading cannot occur. As a final check on the alignment, the loop should be oriented 180 degrees and the maximum-to-minimum ratio should be checked. This will usually be over 20 and in some cases as high as 100. In all cases it should exceed 8.

(b) Turn the "SELECTOR" switch to the "UNILAT." position and the "FREQUENCY RANGE" switch to Band 3 (100 kc to 200 kc). Turn the cw oscillator "ON."

(c) Adjust the "UNILAT. COUP." capacitor (C101) to full capacitance, and set the Band 3 trimmer (C111) at mid-position.

(d) Set the receiver dial at 925 and the signal generator at the reference calibration recorded for that setting. Adjust the "UNILAT. TRIM." capacitor (C102) simultaneously varying the setting of the "UNILATERAL ADJUSTMENT" control (R102) until minimum output is indicated on the output meter. The optimum adjustment is that which provides the best unilateral (front-to-back) ratio. This is checked by noting respectively the output of the loop setting providing greatest output and the setting (180 degrees removed) providing minimum response.

(e) Remove top cover from the antenna shield and adjust the sense coil core (L103) at the low-frequency end of the band, again simultaneously varying the "UNILATERAL ADJUSTMENT" (R102) and tuning for the best unilateral (front-to-back) ratio.

(f) The adjustments outlined in Paragraphs (d) and (e) may have to be repeated several times before the optimum setting for the "UNILAT. TRIM." capacitor and the sense coil core (L103) are found. The cover should be held in place always while the trimmer setting is adjusted or checked.

(g) The sense coil core must then be adjusted to compensate for the detuning effect of the shield cover. It will be necessary to adjust the inductance to a value slightly higher than that required when the cover is off so that the circuit will be properly aligned when the cover is replaced. The optimum adjustment can best be obtained by alternately adjusting the coil core, and checking the unilateral ratio while the shield cover is held temporarily in place.

6.68 On the remaining bands the sense coils are aligned by the same general procedure except that the "UNILAT. TRIM." capacitor (C102) is left as adjusted for Band 3 operation, only the individual sense trimmer capacitors and the sense coils being adjusted. The correction for cover effect on coil inductance should always be made. See Paragraphs 6.67 (f) and (g). This is accomplished as follows:

* See Radio Materiel School pamphlet "Radio Direction Finders," Chapter 13, pages 243 to 248.

(a) Set the "FREQUENCY RANGE" switch on Band 6 (800 kc to 1750 kc). Refer to Figure 5 and adjust the sense antenna trimmer capacitor (C108) using the high-frequency reference setting. Remove the bottom cover from the antenna shield. Refer to Figure 4 and adjust the sense coil (L106) at the low-frequency reference setting.

(b) Set the "FREQUENCY RANGE" switch on Band 5 (400 kc to 800 kc) and adjust the sense antenna trimmer capacitor (C109) and the sense coil (L105).

(c) Set the "FREQUENCY RANGE" switch on Band 4 (200 kc to 400 kc) and adjust the sense antenna trimmer (C110) and the sense coil (L104).

(d) Set the "FREQUENCY RANGE" switch for operation on Band 2 (32.5 kc to 70 kc). Adjust the sense antenna trimmer capacitor (C112). Remove the top cover from the antenna shield. Refer to Figure 3 and adjust the sense coil (L102).

(e) Set the "FREQUENCY RANGE" switch on Band 1 (15 kc to 32.5 kc) and adjust the sense antenna trimmer capacitor (C113) and the sense coil (L101).

NOTE—After the above alignment procedure has been followed the components are correctly aligned. However, when the equipment has been installed in the aircraft the settings of the "UNILAT. COUP." and "UNILAT. TRIM." capacitors should be checked as outlined in Paragraphs 4.26 to 4.31 in order to compensate for variations in individual installations.

6.69 ALIGNMENT CHECK—The maximum noise output can be used as a general indication that the circuits are active and properly aligned. The values in Table K are given as a basis by which the results of the noise output test may be compared, it being necessary only to approximate those values shown. Generally the maximum noise output will be greater at the high-frequency dial settings (925) than at the low-frequency settings (57).

6.70 The following method is employed in making this test.

(a) Connect a 200-mmfd capacitor from the antenna terminal (J105) to ground; no signal input is required. Turn the "VOLUME" control to maximum and the "SELECTOR" switch to the "NON-DIR." position. Turn the cw oscillator "ON."

(b) Connect a 600-ohm output meter (OE Test Equipment or equivalent) across the phone jack and read the voltages indicated by the meter.

(c) Use the reference dial settings of 57 and 925 for each band, comparing the noise output level with the values shown in Table K. These must be considered merely as representative values, subject to some change in individual instances.

TABLE K

APPROXIMATE NOISE VOLTAGE

Band	Dial 57	Dial 925
1	2.2 volts	3.5 volts
2	0.8 volts	1.5 volts
3	1.5 volts	2.0 volts
4	2.7 volts	5.0 volts
5	1.2 volts	1.7 volts
6	1.2 volts	1.5 volts

6.71 A more accurate check on the performance of the receiver may be obtained by checking the gain of the r-f, i-f and audio stages against the data shown in Table L. In checking the i-f and r-f gain it is necessary that the output, as read on a low-capacity, radio-frequency v-t voltmeter, be kept below one volt in order to prevent overloading of the tubes in the receiver. When the v-t voltmeter is connected across the r-f or detector circuits, the associated trimmer capacitor should be readjusted at the high-frequency dial setting (925) to compensate for the detuning effect of the v-t voltmeter. The circuit must again be re-adjusted after the test has been completed.

TABLE L

TYPICAL STAGE GAINS

R-F GAINS*

Band	Dial	Gain
1	925 57	16 8
2	925 57	11 4
3	925 57	11 11
4	925 57	29 16
5	925 57	17 10
6	925 57	13 16

* Selector switch in the "NON-DIR." position. "VOLUME" control at maximum. "ANTENNA EQUALIZER" (R139) set at full clockwise position. Antenna coupling capacitor (C105) adjusted for tracking with a dummy antenna of

200 mmfd capacitance. Signal applied at the antenna post through a 200 mmfd capacitor. Output measured at the grid of the 1st detector (V103).

I-F GAIN*

Band	Input Connection	Output Connection	Transformer	Gain
1-2-3	Grid V103	Grid V105	T101	12
4-5-6	Grid V103	Grid V105	T101	18
All Bands	Grid V105	Grid V106	T102	60
All Bands	Grid V106	Grid V107	T103	0.5
1-2-3	Grid V103	Grid V107	All	360
4-5-6	Grid V103	Grid V107	All	560

* Disconnect oscillator plate lead, at terminal 1 of oscillator shield. Apply signal through a 0.1 mfd capacitor with a 50,000-ohm resistor connected from grid to ground. C123 at maximum capacity.

A-F GAIN*

Signal	Filter	Gain
1020-cycle	in	17
1000-cycle	out	28

* Input signal applied to the grid of V107 through a 0.1 mfd capacitor, a 50,000-ohm resistor connected from the grid to ground. Output measured across phones jack with a 600 ohm load.

6.72 LUBRICATION AND MECHANICAL SERVICE—All principal moving parts should be periodically inspected, cleaned if necessary, and their working surfaces suitably lubricated. Care should be exercised in the handling of all parts involved in the maintenance procedure, not overlooking the complete and proper replacement of all items including screws, lock-washers and safety wires. Do not disturb the adjustment of electrical circuits.

6.73 Receiver Type CRV- or CEX-46152—Oil, free flowing at low temperatures, shall be applied to the tuning gears and control shafts. The detent mechanisms should be given an application of a water-resisting lubricant having a smooth texture and a low pour point.

6.74 Dynamotor Filter, Type CRV- or CEX-21562—When the radio receiver is operating satisfactorily, with the dynamotor noise at a suitably low level, the dynamotor should not be disturbed except for periodical lubrications. Such lubrications are required after each 1000 hours of operation. (Approximately six months of service.) No lubricant other than Navy Grade M-484 Grease should be used. The correct lubrication procedure is as follows:

(a) Disconnect the cable from the unit, cut the snap-slide safety wire, and disengage the slider.

(b) Remove the eight screws which hold the dust cover in place, and remove the cover.

(c) Take out the two screws at each end of the dynamotor and remove the end-bell dust covers.

(d) Remove the bearing plates from the end-bells and apply only enough grease to cover the bearings. Do not pack the bearings and do not allow any lubricant to reach the commutator.

6.75 Examine the brushes to see that they have worn properly and are free from hard spots which would cause grooves in the commutator surface. A new brush should be installed in place of each brush found so defective.

6.76 Should it become necessary to replace the ball bearings or turn down the commutators, proceed as follows:

(a) Remove the brushes from the brush cartridges.

(b) Remove the nuts from the tie rods which hold the bearing end-bells and pull the end-bells away from the field coil assembly. The armature can then be taken out. Pry out the bearing retainers from the end-bells by using two small screwdrivers as wedges between the outer ball race and the end-bell.

(c) If the commutator surfaces are found to be impaired, the armature should be placed in a lathe and the commutators resurfaced by holding a fine grade of sandpaper (not coarser than 00) lightly against the commutator surface as the armature is rotated. Do not use emery cloth. All residue of dust, sand and dirt should be wiped away to leave a clean, smooth, polished commutator surface. If the commutator is turned down (re-surfaced by taking one or more cuts with a tool-bit), the mica segment separators must be undercut.

6.77 Should it be desirable to remove the dynamotor proper from the filter sub-base, invert the unit and remove the four screws together with the lock-washers and the inner base cover. Carefully unsolder the four leads to the dynamotor. Turn the unit right side up again and remove the four nuts and associated washers which hold the dynamotor in place. The dynamotor may then be removed from the sub-base.

6.78 Prior to reassembly of the dynamotor, all parts except those requiring lubrication should be wiped clean, free of grease and oil. When reassembled make certain that the armature turns freely before the brushes are installed. In replacing the brushes check to insure that the "+" and "–" marking on the brushes correspond with those on the end-bell casting, also to insure that the four dynamotor leads are well-soldered to their proper terminals. See Figure 13.

6.79 If the armature still turns easily after the brushes have been installed, the end-bell dust covers and the outer case may be re-assembled and the unit tested by placing it in operation, checking for polarity, measuring the high voltage output and noting if any noise is introduced into the receiver.

6.80 LOOP DRIVE ASSEMBLY, TYPE CRV-69064—The loop drive assembly should give trouble-free operation over a long period of time. The lubricant on the gears, shafts, bearings, etc., should be sufficient to last the life of the equipment. Should servicing of the azimuth scale relay be required, refer to Figure 32 and take out the seven screws (E) which retain the azimuth scale window, remove the window and take out the four screws (F) which hold the azimuth scale relay assembly in place. After unsoldering the relay leads the assembly may be removed for replacement or repair as required.

6.81 THE LOOP ANTENNA ASSEMBLY, CRV-69065—The loop assembly should require little service except for possible cleaning of the slip-ring and brush surfaces after a long period of service. The need for such servicing would be evidenced by noise being introduced into the receiver as the loops are rotated. To remedy such a condition proceed as follows:

(a) If the installation is such that convenient access to the bottom plate (R) is not possible when the loop assembly is installed remove the loop drive assembly and extension, following the instructions outlined in Paragraphs 4.9 to 4.11.

(b) Dismount the loop assembly from the aircraft.

(c) Then remove the five screws (P) which hold the plate (R) in place.

(d) Remove Plate (R) to which are attached the cable receptacles J401 and J402, and the brush assembly (S).

(e) Clean the slip-rings and brushes (S) with cleaning fluid such as carbon tetrachloride, by dampening a cloth and holding it against the rings while rotating the loop drive shaft. Then coat the surfaces with a thin film of petrolatum.

(f) Reassemble the loop antenna assembly and reinstall it following the procedure outlined in Paragraphs 4.12 to 4.15.

6.82 If for any reason it should become necessary to remove the streamlined housing from the loop antenna assembly base, proceed in the following manner:

(a) Remove and disassemble the loop antenna assembly as for cleaning the slip-rings and brushes, Paragraphs 6.81 (a to d).

(b) Then with a long screwdriver loosen the two long screws (T) and (W) which serve to lock the two loop coils in position with their planes at right angles to each other. Loosening these screws two or three turns will suffice.

(c) Keeping the screwdriver firmly engaged in the slotted head of (T) and (W), hold the inner loop rigid and rotate the hand wheel counter-clockwise as far as it will go, or until the planes of the two loops are parallel.

(d) Remove the several bolts (U) by which the streamlined housing is attached to the base, and carefully lift the housing off.

6.83 In reassembling the housing to the base follow in reverse order the procedure outlined in Paragraphs 6.82 (a) to (d). It is necessary, in repositioning the two loops with respect to each other to again hold the inner loop with the screwdriver while the outer loop is rotated clockwise as far as it will go. The correct position of the loop is when a 90° displacement has been obtained. The two locking screws (T) and (W) should then be tightened with the loops in that position.

6.84 It is not practical to attempt to adjust the loop antennas to exactly a 90-degree electrical relationship with each other. To compensate for such discrepancy as may thus arise the lower of the two indices on the shutter (D) may be moved slightly to the right or left of the upper index. In this manner the minimums for bilateral bearings are made to coincide exactly using either the low-frequency or high-frequency loop. These indices should never be changed, however, unless it can be definitely established that a discrepancy exists between the two bearings. To adjust the lower index right or left, remove the seven screws (E) and the scale window. Then, with a screwdriver or other pointed tool slide the lower index right or left as desired. Check the coincidence of the bilateral bearings then obtained first on a low-frequency signal (Bands 1 or 2), then on a high-frequency signal (Bands 3, 4, 5 or 6) either on the same bearing or at a known angular displacement. When the indices show no discrepancies, replace the scale window.

6.85 LOOP ANTENNA ASSEMBLY REPLACEMENTS ON MODELS DZ-2 AND DZ-2a EQUIPMENT—NOTE: To avoid confusion, the word "Loop" as used herein refers to the loop antenna assembly; the word "Antenna" as used herein refers to the non-directional sense antenna.

a. Loop windings in Model DZ-2 and Model DZ-2a equipments are furnished wired so that the sense indication of azimuth (operation "SELECTOR" on "UNILAT") is correct when the antenna and loop installations are made in the normal manners.

(Model DZ-2: Antenna and loop above airplane. Model DZ-2a: Antenna above but loop below airplane).

b. Internal connections inside the loop housing, between the brush assembly and loop connector should be as follows:

Connector Terminal	Wire Tracer Color	Connection to Brush Terminal*	
		Model DZ-2	Model DZ-2a
C	Slate	4	3
D	Orange	3	4
E	Brown	2	2
F	Blue	1	1
G	Black (solid color)	5	5

* Brush Terminal #1 is nearest loop windings; Terminal #5 is nearest mounting plate.

c. The loop installation position determines the loop connection arrangement in accordance with the information above. The antenna installation location determines the position of the azimuth scale on the loop drive shaft; that is, changing from an antenna above the airplane to one below the airplane requires repositioning of the azimuth scale by 180°, provided that the loop location is not changed.

d. A final check for proper sense indication should be made on stations of **known** direction. One station in the frequency range from 15 to 70 kc (Bands 1 and 2) should be checked. Thereafter another station in the range from 100 to 1750 kc (Bands 3, 4, 5, 6) should be checked.

CAUTION The loops of Model DZ-2 and Model DZ-2a Equipment may be used interchangeably on either type of installation only provided that connections are proper. Changing of connections in the loop circuit should be attempted at one point only: within the loop, at the brush terminal. Five screws fasten the mounting plate (for loop and relay cable connectors and the brush assembly) to the loop base. These may be removed and the mounting plate withdrawn for inspection and connections changed as may be required.

6.86 SUPPLEMENTARY DATA ON ALIGNMENT—

a. Model DZ-2 Aircraft Radio Direction Finder Equipment has been aligned for use with specific loop cable lengths as follows:

LOOP CABLE LENGTH

Receiver Serial No.	Cable Length
1 to 251	5 feet
252 to 731	6 feet
732 to 1906	5 feet

b. The Model DZ-2 Equipment was originally designed for operation with a maximum loop cable length of 6 feet. Subsequently, installation requirements indicated the need for longer cables. Procedure for realignment with the longer cables is given in Paragraph 6.86c, immediately below. However, it must be emphasized that efficiency of performance is sacrificed as the cable length approaches the absolute maximum at which Bands 2 and 6 can be still aligned at frequencies corresponding to a 925 dial setting. This maximum length is in the order of 9 to 10 feet. Proper alignment becomes difficult, and in some cases impossible, with loop cable lengths in the order of 10½ feet. It is recommended that the installation be made using a length of loop cable exceeding by as little as possible the original design maximum of 6 feet.

c. If, for any reason, the loop cable length is changed from that shown in the table given in paragraph 6.86a, realignment of the loop compensating capacitor (C202) and the band 6 trimmer capacitor (C119) is required. For alignment purposes, the use of a signal generator source, coupled to the loop antenna, with the receiver output monitored by means of head telephones and an output meter (as described in Paragraph 6.56), is recommended. The signal from the signal generator should be unmodulated. The receiver controls should be set as follows:

1. "MCW-CW" Switch on "CW."
2. "SELECTOR" Switch on "BILAT."
3. "TUNING" Dial on "925."
4. "FREQUENCY RANGE" (Band Switch) on "32.5-70.0 kc (Band 2).
5. "VOLUME" Control adjusted so that the receiver output is between 2 and 10 volts.

Now proceed as follows:

1. Adjust the signal generator frequency (approx. 70 kc) and orient the loop for maximum output. Adjust "VOLUME" control, if necessary. See operation 5, above.
2. Adjust the loop compensating capacitor (C202) for maximum output, using an alignment (insulated) screwdriver. Capacitor C202 is accessible after removing the receiver from its case and taking off the bottom cover of the coil compartment (the second compartment from the front of the receiver. See Figure 4).
3. Adjust the Band 2 trimmer capacitor (C115) for maximum output, and replace the cover.
4. Set the "FREQUENCY RANGE" (Band Switch) on 800-1750 (Band 6), adjust the signal generator frequency (approx. 1750 kc) and orient the loop for maximum output.
5. Adjust the Band 6 trimmer capacitor (C119) for maximum signal output.
6. No further adjustment is necessary.

TABLE I
LIST OF MAJOR UNITS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

CONTRACT NXsa-19698 DATED: 24 DECEMBER, 1942
CONTRACT NXsa-23437 DATED: 13 FEBRUARY, 1943

QUAN-TITY	SYMBOL GROUP	NAVY TYPE DESIGNATION	NAME OF MAJOR UNIT	ASSEMBLY DRAWING NUMBER
1	101-299	*-46152	RADIO RECEIVER	W-303012-504
1		*-46087	RECEIVER MOUNTING BASE	P-720266-504
1	301-399	*-21562	DYNAMOTOR - FILTER	P-720290-504
1		*-21422	DYNAMOTOR - FILTER MOUNTING BASE	M-420557-504
1	401-499	CRV-69065	LOOP ASSEMBLY	P-721710-501
1		CRV-69064	LOOP DRIVE ASSEMBLY	P-721709-1
1			LOOP DRIVE EXTENSION	P-721710-503
1	501-599		LOOP CABLE	P-720708-501 or 502
1			RELAY CABLE	M-421213-502 or 503
1			DYNAMOTOR CABLE	M-421275-501
1			POWER CABLE	M-421274-501

* *Note - For DZ-2 equipments manufactured on Contract NXsa-23437, several of the component units have been manufactured by the Emerson Radio and Phonograph Company. The units so manufactured will be identified on the nameplates by the Navy number prefix "CEX". They are identical with those manufactured by RCA on the earlier contract NXsa-19698 carrying the Navy number prefix "CRV".*

IB-38212/
38265-U1

CONTRACT NXsa-19698
CONTRACT NXsa-23437

DATED: 24 DECEMBER, 1942
DATED: 13 FEBRUARY, 1943

TABLE II
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		CAPACITORS						
C-101	Sense Antenna Coupling Capacitor	Variable, air, 4.5 mmfd to 50 mmfd, 7 stator and 7 rotor plates, rotor not grounded but terminal lug from rotor, screwdriver adjustment, breakdown test 500 v a.c., 60 cycles ceramic base			19	Type APC		M-420864-2
C-102	Sense Antenna Trimmer Capacitor	Same as C-101, except rotor grounded and no terminal lug from rotor			19	Type APC		M-420864-1
*†C-103	Sense Antenna Capacitor	Molded, mica, 50 mmfd ±5%, 500 v d.c. working	-48895-D5	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K50, PO MOSDW 603M		P-720538-5
*†C-104	Antenna Compensating Capacitor (Bands 3,4,5,6)	Molded, mica, 40 mmfd ±3%, 500 v d.c. working	-481077-D3	RE 48A 154	2,13 16 29 34	1469, 5RS M1K40 PO MOSDW		P-720537-1
C-105	Antenna Coupling Trimmer Capacitor	Same as C-101						
*†C-106	Phone Lead Filter Capacitor	Molded, mica, 10,000 mmfd ±10%, 300 v d.c. working	-48938-10	RE 48A 154	2,13 29 34	1441, 3WS R MLW-3-11-10		P-720473-15
*†C-107	Sense Antenna Pad Capacitor (Bands 3,4,5)	Same as C-104	-481077-D3					
C-108	Sense Antenna Trimmer Capacitor	Variable, air, 4.0 mmfd to 25 mmfd max., 4 stator and 3 rotor plates, rotor grounded, screwdriver adjustment, breakdown test 500 v a.c., 60 cycles, ceramic base			19	Type APC		M-420864-3
C-109	Sense Antenna Trimmer Capacitor (Band 5)	Same as C-108						
C-110	Sense Antenna Trimmer Capacitor (Band 4)	Same as C-108						
C-111	Sense Antenna Trimmer Capacitor (Band 3)	Same as C-108						
C-112	Sense Antenna Trimmer Capacitor (Band 2)	Same as C-108						

* *OPERATING SPARE PARTS FURNISHED, refer to TABLE IV, OPERATING SPARES, for quantities.*
† *BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.*

IB-38212/38265-W4

TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		CAPACITORS (Continued)						
C-113	Sense Antenna Trimmer Capacitor (Band 1)	Same as C-108						
C-114	Loop Trimmer Capacitor (Band 1)	Variable, air, 4.5 mmfd. to 50 mmfd. max., 7 stator and 7 rotor plates, rotor grounded, screwdriver adjustment, breakdown test 500 v a.c., 60 cycles, ceramic base			19	Type APC		M-420864-4
C-115	Loop Trimmer Capacitor (Band 2)	Same as C-114						
C-116	Loop Trimmer Capacitor (Band 3)	Same as C-114						
C-117	Loop Trimmer Capacitor (Band 4)	Same as C-114						
C-118	Loop Trimmer Capacitor (Band 5)	Same as C-114						
C-119	Loop Trimmer Capacitor (Band 6)	Same as C-114						
*†C-120	Loop Pad Capacitor (Bands 3,4, 5,6)	Same as C-104	-481077-D3					
*†C-121	Loop Pad Capacitor (All Bands)	Molded, mica, 15 mmfd ±5%, 500 v d.c. working	-48840-D5	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K15, PO MOSDW 603M		P-720538-22
*†C-122	Grid Filter Capacitor for V-106	Molded, mica, 5000 mmfd ±10%, 300 v d.c. working	-481037-D10	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720473-13
C-123A B C D E	Antenna Tuning Capacitor Loop Tuning Capacitor R-F Tuning Capacitor 1st Detector Tuning Capacitor Oscillator Tuning Capacitor	Variable, air, 5 sections, each section capacity 17 mmfd. to 603 mmfd. with 31 aluminum plates, movement of rotor for min. capacity to be clockwise motion to extreme position, ceramic base, includes R-103			33			P-720281-501
*†C-124	Antenna Compensating Capacitor (Band 1)	Molded, mica, 27 mmfd ±5%, 500 v d.c. working	-481146-D5	RE 48A 154	2,13 29,34 16,245	1464, 5RS PO, MOSDW M1K27, 603M		P-720538-2
*†C-125	Dummy Loop Capacitor (Band 2)	Molded, mica, 90 mmfd ±5%, 500 v d c. working	-481199-D5	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K90, PO MOSDW 603M		P-720538-21

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* *OPERATING SPARE PARTS FURNISHED, refer to TABLE IV, OPERATING SPARES, for quantities.*
† *BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.*

TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		CAPACITORS (Continued)						
*†C-126	Dummy Loop Capacitor (Band 6)	Molded, mica, 135 mmfd ±5%, 500 v d.c. working	-481419-D5	RE 48A 154	2,13 16,29 34	1469, 5RS M1K135, PO MOSDW		P-721133-5
C-127	R-F Trimmer Capacitor (Band 1)	Same as C-108						
C-128	R-F Trimmer Capacitor (Band 2)	Same as C-108						
C-129	R-F Trimmer Capacitor (Band 3)	Same as C-108						
C-130	R-F Trimmer Capacitor (Band 4)	Same as C-108						
C-131	R-F Trimmer Capacitor (Band 5)	Same as C-108						
C-132	R-F Trimmer Capacitor (Band 6)	Same as C-108						
*†C-133	R-F Pad Capacitor (All Bands)	Molded, mica, 90 mmfd ±3%, 500 v d.c. working	-481199-D3	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K90, PO MOSDW 603M		P-721081-12
*†C-134	R-F Pad Capacitor (Bands 3,4,5)	Molded, mica, 43 mmfd ±3%, 500 v d.c. working	-481418-D3	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K43, PO MOSDW 603M		P-721081-10
*†C-135A B	Cathode By-pass Capacitor for V-102 Plate Filter Capacitor for V-102	Oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case, complete with mounting bracket		RE 13A 488C	1,2		Tolerance +10% -3% P-720463-8	P-720463-58
*†C-136A B	Screen By-pass Capacitor for V-102 Screen By-pass Capacitor for V-102	Oil filled, paper, 2 sections, 0.1/0.1 mfd ±10%, 500 v d.c. working, each section grounded to case, complete with mounting bracket		RE 13A 488C	1,2		Tolerance +10% -3% P-720463-10	P-720463-60
*†C-137A B	Screen & Plate Filter Capacitor for V-102 Screen Divider By-pass Capacitor	Oil filled, paper, 2 sections, 0.5/0.5 mfd. ±10%, 400 v d.c. working, each section grounded to case		RE 13A 488C	1		Tolerance +10% -3% P-720463-5	P-720463-55
C-138	1st Detector Trimmer Capacitor (Band 1)	Same as C-108						

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* *OPERATING SPARE PARTS FURNISHED, refer to TABLE IV, OPERATING SPARES, for quantities.*
† *BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.*

TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		CAPACITORS (Continued)						
C-139	1st Detector Trimmer Capacitor (Band 2)	Same as C-108						
C-140	1st Detector Trimmer Capacitor (Band 3)	Same as C-108						
C-141	1st Detector Trimmer Capacitor (Band 4)	Same as C-108						
C-142	1st Detector Trimmer Capacitor (Band 5)	Same as C-108						
C-143	1st Detector Trimmer Capacitor (Band 6)	Same as C-108						
*†C-144	1st Detector Pad Capacitor (Bands 3,4,5)	Same as C-134	-481418-D3					
*†C-145	1st Detector Pad Capacitor (All Bands)	Same as C-133	-481199-D3					
*†C-146	1st Detector Grid Coupling Capacitor	Molded, mica, 500 mmfd ±10%, 500 v d.c. working	-48691-D10	RE 48A 154	2,13 16,29 34	1469, 5RS M7K500, PO MOSDW		P-720473-8
*†C-147A	R-F Band-pass Filter Coupling Capacitor (Bands 1,2,3)	Oil filled, paper, 2 sections, 0.1 mfd +10% -3%, and 0.025 mfd ±5%, 500 v d.c. working, each section grounded to case		RE 13A 488C	1,2			P-720463-4
B	R-F Band-pass Filter Coupling Capacitor (Bands 4,5,6)							
*†C-148A	R-F Band-pass Filter Coupling Capacitor (Bands 1,2,3)	Same as C-147A&B						
B	R-F Band-pass Filter Coupling Capacitor (Bands 4,5,6)							
*†C-149A	1st Detector Screen By-pass Capacitor	Same as C-136A&B						
B	1st Detector Screen By-pass Capacitor							
*†C-150	Oscillator Grid Coupling Capacitor	Molded, mica, 100 mmfd ±10%, 500 v d.c. working	-48674-B10	RE 48A 154	2,13 16,29 34	1468LS, 5WS M2K100, OXM MOBW		P-720473-6

** OPERATING SPARE PARTS FURNISHED, refer to TABLE IV, OPERATING SPARES, for quantities.*
† BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.

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TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		CAPACITORS (Continued)						
*†C-151	Oscillator Plate Tank Capacitor (All Bands)	Molded, mica, 60 mmfd ±3%, 500 v d.c. working	-481065-D3	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K60, PO MOSDW 603M		P-721081-11
*†C-152	Oscillator Plate Tank Capacitor (Band 1)	Molded, mica, 370 mmfd ±2%, 500 v d.c. working	-481151-D2	RE 48A 154	2,13 16,29 34	1469, 5RS M5K370, PO MOSDW		P-720537-7
C-153	Oscillator Plate Trimmer Capacitor (Band 1)	Same as C-114						
*†C-154	Oscillator Plate Tank Capacitor (Band 2)	Molded, mica, 147 mmfd ±3%, 500 v d.c. working	-481148-D3	RE 48A 154	2,13 16,29 34	1469, 5RS M2K147, PO MOSDW		P-720537-3
C-155	Oscillator Plate Trimmer Capacitor (Band 2)	Same as C-114						
*†C-156	Oscillator Plate Tank Capacitor (Band 3)	Molded, mica, 70 mmfd ±5%, 500 v d.c. working	-48839-D5	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K70, PO MOSDW 603M		P-720538-6
C-157	Oscillator Plate Trimmer Capacitor (Band 3)	Same as C-114						
*†C-158	Oscillator Plate Tank Capacitor (Band 4)	Molded, mica, 33 mmfd ±5%, 500 v d.c. working	-481147-D5	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K33, PO MOSDW 603M		P-720538-3
C-159	Oscillator Plate Trimmer Capacitor (Band 4)	Same as C-114						
C-160	Oscillator Plate Trimmer Capacitor (Band 5)	Same as C-114						
C-161	Oscillator Plate Trimmer Capacitor (Band 6)	Same as C-114						
*†C-162	Oscillator Series Capacitor (Band 1)	Same as C-152	-481151-D2					

* *OPERATING SPARE PARTS FURNISHED, refer to TABLE IV, OPERATING SPARES, for quantities.*
† *BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.*

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TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		CAPACITORS (Continued)						
*†C-163	Oscillator Series Capacitor (Band 2)	Molded, mica, 485 mmfd ±2%, 500 v d.c. working	-481153-D2	RE 48A 154	2,13 16,29 34	1469, 5RS M6K485, PO MOSDW		P-720537-8
*†C-164	Oscillator Series Capacitor (Band 3)	Molded, mica, 1030 mmfd ±3%, 500 v d.c. working	-481141-D3	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720537-9
*†C-165	Oscillator Series Capacitor (Band 4)	Molded, mica, 1900 mmfd ±3%, 500 v d.c. working	-481142-D3	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720537-10
*†C-166	Oscillator Series Capacitor (Band 5)	Molded, mica, 3500 mmfd ±5%, 300 v d.c. working	-481144-D5	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720538-12
*†C-167	Oscillator Series Capacitor (Band 6)	Molded, mica, 6400 mmfd ±5%, 300 v d.c. working	-481420-D5	RE 48A 154	2,29 34	1464, PW MWSDW		P-721133-6
*†C-168A	1st Detector Cathode By-pass Capacitor	Same as C-135A&B						
B	Oscillator Plate By-pass Capacitor							
*†C-169A	1st Detector Plate Filter Capacitor	Oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case, complete with mounting bracket		RE 13A 488C	1,2		Tolerance +10% -3% P-720463-9	P-720463-59
B	Cathode By-pass Capacitor for V-105							
*†C-170A	Screen By-pass Capacitor for V-105	Same as C-137A&B						
B	Heater By-pass Capacitor							
*†C-171A	Plate Filter Capacitor for V-108	Oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case, complete with mounting bracket		RE 13A 488C	1,2		Tolerance +10% -3% P-720463-11	P-720463-61
B	Plate Filter Capacitor for V-105							
*†C-172A	Cathode By-pass Capacitor for V-106	Oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case, complete with mounting bracket		RE 13A 488C	1,2		Tolerance +10% -3% P-720463-7	P-720463-57
B	Cathode By-pass Capacitor for V-107							

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* *OPERATING SPARE PARTS FURNISHED, refer to TABLE IV, OPERATING SPARES, for quantities.*
† *BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.*

TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		CAPACITORS (Continued)						
*†C-173A B	Screen By-pass Capacitor for V-106 Screen By-pass Capacitor for V-107	Oil filled, paper, 2 sections, 0.1/0.1 mfd ±10%, 500 v d.c. working, each section grounded to case		RE 13A 488C	1,2		Tolerance +10% -3% P-720463-12	P-720463-62
*†C-174	Grid Filter Capacitor for V-107	Same as C-122	-481037-D10					
*†C-175	Plate By-pass Capacitor for V-107	Molded, mica, 100 mmfd ±5%, 500 v d.c. working	-48674-D5	RE 48A 154	2,13 16,29 34 245	1469, 5RS M2K100, PO MOSDW 603M		P-720538-7
*†C-176A B	Screen Line Filter Capacitor Screen Line Filter Capacitor	Same as C-137A&B						
*†C-177	CW Oscillator Output Coupling Capacitor	Molded, mica, 5 mmfd ±10%, 500 v d.c. working	-48771-C10	RE 48A 154	2,13 16,29 34	1469, 5RS M1K5, PO MOSW		P-720473-1
*†C-178	A-F Equalizer Capacitor	Molded, mica, 2100 mmfd ±5%, 500 v d.c. working	-481143-D5	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720538-11
*†C-179	Grid Coupling Capacitor for V-109	Same as C-106	-48938-10					
*†C-180	Grid Compensating Capacitor for V-109	Molded, mica, 470 mmfd ±5%, 500 v d.c. working	-481152-D5	RE 48A 154	2,13 16,29 34 245	1469, 5RS M6K470, PO MOSDW 603M		P-720538-9
*†C-181	Plate By-pass Capacitor for V-109	Molded, mica, 1200 mmfd ±5%, 500 v d.c. working	-481084-D5	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720538-10
*†C-182A B	Volume Control By-pass Capacitor Plate Filter Capacitor for V-106	Same as C-137A&B						
*†C-183A B	Main B+ Filter Capacitor Main B+ Filter Capacitor	Oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case		RE 13A 488C	1,2		Tolerance +10% -3% P-720463-6	P-720463-56
*†C-184A B	Main B+ Filter Capacitor Main B+ Filter Capacitor	Same as C-183A&B						

* *OPERATING SPARE PARTS FURNISHED, refer to TABLE IV, OPERATING SPARES, for quantities.*
† *BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.*

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TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		CAPACITORS (Continued)						
*†C-185A B	Main B+ Filter Capacitor Main B+ Filter Capacitor	Oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case, complete with mounting bracket		RE 13A 488C	1,2		Tolerance +10% -3% P-720463-3	P-720463-53
*†C-186	Primary Capacitor for T-101	Molded, mica, 400 mmfd ±5%, 500 v d.c. working	-481015-D5	RE 48A 154	2,13 16,29 34 245	1469, 5RS M5K400, PO MOSDW 603M		P-720538-8
*†C-187	Secondary Capacitor for T-101	Same as C-186	-481015-D5					
*†C-188	Primary Capacitor for T-102	Same as C-186	-481015-D5					
*†C-189	Secondary Capacitor for T-102	Same as C-186	-481015-D5					
*†C-190	Primary Capacitor for T-103	Same as C-186	-481015-D5					
*†C-191	Secondary Capacitor for T-103	Same as C-186	-481015-D5					
*†C-192	Grid Coupling Capacitor for V-108	Same as C-186	-481015-D5					
*†C-193	Plate Tuning Capacitor for V-108	Same as C-181	-481084-D5					
C-194	Input Tuning Capacitor for T-106	Foil and paper type, 0.010 mfd. ±10%, 500 v d.c. working, part of T-106, not separately replaceable			1			P-72017-512
C-195	Coupling Tuning Capacitor for T-106	Same as C-194						
C-196	Output Tuning Capacitor for T-106	Same as C-194						
*†C-197A B	By-pass Capacitor for R-139 By-pass Capacitor for R-140	Same as C-173 A&B						
*†C-198A B	By-pass Capacitor for R-103 By-pass Capacitor for R-103	Same as C-183A&B						

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* *OPERATING SPARE PARTS FURNISHED, refer to TABLE IV, OPERATING SPARES, for quantities.*
† *BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.*

TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		CAPACITORS (Continued)						
*†C-199A	Screen By-pass Capacitor for V-105	Same as C-173A&B						
B	Screen By-pass Capacitor for V-105							
*†C-200	Image Filter Capacitor	Molded, mica, 20 mmfd ±5%, 500 v d.c. working	-48783-D5	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K20, PO MOSDW 603M		P-720538-1
*†C-201	Phone Lead Filter Capacitor	Same as C-175	-48674-D5					
C202	Loop Cable Compensating Capacitor	Variable, air, 4.5 mmfd. to 50 mmfd., 7 stator and 7 rotor plates, rotor not grounded but terminal lug from rotor, screwdriver adjustment, breakdown test 500 v a.c., 60 cycles, ceramic base			19	Type APC		M-420864-7
*†C-203	Antenna Trimmer Parallel Capacitor	Same as C-200	-48783-D5					
*†C-204	Grid Compensating Capacitor for V-109	Same as C-146	-48691-D10					
*†C-205	Cathode By-pass Capacitor for V-109	Same as C-186	-481015-D5					
*†C-206	Loop Cable Pad Capacitor (Bands 1,2,3,4,5)	Same as C-151	-481065-D3					
*†C-207	R-F Pad Capacitor (Band 2)	Molded, mica, 10 mmfd ±10%, 500 v d.c. working	-48710-C10	RE 48A 154	2,13 16,29 34	1469, 5RS M1K10, PO MOSW		P-720473-2
*†C-208	1st Detector Pad Capacitor (Band 1)	Same as C-207	-48710-C10					
*†C-209	1st Detector Pad Capacitor (Band 2)	Same as C-207	-48710-C10					
*†C-210	Oscillator Pad Capacitor (Bands 1,2,3,4,5)	Same as C-104	-481077-D3					
*†C-211	Sense Antenna Pad Capacitor (Band 6)	Same as C-207	-48710-C10					

* *OPERATING SPARE PARTS FURNISHED, refer to TABLE IV, OPERATING SPARES, for quantities.*
† *BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.*

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TABLE II (Continued)

PARTS LIST BY SYMBOL DESIGNATION

FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		CAPACITORS (Continued)						
C-212 C-213	Line Filter Capacitor Line Filter Capacitor	Dry electrolytic, 50 mfd +90% -10%, 50 v d.c. working, part of line filter and not replaceable, separately			1			M-86011-16
*†C-301	Low Voltage Filter Capacitor	Oil filled, paper, single section, 1.75 mfd ±10%, 50 v d.c. working	-48661-10	RE 13A 488	1,2		Tolerance +10% -3% P-720463-2	P-720555-60
*†C-302	Low Voltage Filter Capacitor	Same as C-301	-48661-10					
*†C-303A B	High Voltage Filter Capacitor High Voltage Filter Capacitor	Oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working	-481161-10	RE 13A 488C	1,2		Tolerance +10% -3% P-720463-1	P-720555-53
*†C-304	Low Voltage Filter Capacitor	Molded, mica, 10,000 mmfd ±10%, 300 v d.c. working	-48589-10	RE 48A 154	13,29 34	3IS, R (Lugs) MKW-3-11-10		P-720473-16
*†C-305	High Voltage Filter Capacitor	Same as C-304	-48589-10					
		δ DYNAMOTORS						
†D-301	Dynamotor for High Voltage Power Supply	Input: 27.9 v d.c. at 1.23 amps., output: 220 v d.c. at 0.070 amps., 4400 r.p.m. continuous duty Winding data: field -1350 turns AWG #29 E wire; primary -12 turns AWG #25 Formex per coil, secondary -75 turns AWG #35 Formex per coil	-21561		235	ML-3412-17		M-420733-502

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* *OPERATING SPARE PARTS FURNISHED, refer to TABLE IV, OPERATING SPARES, for quantities.*

† *BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.*

δ *To be packed separately.*

TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		MISCELLANEOUS ELECTRICAL PARTS						
E-101	Selector Knob	Aluminum, one end 1/2" wide with pointer 7/8" long at other end, 1/4" shaft, 2" overall length, tapped #8-32 threads			1			K-875693-1
E-102	Volume Control Knob	For 1/4" shaft, 8 equally spaced grooves, setscrews Bristo cup point threaded #8-32			402	#S-308-20-BB		K-833667-5
E-103	Tube Shield Base for V-105,106, 107,108	Aluminum 0.025" thick, 1-21/32" O.D., 1-7/32" I.D., 2-1/8" long			82	Cat. #B-803		K-850869-1
E-104	Tube Shield for V-105,106,107, 108	Aluminum 0.015" thick, 1.591" I.D., 1-21/32" O.D., 3-1/2" overall length			82	B-704 or B-709		K-833405-2
E-105	Tube Shield Top for V-105,106, 107,108	Aluminum 0.020" thick, 1-5/8" I.D., 1-1/4" long, center hole 1/4" dia., 13/16" deep			82	Cat. #B-903		K-850869-2
E-106	Terminal Board (TB-1) for C-178, 179, R-115,117,119,121,128, 136,141	Laminated, phenolic, 0.0625" thick, 3-3/8" long, 1-3/8" wide, with 18 terminals	17-P-5 Type FBE		1			P-720434-501
E-107	Terminal Board (TB-2) for R-114, 116,118,120,123,124,125,126	Laminated, phenolic, 0.0625" thick, 3" long, 1-3/8" wide, with 16 terminals	17-P-5 Type FBE		1			P-720434-502
E-108	Unilateral Adjustment Knob	Molded bakelite, 1-1/8" dia. with pointer			304	#637-A		K-864632-1
E-109	Terminal Board for C-177	Laminated, phenolic, 0.0625" thick, 21/32" long, 3/8" wide, with one terminal and one hole, 0.136" dia.	17-P-5		1			K-854183-503
E-110	Terminal Board for Antenna Post	Laminated insulated cloth base, 1-1/4" long, 5/8" wide, 1/8" thick, 3 holes, 0.154" dia., 1 hole 0.046" dia.			1			K-850469-1
E-111	Terminal Board (TB-4) for R-108, 132,133,134,137,138	Laminated, phenolic, 0.0625" thick, 2-5/8" long, 2-1/16" wide, with 12 terminals	17-P-5 Type FBE		1			P-720434-505
E-112	R.F. Shield	Assembly consisting of: C-127,128,129, 130,131,132,133,134,135A&B,136A&B, 207;L-119,120,121,122,123,124;R-104, 105,106,107;S-105A&B;V-102;X-102			1			P-720286-504
E-113	Antenna Shield	Assembly consisting of: C-101,102,103, 105,107,108,109,110,111,112,113,203, 211; L-101,102,103,104,105,106; R-101; S-101,102A&B			1			P-720284-504

TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		MISCELLANEOUS ELECTRICAL PARTS (Continued)						
E-114	Loop Input Shield	Assembly consisting of: C-104,114,115, 116,117,118,119,120,121,124,125,126, 202,206; L-107,108,109,110,111,112, 113A,B,C,114A,B,C,115A,B,C,116A,B,C, 117A,B,C,118A,B,C; R-140; S-103A&B, 104A,B,C,D,E,&F			1			P-720707-502
E-115	1st Detector Shield	Assembly consisting of: C-138,139,140, 141,142,143,144,145,146,147A&B, 148A&B,149A&B,208,209; L-125,126, 127,128,129,130; R-109,110; S-106A, B&C; V-103; X-103			1			P-720287-504
E-116	Oscillator Shield	Assembly consisting of: C-150,151,152, 153,154,155,156,157,158,159,160,161, 162,163,164,165,166,167,168A&B,210; L-131A,B&C, 132A,B&C, 133A,B&C,134A, B&C,135A,B&C,136A,B&C; R-111,112, 113; S-107,108A,B,C,D&E; X-104			1			P-720288-504
E-117	Mounting Plate	Aluminum, 0.064" thick, 16-3/4" long, 11" wide and base plate with 4 mounting plates		47-A-11	1			P-720266-504
E-118	Terminal Board (TB-3) for C-180, 181,204,205, R-129,130,131	Laminated phenolic, 0.0625" thick, 2-1/4" long, 1-3/8" wide, with 12 terminals		17-P-5 Type FBE	1	Type FBE		P-720434-506
E-119	Condenser Drive	Assembly consisting of: condenser gear support, C-123A,B,C,D&E,E-119A, B,C,D,E,F,G,H,J,&K			1			M-420564-503
E-119A	Gear	Assembly consisting of: 2 brass gears, 1 brass bushing, 2 stainless steel springs			1			M-420549-503
E-119B	Scale for Condenser Drive (E-119)	Aluminum 0.064" thick 2-1/4" dia., black alumilite background for scale 0-1000, Bristo setscrew threaded #8-32 for 1/8" long			1			M-420549-501
E-119C	Pinion	Brass rod, 1-3/32" long, 18 teeth, 48" pitch dia., 0.416" O.D.			1			K-855053-3

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TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		MISCELLANEOUS ELECTRICAL PARTS (Continued)						
E-119D	Scale for Condenser Drive (E-119)	Similar to E-119B except scale 0-100			1			M-420549-502
E-119E	Spring for Pinion	Phosphor bronze wire 0.062" dia., 5 active turns, 3/16" I.D., 1/2" free length			1			K-855288-2
E-119F	Spring for Gear Assembly	Stainless steel 0.050" dia. spring wire, 2 complete coils			1			K-856114-1
E-119G	Bearing for Condenser Gear Support	5 balls, 0.162" dia. each			261	S-1		K-855083-3
E-119H	Bearing Retainer	Brass, 1" O.D., 39/64" I.D., 2 holes tapped #2-56 threads			1			K-868700-1
E-119J	Shaft for Tuning	Brass, 2-1/2" long, 0.249" for 5/8", 0.163" for 1-7/8", smaller end threaded #8-32 threads			1			K-855053-1
E-119K	Gear	Assembly consisting of: 2 stainless steel springs, 2 brass gears, 1 brass pinion and brass bushing			1			K-882894-501
E-301	Low Voltage, Positive (+) Brush for Dynamotor (D-301)	Spring approx. 1-1/8" long, one end 5/16" wide, other end 3/8" wide, 1-15/16" overall length			235			K-881930-3
E-302	Low Voltage, Negative (-) Brush for Dynamotor (D-301)	Similar to E-301 except negative polarity			235			K-881930-4
E-303	High Voltage, Positive (+) Brush for Dynamotor (D-301)	Spring approx. 1-1/4" long, one end 9/32" wide, other end 3/8" wide, 1-3/4" overall length			235			K-881930-1
E-304	High Voltage, Negative (-) Brush for Dynamotor (D-301)	Similar to E-303 except negative polarity			235			K-881930-2
E-401	Loop	Assembly consisting of: loop housing, 25-3/8" overall length, 9-5/16" O.D., inner and outer loop assembly		δAN-9534	1	Dwg. #Y-292		P-721707-501

δ *Army-Navy Specification.*

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TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		PROTECTIVE DEVICES						
*†F-101	Power Line Fuse	Glass cartridge type, 5 amps., 25 v		17-F-2e	26 121	Type 4AG Cat.#1094 Cat.#4AG5		K-811485-19
		JACKS & RECEPTACLES						
J-101	Loop Cable Receptacle	7 pole connector, contact rating 5 amps.		δAN-9534	6	Cat.#AN-3102-16S-1P Type RB		K-856849-9
J-102	Dynamotor Cable Receptacle	3 pole connector, contact rating 5 amps.		δAN-9534	6	Cat.#AN-3102-14S-1P Type RB		K-856849-1
J-103	Power Cable Receptacle	2 pole connector, contact rating 10 amps.		δAN-9534	6	Cat.#AN-3102-16S-4P Type RB		K-856849-3
J-104	Telephone Jack	Single circuit			1			K-850654-1
J-104A	Jack Cover for J-104	Assembly consisting of: cover support 0.032" thick brass, 5/8" O.D., 13/16" long, felt pad 5/8" dia. x 1/32" thick, spring & jack cover			1			K-850656-502
J-105	Antenna Terminal Binding Post	Spring type, 0.050" dia. pin, 1-21/32" overall length, marked "A"			65			K-854468-3
J-106	Ground Terminal Binding Post	Similar to J-105 except marked "G"			65			K-854468-2
J-107	Telephone Jack	Same as J-104						
J-301	Cable Receptacle	Same as J-102						
J-401	Loop Cable Connector	Same as J-101						
J-402	Relay Cable Connector	2 contact, male connector, contact rating 5 amps.		δAN-9534	6	Cat.#AN-3102-12S-3P		

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* *OPERATING SPARE PARTS FURNISHED, refer to TABLE IV, OPERATING SPARES, for quantities.*
† *BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.*
δ *Army-Navy Specification.*

TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		JACKS & RECEPTACLES (Continued)						
J-403	Relay Cable Connector	Same as J-402						
		RELAYS						
†K-401	Loop Selector Relay	Shutter, 28 v d.c., holding coil 225 ohms min., power coil 7 ohms min.	-29040		395	U-271-E		K-880754-1
		INDUCTANCES						
†L-101	Sense Coil (Band 1)	See Figure 38 (A)			1			P-720293-501
†L-102	Sense Coil (Band 2)	See Figure 38 (D)			1			P-720293-505
†L-103	Sense Coil (Band 3)	See Figure 39 (E)			1			M-420562-501
†L-104	Sense Coil (Band 4)	See Figure 39 (D)			1			M-420562-502
†L-105	Sense Coil (Band 5)	See Figure 39 (D)			1			M-420562-503
†L-106	Sense Coil (Band 6)	See Figure 39 (D)			1			M-420562-504
†L-107	Dummy Loop Coil (Band 6)	See Figure 40 (C)			1			M-421235-506
†L-108	Dummy Loop Coil (Band 5)	See Figure 40 (E)			1			M-421235-505
†L-109	Dummy Loop Coil (Band 4)	See Figure 40 (D)			1			M-421235-504
†L-110	Dummy Loop Coil (Band 3)	See Figure 40 (C)			1			M-421235-503
†L-111	Dummy Loop Coil (Band 2)	See Figure 40 (B)			1			M-421235-502
†L-112	Dummy Loop Coil (Band 1)	See Figure 40 (A)			1			M-421235-501
†L-113A	Loop Tuner Sense Winding (Band 6)	See Figure 41 (C)			1			M-420561-506
B	Loop Tuner Loop Winding (Band 6)							
C	Loop Tuner Grid Winding (Band 6)							

† *BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.*

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TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		INDUCTANCES (Continued)						
†L-114A	Loop Tuner Sense Winding (Band 5)	See Figure 41 (C)			1			M-420561-503
B	Loop Tuner Loop Winding (Band 5)							
C	Loop Tuner Grid Winding (Band 5)							
†L-115A	Loop Tuner Sense Winding (Band 4)	See Figure 41 (B)			1			M-420561-502
B	Loop Tuner Loop Winding (Band 4)							
C	Loop Tuner Grid Winding (Band 4)							
†L-116A	Loop Tuner Sense Winding (Band 3)	See Figure 41 (A)			1			M-420561-501
B	Loop Tuner Loop Winding (Band 3)							
C	Loop Tuner Grid Winding (Band 3)							
†L-117A	Loop Tuner Sense Winding (Band 2)	See Figure 38 (F)			1			M-421223-502
B	Loop Tuner Loop Winding (Band 2)							
C	Loop Tuner Grid Winding (Band 2)							
†L-118A	Loop Tuner Sense Winding (Band 1)	See Figure 38 (C)			1			M-421223-501
B	Loop Tuner Loop Winding (Band 1)							
C	Loop Tuner Grid Winding (Band 1)							
†L-119	R-F Tuner Coil (Band 1)	See Figure 38 (G)			1			P-720293-502
†L-120	R-F Tuner Coil (Band 2)	See Figure 38 (E)			1			P-720293-506
†L-121	R-F Tuner Coil (Band 3)	See Figure 39 (A)			1			P-720294-501
†L-122	R-F Tuner Coil (Band 4)	See Figure 39 (B)			1			P-720294-503
†L-123	R-F Tuner Coil (Band 5)	See Figure 39 (B)			1			P-720294-505

† *BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.*

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TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		INDUCTANCES (Continued)						
†L-124	R-F Tuner Coil (Band 6)	See Figure 39 (C)			1			P-720294-507
†L-125	1st Detector Tuning Coil (Band 1)	See Figure 38 (B)			1			P-720293-503
†L-126	1st Detector Tuning Coil (Band 2)	See Figure 38 (E)			1			P-720293-507
†L-127	1st Detector Tuning Coil (Band 3)	See Figure 39 (A)			1			P-720294-502
†L-128	1st Detector Tuning Coil (Band 4)	See Figure 39 (B)			1			P-720294-504
†L-129	1st Detector Tuning Coil (Band 5)	See Figure 39 (B)			1			P-720294-506
†L-130	1st Detector Tuning Coil (Band 6)	See Figure 39 (C)			1			P-720294-508
†L-131A B C	Oscillator Grid Coil (Band 1) Oscillator Output Coil (Band 1) Oscillator Plate Coil (Band 1)	See Figure 42 (A)			1			P-720408-501
†L-132A B C	Oscillator Grid Coil (Band 2) Oscillator Output Coil (Band 2) Oscillator Plate Coil (Band 2)	See Figure 42 (A)			1			P-720408-502
†L-133A B C	Oscillator Grid Coil (Band 3) Oscillator Output Coil (Band 3) Oscillator Plate Coil (Band 3)	See Figure 42 (B)			1			P-720408-503
†L-134A B C	Oscillator Grid Coil (Band 4) Oscillator Output Coil (Band 4) Oscillator Plate Coil (Band 4)	See Figure 42 (C)			1			P-720408-504
†L-135A B C	Oscillator Grid Coil (Band 5) Oscillator Output Coil (Band 5) Oscillator Plate Coil (Band 5)	See Figure 42 (C)			1			P-720408-505
†L-136A B C	Oscillator Grid Coil (Band 6) Oscillator Output Coil (Band 6) Oscillator Plate Coil (Band 6)	See Figure 42 (C)			1			P-720408-506

† *BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.*

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TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		INDUCTANCES (Continued)						
*†L-137	Phone Lead Filter Coil	640 turns, 7 strands AWG #42 S litz wire, universal wound, 1 cross per turn, wound over bakelite tube, I.D. 1/2" dia., 1-3/16" long			1			K-856431-501
L-138 L-139	Line Filter Coil Line Filter Coil	110 turns AWG #22 E wire, 3 layers on pressed powdered iron core, 0.484" dia. x 1-1/4" long, d-c resistance 0.3 ohm, part of line filter and not replaceable separately			1			K-901517-28 K-901517-29
*†L-301	Low Voltage Filter Coil	250 turns AWG #17 E wire wound over a vulcanized fiber spool, 0.375" x 0.040" thick x 2-3/4" long, start lead covered with 0.005" kraft paper 50 turns per layer, insulation between layers, 1 turn 0.005" kraft, over coil 2 turns 0.007" gummed kraft paper, wire traverse 2.531", coil built 0.300", d-c resistance at 25°C. 0.275 ohm ±5%, inductance at 0.1 v, 1000 cycles, 880 to 1300 microhenries, hi-pot: 500 v to core			1	XT-4124		K-901472-501
L-401A B	Loop Antenna (Bands 1&2) Loop Antenna (Bands 1&2)	Center tapped winding of 300 turns, 10 parallel strands AWG #40 DSE litz wire, wound in 4 universal pies of 75 turns each, resistance of each section 34.1 ohms ±10%, inductance (measured at 1000 C.P.S.) 8.6 mh. each section, 28 mh. ±5% overall, see Figure 45			1			P-720713-4
L-402A B	Loop Antenna (Bands 3,4,5,6) Loop Antenna (Bands 3,4,5,6)	Center tapped winding of 14 total turns, 81 parallel strands AWG #38 DSE litz wire, starting at center wind 7 turns R.H., each side, resistance of each section 0.101 ohm, +3.5%, inductance (measured at 1000 C.P.S.) 14.15 microhenries each section, overall, 44.8 microhenries ±5%, see Figure 46.			1			P-720717-9

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* *OPERATING SPARE PARTS FURNISHED, refer to TABLE IV, OPERATING SPARES, for quantities.*
† *BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.*

TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		MISCELLANEOUS MECHANICAL PARTS						
O-101	Switch Shaft for Selector	Brass rod, 0.249" dia., 14" long, milled flat, 12-3/8" both sides, tapered end			1			K-855022-2
O-102	Switch Shaft for Frequency Range	Similar to O-101 except 5-3/8" long, milled flat 3-3/4" both sides			1			K-855022-1
O-103	Slide "UNILAT. COUP.", "UNILAT. TRIM", "ANT. TRIM."	Assembly consisting of: aluminum alloy slide, 2-5/8" long, 13/16" wide, 0.032" thick with brass pin		47-A-11	1			K-855061-501
O-104	Yoke	Assembly consisting of: duralumin yoke 13/32" dia., 1-5/16" long, both ends tapped #8-32 threads, 1/8" long, for Bristo setscrews			1			K-844669-502
O-105	Capacitor Mounting Plate	Assembly consisting of: aluminum alloy mounting plate, 4-23/32" long, 3-57/64" wide, 0.064" thick and 8 dural elastic stop nuts #6-32 threads		47-A-11	1			M-420569-501
O-106	Detent for Frequency Range Switch	Assembly consisting of: stainless steel detent, 12 equally spaced teeth, brass bushing, 2 pins, 2 stainless steel rollers and music wire spring			1			M-420548-501
O-107	Detent for Selector Switch	Similar to O-106 except detent moves in three positions			1			M-420548-502
O-401	Drive Assembly for Loop	Assembly consisting of: relay (K-401), relay cable connector (J-403) and azimuth scale graduated from 0-36			395	Dwg. #Y-291		P-721709-1
O-402	Tube for Loop Extension	Aluminum alloy with 0.120" wall thickness, 1.250" O.D., 1.01" I.D., 50-15/16" long			395	Dwg. #U-252 -A		K-880767-4
O-403	Tube for Loop Extension	Aluminum alloy with 0.120" wall thickness, 0.562" O.D., 0.322" I.D., 54-15/64" long, one end slotted			395	Dwg. #U-251		K-880782-4
		RESISTORS						
*†R-101	Antenna Static Leak Resistor	Composition, 560,000 ohms ±10%, 1/2 watt, insulated	-63360		4,21	BT-1/2		K-850981-95
†R-102	Unilateral Adjustment Potentiometer	30,000 ohms ±20%, curve "C", L.H. taper	-63807		21	CSM		K-855289-2

* *OPERATING SPARE PARTS FURNISHED, refer to TABLE IV, OPERATING SPARES, for quantities.*
† *BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.*

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TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		RESISTORS (Continued)						
†R-103	Gain Equalizer	Potentiometer, 5000 ohms ±20%, curve "B", L.H. taper	-63805		21	CSMP		K-855773-1
*†R-104	V-102 Cathode Bias Resistor	Composition, 470 ohms ±10%, 1/2 watt, insulated	-63360		21	BT-1/2		K-850981-58
*†R-105	V-102 Plate Feed Resistor	Composition, 5600 ohms ±10%, 1/2 watt, insulated	-63360		21	BT-1/2		K-850981-71
*†R-106	V-102 Plate Filter Resistor	Composition, 4700 ohms ±10%, 1/2 watt, insulated	-63360		21	BT-1/2		K-850981-70
*†R-107	V-102 Screen Dropping Resistor	Composition, 100,000 ohms ±10%, 1/2 watt, insulated	-63360		21	BT-1/2		K-850981-86
*†R-108	V-102 Plate & Screen Filter Resistor	Composition, 47,000 ohms ±10%, 1/2 watt, insulated	-63360		4,21 617	BT-1/2		K-850981-82
*†R-109	V-103 Grid Leak Resistor	Composition, 1 megohm ±10%, 1/2 watt, insulated	-63360		21	BT-1/2		K-850981-98
*†R-110	V-103 Screen Filter Resistor	Composition, 10,000 ohms ±10%, 1/2 watt, insulated	-63360		4,21 617	BT-1/2		K-850981-74
*†R-111	V-104 Grid Leak Resistor	Composition, 220,000 ohms ±10%, 1/2 watt, insulated	-63360		21	BT-1/2		K-850981-90
*†R-112	V-103 Cathode Bias Resistor	Same as R-110	-63360					
*†R-113	V-104 Plate Filter Resistor	Composition, 56,000 ohms ±10%, 1/2 watt, insulated	-63360		21	BT-1/2		K-850981-83
*†R-114	V-104 Plate Voltage Divider Resistor	Same as R-107	-63360					
*†R-115	V-104 Plate Bleeder Resistor	Composition, 33,000 ohms ±10%, 1/2 watt, insulated	-63360		21	BT-1/2		K-850981-80
*†R-116	V-103 Plate Filter Resistor	Same as R-106	-63360					
*†R-117	V-105 Cathode Bias Resistor	Composition, 680 ohms ±10%, 1/2 watt, insulated	-63360		4,21 617	BT-1/2		K-850981-60

* *OPERATING SPARE PARTS FURNISHED, refer to TABLE IV, OPERATING SPARES, for quantities.*
† *BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.*

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TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		RESISTORS (Continued)						
*†R-118	V-105 Screen Filter Resistor	Same as R-110	-63360					
*†R-119	V-105 Plate Filter Resistor	Same as R-106	-63360					
*†R-120	V-106 Cathode Bias Resistor	Same as R-117	-63360					
*†R-121	V-106 Screen Filter Resistor	Same as R-110	-63360					
*†R-122	T-103 Primary Load Resistor	Composition, 270,000 ohms ±10%, 1/2 watt, insulated	-63360		21	BT-1/2		K-850981-91
*†R-123	V-107 Screen Bleeder Resistor	Same as R-115	-63360					
*†R-124	V-106 Plate Filter Resistor	Same as R-106	-63360					
*†R-125	V-107 Cathode Bias Resistor	Composition, 18,000 ohms ±10%, 1/2 watt, insulated	-63360		21	BT-1/2		K-850981-77
*†R-126	V-107 Screen Dropping Resistor	Composition, 330,000 ohms ±10%, 1/2 watt, insulated	-63360		21	BT-1/2		K-850981-92
*†R-127	V-108 Grid Leak Resistor	Composition, 470,000 ohms ±10%, 1/2 watt, insulated	-63360		4,21	BT-1/2		K-850981-94
*†R-128	V-107 A-F Equalizer Resistor	Same as R-111	-63360					
*†R-129	V-109 Grid Compensating Resistor	Same as R-111	-63360					
*†R-130	V-109 Grid Leak Resistor	Same as R-101	-63360					
*†R-131	V-109 Cathode Bias Resistor	Same as R-104	-63360					
*†R-132	Screen Line Filter Resistor	Composition, 12,000 ohms ±10%, 1/2 watt, insulated	-63360		4,21 617	BT-1/2		K-850981-75
*†R-133	Main Voltage Divider Resistor	Composition, 33,000 ohms ±10%, 1 watt, insulated	-63288		21	BT-1		K-844314-80
*†R-134	Main Voltage Divider Resistor	Composition, 47,000 ohms ±10%, 1 watt, insulated	-63288		21	BT-1		K-844314-82

* *OPERATING SPARE PARTS FURNISHED, refer to TABLE IV, OPERATING SPARES, for quantities.*
† *BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.*

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TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		RESISTORS (Continued)						
†R-135A B	Volume Control Potentiometer Volume Control Potentiometer	Dual, section A, 20,000 ohms ±2000 ohms, curve "E", R.H. taper, section B, 300,000 ohms ±20%, curve "F" L.H. taper	-63808		21	CSMP		K-855768-1
*†R-136	V-108 Plate Bleeder Resistor	Composition, 39,000 ohms ±10%, 1/2 watt, insulated	-63360		21	BT-1/2		K-850981-81
*†R-137	Heater Dropping Resistor	Wire wound, 1 ohm ±10%, 1 watt, insulated	-63703-10		21	BW-1		K-855796-53
*†R-138	Heater Shunt Resistor	Wire wound, 68 ohms ±10%, 1 watt, insulated	-63703-10		21	BW-1		K-855796-51
†R-139	Antenna Equalizer Resistor	Variable, 15,000 ohms ±3000 ohms, Curve "A", linear taper	-63804		21	CSMP		K-855769-1
*†R-140	Antenna Attenuator Resistor	Composition, 1500 ohms ±10%, 1/2 watt, insulated	-63360		21	BT-1/2		K-850981-64
*†R-141	Bias Bleeder Resistor	Same as R-107	-63360					
*†R-142	T-102 Grid Filter Resistor	Same as R-107	-63360					
*†R-143	T-103 Grid Limiter Resistor	Same as R-107	-63360					
*†R-144	Heater Shunt Resistor	Same as R-138	-63703-10					
*†R-145	Heater Shunt Resistor	Same as R-138	-63703-10					
*†R-146	V-109 Plate Surge Resistor	Same as R-113	-63360					
		SWITCHES						
†S-101	Antenna Selector Switch	Rotary tap type, 12 contact, single section			28			M-422888-1
†S-102A B	Sense Coil Band Selector Switch Sense Coil & Trimmer Band Selector Switch	Rotary tap type, 12 contact, 2 section			28			M-422892-1

* *OPERATING SPARE PARTS FURNISHED, refer to TABLE IV, OPERATING SPARES, for quantities.*
† *BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.*

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TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		SWITCHES (Continued)						
†S-103A	Loop Selector Switch	Rotary tap type, 12 contact, 2 section			28			M-422893-1
B	Loop & Dummy Antenna Selector Switch							
†S-104A	Loop Selector Switch	Rotary tap type, 12 contact, 6 section			28			M-422887-1
B	Dummy Loop Band Selector Switch							
C	Sense Coupling Band Selector Switch							
D	Loop Band Selector Switch							
E	Loop Band Selector Switch							
F	R-F Grid Band Selector Switch							
†S-105A	R-F Plate Band Selector Switch	Rotary tap type, 12 contact, 2 section			28			M-422890-1
B	R-F Tuning Band Selector Switch							
†S-106A	R-F Coupling Band Selector Switch	Rotary tap type, 12 contact, 3 section			28			M-422889-1
B	1st Detector Tuning Band Selector Switch							
C	1st Detector Grid Band Selector Switch							
†S-107A	I-F Broad-Sharp Selector Switch	Rotary tap type, 12 contact, 5 section			28			M-422891-1
B	Oscillator Series Pad Selector Switch							
C	Oscillator Output Band Selector Switch							
D	Oscillator Grid Band Selector Switch							
E	Oscillator Tuning Band Selector Switch							
†S-108	A-F Filter Selector Switch	D.P.D.T. toggle, rating 1 amp. at 250 v d.c., 3 amps. at 125 v d.c.	-24033		7			M-420278-13
†S-109	A-F Equalizer Selector Switch	S.P.D.T. toggle, rating 1 amp. at 250 v d.c., 3 amps. at 125 v d.c.	-24074		7			M-420278-14
†S-110	CW Oscillator Selector Switch	S.P.S.T. toggle, rating 1 amp. at 250 v d.c., 3 amps. at 125 v d.c.	-24041		7			M-420278-12
†S-111	Power Switch	D.P.S.T. toggle, rating 1 amp. at 250 v.d.c., 3 amps at 125 v d.c.	-24025		7			M-420278-15

† *BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.*

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TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		TRANSFORMERS						
†T-101	1st I-F Transformer	See Figure 43(A)			1			P-720402-501
†T-102	2nd I-F Transformer	See Figure 43(B)			1			P-720402-502
†T-103	3rd I-F Transformer	See Figure 43(C)			1			P-720402-503
†T-104	CW Oscillator Transformer	See Figure 43(D)			1			P-720402-504
†T-105	Output Transformer	Audio pack consisting of: output transformer and reactor; output transformer consisting of: primary, 3900 turns AWG #40 E wire, d-c resistance 1610 ohms, secondary 880 turns AWG #34 E wire, d-c resistance 73 ohms; impedance, primary 3 v, 60 cycles a.c. and 0.015 amp., d.c. shall be 11,000 ohms min., hi-pot: primary 2000 v a.c. r-m-s to shield and core, secondary 1000 v a.c. r-m-s to shield and core Reactor 2500 turns AWG #35 E wire, d-c resistance 300 ohms ±10%, impedance at 3 v, 60 cycles a.c. and 0.050 amp; d.c. shall be 2800 ohms min; hi-pot: 1000 v a.c. r-m-s for 1 minute	-30525		1 658			M-420793-1
†T-106	A-F Band-Pass Filter Transformer	See Figure 44	-53066		1 733b			M-420774-1
		VACUUM TUBES						
*†V-101	Neon Signal Overload Protection Tube	Neon lamp, glow voltage 50-65 v, 60 cycles			298			K-814082-4
*†V-102	R-F Amplifier Tube	Triple grid super-control amplifier small 6 pin base, small metal cap, heater: 6.3 v a.c. or d.c. at 0.3 amp.	-6D6		1a	-6D6		

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* *OPERATING SPARE PARTS FURNISHED, refer to TABLE IV, OPERATING SPARES, for quantities.*
† *BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.*

TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		VACUUM TUBES (Continued)						
*†V-103	1st Detector Tube	Triple grid detector amplifier, small 6 pin base, small metal cap, heater: 6.3 v a.c. or d.c. at 0.3 amp.	-6C6		1a	-6C6		
*†V-104	Oscillator Tube	Super triode amplifier, detector, small 5 pin base, heater: 6.3 v a.c. or d.c. at 0.3 amp.	-76		1a	-76		
*†V-105	1st I-F Amplifier Tube	Same as V-102	-6D6					
*†V-106	2nd I-F Amplifier Tube	Same as V-102	-6D6					
*†V-107	2nd Detector Tube	Same as V-103	-6C6					
*†V-108	CW Oscillator Tube	Same as V-104	-76					
*†V-109	Audio Power Amplifier Tube	Power amplifier pentode, small, 6-pin base, heater: 6.3 v a.c. or d.c. at 0.4 amp.	-41		1a	-41		
		INTERCONNECTING CABLES						
W-501	Loop to Receiver Cable	7 conductor, conduit shielded, 5' or 6' long (as required), amphenol plug at each end, see Figure 33			1			P-720708-501 or 502
W-502	Dynamotor Cable	3 conductor, conduit shielded, supplied in bulk with required amphenol plug, to be fabricated at time of installation, see Figure 34			1			M-421275-501
W-503	Power Cable	2 conductor, conduit shielded, supplied in bulk with required amphenol plug, amphenol fitting, to be fabricated at time of installation, see Figure 35			1			M-421274-501
W-504	Loop Relay Cable	2 conductor, conduit shielded, supplied in either 12" or 34" length as required, see Figure 36			1			M-421213-502 or 503

* *OPERATING SPARE PARTS FURNISHED, refer to TABLE IV, OPERATING SPARES, for quantities.*
† *BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.*

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TABLE II (Continued)
PARTS LIST BY SYMBOL DESIGNATION
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
		SOCKETS						
†X-102	R-F Amplifier Tube Socket	6 contact, steatite ceramic base, with adapter plate and #4 retaining ring	-49370		6	RSS-6M		K-856868-503
†X-103	1st Detector Tube Socket	Same as X-102	-49370					
†X-104	Oscillator Tube Socket	5 contact, steatite ceramic base, with adapter plate and #4 retaining ring	-49369		6	RSS-5M		K-856868-502
†X-105	1st I-F Amplifier Tube Socket	6 contact, steatite ceramic base, #4 retaining ring, without adapter plate	-49370		6	SS-6M		K-856956-3
†X-106	2nd I-F Amplifier Tube Socket	Same as X-105	-49370					
†X-107	2nd Detector Tube Socket	Same as X-105	-49370					
†X-108	CW Oscillator Tube Socket	5 contact, steatite ceramic base, #4 retaining ring, without adapter plate	-49369		6	SS-5M		K-856956-2
†X-109	Audio Power Amplifier Tube	Same as X-105	-49370					
		MISCELLANEOUS						
*†	Line Filter	Assembly consisting of: C-212,213, L-138,139, see Figure 47			1			K-901517-501
	Wrench for Setscrews	Short arm, steel, 6 flutes for #8 setscrews (Receiver)			111			K-860519-3
	Wrench for Setscrews	Short arm, steel, 6 flutes for 1/4" setscrews, #8 cap (Loop & Drive assembly)			111			K-860519-5

* *OPERATING SPARE PARTS FURNISHED, refer to TABLE IV, OPERATING SPARES, for quantities.*
† *BULK SPARE PARTS FURNISHED, refer to TABLE IV, BULK SPARES, for quantities.*

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TABLE III
PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED
MISCELLANEOUS (CLASS 10)		
2		E-101
2		E-102
4		E-103
4		E-104
4		E-105
1		E-106
1		E-107
1		E-108
1		E-109
1		E-110
1		E-111
1		E-112
1		E-113
1		E-114
1		E-115
1		E-116
1		E-117
1		E-118
1		E-119
1		E-119A
1		E-119B
1		E-119C
1		E-119D
1		E-119E
1		E-119F
1		E-119G
MISCELLANEOUS (CLASS 10) (Continued)		
1		E-119H
1		E-119J
1		E-119K
1		E-301
1		E-302
1		E-303
1		E-304
1		E-401
1		O-102
1		O-103
1		O-104
1		O-105
1		O-106
1		O-107
1		O-401
1		O-402
1		O-403
MOTORS (CLASS 21)		
1	-21561	D-301A
SWITCHES (CLASS 25)		
1	-24025	S-111
1	-24033	S-108
SWITCHES (CLASS 24) (Continued)		
1	-24041	S-110
1	-24074	S-109
1		S-101
1		S-102A&B
1		S-103A&B
1		S-104A,B,C,D,E,F
1		S-105A&B
1		S-106A,B,C
1		S-107A,B,C,D,E
PROTECTIVE DEVICES (CLASS 28)		
1		F-101
RELAYS (CLASS 29)		
1		K-401
TRANSFORMERS (CLASS 30)		
1	-30525	T-105
1		T-101
1		T-102
1		T-103
1		T-104
VACUUM TUBES (CLASS 38)		
1	-41	V-109
2	-76	V-104,108

TABLE III (Continued)
PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED
VACUUM TUBES (CLASS 38) (Continued)		
2	-6C6	V-103,107
3	-6D6	V-102,105,106
1		V-101
INDUCTANCES (CLASS 47)		
1		L-101
1		L-102
1		L-103
1		L-104
1		L-105
1		L-106
1		L-107
1		L-108
1		L-109
1		L-110
1		L-111
1		L-112
1		L-113A,B,C
1		L-114A,B,C
1		L-115A,B,C
1		L-116A,B,C
1		L-117A,B,C
1		L-118A,B,C
INDUCTANCES (CLASS 47) (Continued)		
1		L-119
1		L-120
1		L-121
1		L-122
1		L-123
1		L-124
1		L-125
1		L-126
1		L-127
1		L-128
1		L-129
1		L-130
1		L-131A,B,C
1		L-132A,B,C
1		L-133A,B,C
1		L-134A,B,C
1		L-135A,B,C
1		L-136A,B,C
1		L-137
1		L-138
1		L-139
1		L-301
INDUCTANCES (CLASS 47) (Continued)		
1		L-401A&B
1		L-402A&B
CAPACITORS (CLASS 48)		
2	-48589-10	C-304,305
2	-48661-10	C-301,302
1	-48674-B10	C-150
2	-48674-D5	C-175,201
2	-48691-D10	C-146,204
4	-48710-C10	C-207,208,209,211
1	-48771-C10	C-177
2	-48783-D5	C-200,203
1	-48839-D5	C-156
1	-48840-D5	C-121
1	-48895-D5	C-103
2	-48938-10	C-106,179
8	-481015-D5	C-186,187,188,189,190,191, 192,205
2	-481037-D10	C-122,174
2	-481065-D3	C-151,206
4	-481077-D3	C-104,107,120,210
2	-481084-D5	C-181,193
1	-481141-D3	C-164

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TABLE III (Continued)
PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED
CAPACITORS (CLASS 48) (Continued)		
1	-481142-D3	C-165
1	-481143-D5	C-178
1	-481144-D5	C-166
1	-481146-D5	C-124
1	-481147-D5	C-158
1	-481148-D3	C-154
2	-481151-D2	C-152,162
1	-481152-D5	C-180
1	-481153-D2	C-163
1	-481161-10	C-303A&B
2	-481199-D3	C-133,145
1	-481199-D5	C-125
2	-481418-D3	C-134,144
1	-481419-D5	C-126
1	-481420-D5	C-167
3		C-101,102,105
18		C-108,109,110,111,112,113, 127,128,129,130,131,132, 138,139,140,141,142,143
12		C-114,115,116,117,118,119, 153,155,157,159,160,161
1		C-123A,B,C,D,E
2		C-135A&B, 168A&B
2		C-136A&B, 149A&B
4		C-137A&B, 170A&B, 176A&B 182A&B

QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED
CAPACITORS (CLASS 48) (Continued)		
2		C-147A&B, 148A&B
1		C-169A&B
1		C-171A&B
1		C-172A&B
3		C-173A&B, 197A&B, 199A&B
3		C-183A&B, 184A&B, 198A&B
1		C-185A&B
3		C-194,195,196
1		C-202
2		C-212,213
JACKS & RECEPTACLES (CLASS 49)		
1	-49369	X-104
1	-49369	X-108
2	-49370	X-102,103
4	-49370	X-105,106,107,109
2		J-101,401
2		J-102,301
1		J-103
2		J-104,107
1		J-104A
1		J-105
1		J-106
2		J-402,403

QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED
FILTERS (CLASS 53)		
1	-53066	T-106
INTERCONNECTING CABLES (CLASS 62)		
1		W-501
1		W-502
1		W-503
1		W-504
RESISTORS (CLASS 63)		
1	-63288	R-133
1	-63288	R-134
2	-63360	R-104,131
2	-63360	R-117,120
1	-63360	R-140
4	-63360	R-106,116,119,124
1	-63360	R-105
4	-63360	R-110,112,118,121
1	-63360	R-132
1	-63360	R-125
2	-63360	R-115,123
1	-63360	R-136
1	-63360	R-108
2	-63360	R-113,146
5	-63360	R-107,114,141,142,143

TABLE III (Continued)
PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED
RESISTORS (CLASS 63) (Continued)								
3	-63360	R-111,128,129						
1	-63360	R-122						
1	-63360	R-126						
1	-63360	R-127						
2	-63360	R-101,130						
1	-63360	R-109						
1	-63703-10	R-137						
3	-63703-10	R-138,144,145						
1	-63804	R-139						
1	-63805	R-103						
1	-63807	R-102						
1	-63808	R-135A&B						

TABLE IV
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
OPERATING SPARES

CONTRACT NXsa-19698

DATED 24 DECEMBER, 1942

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					MISCELLANEOUS (CLASS 10)					
1		1			Spare parts box (wooden)					T-621078-501
					PROTECTIVE DEVICES (CLASS 28)					
2		4		F-101	Fuse, glass, cartridge type, 5 amps., 25 v	17-F-2e	26 121	Type 4AG Cat.#1094 Cat.#4AG5		K-811485-19
					TRANSFORMERS (CLASS 30)					
3		1		L-301	Transformer, reactor, over-vulcanized fiber spool, wind 250 turns AWG #17 E wire, 50 turns per layer, coil build 0.300", d-c resistance 0.275 ohm ±5% at 25°C., inductance at 0.1 v, 1000 cycles, 880 to 1300 microhenries, hi-pot: 500 v to core		1	XT-4124		K-901472-501
					VACUUM TUBES (CLASS 38)					
4		2	-41	V-109	Vacuum tube, power amplifier pentode, small 6 pin base, heater: 6.3 v a.c. or d.c at 0.4 amp.		1a	-41		
5		4	-76	V-104,108	Vacuum tube, super triode amplifier detector, small 5 pin base, heater: 6.3 v a.c.or d.c. at 0.3 amp.		1a	-76		
6		4	-6C6	V-103,107	Vacuum tube, triple grid detector amplifier, small 6 pin base, small metal cap, heater: 6.3 v a.c. or d.c. at 0.3 amp.		1a	-6C6		
7		6	-6D6	V-102,105,106	Vacuum tube, triple grid super control amplifier, small 6 pin base, small metal cap, heater: 6.3 v a.c. or d.c. at 0.3 amp.		1a	-6D6		
8		2		V-101	Vacuum tube, neon lamp, glow voltage 50-65 v, 60 cycles		298			K-814082-4

IB-38212-X3

TABLE IV (Continued)

SPARE PARTS LIST BY NAVY TYPE NUMBERS

FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

OPERATING SPARES

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					INDUCTANCES (CLASS 47)					
9		1		L-137	Coil assembly consisting of: 640 turns, 7 strands AWG #42 S litz wire, universal wound, 1 cross per turn, wound over bakelite tube, I.D. 1/2" dia., 1-3/16" long		1			K-856431-501
					CAPACITORS (CLASS 48)					
10		1	-48589-10	C-304,305	Capacitor, molded, mica, 10,000 mmfd ±10%, 300 v d.c. working	RE 48A 154	13,29 34	3LS,R (Lugs) MKW-3-11-10		P-720473-16
δ11		1	-48661-10	C-301,302	Capacitor, oil filled, paper, single section, 1.75 mfd ±10%, 50 v d.c. working	RE 13A 488C	1			P-720555-60
			-48661	C-301,302	Same as above except **tolerance +10% -3%**	RE 13A 488C	1			P-720463-2
11		1	-48674-B10	C-150	Capacitor, molded, mica, 100 mmfd ±10%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1468LS, 5WS M2K100, OXM MOBW		P-720473-6
12		1	-48674-D5	C-175,201	Capacitor, molded, mica, 100 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M2K100, PO MOSDW 603M		P-720538-7
13		1	-48691-D10	C-146,204	Capacitor, molded, mica, 500 mmfd ±10%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M7K500, PO MOSDW		P-720473-8
14		2	-48710-C10	C-207,208,209,211	Capacitor, molded, mica, 10 mmfd ±10%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M1K10, PO MOSW		P-720473-2
15		1	-48771-C10	C-177	Capacitor, molded, mica, 5 mmfd ±10%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M1K5, PO MOSW		P-720473-1
16		1	-48783-D5	C-200,203	Capacitor, molded, mica, 20 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K20, PO MOSDW 603M		P-720538-1
17		1	-48839-D5	C-156	Capacitor, molded, mica, 70 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K70, PO MOSDW 603M		P-720538-6

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δ Capacitors having either tolerance specified may have been used in the equipment. Either one or the other type may be supplied as spare.

TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
OPERATING SPARES

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					CAPACITORS (CLASS 48) (Continued)					
18		1	-48840-D5	C-121	Capacitor, molded, mica, 15 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K15, PO MOSDW 603M		P-720538-22
19		1	-48895-D5	C-103	Capacitor, molded, mica, 50 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K50, PO MOSDW 603M		P-720538-5
20		1	-48938-10	C-106,179	Capacitor, molded, mica, 10,000 mmfd ±10%, 300 v d.c. working	RE 48A 154	2,13 29,34	1441, 3WS R,MLW-3-11-10		P-720473-15
21		4	-481015-D5	C-186,187,188,189, 190,191,192,205	Capacitor, molded, mica, 400 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M5K400, PO MOSDW 603M		P-720538-8
22		1	-481037-D10	C-122,174	Capacitor, molded, mica, 5000 mmfd ±10%, 300 v d.c. working	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720473-13
23		1	-481065-D3	C-151,206	Capacitor, molded, mica, 60 mmfd ±3%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K60, PO MOSDW 603M		P-721081-11
24		2	-481077-D3	C-104,107,120,210	Capacitor, molded, mica, 40 mmfd ±3%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M1K40, PO MOSDW		P-720537-1
25		1	-481084-D5	C-181,193	Capacitor, molded, mica, 1200 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720538-10
26		1	-481141-D3	C-164	Capacitor, molded, mica, 1030 mmfd ±3%, 500 v d.c. working	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720537-9
27		1	-481142-D3	C-165	Capacitor, molded, mica, 1900 mmfd ±3%, 500 v d.c. working	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720537-10
28		1	-481143-D5	C-178	Capacitor, molded, mica, 2100 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720538-11

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TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
OPERATING SPARES

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					CAPACITORS (CLASS 48) (Continued)					
29		1	-481144-D5	C-166	Capacitor, molded, mica, 3500 mmfd ±5%, 300 v d.c. working	RE 48A 154	2,13 29,34	1464, 1RS PW. MWSDW		P-720538-12
30		1	-481146-D5	C-124	Capacitor, molded, mica, 27 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34,245	1469, 5RS M1K27, PO MOSDW, 603M		P-720538-2
31		1	-481147-D5	C-158	Capacitor, molded, mica, 33 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34,245	1469, 5RS M1K33, PO MOSDW, 603M		P-720538-3
32		1	-481148-D3	C-154	Capacitor, molded, mica, 147 mmfd ±3%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M2K147, PO MOSDW		P-720537-3
33		1	-481151-D2	C-152,162	Capacitor, molded, mica, 370 mmfd ±2%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M5K370, PO MOSDW		P-720537-7
34		1	-481152-D5	C-180	Capacitor, molded, mica, 470 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M6K470, PO MOSDW 603M		P-720538-9
35		1	-481153-D2	C-163	Capacitor, molded, mica, 485 mmfd ±2%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M6K485, PO MOSDW		P-720537-8
δ52		1	-481161-10	C-303A&B	Capacitor, oil filled, paper, 2 sections 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case	RE 13A 488C	1			P-720555-53
			-481161	C-303A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-1
36		1	-481199-D3	C-133,145	Capacitor, molded, mica, 90 mmfd ±3%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K90, PO MOSDW 603M		P-721081-12
37		1	-481199-D5	C-125	Capacitor, molded, mica, 90 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K90, PO MOSDW 603M		P-720538-21
38		1	-481418-D3	C-134,144	Capacitor, molded, mica, 43 mmfd ±3%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K43, PO MOSDW 603M		P-721081-10

δ Capacitors having either tolerance specified may have been used in the equipment. Either type may be supplied as spare.

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TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
OPERATING SPARES

ITEM	BOX NO.	QUAN-TITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLER-ANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					CAPACITORS (CLASS 48) (Continued)					
39		1	-481419-D5	C-126	Capacitor, molded, mica, 135 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M1K135, PO MOSDW		P-721133-5
40		1	-481420-5	C-167	Capacitor, molded, mica, 6400 mmfd ±5%, 300 v d.c. working	RE 48A 154	2,29 34	1464, PW MWSDW		P-721133-6
δ41		1		C-135A&B,168A&B	Capacitor, oil filled, paper, 2 sections 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case complete with mounting bracket	RE 13A 488C	1			P-720463-58
				C-135A&B,168A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-8
δ42		1		C-136A&B,149A&B	Capacitor, oil filled, paper, 2 sections, 0.1/0.1 mfd ±10%, 500 v d.c. working, each section grounded to case complete with mounting bracket	RE 13A 488C	1			P-720463-60
				C-136A&B,149A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-10
δ43		2		C-137A&B,170A&B, 176A&B,182A&B	Capacitor, oil filled, paper, 2 sections 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case	RE 13A 488C	1			P-720463-55
				C-137A&B,170A&B, 176A&B,182A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-5
44		1		C-147A&B,148A&B	Capacitor, oil filled, paper, 2 sections, 0.1 mfd +10% -3%, 0.025 mfd ±5%, 500 v d.c. working each sec-grounded to case	RE 13A 488C	1			P-720463-4
δ45		1		C-169A&B	Capacitor, oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case complete with mounting bracket	RE 13A 488C	1			P-720463-59
				C-169A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-9
δ46		1		C-171A&B	Capacitor, oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case complete with mounting bracket	RE 13A 488C	1			P-720463-61
				C-171A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-11

δ Capacitors having either tolerance specified may have been used in the equipment. Either type may be supplied as spare.

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TABLE IV (Continued)

SPARE PARTS LIST BY NAVY TYPE NUMBERS

FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

OPERATING SPARES

ITEM	BOX NO.	QUAN-TITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLER-ANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					CAPACITORS (CLASS 48) (Continued)					
δ47		1		C-172A&B	Capacitor, oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case complete with mounting bracket	RE 13A 488C	1			P-720463-57
				C-172A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-7
δ48		2		C-173A&B, 197A&B, 199A&B	Capacitor, oil filled, paper, 2 sections, 0.1/0.1 mfd ±10%, 500 v d.c. working, each section grounded to case	RE 13A 488C	1			P-720463-62
				C-173A&B, 197A&B, 199A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-12
δ49		2		C-183A&B, 184A&B, 198A&B	Capacitor, oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case	RE 13A 488C	1			P-720463-56
				C-183A&B, 184A&B, 198A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-6
δ50		1		C-185A&B	Capacitor, oil filled, paper, 2 sections 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case complete with mounting bracket	RE 13A 488C	1			P-720463-53
				C-185A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-3
					FILTERS (CLASS 53)					
53		1			Line filter assembly consisting of C-212,213, L-138,139, see Figure 47		1			K-901517-501
					RESISTORS (CLASS 63)					
54		1	-63288	R-133	Resistor, composition, 33,000 ohms ±10%, 1 watt, insulated		21	BT-1		K-844314-80
55		1	-63288	R-134	Resistor, composition, 47,000 ohms ±10%, 1 watt, insulated		21	BT-1		K-844314-82
56		1	-63360	R-104,131	Resistor, composition, 470 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-58
57		1	-63360	R-117,120	Resistor, composition, 680 ohms ±10%, 1/2 watt, insulated		4,21 617	BT-1/2		K-850981-60

δ Capacitors having either tolerance specified may have been used in the equipment. Either type may be supplied as spare.

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TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
OPERATING SPARES

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					RESISTORS (CLASS 63) (Continued)					
58		1	-63360	R-140	Resistor, composition, 1500 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-64
59		2	-63360	R-106,116,119,124	Resistor, composition, 4700 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-70
60		1	-63360	R-105	Resistor, composition, 5600 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-71
61		2	-63360	R-110,112,118,121	Resistor, composition, 10,000 ohms ±10%, 1/2 watt, insulated		4,21 617	BT-1/2		K-850981-74
62		1	-63360	R-132	Resistor, composition, 12,000 ohms ±10%, 1/2 watt, insulated		4,21 617	BT-1/2		K-850981-75
63		1	-63360	R-125	Resistor, composition, 18,000 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-77
64		1	-63360	R-115,123	Resistor, composition, 33,000 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-80
65		1	-63360	R-136	Resistor, composition, 39,000 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-81
66		1	-63360	R-108	Resistor, composition, 47,000 ohms ±10%, 1/2 watt, insulated		4,21 617	BT-1/2		K-850981-82
67		1	-63360	R-113,146	Resistor, composition, 56,000 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-83
68		3	-63360	R-107,114,141,142, 143	Resistor, composition, 100,000 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-86
69		2	-63360	R-111,128,129	Resistor, composition, 220,000 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-90

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TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
OPERATING SPARES

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					RESISTORS (CLASS 63) (Continued)					
70		1	-63360	R-122	Resistor, composition, 270,000 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-91
71		1	-63360	R-126	Resistor, composition, 330,000 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-92
72		1	-63360	R-127	Resistor, composition, 470,000 ohms ±10%, 1/2 watt, insulated		4,21	BT-1/2		K-850981-94
73		1	-63360	R-101,130	Resistor, composition, 560,000 ohms ±10%, 1/2 watt, insulated		4,21	BT-1/2		K-850981-95
74		1	-63360	R-109	Resistor, composition, 1 megohm ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-98
75		1	-63703-10	R-137	Resistor, wire wound, 1 ohm ±10%, 1 watt, insulated		21	BW-1		K-855796-53
76		2	-63703-10	R-138,144,145	Resistor, wire wound, 68 ohms ±10%, 1 watt, insulated		21	BW-1		K-855796-51

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TABLE IV
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

CONTRACT NXsa-19698

BULK SPARES

DATED 24 DECEMBER, 1942

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					***DYNAMOTORS (CLASS 21)**					
77		1	-21561	D-301	Dynamotor, input 27.9 v d.c. at 1.23 amps., output 220 v d.c. at 0.070 amps., 4400 r.p.m., continuous duty winding data: field 1350 turns AWG #29 F wire, primary 12 turns AWG #25 Formex per coil, secondary 75 turns AWG #35 Formex per coil		235	ML-3412-17		M-420733-502
					SWITCHES (CLASS 24)					
78		1	-24025	S-111	Switch, D.P.S.T., toggle, rating: 1 amp., 250 v d.c., 3 amps., 125 v d.c		7			M-420278-15
79		1	-24033	S-108	Switch, D.P.D.T., toggle, rating: 1 amp., 250 v d.c., 3 amps., 125 v d.c.		7			M-420278-13
80		1	-24041	S-110	Switch, S.P.S.T., toggle, rating: 1 amp., 250 v d.c., 3 amps., 125 v d.c.		7			M-420278-12
81		1	-24074	S-109	Switch, S.P.D.T., toggle, rating: 1 amp., 250 v d.c., 3 amps., 125 v d.c.		7			M-420278-14
82		1		S-101	Selector switch, (Ant.), rotary tap type, 12 contact, single section		28			M-422888-1
83		1		S-102A&B	Band switch, (Ant.), rotary tap type, 12 contact, 2 section		28			M-422892-1
84		1		S-103A&B	Selector switch, (Loop), rotary tap type, 12 contact, 2 section		28			M-422893-1
85		1		S-104A,B,C,D,E&F	Band switch, (Loop), rotary tap type, 12 contact, 6 section		28			M-422887-1
86		1		S-105A&B	Band switch, (R-F), rotary tap type, 12 contact, 2 section		28			M-422890-1
87		1		S-106A,B&C	Band switch, (First Det.), rotary tap type, 12 contact, 3 section		28			M-422889-1
87a		1		S-107A,B,C,D&E	Band switch, (Osc.), rotary tap type, 12 contact, 5 section		28			M-422891-1

* *To be packed separately.*

IB-38212-Y2

TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
BULK SPARES

ITEM	BOX NO.	QUAN-TITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLER-ANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					PROTECTIVE DEVICES (CLASS 28)					
88		16		F-101	Fuse, glass cartridge type, 5 amps., 25 v	17-F-2e	 26 121	Type 4AG Cat. #1094 Cat. #4AG5		K-811485-19
					RELAYS (CLASS 29)					
89		1	-29040	K-401	Shutter relay, 28 v d.c., holding coil 225 ohms min., power coil 7 ohms min.		395	U-271-E		K-880754-1
					TRANSFORMERS (CLASS 30)					
90		1	-30525	T-105	Audio pack consisting of output transformer and reactor; output transformer consisting of: primary, 3900 turns AWG #40 E wire, d-c resistance 1610 ohms; secondary, 880 turns AWG #34 E wire, d-c resistance 73 ohms; impedance, primary 3 v, 60 cycles a.c. and 0.015 amp., d.c. shall be 11,000 ohms min., hi-pot: primary 2000 v a.c. r-m-s to shield and core, secondary 1000 v a.c. r-m-s to shield and core Reactor 2500 turns AWG #35 E wire, d-c resistance 300 ohms ±10%, impedance at 3 v, 60 cycles a.c. and 0.050 amp.; d.c. shall be 2800 ohms min. hi-pot: 1000 v a.c. r-m-s for 1 minute		1			M-420793-1
91		4		L-301	Transformer, reactor, over vulcanized fiber spool wind 250 turns AWG #17 E wire, 50 turns per layer, coil build 0.300", d-c resistance 0.275 ohm ±5% at 25°C., inductance at 0.1 v, 1000 cycles, 880 to 1300 microhenries, hi-pot: 500 v to core		1	XT-4124		K-901472-501

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TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
BULK SPARES

ITEM	BOX NO.	QUAN-TITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLER-ANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					VACUUM TUBES (CLASS 38)					
92		8	-41	V-109	Vacuum tube, power amplifier pentode, small 6 pin base, heater: 6.3 v a.c. or d.c. at 0.4 amp.		1a	-41		
93		16	-76	V-104,108	Vacuum tube, super triode amplifier, detector, small 5 pin base, heater: 6.3 v a.c. or d.c. at 0.3 amp.		1a	-76		
94		16	-6C6	V-103,107	Vacuum tube, triple grid detector amplifier, small 6 pin base, small metal cap, heater: 6.3 v a.c. or d.c. at 0.3 amp.		1a	-6C6		
95		24	-6D6	V-102,105,106	Vacuum tube, triple grid, super control amplifier, small 6 pin base, small metal cap, heater: 6.3 v a.c. or d.c. at 0.3 amp.		1a	-6D6		
96		8		V-101	Vacuum tube, neon lamp, glow voltage 50-65 v, 60 cycles		298			K-814082-4
					INDUCTANCES (CLASS 47)					
97		1		L-101	Sense coil (Band 1) see Figure 38(A)		1			P-720293-501
98		1		L-102	Sense coil (Band 2) see Figure 38(D)		1			P-720293-505
99		1		L-103	Sense coil (Band 3) see Figure 39(E)		1			M-420562-501
100		1		L-104	Sense coil (Band 4) see Figure 39(D)		1			M-420562-502
101		1		L-105	Sense coil (Band 5) see Figure 39(D)		1			M-420562-503
102		1		L-106	Sense coil (Band 6) see Figure 39(D)		1			M-420562-504
103		1		L-107	Dummy loop coil (Band 6) see Figure 40(C)		1			M-421235-506
104		1		L-108	Dummy loop coil (Band 5) see Figure 40(E)		1			M-421235-505
105		1		L-109	Dummy loop coil (Band 4) see Figure 40(D)		1			M-421235-504
106		1		L-110	Dummy loop coil (Band 3) see Figure 40(C)		1			M-421235-503
107		1		L-111	Dummy loop coil (Band 2) see Figure 40(B)		1			M-421235-502
108		1		L-112	Dummy loop coil (Band 1) see Figure 40(A)		1			M-421235-501
109		1		L-113A,B&C	Loop tuning coil (Band 6) see Figure 41(C)		1			M-420561-506

TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
BULK SPARES

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					INDUCTANCES (CLASS 47) (Continued)					
110		1		L-114A, B&C	Loop tuning coil (Band 5) see Figure 41 (C)		1			M-420561-503
111		1		L-115A, B&C	Loop tuning coil (Band 4) see Figure 41 (F)		1			M-420561-502
112		1		L-116A, B&C	Loop tuning coil (Band 3) see Figure 41 (A)		1			M-420561-501
113		1		L-117A, B&C	Loop tuning coil (Band 2) see Figure 38 (F)		1			M-421223-502
114		1		L-118A, B&C	Loop tuning coil (Band 1) see Figure 38 (C)		1			M-421223-501
115		1		L-119	R-F tuning coil (Band 1) see Figure 38 (G)		1			P-720293-502
116		1		L-120	R-F tuning coil (Band 2) see Figure 38 (E)		1			P-720293-506
117		1		L-121	R-F tuning coil (Band 3) see Figure 39 (A)		1			P-720294-501
118		1		L-122	R-F tuning coil (Band 4) see Figure 39 (B)		1			P-720294-503
119		1		L-123	R-F tuning coil (Band 5) see Figure 39 (B)		1			P-720294-505
120		1		L-124	R-F tuning coil (Band 6) see Figure 39 (C)		1			P-720294-507
121		1		L-125	1st detector tuning coil (Band 1) see Figure 38(B)		1			P-720293-503
122		1		L-126	1st detector tuning coil (Band 2) see Figure 38(E)		1			P-720293-507
123		1		L-127	1st detector tuning coil (Band 3) see Figure 39(A)		1			P-720294-502
124		1		L-128	1st detector tuning coil (Band 4) see Figure 39(B)		1			P-720294-504
125		1		L-129	1st detector tuning coil (Band 5) see Figure 39(B)		1			P-720294-506

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TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
BULK SPARES

ITEM	BOX NO.	QUAN-TITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLER-ANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					INDUCTANCES (CLASS 47) (Continued)					
126		1		L-130	1st detector tuning coil (Band 6) see Figure 39(C)		1			P-720294-508
127		1		L-131A,B&C	R-F oscillator coil (Band 1) see Figure 42(A)		1			P-720408-501
128		1		L-132A,B&C	R-F oscillator coil (Band 2) see Figure 42(A)		1			P-720408-502
129		1		L-133A,B&C	R-F oscillator coil (Band 3) see Figure 42(B)		1			P-720408-503
130		1		L-134A,B&C	R-F oscillator coil (Band 4) see Figure 42(C)		1			P-720408-504
131		1		L-135A,B&C	R-F oscillator coil (Band 5) see Figure 42(C)		1			P-720408-50
132		1		L-136A,B&C	R-F oscillator coil (Band 6) see Figure 42(C)		1			P-720408-506
133		4		L-137	Coil assembly consisting of: 640 turns, 7 strands AWG #42 S litz wire universal wound, 1 cross per turn, wound over bakelite tube, I.D. 1/2" dia., 1-3/16" long		1			K-856431-501
134		1		T-101	1st i-f transformer, see Figure 43(A)		1			P-720402-501
135		1		T-102	2nd i-f transformer, see Figure 43(B)		1			P-720402-502
136		1		T-103	3rd i-f transformer, see Figure 43(C)		1			P-720402-503
137		1		T-104	CW oscillator transformer, see Figure 43(D)		1			P-720402-504

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TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
BULK SPARES

ITEM	BOX NO.	QUAN-TITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLER-ANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					CAPACITORS (CLASS 48)					
138		4	-48589-10	C-304,305	Capacitor, molded, mica, 10,000 mmfd ±10%, 300 v d.c. working	RE 48A 154	13,29 34	3LS,R (Lugs) MKW-3-11-10		P-720473-16
δ179		4	-48661-10	C-301,302	Capacitor, oil filled, paper, single sections, 1.75 mfd ±10%, 50 v d.c. working	RE 13A 488C	1			P-720555-60
			-48661	C-301,302	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-2
139		4	-48674-B10	C-150	Capacitor, molded, mica, 100 mmfd ±10%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1468LS, 5WS M2K100, OXM MOBW		P-720473-6
140		4	-48674-D5	C-175,201	Capacitor, molded, mica, 100 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M2K100, PO MOSDW 603M		P-720538-7
141		4	-48691-D10	C-146,204	Capacitor, molded, mica, 500 mmfd ±10%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M7K500, PO MOSDW		P-720473-8
142		8	-48710-C10	C-207,208,209,211	Capacitor, molded, mica, 10 mmfd ±10%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M1K10, PO MOSW		P-720473-2
143		4	-48771-C10	C-177	Capacitor, molded, mica, 5 mmfd ±10%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M1K5, PO MOSW		P-720473-1
144		4	-48783-D5	C-200,203	Capacitor, molded, mica, 20 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K20, PO MOSDW 603M		P-720538-1
145		4	-48839-D5	C-156	Capacitor, molded, mica, 70 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K70, PO MOSDW 603M		P-720538-6
146		4	-48840-D5	C-121	Capacitor, molded, mica, 15 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K15, PO MOSDW 603M		P-720538-22
147		4	-48895-D5	C-103	Capacitor, molded, mica, 50 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K50, PO MOSDW 603M		P-720538-5

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δ Capacitors having either tolerance specified may have been used in the equipment. Either one or the other type may be supplied as spare.

TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
BULK SPARES

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					CAPACITORS (CLASS 48) (Continued)					
148		4	-48938-10	C-106,179	Capacitor, molded, mica, 10,000 mmfd ±10%, 300 v d.c. working	RE 48A 154	2,13 29,34	1441, 3WS R, MLW-3-11-10		P-720473-15
149		16	-481015-D5	C-186,187,188,189,190, 191,192,205	Capacitor, molded, mica, 400 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M5K400, PO MOSDW 603M		P-720538-8
150		4	-481037-D10	C-122,174	Capacitor, molded, mica, 5000 mmfd ±10%, 300 v d.c. working	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720473-13
151		4	-481065-D3	C-151,206	Capacitor, molded, mica, 60 mmfd ±3%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K60, PO MOSDW 603M		P-721081-11
152		8	-481077-D3	C-104,107,120,210	Capacitor, molded, mica, 40 mmfd ±3%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M1K40, PO MOSDW		P-720537-1
153		4	-481084-D5	C-181,193	Capacitor, molded, mica, 1200 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720538-10
154		4	-481141-D3	C-164	Capacitor, molded, mica, 1030 mmfd ±3%, 500 v d.c. working	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720537-9
155		4	-481142-D3	C-165	Capacitor, molded, mica, 1900 mmfd ±3%, 500 v d.c. working	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720537-10
156		4	-481143-D5	C-178	Capacitor, molded, mica, 2100 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720538-11
157		4	-481144-D5	C-166	Capacitor, molded, mica, 3500 mmfd ±5%, 300 v d.c. working	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720538-12
158		4	-481146-D5	C-124	Capacitor, molded, mica, 27 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34,245	1469, 5RS M1K27, PO MOSDW, 603M		P-720538-2
159		4	-481147-D5	C-158	Capacitor, molded, mica, 33 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K33, PO MOSDW 603M		P-720538-3

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TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
BULK SPARES

ITEM	BOX NO.	QUAN-TITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLER-ANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					CAPACITORS (CLASS 48) (Continued)					
160		4	-481148-D3	C-154	Capacitor, molded, mica, 147 mmfd ±3%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M2K147, PO MOSDW		P-720537-3
161		4	-481151-D2	C-152,162	Capacitor, molded, mica, 370 mmfd ±2%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M5K370, PO MOSDW		P-720537-7
162		4	-481152-D5	C-180	Capacitor, molded, mica, 470 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M6K470, PO MOSDW 603M		P-720538-9
163		4	-481153-D2	C-163	Capacitor, molded, mica, 485 mmfd ±2%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M6K485, PO MOSDW		P-720537-8
δ180		4	-481161-10	C-303A&B	Capacitor, oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case	RE 13A 488C	1			P-720555-53
			-481161	C-303A&B	Same as above except tolerance +10%-3%	RE 13A 488C	1			P-720463-1
164		4	-481199-D3	C-133,145	Capacitor, molded, mica, 90 mmfd ±3%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K90, PO MOSDW 603M		P-721081-12
165		4	-481199-D5	C-125	Capacitor, molded, mica, 90 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K90, PO MOSDW 603M		P-720538-21
166		4	-481418-D3	C-134,144	Capacitor, molded, mica, 43 mmfd ±3%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K43, PO MOSDW 603M		P-721081-10
167		4	-481419-D5	C-126	Capacitor, molded, mica, 135 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M1K135, PO MOSDW		P-721133-5
168		4	-481420-D5	C-167	Capacitor, molded, mica, 6400 mmfd ±5%, 300 v d.c. working	RE 48A 154	2 29 34	1464, PW MWSDW		P-721133-6
δ169		4		C-135A&B,168A&B	Capacitor, oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case complete with mounting bracket	RE 13A 488C	1			P-720463-58
				C-135A&B,168A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-8

δ Capacitors having either tolerance specified may have been used in the equipment. Either one or the other type may be supplied as spare. Y2

TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
BULK SPARES

ITEM	BOX NO.	QUAN-TITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLER-ANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					CAPACITORS (CLASS 48) (Continued)					
δ170		4		C-136A&B,149A&B	Capacitor, oil filled, paper, 2 sections, 0.1/0.1 mfd ±10%, 500 v d.c. working, each section grounded to case complete with mounting bracket	RE 13A 488C	1			P-720463-60
				C-136A&B,149A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-10
δ171		8		C-137A&B,170A&B, 176A&B,182A&B	Capacitor, oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case	RE 13A 488C	1			P-720463-55
				C-137A&B,170A&B, 176A&B,182A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-5
172		4		C-147A&B,148A&B	Capacitor, oil filled, paper, 2 sections, 0.1 mfd +10% -3%, 0.025 mfd ±5%, 500 v d.c. working, each section grounded to case	RE 13A 488C	1			P-720463-4
δ173		4		C-169A&B	Capacitor, oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case complete with mounting bracket	RE 13A 488C	1			P-720463-59
				C-169A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-9
δ174		4		C-171A&B	Capacitor, oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case complete with mounting bracket	RE 13A 488C	1			P-720463-61
				C-171A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-11
δ175		4		C-172A&B	Capacitor, oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case complete with mounting bracket	RE 13A 488C	1			P-720463-57
				C-172A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-7
δ176		8		C-173A&B,197A&B, 199A&B	Capacitor, oil filled, paper, 2 sections, 0.1/0.1 mfd ±10%, 500 v d.c. working, each section grounded to case	RE 13A 488C	1			P-720463-62
				C-173A&B,197A&B, 199A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-12

δ Capacitors having either tolerance specified may have been used in the equipment. Either one or the other type may be supplied as spare.

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TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
BULK SPARES

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					CAPACITORS (CLASS 48) (Continued)					
δ177		8		C-183A&B, 184A&B, 198A&B	Capacitor, oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case	RE 13A 488C	1			P-720463-56
				C-183A&B, 184A&B, 198A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-6
δ178		4		C-185A&B	Capacitor, oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case complete with mounting bracket	RF 13A 488C	1			P-720463-53
				C-185A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-3
					VACUUM TUBE SOCKETS (CLASS 49)					
181		2	-49369	X-104	Socket, 5 contact, steatite ceramic base, with adapter plate and #4 retaining ring		6	#RSS-5M		K-856868-502
182		2	-49369	X-108	Socket, 5 contact, steatite ceramic base, #4 retaining ring, without adapter plate		6	#SS-5M		K-856956-2
183		2	-49370	X-102,103	Socket, 6 contact, steatite ceramic base, with adapter plate and #4 retaining ring		6	#RSS-6M		K-856868-503
184		2	-49370	X-105,106,107,109	Socket, 6 contact, steatite ceramic base, #4 retaining ring, without adapter plate		6	#SS-6M		K-856956-3
					FILTERS (CLASS 53)					
185		1	-53066	T-106	A-F band-pass filter, see Figure 44		1			M-420774-1
186		4			Line filter assembly consisting of C-212,213, L-138,139, see Figure 47		1			K-901517-501

δ Capacitors having either tolerance specified may have been used in the equipment. Either one or the other type may be supplied as spare. Y2

TABLE IV (Continued)

SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

BULK SPARES

ITEM	BOX NO.	QUAN-TITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLER-ANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					RESISTORS (CLASS 63)					
187		4	-63288	R-133	Resistor, composition, 33,000 ohms ±10%, 1 watt, insulated		21	BT-1		K-844314-80
188		4	-63288	R-134	Resistor, composition, 47,000 ohms ±10%, 1 watt, insulated		21	BT-1		K-844314-82
189		4	-63360	R-104,131	Resistor, composition, 470 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-58
190		4	-63360	R-117,120	Resistor, composition, 680 ohms ±10%, 1/2 watt, insulated		4,21 617	BT-1/2		K-850981-60
191		4	-63360	R-140	Resistor, composition, 1500 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-64
192		8	-63360	R-106,116,119,124	Resistor, composition, 4700 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-70
193		4	-63360	R-105	Resistor, composition, 5600 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-71
194		8	-63360	R-110,112,118,121	Resistor, composition, 10,000 ohms ±10%, 1/2 watt, insulated		4,21 617	BT-1/2		K-850981-74
195		4	-63360	R-132	Resistor, composition, 12,000 ohms ±10%, 1/2 watt, insulated		4,21 617	BT-1/2		K-850981-75
196		4	-63360	R-125	Resistor, composition, 18,000 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-77
197		4	-63360	R-115,123	Resistor, composition, 33,000 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-80
198		4	-63360	R-136	Resistor, composition, 39,000 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-81
199		4	-63360	R-108	Resistor, composition, 47,000 ohms ±10%, 1/2 watt, insulated		4,21 617	BT-1/2		K-850981-82
200		4	-63360	R-113,146	Resistor, composition, 56,000 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-83

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TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
BULK SPARES

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					RESISTORS (CLASS 63) (Continued)					
201		12	-63360	R-107,114,141,142, 143	Resistor, composition, 100,000 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-86
202		8	-63360	R-111,128,129	Resistor, composition, 220,000 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-90
203		4	-63360	R-122	Resistor, composition, 270,000 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-91
204		4	-63360	R-126	Resistor, composition, 330,000 ohms ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-92
205		4	-63360	R-127	Resistor, composition, 470,000 ohms ±10%, 1/2 watt, insulated		4,21	BT-1/2		K-850981-94
206		4	-63360	R-101,130	Resistor, composition, 560,000 ohms ±10%, 1/2 watt, insulated		4,21	BT-1/2		K-850981-95
207		4	-63360	R-109	Resistor, composition, 1 megohm ±10%, 1/2 watt, insulated		21	BT-1/2		K-850981-98
208		4	-63703-10	R-137	Resistor, wire wound, 1 ohm ±10%, 1 watt, insulated		21	BW-1		K-855796-53
209		8	-63703-10	R-138,144,145	Resistor, wire wound, 68 ohms ±10%, 1 watt, insulated		21	BW-1		K-855796-51
210		1	-63804	R-139	Potentiometer, variable, 15,000 ohms ±3000 ohms, curve "A", linear taper		21	CSMP		K-855769-1
211		1	-63805	R-103	Potentiometer, 5000 ohms ±20% curve "B", L.H. taper		21	CSMP		K-855773-1
212		1	-63807	R-102	Potentiometer, 30,000 ohms ±20%, curve "C", L.H. taper		21	CSM		K-855289-2
213		1	-63808	R-135A&B	Potentiometer, dual section A: 20,000 ohms ±2000 ohms, curve "E", R.H. taper, section B: 300,000 ohms ±20%, curve "F", L.H. taper		21	CSM		K-855768-1

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TABLE IV

SPARE PARTS LIST BY NAVY TYPE NUMBERS

FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

OPERATING SPARES

CONTRACT NXsa-23437 DATED 13 FEBRUARY, 1943

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					MISCELLANEOUS (CLASS 10)					
1		1		E-301	Brush, low voltage (+) for use with dynamotor-filter D-301		235			K-881930-3
2		1		E-302	Brush, low voltage (-) for use with dynamotor-filter D-301		235			K-881930-4
3		1		E-303	Brush, high voltage (+) for use with dynamotor-filter D-301		235			K-881930-1
4		1		E-304	Brush, high voltage (-) for use with dynamotor-filter D-301		235			K-881930-2
5		1			Spare Parts Box					
					PROTECTIVE DEVICES (CLASS 28)					
6		4		F-101	Fuse, glass, cartridge type, 5 amps., 25 v	17-F-2e	 26 121	Type 4AG Cat. #1094 Cat. #4AG5		K-811485-19
					VACUUM TUBES (CLASS 38)					
7		1	-41	V-109	Vacuum tube, power amplifier pentode, small 6-pin base, heater: 6.3 v a.c. or d.c. at 0.4 amp.		1a	-41		
8		1	-76	V-104, 108	Vacuum tube, super triode amplifier, detector, small 5 pin base, heater: 6.3 v a.c. or d.c. at 0.3 amp.		1a	-76		
9		1	-6C6	V-103, 107	Vacuum tube, triple grid detector amplifier, small 6 pin base, small metal cap, heater: 6.3 v a.c. or d.c. at 0.3 amp.		1a	-6C6		
10		1	-6D6	V-102, 105, 106	Vacuum tube, triple grid super control amplifier, small 6 pin base, small metal cap, heater: 6.3 v a.c. or d.c. at 0.3 amp.		1a	-6D6		
11		1		V-101	Vacuum tube, neon lamp, glow voltage 50-65 v, 60 cycles		298			K-814082-4

IB-38265-X3

TABLE IV

SPARE PARTS LIST BY NAVY TYPE NUMBERS

FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

BULK SPARES

CONTRACT NXsa-23437

DATED 13 FEBRUARY, 1943

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					MISCELLANEOUS (CLASS 10)					
12		4		E-301	Brush, low voltage (+) for use with dynamotor-filter D-301		235			K-881930-3
13		4		E-302	Brush, low voltage (-) for use with dynamotor-filter D-301		235			K-881930-4
14		4		E-303	Brush, high voltage (+) for use with dynamotor-filter D-301		235			K-881930-1
15		4		E-304	Brush, high voltage (-) for use with dynamotor-filter D-301		235			K-881930-2
					SWITCHES (CLASS 24)					
16		1	-24025	S-111	Switch, D.P.S.T., toggle, rating: 1 amp. at 250 v d.c., 3 amps. at 125 v d.c.		7			M-420278-15
17		1	-24033	S-108	Switch, D.P.D.T., toggle, rating: 1 amp. at 250 v d.c., 3 amps. at 125 v d.c.		7			M-420278-13
18		1	-24041	S-110	Switch, S.P.S.T., toggle, rating: 1 amp. at 250 v d.c., 3 amps. at 125 v d.c.		7			M-420278-12
19		1	-24074	S-109	Switch, S.P.D.T., toggle, rating: 1 amp. at 250 v d.c., 3 amps. at 125 v d.c.		7			M-420278-14
20		1		S-101	Selector switch, (Ant.), rotary tap type, 12 contact, single section		28			M-422888-1
21		1		S-102A&B	Band switch, (Ant.), rotary tap type, 12 contact, 2 section		28			M-422892-1
22		1		S-103A&B	Selector switch, (Loop), rotary tap type, 12 contact, 2 section		28			M-422893-1
23		1		S-104A,B,C,D,E&F	Band switch, (Loop), rotary tap type, 12 contact, 6 section		28			M-422887-1
24		1		S-105A&B	Band switch, (R-F), rotary tap type, 12 contact, 2 section		28			M-422890-1

IB-38265-Y3

TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
BULK SPARES

ITEM	BOX NO.	QUAN-TITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLER-ANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					SWITCHES (CLASS 24) (Continued)					
25		1		S-106A,B&C	Band switch, (First Det.), rotary tap type, 12 contact, 3 section		28			M-422889-1
26		1		S-107A,B,C,D&E	Band switch, (Osc.), rotary tap type, 12 contact, 5 section		28			M-422891-1
					PROTECTIVE DEVICES (CLASS 28)					
27		16		F-101	Fuse, glass cartridge type, 5 amps., 25 v	17-F-2e	 26 121	Type 4AG Cat. #1094 Cat. #4AG5		K-811485-19
					RELAYS (CLASS 29)					
28		1	-29040	K-401	Shutter relay, 28 v d.c., holding coil 225 ohms min., power coil 7 ohms min.		395	U-271-E		K-880754-1
					TRANSFORMERS (CLASS 30)					
29		1	-30525	T-105	Audio pack consisting of output transformer and reactor; output transformer consisting of: primary, 3900 turns AWG #40 E wire, d-c resistance 1610 ohms; secondary, 880 turns AWG #34 E wire, d-c resistance 73 ohms; impedance, primary 3 v, 60 cycles a.c. and 0.015 amp. d.c. shall be 11,000 ohms min., hi-pot: primary 2000 v a.c. r-m-s to shield and core, secondary 1000 v a.c. r-m-s to shield and core		1			M-420793-1

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TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
BULK SPARES

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					TRANSFORMERS (CLASS 30) (Continued)					
				T-105 (Continued)	Reactor 2500 turns AWG #35 E wire, d-c resistance 300 ohms ±10%, impedance at 3 v, 60 cycles a.c. and 0.050 amp. d.c. shall be 2800 ohms min.; hi-pot: 1000 v a.c. r-m-s for one minute					
30		1		L-301	Transformer, reactor, over vulcanized fiber spool wind 250 turns AWG #17 E wire, 50 turns per layer, coil build 0.300", d-c resistance 0.275 ohm ±5% at 25°C., inductance at 0.1 v, 1000 cycles, 880 to 1300 microhenries, hi-pot: 500 v to core		1	XT-4124		K-901472-501
					VACUUM TUBES (CLASS 38)					
31		4	-41	V-109	Vacuum tube, power amplifier pentode, small 6 pin base, heater: 6.3 v a.c or d.c. at 0.4 amp.		1a	-41		
32		4	-76	V-104, 108	Vacuum tube, super triode amplifier, detector, small 5 pin base, heater: 6.3 v a.c. or d.c. at 0.3 amp.		1a	-76		
33		4	-6C6	V-103, 107	Vacuum tube, triple grid detector amplifier, small 6 pin base, small metal cap, heater: 6.3 v a.c. or d.c. at 0.3 amp.		1a	-6C6		
34		4	-6D6	V-102, 105, 106	Vacuum tube, triple grid, super control amplifier, small 6 pin base, small metal cap, heater: 6.3 v a.c. or d.c. at 0.3 amp.		1a	-6D6		
35		4		V-101	Vacuum tube, neon lamp, glow voltage 50-65 v. 60 cycles		298			K-814082-4
					INDUCTANCES (CLASS 47)					
36		1		L-101	Sense coil (Band 1) see Figure 38 (A)		1			P-720293-501
37		1		L-102	Sense coil (Band 2) see Figure 38 (D)		1			P-720293-505
38		1		L-103	Sense coil (Band 3) see Figure 39 (E)		1			M-420562-501

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TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
BULK SPARES

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					INDUCTANCES (CLASS 47) (Continued)					
39		1		L-104	Sense coil (Band 4) see Figure 39 (D)		1			M-420562-502
40		1		L-105	Sense coil (Band 5) see Figure 39 (D)		1			M-420562-503
41		1		L-106	Sense coil (Band 6) see Figure 39 (D)		1			M-420562-504
42		1		L-107	Dummy loop coil (Band 6) see Figure 40 (C)		1			M-421235-506
43		1		L-108	Dummy loop coil (Band 5) see Figure 40 (E)		1			M-421235-505
44		1		L-109	Dummy loop coil (Band 4) see Figure 40 (D)		1			M-421235-504
45		1		L-110	Dummy loop coil (Band 3) see Figure 40 (C)		1			M-421235-503
46		1		L-111	Dummy loop coil (Band 2) see Figure 40 (B)		1			M-421235-502
47		1		L-112	Dummy loop coil (Band 1) see Figure 40 (A)		1			M-421235-501
48		1		L-113A,B&C	Loop tuning coil (Band 6) see Figure 41 (C)		1			M-420561-505
49		1		L-114A,B&C	Loop tuning coil (Band 5) see Figure 41 (C)		1			M-420561-503
50		1		L-115A,B&C	Loop tuning coil (Band 4) see Figure 41 (B)		1			M-420561-502
51		1		L-116A,B&C	Loop tuning coil (Band 3) see Figure 41 (A)		1			M-420561-501
52		1		L-117A,B&C	Loop tuning coil (Band 2) see Figure 38 (F)		1			M-421223-502
53		1		L-118A,B&C	Loop tuning coil (Band 1) see Figure 38 (C)		1			M-421223-501
54		1		L-119	R-F tuning coil (Band 1) see Figure 38 (G)		1			P-720293-502
55		1		L-120	R-F tuning coil (Band 2) see Figure 38 (E)		1			P-720293-506
56		1		L-121	R-F tuning coil (Band 3) see Figure 39 (A)		1			P-720294-501
57		1		L-122	R-F tuning coil (Band 4) see Figure 39 (B)		1			P-720294-503
58		1		L-123	R-F tuning coil (Band 5) see Figure 39 (B)		1			P-720294-505
59		1		L-124	R-F tuning coil (Band 6) see Figure 39 (C)		1			P-720294-507

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TABLE IV (Continued)

SPARE PARTS LIST BY NAVY TYPE NUMBERS

FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

BULK SPARES

ITEM	BOX NO.	QUAN-TITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					INDUCTANCES (CLASS 47) (Continued)					
60		1		L-125	1st detector tuning coil (Band 1) see Figure 38 (B)		1			P-720293-503
61		1		L-126	1st detector tuning coil (Band 2) see Figure 38 (E)		1			P-720293-507
62		1		L-127	1st detector tuning coil (Band 3) see Figure 39 (A)		1			P-720294-502
63		1		L-128	1st detector tuning coil (Band 4) see Figure 39 (B)		1			P-720294-504
64		1		L-129	1st detector tuning coil (Band 5) see Figure 39 (B)		1			P-720294-506
65		1		L-130	1st detector tuning coil (Band 6) see Figure 39 (C)		1			P-720294-508
66		1		L-131A,B&C	R-F oscillator coil (Band 1) see Figure 42 (A)		1			P-720408-501
67		1		L-132A,B&C	R-F oscillator coil (Band 2) see Figure 42 (A)		1			P-720408-502
68		1		L-133A,B&C	R-F oscillator coil (Band 3) see Figure 42 (B)		1			P-720408-503
69		1		L-134A,B&C	R-F oscillator coil (Band 4) see Figure 42 (C)		1			P-720408-504
70		1		L-135A,B&C	R-F oscillator coil (Band 5) see Figure 42 (C)		1			P-720408-505
71		1		L-136A,B&C	R-F oscillator coil (Band 6) see Figure 42 (C)		1			P-720408-506
72		1		L-137	Coil assembly consisting of: 640 turns, 7 strands AWG #42 S litz wire universal wound, 1 cross per turn, wound over bakelite tube, I.D. 1/2" dia., 1-3/16" long		1			K-856431-501
73		1		T-101	1st i-f transformer, see Figure 43 (A)		1			P-720402-501
74		1		T-102	2nd i-f transformer, see Figure 43 (B)		1			P-720402-502
75		1		T-103	3rd i-f transformer, see Figure 43 (C)		1			P-720402-503
76		1		T-104	CW oscillator transformer, see Figure 43 (D)		1			P-720402-504

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TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
BULK SPARES

ITEM	BOX NO.	QUAN-TITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					CAPACITORS (CLASS 48)					
77		1	-48589-10	C-304,305	Capacitor, molded, mica, 10,000 mmfd ±10%, 300 v d.c. working	RE 48A 154	13,29 34	3LS, R (Lugs) MKW-3-11-10		P-720473-16
δ78		1	-48661-10	C-301,302	Capacitor, oil filled, paper, single sections, 1.75 mfd ±10%, 50 v d.c. working	RE 13A 488C	1,2			P-720555-60
			-48661	C-301,302	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-2
79		1	-48674-B10	C-150	Capacitor, molded, mica, 100 mmfd ±10%, 500 v d.c. working	RF 48A 154	2,13 16,29 34	1468LS,5WS M2K100,OXM MOBW		P-720473-6
80		1	-48674-D5	C-175,201	Capacitor, molded, mica, 100 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34,245	1469, 5RS M2K100, PO MOSDW, 603M		P-720538-7
81		1	-48691-D10	C-146,204	Capacitor, molded, mica, 500 mmfd ±10%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M7K500, PO MOSDW		P-720473-8
82		1	-48710-C10	C-207,208,209,211	Capacitor, molded, mica, 10 mmfd ±10%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M1K10,PO MOSW		P-720473-2
83		1	-48771-C10	C-177	Capacitor, molded, mica, 5 mmfd ±10%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M1K5, PO MOSW		P-720473-1
84		1	-48783-D5	C-200,203	Capacitor, molded, mica, 20 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K20, PO MOSDW 603M		P-720538-1
85		1	-48839-D5	C-156	Capacitor, molded, mica, 70 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K70, PO MOSDW 603M		P-720538-6
86		1	-48840-D5	C-121	Capacitor, molded, mica, 15 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K15, PO MOSDW 603M		P-720538-22

δ Capacitors having either tolerance specified may have been used in the equipment. Either type may be used as spare.

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TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
BULK SPARES

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					CAPACITORS (CLASS 48) (Continued)					
87		1	-48895-D5	C-103	Capacitor, molded, mica, 50 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K50, PO MOSDW 603M		P-720538-5
88		1	-48938-10	C-106,179	Capacitor, molded, mica, 10,000 mmfd ±10%, 300 v d.c. working	RE 48A 154	2,13 29,34	1441, 3WS R,MLW-3-11-10		P-720473-15
89		1	-481015-D5	C-186,187,188,189, 190,191,192,205	Capacitor, molded, mica, 400 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M5K400, PO MOSDW 603M		P-720538-8
90		1	-481037-D10	C-122,174	Capacitor, molded, mica, 5000 mmfd ±10%, 300 v d.c. working	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720473-13
91		1	-481065-D3	C-151,206	Capacitor, molded, mica, 60 mmfd ±3%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K60, PO MOSDW 603M		P-721081-11
92		1	-481077-D3	C-104,107,120,210	Capacitor, molded, mica, 40 mmfd ±3%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M1K40, PO MOSDW		P-720537-1
93		1	-481084-D5	C-181,193	Capacitor, molded, mica, 1200 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720538-10
94		1	-481141-D3	C-164	Capacitor, molded, mica, 1030 mmfd ±3%, 500 v d.c. working	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720537-9
95		1	-481142-D3	C-165	Capacitor, molded, mica, 1900 mmfd ±3%, 500 v d.c. working	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720537-10
96		1	-481143-D5	C-178	Capacitor, molded, mica, 2100 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720538-11
97		1	-481144-D5	C-166	Capacitor, molded, mica, 3500 mmfd ±5%, 300 v d.c. working	RE 48A 154	2,13 29,34	1464, 1RS PW, MWSDW		P-720538-12
98		1	-481146-D5	C-124	Capacitor, molded, mica, 27 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M1K27, PO MOSDW		P-720538-2

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TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
BULK SPARES

ITEM	BOX NO.	QUAN-TITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLER-ANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					CAPACITORS (CLASS 48) (Continued)					
99		1	-481147-D5	C-158	Capacitor, molded, mica, 33 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K33, PO MOSDW 603M		P-720538-3
100		1	-481148-D3	C-154	Capacitor, molded, mica, 147 mmfd ±3%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M2K147, PO MOSDW		P-720537-3
101		1	-481151-D2	C-152,162	Capacitor, molded, mica, 370 mmfd ±2%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M5K370, PO MOSDW		P-720537-7
102		1	-481152-D5	C-180	Capacitor, molded, mica, 470 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M6K470, PO MOSDW 603M		P-720538-9
103		1	-481153-D2	C-163	Capacitor, molded, mica, 485 mmfd ±2%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M6K485, PO MOSDW		P-720537-8
104δ		1	-481161-10	C-303A&B	Capacitor, oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case	RE 13A 488C	1,2			P-720555-53
			-481161	C-303A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-1
105		1	-481199-D3	C-133,145	Capacitor, molded, mica, 90 mmfd ±3%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K90, PO MOSDW 603M		P-721081-12
106		1	-481199-D5	C-125	Capacitor, molded, mica, 90 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K90, PO MOSDW 603M		P-720538-21
107		1	-481418-D3	C-134,144	Capacitor, molded, mica, 43 mmfd ±3%, 500 v d.c. working	RE 48A 154	2,13 16,29 34 245	1469, 5RS M1K43, PO MOSDW 603M		P-721081-10

δ *Capacitors having either tolerance specified may have been used in the equipment. Either type may be used as spare.*

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TABLE IV (Continued)

SPARE PARTS LIST BY NAVY TYPE NUMBERS

FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

BULK SPARES

ITEM	BOX NO.	QUAN-TITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					CAPACITORS (CLASS 48) (Continued)					
108		1	-481419-D5	C-126	Capacitor, molded, mica, 135 mmfd ±5%, 500 v d.c. working	RE 48A 154	2,13 16,29 34	1469, 5RS M1K135, PO MOSDW		P-721133-5
109		1	-481420-D5	C-167	Capacitor, molded, mica, 6400 mmfd ±5%, 300 v d.c. working	RE 48A 154	2,29 34	1464, PW MWSDW		P-721133-6
δ109a		1		C-135A&B,168A&B	Capacitor, oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case, complete with mounting bracket	RE 13A 488C	1,2			P-720463-58
				C-135A&B,168A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-8
δ110		1		C-136A&B,149A&B	Capacitor, oil filled, paper, 2 sections, 0.1/0/1 mfd +10%, 500 v d.c. working, each section grounded to case, complete with mounting bracket	RE 13A 488C	1,2			P-720463-60
				C-136A&B,149A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-10
δ111		1		C-137A&B,170A&B, 176A&B,182A&B	Capacitor, oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case	RE 13A 488C	1,2			P-720463-55
				C-137A&B,170A&B, 176A&B,182A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-5
112		1		C-147A&B,148A&B	Capacitor, oil filled, paper, 2 sections, 0.1 mfd -3% +10%, 0.025 mfd ±5%, 500 v d.c. working, each section grounded to case	RE 13A 488C	1			P-720463-4
δ113		1		C-169A&B	Capacitor, oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case, complete with mounting bracket	RE 13A 488C	1,2			P-720463-59
				C-169A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-9
δ114		1		C-171A&B	Capacitor, oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case, complete with mounting bracket	RE 13A 488C	1,2			P-720463-61
				C-171A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-11

δ Capacitors having either tolerance specified may have been used in the equipment. Either type may be used as spare.

Y2

TABLE IV (Continued)

SPARE PARTS LIST BY NAVY TYPE NUMBERS

FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

BULK SPARES

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					CAPACITORS (CLASS 48) (Continued)					
δ115		1		C-172A&B	Capacitor, oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case, complete with mounting bracket	RE 13A 488C	1,2			P-720463-57
				C-172A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-7
δ116		1		C-173A&B, 197A&B, 199A&B	Capacitor, oil filled, paper, 2 sections, 0.1/0.1 mfd ±10%, 500 v d.c. working, each section grounded to case	RE 13A 488C	1,2			P-720463-62
				C-173A&B, 197A&B, 199A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-12
δ117		1		C-183A&B, 184A&B, 198A&B	Capacitor, oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case	RE 13A 488C	1,2			P-720463-56
				C-183A&B, 184A&B, 198A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-6
δ118		1		C-185A&B	Capacitor, oil filled, paper, 2 sections, 0.5/0.5 mfd ±10%, 400 v d.c. working, each section grounded to case, complete with mounting bracket	RE 13A 488C	1,2			P-720463-53
				C-185A&B	Same as above except tolerance +10% -3%	RE 13A 488C	1			P-720463-3
					SOCKETS (CLASS 49)					
119		1	-49369	X-104	Socket, 5 contact, steatite ceramic base, with adapter plate and #4 retaining ring		6	#RSS-5M		K-856868-502
120		1	-49369	X-108	Socket, 5 contact, steatite ceramic base, #4 retaining ring without adapter plate		6	#SS-5M		K-856956-2
121		1	-49370	X-102,103	Socket, 6 contact, steatite ceramic base, with adapter plate and #4 retaining ring		6	#RSS-6M		K-856868-503
122		1	-49370	X-105,106,107,109	Socket, 6 contact, steatite ceramic base, #4 retaining ring without adapter plate		6	#SS-6M		K-856956-3

δ *Capacitors having either tolerance specified may have been used in the equipment. Either type may be used as spare.*

Y2

TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
BULK SPARES

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					FILTERS (CLASS 53)					
123		1	-53066	T-106	A-F band-pass filter, see Figure 44		1			M-420774-1
124		1			Line filter assembly consisting of C-212,213, L-138,139, see Figure 47		1			K-901517-501
					RESISTORS (CLASS 63)					
125		1	-63288	R-133	Resistor, composition, 33,000 ohms ±10%, 1 watt, insulated		21	Type BT-1		K-844314-80
126		1	-63288	R-134	Resistor, composition, 47,000 ohms ±10%, 1 watt, insulated		21	Type BT-1		K-844314-82
127		1	-63360	R-104,131	Resistor, composition, 470 ohms ±10%, 1/2 watt, insulated		21	Type BT-1/2		K-850981-58
128		1	-63360	R-117,120	Resistor, composition, 680 ohms ±10%, 1/2 watt, insulated		4,21 617	Type BT-1/2		K-850981-60
129		1	-63360	R-140	Resistor, composition, 1500 ohms ±10% 1/2 watt, insulated		21	Type BT-1/2		K-850981-64
130		1	-63360	R-106,116,119,124	Resistor, composition, 4700 ohms ±10%, 1/2 watt, insulated		21	Type BT-1/2		K-850981-70
131		1	-63360	R-105	Resistor, composition, 5600 ohms ±10%, 1/2 watt, insulated		21	Type BT-1/2		K-850981-71
132		1	-63360	R-110,112,118,121	Resistor, composition, 10,000 ohms ±10%, 1/2 watt, insulated		4,21 617	Type BT-1/2		K-850981-74
133		1	-63360	R-132	Resistor, composition, 12,000 ohms ±10%, 1/2 watt, insulated		4,21 617	Type BT-1/2		K-850981-75
134		1	-63360	R-125	Resistor, composition, 18,000 ohms ±10%, 1/2 watt, insulated		21	Type BT-1/2		K-850981-77
135		1	-63360	R-115,123	Resistor, composition, 33,000 ohms ±10%, 1/2 watt, insulated		21	Type BT-1/2		K-850981-80

Y2

TABLE IV (Continued)
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT
BULK SPARES

ITEM	BOX NO.	QUAN-TITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLER-ANCE, RATING OR MODIFICATION	RCA DRAWING NUMBER
					RESISTORS (CLASS 63) (Continued)					
136		1	-63360	R-136	Resistor, composition, 39,000 ohms ±10%, 1/2 watt, insulated		21	Type BT-1/2		K-850981-81
137		1	-63360	R-108	Resistor, composition, 47,000 ohms ±10%, 1/2 watt, insulated		4,21 617	Type BT-1/2		K-850981-82
138		1	-63360	R-113,146	Resistor, composition, 56,000 ohms ±10%, 1/2 watt, insulated		21	Type BT-1/2		K-850981-83
139		1	-63360	R-107,114,141,142,143	Resistor, composition, 100,000 ohms ±10%, 1/2 watt, insulated		21	Type BT-1/2		K-850981-86
140		1	-63360	R-111,128,129	Resistor, composition, 220,000 ohms ±10%, 1/2 watt, insulated		21	Type BT-1/2		K-850981-90
141		1	-63360	R-122	Resistor, composition, 270,000 ohms ±10%, 1/2 watt, insulated		21	Type BT-1/2		K-850981-91
142		1	-63360	R-126	Resistor, composition, 330,000 ohms ±10%, 1/2 watt, insulated		21	Type BT-1/2		K-850981-92
143		1	-63360	R-127	Resistor, composition, 470,000 ohms ±10%, 1/2 watt, insulated		4,21	Type BT-1/2		K-850981-94
144		1	-63360	R-101,130	Resistor, composition, 560,000 ohms ±10%, 1/2 watt, insulated		4,21	Type BT-1/2		K-850981-95
145		1	-63360	R-109	Resistor, composition, 1 megohm ±10%, 1/2 watt, insulated		21	Type BT-1/2		K-850981-98
146		1	-63703-10	R-137	Resistor, wire wound, 1 ohm ±10%, 1 watt, insulated		21	Type BW-1		K-855796-53
147		1	-63703-10	R-138,144,145	Resistor, wire wound, 68 ohms ±10%, 1 watt, insulated		21	Type BW-1		K-855796-51
148		1	-63804	R-139	Variable, 15,000 ohms ±3000 ohms, Curve "A", linear type		21	Type CSMP		K-855769-1
149		1	-63805	R-103	Potentiometer, 5000 ohms ±20%, Curve "B", L.H. taper		21	Type CSMP		K-855773-1
150		1	-63807	R-102	Potentiometer, 30,000 ohms ±20%, Curve "C", L.H. taper		21	Type CSM		K-855289-2
151		1	-63808	R-135A&B	Potentiometer, dual; section A: 20,000 ohms ±2000 ohms, curve "E", R.H. taper; section B: 300,000 ohms ±10%, curve "F". L.H. taper		21	Type CSMP		K-855768-1

Y2

RESISTOR AND CAPACITOR CODES

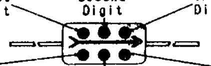
MICA CAPACITOR CODING

Values of capacitance and tolerance are coded identically on both R.M.A. 6 dot and A.W.S. coded capacitors. Only the coding of the sixth (lower left) dot differs between the two.

R. M. A. CODE

R.M.A. coded capacitors have 3 or 6 dots located as shown below.

6 DOT COLOR CODE



On capacitors bearing 6 dots, the upper 3 dots become the first 3 figures. When the number of zeros determined by the "Zero Add" (lower right) dot is added, the capacitance in micromicrofarads (mmfd) is obtained. The other two dots show the percentage tolerance and the voltage rating.

EXAMPLE:

Brown, Red, Green / Green, Silver, Brown: 125 + 0 = 1250 mmfd capacitance; 10% tolerance; 500 v d-c working voltage

3 DOT COLOR CODE

On capacitors bearing 3 dots, the first 2 dots become the first two figures. When the number of zeros determined by the "Zero Add" (third) dot is added, the capacitance in micromicrofarads (mmfd) is obtained. All 3 dot capacitors are rated at 500 v d-c working voltage.

EXAMPLE:

Red, Green, Brown: 25 + 0 - 250 mmfd capacitance; (inferred tolerance) 500 v d-c working voltage

A. W. S. CODE

A.W.S. coded capacitors may have a coded "Type Designation" or 6 colored dots as shown below.

TYPE DESIGNATION

CM 20 A 050 M

Component — Case — Characteristic — Capacitance — Tolerance

COMPONENT: All mica capacitors are identified by "CM".
*CASE: Identifies external shape and dimensions.
*CHARACTERISTIC: Identifies temperature coefficient and "Q".
CAPACITANCE: The first 2 digits are the first 2 figures of the capacitance, in mmfd. The third determines the number of zeros to add. If more than 3 digits are used, all except the last are figures of capacitance. The last determines the number of zeros to add.

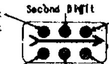
TOLERANCE:

Designation	Tolerance
G	±2%
J	±5%
K	±10%
M	±20%

EXAMPLE: The above type designation identifies the capacitance as 5 mmfd and the tolerance as 20 per cent.

For specific information see publication C75.3 - 1942 of the American Standards Association.

6 DOT COLOR CODE



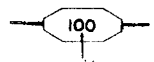
EXAMPLE:
Black Orange Orange
Black Silver Red
033 + 00 = 3300 mmfd capacitance
10% tolerance
"A" characteristic

R. C. A. CODE

for mica capacitors of the shape shown below

The capacitance in micromicrofarads (mmfd) is stamped on the case. The color of the numbers shows the tolerance, as follows:

Green . . . 2.5%   Blue 10%
Black . . . . 5%   Yellow . . . 20%
Red . . . 30%



† *When the "ZERO ADD" color is GOLD, multiply the preceeding digits by 0.1 for capacitance in mmfd; when the "ZERO ADD" color is SILVER, multiply by 0.01*

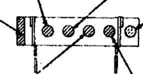
RCA CERAMIC CAPACITOR CODING

COLOR IDENTIFICATION

COLOR	DIGIT	ZERO ADD	TOLERANCE Note 1	TOLERANCE Note 2	TEMP. COEFFICIENT [MMFD/MMFD/°C.]
BLACK	0	0			0
BROWN	1	1	5%	0.5 mmfd	-0.30 x 10^{-4}
RED	2	2			-0.80 x 10^{-4}
ORANGE	3	3	2½%		-1.5 x 10^{-4}
YELLOW	4	4			-2.2 x 10^{-4}
GREEN	5	5	5%	0.5 mmfd	-3.3 x 10^{-4}
BLUE	6	6			-4.7 x 10^{-4}
VIOLET	7	7			-7.5 x 10^{-4}
GRAY	8		2½%	0.25 mmfd	
WHITE	9		10%	1.0 mmfd	

Note 1 - This column applies to capacitances GREATER than 10 mmfd.
Note 2 - This column applies to capacitances LESS than 10 mmfd.

COLOR CODING



The d-c working voltage of this type is 500 volts.

EXAMPLE:

4 Brown Dots, Red End Color:
11 + 0 = 110 mmfd capacitance
±5% tolerance
-0.80 x 10^{-4} mmfd/mmfd/°C. temperature coefficient
inferred: 500 volt rating

COLOR IDENTIFICATION FOR MICA CAPACITORS

COLOR	DIGITS and ZERO ADD	TOLERANCE R.M.A.	TOLERANCE A.W.S.	TOLERANCE R.C.A. mica	D-C VOLTAGE (R.M.A.)	CHARACTERISTIC (A.W.S.)
BLACK	0			5%		A
BROWN	1	1%			100	B
RED	2	2%	2% (G)		200	C
ORANGE	3	3%			300	D
YELLOW	4	4%		20%	400	E
GREEN	5	5%		2½%	500	F
BLUE	6	6%		10%	600	G
VIOLET	7	7%			700	
GRAY	8	8%			800	
WHITE	9	9%			900	
GOLD	†	5%	5% (J)		1000	
SILVER	†	10%	10% (K)		2000	
NO COLOR		20%	20% (M)		500	

†When the "ZERO ADD" color is GOLD, multiply the number obtained from "A" and "B" by 0.1 to get capacitance in mmfd; when it is SILVER; multiply the number by 0.01.

RESISTOR CODING

(Composition and Low Power Wire Wound Resistors)

THE R.M.A. CODING AND A.W.S. CODING FOR THESE RESISTORS ARE IDENTICAL

FIRST SYSTEM

Tolerance may not be given; in which case there will be no "D" band.

SECOND SYSTEM

The body color indicates the type of resistor, and is coded as follows:

BODY COLOR	TYPE
Black	Composition, non-insulated
Any Color but Black	Composition, insulated
Chocolate Brown	Wire wound, insulated

TO FIND RESISTANCE IN OHMS FROM COLOR CODING:

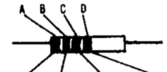
Obtain the digits identified by the colors of "A", "B", and "C" from the following table:

COLOR IDENTIFICATION

COLOR	Digit or Zero Add	COLOR	Digit or Zero Add	Tolerance
Black	0	Violet	7	
Brown	1	Gray	8	
Red	2	White	9	
Orange	3	Gold	†	5%
Yellow	4	Silver	†	10%
Green	5	No Color		20%
Blue	6			

† When the "ZERO ADD" color is GOLD, multiply the number obtained from "A" and "B" by 0.1 to get resistance in ohms; when it is SILVER; multiply the number by 0.01.

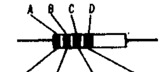
EXAMPLE



A B x C = 25 x 0.1 = 2.5
Resistance is 2.5 ohms
Tolerance: 10 per cent

EXAMPLE

The first two digits "A" and "B" become the first two numbers of the resistance. The ZERO ADD digit, "C", gives the number of zeros to add after the first two numbers. (If the ZERO ADD color is GOLD or SILVER, it becomes a multiplier. See note †)



A B + C zeros = 25 + 3 zeros = 25,000
Resistance is 25,000 ohms
Tolerance: 10 per cent

TABLE VI

LIST OF MANUFACTURERS

FOR MODEL DZ-2 DIRECTION FINDER EQUIPMENT

CODE NUMBER	MFR. PREFIX	NAME	ADDRESS
1	CRV	Radio Corporation of America	Camden, N.J.
1a	CRC	Radio Corporation of America	Harrison, N.J.
2	CAW	Aerovox Wireless Corp.	742 Belleville Ave., New Bedford, Mass.
4	CRZ	Allen-Bradley Company	1326 S. 2nd Street, Milwaukee, Wis.
6	CPH	American Phenolic Corp.	1830 S. 54th Street, Cicero, Ill.
7	CHH	Arrow-Hart & Hegeman Electric Co.	102 Hawthorne Street, Hartford, Conn.
13	CD	Cornell-Dubilier Electric Corp.	1000 Hamilton Boulevard, S. Plainfield, N.J.
16	CER	Erie Resistor Corporation	644 W. 12th Street, Erie, Penna.
19	CHC	Hammarlund Mfg. Co.	460 West 34th Street, New York, N.Y.
21	CIR	International Resistance Corp.	401 N. Broad Street, Phila., Penna.
26	CLF	Littelfuse Lab.	4757 N. Ravenswood Ave., Chicago, Ill.
28	CMA	P.R. Mallory & Co. Inc. (Yaxley Division)	3029 E. Washington Street, Indianapolis, Ind.
29	CMR	Micamold Radio Corp.	1087 Flushing Ave., Brooklyn, N.Y.
33	CRK	Radio Condenser Co.	Camden, N.J.
34	CSL	Solar Mfg. Co.	588 Avenue A, Bayonne, N.J.
65		American Radio Hardware Co.	476 Broadway, New York, N.Y.
67a		American Steel Package Co.	Defiance, Ohio
82		Aluminum Goods Mfg. Co.	Manitowoc, Wisconsin
111	CTB	Bristol Co.	117 Bristol Road, Waterbury, Conn.
121	CFA	Bussman Mfg. Co.	2538 W. University Street, St. Louis, Mo.
235	CEK	Eicor, Inc.	1501 W. Congress St., Chicago, Ill.
245	CMF	Electro-Motive Corp.	Willimantic, Conn.
261		Fafnir Bearing Co.	Booth Street, New Britain, Conn.
298		General Electric Vapor Lamp Mfg. Co.	Hoboken, N.J.
304	CAB	General Radio Co.	30 State Street, Cambridge, Mass.
395	CKF	Kearfott Engineering Co., Inc.	117 Liberty St., New York, N.Y.
617	CPQ	Spur Resistor Corp.	Theresia St., St. Marys, Penna.
658		Super Electric Co.	Jersey City, N.J.
733b	CAKY	Wheeler Insulated Wire Co.	Bridgeport, Conn.

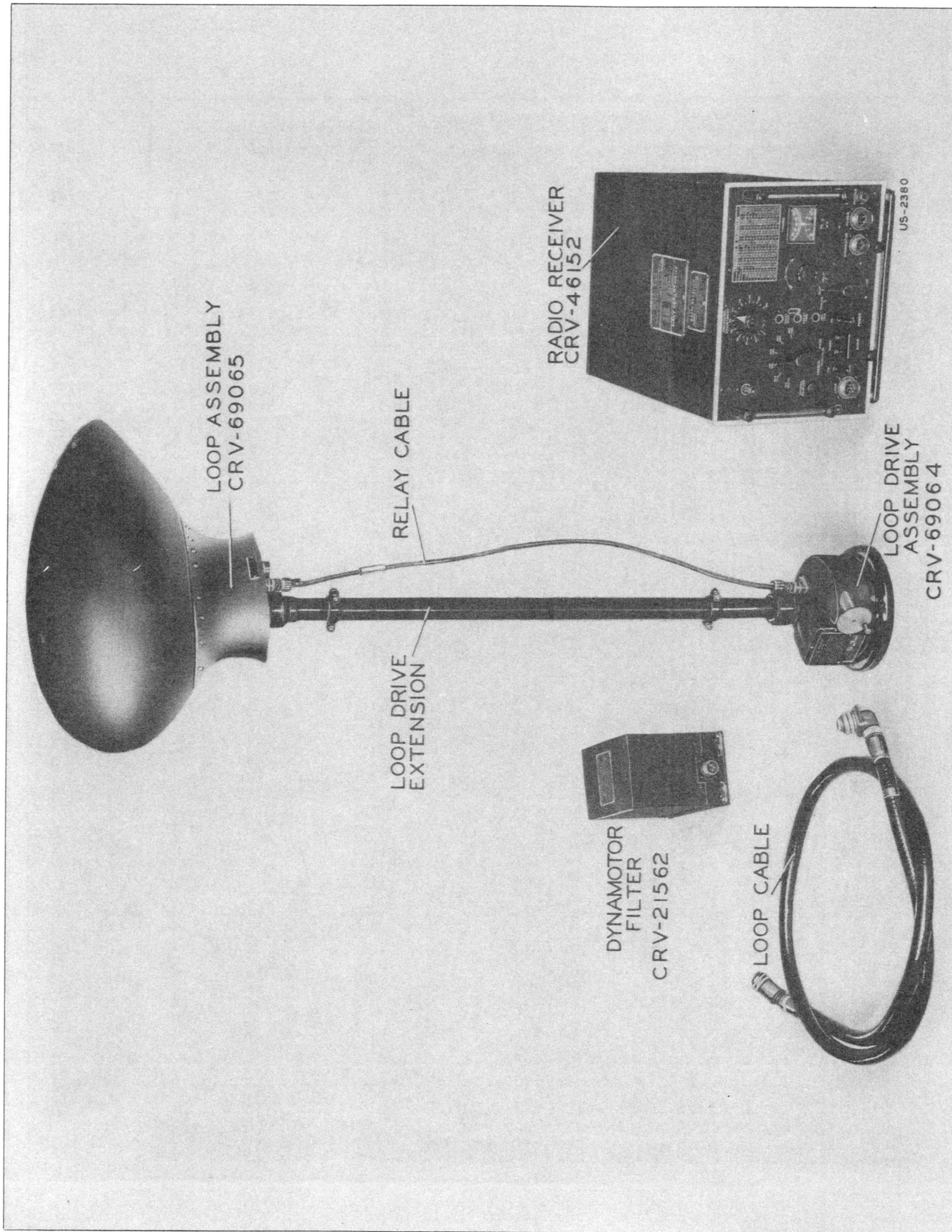


Figure 1—Model DZ-2 Aircraft Radio Direction Finder Equipment

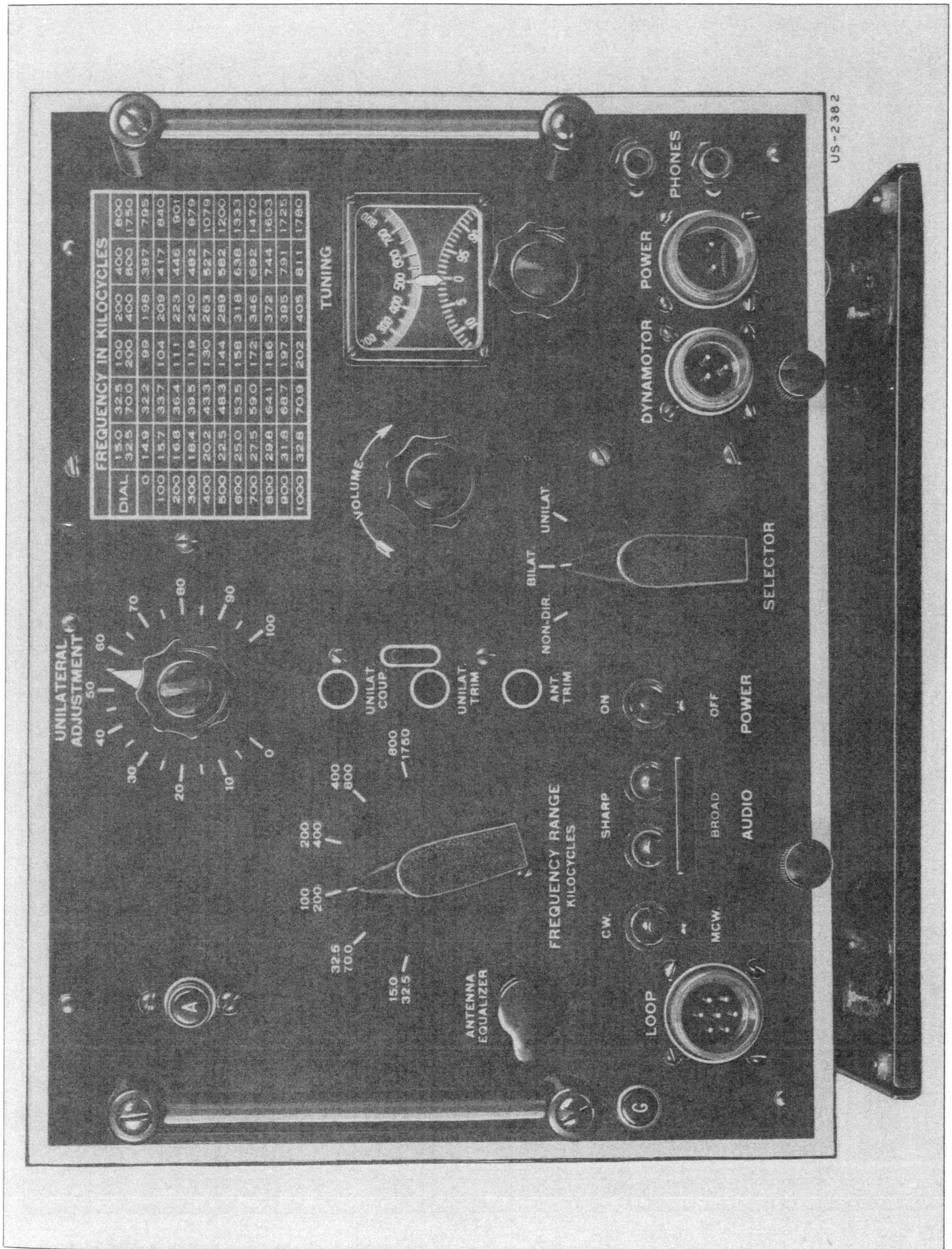


Figure 2—Receiver
(Front View)

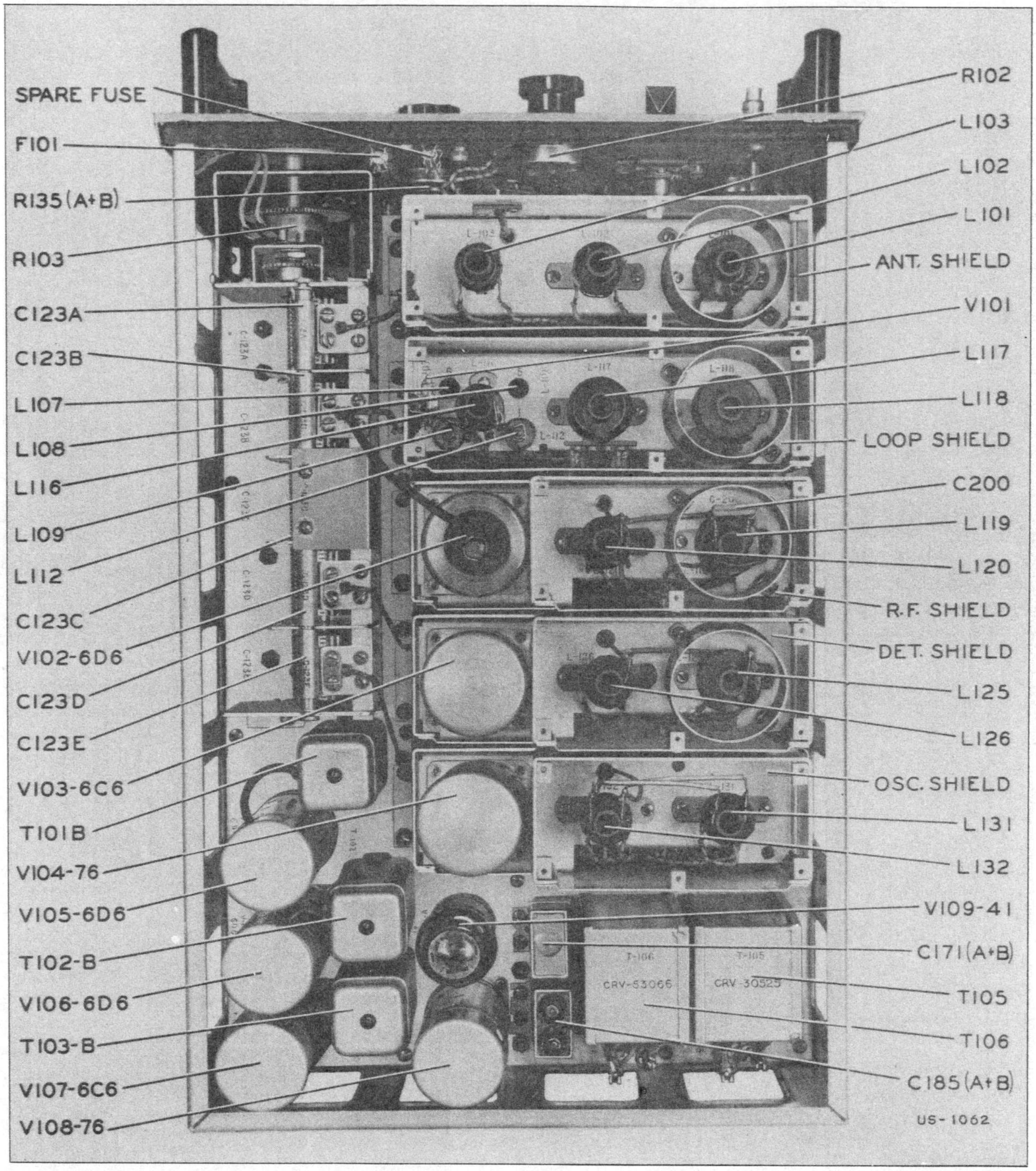


Figure 3—Receiver (Top View, Outer Case and Shield Covers Removed)

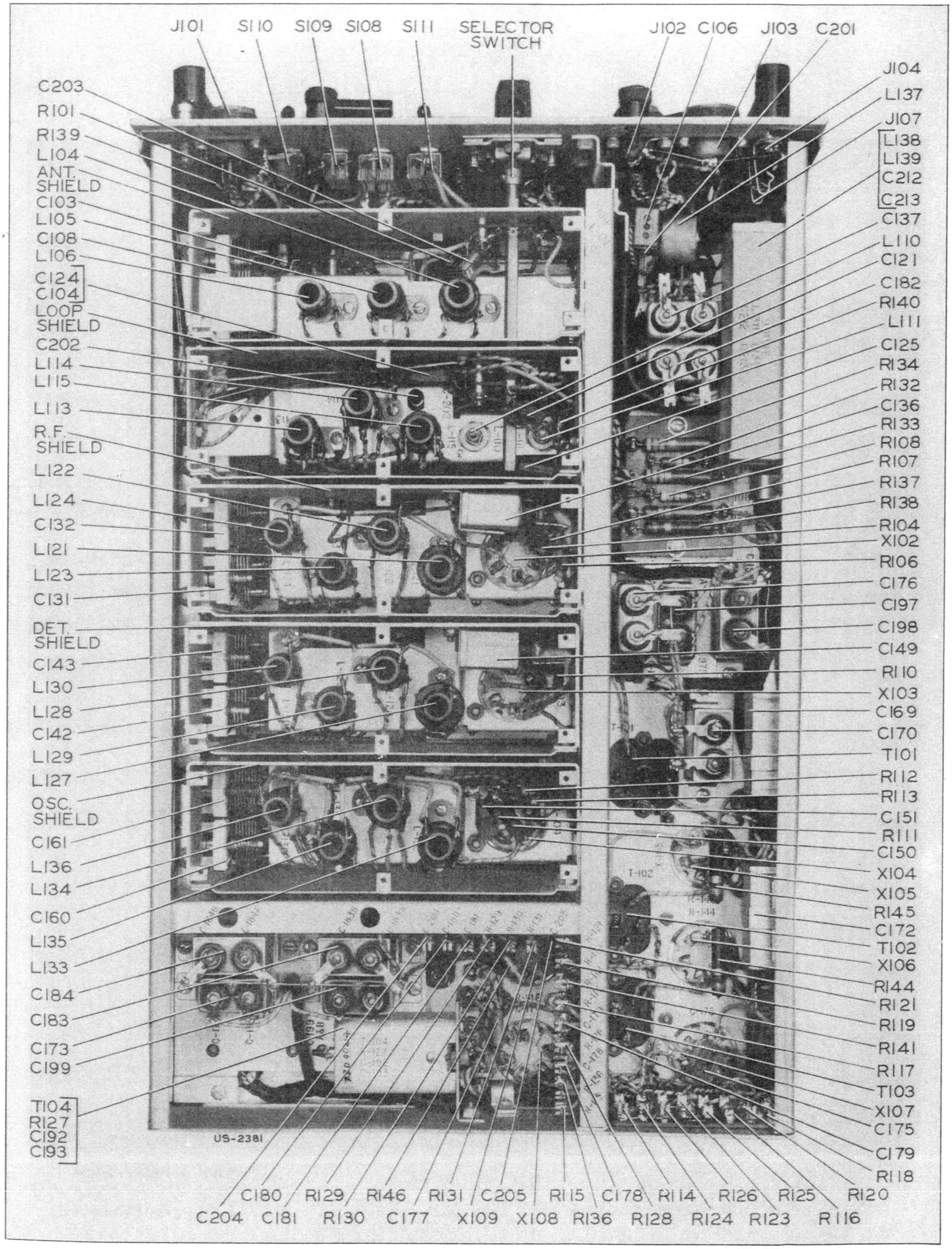


Figure 4—Receiver (Bottom View, Outer Case and Shield Covers Removed)

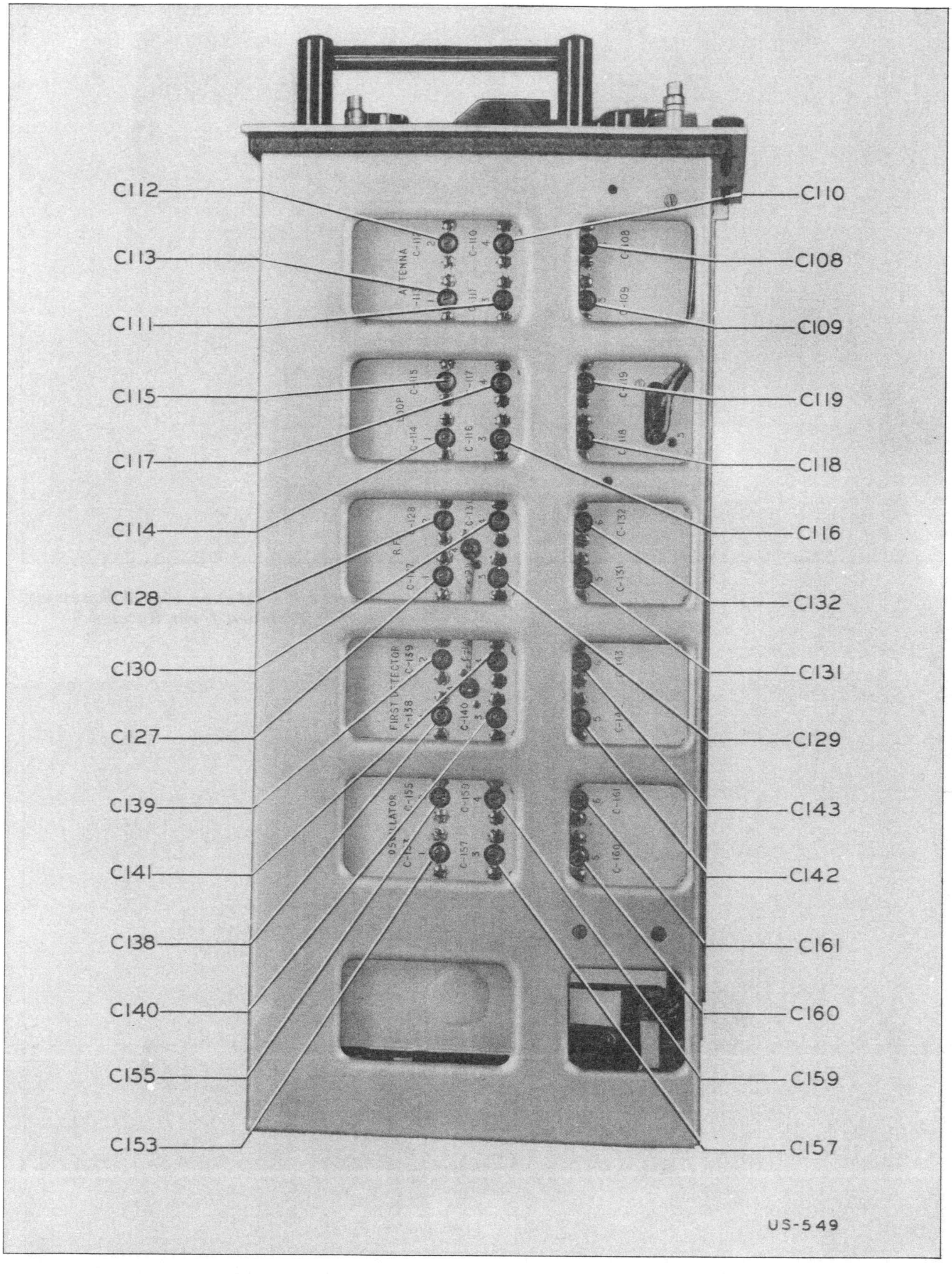


Figure 5—Receiver
(Side View, Outer Case Removed)

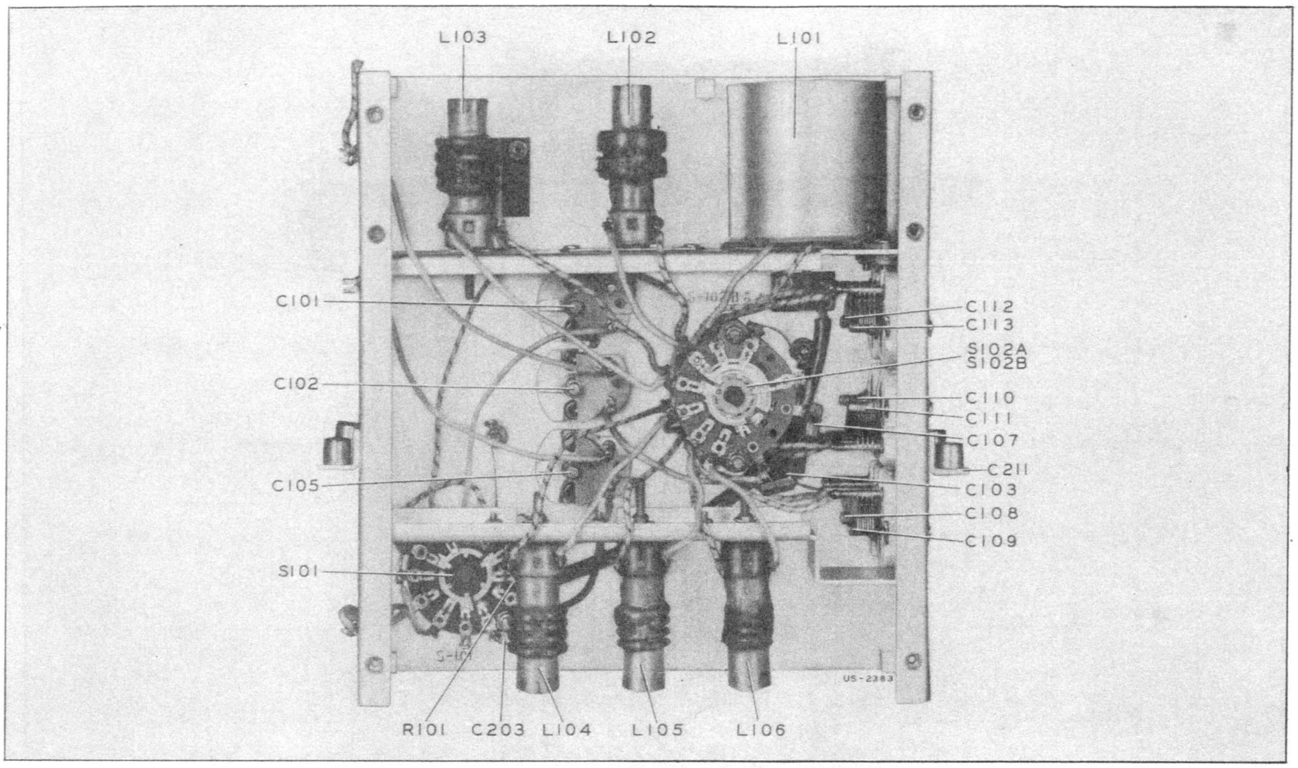


Figure 6—Antenna Shield Assembly (Removed from Receiver)

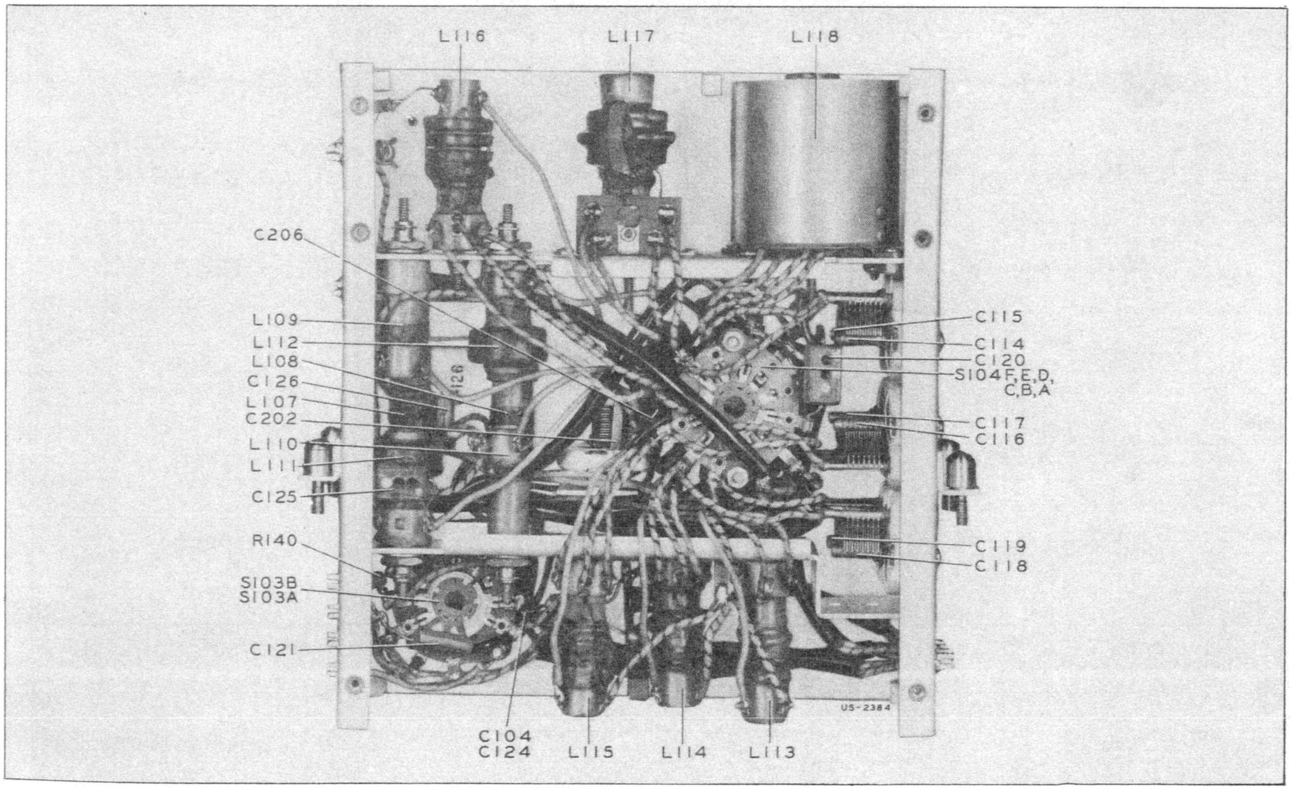


Figure 7—Loop Shield Assembly (Removed from Receiver)

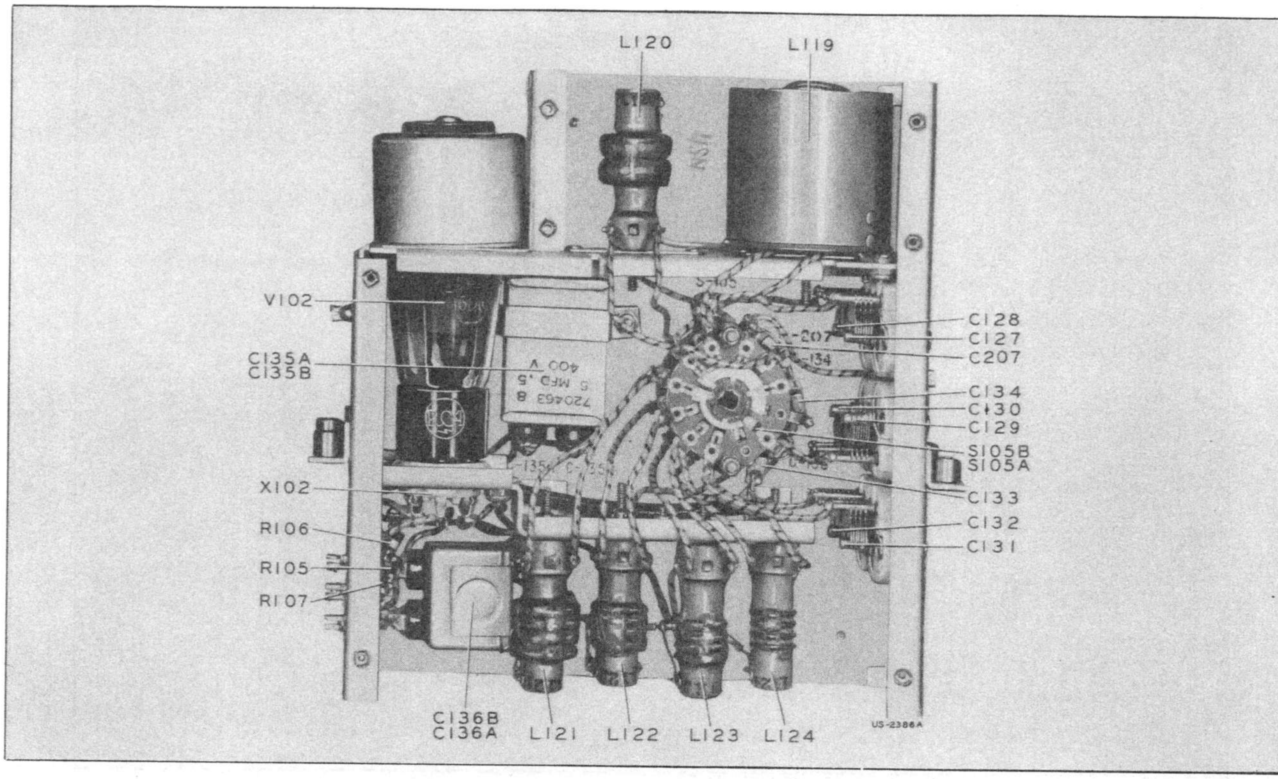


Figure 8—R-F Amplifier Shield Assembly (Removed from Receiver)

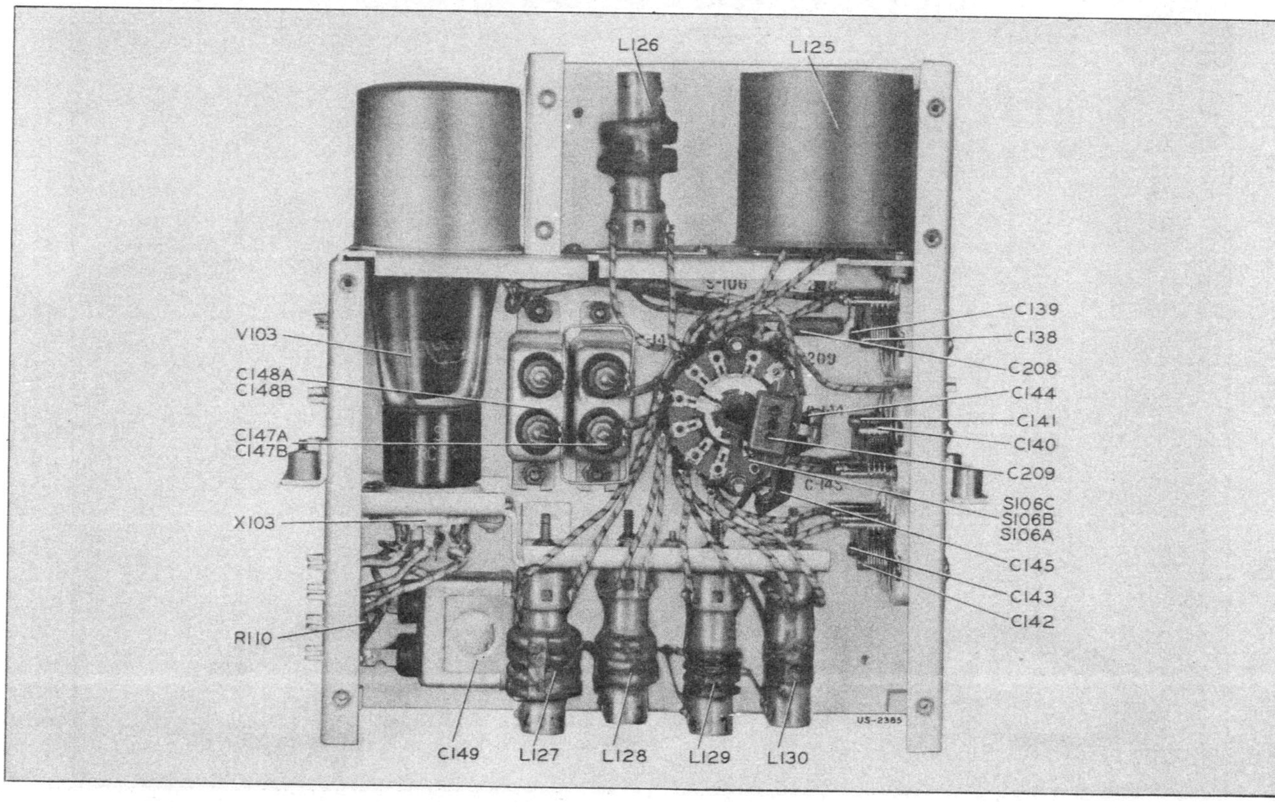


Figure 9—First Detector Shield Assembly (Removed from Receiver)

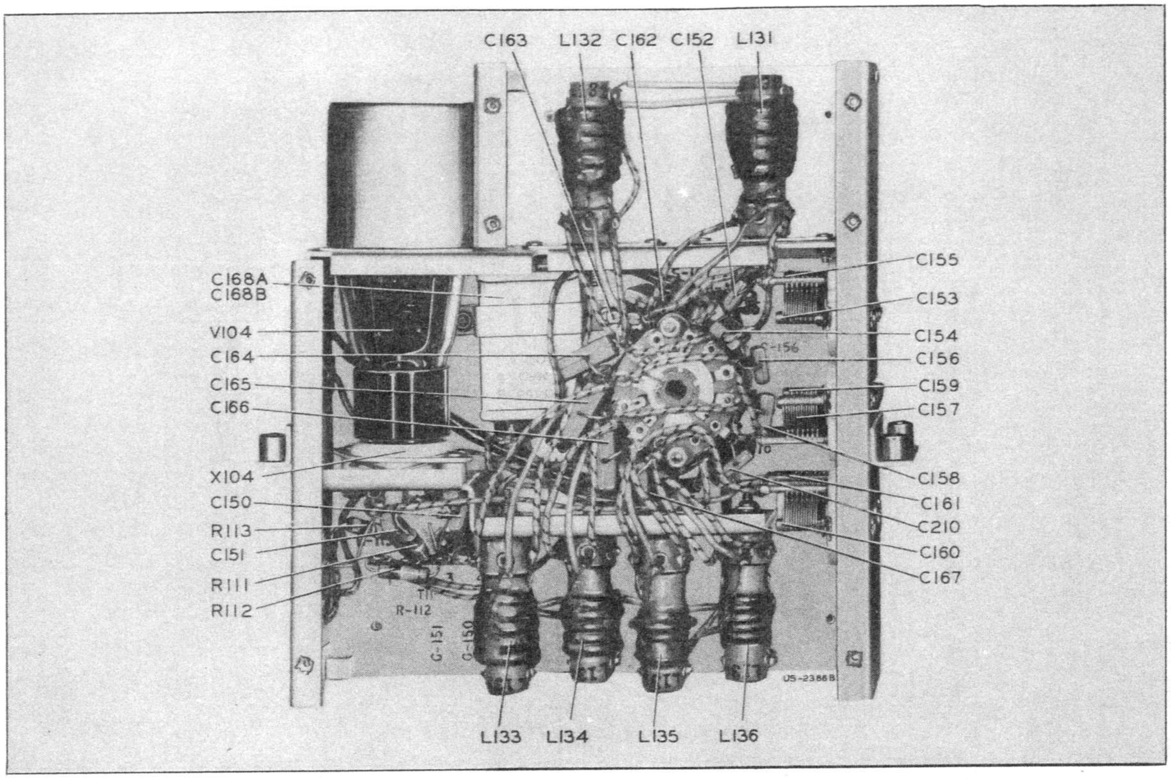


Figure 10—*Oscillator Shield Assembly (Removed from Receiver)*

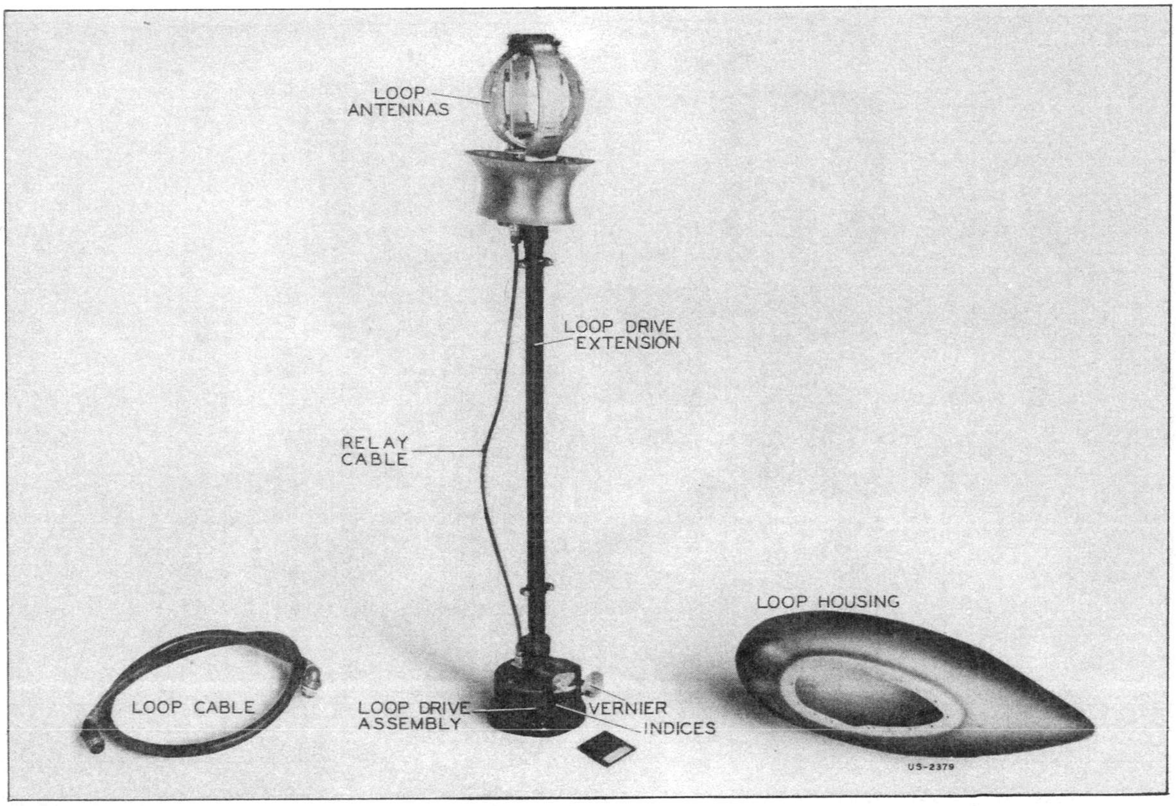


Figure 11—*Loop Antenna (Loop Housing and Scale Window Removed)*

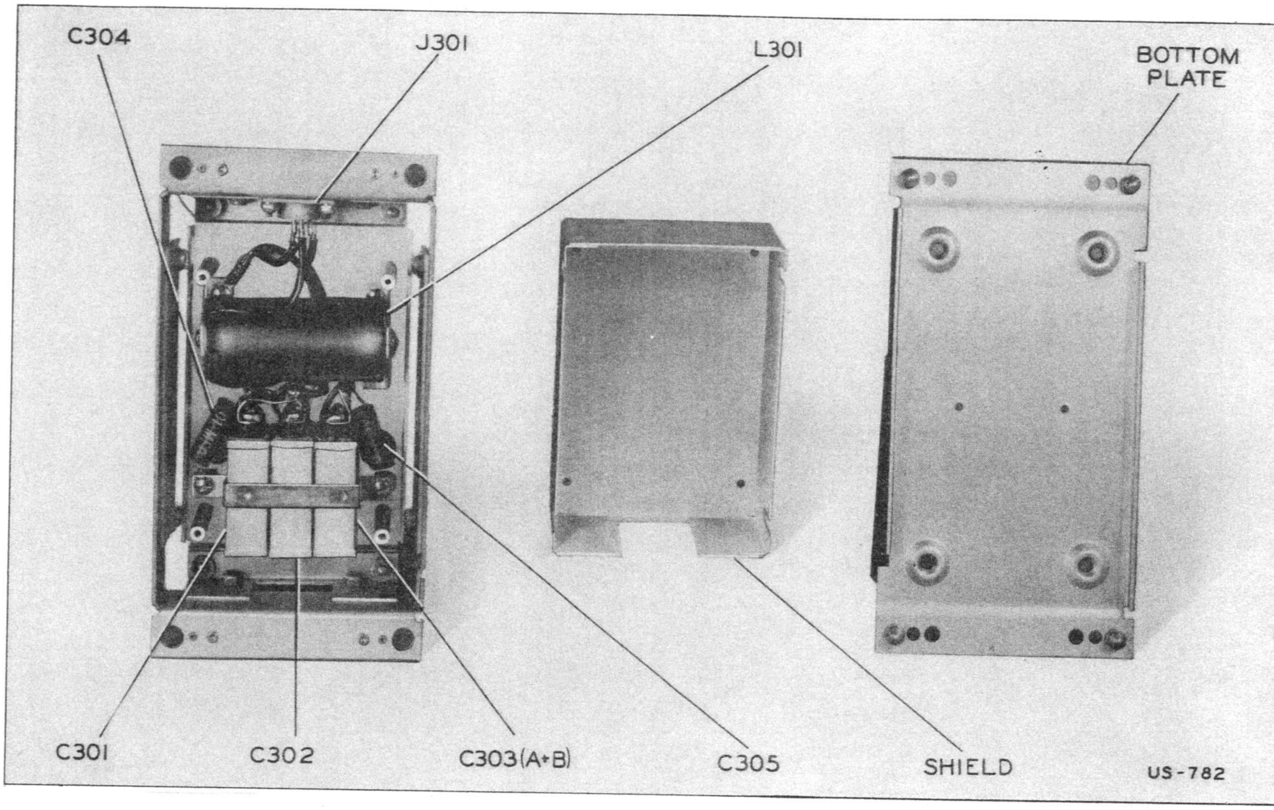


Figure 12—Dynamotor-Filter
(Bottom Cover and Shield Removed)

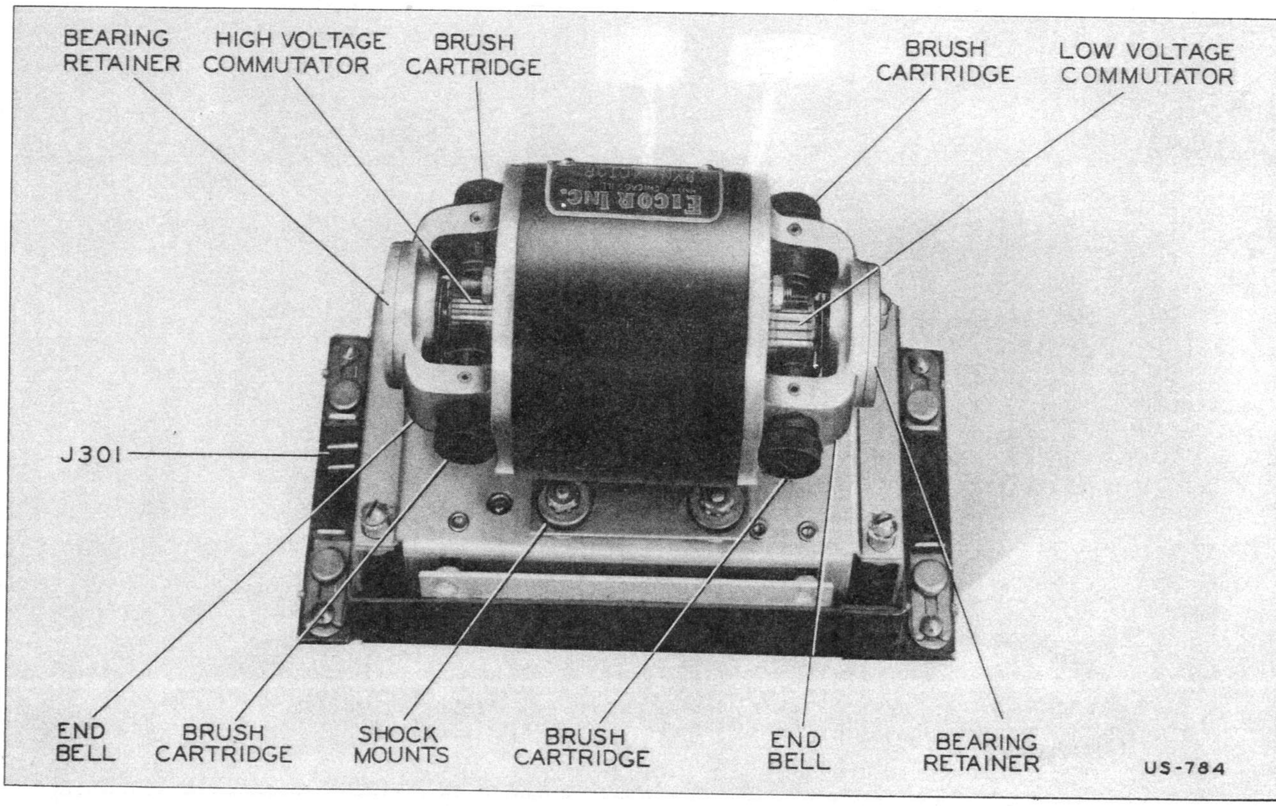


Figure 13—Dynamotor-Filter
(Shield and Dust Covers Removed)

Figure 16 not used

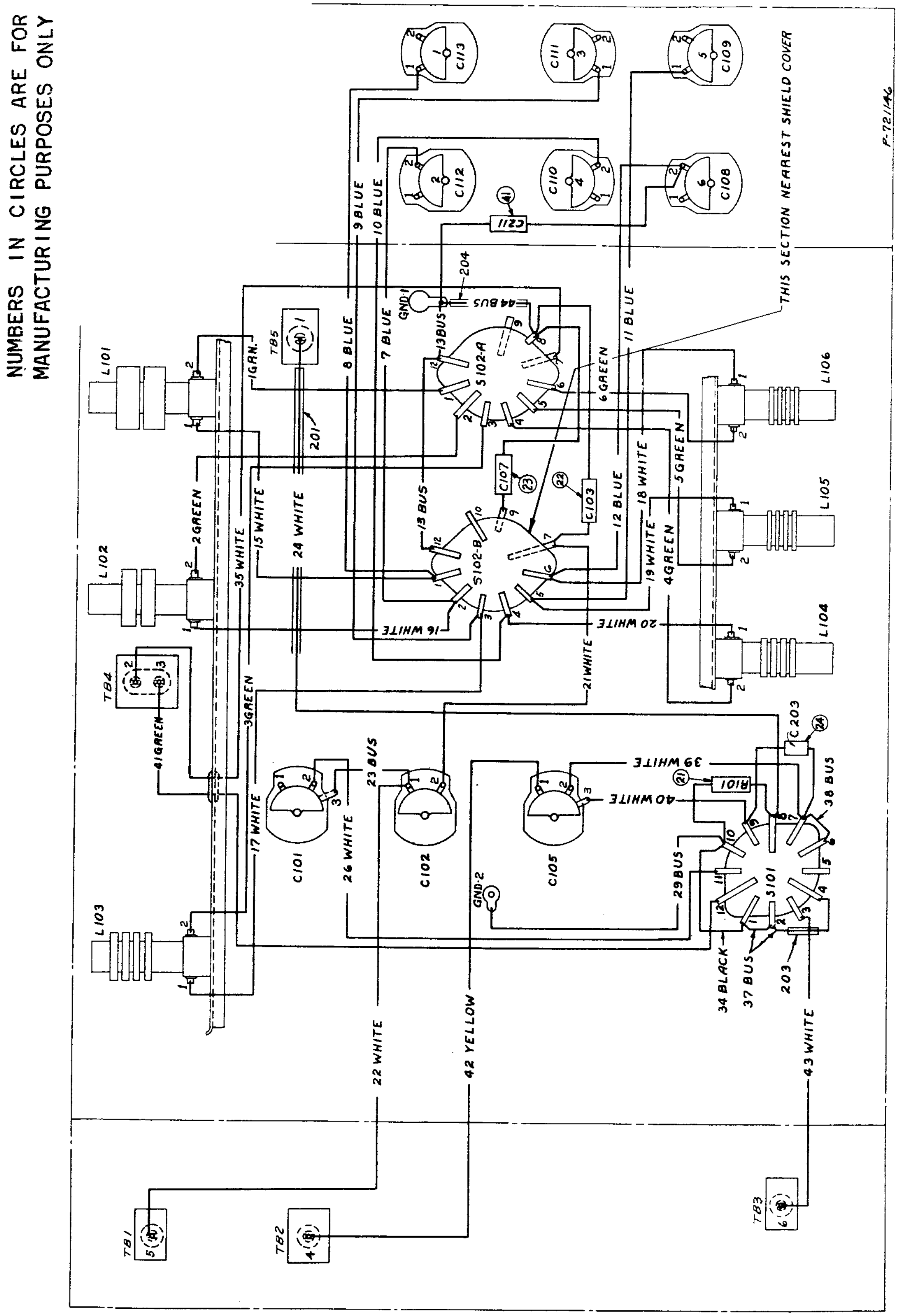


Figure 17—Antenna Shield Assembly (Connections, P-721146)

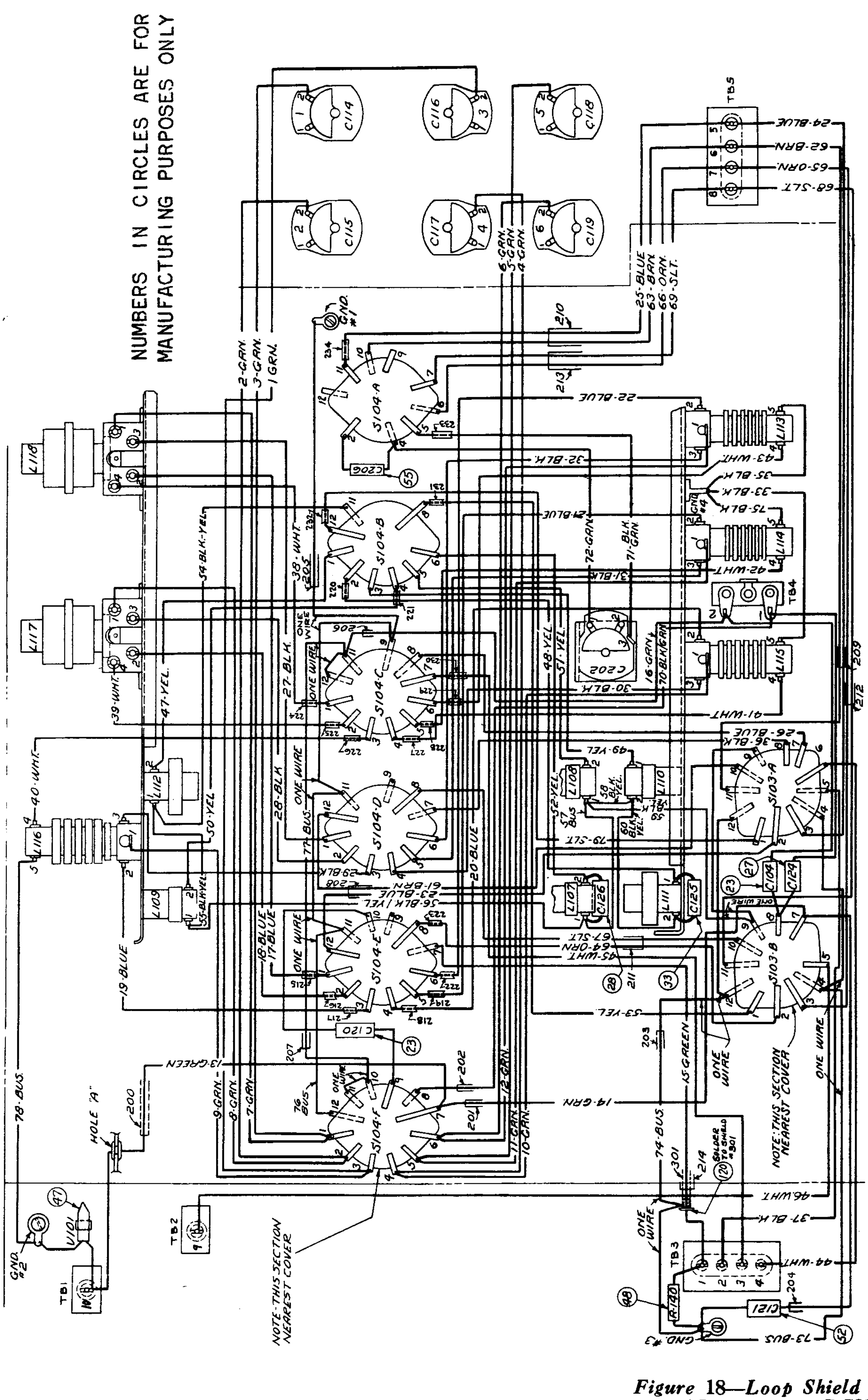


Figure 18—Loop Shield Assembly
(Connections, P-721147)

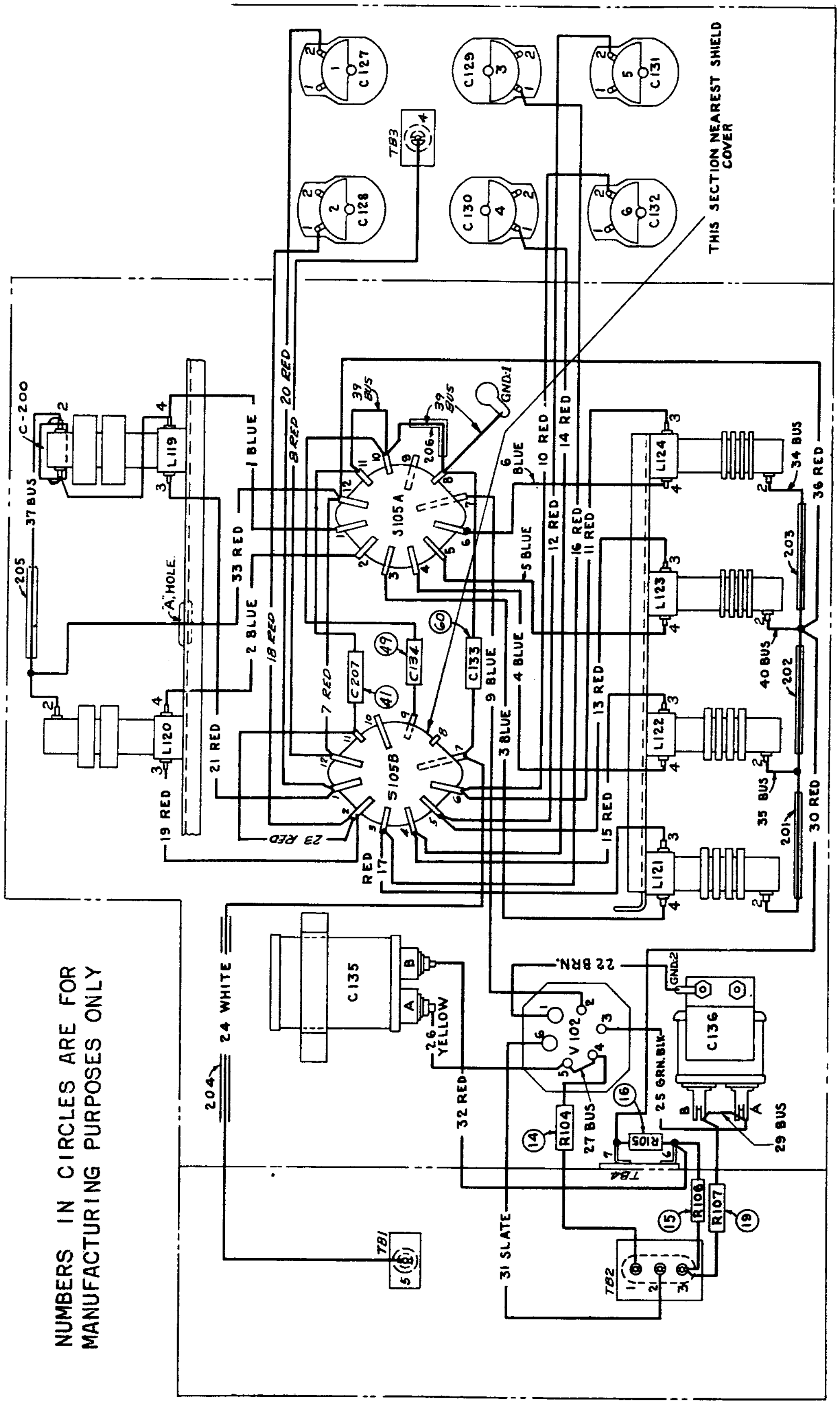


Figure 19—R-F Amplifier Shield Assembly (Connections, P-721149)

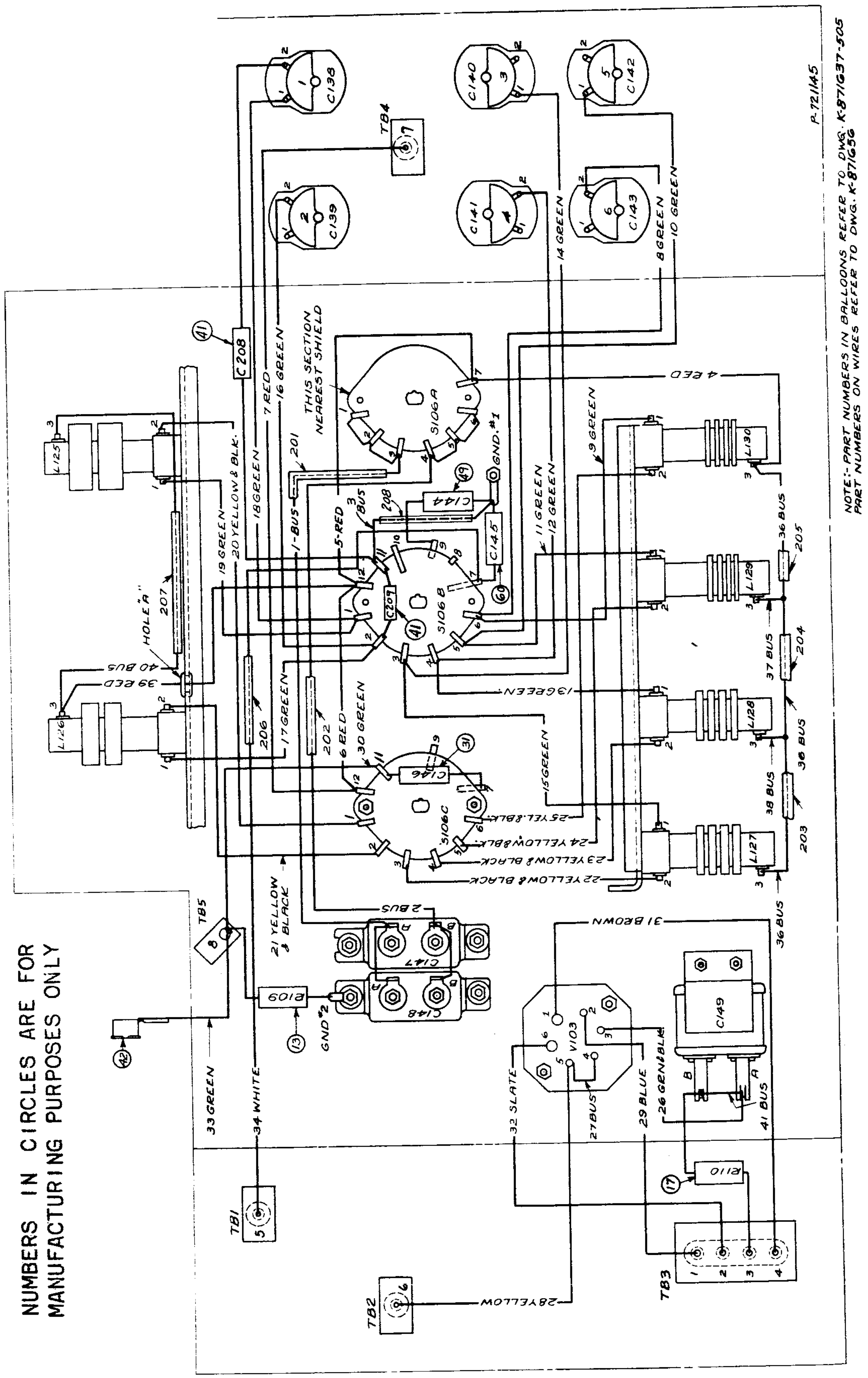


Figure 20—First Detector Shield Assembly (Connections, P-721145)

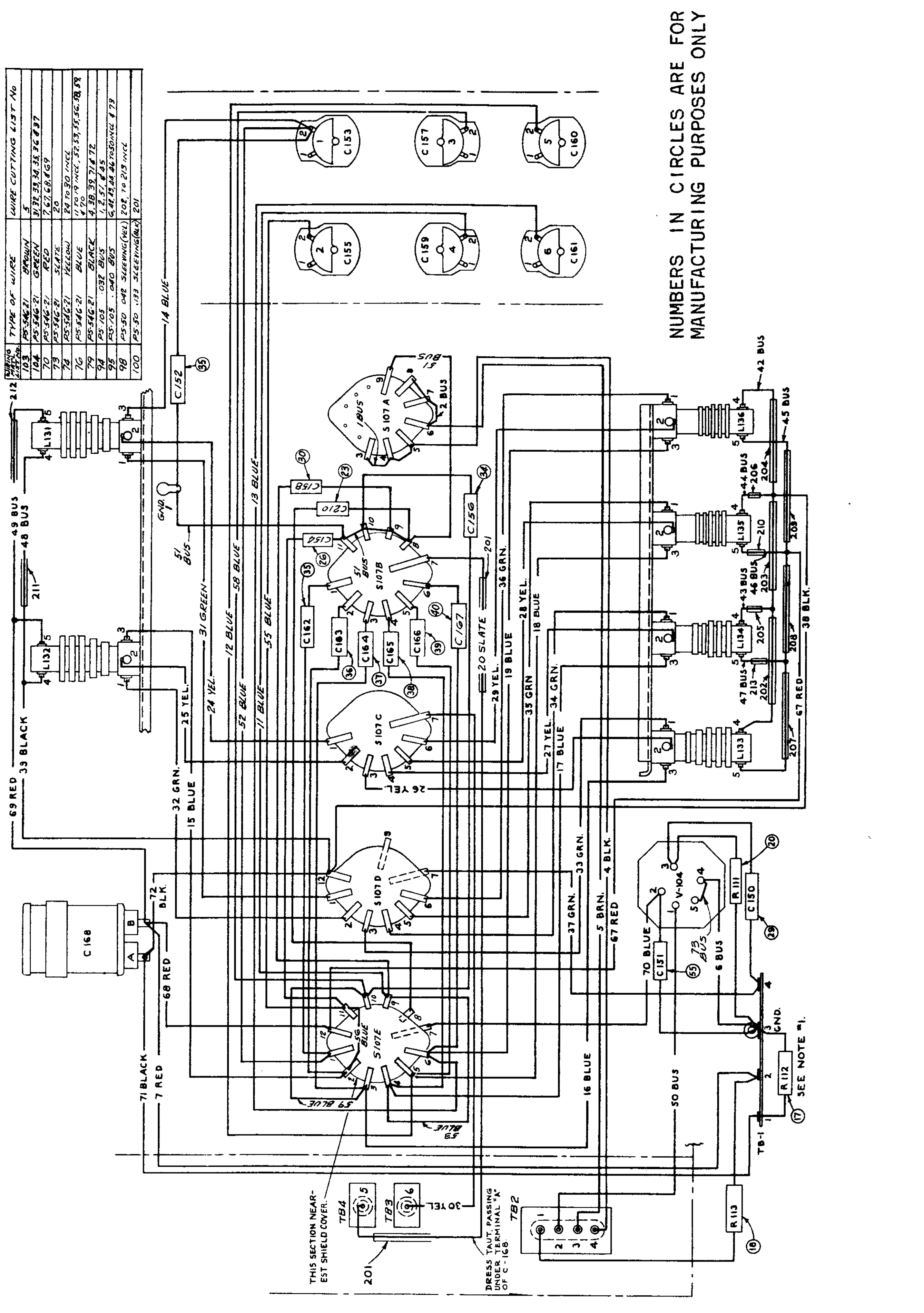


Figure 21—*Oscillator Shield Assembly (Connections, P-721148)*

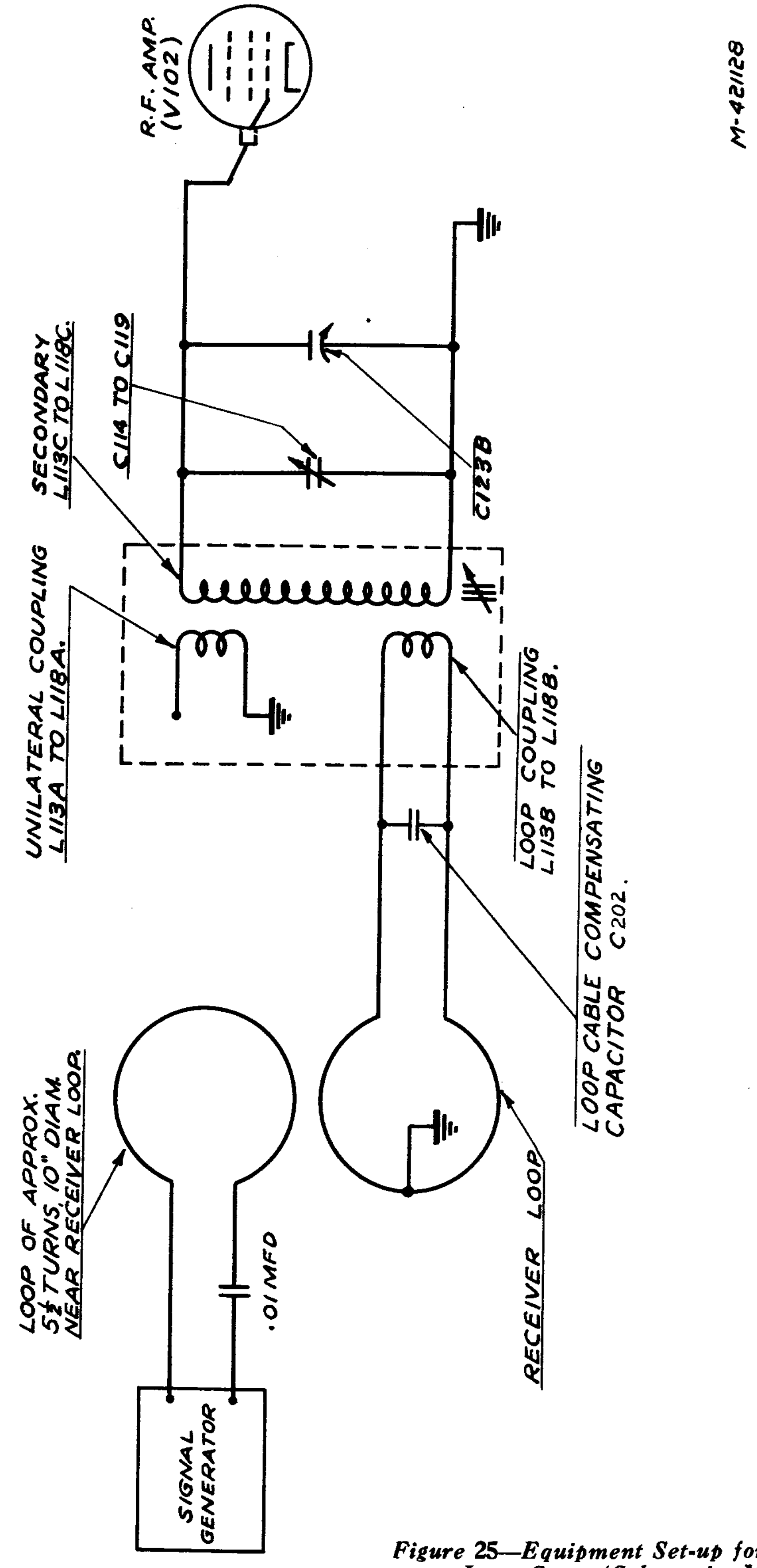


Figure 25—Equipment Set-up for Alignment of Loop Stage (Schematic, M-421128)

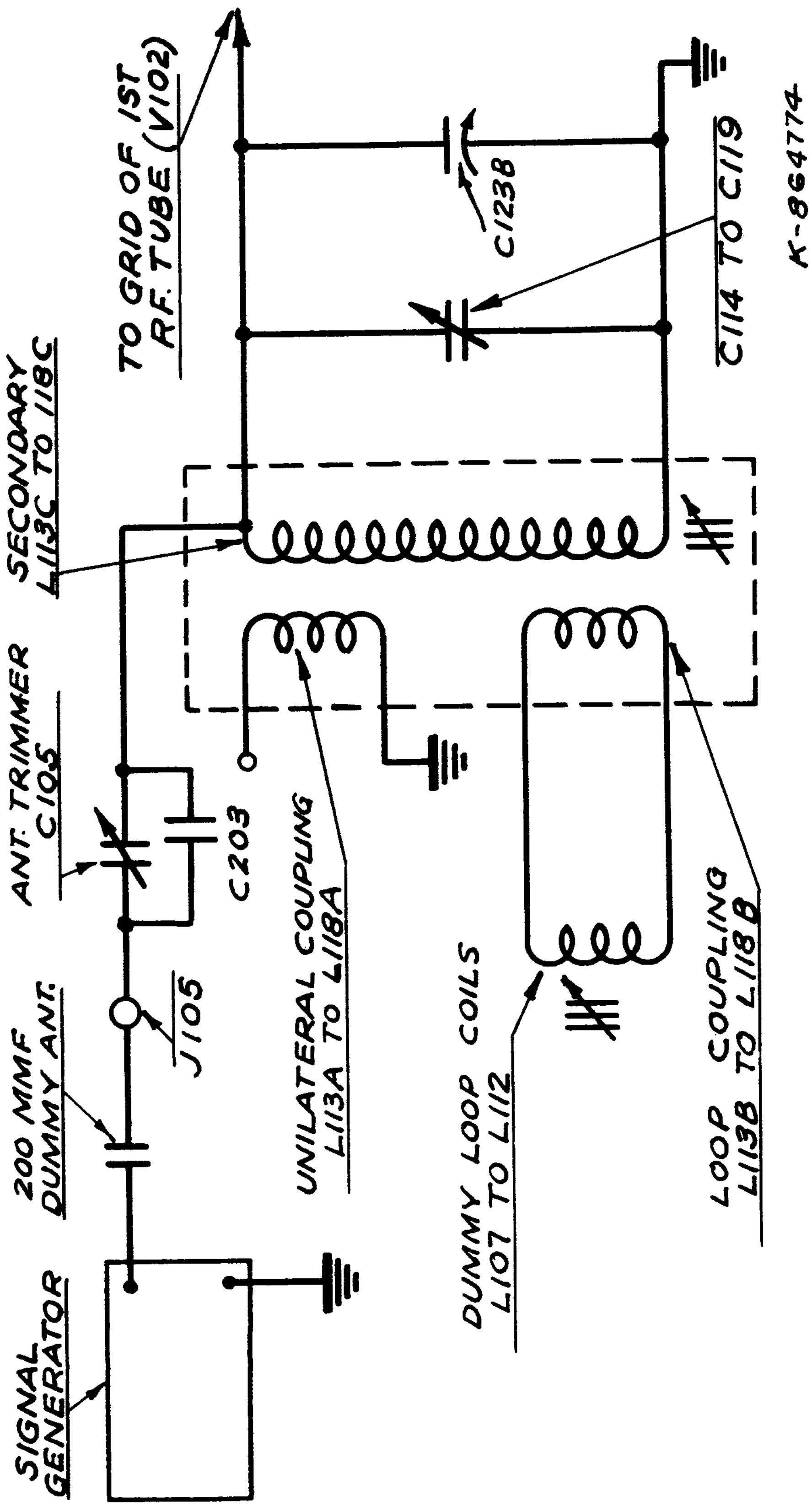


Figure 26—Equipment Set-up for Alignment of Dummy Loop Coils (Schematic, K-864774)

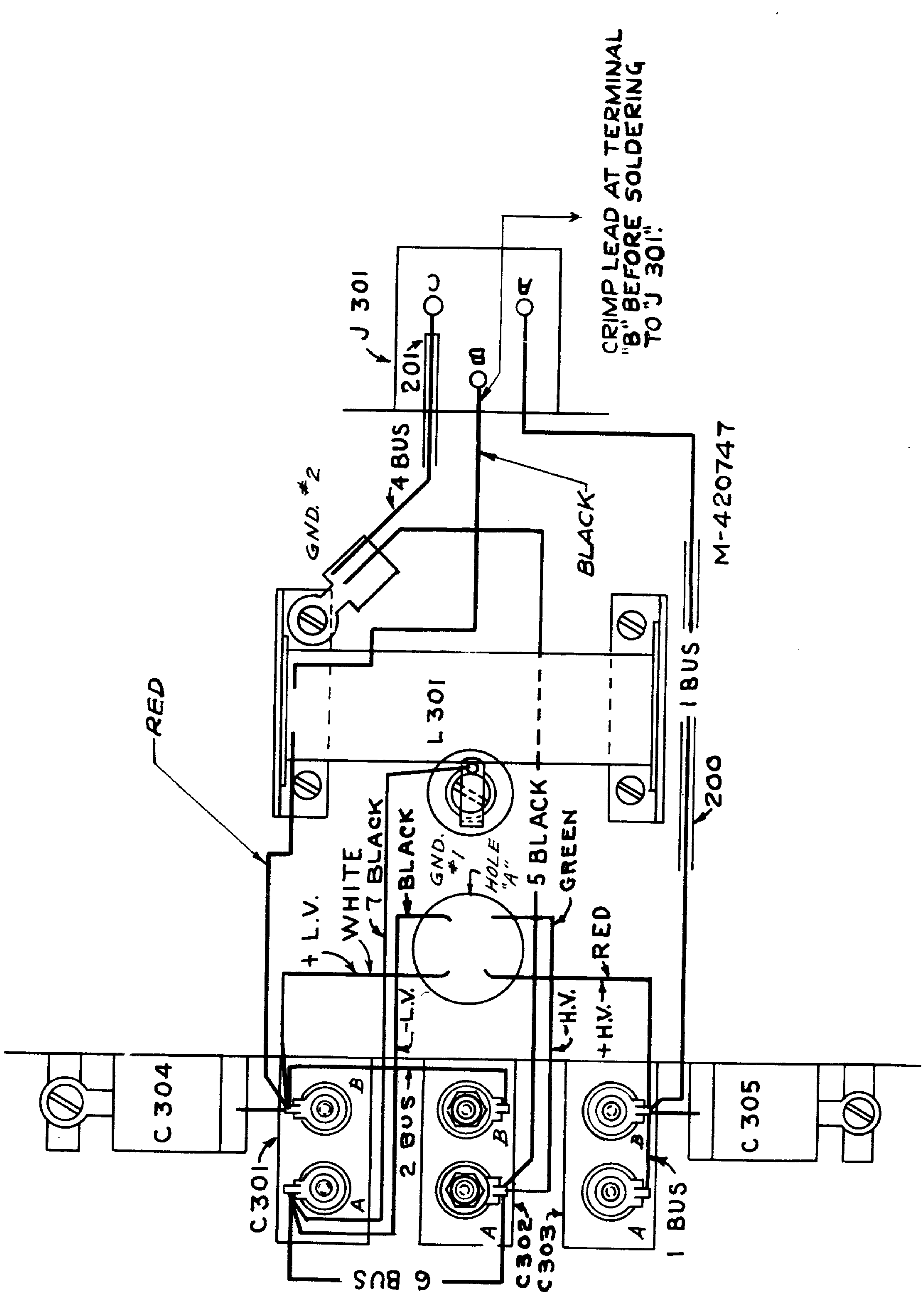


Figure 27—Dynamotor-Filter (Connections, M-420747)

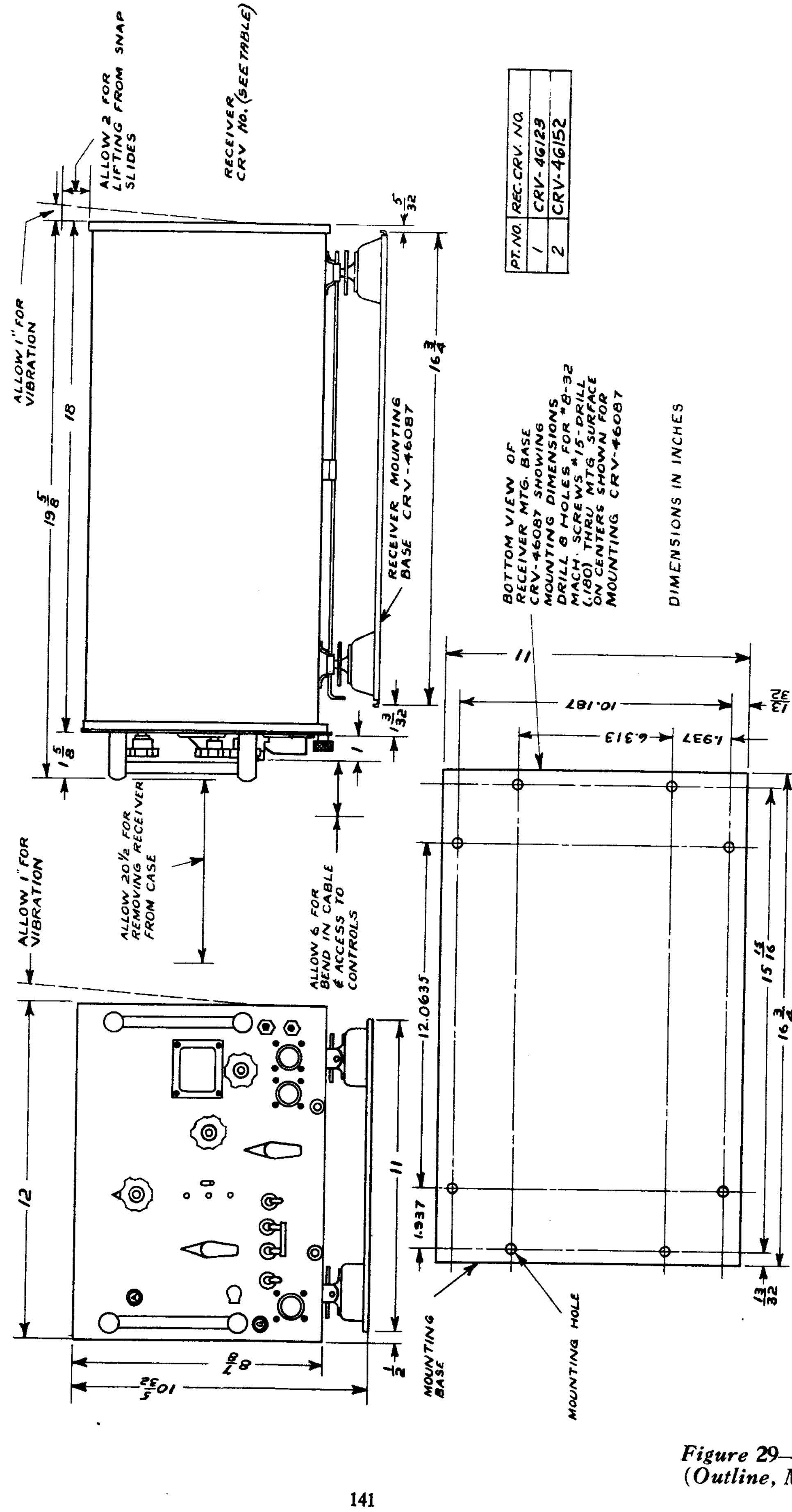


Figure 29—Receiver
(Outline, M-421233)

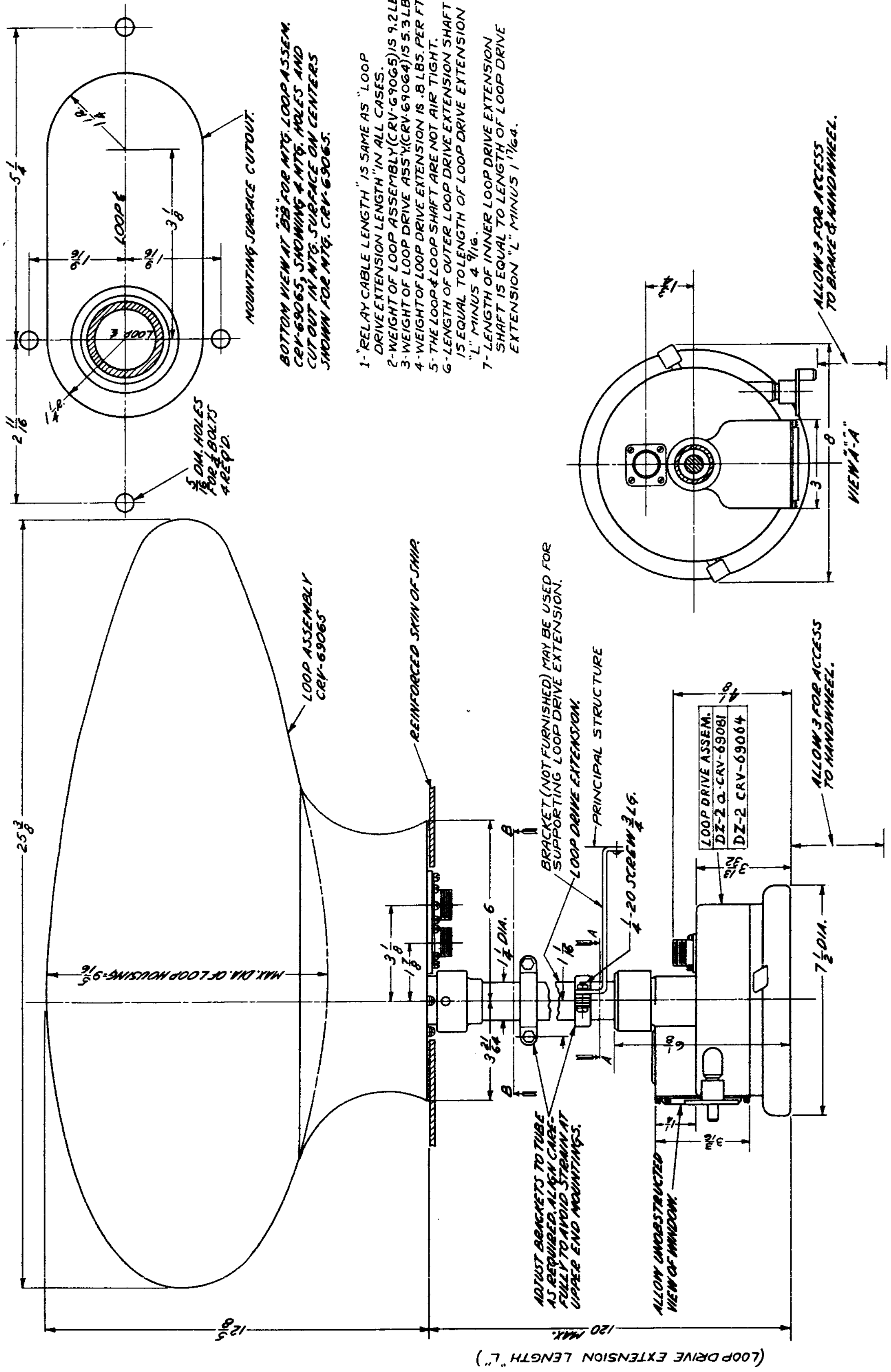


Figure 30—*Loop Antenna and Loop Drive Assembly* (*Outline*, P-721646)

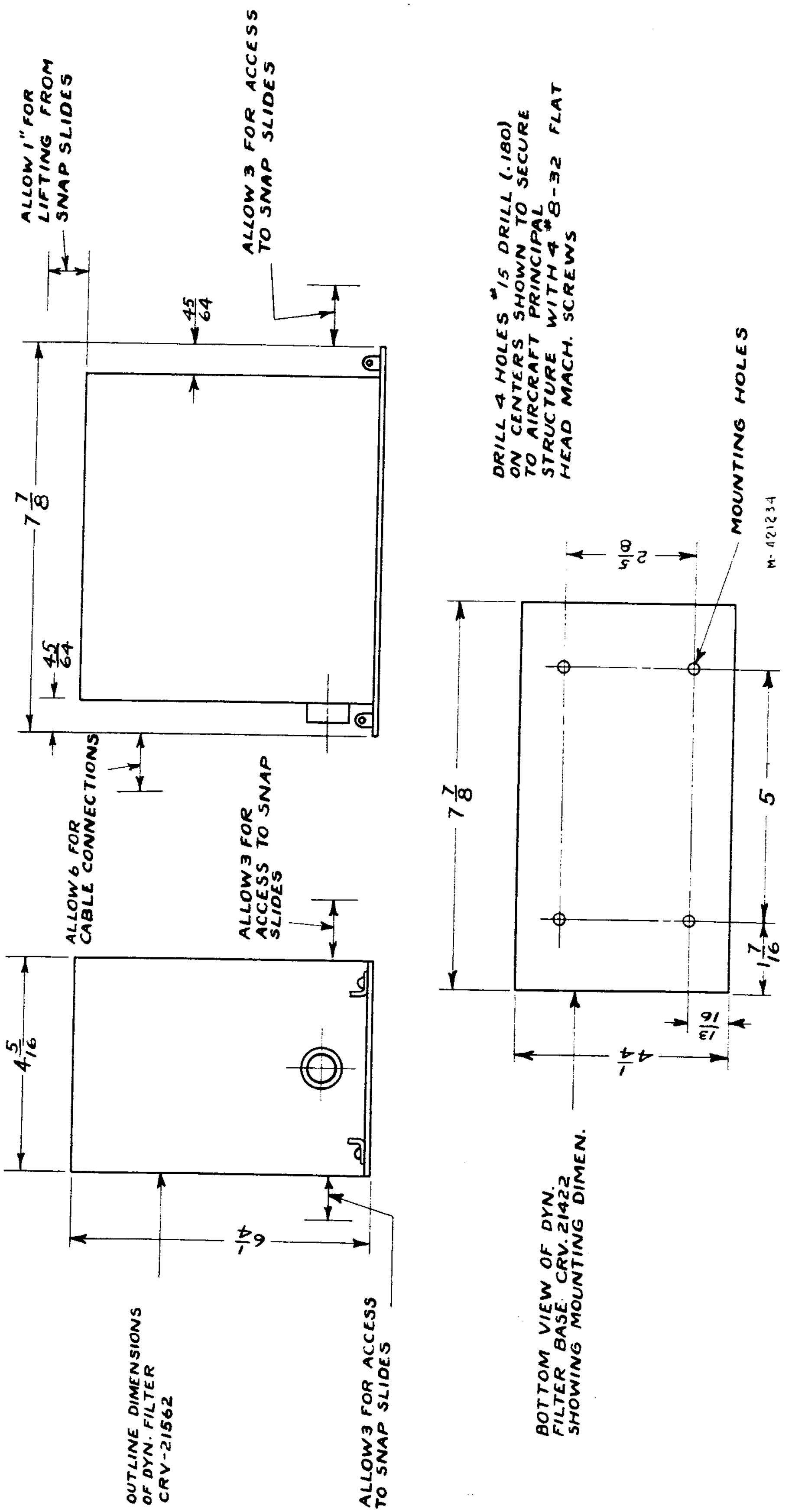


Figure 31—*Dynamotor-Filter* (*Outline*, *M*-421234)

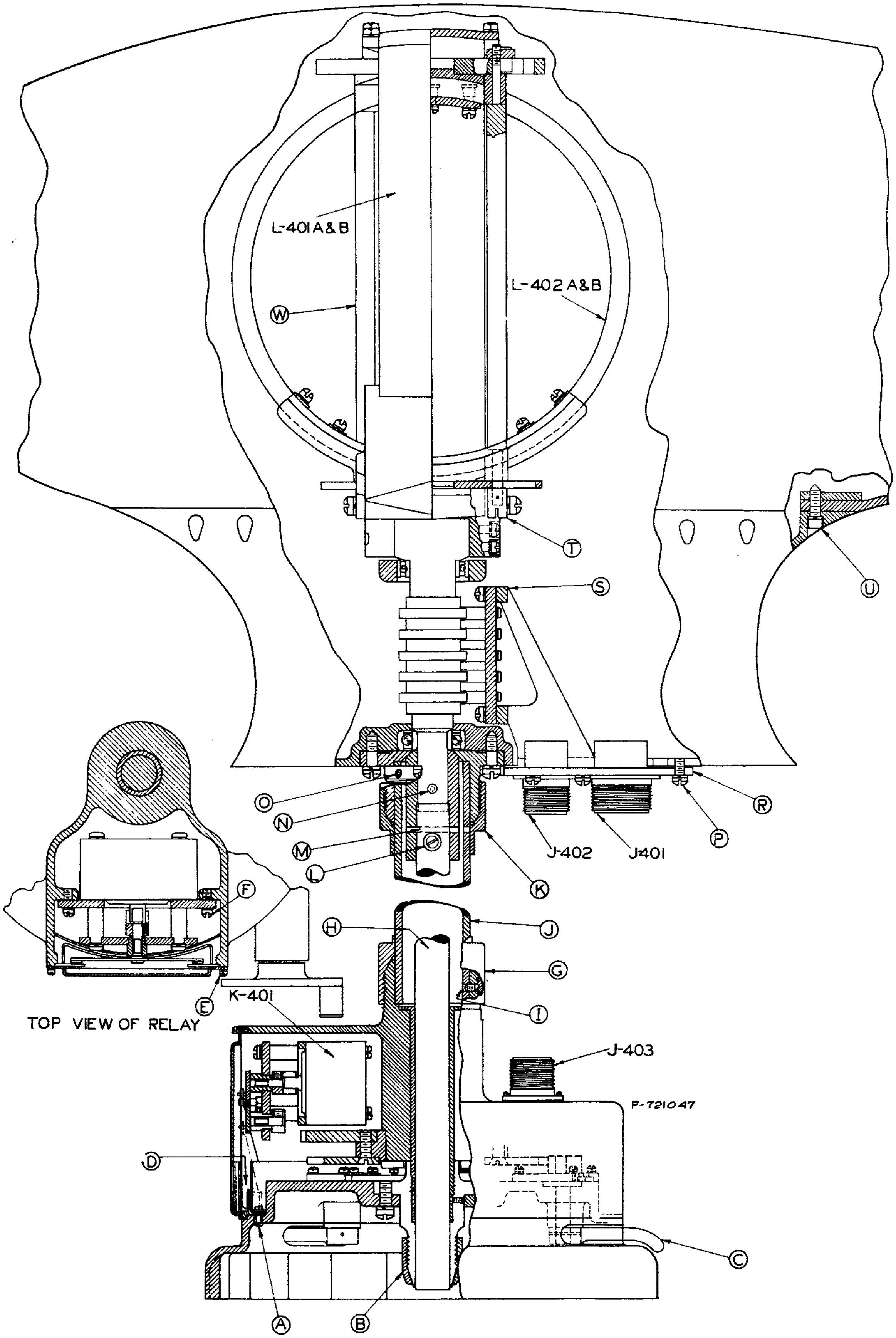


Figure 32—Loop Drive and Loop Antenna Assembly (P-721047)

PROCEDURE FOR FABRICATING RELAY CABLE

(A) CUT COMPLETELY AROUND VINYLITE COATING OF CABLE 1-1/8" FROM EACH END BEING CAREFUL NOT TO CUT INTO TINNED COPPER BRAID.

(B) REMOVE VINYLITE COATING FROM CABLE BY PEELING TOWARD OUTER END.

(C) CUT COMPLETELY AROUND AND REMOVE TINNED BRAID 1" FROM EACH END OF CABLE, LEAVING 1/8" OF BRAID EXTENDING BEYOND OUTER VINYLITE COATING. CUT OFF FRAYED COTTON COVERING.

(D) STRIP AND TIN END OF EACH LEAD FOR 3/16".

(E) SLIDE (ITEM 4) CLAMP END FIRST, ONTO CABLE, FOLLOW WITH WASHER (ITEM 9).

(F) PLACE (ITEM 10), COUNTER-SUNK SIDE FIRST, OVER BRAID.

(G) TURN BRAID AGAINST OUTER SURFACE OF WASHER (ITEM 10) AND SOLDER. TRIM OFF BRAID EXTENDING BEYOND CIRCUMFERENCE OF WASHER.

(H) UNSCREW EXTENSION OF CONNECTOR (ITEM 3) AND SLIDE EXTENSION AND COUPLING NUT OF (ITEM 3) OVER CABLE.

(I) SOLDER WHITE LEAD TO CONNECTOR TERMINAL "A", AND BLACK LEAD TO CONNECTOR TERMINAL "B".

(J) INSERT (ITEM 12) BETWEEN TERMINALS OF CONNECTOR (ITEM 3) AND WRAP AROUND THESE TERMINALS INSULATING THEM FROM EACH OTHER AND FROM (ITEM 3) EXTENSION.

(K) PLACE "C" WASHER (ITEM 11) BETWEEN CONNECTOR AND WASHER (ITEM 10), AND SCREW EXTENSION BACK ON CONNECTOR.

(L) SCREW CABLE CLAMP (ITEM 4) ONTO EXTENSION OF CONNECTOR AND TIGHTEN CLAMP SCREW (ITEM 8), ANCHOR THE CLAMP SCREW WITH (ITEM 5).

(M) WRAP CABLE MARKER (ITEM 5) AROUND CABLE IN POSITION SHOWN, THREADING TABS THROUGH SLOTS OF CABLE MARKER AND BENDING TABS BACK.

M-427652

(N) CUT OFF TAB ENDS, ALLOWING 1/4" TO BEND BACK.

(O) ANCHOR WITH (ITEM 6).

THE FOLLOWING TOOLS ARE REQUIRED:

- HACKSAW WITH FINE TOOTH BLADE
- SOLDERING IRON
- PLIERS (LONG NOSE)
- WIRE STRIPPING TOOL
- SHARP KNIFE
- FILE

ITEM	RCA REFERENCE	OTHER REFERENCE	DESCRIPTION
2	M-440550-14		2 CONDUCTOR AWG #18, EACH 37 TO 41 STRANDS AWG #34 BARE COPPER WIRE VINYLITE INSULATED, COTTON BRAID COVERED, TINNED COPPER BRAID SHIELD, COVERED BY VINYLITE O.D. 0.281" +0.005" -0.010", BLACK, SUPPLIED IN 36-1/2" LENGTH.
3	K-856849-7	AMER. PHENOLIC CORP. 12S-3S	CONNECTOR (ALUM.-ALLOY BODY, 5/8" X 24" THREADS).
4	K-880987-1	AMER. PHENOLIC CORP. CAT. NO. 9771	CABLE CLAMP (MAX. CABLE 5/16" DIA., 5/8" X 24" THREADS).
5	24840-4		CABLE MARKER (NAMEPLATE).
6			SOLDER (KESTER ROSIN CORE 50% TIN-50% LEAD).
7	NOT USED		
8	K-57431-5		GLYPTAL CEMENT (#1276).
9	K-76711-25		WASHERS, BRASS, 5/16" I.D. X 9/16" O.D.
10	K-880994-1		WASHER, BRASS, 0.260" I.D., 7/16" O.D. ONE SIDE COUNTER-SUNK.
11	K-880996-1		WASHER, BRASS, "C", 5/16" I.D., X 9/16" O.D.
12	PS-74		FISH PAPER 3/8" X 2".

M-427652

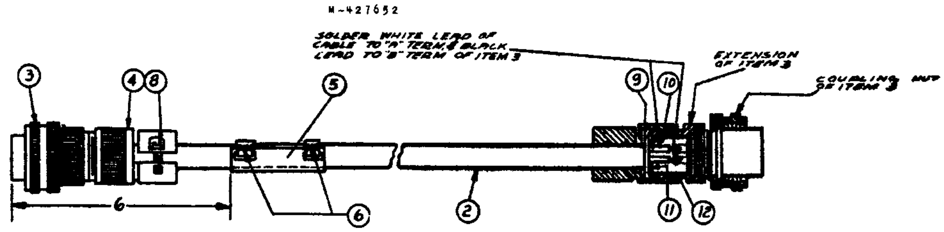
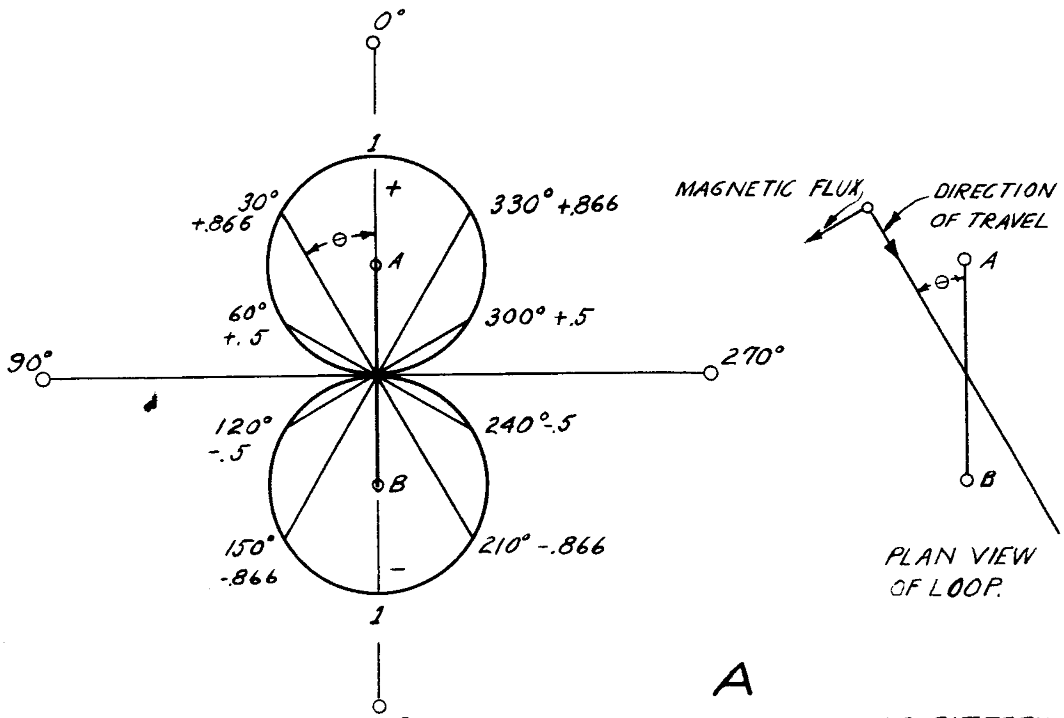
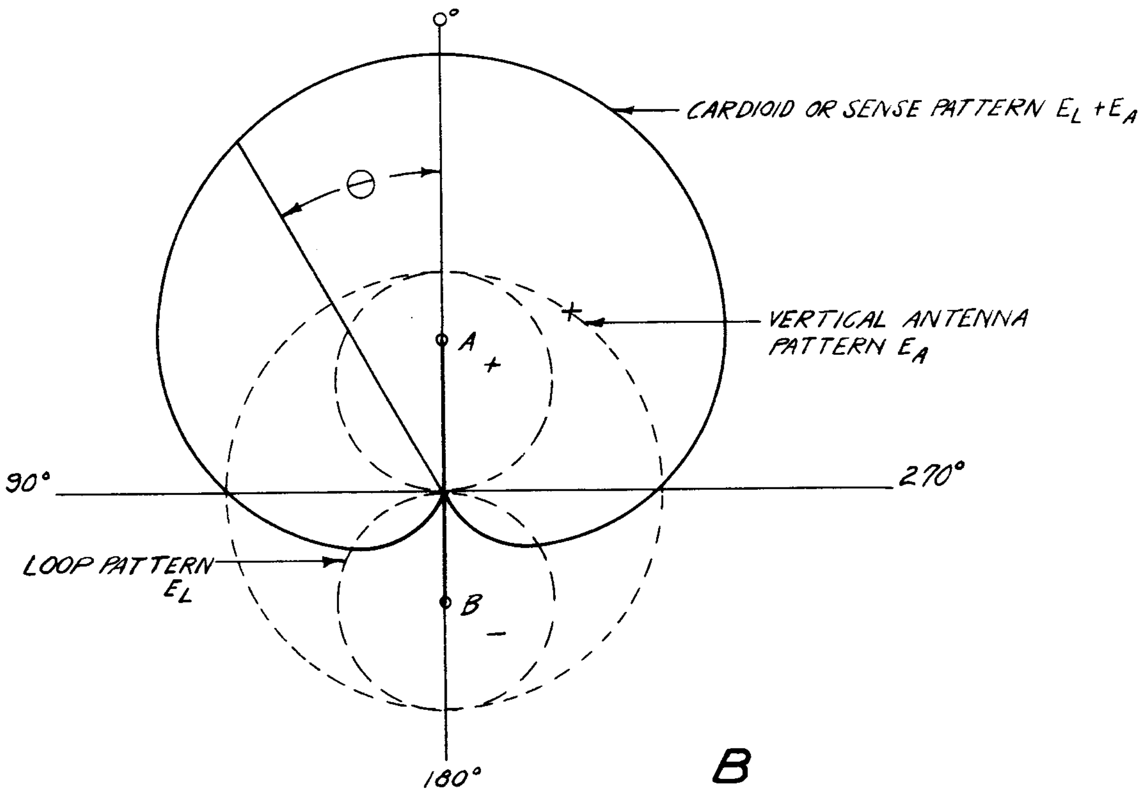


Figure 36—Relay Cable Assembly (M-427652)

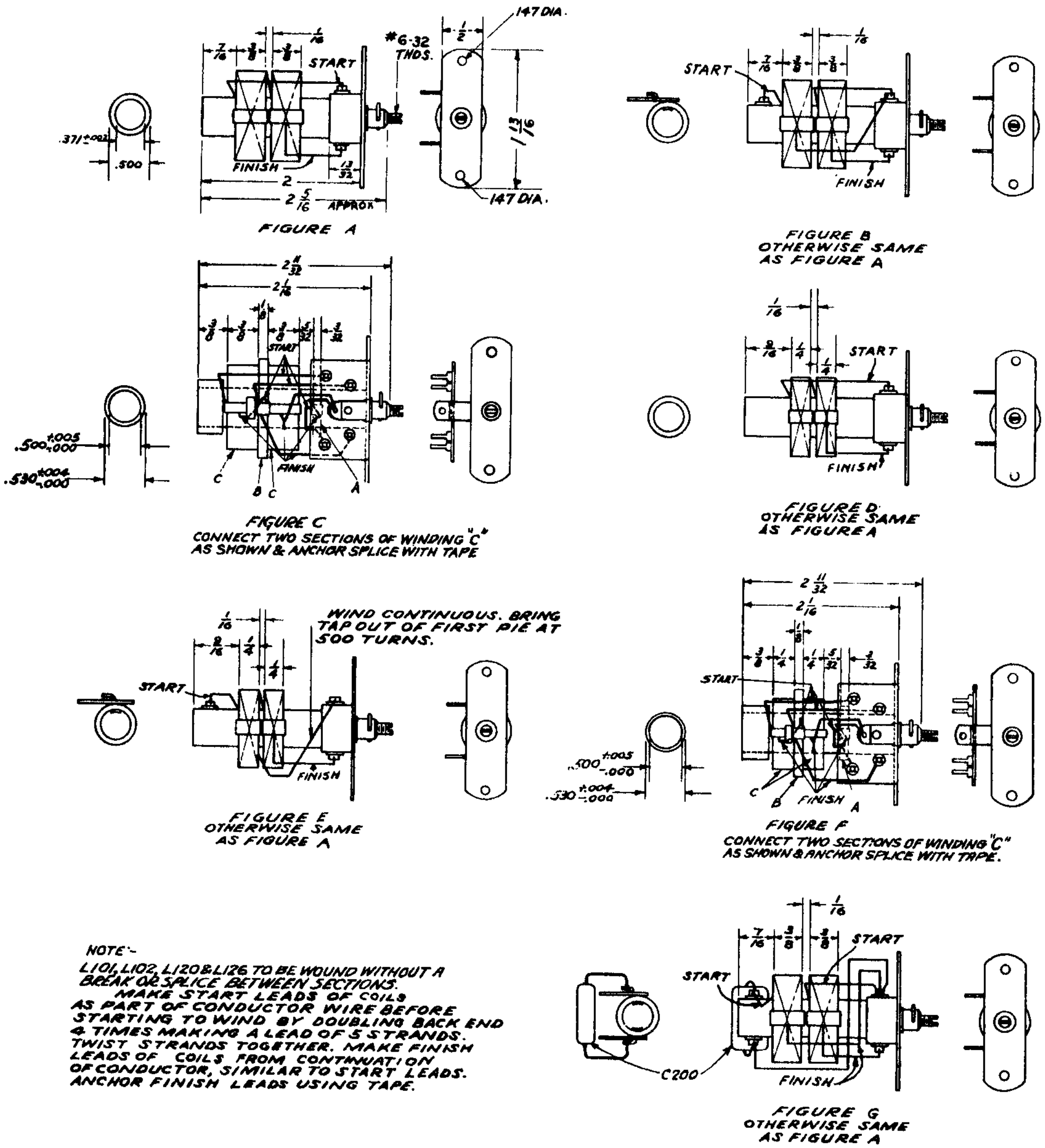


POLAR DIAGRAM SHOWING LOOP PATTERN AS USED FOR BEARING DETERMINATION.



CARDIOID OR HEART-SHAPED DIAGRAM SHOWING RESULTANT PATTERN OF ADDITION & SUBTRACTION OF LOOP & ANTENNA VOLTAGE, USED FOR SENSE DETERMINATION.

Figure 37—Polar and Cardioid Characteristics of Loop Antenna (M-406574)



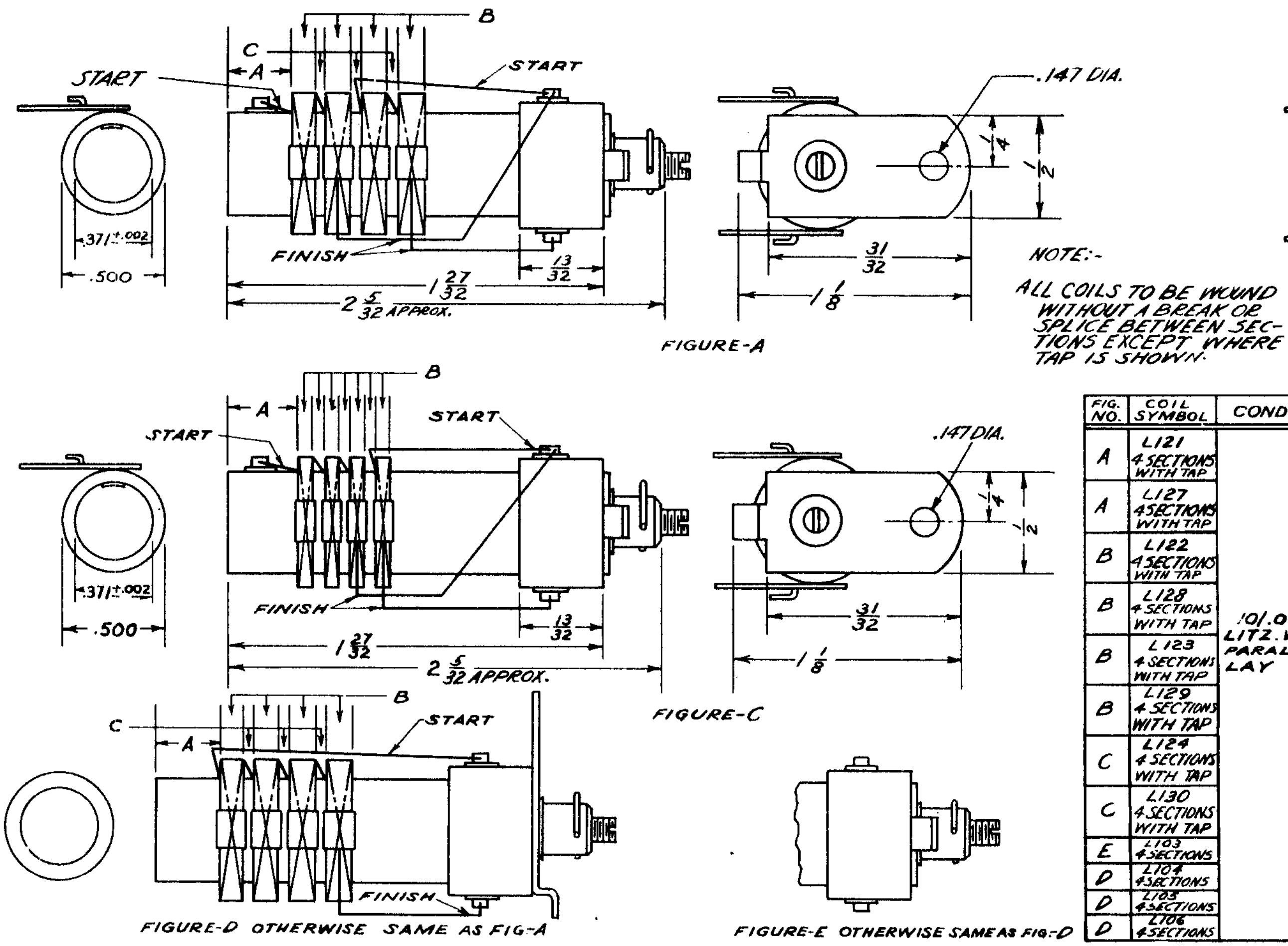
NOTE:-
L101, L102, L120 & L126 TO BE WOUND WITHOUT A BREAK OR SPLICE BETWEEN SECTIONS.
MAKE START LEADS OF COILS AS PART OF CONDUCTOR WIRE BEFORE STARTING TO WIND BY DOUBLING BACK END 4 TIMES MAKING A LEAD OF 5 STRANDS. TWIST STRANDS TOGETHER. MAKE FINISH LEADS OF COILS FROM CONTINUATION OF CONDUCTOR, SIMILAR TO START LEADS. ANCHOR FINISH LEADS USING TAPE.

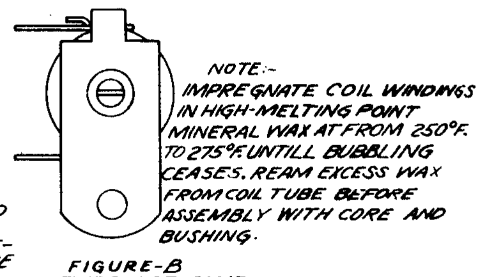
IMPREGNATE COIL WINDING IN HIGH-MELTING-POINT MINERAL WAX AT FROM 250°F. TO 275°F. UNTIL BUBBLING CEASES. REAM EXCESS WAX FROM INSIDE OF COIL TUBE BEFORE ASSEMBLY WITH CORE AND BUSHING.

FIG. NO	COIL SYMBOL	CONDUCTOR	METHOD OF WINDING	TURNS PER SECTION	OVERALL DIA.
A	L101 2 SECTIONS	S.S.E. 0.005 DIA	UNIVERSAL 1 CROSS PER TURN	1670	$1\frac{1}{16}$
B	L125 2 SECTIONS WITH TAP				
C	L118C 2 SECTIONS			1725	$1\frac{3}{32}$
	L118B		UNIVERSAL 4 CROSSES PER TURN	800	$\frac{1}{4}$
	L118A			100	$\frac{11}{16}$
D	L102 2 SECTIONS		UNIVERSAL 2 CROSSES PER TURN	735	$\frac{7}{8}$
E	L126 2 SECTIONS WITH TAP				
F	L117C 2 SECTIONS			665	$\frac{7}{8}$
	L117B		UNIVERSAL 4 CROSSES PER TURN	600	$1\frac{3}{32}$
	L117A			80	$\frac{11}{16}$
G	L119 2 SECTIONS WITH TAP		UNIVERSAL 1 CROSS PER TURN	1670	$1\frac{1}{16}$
E	L120 2 SECTIONS WITH TAP		UNIVERSAL 2 CROSSES PER TURN	735	$\frac{7}{8}$

P-721160

Figure 38—Coil Winding Data (P-721160)



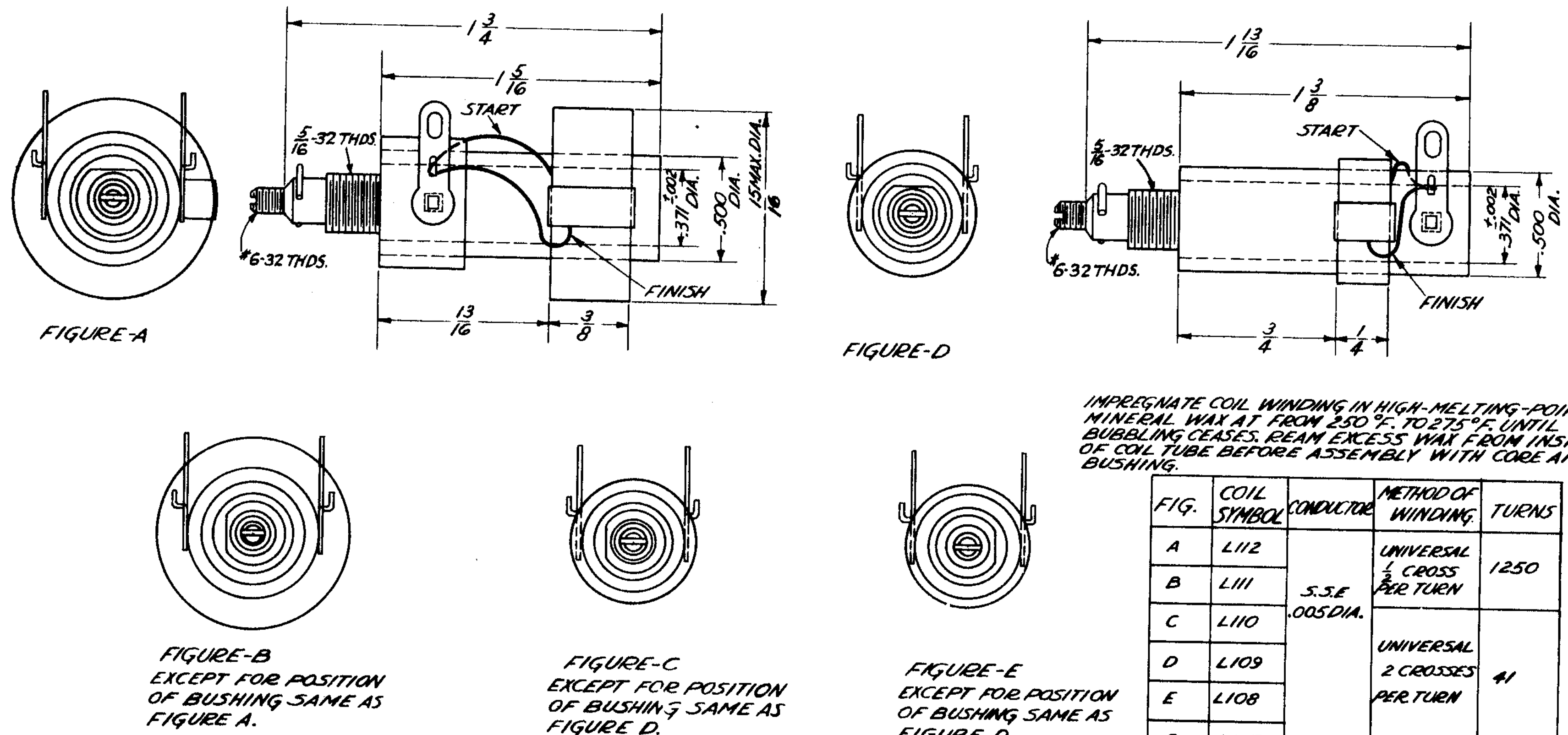


K-421185

FIG. NO.	COIL SYMBOL	CONDUCTOR	METHOD OF WINDING	TURNS PER SECTION	A	B	C
A	L121 4 SECTIONS WITH TAP	10/.0025 LITZ. WIRE PARALLEL LAY	UNIVERSAL 4 CROSSES PER TURN	118	7/16	1/8	3/64
A	L127 4 SECTIONS WITH TAP				7/16	1/8	3/64
B	L122 4 SECTIONS WITH TAP			59	15/32	3/32	3/64
B	L128 4 SECTIONS WITH TAP				15/32	3/32	3/64
B	L123 4 SECTIONS WITH TAP		UNIVERSAL 6 CROSSES PER TURN	29	7/16	1/16	1/16
B	L129 4 SECTIONS WITH TAP				7/16	1/16	1/16
C	L124 4 SECTIONS WITH TAP			15	1/2	1/16	
C	L130 4 SECTIONS WITH TAP				1/2	1/16	
E	L103 4 SECTIONS		UNIVERSAL 4 CROSSES PER TURN	118	15/32	1/8	3/64
D	L104 4 SECTIONS			59		3/32	
D	L105 4 SECTIONS		UNIVERSAL 6 CROSSES PER TURN	29	17/32	1/16	1/16
D	L106 4 SECTIONS			15			

Figure 39—Coil Winding Data
(M-421185)

MAKE START LEADS OF COILS AS PART OF CONDUCTOR WIRE BEFORE STARTING TO WIND BY DOUBLING BACK END 4 TIMES MAKING A LEAD OF 5 STRANDS. TWIST STRANDS TOGETHER. MAKE FINISH LEADS OF COIL FROM CONTINUATION OF CONDUCTOR, SIMILAR TO START LEADS. ANCHOR FINISH LEADS USING TAPE.

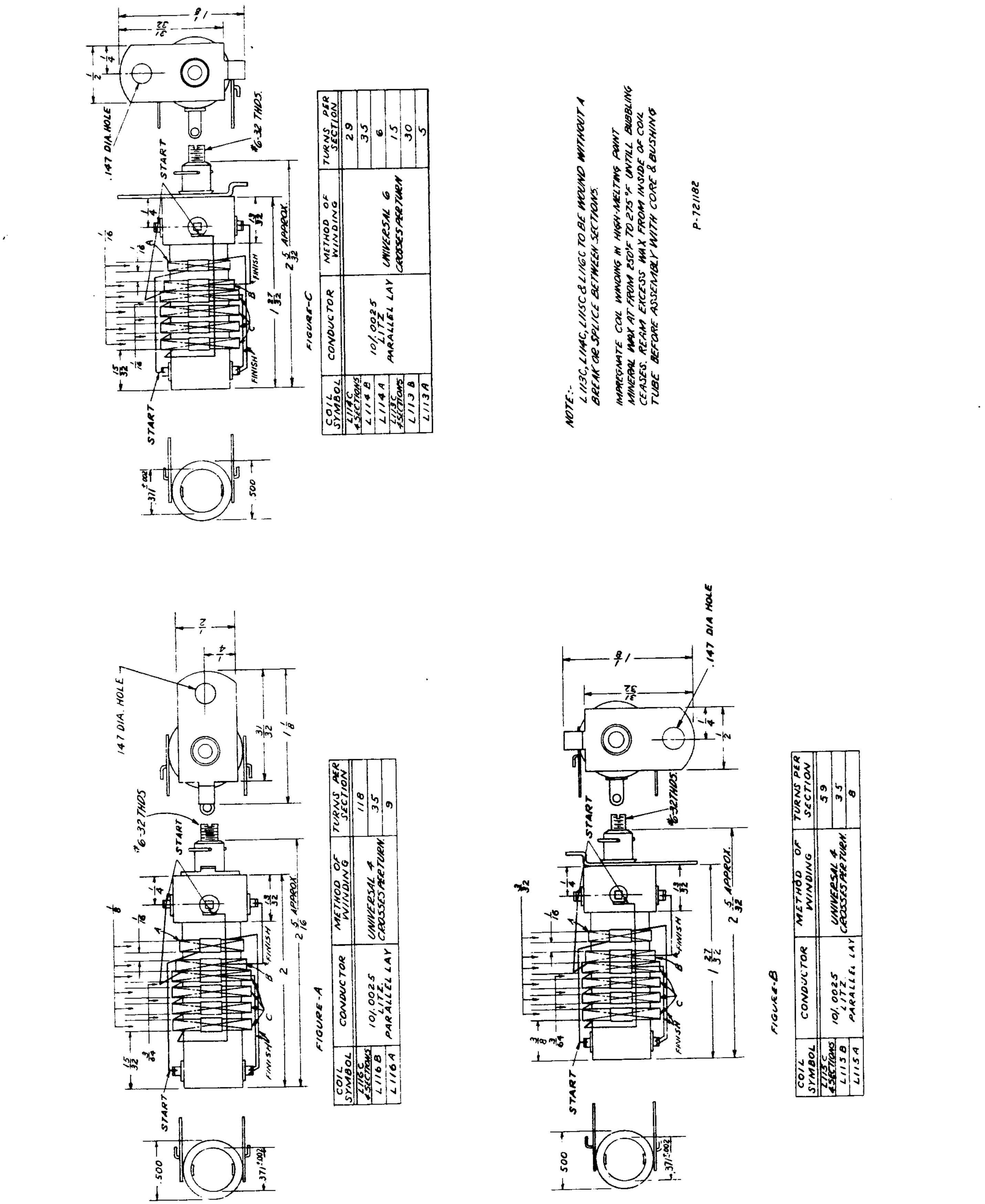


IMPREGNATE COIL WINDING IN HIGH-MELTING-POINT MINERAL WAX AT FROM 250 °F. TO 275 °F. UNTIL BUBBLING CEASES. REAM EXCESS WAX FROM INSIDE OF COIL TUBE BEFORE ASSEMBLY WITH CORE AND BUSHING.

FIG.	COIL SYMBOL	CONDUCTOR	METHOD OF WINDING	TURNS
A	L112	S.S.E .005 DIA.	UNIVERSAL 1/2 CROSS PER TURN	1250
B	L111			
C	L110			
D	L109		UNIVERSAL 2 CROSSES PER TURN	41
E	L108			
C	L107			

M-426841

Figure 40—Coil Winding Data
(*M*-426841)



COIL SYMBOL	CONDUCTOR	METHOD OF WINDING	TURNS PER SECTION
L116C 4 SECTIONS	10/.0025 LITZ PARALLEL LAY	UNIVERSAL 4 CROSSES PER TURN	118
L116B			35
L116A			9

COIL SYMBOL	CONDUCTOR	METHOD OF WINDING	TURNS PER SECTION
L115C 4 SECTIONS	10/.0025 LITZ PARALLEL LAY	UNIVERSAL 4 CROSSES PER TURN	59
L115B			35
L115A			8

COIL SYMBOL	CONDUCTOR	METHOD OF WINDING	TURNS PER SECTION
L114C 4 SECTIONS	10/.0025 LITZ PARALLEL LAY	UNIVERSAL 6 CROSSES PER TURN	29
L114B			35
L114A			6
L113C 4 SECTIONS			15
L113B			30
L113A			5

Figure 41—Coil Winding Data
(P-721182)

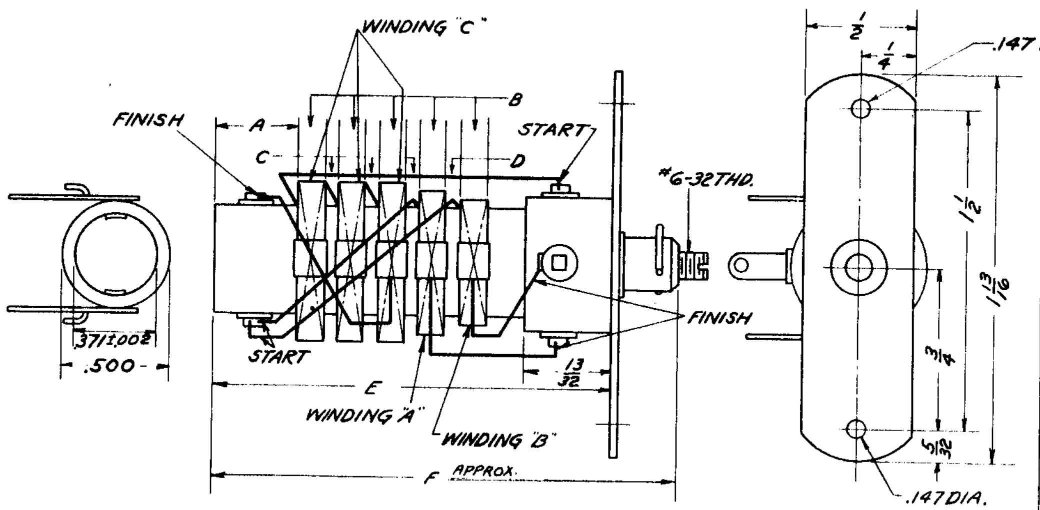


FIGURE - A.

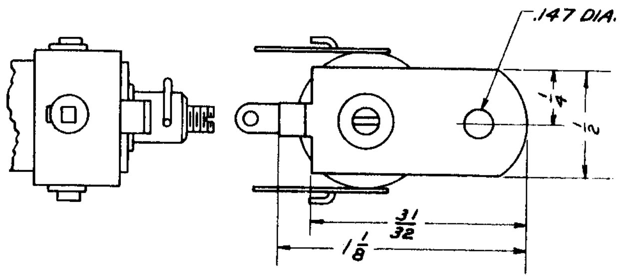


FIGURE-B
OTHERWISE SAME AS FIGURE A

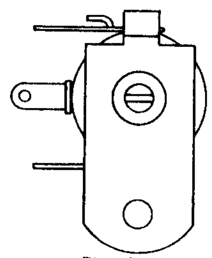


FIGURE - C
EXCEPT FOR POSITION
OF PLATE SAME AS FIG. B

IMPREGNATE COIL WINDING IN HIGH MELTING POINT MINERAL WAX AT FROM 250°F. TO 275°F. UNTIL BUBBLING CEASES. REAM EXCESS WAX FROM INSIDE OF COIL TUBE BEFORE ASSEMBLY WITH CORE AND BUSHING

FIG. NO.	COIL SYMBOL	CONDUCTOR	METHOD OF WINDING.	TURNS PER SECTION	A	B	C	D	E	F APPROX.
A	L-131-C 3 SECTIONS.	10/.0025 LITZ PARALLEL LAY	UNIVERSAL 4 CROSSES PER TURN	150	3/8	1/8	1/16	1/16	2	2 5/16
	L-131-A			125						
	L-131-B			65						
A	L-132-C 3 SECTIONS			140	3/8	1/8	1/16	1/16	2	2 5/16
	L-132-A			100						
	L-132-B			75						
B	L-133-C 3 SECTIONS			95	3/8	1/8	1/16	1/32	1 27/32	2 5/32
	L-133-A			80						
	L-133-B	S.S.E. 0/.010 DIA.		40						
C	L-134-C 3 SECTIONS	10/.0025 LITZ PARALLEL LAY		60	3/8	3/32	3/64	3/64	1 27/32	2 5/32
	L-134-A	S.S.E.		70						
	L-134-B	0.010 DIA		35						
C	L-135-C 3 SECTIONS	10/.0025 LITZ PARALLEL LAY	UNIVERSAL 6 CROSSES PER TURN	30	15/32	1/16	1/16	1/16	1 27/32	2 5/32
	L-135-A	S.S.E.		60						
	L-135-B	0.010 DIA.		18						
C	L-136-C 3 SECTIONS	10/.0025 LITZ PARALLEL LAY.		18	15/32	1/16	1/16	1/16	1 27/32	2 5/32
	L-136-A	S.S.E		30						
	L-136-B	0.010 DIA.		25						

NOTE:
L-131-C TO L-136C INCL. TO BE WOUND WITHOUT A BREAK OR SPLICE BETWEEN SECTIONS. ANCHOR FINISH LEADS USING TAPE.

M-421189

FOR RCA MFG. DWG. SEE P-720408

Figure 42—Coil Winding Data
(*M*-421189)

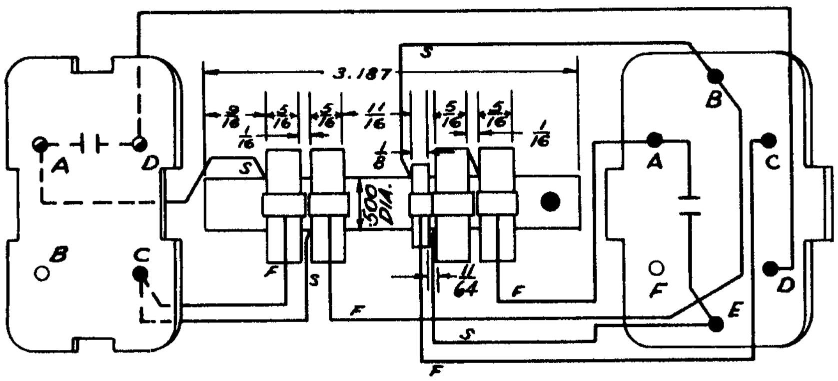


FIGURE-A

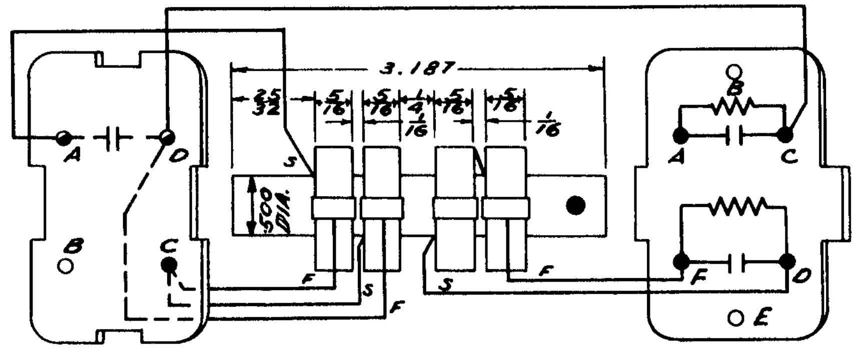


FIGURE-C

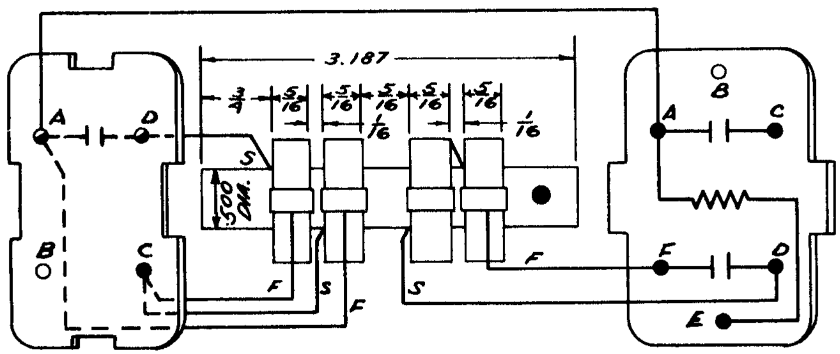


FIGURE-B

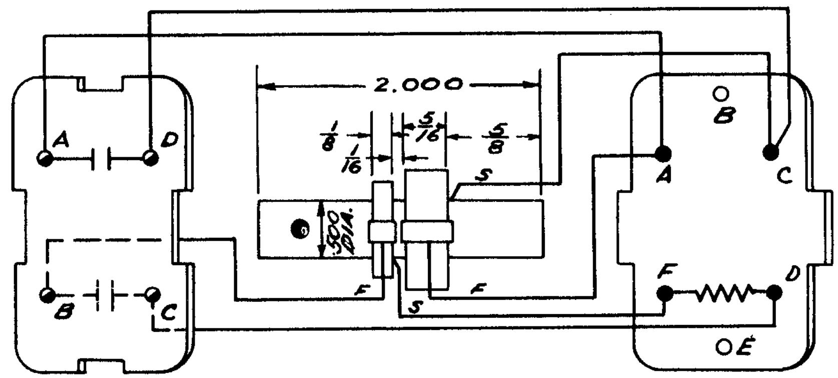


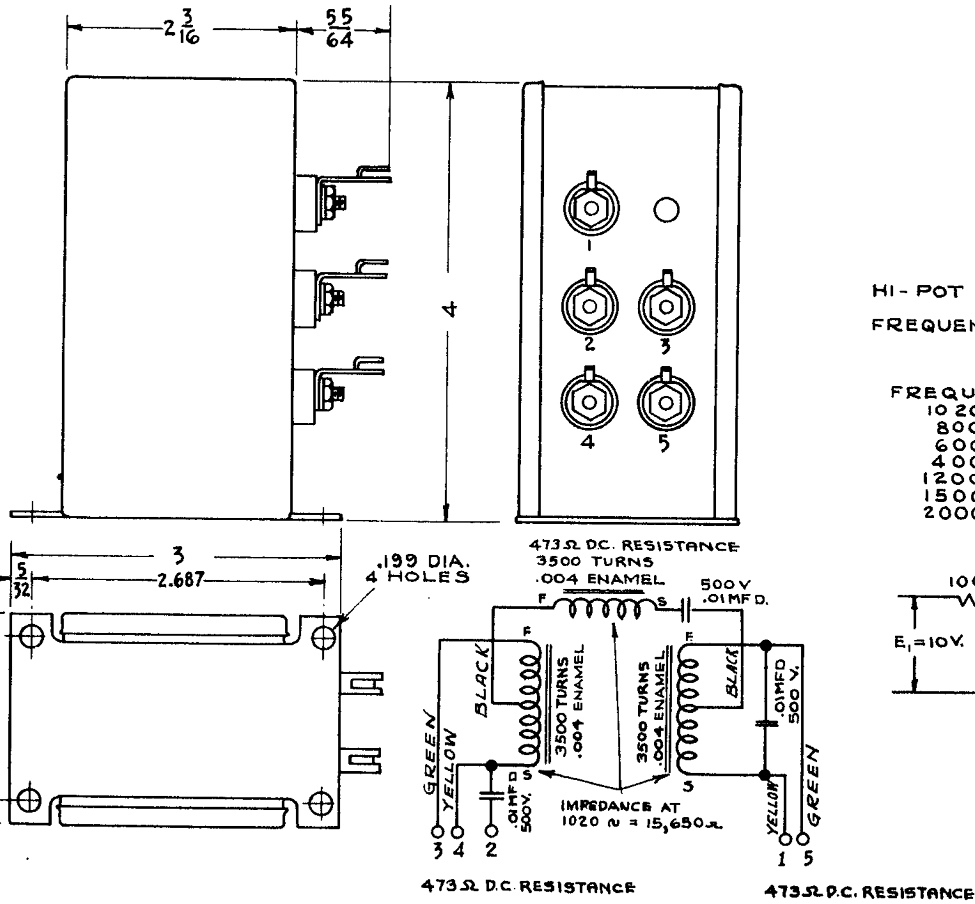
FIGURE-D

NOTE:-
T-101C, T102B & T103B TO BE WOUND WITHOUT A BREAK OR SPLICE BETWEEN SECTIONS.

FIG. NO.	COIL SYMBOL	CONDUCTOR	METHOD OF WINDING	TURNS PER SECTION
A	T101A 2 SECTIONS	7/0.0025 LITZ. PARALLEL LAY	UNIVERSAL ONE CROSS PER TURN	400
A	T101B		UNIVERSAL FOUR CROSSES PER TURN	120
A	T101C 2 SECTIONS		UNIVERSAL ONE CROSS PER TURN	400
B	T102A 2 SECTIONS			400
B	T102B 2 SECTIONS			400
C	T103A 2 SECTIONS			400
C	T103B 2 SECTIONS			400
D	T104A		UNIVERSAL FOUR CROSSES PER TURN.	110
D	T104B		UNIVERSAL ONE CROSS PER TURN	400

M-421350

Figure 43—Coil Winding Data
(M-421350)



TEST SPECIFICATION

HI-POT VOLTAGE :- 1000 VOLTS, RMS, 60 CYCLES

FREQUENCY RESPONSE :- THE PEAK SHALL BE AT 1020 ~ ± 20 ~.

FREQUENCY	RESPONSE
1020	E_2 SHALL NOT BE LESS THAN 3.5 VOLTS.
800	AT LEAST 25 Db. BELOW 1020 ~ RESPONSE.
600	45
400	60
1200	15
1500	35
2000	AT LEAST 50 Db. BELOW 1020 ~ RESPONSE.

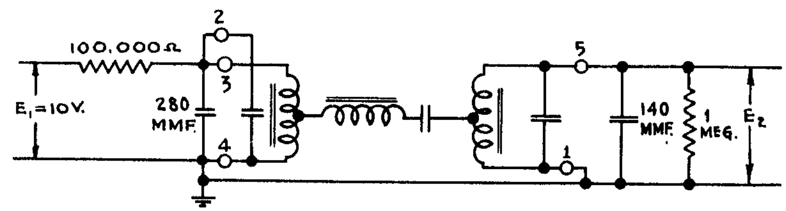
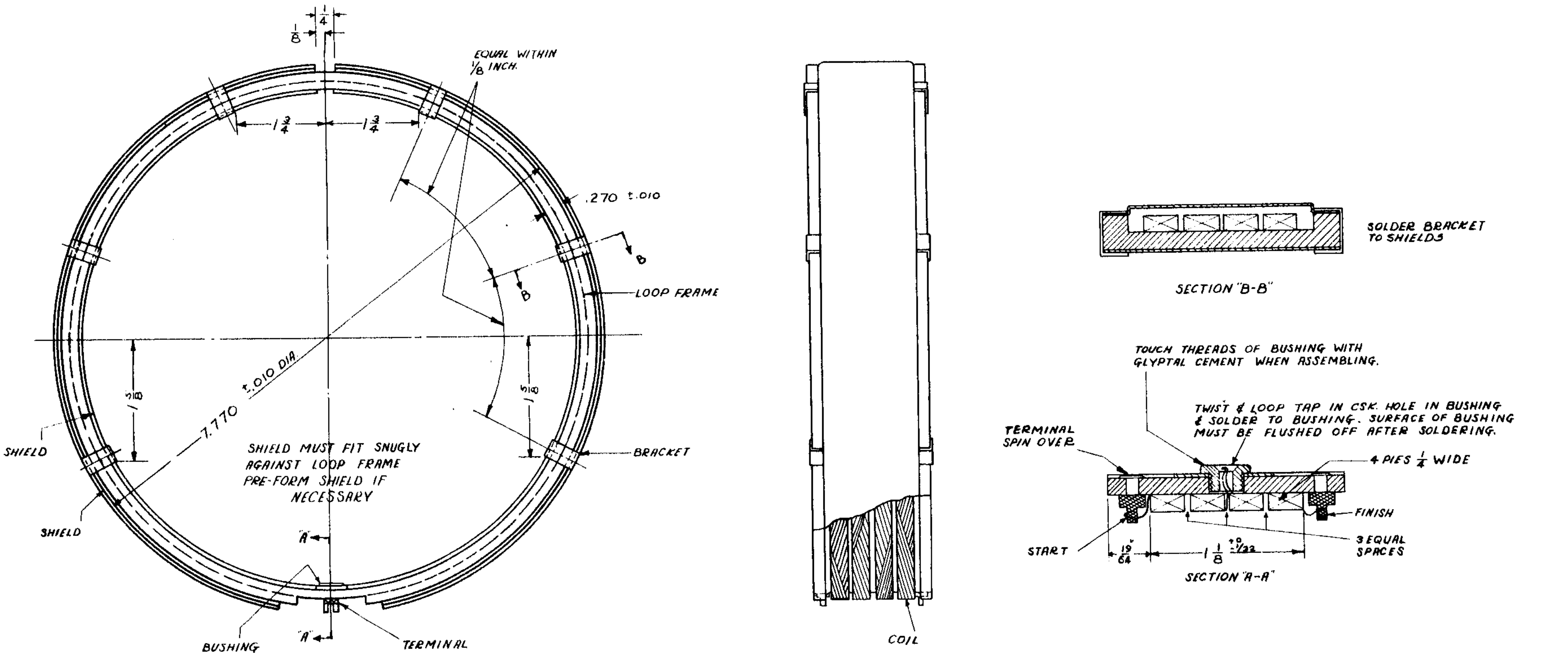


Figure 44—Audio Filter Winding Data (M-420774)



NOTE #1
WIRE: 10 STRANDS OF .0031 DIA. PARALLEL D.S.E. LITZ WIRE. TOTAL TURNS 300 (4 UNIVERSAL PIES, 75 TURNS EACH) USE BAKELITE CEMENT ON FORM & WIRES WHILE WINDING, TO HOLD WIRES IN PLACE.\IMPREGNATE IN A HIGH-MELTING POINT MINERAL WAX AT FROM 250°F. TO 275°F. UNTIL BUBBLING CEASES. REMOVE EXCESS WAX AFTER HEATING IN OVEN AT 250°F. FOR 4 HOURS.

NOTE #2
MEASURMENTS OF INDUCTANCE AT 1000 C.P.S. AND D.C. RESISTANCE AS PER TABLE "A" (3" LEADS, SHIELDS FLOATING, LOOP SUSPENDED OVER BRIDGE)

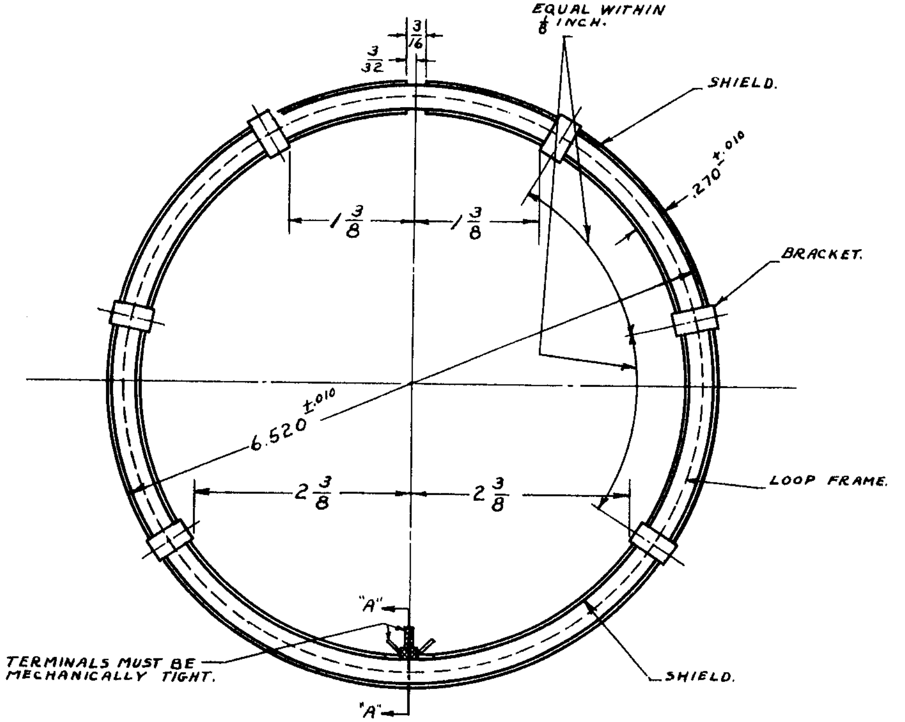
NOTE #3
FOR CHECKING PURPOSES ON "Q" METER USE TABLE "B" WHEN SHIELDS ARE NOT YET ASSEMBLED AND TABLE "C" WHEN SHIELDS ARE ASSEMBLED, (3" LEADS, SHIELDS FLOATING, LOOP SUSPENDED OVER "Q" METER)

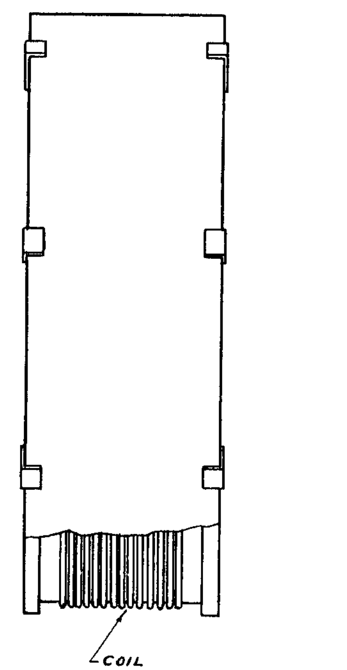
TABLE "A"

SECTION	D.C RESISTANCE		INDUCTANCE (SHIELD ASSEMBLED)	
	OHMS	LIMIT	MILLIHENRIES	LIMITS
OVERALL			28.0	±5%
START TO TAP	34.1	+10%	8.6	NOT TO DIFFER OVER 5%
TAP TO FIN.	34.1	+10%	8.6	

TABLE	FREQ.	CAPACITY M.M.F.	Q	DISTRIBUTED CAPACITY M.M.F.	INDUCTANCE MILLIHENRIES
B	50	308	86	44	28.5
	100	44	47		
C	50	335	37	66	25.4
	75	112	33		
	100	34.5	20		

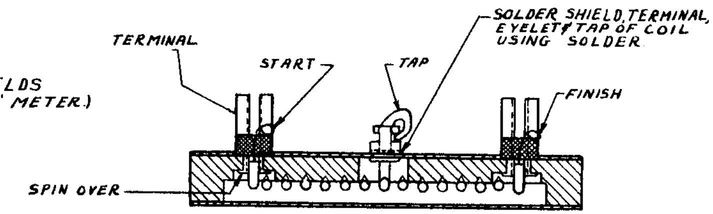
Figure 45—Loop Antenna Winding Data
Bands 1, 2
(P-721605)





① NOTE #1:-
WIRE- 81 STRANDS OF .004 DIA. PARALLEL D.S.E. WIRE. START WITH CENTER, WIND 7 TURNS RIGHT HAND EACH SIDE (TOTAL TURNS 14). PAINT FINISHED WINDINGS LIGHTLY WITH BAKELITE CEMENT TO ANCHOR SAME TO FORM. IMPREGNATE IN A HIGH-MELTING POINT MINERAL WAX AT FROM 250°F. TO 275°F. UNTIL BUBBLING CEASES. REMOVE EXCESS WAX AFTER HEATING IN OVEN AT 250°F. FOR 4 HOURS.

AFTER SOLDERING LEAD TO TERMINAL, ANCHOR WITH GLYPTAL CEMENT TO PREVENT ROTATION.



ENLARGED VIEW AT SECTION "A-A"

NOTE #2:-
FOR CHECKING PURPOSES ON "Q" METER USE TABLE "B" WHEN SHIELDS ARE ASSEMBLED. (3" LEADS, SHIELDS FLOATING, LOOP SUSPENDED OVER "Q" METER.)

TABLE "A"

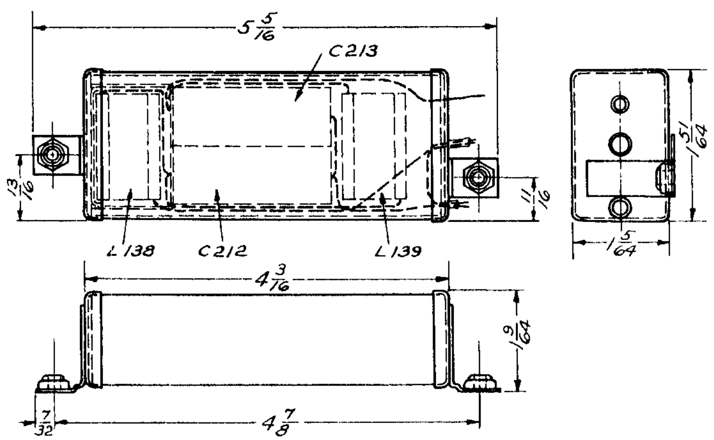
SECTION	D.C. RESISTANCE		INDUCTANCE (SHIELDS ASSEMBLED)	
	OHMS	LIMIT	MICROHENRIES	LIMITS.
OVERALL			44.8	±5%
START TO TAP	0.101	±3.5%	14.15	NOT TO DIFFER
TAP TO FIN.	0.101	±3.5%	14.15	OVER 5%

TABLE "B"

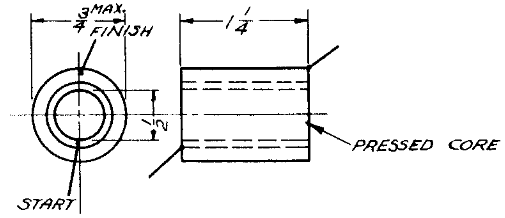
FREQUENCY K.C.	CAPACITY MMF.	Q	DISTRIBUTED CAPACITY MMF.	INDUCTANCE MICROHENRIES
1400	298	140	20.1	40.6
2800	59.4	77		

NOTE #3:-
MEASUREMENTS OF INDUCTANCE AT 1000 C.P.S. AND D.C. RESISTANCE AS PER TABLE "A". (3" LEADS, SHIELDS FLOATING, LOOP SUSPENDED OVER BRIDGE.)

Figure 46—Loop Antenna Winding Data Bands 3, 4, 5, 6 (P-721604)



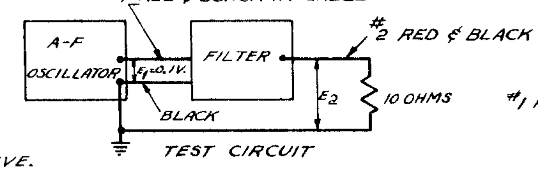
FINISH WITH SILVER GRAY LACQUER.



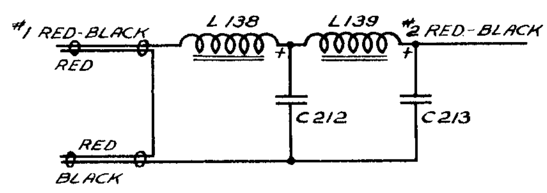
WINDING SPECIFICATIONS (L138 & L139)								
WOUND OVER	CONDUCTOR MATERIAL-SIZE	WEIGHT LBS.	TURNS	T/L	BETWEEN LAYERS	OVER COIL	DC RES AT 25°C OHMS	COIL BUILD
SPOOL	ENAMEL COPPER .0253 DIA.	.035	110	37	1-.003 KRAFT PAPER	1 LAYER GUMMED KRAFT PAPER	.30	.109

C212 AND C213 ARE 50-MICROFARAD, 50-VOLT ELECTROLYTIC CAPACITORS.

HI-POT :- 500 V. TO CASE
INDUCTANCE :- MEASURED AT 1.0V. 1000 CYCLES EACH COIL SHALL BE 0.350 MILLIHENRY $^{+5}_{-10}$ %
POLARITY :- CONNECT RED & BLACK LEAD #1 TO THE POSITIVE SIDE & THE BLACK LEAD TO THE NEGATIVE SIDE OF A 6 VOLT D.C. SUPPLY. THERE SHOULD BE APPROX. 6V. BETWEEN THE RED & BLACK LEAD Nº 2 & THE BLACK LEAD, WITH THE RED & BLACK LEAD Nº2 POSITIVE.
FREQUENCY RESPONSE :- IN TEST CIRCUIT E_2/E, AT 100 CYCLES SHALL NOT BE LESS THAN 0.90. E_2/E, AT 5000 CYCLES SHALL BE LESS THAN .018. E_2/E AT 15,000 CYCLES SHALL BE LESS THAN .0018.



TEST CIRCUIT



SCHEMATIC DIAGRAM

Figure 47—Coil Winding Data and Outline of Line Filter (M-422960)

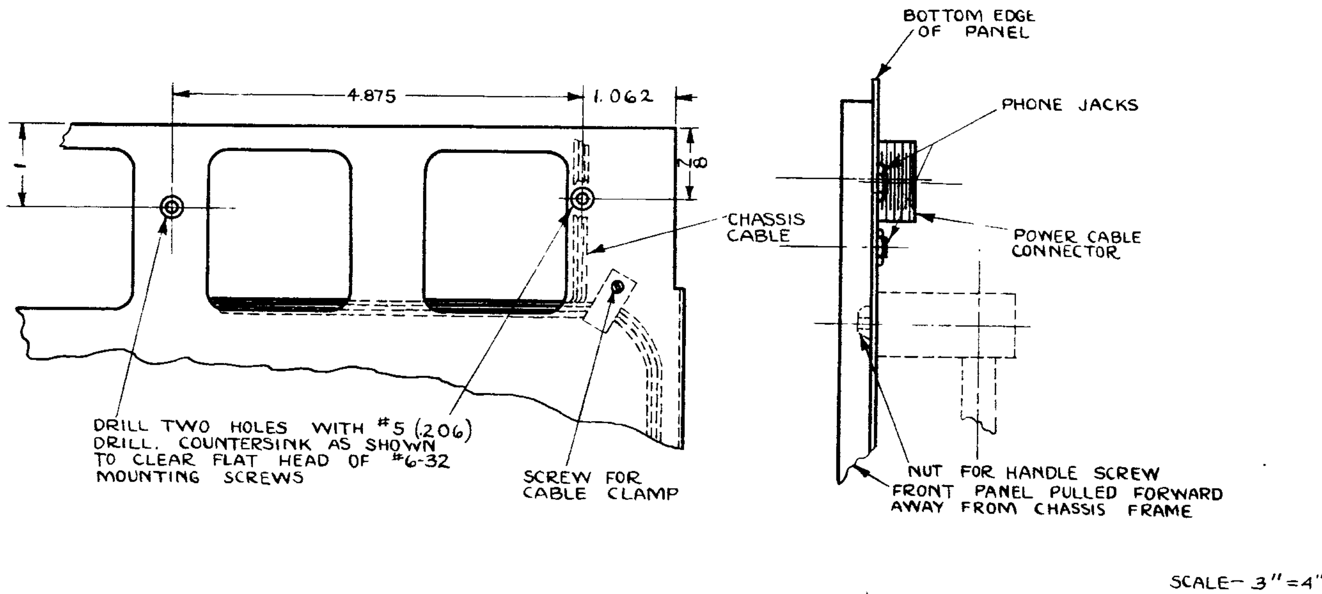


Figure 48—Mounting Hole Details for Line Filter (M-422992)

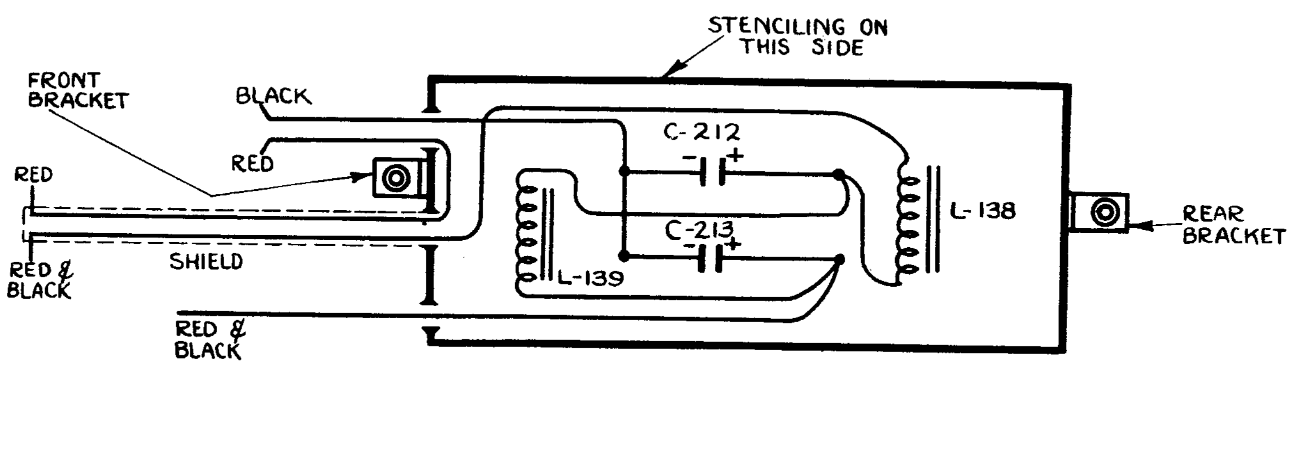


Figure 49—Line Filter (Schematic M-422991)

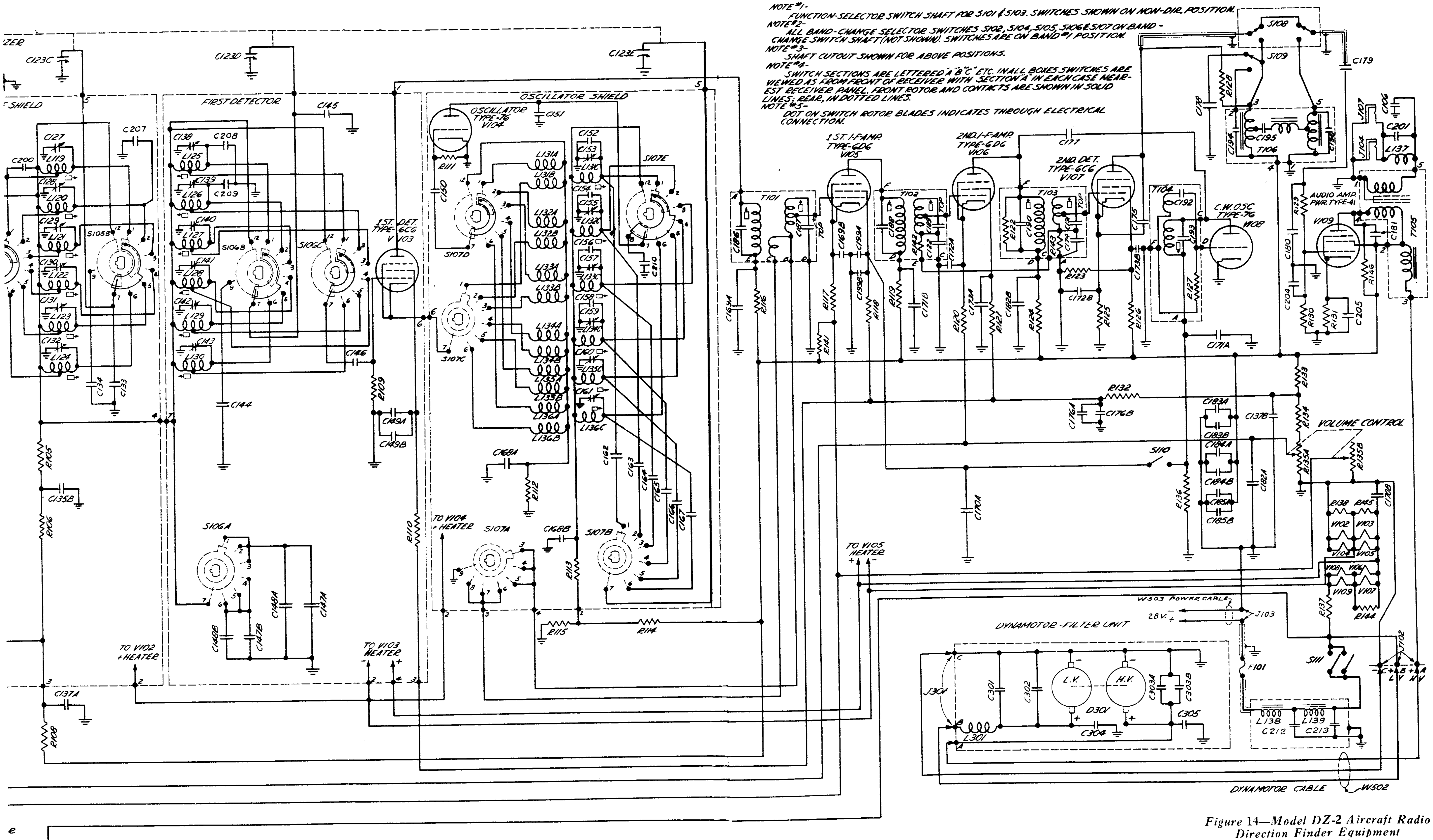
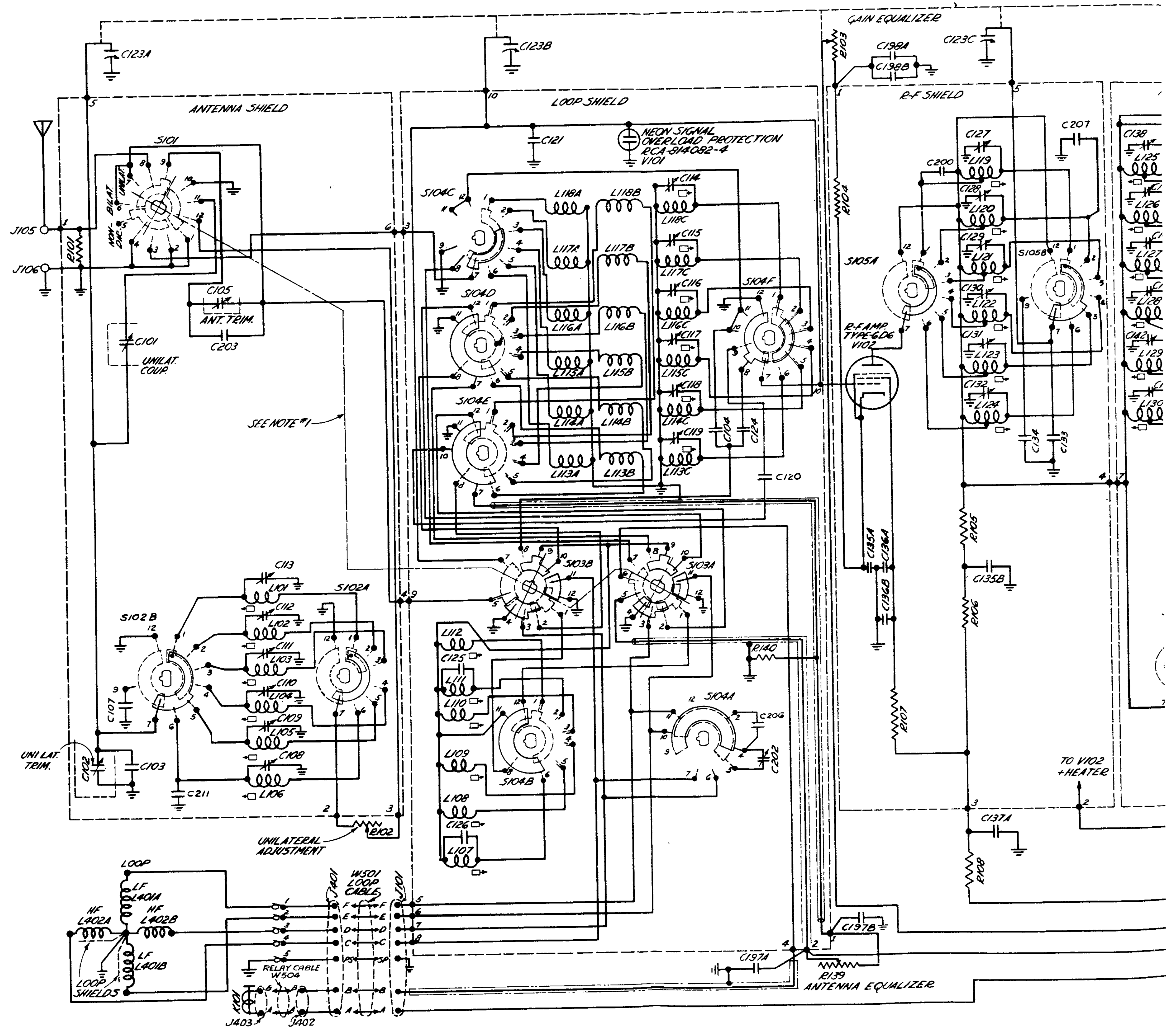


Figure 14—Model DZ-2 Aircraft Radio Direction Finder Equipment With Line Filter (Schematic TT-620704-4)


ANTENNA SHIELD
LOOP SHIELD
GAIN EQUALIZER
R-F SHIELD
NEON SIGNAL
OVERLOAD PROTECTION
RCA 814082-4
V101
R-F AMP.
TYPE-6D6
V102
SEE NOTE #1
ANT. TRIM.
UNILAT.
COUP.
UNI LAT.
TRIM.
UNILATERAL
ADJUSTMENT
LOOP
LOOP
SHIELDS
RELAY CABLE
W504
W501
LOOP
CABLE
ANTENNA EQUALIZER
TO V102
+HEATER
J105
J106
J403
J402
S101
S102A
S102B
S103A
S103B
S104A
S104B
S104C
S104D
S104E
S104F
S105A
S105B

NUMBERS IN CIRCLES ARE FOR MANUFACTURING PURPOSES ONLY

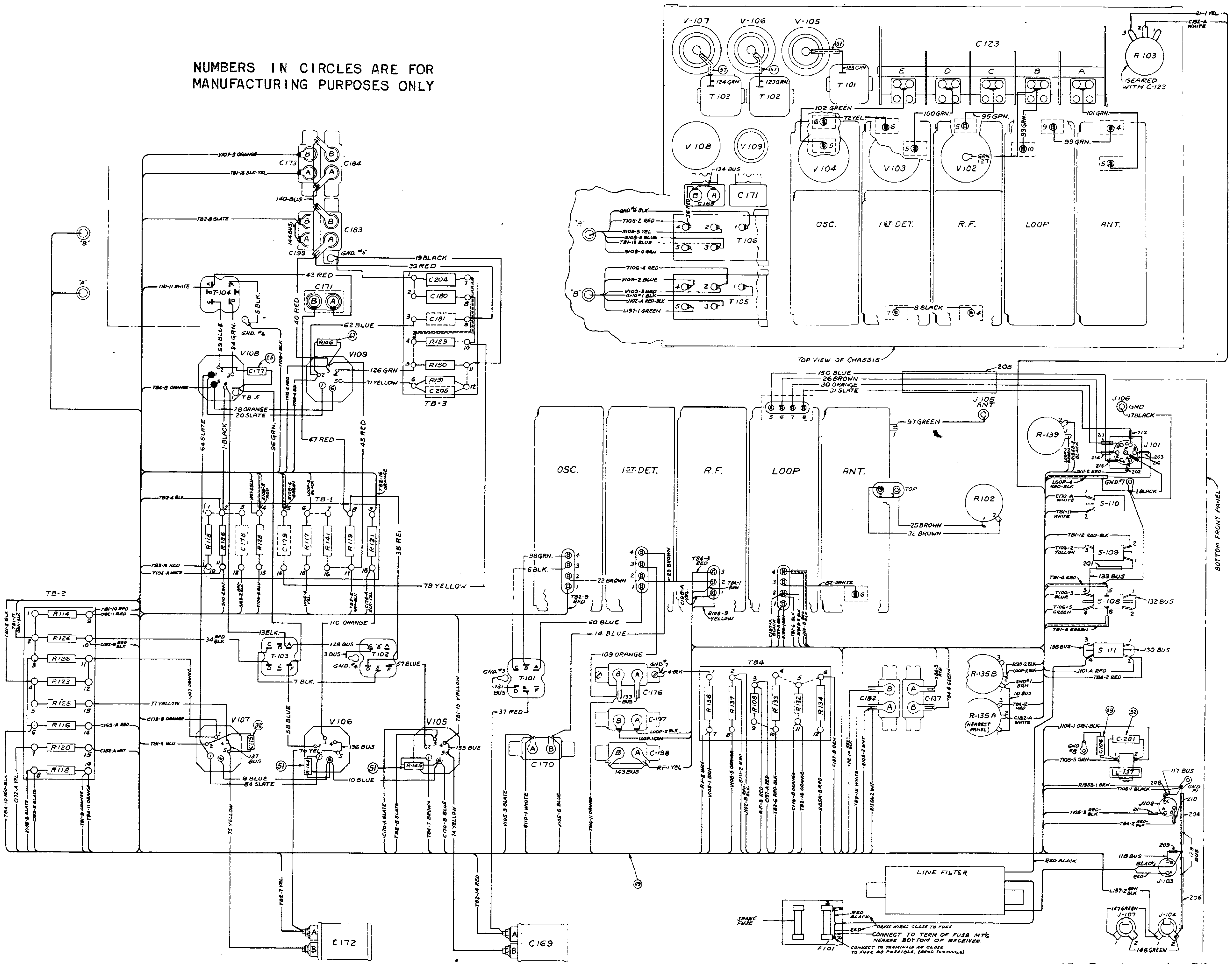


Figure 15—Receiver, with Filter (Connections, WW-305256)

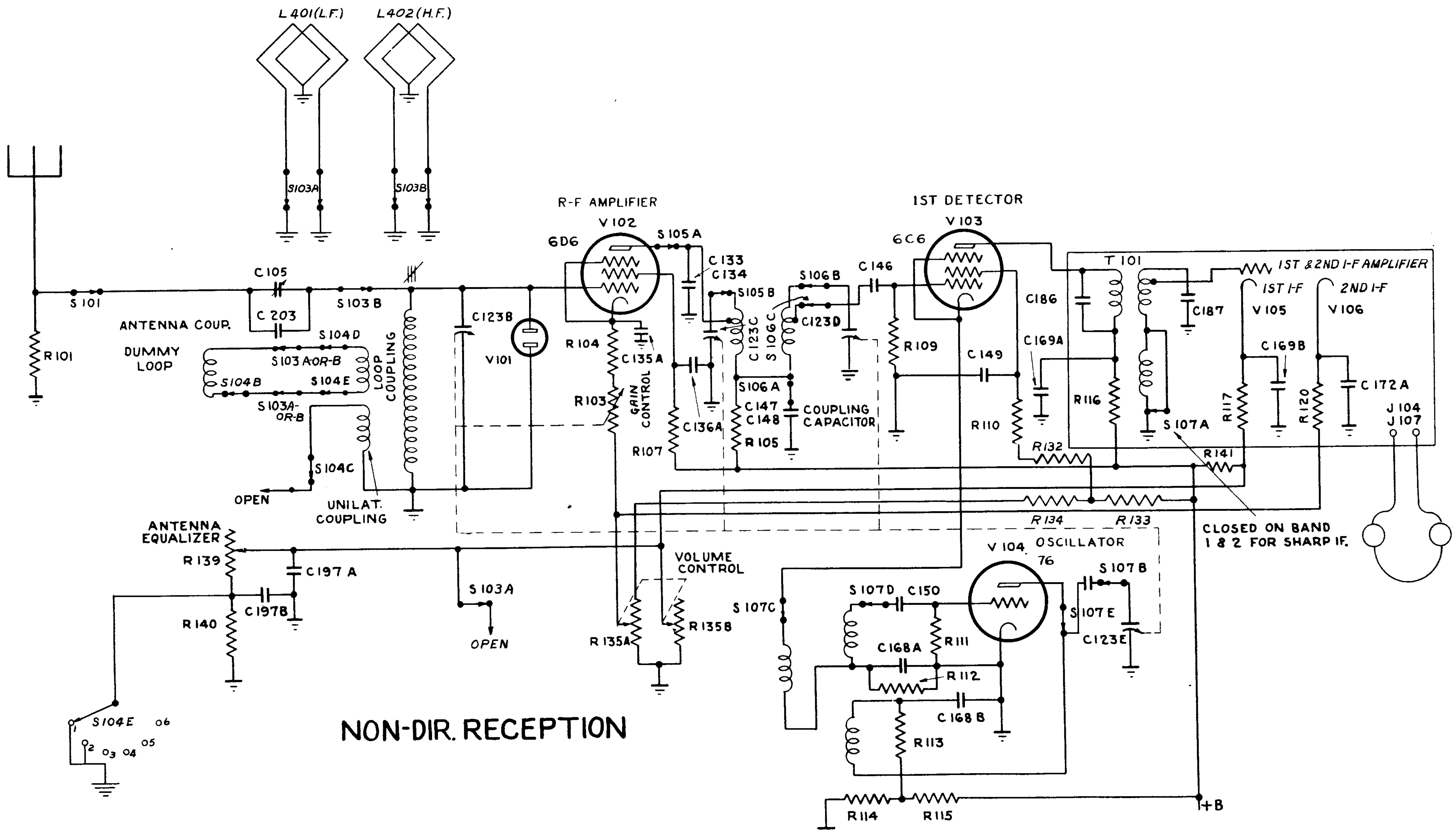


Figure 22—Non-Directional Operation (Functional Schematic, P-721048)

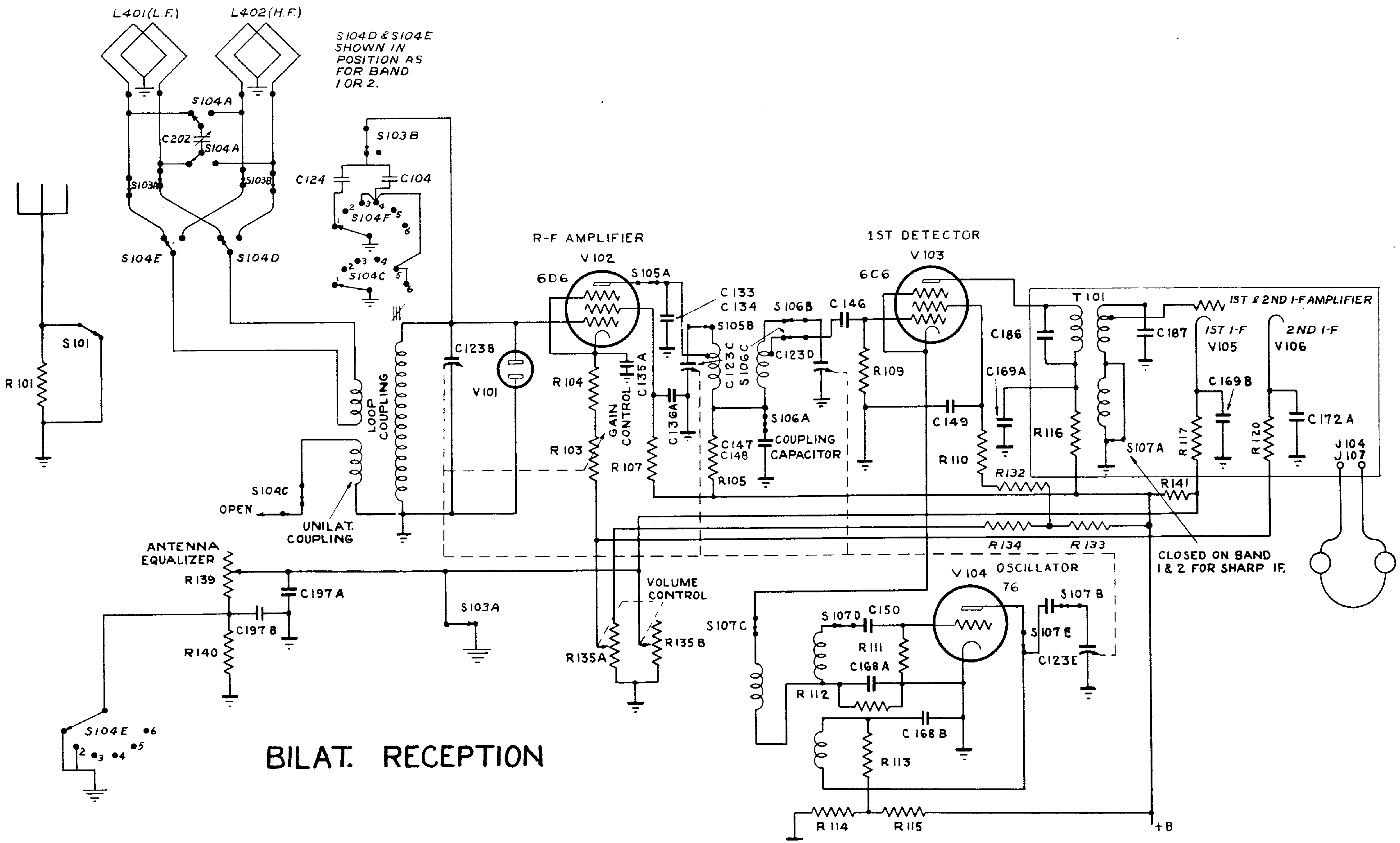


Figure 23—Bilateral Operation (Functional Schematic, P-721049)

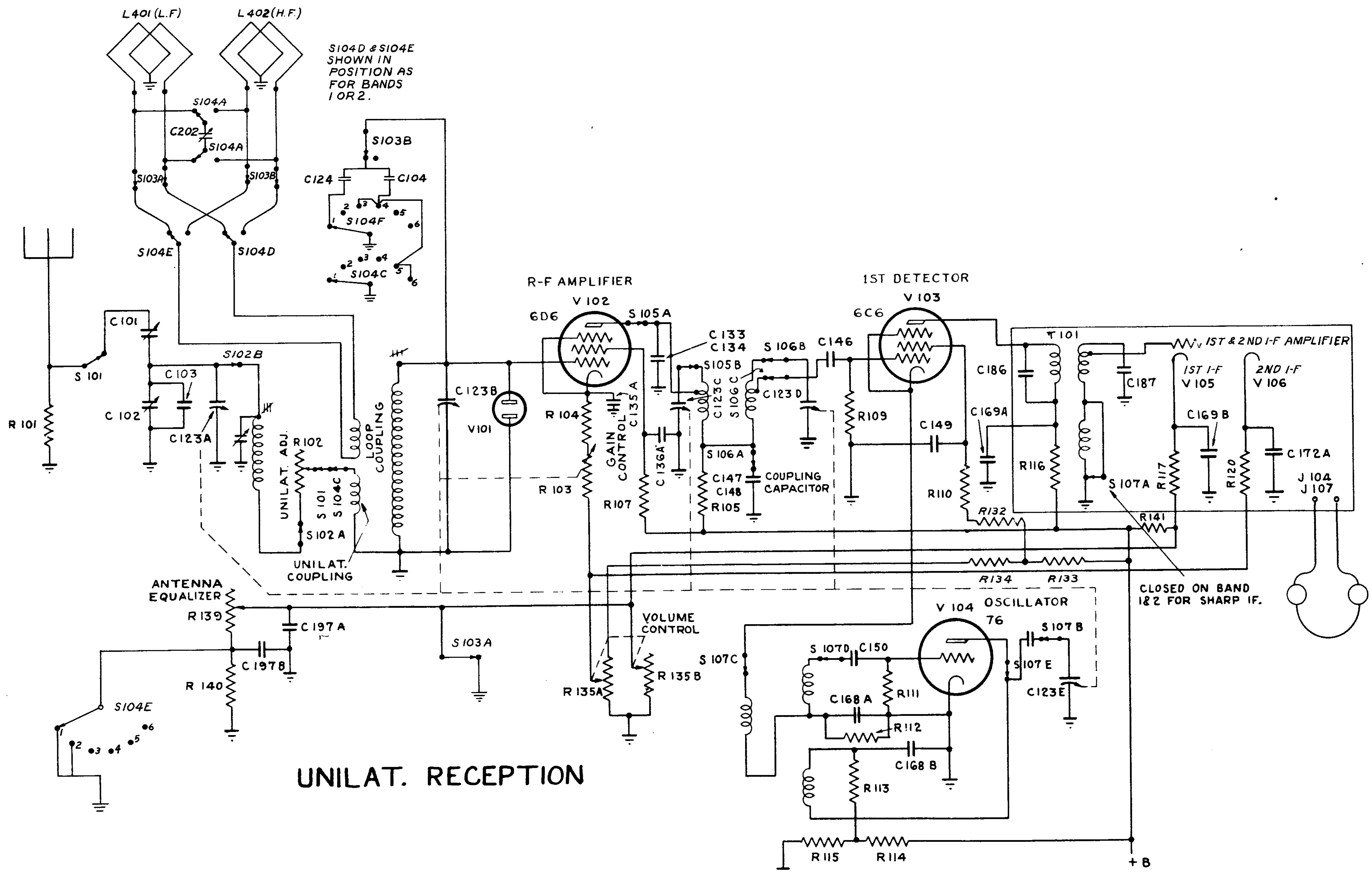
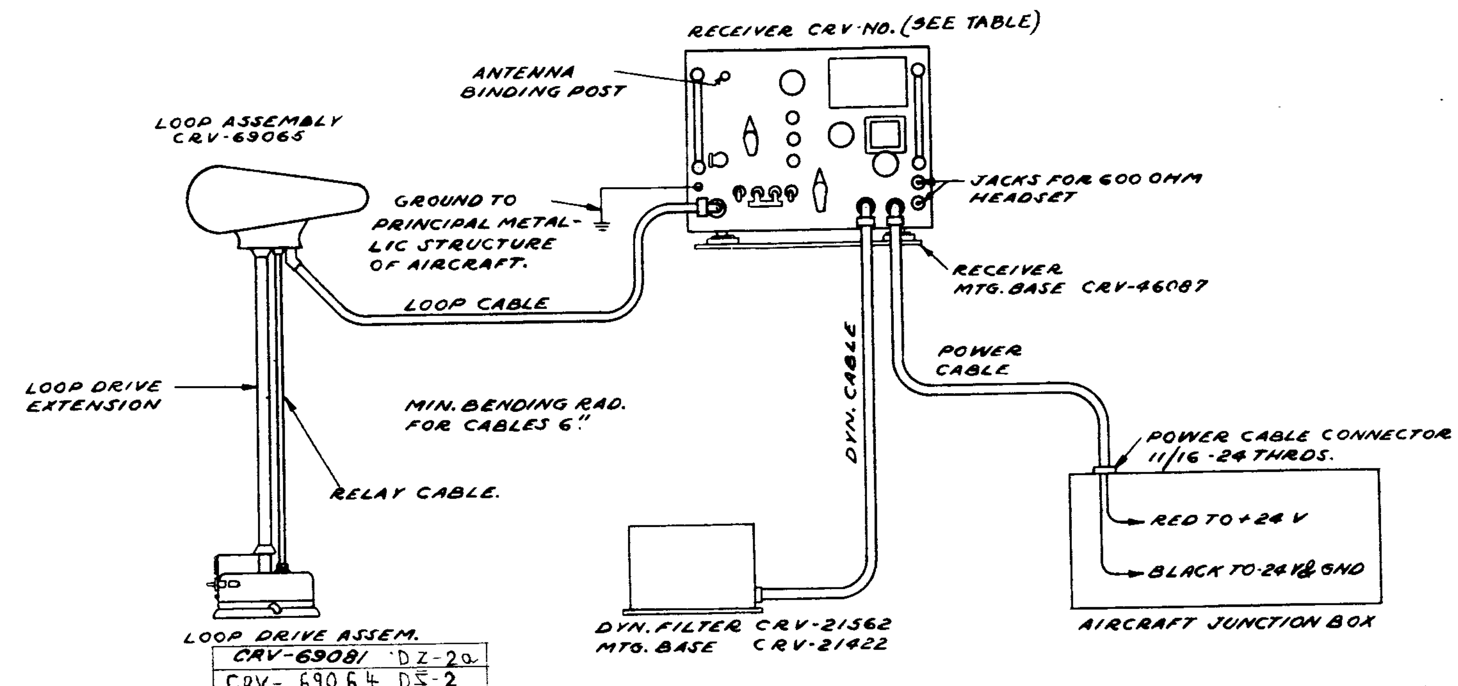


Figure 24—Unilateral Operation (Functional Schematic, P-721050)

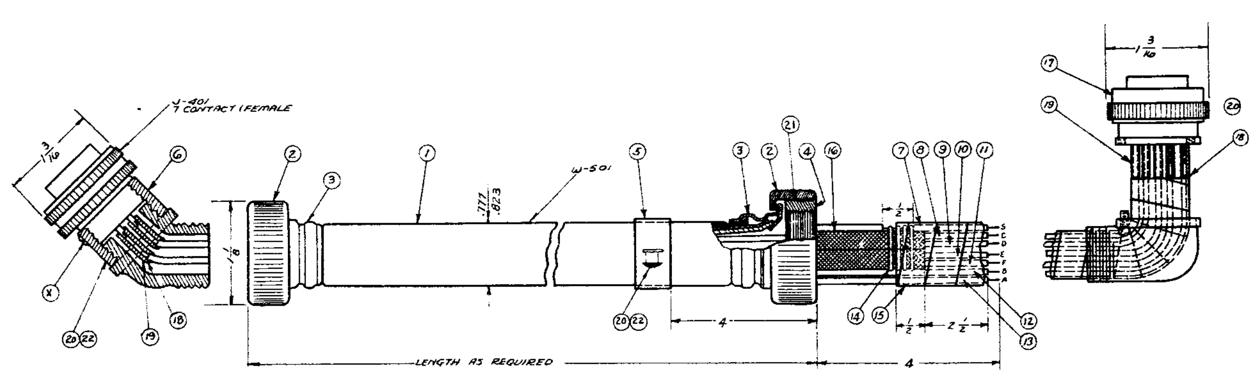


EQUIPMENT	PART NO.	REC. CRV. NO.
DZ-1	1	CRV-46123
DZ-2 & 2a	2	CRV-46152

NOTE:-LOOP MOUNTED IN INVERTED POSITION IN MODEL DZ2a

Figure 28—Model DZ-2 Radio Direction Finder Equipment (Interconnections, M-440117)

ITEM	RCA REFERENCE	OTHER REFERENCE	DESCRIPTION
1	K-874228-2	AMERICAN BRASS CO. AN-WW-561a, TYPE 11	SYNTHETIC RUBBER COVERED FLEXIBLE SHIELDING CONDUIT (ALUM. ALLOY CONDUIT I.D. 5/8" WITH ALUM. WIRE BRAIDING) SUPPLIED IN BULK LENGTH OF 85 FEET
2	K-874098-4	AMERICAN BRASS CO. AN-3054-10	COUPLING NUT (ALUM. ALLOY 1" X 20 THREADS)
3	K-874099-4	AMERICAN BRASS CO. AN-3050-10	FERRULE (ALUM. ALLOY)
4	K-875998-1		ADAPTER (ALUM. ALLOY) 7/8" X 20 THREADS INSIDE - 1" X 20 THREADS INSIDE)
5	24757-1		CABLE MARKER (NAMEPLATE)
6	K-865333-1	AMERICAN PHENOLIC CORP. 97-630	CONNECTOR (ALUM. ALLOY BODY SPECIAL 45° 7/8" X 20 THREADS)
7	PS-533-22		WIRE (BLACK) (BRAID COVERED, VARNISH CLOTH INSULATED, 10 STRANDS, 0.010")
8	PS-546-22		WIRE (WHITE-SLATE TRACER) (ACETATE YARD BRAID, 10 STRANDS, 0.010")
9	PS-546-22		WIRE (WHITE-ORANGE TRACER) (ACETATE YARD BRAID, 10 STRANDS, 0.010")
10	PS-546-22		WIRE (WHITE-BROWN TRACER) (ACETATE YARD BRAID, 10 STRANDS, 0.010")
11	PS-546-22		WIRE (WHITE-BLUE TRACER) (ACETATE YARD BRAID, 10 STRANDS, 0.010")
12	PS-533-22		WIRE (BLACK-RED TRACER) (BRAID COVERED, VARNISH CLOTH INSULATED, 10 STRANDS, 0.010")
13	PS-533-22		WIRE (RED) (BRAID COVERED, VARNISH CLOTH INSULATED, 10 STRANDS, 0.010")
14	PS-105		WIRE (SOLID TINNED COPPER 0.0126" DIA.)
15	PS-567		SCOTCH ACETATE CLOTH TAPE 1/2" WIDE
16	K-844629-7		SHIELDED LOOM (CERESE WAXED COTTON TUBING, TINNED COPPER BRAID)
17	K-865495-3	AMERICAN PHENOLIC CORP. AN-3108-P8, 16S-1S	CONNECTOR (ALUM. ALLOY BODY, 90°, 7/8" X 20 THREADS)
18	K-57431-5		GLYPTAL CEMENT (G.E. #1276)
19	PS-50		VARNISHED TUBING (I.D. 133" X 5/8" LONG, BLACK)
20			SOLDER (KESTER ROSIN CORE, 50% TIN - 50% LEAD)
21	K-57431-35		THERMO-PLASTIC CEMENT (G.E. ZV5057)
22	K-864586-1		RED GLYPTAL (G.E. #1153 GLYPTAL & RED STAMPING INK #2462)



PROCEDURE FOR FABRICATING LOOP CABLES

(A) CUT CONDUIT, (ITEM 1) TO "LENGTH AS REQUIRED", LESS 7/8", USING FINE TOOTH HACKSAW.

(B) WITH SHARP KNIFE CUT COMPLETELY AROUND SYNTHETIC RUBBER COATING 1/4" FROM EACH END OF CABLE, BEING SURE NOT TO CUT ALUMINUM WIRE BRAIDING.

(C) PEEL COATING OFF END OF CONDUIT FROM INSIDE TOWARD END.

(D) TRIM OFF ANY FRAYED ENDS OF WIRE WITH SHEARS.

(E) INSERT PLUG, 8473-2-P, IN HOLE OF PLUNGER.

(F) TIGHTEN SET SCREW TO HOLD PLUG IN PLACE, USING WRENCH FURNISHED WITH TOOLS.

(G) INSERT LOWER HALF OF SPLIT DIE, 8473-2-G, SO THAT SIDE MARKED WITH SIZE FACES BEADING ROLLS.

(H) SLIP NUTS, ITEM 2, OVER CONDUIT.

(I) SLIP FERRULES (ITEM 3) ON ENDS OF CONDUIT BEING CERTAIN TO PUSH THEM ALL THE WAY ON, & PLACE ONE END OF CONDUIT IN LOWER HALF OF DIE.

(J) DROP UPPER HALF OF DIE INTO POSITION.

(K) TURN HANDWHEEL OF FERRULE ATTACHING MACHINE TO ADVANCE PLUNGER UNTIL SHOULDER OF PLUG LOCKS THE FLANGE ON THE FERRULE INTO POSITION.

(L) ADVANCE BEADING ROLLS BY TURNING KNOBS UNTIL A SLIGHT DEPRESSION IS MADE ON THE SHANK OF THE FERRULE, THEN ROTATE BEADING HEAD ONE REVOLUTION. ADVANCE BEADING & ROTATE HEAD UNTIL BEAD OF DESIRED DEPTH IS OBTAINED.

(M) REPEAT PROCEDURE WITH OTHER END OF CABLE.

(N) SCREW ADAPTORS, (ITEM 4) INTO COUPLING NUTS, (ITEM 2) HAVING FIRST COATED THE THREADS WITH (ITEM 21).

(O) ALLOW NUTS TO TURN FREELY ON FERRULES.

(P) HEAT OUTER PART OF NUTS (ITEM 2) WITH SOLDERING IRON TO HARDEN CEMENT.

(Q) CUT SHIELDED LOOM (ITEM 16) TO "LENGTH AS REQUIRED" PLUS 2 INCHES.

(R) CUT WIRES (ITEMS 7 TO 13) TO LENGTH AS REQUIRED PLUS 5 INCHES, STRIP & TIN THE ENDS OF EACH WIRE 3/16".

(S) PULL WIRES (ITEMS 8 & 9) THROUGH ONE PIECE OF LOOM (ITEM 16) & WIRES 10 & 11 THROUGH OTHER PIECE OF LOOM.

(T) STRIP WIRE (ITEM 7) FOR DISTANCE OF 1/2" STARTING 3" FROM EACH END.

(U) WRAP BOTH PIECES (ITEM 16) & EXPOSED PORTION OF (ITEM 7) TOGETHER WITH (ITEM 14) COAT AREA WITH (ITEM 20).

(V) LAY WIRES (ITEMS 12 & 13) ALONG ASSEMBLY ABOVE DESCRIBED SUCH THAT TOTAL DIAMETER OF WIRE BUNDLE DOES NOT EXCEED 5/8".

(W) PULL WIRE BUNDLE THROUGH CONDUIT (ITEM 1),

(X) DISASSEMBLE (ITEM 6) HAVING LOOSENED SCREW "X".

(Y) DISASSEMBLE CONNECTOR (ITEM 17) BY REMOVING 4 SCREWS.

(Z) PULL BUNDLE OF WIRES THROUGH SHELLS OF CONNECTORS & SLIP TUBING (ITEM 19) OVER EACH WIRE.

(AA) SOLDER WIRES, (ITEMS 7 TO 13) INTO TERMINALS OF PLUGS (ITEMS 6 & 17) BEING SURE THAT WIRES 7 TO 13 CONNECT TO TERMINALS S,C,D,E,F,B AND A, RESPECTIVELY.

(BB) SLIP (ITEM 19) INTO POSITION & ANCHOR WITH (ITEM 18) FIRST HAVING COVERED ALL SOLDERED JOINTS WITH (ITEM 22).

(CC) WRAP BUNDLE OF WIRES AT EACH END WITH (ITEM 15) OVER AREA SHOWN.

(DD) ASSEMBLE CONNECTORS & FASTEN CONNECTORS TO CABLE BY TIGHTENING NUTS (ITEM 2) STRETCHING CONDUIT (ITEM 1) TO PERMIT WIRES TO ENTER CABLE.

(EE) WRAP CABLE MARKER (ITEM 5) AROUND CONDUIT IN POSITION SHOWN, THREADING TAB THROUGH SLOT & BENDING BACK ON ITSELF.

(FF) CUT OFF EXCESS TAB, ALLOWING 1/4" TO BEND BACK.

(GG) ANCHOR TAB USING (ITEM 20) COVER JOINT WITH (ITEM 22).

THE FOLLOWING TOOLS SUPPLIED BY THE AMERICAN BRASS CO., WATERBURY, CONN., ARE REQUIRED:

AMERICAN NO. 1 FERRULE ATTACHING MACHINE
PLUG #8473-2-P
DIE #8473-2-G

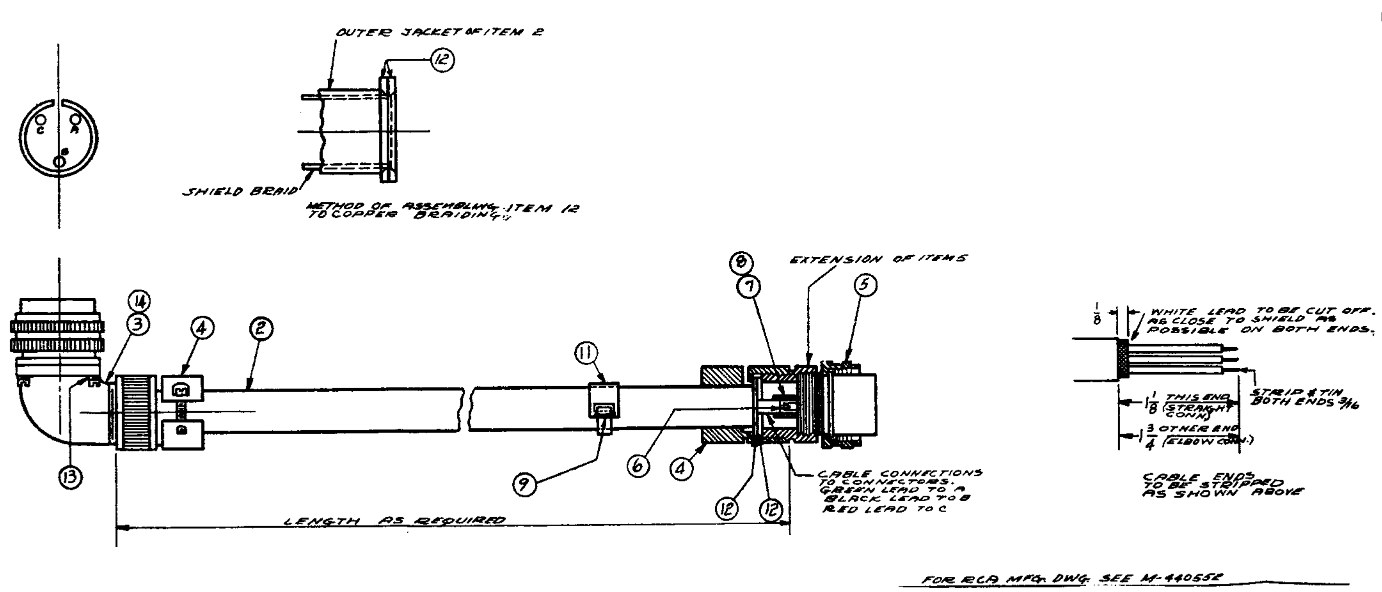
THE FOLLOWING ADDITIONAL TOOLS ARE REQUIRED:

HACKSAW WITH FINE TOOTH BLADE
SOLDERING IRON — SCREW DRIVER
SHARP KNIFE — PLIERS (LONG NOSE)
WIRE STRIPPING TOOL — FILE

Figure 33—Loop Cable Assembly
(T-620792-1)

ITEM	RCA REFERENCE	OTHER REFERENCE	DESCRIPTION
2	M-440552-2		4 CONDUCTOR, AWG #14, EACH 37 TO 41 STRANDS AWG #30 BARE COPPER WIRE, VINYLITE INSULATED, COTTON BRAID COVERED, TINNED COPPER BRAID SHIELD, COVERED BY VINYLITE O.D. 0.490" +0.000" -0.020" BLACK, SUPPLIED IN 12' LENGTH.
3	K-865495-1	AMER. PHENOLIC CORP. AN-3108-P8, 14S-1S	CONNECTOR (ALUM. ALLOY BODY, 90° 3/4" X 20" THREADS).
4	K-880987-2		CABLE CLAMP (MAX. CABLE 1/2" DIA., 3/4" X 20" THREADS).
5	K-856849-4		CONNECTOR (ALUM. ALLOY BODY, TYPE AN-3106-PA, 3/4" X 20" THREADS).
6	K-864937-3		SLEEVING (BRASS, HOT TIN DIPPED).
7	PS-50		VARNISHED TUBING (0.166" I.D. X 5/8" LONG, BLACK).
8	K-57431-5		GLYPTAL CEMENT (G.E. #1276).
9			SOLDER (KESTER ROSIN CORE 50% TIN-50% LEAD).
10	NOT USED		
11	24840-2		CABLE MARKER (NAMEPLATE).
12	K-880994-2		WASHER, BRASS, 7/16" I.D. X 5/8" O.D.
13	K-59048-31		LOCKWASHERS, #6, STAINLESS STEEL.
14	M-253474-19		SAME AS ITEM 3 EXCEPT WITH SPLIT SHELL. THIS ITEM NOT SUPPLIED IN ADDITION TO ITEM 3 BUT AT TIMES IS SHIPPED IN PLACE OF ITEM 3.

M-427653



PROCEDURE FOR FABRICATING DYNAMOTOR CABLES

(A) CUT CABLE (ITEM 2) TO LENGTH AS REQUIRED, ADDING 2" FOR STRIPPING.

(B) WITH A SHARP KNIFE CUT COMPLETELY AROUND THE VINYLITE COATING 1-1/8" FROM ONE END OF THE CABLE AND 1-3/4" FROM THE OTHER END AS SHOWN, BEING CAREFUL NOT TO CUT INTO THE TINNED COPPER BRAID.

(C) REMOVE COVERING BY PEELING FROM INSIDE TOWARD END OF CABLE.

(D) CUT BRAID COMPLETELY AROUND AND REMOVE, LEAVING 1/8" OF BRAID EXTENDING BEYOND THE OUTER VINYLITE COVERING AS SHOWN. CUT OFF FRAYED ENDS OF COTTON COVERING.

(E) CUT OFF WHITE LEAD AT BOTH ENDS OF CABLE AS CLOSE TO BRAID AS POSSIBLE.

(F) STRIP AND TIN EACH END OF REMAINING LEADS FOR 3/16".

(G) SLIDE ONE OF CABLE CLAMPS (ITEM 4), CLAMP-END FIRST, ONTO EACH END OF CABLE.

(H) TAKING ONE END OF CABLE, FIT ONE WASHER (ITEM 12) OVER THE 1/8" OF BRAID EXTENDING BEYOND THE CABLE INSULATION AS SHOWN.

(I) TURN BRAID AGAINST OUTER SURFACE OF WASHER (ITEM 12) AND SOLDER. TRIM OFF BRAID EXTENDING BEYOND THE CIRCUMFERENCE OF THE WASHER. DO SAME AT OTHER END OF CABLE.

(J) AT CABLE END HAVING SHORTER LEADS, PLACE ANOTHER WASHER (ITEM 12) AGAINST SOLDERED WASHER.

(K) SLIP VARNISHED TUBING (ITEM 7) OVER EACH LEAD.

(L) FILE DOWN TERMINALS ON CONNECTORS (ITEMS 5, AND 3 OR 14) TO 3/16" LONG. SOLDER SLEEVING (ITEM 6) ON EACH TERMINAL OF EACH CONNECTOR.

(M) SLIP EXTENSION OF (ITEM 5), OUTSIDE THREADED END FIRST, OVER THE THREE LEADS.

(N) SOLDER GREEN, BLACK, AND RED LEADS INTO THE SLEEVING OF TERMINALS A, B, AND C RESPECTIVELY.

(O) SLIDE TUBING (ITEM 7) INTO POSITION AND ANCHOR (ITEM 8).

(P) ASSEMBLE CONNECTOR (ITEM 5) TO ITS EXTENSION.

(Q) SCREW CABLE CLAMP (ITEM 4) TO EXTENSION OF (ITEM 5) AND TIGHTEN CLAMP SCREW.

(R) DISASSEMBLE ELBOW CONNECTOR (ITEM 3). SLIDE SHELL OF CONNECTOR, THREADED END FIRST, OVER LEADS OF OTHER END OF CABLE. NOTE: IF (ITEM 14) HAS BEEN SUPPLIED INSTEAD OF (ITEM 3), THE SHELL OF THE CONNECTOR MAY BE PLACED AROUND THE LEADS AFTER THEY HAVE BEEN SOLDERED TO THE TERMINALS OF THE CONNECTOR, BUT THE INSIDE THREADED COUPLING NUT OF THE CONNECTOR MUST BE PLACED, FLANGE END FIRST, OVER THE LEADS BEFORE SOLDERING.

(S) SLIP VARNISHED TUBING (ITEM 7) OVER EACH LEAD.

(T) SOLDER GREEN, BLACK, AND RED LEADS INTO SLEEVING OF TERMINALS A, B, AND C RESPECTIVELY OF (ITEM 3 OR 14).

(U) SLIDE (ITEM 7) INTO POSITION AND ANCHOR (ITEM 8).

(V) ASSEMBLE CONNECTOR (ITEM 3) USING 4 MACHINE SCREWS AND LOCKWASHERS (ITEM 13) AND ANCHOR MACHINE SCREWS WITH (ITEM 8). ASSEMBLE CONNECTOR (ITEM 14) BY PULLING COUPLING NUT OVER TERMINAL INSERT OF CONNECTOR AND CLAMPING SHELL OF CONNECTOR AROUND END OF INSERT. BEFORE TIGHTENING SCREWS OF SHELL BE SURE KEY IS LINED WITH KEY-WAY OF INSERT.

(W) WRAP CABLE MARKER (ITEM 11) AROUND CABLE IN POSITION SHOWN, THREADING TAB THROUGH SLOT AND BENDING TAB BACK ON ITSELF.

M-427653

(X) CUT OFF END OF TAB, ALLOWING 1/4" TO BEND BACK.

(Y) ANCHOR TAB WITH (ITEM 9).

THE FOLLOWING TOOLS ARE REQUIRED:

- HACKSAW WITH FINE TOOTH BLADE
- SOLDERING IRON
- PLIERS (LONG NOSE)
- WIRE STRIPPING TOOL
- SHARP KNIFE
- FILE

Figure 34—Dynamotor Cable Assembly (M-427653)

ITEM	RCA REFERENCE	OTHER REFERENCE	DESCRIPTION
2	M-440551-2		4 CONDUCTOR, AWG #14, EACH 40 STRANDS AWG #30 BARE COPPER WIRE, VINYLITE INSULATED, COTTON BRAID COVERED, BRAIDED TINNED COPPER SHIELD, COVERED BY VINYLITE, O.D. 0.490" +0.000" -0.020" BLACK, SUPPLIED IN 10' LENGTH.
3	K-865495-2	AMER. PHENOLIC CORP. 16S-4S	CONNECTOR (ALUM. ALLOY BODY, TYPE AN-3108-PB90, 7/8" X 20" THREADS).
4	K-880987-3	AMER. PHENOLIC CORP. CAT. #9771	CABLE CLAMP (MAX. CABLE 5/8" DIA., 7/8" X 20" THREADS).
5	K-880987-2	AMER. PHENOLIC CORP. CAT. #9771	CABLE CLAMP (MAX. CABLE 1/2" DIA., 3/4" X 20" THREADS).
6	K-880994-2		WASHER, BRASS, 7/16" I.D., 5/8" O.D.
7	K-880994-3		WASHER, BRASS, 7/16" I.D., 3/4" O.D.
8	K-57431-5		GLYPTAL CEMENT (G.E. #1276).
9	K-874099-3		SOLDER (KESTER ROSIN CORE, 50% TIN-50% LEAD).
10	NOT USED		
11	24840-3		CABLE MARKER (NAMEPLATE)
12	K-864937-2		SLEEVING (BRASS, HOT TIN DIPPED)
13	PS-50		VARNISH TUBING (0.166" I.D. X 5/8" LONG, BLACK).
14	K-59048-31		LOCKWASHERS, #6, STAINLESS STEEL.
15	M-253474-2	AMER. PHENOLIC CORP. 16S-4S	SAME AS ITEM 3 EXCEPTING WITH SPLIT SHELL. NOT SUPPLIED IN ADDITION TO ITEM 3 BUT AT TIMES SHIPPED IN PLACE OF ITEM 3.

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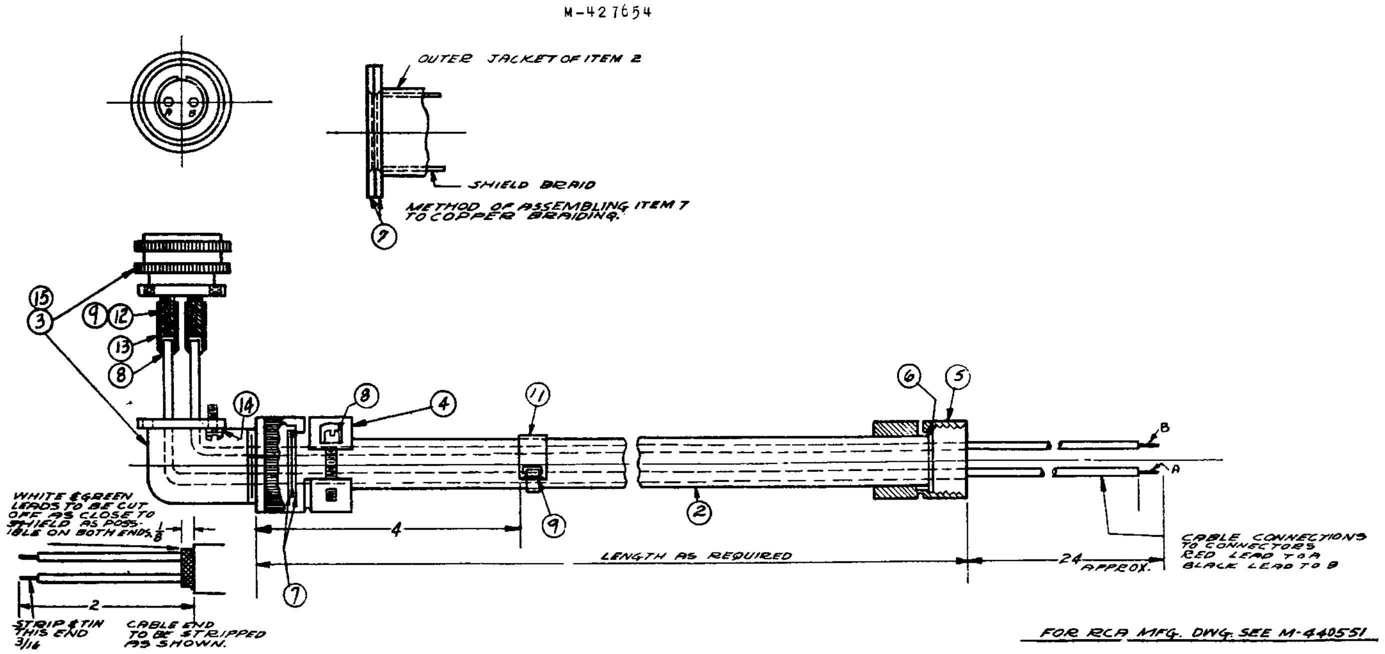

PROCEDURE FOR FABRICATING POWER CABLE

(A) CUT CABLE (ITEM 2) TO LENGTH AS REQUIRED PLUS 27".

(B) WITH A SHARP KNIFE CUT COMPLETELY AROUND VINYLITE COATING, 2" FROM ONE END OF CABLE AND 25" FROM THE OTHER END, BEING CAREFUL NOT TO CUT INTO TINNED COPPER BRAID.

(C) PEEL COVERING FROM CABLE FROM INSIDE TOWARD OUTER END.

(D) CUT COMPLETELY AROUND THE COPPER BRAID AT EACH CABLE END, AND REMOVE, LEAVING 1/8" OF BRAID EXTENDING BEYOND THE OUTER INSULATION AS SHOWN. CUT OFF FRAYED ENDS OF COTTON COVERING.

(E) CUT OFF WHITE AND GREEN LEADS AT BOTH ENDS OF CABLE AS CLOSE TO SHIELD AS POSSIBLE.

(F) STRIP AND TIN EACH END OF REMAINING RED AND BLACK LEADS FOR 3/16".

(G) SLIDE ONE OF CABLE CLAMPS (ITEM 4), CLAMP END FIRST, ONTO EACH END OF CABLE.

(H) TAKING ONE END OF CABLE, FIT ONE WASHER (ITEM 7) OVER THE 1/8" OF BRAID EXTENDING BEYOND THE CABLE INSULATION AS SHOWN.

(I) TURN BRAID AGAINST OUTER SURFACE OF WASHER AND SOLDER. TRIM OFF BRAID EXTENDING BEYOND CIRCUMFERENCE OF WASHER. DO SAME AT OTHER END OF CABLE.

(J) TAKING THE CABLE END WITH THE SHORTER LEADS, PLACE ANOTHER WASHER (ITEM 7) AGAINST SOLDERED WASHER.

(K) DISASSEMBLE ELBOW CONNECTOR (ITEM 3 OR 15). FILE DOWN TERMINALS ON CONNECTOR TO 3/16" LONG AND SOLDER SLEEVING (ITEM 12) TO EACH TERMINAL.

(L) SLIDE SHELL OF CONNECTOR, THREADED END FIRST, OVER LEADS OF CABLE.

NOTE: IN THE CASE OF (ITEM 15), THE SHELL OF THE CONNECTOR MAY BE PLACED AROUND THE LEADS AFTER THEY HAVE BEEN SOLDERED TO THE TERMINALS OF THE CONNECTOR; BUT THE INSIDE THREADED COUPLING NUT OF THE CONNECTOR MUST BE PLACED, FLANGE END FIRST, OVER THE LEADS BEFORE SOLDERING.

(M) SLIP VARNISHED TUBING (ITEM 13) OVER EACH LEAD.

(N) SOLDER RED LEAD TO TERMINAL A AND BLACK LEAD TO TERMINAL B OF THE CONNECTOR.

(O) SLIDE (ITEM 13) INTO POSITION AND ANCHOR (ITEM 8).

(P) ASSEMBLE CONNECTOR (ITEM 3) USING 4 MACHINE SCREWS AND LOCKWASHERS SUPPLIED.

ASSEMBLE CONNECTOR (ITEM 15) BY PULLING COUPLING NUT OVER TERMINAL INSERT OF CONNECTOR, AND CLAMPING SHELL OF CONNECTOR AROUND END OF INSERT. BEFORE TIGHTENING SCREWS OF SHELL BE SURE KEY IS LINED WITH KEY-WAY OF INSERT.

(Q) WRAP CABLE MARKER (ITEM 11) AROUND CABLE IN POSITION SHOWN, THREADING TAB THROUGH SLOT AND BENDING TAB BACK ON ITSELF.

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(R) CUT OFF END OF TAB, ALLOWING 1/4" TO BEND BACK.

(S) ANCHOR TAB WITH (ITEM 9).

THE FOLLOWING TOOLS ARE REQUIRED:

- HACKSAW WITH FINE TOOTH BLADE
- SOLDERING IRON
- PLIERS (LONG NOSE)
- WIRE STRIPPING TOOL
- SHARP KNIFE
- FILE

Figure 35—Power Cable Assembly (M-427654)