INSTRUCTION BOOK

for

NAVY MODELS TBL-5/6/7/12/13

Radio Telegraph Transmitting Equipment

NAVSHIPS
900,381

MANUFACTURED
BY

Westinghouse Electric & Manufacturing Company

Radio Division — Baltimore, Maryland

FOR

U. S. NAVY DEPARTMENT — BUREAU OF SHIPS

CONTRACT NOs-69919 I.B. 7292 Approved 20 Feb. 1945
CONTRACT NOs-69919 (Supplementary)
CONTRACT NOs-97922
CONTRACT NXss-17132
CONTRACT NXsr-38684

NAVY DEPARTMENT
BUREAU OF SHIPS
WASHINGTON, D.C.

20 Feb. 1945
(Date of Approval)

1. NAVSHIPS 900,381 is a restricted, non-registered instruction book covering the installation, operation and maintenance of TBL-5/6/7/12/13 Transmitting Equipments.

2. When superseded by a later edition, or when no longer required, this publication should be destroyed. No report of such destruction is required.

3. Spare Parts lists for the equipment are contained in NAVSHIPS 900,383-(1). The parentheses represent a number which identifies a spare parts list applying to specific contracts.

4. A copy of the appropriate spare parts catalog should accompany each copy of NAVSHIPS 900,381.

5. Copies of the instruction book or appropriate spare parts catalog (for contract number see equipment nameplate) should be obtained from the nearest Radio Material Pool.

/s/ J. B. Dow
By direction

SECURITY NOTICE

RECORD OF CORRECTIONS MADE

CHANGE NO.	DATE	SIGNATURE OF OFFICER MAKING THE CORRECTION

TEMPORARY CORRECTION T-3 TO TECHNICAL MANUAL FOR: RADIO TELEGRAPH TRANSMITTING EQUIPMENT MODELS TBL-12/13 NAVSHIPS 900,381

This temporary correction changes the manual to reflect the equipment changes made by Field Changes 8-TBL-12 and 8-TBL-13. These field changes apply to Radio Telegraph Transmitting Equipment Model TBL-12 or TBL-13 when Power Supply PP-1211/U is connected to Radio Telegraph Transmitting Equipment Model TBL-12 or TBL-13. The purpose of Field Change 8-TBL-12 or 8-TBL-13 is to provide wiring changes to Radio Telegraph Transmitting Equipment Model TBL-12 or TBL-13 which when combined with wiring changes of Field Change 1-PP-1211/U, eliminate a high-voltage safety hazard from Power Supply PP-1211/U.

Holders of equipment accompanied by technical manuals shall not make this correction in the manuals until the accomplishment of Field Change 8-TBL-12 or 8-TBL-13.

For combinations of Power Supply PP-1211/U with Radio Telegraph Transmitting Equipment Model TBL-12 or TBL-13, make the following changes to NAVSHIPS 900,381. Insert this temporary Correction in Technical Manual 900,381 immediately after the front cover.

NOTE: The only Radio Telegraph Transmitting Equipment Model TBL-12 or TBL-13 affected by Field Changes 8-TBL-12 and 8-TBL-13 are: Those connected to Power Supply PP-1211/U. Therefore, make Temporary Correction T-3 to Technical Manual NAVSHIPS 900,381 only when it is to be used with Radio Telegraph Transmitting Equipment Model TBL-12 or TBL-13 connected to Power Supply PP-1211/U.

Figure 10-38 - "Interconnection Diagram, Model TBL-7/12/13 for 115/230 V.D.C. Power Supply (Dwg. 7608923)", make the following pen and ink changes:

1. Cross out connections to Terminals 7 through 16. Cross out the solid line connection to Terminal 17. Cross out connections to Terminals 18 through 22. At Terminal 23 allow the ground symbol to remain connected, but cross out the lead to the filter unit.
2. Cross out the filter unit, magnetic controller, and the motor generator unit.
3. At the bottom of the page write:
   "For power connections, see Figure 1 of Temporary Correction T-3 in the front of this book."
   "Corrected for Field Change 8-TBL-12 and 8-TBL-13."

Figure 10-42 - "Schematic Diagram, Model TBL-7/12 for 115/230 V.D.C. Power Supply (Dwg. 7300491)" and "Schematic Diagram, Model TBL-13 for 115/230 V.D.C. Power Supply (Dwg. 73007211)" make the following pen and ink corrections to the applicable Schematic:

1. Locate the side of Switch S24 which connects Fuse F3 to Terminal GG. Make a direct short from the switch side of Fuse F3 to Terminal GG. Cross out the connections to S24.

2. Locate the side of Switch S24 which connects Fuse F4 to Terminal KK. Make a direct short from the switch side of Fuse F4 to Terminal KK. Cross out the connections to S24 including the one to K2A. (All Terminals of S24 are now disconnected)
3. Between terminals 12 and 21 draw a small circle to represent a terminal. Number it "13".
4. Locate the connection between Terminal 7 and Terminal C. Cross out the section between Terminal 7 and the first junction. (Where R3 connects)
5. Connect the side of S24 which is at the bottom of the page, between Terminals 7 and 13.
6. Cross out the connection between Terminal 22 and Switch S36. Cross out the connection at the arm of S36. Connect the line that went to the arm, to the third terminal of S36 - the terminal connecting to S35 and Fuse F4.
7. Connect the Terminal JJ side of K3-B to Terminal 17. Cross out the connection between Terminal JJ and K3-B.
8. Cross out the Magnetic Controller, the Filter unit, 115 or 230 V.D.C. Motor, H.V. Generator, and L.V. and Bias Generator.
9. At the input terminals of the transmitter, cross out the following connections:
   20 to P1
   7 to P4
   12 to S150
   21 to P2
   8 to T4
   9 to T5
   11 to F(+)
   22 to R152
   14 to C151
   15 to L151
   16 to C152
   10 to R150
   17 to L150
   18 to 2000(-)
   19 to C150
   23 to C150
10. Find Terminal 64 at R151 in the Filter Unit. Cross out the connection at Terminal 64.
11. At the bottom of the page write the following:
    "For power connections, see Figure 1 of Temporary Correction T-3 in the front of this manual."
    "Corrected for Field Change 8-TBL-12" or "Corrected for Field Change 8-TBl-13". (Depending on schematic changed)

Figure 10-43 "Schematic Diagram, Model TBL-13 for 115/230 V.D.C. Power Supply (Dwg. 7300721)," make the following pen and ink corrections:

1. At Terminal 19, cross out the number "19". Replace the number "19", with the number "23".
2. At Terminal 23, cross out the number "23". Replace the number "23" with the number "19".

Figure 10-49 "Wiring Diagram, Transmitter Right-Hand Frame, TBL-7/12/13 for 115/230 V.D.C. Power Supply (Dwg. 7300493)," make the following pen and ink corrections:

1. Looking at Switch S-24 with the page in the normal upright position, cross out the connections to the two left terminals on Switch S24. Join the two disconnected wires. Cross out the connections to the two right terminals of the switch. Join those two wires. Draw an arrow with the back end connected to the top left terminal of S24 and the point headed toward the top of the page. Draw an arrow with the back end connected to the bottom left terminal on S24 and the point headed toward the top of the page. Draw a circle with a ground symbol connected to it around the two arrows. In front of the arrow points write:
   "To Terminals 7 and 13 (RG-108)"
2. At the bottom of the page write:
   "Corrected for Field Change 8-TBL-12 and 8-TBL-13."

Figure 10-51 "Wiring Diagram, Transmitter Left-Hand Frame, TBL-7/12/13 for 115/230 V.D.C. Power Supply (Dwg. 7300494)," make the following pen and ink corrections.

1. Cross out the connecting wire between No. 6 or Relay K-3 and Terminal JJ. Draw a new wire from No. 6 of Relay K-3 to Terminal 17. (Terminal 17 is at the right hand top of the page - to the left of "SECTION X" and below the word "Restricted".)
2. Cross out the wire connecting Terminal 72 to Switch S36.
3. Find the wire from Terminal E to Switch S36. Cross out the end of this wire that connects to S36. Connect the wire instead to the terminal on S35 which has three wires connected to it. (Looking at the page in the normal upright position, this is the lower left terminal) Draw an arrow pointing to Switch S35. Near the arrow write:
   "The new connection is to the jumper bar connecting S35 to S36."
4. Connect the back end of an arrow to Terminal 7 and point the arrow to the bottom of the page. Draw a similar arrow from Terminal 13. Draw a circle around the arrows and connect a ground symbol to the circle. Connect the ground symbol to Terminal 23. In front of the arrow point write: "To upper terminals of S24".
   Below, write:
   "(RG-108 with shielding grounded at Terminal 23)"
5. Cross out the short wire between Terminal 7 and Terminal C.
6. At the bottom of the page, write:
   "Corrected Field Change 8-TBL-12 and 8-TBL-13."

TBL-12 or TBL-13 Terminal Board (CAY-52247 or CAY-52248) Terminal	PP-1211/U Terminal Board
20	+230 VDC
21	-230 VDC
8 and 9	220 VAC
10	+250 VDC
11	-250 VDC
14	+1000 VDC
15	-1000 VDC
16	B
17	C
18	-2000 VDC
19	+2000 VDC
7 and 13	Switch

Connections between Power Supply PP-1211/U and
Radio Telegraph Transmitting Equipment
Model TBL-12 or TBL-13

Figure I

Temporary Correction T-2 to Instruction Book for Radio Transmitters TBL-5/6/7/12/13, NAVSHIPS 900, 381.

Temporary Correction T-2 is effective upon receipt.

Insert this temporary correction immediately after front cover of NAVSHIPS 900, 381. Record in RECORD OF CORRECTIONS MADE chart, page A of NAVSHIPS 900, 381.

Make all changes with red ink and identify with asterisk. In margins of modified pages enter "*F. C. #7 TBL-5/6/7/12/13."

Page 9-14

Under present C-102 enter "C-103". In function column, enter "I-F coupling". In description column, enter "Same as C-80". In Navy Type and Navy Spec columns, enter "FSN N5910-191-6806".

Page 9-27

Under present J-1 enter "J-2". In function column,enter "Antenna Jack". In description column,enter "Coaxial Receptacle". In Navy Type Number column,enter "UG-58A/U". In Navy Spec Number column,enter "FSN N5935-149-3483".

Page 9-74

Under present R-57,enter "R-58". In function column, enter "R-f limiting". In description column,enter "500 ohm, 37 watt". In Navy Type column, enter "RW22G501". In Navy Spec column, enter "MIL-R-26C".

Pages 10-33 through 10-40, Figures 10-37 through 10-40

Select the Interconnection Diagram applicable to the transmitter in use. At antenna terminal enter symbol "J-2". Draw line through "3/8 DIA COPPER TUBING" and directly above,write "RG-8/U". Draw line through words "to ANTENNA" and directly above, write "TO TRANSMITTER COUPLER CU-402/SRT". Within the transmitter box draw lines vertically upward from terminals 2, 3, and 17. Terminate these lines in a single horizontal line leading to the left and downward to clear area adjacent to Control Unit diagram and terminate with arrow pointing to new note "MSCA-7 CABLE TO TRANSMITTER CONTROL CIRCUITS OF CONTROL-MONITOR C-1360 ( )/SRT". Also, within transmitter block, draw a block symbol for L6 and terminal 1 thereon. Draw line from this terminal 1 to new cable. From terminal 1 of L6, draw symbol of resistor to ground. Identify resistor as R58.

Pages 10-41 through 10-54, Figures 10-42 through 10-47

Select Schematic Diagram applicable to the transmitter in use. At terminal symbol directly under antenna (triangle), enter symbol J-2. In I-F Section antenna tuning curcuit, enter new capacitor symbol C103 in series with lead from L29 to M12. Show disconnection XXX of L6 and R8 from ground symbol. Draw one inch line and arrow to left from bottom terminal junction of L6 and R8. Mark this line with asterisk. From terminal 1 of L6, draw symbol of resistor R-58. Connect R58 to ground. Draw one inch lines and arrows from terminals 2, 3 and 17 and mark with asterisk. In clear area at lower right, enter note, "*MSCA-7 CABLE TO TRANSMITTER CONTROL CIRCUITS IN CONTROL MONITOR C-1360 ( )/SRT. F.C. #7 TBL-5/6/7/12/13".

Pages 10-55 through 10-58, Figures 10-48, 10-49
Pages 10-63 through 10-66, Figures 10-52, 10-53

Select Wiring Diagram applicable to transmitter in use. In top of diagram in lead from M12 to insulator insert new capacitor C103. Cross out wire symbol A and on either side of new capacitor, write "#12 wire". Delete symbol ANT on vertical lead from S18 and insert J2.

Pages 10-59 through 10-62, Figures 10-50, 10-51
Pages 10-67 through 10-72, Figures 10-54, 10-55, 10-56

Select Wiring Diagram applicable to transmitter in use. At right side of diagram show disconnection XXX of ground from terminal 1 junction of L6 and R8. Show new resistor R58 connected between terminal 1 junction of L6/R8 and ground. Draw one inch line and arrow to the right and enter note, "TO TRANSMITTER CONTROL CIRCUITS OF CONTROL-MONITOR C-1360 ( )/SRT. F.C. #7 TBL 5/6/7/12/13".

TEMPORARY CORRECTION T-1 TO TECHNICAL MANUAL FOR RADIO TRANSMITTING EQUIPMENT TBL - - - -- - NAVSHIPS 900,381

Temporary Correction T-1 does not apply to the Technical Manual UNTIL Field Change No. 1-TBL has been accomplished and tested. THEREFORE - DO NOT correct the Technical Manual until the Field Change has been accomplished.

Field Change No. 1-TBL applies to Models TBL-6 and TBL-7 radio equipments. Its purpose is to rectify errors in the labeling of the band change switch, steps #6 and #7 on the equipment and in the technical manual.

This technical manual correction material was originally published in EMB Chapter 9, Change 5, of August 1954, as follows:

> Correct error in instruction books of the TBL-5/6, page 295, figure 43, and of the TBL-7, page 205, figure 35.

This Technical Manual correction material was originally published in the EMB, Chapter 9, Change 5, of August 1954.

CORRECTION TO MODEL TBL-13 INSTRUCTION BOOK AND MODELS TBL-5/6/7/12/13 INSTRUCTION BOOK, NAVSHIPS 900,381.

A correction should be made in the schematic diagram (drawing 7300720) which applies to the 220/440-volt, 3 phase, 60 cycle, a-c power supply of the model TBL-13 transmitter. The diagram appears in two books; the model TBL-13 preliminary instruction book, and the final instruction book for models TBL-5/6/7/12/13, NAVSHIPS 900,381. The lead from the second amplifier plate-current meter (M-8) is connected to the leads from meters M-5 and M-11, and the diagram should be altered to show the connection as in Figure 1.

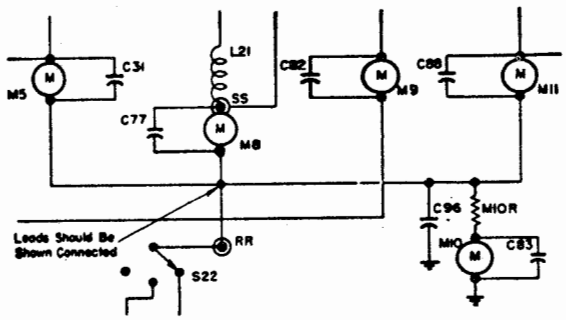

FIGURE 1.--Correction in schematic diagram of TBL-13 power supply

INSTRUCTION BOOK CORRECTION FOR MODELS TBL-5/-6/-7/-12/-13 TRANSMITTING EQUIPMENT,NAVSHIPS 900,381.

Figures 10-43 and 10-47 in the instruction book for Models TBL-5/-6/-7/-12/-13 transmitters, NAVSHIPS 900,381, are in error and should be corrected to be in conformance with the respective equipment. These figures are schematic diagrams of the Model TBL-13 transmitter. On both schematics, the numerals 19 and 23, identifying terminals on the +2000 V lead and ground, should be reversed. The terminal for the + 2000 V lead should be marked "19" and the ground lead should be marked "23". In addition, a connection should be shown from terminal 23 to ground on the schematic in figure 10-47.

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CONTRACTUAL GUARANTEE

THE EQUIPMENT, INCLUDING ALL PARTS AND SPARE PARTS, EXCEPT VACUUM 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 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 DEFECTIVE DESIGN, AND AS CONDITION OF CONTRACT SUBJECT TO ONE HUNDERD 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 SOME 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.

x

CONTRACTUAL GUARANTEE—Continued

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.

(1) ON NAVY CONTRACTS NOs-69919 (TBL-5) AND NOs-69919 SUPPLEMENTARY (TBL-6) ALL TYPE_860 AND TYPE_803 TUBES WILL BE COVERED BY A 1000-HOUR SERVICE LIFE GUARANTEE AS DEFINED IN RE-13A-600B.

(2) ON NAVY CONTRACTS NOs.-97922 (TBL-7), NXss-17132 (TBL-12) AND NXsr.-38684 (TBL-13) ALL TYPE_860 AND TYPE _803 TUBES WILL BE COVERED BY A 1000-HOUR SERVICE LIFE GUARANTEE AS DEFINED IN RE-13A-600E.

(3) TUBES SMALLER THAN 50-WATT SIZE ARE NOT USED IN THIS EQUIPMENT.

(4) WE CERTIFY THAT THE TRANSMITTING TUBES, TYPE CWL 860 AND CWL 803, AS USED IN THE MODEL TBL—5/6/7/12/13 EQUIPMENTS, WILL HAVE A LIFE EXPECTATION OF 2,000 HOURS RESPECTIVELY FOR FULL POWER KEYED OPERATION, PROVIDING THE EQUIPMENT IS PROPERLY OPERATED ACCORDING TO THE INSTRUCTIONS SUPPLIED HEREWITH.

IN THE MANUFACTURE OF THIS EQUIPMENT, NO ITEMS OF FOREIGN MANUFACTURE, GROWTH, OR PRODUCTION WILL BE USED WHEN EQUIVALENT ITEMS ARE MANUFACTURED IN THE UNITED STATES.

INSTRUCTIONS TO OPERATING PERSONNEL
REGARDING REPORT OF FAILURE

Report of failure of any part of this equipment, during its service life, shall be made to the Bureau of Ships in accordance with current instructions. The report shall cover all details of the failure and give the date of installation of the equipment. For procedure in reporting failure see Chapter 67 of the "Bureau of Ships Manual", or superseding instructions.

Contract NOs-69919 Date Nov. 22, 1939, Contract NOs-69919 (Supplementary) Date March 14, 1941, Contract NOs-97922 Date Sept. 28, 1942, Contract NXss-17132 Date May 26, 1943, Contract NXsr-38684 Date Sept. 28, 1943.

Serial Number of Equipment_____

Date of Acceptance by Navy, Month_____ Day_____ Year____

Date of Delivery to Contract Destination, Month_____ Day____ Year____

Date of Completion of Installation, Month_____ Day_____ Year____

Date Placed in Service, Month_____ Day_____ Year_____

Blank spaces on this page shall be filled in at the time of installation. Operating personnel shall also mark the "date placed in service" on the date of acceptance plate located below the model nameplate on the equipment, using suitable methods to avoid damaging the equipment.

All requests or requisitions for replacement material should include complete descriptive data covering the part desired, in the following form:

1. Name of Part desired.
2. Federal Stock Number (if assigned).
3. Navy Type number (if assigned) (including *prefix* and *suffix* as applicable).
4. Commercial designation.
5. Model designation (including *suffix*) of equipment in which used.
6. Navy Type designation (including *prefix* and *suffix* where applicable) of major unit in which part is used.
7. Contract, purchase order, requisition, etc., under which the equipment was procured.
8. Circuit symbol designation of part.
9. (a) Navy drawing and/or specification number. (Include part or group number).
   (b) Manufacturer's drawing or specification's number. (Include part or group number).
10. Rating or other descriptive data.

WARNING

The attention of officers and operating personnel is directed to Chapter 67 of the Bureau of Ships Manual or superseding instructions on the subject of Radio-Safety precautions to be observed.

While every practicable safety precaution has been incorporated in this equipment, the following rules must be strictly observed:

KEEP AWAY FROM LIVE CIRCUITS. Operating personnel must at all times observe all safety regulations. Do not change tubes or make adjustments inside equipment with high voltage supply on. Under certain conditions dangerous potentials may exist in circuits with power controls in the off position due to charges retained by capacitors. To avoid casualties always remove power and discharge and ground circuits prior to touching them.

DON'T SERVICE OR ADJUST ALONE. Under no circumstances should any person reach within or enter the enclosure for the purpose of servicing or adjusting the equipment without the immediate presence or assistance of another person capable of rendering aid.

DON'T TAMPER WITH INTERLOCKS. Do not depend on door switches or interlocks for protection but always shut down motor-generators or other power equipment. Under no circumstances should any access gate, door or safety interlock switch be removed, short circuited, or tampered with in any way, by other than authorized maintenance personnel, nor should reliance be placed upon the interlock switches for removing voltages from the equipment.

RESUSCITATION

AN APPROVED POSTER ILLUSTRATING THE RULES FOR RESUSCITATION BY THE PRONE PRESSURE METHOD SHALL BE PROMINENTLY DISPLAYED IN EACH RADIO, RADAR OR SONAR ENCLOSURE. POSTERS MAY BE OBTAINED UPON REQUEST TO THE BUREAU OF MEDICINE AND SURGERY.

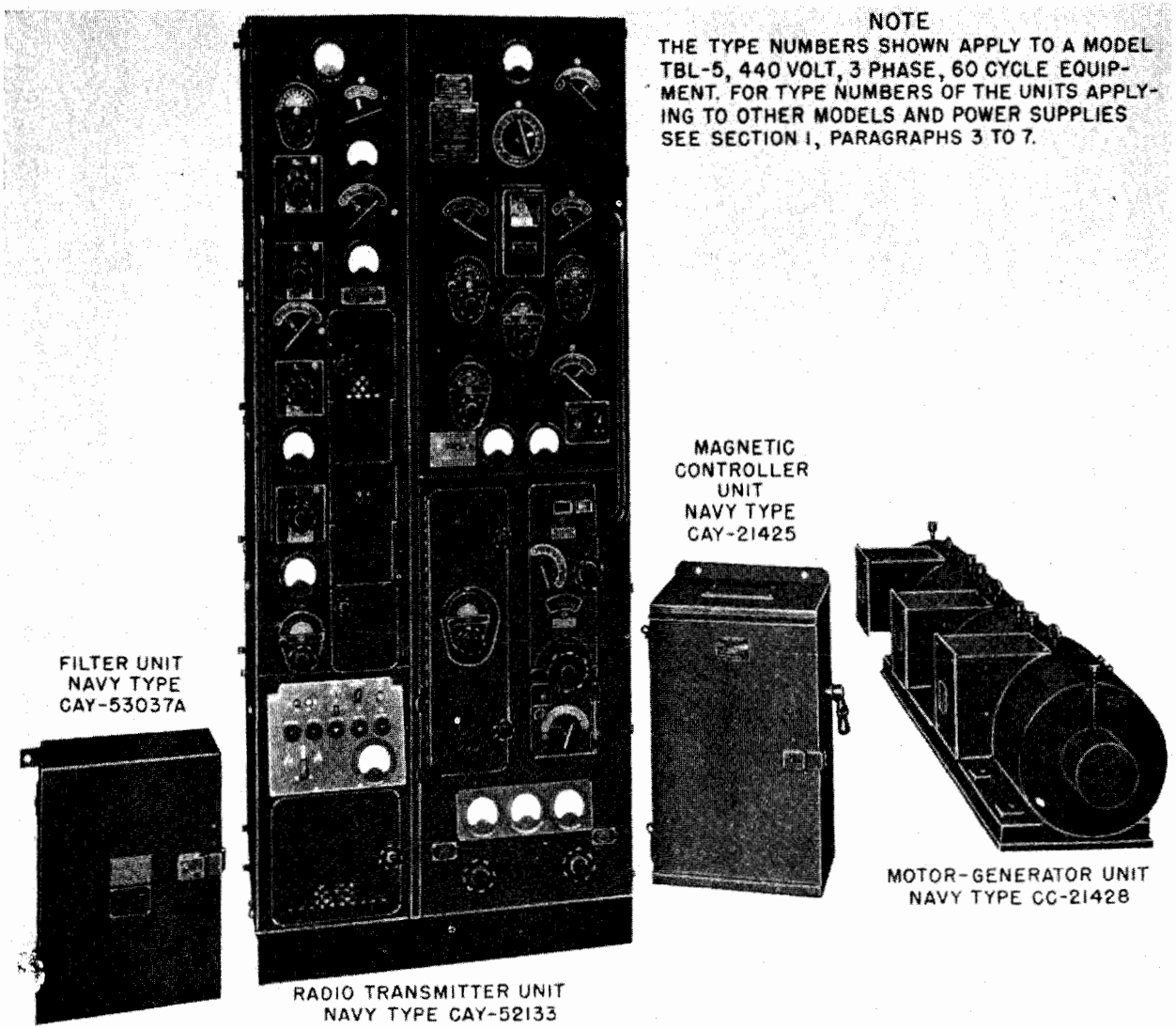


Fig. 1-1—Composite View, Typical TBL Series Components (Photo C-4751)

I. GENERAL DESCRIPTION

1. PREFACE.

a. This instruction book has been written to cover Ship Type Navy Model TBL-5, TBL-6, TBL-7, TBL-12 and TBL-13 Radio Telegraph Transmitting Equipments. Essentially, each model is similar in design. However, each type incorporates improvements over the previous model. For convenience to the operator, the listing below shows these improvements as made from model to model.

(1) TBL-5 to TBL-6

(a) The TBL-6 Transmitter dial nameplates are made to cover frequency range of each step.

(b) Type MN overload relay is used in place of the SC-1 relay.

(c) Resistors supplied for TBL-6 are Grade 1, Class I, i.e., Style F.

(d) Mica capacitors are provided with low loss cases.

(e) Motor-Generator units were redesigned to eliminate all cast iron parts. These are replaced by cast steel or fabricated steel parts.

(f) Magnetic controllers have been improved to withstand greater shock. Their panels are of micarta and are shockmounted. Fuses and knife switches have clamping devices. Also, improved relays have been incorporated into the controllers.

(g) In some transmitters, either Model TBL-5 or TBL-6, the rotors and coil form are made up of machined Micarta, Moldarta or ceramic. All three of these forms are electrically and mechanically interchangeable, with each other.

(h) In TBL-6, the internal mechanisms of starting relays K-2, K-4 and K-13 have been improved.

(2) TBL-6 to TBL-7.

(a) An R.F. pick-up capacitor was added to the frequency meter.

(b) In TBL-7, the internal mechanisms of starting relays K-2, K-4 and K-13 were redesigned for greater stability.

(c) The relays mentioned in (b) above are interchangeable as a unit, but parts of the relays are not necessarily so.

(3) TBL-7 to TBL-12.

(a) The TBL-7 unit utilizes two handrails—one on either side of the transmitter, while the TBL-12 unit utilizes four handrails—two on either side of the transmitter. See outline drawings for details.

(4) TBL-12 to TBL-13.

(a) For TBL-13 the magnetic controllers are smaller and more compact and are of the high intensity type.

(b) The multiplier resistors for the high voltage voltmeters are of the new hermetically sealed type.

b. Whenever possible, where replacement parts are ordered for any of the older model equipments such as the TBL-5, TBL-6 and TBL-7, parts of improved design will be supplied.

c. Throughout the text portion of this Instruction Book on Navy Model TBL Equipment, mention will be made to various part number nomenclature such as CAY-52131, CAY-52131A, etc. To simplify the text matter and avoid unnecessary duplication, these part numbers will be listed below together with the model number and type of equipment with which it is associated.

Type Number	Unit	Used with Model	Voltage
CAY-52131	Transmitter	TBL-5	115 V.D.C.
CAY-52132	Transmitter	TBL-5	230 V.D.C.
CAY-52133	Transmitter	TBL-5	440/3/60
CAY-52131A	Transmitter	TBL-6	115 V.D.C.
CAY-52132A	Transmitter	TBL-6	230 V.D.C.
CAY-52133A	Transmitter	TBL-6	440/3/60
CAY-52247	Transmitter	TBL-7/12/13	115 V.D.C.
CAY-52248	Transmitter	TBL-7/12/13	230 V.D.C.
CAY-52249	Transmitter	TBL-7/12/13	440/3/60
CAY-53036A	Filter Unit	TBL-5/6/7/12/13	D.C. Supply
CAY-53037A	Filter Unit	TBL-5/6/7/12/13	A.C. Supply
CC-21426	Motor-Generator	TBL-5	115 V.D.C.
CC-21229A	Motor	TBL-5	115 V.D.C.
CC-21232	Generator	TBL-5	D.C.
CC-21233	Generator	TBL-5	D.C.
CC-21427	Motor-Generator	TBL-5	230 V.D.C.
CC-21230A	Motor	TBL-5	230 V.D.C
CC-21428	Motor-Generator	TBL-5	440/3/60
CC-21231A	Motor	TBL-5	440/3/60

Type Number	Unit	Used with Model	Voltage
CC-21426A	Motor-Generator	TBL-6/7/12/13	115 V.D.C.
CC-21229B	Motor	TBL-6/7/12/13	115 V.D.C.
CC-21232A	Generator	TBL-6/7/12/13	D.C.
CC-21233B	Generator	TBL-6/7/12/13	D.C.
CC-21427A	Motor-Generator	TBL-6/7/12/13	230 V.D.C.
CC-21230B	Motor	TBL-6/7/12/13	230 V.D.C.
CC-21428A	Motor-Generator	TBL-6/7/12/13	220/440/3/60
CC-21231B	Motor	TBL-6/7/12/13	220/440/3/60
CAY-21234A	Magnetic Controller	TBL-5	115 V.D.C.
CAY-21235A	Magnetic Controller	TBL-5	230 V.D.C.
CAY-21425	Magnetic Controller	TBL-5	440/3/60
CAY-21713	Magnetic Controller	TBL-6/7/12	115 V.D.C.
CAY-21714	Magnetic Controller	TBL-6/7/12	230 V.D.C.
CAY-21715	Magnetic Controller	TBL-6	220/3/60
CAY-21716	Magnetic Controller	TBL-6/7/12	440/3/60
CAY-211226	Magnetic Controller	TBL-13	115 V.D.C.
CAY-211227	Magnetic Controller	TBL-13	230 V.D.C.
CAY-211228	Magnetic Controller	TBL-13	440/3/60

d. Except where differences in the units exist, the text material on the five different transmitters is essentially the same. When differences exist, these will be explained in detail. Where the text is general, such as in Installation, Operation and Maintenance procedures, the text will be applicable to all equipments.

e. To avoid unnecessary duplication of Installation Outline, Schematic, Wiring and Interconnection Drawings, only one of each will be included where the only difference is in the part number designation for the unit. For example, the outline drawings for all individual units in the various TBL series equipments are similar. Therefore only one drawing for the Transmitter and Power Equipment will be shown.

f. The weights for the various units may vary from those printed on the drawings. This is due to the fact that no two equipments weight the same. Should green lumber be used, the crated weight will decrease during shipment. In most cases, it has been established that a variation of $\pm 5\%$ in weights will exist. The weights printed come within this $\pm 5\%$ variation.

2. GENERAL.

a. The Navy Model TBL Series Radio Telegraph Transmitting Equipments are designed for use on submarines, destroyers, cruisers and other similar types of vessels. Each equipment consists of a radio transmitter unit, a filter unit, a motor-generator unit and a magnetic controller. Certain items of the units are different in order to adapt the units for operation on any one of various power supplies available on shipboard. Thus, a different combination of units is employed for each of the power supplies. These are enumerated under Paragraphs 3 through 7 LIST OF EQUIPMENT.

b. Design of the transmitter unit is based on the master oscillator-intermediate amplifier—power amplifier principle. Provision is made to allow operation into any of the various antennas encountered on the above mentioned types of vessels. The transmitter unit, as controlled by the master oscillator, is continuously variable as to emitted frequency throughout the frequency ranges specified. All necessary operating controls are located on the front panel and are electrically "dead".

c. Incorporation of an antenna transfer switch provides for manual transfer of the antenna for reception on either the intermediate frequency or high frequency ranges. The keying system will provide satisfactory service at keying speeds up to 100 words per minute.

d. Power output may be varied from full power to a minimum of 25% by means of a single control on the transmitter unit. Modulated CW transmission is provided on the intermediate frequency range. Telephone transmission on either the high frequency or intermediate frequency band may be obtained when the equipment is used in conjunction with Navy Type _50064 or equivalent speech input equipment capable of delivering an audio output of 1.6 watts (i.e. 28 volts across 500 ohms) for 85% modulation of the transmitter. Telephone carrier will be approximately $\frac{1}{4}$ of the normal CW output value. Speech input equipment is not supplied as part of the transmitting equipment.

e. The transmitter is supplied power through a suitable filter unit from a three-unit motor-generator set, the motor of which operates from the ship's supply line.

f. The transmitting equipment can be controlled and keyed using either the Navy Standard 4-wire or 6-wire remote control system.

3. LIST OF EQUIPMENT: TBL-5.

a. The Model TBL-5 Equipment is designed for operation from 115 Volt D.C., 230 Volt D.C., and 440 Volt, 3 Phase, 60 Cycle A.C. power supplies. The complete equipment supplied for use with any one of these power supply voltages consists of the following component units.

b. FOR 115 VOLT D.C. POWER SUPPLY.

Radio Transmitter Unit, Navy Type CAY-52131

	Uncrated	Crated
Height	72″	78″
Width	31¾″	42″
Depth	23⅝″	30″
Weight	820 lbs.	1087 lbs.
Volume	.....	56.87 cu. ft.

Filter Unit, Navy Type CAY-53036A

	Uncrated	Crated
Height	18¼″	27″
Width	16¼″	21″
Depth	10⅛″	17″
Weight	56 lbs.	117 lbs.
Volume	.....	5.58 cu. ft.

Motor-Generator Unit, Navy Type CC-21426 consisting of:

Motor, Type CC-21229A
Generator, 2000 V. D.C., Type CC-21232
Generator, 250/1000 V. D.C., Type CC-21233

	Terminal Board		
	On Top	On Side	
	Uncrated		Crated
Height	18⅛″	15¼″	21″
Width	13″	16⅛″	21″
Length	60 11/16″	60 11/16″	66″
Weight	800 lbs.		822 lbs.
Volume	.....		16.86 cu. ft.

Magnetic Controller, Navy Type CAY-21234A

	Uncrated	Crated
Height	20½″	27″
Width	13½″	20″
Depth	12¼″	17″
Weight	60 lbs.	115 lbs.
Volume	.....	5.31 cu. ft.

Complete set of Vacuum Tubes for installation consisting of:

Installed	Type	Weight, Each
4	_860	7¼ oz.
2	_803	11 oz.
		3 lbs. 3 oz.

The above tubes are packed in a crate with dimensions 25 x 23 x 31. Crated weight 65 lbs. Volume 9.49 cu. ft.

Total Uncrated Weight of Equipment Less Spare Parts 1739 lbs. 3 oz.
Total Crated Weight of Equipment Less Spare Parts 2206 lbs.

Spare Parts Box # 1—Radio Spare Parts

	Uncrated	Crated
Height	15½″	17″
Width	16⅜″	18″
Length	25½″	29″
Weight	146 lbs.	174 lbs.
Volume	.....	4.34 cu. ft.

Spare Parts Box # 2—Miscellaneous Spare Parts (Except Armatures) for Type CC-21229A Motor, Type CC-21232 Generator and Type CC-21233 Generator per Dwg. CAY-T-147, Sheet 8.

	Uncrated	Crated
Height	6¾″	8″
Width	16½″	18″
Length	25½″	28″
Weight	88 lbs.	105 lbs.
Volume	.....	2.33 cu. ft.

Spare Parts Box # 3—Spare Armature for Type CC-21232 Generator per Dwg. CAY-T-147, Sheet 8.

	Uncrated	Crated
Height	6¾″	8″
Width	7½″	9″
Length	25½″	28″
Weight	52 lbs.	102 lbs.
Volume	.....	1.16 cu. ft.

Spare Parts Box # 4—Spare Armature for Type CC-21233 Generator per Dwg. CAY-T-147, Sheet 8.

	Uncrated	Crated
Height	6¾″	8″
Width	7½″	9″
Length	25½″	28″
Weight	50 lbs.	102 lbs.
Volume	.....	1.16 cu. ft.

Spare Parts Box # 5—Spare Armature for Type CC-21229A Motor per Dwg. CAY-T-147, Sheet 8.

	Uncrated	Crated
Height	9½″	10″
Width	10½″	18″
Length	25½″	30″
Weight	80 lbs.	102 lbs.
Volume	.....	2.21 cu. ft.

Total Uncrated Weight of Complete Equipment—2155 lbs. 3 oz.
Total Crated Weight of Complete Equipment—2791 lbs.

c. For 230 VOLT D.C. POWER SUPPLY.

Radio Transmitter Unit, Navy Type CAY-52132.

	Uncrated	Crated
Height	72″	78″
Width	31¾″	42″
Depth	23⅝″	30″
Weight	820 lbs.	1087 lbs.
Volume	.....	56.87 cu. ft.

Filter Unit, Navy Type CAY-53036A

	Uncrated	Crated
Height	18¼″	27″
Width	16¼″	20″
Depth	10⅛″	17″
Weight	56 lbs.	115 lbs.
Volume	.....	5.31 cu. ft.

Motor-Generator, Navy Type CC-21427 consisting of:
Motor, Type CC-21230A
Generator, 2000 V. D.C., Type CC-21232
Generator, 250/1000 V. D.C., Type CC-21233

	Terminal Board On Top	Terminal Board On Side	Crated
	Uncrated		
Height	18⅛″	15¼″	21″
Width	13″	16⅛″	21″
Length	60 11/16″	60 11/16″	66″
Weight	800 lbs.		822 lbs.
Volume	.....		16.86 cu. ft.

Magnetic Controller, Navy Type CAY-21235A

	Uncrated	Crated
Height	20½″	27″
Width	13½″	21″
Depth	12¼″	17″
Weight	60 lbs.	115 lbs.
Volume	.....	5.58 cu. ft.

Complete set of Vacuum Tubes for installation consisting of:

Installed	Type	Weight Each
4	_860	7¼ oz.
2	_803	11 oz.
		3 lbs. 3 oz.

The above tubes are packed in a crate 25 x 23 x 31. Weight 65 lbs. Volume 9.49 cu. ft.

Total Uncrated Weight of Equipment less Spare Parts 1739 lbs. 3 oz.

Total Crated Weight of Equipment less Spare Parts 2206 lbs.

Spare Parts Box # 1—Radio Spare Parts.

	Uncrated	Crated
Height	15½″	17″
Width	16⅜″	18″
Length	25½″	29″
Weight	146 lbs.	188 lbs.
Volume	.....	4.34 cu. ft.

Spare Parts Box # 2—Miscellaneous Spare Parts (Except Armatures) for Type CC-21230A Motor, Type CC-21232 Generator and Type CC-21233 Generator Per Dwg. CAY-T-147, Sheet 8.

	Uncrated	Crated
Height	6¾″	8″
Width	16½″	18″
Length	25½″	28″
Weight	88 lbs.	105 lbs.
Volume	.....	2.33 cu. ft.

Spare Parts Box # 3—Armature for Type CC-21232 Generator per Dwg. CAY-T-147, Sheet 8.

	Uncrated	Crated
Height	6¾″	8″
Width	7½″	9″
Length	25½″	28″
Weight	52 lbs.	68 lbs.
Volume	.....	1.16 cu. ft.

Spare Parts Box # 4—Spare Armature for Type CC-21233 Generator per Dwg. CAY-147, Sheet 8.

	Uncrated	Crated
Height	6¾″	8″
Width	7½″	9″
Length	25½″	28″
Weight	50 lbs.	66 lbs.
Volume	.....	1.16 cu. ft.

Spare Parts Box # 5—Spare Armature for Type CC-21230A Motor per Dwg. CAY-T-147, Sheet 8.

	Uncrated	Crated
Height	9½″	11″
Width	10½″	12″
Length	25½″	29″
Weight	80 lbs.	102 lbs.
Volume	.....	2.21 cu. ft.

Total Uncrated Weight of Complete Equipment— 2155 lbs. 3 oz.

Total Crated Weight of Complete Equipment— 2745 lbs.

d. FOR 440 VOLT, 3 PHASE, 60 CYCLE, POWER SUPPLY.

Radio Transmitter Unit, Navy Type CAY-52133.

	Uncrated	Crated
Height	72″	78″
Width	31¾″	42″
Depth	23⅝″	30″
Weight	829 lbs.	1092 lbs.
Volume	.....	56.87 cu. ft.

Filter Unit, Navy Type CAY-53037A

	Uncrated	Crated
Height	18¼″	27″
Width	16¼″	21″
Depth	10⅛″	17″
Weight	87 lbs.	148 lbs.
Volume	.....	5.58 cu. ft.

Motor-Generator Unit, Navy Type CC-21428 consisting of:
Motor, Type CC-21231A
Generator, 2000 V. D.C., Type CAY-21232
Generator, 250/1000 V. D.C., Type CAY-21233

	Terminal Board On Top	Terminal Board On Side	Crated
	Uncrated		
Height	18⅛″	15″	27″
Width	13″	18⅛″	21″
Length	55⅛″	55⅛″	66″
Weight	680 lbs.		772 lbs.
Volume	.....		16.84 cu. ft.

Magnetic Controller, Navy Type CAY-21425

	Uncrated	Crated
Height	21¼″	27″
Width	15″	20″
Depth	11⅝″	17″
Weight	50 lbs.	105 lbs.
Volume	.....	5.31 cu. ft.

Complete set of Vacuum Tubes for installation consisting of:

Installed	Type	Weight, Each
4	_860	7¼ oz.
2	_803	11 oz.
		3 lbs. 3 oz.

The above tubes are packed in a crate with dimensions 25 x 23 x 31. Crated Weight 65 lbs. Volume 9.49 cu. ft.

Total Uncrated Weight of Equipment less spare Parts 1649 lbs. 3 oz.

Total Crated Weight of Equipment less Spare Parts 2182 lbs.

Spare Parts Box # 1—Radio Spare Parts.

	Uncrated	Crated
Height	15½″	17″
Width	16⅜″	18″
Length	25½″	28″
Weight	140 lbs.	180 lbs.
Volume	.....	4.96 cu. ft.

Spare Parts Box # 2—Miscellaneous Spare Parts (Except Armatures) for Type CC-21231A Motor, Type CC-21232 Generator and Type CC-21233 Generator per Dwg. CAY-T-147, Sheet 8.

	Uncrated	Crated
Height	6¾″	8″
Width	13½″	18″
Length	25½″	28″
Weight	60 lbs.	83 lbs.
Volume	.....	2.33 cu. ft.

Spare Parts Box # 3—Spare Armature for Type CC-21232 Generator per Dwg. CAY-T-147, Sheet 8.

	Uncrated	Crated
Height	6¾″	8″
Width	7½″	9″
Length	25½″	28″
Weight	50 lbs.	66 lbs.
Volume	.....	1.17 cu. ft.

Spare Parts Box # 4—Spare Armature for Type CC-21233 Generator per Dwg. CAY-T-147, Sheet 8.

	Uncrated	Crated
Height	6¾″	8″
Width	7½″	9″
Length	25½″	28″
Weight	50 lbs.	66 lbs.
Volume	.....	1.17 cu. ft.

Total Uncrated Weight of Complete Equipment— 1949 lbs. 3 oz.

Total Crated Weight of Complete Equipment— 2577 lbs.

4. LIST OF EQUIPMENT: TBL-6.

a. The Motor-Generators for the Model TBL-6 Equipments are constructed of cast steel instead of cast iron, and the Magnetic Controllers are especially designed to stand severe shock. These equipments are designed for operation from 115 Volt, D.C., 230 Volt D.C., 220 Volt, 3 Phase, 60 Cycle A.C. and 440 Volt, 3 Phase, 60 Cycle A.C., power supplies. The complete equipment for use with any one of these power supply voltages consists of the following component units.

b. FOR 115 VOLT D.C. POWER SUPPLY.

Radio Transmitter Unit, Navy Type CAY-52131A

	Uncrated	Crated
Height	72″	78″
Width	31¾″	42″
Depth	23⅝″	30″
Weight	820 lbs.	1087 lbs.
Volume	.....	56.87 cu. ft.

Filter Unit, Navy Type CAY-53036A

	Uncrated	Crated
Height	18¼″	27″
Width	16¼″	21″
Depth	10⅛″	17″
Weight	56 lbs.	117 lbs.
Volume	.....	5.58 cu. ft.

Motor-Generator Unit, Type CC-21426A consisting of:
Motor, Type CC-21229B
Generator, 2000 V. D.C., Type CC-21232A
Generator, 250/1000 V. D.C., Type CC-21233B

	Terminal Board On Top	Terminal Board On Side	Crated
	Uncrated		
Height	20″	16″	21″
Width	13¼″	16¾″	21″
Length	61″	61″	66″
Weight	745 lbs.		822 lbs.
Volume	.....		16.84 cu. ft.

Magnetic Controller, Navy Type CAY-21713

	Uncrated	Crated
Height	20 13/16″	27″
Width	13″	20″
Depth	11 15/16″	17″
Weight	60 lbs.	115 lbs.
Volume	.....	5.31 cu. ft.

Complete set of Vacuum Tubes for installation consisting of:

Installed	Type	Weight, Each
4	_860	7¼ oz.
2	_803	11 oz.
		3 lbs. 3 oz.

The above tubes are packed in a crate with dimensions 25 x 23 x 31. Crated Weight 65 lbs. Volume 9.49 cu. ft.

Total Uncrated Weight of Equipment less Spare Parts 1684 lbs. 3 oz.

Total Crated Weight of Equipment less Spare Parts 2206 lbs.

Spare Parts Box # 1—Radio Spare Parts.

	Uncrated	Crated
Height	15½"	17"
Width	16⅜"	18"
Length	25½"	29"
Weight	146 lbs.	174 lbs.
Volume	.....	4.34 cu. ft.

Spare Parts Box # 2—Miscellaneous Spare Parts. (Except Armatures) for Type CC-21229B Motor, Type CC-21232A Generator and Type CC-21233B Generator per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	6¾"	8"
Width	16½"	18"
Length	25½"	28"
Weight	88 lbs	105 lbs.
Volume	.....	2.33 cu. ft.

Spare Parts Box # 3—Spare Armature for Type CC-21232A Generator per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	6¾"	8"
Width	7½"	9"
Length	25½"	28"
Weight	52 lbs.	102 lbs.
Volume	.....	1.16 cu. ft.

Spare Parts Box # 4—Spare Armature for Type CC-21233B Generator per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	6¾"	8"
Width	7½"	9"
Length	25½"	28"
Weight	50 lbs.	102 lbs.
Volume	.....	1.16 cu. ft.

Spare Parts Box # 5—Spare Armature for Type CC-21229B Motor per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	9½"	10"
Width	10½"	18"
Length	25½"	30"
Weight	80 lbs.	102 lbs
Volume	1.47 cu. ft.	2.21 cu. ft.

Total Uncrated Weight of Complete Equipment—
2100 lbs. 3 oz.

Total Crated Weight of Complete Equipments—
2791 lbs.

c. FOR 230 VOLT D.C. POWER SUPPLY.

Radio Transmitter, Navy Type CAY-52132A

	Uncrated	Crated
Height	72"	78"
Width	31¾"	42"
Depth	23⅝"	30"
Weight	820 lbs.	1087 lbs.
Volume	.....	56.87 cu. ft.

Filter Unit, Navy Type CAY-53036A

	Uncrated	Crated
Height	18¼"	27"
Width	16¼"	20"
Depth	10⅛"	17"
Weight	56 lbs.	115 lbs.
Volume	.....	5.31 cu. ft.

Motor-Generator Unit, Navy Type CC-21427A consisting of:

Motor, Type CC-21230B
Generator, 2000 V. D.C., Type CC-21232A
Generator, 250/1000 V. D.C., Type CC-21233B

	Terminal Board On Top	Terminal Board On Side	
	Uncrated		Crated
Height	20"	16"	21"
Width	13¼"	16¾"	21"
Length	61"	61"	66"
Weight	745 lbs.		822 lbs.
Volume	.....		16.84 cu. ft.

Magnetic Controller, Navy Type CAY-21714

	Uncrated	Crated
Height	20 13/16"	27"
Width	13"	21"
Depth	11 15/16"	17"
Weight	60 lbs.	117 lbs.
Volume	.....	5.58 cu. ft.

Complete set of Vacuum Tubes for installation consisting of:

Installed	Type	Weight, Each
4	_860	7¼ oz.
2	_803	11 oz.
		3 lbs. 3 oz.

The above tubes are packed in a crate with dimensions 25 x 23 x 31. Crated Weight 65 lbs. Volume 9.49 cu. ft.

Total Uncrated Weight of Equipment less Spare Parts
1684 lbs. 3 oz.

Total Crated Weight of Equipment less Spare Parts
2206 lbs.

Spare Parts Box # 1—Radio Spare Parts.

	Uncrated	Crated
Height	15½"	17"
Width	16⅜"	18"
Length	25½"	29"
Weight	146 lbs.	188 lbs.
Volume	.....	4.34 cu. ft.

Spare Parts Box # 2—Miscellaneous Spare Parts (Except Armatures) for Type CC-21230B Motor, Type CC-21232A Generator and Type CC-21233B Generator, per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	6¾"	8"
Width	16½"	18"
Length	25½"	28"
Weight	88 lbs.	105 lbs.
Volume	.....	2.33 cu. ft.

Spare Parts Box # 3—Spare Armature for Type CC-21232A Generator per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	6¾″	8″
Width	7½″	9″
Length	25½″	28″
Weight	50 lbs.	68 lbs.
Volume	.....	1.16 cu. ft.

Spare Parts Box # 4—Spare Armature for Type CC-21233B Generator per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	6¾″	8″
Width	7½″	9″
Length	25½″	28″
Weight	50 lbs.	66 lbs.
Volume	.....	1.16 cu. ft.

Spare Parts Box # 5—Spare Armature for Type CC-21230B Motor per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	9½″	11″
Width	10½″	12″
Length	25½″	29″
Weight	80 lbs.	102 lbs.
Volume	.....	2.21 cu. ft.

Total Uncrated Weight of Complete Equipment 2098 lbs. 3 oz.

Total Crated Weight of Complete Equipment 2735 lbs.

d. FOR 220 VOLT, 3 PHASE, 60 CYCLE, POWER SUPPLY.

Radio Transmitter, Navy Type CAY-52133A

	Uncrated	Crated
Height	72″	78″
Width	31¾″	42″
Depth	23⅝″	30″
Weight	829 lbs.	1092 lbs.
Volume	.....	56.87 cu. ft.

Filter Unit, Navy Type CAY-53037A

	Uncrated	Crated
Height	18¼″	27″
Width	16¼″	20″
Depth	10⅛″	17″
Weight	87 lbs.	148 lbs.
Volume	.....	5.31 cu. ft.

Motor-Generator Unit, Navy Type CC-21428A consisting of:
Motor, Type CC-21231B
Generator, 2000 V. D.C., Type CC-21232A
Generator, 250/1000 V. D.C., Type CC-21233B

	Terminal Board On Top	Terminal Board On Side	
	Uncrated	Uncrated	Crated
Height	20″	16″	21″
Width	13¼″	16¾″	21″
Length	55¾″	55¾″	66″
Weight	680 lbs.		772 lbs.
Volume	.....		16.84 cu. ft.

Magnetic Controller, Navy Type CAY-21715

	Uncrated	Crated
Height	18¾″	27″
Width	16⅝″	21″
Depth	9 3/16″	17″
Weight	50 lbs.	117 lbs.
Volume	.....	5.58 cu. ft.

Complete set of Vacuum Tubes for installation consisting of:

Installed	Type	Weight, Each
4	_860	7¼ oz.
2	_803	11 oz.
		3 lbs. 3 oz.

The above tubes are packed in a crate with dimensions 25 x 23 x 31. Crated weight 65 lbs. Volume 9.49 cu. ft.

Total Uncrated Weight of Equipment less Spare Parts 1649 lbs. 3 oz.

Total Crated Weight of Equipment less Spare Parts 2194 lbs.

Spare Parts Box # 1—Radio Spare Parts.

	Uncrated	Crated
Height	15½″	17″
Width	16⅜″	18″
Length	25½″	29″
Weight	146 lbs.	168 lbs.
Volume	.....	4.34 cu. ft.

Spare Parts Box # 2—Miscellaneous Spare Parts (Except Armatures) for Type CC-21231B Motor, Type CC-21232A Generator and Type CC-21233B Generator per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	6¾″	8″
Width	13½″	18″
Length	25½″	28″
Weight	88 lbs.	100 lbs.
Volume	.....	2.33 cu. ft.

Spare Parts Box # 3—Spare Armature for Type CC-21232A Generator per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	6¾″	8″
Width	7½″	9″
Length	25½″	28″
Weight	52 lbs	66 lbs.
Volume	.....	1.16 cu. ft.

Spare Parts Box # 4—Spare Armature for Type CC-21233B Generator per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	6¾″	8″
Width	7½″	9″
Length	25½″	28″
Weight	50 lbs.	66 lbs.
Volume	.....	1.16 cu. ft.

Total Uncrated Weight of Complete Equipment 1985 lbs. 3 oz.

Total Crated Weight of Complete Equipment 2594 lbs.

e. FOR 440 VOLT, 3 PHASE, 60 CYCLE, POWER SUPPLY.

Radio Transmitter Unit, Navy Type CAY-52133A

	Uncrated	Crated
Height	72″	78″
Width	31¾″	42″
Depth	23⅝″	30″
Weight	829 lbs.	1092 lbs.
Volume	.....	56.87 cu. ft.

Filter Unit, Navy Type CAY-53037A

	Uncrated	Crated
Height	18¼″	27″
Width	16¼″	21″
Depth	10⅛″	17″
Weight	87 lbs.	148 lbs.
Volume	.....	5.58 cu. ft.

Motor-Generator Unit, Navy Type CC-21428A consisting of:

Motor, Type CC-21231B

Generator, 2000 V. D.C., Type CC-21232A

Generator, 250/1000 V. D.C., Type CC-21233B

	Terminal Board On Top	Terminal Board On Side	
	Uncrated		Crated
Height	20″	16″	21″
Width	13¼″	16¾″	21″
Length	55¾″	55¾″	66″
Weight	680 lbs.		772 lbs.
Volume	.....		16.84 cu. ft.

Magnetic Controller, Navy Type CAY-21716

	Uncrated	Crated
Height	18 29/32″	27″
Width	16⅝″	20″
Depth	9 3/16″	17″
Weight	50 lbs.	*105 lbs.
Volume	.....	*5.31 cu. ft.

*Shipped with Filter Unit, Navy Type CAY-53037A

Complete set of Vacuum Tubes for installation consisting of:

Installed	Type	Weight, Each
4	_860	7¼ oz.
2	_803	11 oz.
		3 lbs. 3 oz.

The above tubes are packed in a crate with dimensions 25 x 23 x 31. Crated weight 65 lbs. Volume 9.49 cu. ft.

Total Uncrated Weight of Equipment less Spare Parts 1649 lbs. 3oz.

Total Crated Weight of Equipment less Spare Parts 2182 lbs.

Spare Parts Box # 1—Radio Spare Parts.

	Uncrated	Crated
Height	15½″	17″
Width	16⅜″	18″
Length	25½″	28″
Weight	140 lbs.	180 lbs.
Volume	.....	4.96 cu. ft.

Spare Parts Box # 2—Miscellaneous Spare Parts (Except Armatures) for Type CC-21231B Motor, Type CC-21232A Generator and Type CC-21233B Generator per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	6¾″	8″
Width	13½″	18″
Length	25½″	28″
Weight	60 lbs.	83 lbs.
Volume	.....	2.33 cu. ft.

Spare Parts Box # 3—Spare Armature for Type CC-21232A Generator per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	6¾″	8″
Width	7½″	9″
Length	25½″	28″
Weight	50 lbs.	66 lbs.
Volume	.....	1.17 cu. ft.

Spare Parts Box # 4—Spare Armature for Type CC-21233B Generator per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	6¾″	8″
Width	7½″	9″
Length	25½″	28″
Weight	50 lbs.	66 lbs.
Volume	.....	1.17 cu. ft.

Total Uncrated Weight of Complete Equipment 1949 lbs. 3 oz.

Total Crated Weight of Complete Equipment 2577 lbs.

5. LIST OF EQUIPMENT: TBL-7.

a. The Model TBL-7 Equipment is designed for operation from 115 Volt, D.C., 230 Volt, D.C, and 440 Volt, 3 Phase, 60 Cycle, A.C. power supplies. The equipment supplied for use with any one of these power supply voltages consists of the following component units.

b. FOR 115 VOLT D.C. POWER SUPPLY.

Radio Transmitter, Navy Type CAY-52247

	Uncrated	Crated
Height	72″	78″
Width	32″	42″
Depth	24¼″	30″
Weight	820 lbs.	1087 lbs.
Volume	.....	56.87 cu. ft.

Filter Unit, Navy Type CAY-53036A

	Uncrated	Crated
Height	18¼″	42″
Width	16¼″	24″
Depth	10⅛″	16″
Weight	56 lbs.	*202 lbs.
Volume	.....	*9.33 cu. ft.

*Shipped with Magnetic Controller, Navy Type CAY-21713.

Motor-Generator Unit, Navy Type CC-21426A consisting of:

Motor, Type CC-21229B

Generator, 2000 V. D.C., Type CC-21232A

Generator, 250/1000 V. D.C., Type CC-21233B

	Terminal Board On Top	Terminal Board On Side	Crated
	Uncrated		
Height	20″	16″	21″
Width	13¼″	16¾″	21″
Length	61″	61″	66″
Weight	745 lbs.		822 lbs.
Volume	.....		16.84 cu. ft.

Magnetic Controller, Navy Type CAY-21713

	Uncrated	Crated
Height	20 13/16″	42″
Width	13″	24″
Depth	11 15/16″	16″
Weight	60 lbs.	*202 lbs.
Volume	.....	*9.33 cu. ft.

*Shipped with Filter Unit, Navy Type CAY-53036A

Complete set of Vacuum Tubes for installation consisting of:

Installed	Type	Weight, Each
4	_860	7¼ oz.
2	_803	11 oz.
		3 lbs. 3 oz.

The above tubes are packed in a crate with dimensions 25 x 23 x 31. Crated weight 65 lbs. Volume 9.49 cu. ft.

Total Uncrated Weight of Equipment less Spare Parts 1684 lbs. 3 oz.

Total Crated Weight of Equipment less Spare Parts 2176 lbs.

Spare Parts Box # 1—Radio Spare Parts.

	Uncrated	Crated
Height	15½″	17″
Width	16⅜″	18″
Length	25½″	29″
Weight	146 lbs.	188 lbs.
Volume	.....	4.34 cu. ft.

Spare Parts Box # 2—Miscellaneous Spare Parts (Except Armatures) for Type CC-21229B Motor, Type CC-21232B Generator and Type CC-21233B Generator per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	6¾″	8″
Width	16½″	18″
Length	25½″	28″
Weight	88 lbs.	105 lbs.
Volume	1.64 cu. ft.	2.33 cu. ft.

Spare Parts Box # 3—Spare Armature for Type CC-21232A Generator per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	6¾″	8″
Width	7½″	9″
Length	25½″	28″
Weight	50 lbs.	66 lbs.
Volume	.75 cu. ft.	1.16 cu. ft.

Spare Parts Box # 4—Spare Armature for Type CC-21233B Generator per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	6¾″	8″
Width	7½″	9″
Length	25½″	28″
Weight	50 lbs.	66 lbs.
Volume	.75 cu. ft.	1.16 cu. ft.

Spare Parts Box # 5—Spare Armature for Type CC-21229B Motor per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	9½″	11″
Width	10½″	12″
Length	25½″	28″
Weight	80 lbs.	102 lbs.
Volume	1.47 cu. ft.	2.21 cu. ft.

Total Uncrated Weight of Complete Equipment 2098 lbs, 3 oz.

Total Crated Weight of Complete Equipment 2703 lbs.

c. FOR 230 VOLT D.C. POWER SUPPLY

Radio Transmitter, Navy Type CAY-52248

	Uncrated	Crated
Height	72″	78″
Width	32″	42″
Depth	24¼″	30″
Weight	820 lbs.	1087 lbs.
Volume	.....	56.87 cu. ft.

Filter Unit, Navy Type CAY-53036A

	Uncrated	Crated
Height	18¼″	42″
Width	16¼″	24″
Depth	10⅛″	16″
Weight	56 lbs.	*202 lbs.
Volume	.....	*9.33 cu. ft.

*Shipped with Magnetic Controller, Navy Type CAY-21714.

Motor-Generator Unit, Navy Type CC-21427A consisting of:

Motor, Type CC-21230B
Generator, 2000, V. D.C., Type CC-21232A
Generator, 250/1000 V. D.C., Type CC-21233B

	Terminal Board On Top	Terminal Board On Side	Crated
	Uncrated		
Height	20″	16″	21″
Width	13¼″	16¾″	21″
Depth	61″	61″	66″
Weight	745 lbs.		822 lbs.
Volume	.....		16.84 cu. ft.

Magnetic Controller, Navy Type CAY-21714

	Uncrated	Crated
Height	20 13/16″	42″
Width	13″	24″
Depth	11 15/16″	16″
Weight	60 lbs.	*202 lbs.
Volume	.....	*9.33 cu. ft

*Shipped with Filter Unit, Navy Type CAY-53036A

Complete set of Vacuum Tubes for installation consisting of:

Installed	Type	Weight, Each
4	_860	7¼ oz.
2	_803	11 oz.
		3 lbs. 3 oz.

The above tubes are packed in a crate with dimensions 25 x 23 x 31. Crated weight 65 lbs. Volume 9.49 cu. ft.

Total Uncrated Weight of Equipment less Spare Parts 1684 lbs. 3 oz.

Total Crated Weight of Equipment less Spare Parts 2176 lbs.

Spare Parts Box # 1—Radio Spare Parts.

	Uncrated	Crated
Height	15½"	17"
Width	16⅜"	18"
Length	25½"	29"
Weight	146 lbs.	188 lbs.
Volume	.....	4.34 cu. ft.

Spare Parts Box # 2—Miscellaneous Spare Parts (Except Armatures) for Type CC-21230B Motor, Type CC-21232A Generator and Type CC-21233B Generator per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	6¾"	8"
Width	16½"	18"
Length	25½"	28 lbs.
Weight	88 lbs.	105 lbs.
Volume	.....	2.33 cu. ft.

Spare Parts Box # 3—Spare Armature for Type CC-21232A Generator per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	6¾"	8"
Width	7½"	9"
Length	25½"	28"
Weight	50 lbs.	66 lbs.
Volume	.....	1.16 cu. ft.

Spare Parts Box # 4—Spare Armature for Type CC-21233B Generator per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	6¾"	8"
Width	7½"	9"
Length	25½"	28"
Weight	50 lbs	66 lbs.
Volume	.....	1.16 cu. ft.

Spare Parts Box # 5—Spare Armature for Type CC-21230B Motor per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	9½"	11"
Width	10½"	12"
Length	25½"	28"
Weight	80 lbs.	102 lbs.
Volume	.....	2.21 cu. ft.

Total Uncrated Weight of Complete Equipment 2089 lbs., 3 oz.

Total Crated Weight of Complete Equipment 2703 lbs.

d. FOR 440 VOLT, 3 PHASE, 60 CYCLE, POWER SUPPLY.

Radio Transmitter, Navy Type CAY-52249

	Uncrated	Crated
Height	72"	78"
Width	32"	42"
Depth	24¼"	30"
Weight	829 lbs.	1092 lbs.
Volume	.....	56.87 cu. ft.

Filter Unit, Navy Type CAY-53037A

	Uncrated	Crated
Height	18¼"	42"
Width	16¼"	24"
Depth	10⅛"	16"
Weight	87 lbs.	*222 lbs.
Volume	.....	*9.33 cu. ft.

*Shipped with Magnetic Controller, Navy Type CAY-21716.

Motor-Generator Unit, Navy Type CC-21428A consisting of:
Motor, Type CC-21231B
Generator, 2000 V. D.C., Type CC-21232A
Generator, 250/1000 V. D.C., Type CC-21233B

	Terminal Board On Top	Terminal Board On Side	Crated
	Uncrated		
Height	20"	16"	21"
Width	13¼"	16¾"	21"
Length	55¾"	55¾"	66"
Weight	680 lbs.		772 lbs.
Volume	.....		16.84 cu. ft.

Magnetic Controller, Navy Type CAY-21716

	Uncrated	Crated
Height	18$\frac{29}{32}$"	42"
Width	16⅝"	24"
Depth	9$\frac{3}{16}$"	16"
Weight	50 lbs.	*222 lbs.
Volume	.....	*9.33 cu. ft.

*Shipped with Filter Unit, Navy Type CAY-53037A.

Complete Set of Vacuum Tubes for installation consisting of:

Installed	Type	Weight, Each
4	_860	7¼ oz.
2	_803	11 oz.
		3 lbs. 3 oz.

The above tubes are packed in a crate with dimensions 25 x 23 x 31. Crated weight 65 lbs. Volume 9.49 cu. ft.

Total Uncrated Weight of Equipment less Spare Parts 1649 lbs. 3 oz.

Total Crated Weight of Equipment less Spare Parts 2151 lbs.

Spare Parts Box # 1—Radio Spare Parts.

	Uncrated	Crated
Height	15½"	17"
Width	16⅜"	18"
Length	25½"	28"
Weight	140 lbs.	180 lbs.
Volume	.....	4.96 cu. ft.

Spare Parts Box # 2—Miscellaneous Spare Parts (Except Armatures) for Type CC-21231B Motor, Type CC-21232A Generator and Type CC-21233B Generator per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	6¾″	8″
Width	13½″	18″
Length	25½″	28″
Weight	60 lbs.	73 lbs.
Volume	.....	2.33 cu. ft.

Spare Parts Box # 3—Spare Armature for Type CC-21232A Generator per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	6¾″	8″
Width	7½″	9″
Length	25½″	28″
Weight	50 lbs.	66 lbs.
Volume	.....	1.16 cu. ft.

Spare Parts Box # 4—Spare Armature for Type CC-21233B Generator per Dwg. CAY-T-147, Sheet 18.

	Uncrated	Crated
Height	6¾″	8″
Width	7½″	9″
Length	25½″	28″
Weight	50 lbs.	66 lbs.
Volume	.....	1.16 cu. ft.

Total Uncrated Weight of Complete Equipment 1949 lbs. 3 oz.

Total Crated Weight of Complete Equipment 2536 lbs.

6. LIST OF EQUIPMENT: TBL-12.

a. The Model TBL-12 Equipment is designed for operation from 115 Volt D.C., 230 Volt D.C., and 440 Volt, 3 Phase, 60 Cycle power supplies. The TBL-12 equipment is identical with TBL-7 with the exception of the differences listed in Par. 1*a*(3). Since there is no change in power supplies, Navy Type numbers, number of component units supplied for each voltage, etc., the weights and dimensions given in Par. 5 may be used. The equipments supplied for use with any of the above power supply voltages consist of the following component units.

b. FOR 115 VOLT D.C. POWER SUPPLY

Radio Transmitter, Navy Type CAY-52247
Filter Unit, Navy Type CAY-53036A
Motor-Generator Unit, Navy Type CC-21426A
Magnetic Controller, Navy Type CAY-21713
Set of Vacuum Tubes
Spare Parts Box # 1
Spare Parts Box # 2
Spare Parts Box # 3
Spare Parts Box # 4
Spare Parts Box # 5
See Paragraph 5*b* for descriptive data.

c. FOR 230 VOLT D.C. POWER SUPPLY

Radio Transmitter, Navy Type CAY-52248
Filter Unit, Navy Type CAY-53036A
Motor-Generator Unit, Navy Type CC-21427A
Magnetic Controller, Navy Type CAY-21714
Set of Vacuum Tubes
Spare Parts Box # 1
Spare Parts Box # 2
Spare Parts Box # 3
Spare Parts Box # 4
Spare Parts Box # 5
See Paragraph 5*c*. for descriptive data.

d. FOR 440 VOLT, 3 PHASE, 60 CYCLE POWER SUPPLY

Radio Transmitter, Navy Type CAY-52249
Filter Unit, Navy Type CAY-53037A
Motor-Generator Unit, Navy Type CC-21428A
Magnetic Controller, Navy Type CAY-21716
Set of Vacuum Tubes
Spare Parts Box # 1
Spare Parts Box # 2
Spare Parts Box # 3
Spare Parts Box # 4
See Paragraph 5*e*. for descriptive data.

7. LIST OF EQUIPMENT: TBL-13.

a. The Model TBL-13 Equipment is designed for operation from 115 Volt D.C., 230 Volt D.C., and 440 Volt, 3 Phase, 60 Cycle power supplies. The equipments supplied for use with any of these power supply voltages are identical to Model TBL-7 and TBL-12 with the exception of the magnetic controller for each voltage supply. Therefore, the differences only will be listed below. For component units comprising Model TBL-13 with the exceptions noted, refer to Paragraphs 5*b*, 5*c* and 5*e*.

b. FOR 115 VOLT D.C. POWER SUPPLY

Magnetic Controller, Navy Type CAY-211226

	Uncrated	Crated
Height	18¾″	40″
Width	11 11/16″	21″
Depth	9 13/16″	18″
Weight	45 lbs.	*194 lbs.
Volume	.....	*8.75 cu. ft.

*Shipped with Filter Unit, Type CAY-53036A

Total Uncrated Weight of Equipment less Spare Parts 1673 lbs. 3 oz.

Total Crated Weight of Equipment less Spare Parts 2168 lbs.

Total Uncrated Weight of Complete Equipment 2087 lbs. 3 oz.

Total Crated Weight of Complete Equipment 2695 lbs.

c. FOR 230 VOLT D.C. POWER SUPPLY

Magnetic Controller, Navy Type CAY-211227

	Uncrated	Crated
Height	$18\frac{3}{4}$″	40″
Width	$11\frac{11}{16}$″	21″
Depth	$9\frac{13}{16}$″	18″
Weight	45 lbs.	*194 lbs.
Volume	.....	*8.75 cu. ft.

*Shipped with Filter Unit, Navy Type CAY-53036A

Total Uncrated Weight of Equipment less Spare Parts 1673 lbs. 3 oz.

Total Crated Weight of Equipment less Spare Parts 2168 lbs.

Total Uncrated Weight of Complete Equipment 2087 lbs. 3 oz.

Total Crated Weight of Complete Equipment 2695 lbs.

d. FOR 440 VOLT, 3 PHASE, 60 CYCLE, POWER SUPPLY

Magnetic Controller, Navy Type CAY-211228

	Uncrated	Crated
Height	$11\frac{9}{32}$″	40″
Width	$8\frac{7}{32}$″	21″
Depth	$6\frac{3}{4}$″	18″
Weight	18 lbs.	*194 lbs.
Volume	.....	*8.75 cu. ft.

*Shipped with Filter Unit, Navy Type CAY-53037A

Total Uncrated Weight of Equipment less Spare Parts 1617 lbs. 3 oz.

Total Crated Weight of Equipment less Spare Parts 2123 lbs.

Total Uncrated Weight of Complete Equipment 1917 lbs. 3 oz.

Total Crated Weight of Complete Equipment 2508 lbs.

II. THEORY OF OPERATION

8. TRANSMITTER.

a. The radio transmitter units of the TBL—Series Equipments, consist of two frames bolted together to operate as a single mechanical assembly. See Figs. 10-1, 10-2. It includes the necessary electrical circuits, tubes and control apparatus for taking power from a motor-generator unit and delivering telegraphically keyed CW or MCW radio frequency energy to an antenna. When used with suitable speech input equipment such as Navy Type _50064, it will deliver a speech modulated wave to an antenna.

b. Each electrical part throughout the equipment is indicated by a symbol letter and number, i.e., M-1, C-2, R-8, etc. This number for a given part is the same throughout the text and all drawings on which they appear.

c. Schematically, the circuits for all the power supplies are fundamentally the same. Therefore, description on the operation will apply equally well to any one of the equipments. Parts which serve the same purpose in each of the types of transmitters and are identical, are assigned the same symbol number. However, parts which serve the same purpose in each of the types of transmitters, but have a different rating because of differences in equipment voltage, are assigned different symbol numbers.

d. Throughout the discussion on operation, all symbol numbers which apply to a circuit part are listed following the name of the part. Therefore, it should be kept in mind that wherever more than one symbol number follows the name of the part, only one of the symbol numbers apply to the equipment under discussion. The proper symbol which applies, is easily determined by referring to the schematic and wiring diagrams and parts list for the particular equipment. The parts list indicates the symbol number and the characteristics of the part as applied to each of the equipments.

e. The frequency range is 175 to 600 Kcs. and 2000 to 18100 Kcs. Nominal radio frequency output on keyed CW is 200 watts. On MCW it is 100 watts, and on telephone, the nominal unmodulated carrier is 50 watts. The carrier may be modulated up to 85%. For telegraph operation, power output may be varied from full power to a minimum of 25% by means of a generator field rheostat on the radio transmitter unit. This form of power reduction is not recommended for telephone operation. For telephone operation, reduction in power should be obtained by use of the ANT. COUPLING controls S or J, reducing coupling for a reduction in power output. This method maintains the audio quality when operating at reduced power output.

f. Telegraph keying speeds up to 100 words per minute may be utilized on both the I.F. and H.F. frequency bands.

g. Access to tubes, relays and terminal board connections is through three doors in the front panel. See Figs. 10-3, 10-4. These doors are electrically interlocked to remove dangerous high voltages when opened.

h. The schematic and wiring diagrams which apply to the different models covered by these instructions are as follows:

(1) 115 OR 230 VOLT D.C. POWER SUPPLY.
Schematic Diagram for TBL-5/6, Fig. 10-41, Dwg. 7300398.
Schematic Diagram for TBL-7/12, Fig. 10-42, Dwg. 7300491.
Schematic Diagram for TBL-13, Fig. 10-43, Dwg. 7300721.
Transmitter Wiring Diagrams:
Right-Hand Frame for TBL-5/6, Fig. 10-48, Dwg. 7300401.
Right-Hand Frame for TBL-7/12/13, Fig. 10-49, Dwg. 7300493.
Left-Hand Frame for TBL-5/6, Fig. 10-50, Dwg. 7300404.
Left-Hand Frame for TBL-7/12/13, Fig. 10-51, Dwg. 7300494.
Interconnection Diagram for TBL-5/6, Fig. 10-37, Dwg. 7606326.
Interconnection Diagram for TBL-7/12/13, Fig. 10-38, Dwg. 7608923.

(2) 220/440/3/60 A.C. POWER SUPPLY.
Schematic Diagram for TBL-5, Fig. 10-44, Dwg. 7300405.
Schematic Diagram for TBL-6, Fig. 10-45, Dwg. 7300476.
Schematic Diagram for TBL-7/12, Fig. 10-46, Dwg. 7300492.
Schematic Diagram for TBL-13, Fig. 10-47, Dwg. 7300720.
Transmitter Wiring Diagrams:
Right-Hand Frame for TBL-5/6, Fig. 10-52, Dwg. 7300402.
Right-Hand Frame for TBL-7/12/13, Fig. 10-53, Dwg. 7300495.
Left-Hand Frame for TBL-5, Fig. 10-54, Dwg. 7300406.
Left-Hand Frame for TBL-6, Fig. 10-55, Dwg. 7300477.
Left-Hand Frame for TBL-7/12/13, Fig. 10-56, Dwg. 7300496.
Interconnection Diagram for TBL-5/6, Fig. 10-39, Dwg. 7606327.
Interconnection Diagram for TBL-7/12/13, Fig. 10-40, Dwg. 7608924.

i. The radio transmitter unit consists of two entirely separate radio frequency circuits to allow coverage for the 175 to 600 Kcs. and 2000 to 18100 Kcs. bands. Throughout this text, the 175 to 600 Kcs. band will be known as the I.F. band and the 2000 to 18100 Kcs. band will be known as the H.F. band.

j. The two radio frequency circuits use common vacuum tubes for all stages except the master oscillator. The M.O. of each band or circuit uses a Type _38160 (_860) tube. The complete layout for each circuit is shown by the following tabulation. Whenever tubes are marked with the old style marking, they should be changed to the new method of tube marking. Therefore, any tube marked -38160 will hereafter be known as _860. Any tube marked _38803 will be known as _803.

Tube	H.F.	I.F.
1–860	2nd. Int. Amplifier	Int. Amplifier
1–860	1st. Int. Amplifier	Audio Oscillator
1–860	Master Oscillator	
1–860		Master Oscillator
2–803	Power Amplifier	Power Amplifier

k. Two tube access doors are provided, one for the master oscillator tubes and one for the other tubes. A third door provides access to the terminal board and relays. Refer to Figs. 10-3, 10-4. These doors, provided with interlocks, will remove all power except line voltage and master oscillator heater system power from the radio transmitter if any door is opened.

l. Only one of the two radio frequency circuits may be used at a time. Selection of either circuit is accomplished by operation of the TRANSFER SWITCH H.F.-I.F. control A on the front panel. This control actuates switches which transfer the tubes from one circuit to the other. Operating voltages applied to the tubes remain the same regardless of which radio frequency circuit is in use. To indicate which controls apply to I.F. band and which to the H.F. band, the backgrounds of the name plates are finished in different colors. The controls which apply to the I.F. circuit have a blue background and those which apply to the H.F. circuit have a green background.

m. As stated before, the H.F. and I.F. transmitters use separate master oscillator tubes and circuits. However, these two circuits and their associate tubes are mounted in one complete master oscillator unit. This unit is made up of two casting assemblies bolted together. The master oscillator unit is mounted as a separate unit in the lower portion of the right frame. It is mounted on rubber shockmounts in such a manner that very little vibration is transmitted from the radio transmitter unit to the master oscillator unit. One casting contains both oscillator tubes and their associated output circuits. The other casting, which is completely enclosed, contains the actual frequency determining circuits for both oscillators.

n. The unit which contains both H.F. and I.F. frequency determining circuits is a temperature controlled compartment. This compartment requires three hours or more to come up to temperature after which it is held at an approximately constant temperature of 60°C. Temperature is controlled by means of a mercury type thermo-regulator set for 60°C. and a heat controlling relay. A protective device in the form of a "Westinghouse Watchman" is connected in series with the heater resistor and disconnects the heater circuit in case the temperature should rise to 70°C. and the heater circuit is reconnected when the temperature falls to approximately 55°C.

o. A blower, see Figs. 10-5, 10-6, located at the bottom of the constant temperature compartment, circulates the air constantly around the master oscillator tank circuits. It maintains all frequency determining parts of the circuit at a practically constant temperature.

p. Thermostat relay K-1 or K-12 and the thermostat relay resistors are located in the master oscillator compartment near thermostat S-3 which has its bulb in the air stream just above the blower. See Fig. 10-5.

q. The H.F. circuit frequency determining components occupy the lower half and the I.F. circuit frequency determining components occupy the upper half of the constant temperature compartment. To the front of this compartment is fastened the dial assembly which contains the frequency controlling dials of both the H.F. and I.F. transmitters.

r. The cover for the master oscillator heat compartment is fitted with a paper gasket in order to provide good electrical contact at definitely known points only. These points are at the screws. This eliminates unknown contact elsewhere.

9. COMPONENT SECTIONS OF I.F. AND H.F. TRANSMITTERS.

For descriptive convenience, the complete radio transmitter unit may be divided into the following twelve sections:

a. Terminal Board and Relay Section
b. H.F. Master Oscillator
c. H.F. First Intermediate Amplifier
d. H.F. Second Intermediate Amplifier
e. H.F. Power Amplifier
f. H.F. Antenna Tuning and Coupling Section
g. I.F. Master Oscillator
h. I.F. Audio Oscillator 800 cycles
i. I.F. Intermediate and Power Amplifiers
j. I.F. Antenna Tuning and Coupling Section
k. Modulator
l. Power Circuits and Controls

a. TERMINAL BOARD AND RELAY SECTION.

(1) The terminal board and relay panel is located at the bottom of the left frame and is accessible by

opening an access door in the lower front panel which is suitably interlocked with the control circuits and held in place by one door latch. All external control and power wiring, with the exception of the antenna leads, is connected to two terminal boards located in this section. The antenna connection is made at the top of the unit and is accessible through a hole located in the top shield. See Fig. 10-25, Dwg. 7610943. The relay panel, see Figs. 10-3, 10-4 mounts starting contactor K-2, or K-13; field contactor K-3, or K-16; M.O. overload relay K-8, K-14, or K-17; H.V. overload relay K-10, K-15 or K-18. The power and control terminals, except for the three high voltage terminals, are located on the forward edge of the relay panel. The three high voltage terminals, 14, 17, 19, are on a separate terminal strip located near the resistor bank at the left of the access door. See Fig. 10-25, Dwg. 7610943 for location of the parts mounted in this section.

b. H.F. MASTER OSCILLATOR.

(1) The H. F. master oscillator uses a Type _860 tube in an electron coupled circuit which has its tank circuit inductances and capacitance mounted in the lower half of the temperature controlled compartment.

(2) Also, located in the constant temperature compartment, is a compensating capacitor C-7 in the 115 and 230 volt D.C. equipments or C-100 in the 220/440 volts, 3 phase, 60 cycle equipment. This capacitor consists of a bi-metallic device which is connected in the circuit in such a manner that it neutralizes the effect of variable tube capacity due to the tube heating when the master oscillator tube is in operation. The bi-metal is actuated by current from compensator transformer T-3 in the 115 and 230 volts D.C. equipment or T-5 in the 220/440 volts, 3 phase, 60 cycle equipment, which is supplied with power through contact K-6D of the keying relay. *Do not make any adjustments on capacitor C-7 or C-100. This capacitor has been set correctly at the factory and no adjustment is needed.*

(3) The center portion of the master oscillator tube compartment contains the high frequency master oscillator output doubler grid tuning circuit. This circuit is always tuned to double the master oscillator frequency. The doubler circuit is completely shielded from other parts in the tube compartment. It is tuned by means of a dial projecting through the master oscillator tube access door on the front panel of the transmitter.

(4) The electron-coupled circuit, as used in the master oscillator, is shown complete in the schematic diagrams, Figs. 10-41, 42, 43, 44, 45, 46, or 47, Dwgs. 7300398, 7300491, 7300721, 7300405, 7300476, 7300492, or 7300720, respectively. Referring to the particular diagram applicable to the equipment and voltage supply, it will be shown that the tuned circuit consists of the variable tapped master oscillator tank coil L-1 and master oscillator tank capacitors C-1, C-2, C-3 and C-4. This circuit covers the frequency band of 1000 to 2262.5 Kcs. Tuning is accomplished by selection of proper coil taps on master oscillator range switch S-1 and by moving a copper cylinder inside the coil. In order to avoid neutralizing the master oscillator plate circuit, the screen grid is tied to ground through master oscillator screen grid capacitor C-12. The tube filament is operated at a radio frequency potential above ground. Radio frequency master oscillator filament choke coils L-2 and L-3 prevent radio frequency filament potential from leaking off to ground through filament transformer T-1. Capacitors C-8 and C-9 by-pass the filament and provide a mid-tap for connecting the filaments to the tank circuit. Master oscillator screen resistor R-6 drops the potential on the screen grid, which is used as an anode in this circuit, to approximately 300 volts. Master oscillator plate power is supplied to the tube through master oscillator plate resistor R-7 and the radio frequency master oscillator plate choke coil L-4. The master oscillator plate resistor R-7, see Figs. 10-5, 10-6, reduces the 1000 volt plate supply to approximately 700 volts. The values of *approximately 300 volts for the screen grid and 700 volts for the plate are the optimum operating voltages* for the Type _860 tube that must be used to obtain maximum frequency stability regardless of variations in supply voltage. Choke coil L-4 prevents the radio frequency plate power from leaking to ground through master oscillator plate resistor R-7 and 1000 volt supply. The doubler circuit coupling capacitors C-15 and C-16 block off D.C. plate potential and also couple the master oscillator to the tuned doubler circuit. This doubler circuit consists of the variable doubler circuit tuning capacitor C-17 and doubler tank coil L-5. It is always tuned to the *second harmonic of the oscillator,* i.e., tuned to the frequencies in the 2000 to 4525 Kcs. band. It provides grid excitation for the first intermediate amplifier through the first intermediate amplifier grid coupling capacitor C-18.

(5) A stop has been provided at the high frequency end of the master oscillator tuning control, H.F. M.O. TUNING control C. This stop is effective on the eight ranges of H.F.M.O. RANGE control B so that proper frequency range and overlap is obtained. The stop is set at such a position that a maximum dial setting of 5000 is obtained.

(6) The master oscillator tube obtains its bias (normal value 27 volts) from bias potentiometer resistor R-5. Keying is accomplished by opening the circuit between the master oscillator and intermediate amplifier filament transformer T-1 center tap and ground. Contacts K-6C are shunted by keying relay spark absorbing capacitor C-60 in series with keying relay spark absorbing resistor R-9 to reduce arcing and key clicks to a minimum. Keying filter choke L-6 and resistor R-8 in the plate return circuit of the power amplifier tubes tend to reduce the clicks

on the "make" of the keying circuit by rounding the front of the keying wave.

(7) Following, is a brief explanation of the electron-coupled oscillator circuit. In order to more easily explain this oscillator circuit, reference is first made to the standard Colpitts oscillator circuit shown in Fig. 10-67, Dwg. 7705422. In this diagram, coil L-1 and capacitors C-1 and C-2 form the tank circuit which operates at frequency "f".

(8) Capacitors C-1 and C-2 are of such a value as to give the correct voltage distribution to plate and grid for proper operation. Generally, C-1 is approximately four times as large as C-2. C-3 is the grid blocking capacitor and the grid receives its bias by the action of grid leak R-1. C-4 is the plate blocking capacitor. High voltage is fed to the plate through radio frequency choke RFC-1. Output is taken from the plate through coupling capacitor C-5. The output frequency is the same as that of the tank circuit "f".

(9) Referring to the electron coupled oscillator circuit, Fig. 10-67, Dwg. 7705422, it can be seen that the circuit is very similar to the Colpitts circuits using a three element tube. The exception is that the screen grid of the four element tube takes the place of the plate. The tank circuit is again composed of inductance L-1 and capacitors C-1 and C-2, and operates at a frequency "f". In order to obtain the shielding action of the screen grid, the screen grid end of the tank circuit, instead of the filament, is grounded. This operates the filament at radio frequency potential, and necessitates the use of chokes RFC-2 and RFC-3 in the filament leads to transformer T-1. It should be noted that capacitors C-1 and C-2 have been interchanged placing the high radio frequency potential on the grid instead of the screen grid. This causes the output frequency to be rich in harmonic content, which is an advantage as shown later.

(10) The plate of the tube is connected through to the output circuit in the same manner as in the Colpitts circuit. The plate, however, does not receive its energy from the oscillator circuit in the usual manner of capacity coupling or direct connection. The grounded screen prevents capacity coupling. Since the electrons flowing to the plate must pass through the screen grid, the screen modulates the plate current at radio frequency "f". Desired A.C. in the plate circuit is then built up across the impedance offered by choke RFC-1. This method of coupling is called electron coupling. It is a very great advantage, since any change made in the output circuit reflects only very slightly on the frequency determining tank circuit and does not shift the frequency. As previously described, the output frequency is rich in harmonics. This allows a doubling circuit composed of L-2 and C-7 to be connected to the plate and operate at twice the frequency of the main tank circuit, or "2f". The action further reduces the effect of any variation in the circuits attached to the output.

(11) With an electron-coupled circuit, if the screen grid voltage is held constant, and the plate voltage is varied, the frequency decreases as the plate voltage is increased. Conversely, if the plate voltage is held constant, and the screen grid voltage is varied, the frequency increases as the voltage increases. The two curves can be made approximately equal and opposite by proper proportioning of the circuit and operating voltages. Then, if the screen grid and plate are connected to the same potential, and series resistors are used to obtain the correct operating voltages, any change in the supply voltage causes only a very small amount of shift in the output frequency. The resistors which accomplish this are shown as R-2 and R-3 in the schematic diagrams, Figs. 10-41 through 10-47.

c. H.F. FIRST INTERMEDIATE AMPLIFIER.

(1) The first intermediate amplifier, using a Type _860 tube, is located in the lower portion of the left-hand frame of the transmitter unit. It is used to prevent reaction on the master oscillator by the second intermediate and power amplifiers. See Fig. 10-8. For transmitter output frequencies of 2000 to 4000 Kcs., the first intermediate amplifier is operated as a fundamental or straight through amplifier at the frequency of the master oscillator doubler circuit L-5 and C-17. For the transmitter output range of 4000 to 9050 Kcs., this amplifier is operated as a frequency multiplier to double the output frequency of the master oscillator unit, (i.e., functioning at four times the frequency of the master oscillator tank circuit). To do this, range switch S-9 is closed, shorting out the appropriate number of turns in the first intermediate amplifier tank coil L-11. The Type _860 tube used in this stage obtains its grid excitation from the tuned doubler circuits of the master oscillator through the first intermediate amplifier grid coupling capacitor C-18. Radio frequency first intermediate amplifier grid choke coil L-7 offers a high impedance path for the radio frequency grid voltage to ground. At the same time, it allows a blocking bias to be applied to the tube grid from bias potentiometer R-28, R-29, and R-30. First intermediate amplifier grid grounding capacitor C-19 protects the potentiometer and bias circuit from any radio frequency potential. First intermediate amplifier grid resistor R-10 provides an operating bias in addition to that normally supplied from the potentiometer. The tuned plate circuit consists of the variable first intermediate amplifier tuning capacitor C-28 and the first intermediate amplifier inductance L-11. Filament by-pass capacitors C-22 and C-23 by-pass the filaments and effectively ground it for r-f. Radio frequency choke coil L-12 is used to prevent any radio frequency energy from getting back to the plate voltage supply.

(2) Screen grid potential for this stage is obtained from a potentiometer consisting of H.V. potentiometer resistors R-24, R-25, R-26, R-27, R-53, and R-54 which are connected across the 2000 volt plate voltage supply. Screen resistor R-15 further reduces this potential and improves operation. The screen grid is effectively grounded by capacitor C-24. Normal screen, bias and plate potentials are approximately 490, −250, and 2000 volts, respectively.

d. H.F. SECOND INTERMEDIATE AMPLIFIER.

(1) The second intermediate amplifier uses one Type _860 tube and is located immediately above the first intermediate amplifier. For transmitter output frequencies of 2000 to 9050 Kcs., this amplifier is operated as a fundamental or straight through amplifier. Also, it operates as a frequency doubler for output frequencies of 9050 to 18100 Kcs.

(2) The tuned plate circuit of the second intermediate amplifier consists of a continuously variable second intermediate amplifier tank coil L-16, a variable second intermediate amplifier tuning capacitor C-36, H.F. 2nd amp. tuning Control F, and a fixed mica second intermediate amplifier tank capacitor C-35. The mica capacitor is placed in the circuit by means of the high frequency range switch S-12 for transmitter output range of 2000 to 4000 Kcs.

(3) Radio frequency second I.A. grid choke L-14 offers a high impedance path for the radio frequency grid voltage to ground. At the same time, it allows a blocking bias to be applied to the tube grid from bias potentiometer R-28, R-29, and R-30. The second I.A. grid choke grounding capacitor C-30 protects the potentiometer and bias circuit from any transient radio frequency potential. Normal screen, bias and plate potentials are approximately 320, −250 and 2000 volts, respectively.

e. H.F. POWER AMPLIFIER.

(1) The power amplifier is located in the upper portion of the left-hand section of the transmitter unit, see Fig. 10-8. It is similar in construction to the second intermediate amplifier except that two Type _803 tubes are used in parallel. The power amplifier operates as a fundamental or straight through amplifier over the entire frequency range of 2000 to 18100 Kcs. Frequency range switch S-16 cuts in fixed P.A. tank capacitor C-46 in parallel with P.A. tuning capacitor C-47 for frequencies between 2000 and 4000 Kcs. Normal screen, bias and plate potentials are approximately 300, −135 and 2000 volts, respectively.

f. H.F. ANTENNA TUNING AND COUPLING SECTION.

(1) The antenna tuning equipment occupies the entire top portion of the left-hand section of the transmitter unit. The antenna tuning system is made up of antenna coupling capacitor C-50, antenna tuning inductance L-25, antenna tuning capacitor C-51, and antenna feed switch S-17, shown in Fig. 10-8.

(2) D.C. blocking capacitor C-49 is added in series with antenna coupling capacitor C-50 to protect the antenna system from D.C. potentials that might be occasioned by damage or voltage breakdown of capacitor C-50.

(3) Antenna tuning capacitor C-51 is variable. It is operated in parallel with variable antenna tuning inductance L-25 for voltage feed, and in series with L-25 for current feed. The antenna terminal is located at the top of the unit and is accessible through a hole in the top shield.

g. I.F. MASTER OSCILLATOR.

(1) The master oscillator uses a Type _860 tube in a standard Colpitts oscillator circuit. The frequency determining parts of the circuit are: variometer L-9, inductance L-30 and capacitors C-55, C-56, C-57, C-58, C-61, C-62 and C-63. These parts are located in the upper half of the temperature controlled compartment, as seen in Figs. 10-5 and 10-6.

(2) The master oscillator frequency band is divided into seven ranges selected by switch S-23. Various frequency ranges are obtained by selecting different values of inductance and capacity by means of this switch. Tuning or frequency adjustment, throughout any range, is accomplished by variometer L-9. Main tank capacity is made up of capacitors C-61, C-62 and C-63. These three capacitors are proportioned across the tank circuit so as to provide the proper grid and plate voltage for the oscillator tube and coupling to the following intermediate amplifier stage. See Figs. 10-41, 42, 43, 44, 45, 46 or 47, Dwgs. 7300398, 7300491, 7300721, 7300405, 7300476, 7300492, or 7300720, respectively.

(3) Plate power to the oscillator tube is provided by series feed through the tank inductance. Grid choke L-10 and grid leak resistor R-13 provide the necessary D.C. circuit for the grid of the oscillator tube. Blocking capacitor C-64 isolates the D.C. grid circuit from the D.C. plate circuit which passes through L-9, L-30. Screen grid potential is supplied to the Type _860 master oscillator tube from screen grid potentiometer resistors R-31 and R-32. M.O. screen grid resistor R-14, connected in series with the screen grid, prevents the tube from taking excessive screen grid current. The filament, screen grid, and plate circuits are suitably by-passed to ground by capacitors C-67, C-68, C-69 and C-54 to prevent radio frequency energy getting into the power supply. The normal screen and plate potentials on the tube are approximately 300 and 950 volts, respectively.

(4) The master oscillator tube obtains its operating bias from M.O. grid leak R-13. Keying is accomplished by opening the circuit between the M.O. and I.A. filament transformer T-1 center tap and ground. Contacts K-6C are shunted by keying relay spark absorbing capacitor C-60 in series with keying relay spark absorbing resistor R-9 to reduce

arcing and key clicks to a minimum. Keying filter choke L-6 and resistor R-8 in the plate return circuit of the power amplifier tube tends to reduce the click on the "make" of the keying circuit by rounding the front of the keying wave.

(5) This oscillator operates over a frequency range of 87.5 to 300 Kcs. which is just half the output frequency of the transmitter. Frequency is doubled to the proper output frequency by means of the intermediate amplifier which follows the master oscillator. Inter-reaction between the output circuits and the frequency determining oscillator circuits is reduced to a minimum by operating the oscillator at half frequency.

(6) Coupling to the intermediate amplifier tube grid is taken from the point between C-62 and C-63. Their values are so proportioned that proper grid excitation voltage is obtained at all times.

h. I.F. AUDIO OSCILLATOR, 800 CYCLES.

(1) Mounted in the H.F. first intermediate amplifier section is the I.F. 800 cycle audio oscillator. See Fig. 10-8. The Type _860 tube of the H.F. first intermediate amplifier is switched into the I.F. audio oscillator circuit by switches S-4, S-5 and S-6. The I.F. audio oscillator uses this tube in a conventional tuned grid oscillator circuit. An iron core audio oscillator transformer T-4 with the grid winding tuned by audio oscillator tank capacitor C-20 is used. Grid leak bias is supplied by the voltage drop across audio oscillator grid resistor R-11 and audio oscillator capacitor C-21. The audio oscillator is connected to the power amplifier screen grids through coupling capacitor C-26. The screen grid of the audio oscillator is electrostatically grounded through screen grid by-pass capacitor C-25. The filament of this tube is energized through contacts on the PHONE-CW-MCW switch S-7. Audio oscillator filament compensating resistors R-16 and R-55 are switched into the circuit when the filaments of the audio oscillator is cut off in the CW position. This leaves the filament potential of all other tubes at the same value regardless of the position of the PHONE-CW-MCW switch S-7.

i. I.F. INTERMEDIATE AND POWER AMPLIFIERS.

(1) The intermediate amplifier and power amplifier tank circuits occupy the space in the right-hand section of the transmitter unit directly above the combined master oscillator unit as shown in Figs. 10-5, 10-6. The Type _860 tube, located in the H.F. second intermediate amplifier compartment in the left-hand section, functions as the intermediate amplifier of the I.F. transmitter. This tube, and the two Type _803 power amplifier tubes are located in the H.F. circuit compartments as short leads to the vacuum tubes are essential in the H.F. transmitter.

(2) The intermediate and power amplifier tank circuits are both made up of variometer tuning inductances and fixed tank capacitors. The tuning ranges of both circuits are divided into five ranges by tapping the tuning inductances and varying the value of the fixed capacitors across each circuit. Both circuits cover a frequency range of 175 to 600 Kcs. Selection of any of these five bands is obtained by operating switch S-21 in the intermediate amplifier circuit and switch S-20 in the power amplifier circuit. These two switches are ganged together and operated from the I.F. RANGE switch, control P on the front panel.

(3) Excitation is supplied to the Type _860 intermediate amplifier tube by the potential developed across M.O. tank capacitor C-62 in the master oscillator tank circuit. In this way, excitation is nearly constant over the entire specified frequency band.

(4) Proper grid excitation voltage from the intermediate amplifier circuit to the grids of the power amplifier tubes is provided by capacitors C-79 and C-80 across the intermediate amplifier tank circuit.

(5) Both stages provide plate power for their associated tubes by means of series feed through the tuning inductances. Choke coil L-13, by-pass capacitor C-72, and grid resistors R-17 and R-42 provide D.C. grid return for the intermediate amplifier tube. Similarly, choke coil L-20, by-pass capacitor C-81, and grid resistor R-21 provide the D.C. grid circuit for the power amplifier tubes.

(6) Grid bias to the amplifier tubes is applied through the grid choke and is obtained from bias potentiometer R-28, R-29 and R-30. In addition, a small amount of grid bias is obtained from the individual tube grid resistors. Sufficient fixed bias is supplied to block the amplifier tubes when excitation is removed. Therefore, keying the master oscillator automatically keys the amplifiers. Normal plate voltage on both the intermediate and power amplifier is approximately 2000 volts. The screen and bias voltage on the intermediate amplifier are 320 and −250 volts, respectively. The screen and bias voltage on the power amplifier are 300 and −135 volts, respectively.

j. I.F. ANTENNA TUNING AND COUPLING SECTION.

(1) In the upper portion of the right-hand frame, refer to Figs. 10-5, 10-6, is mounted the antenna tuning and coupling system. The antenna tuning circuit is made up of: I.F. antenna coupling coil L-29; I.F. antenna blocking capacitors C-91 and C-95; I.F. antenna tuning variometer L-27; I.F. antenna series capacitor C-92; and I.F. antenna loading inductance L-26. The I.F. antenna coupling coil L-29 is in the form of a rotor placed inside power amplifier tank coil L-22. It is varied by I.F. ANTENNA COUPLING, control S on the front panel of the transmitter unit. I.F. antenna loading inductance L-26 is provided with fifteen taps connected to S-19 which in con-

junction with I.F. antenna tuning variometer L-27, provides tuning of the antenna circuit. I.F. antenna series capacitor C-92 is placed in or out of the circuit by switch S-34. This capacitor is placed in the circuit to allow tuning of relatively high capacity antennas at the 600 Kcs. end of the frequency range.

(2) In some of the TBL-5 transmitters, switch S-19 is made of a large Mycalex plate with dimensions 17¾ inches by 10½ inches. This switch mounting plate has been reduced in size for all of the other transmitters to 13 inches by 10½ inches. However, the switches are electrically and mechanically interchangeable and appropriate brackets are supplied for the smaller board.

(3) D.C. blocking capacitors C-91 and C-95 protect the antenna system from D.C. potentials that might be occasioned by the voltage breakdown of the antenna coupling coil.

k. MODULATOR.

(1) Either the H.F. transmitter or I.F. transmitter output may be VOICE modulated. This is accomplished by suppressor grid modulation of the power amplifier tubes. PHONE-CW-MCW switch S-7 transfers the suppressor grids of the Type _803 tubes from H.F. potentiometer resistors R-24, R-25, R-53, R-54, R-26 and R-27 with its positive potential to bias potentiometer resistor R-28, R-29 and R-30 with its negative potential. The value of negative potential is chosen which will give an unmodulated carrier output of one fourth of the output on CW telegraph.

(2) For telephone transmission the speech input equipment (Navy Type-50064 Speech Amplifier, etc.), which is not supplied under the contract for the transmitting equipment, should be connected to the primary of audio transformer T-6 through terminals 27 and 28. The secondary of transformer T-6 is connected in series with the suppressor grid lead by means of PHONE-CW-MCW switch S-7. Thus, the audio voltage induced in the secondary of the transformer is algebraically added to the negative bias from bias potentiometer R-28, R-29 and R-30. This action modulates the voltage impressed upon the suppressor grids of the power amplifier tubes, which in turn modulates the output.

(3) In order to control the radio transmitter unit for telephone transmission, a microphone with a "Press-to-Talk" button or an equivalent switch should be connected into the keying circuit of the transmitter. The "Press-to-Talk" button serves the same function as a remote telegraph key.

l. POWER CIRCUITS AND CONTROLS.

(1) All of the *tuning controls* are marked with letters for the convenience of the operating personnel and are as follows. Reference should be made to Photographs, Figs. 10-3 and 10-4.

(A) TRANSFER SWITCH H.F.-I.F.
(B) H.F. M.O. RANGE
(C) H.F. M.O. TUNING
(D) H.F. DOUBLER CIRCUIT TUNING
(E) H.F. 1ST AMP. TUNING
(F) H.F. 2ND AMP. TUNING
(G) H.F. P.A. TUNING
(H) H.F. RANGE SWITCH
(J) H.F. ANTENNA COUPLING
(K) H.F. ANTENNA INDUCTANCE
(L) H.F. ANTENNA CAPACITOR
(M) H.F. ANTENNA FEED CURRENT-VOLTAGE
(N) I.F. M.O. RANGE
(O) I.F. M.O. TUNING
(P) I.F. RANGE SWITCH
(Q) I.F. INT. AMP. TUNING
(R) I.F. P.A. TUNING
(S) I.F. ANTENNA COUPLING
(T) I.F. ANTENNA TUNING
(U) I.F. ANTENNA SERIES CAPACITOR IN-OUT
(V) I.F. ANTENNA INDUCTANCE
(W) ANTENNA TRANSFER SWITCH I.F.-H.F.-RECEIVER

(2) The power control switches and the indicator lights are located on a panel directly above the terminal board access door. The control switches from left to right are: START-STOP, REMOTE-LOCAL, LINE VOLTAGE NORMAL-HIGH (D.C. Sets Only) or H.F. M.O. FILAMENT STAND-BY ON-OFF (A.C. Sets Only) OVERLOAD RELAY RESET. THE indicator lights on the D.C. sets are MOTOR SOLENOID (Blue), PLATE VOLTAGE (Red), HEATER POWER (Amber) and BIAS VOLTAGE (Green.) The indicator lights on the A.C. sets are MOTOR SOLENOID (Blue), PLATE VOLTAGE (Red), H.F. M.O. FILAMENT (Clear), HEATER POWER (Amber) and BIAS VOLTAGE (Green). Near the bottom of this panel are LINE VOLTAGE voltmeter, PHONE-CW-MCW switch and BIAS VOLTAGE voltmeter on the D.C. Sets or PHONE-CW-MCW switch and BIAS VOLTAGE voltmeter on the A.C. sets.

(3) Below the master oscillator compartment are located the PLATE VOLTAGE, M.O. PLATE VOLTAGE, and FILAMENT VOLTAGE voltmeters with PLATE VOLTAGE and FILAMENT VOLTAGE rheostats immediately below. Except for TEST key and EMERGENCY SWITCH, located near the middle of the panel, all tuning controls and indicating instruments are located near their respective circuit.

(4) The TRANSFER SWITCH H.F.-I.F. control A when operated, actuates switches S-4, S-5, S-6, S-8, S-10, S-11, S-14, S-15, and S-37. Switches S-4 and S-5 transfer plate and grid connections of one of the Type _860 tubes to either the first intermediate amplifier radio frequency circuits of the H.F. transmitter or the audio oscillator circuits (transformer

T-4) for use in modulating the I.F. transmitter. Switches S-10 and S-11 perform a similar action of connecting another Type _860 tube to either the H.F. second intermediate amplifier circuit or the intermediate amplifier circuits of the I.F. transmitter. Switches S-14 and S-15 perform the same function for the two Type _803 power amplifier tubes by connecting them to either the H.F. or I.F. power amplifier circuits.

(5) Switch S-8 removes filament power from the oscillator tube not in use. Switch S-6, when in the I.F. position, transfers filament of the H.F. first intermediate amplifier tube to PHONE-CW-MCW switch S-7. There it may control the type of modulation of the I.F. transmitter. S-37 opens the primary circuit of H.F. oscillator compensating capacitor transformer T-3 when using the I.F. transmitter. Plate voltage is applied to both master oscillator tubes and to the H.F. first intermediate amplifier-I.F. audio oscillator tube whenever either circuit is in operation.

(6) All other control and power circuits function the same regardless of which radio frequency transmitter circuit is in use.

(7) Keying relay K-6 performs the function of keying either the H.F. or I.F. transmitting circuits when in use. This relay is mounted behind a glass cover on the front panel seen in Figs. 10-1, 10-2 and may be removed for cleaning and adjustment.

(8) Contacts K-6C of this relay are connected in the filament center tap return of the winding on filament transformer T-1. This transformer supplies the oscillator and intermediate amplifier tubes. Opening of contacts K-6C, opens the plate return circuit from either master oscillator tube and its associated intermediate amplifier tubes. Contacts K-6A and K-6B through transmitter terminals 36, 37 and 38 permit control of receiver protective relays or receiver attenuator relays when provided. Contact K-6A may be used to operate receiver attenuator relays having a normally open contact. If the relays have normally closed contacts, keying relay contact K-6B may be used to control the circuit. When either contacts K-6A or K-6B or both, are used to control one or more receiver attenuator relays, the contact rating of 250 volts D.C. and 150 ma. should not be exceeded. A suitable spark suppression circuit should be incorporated external to the transmitter to eliminate sparking at the keying relay contacts. Individual installation conditions will dictate the degree of spark suppression necessary. Unless this spark suppression is accomplished properly, the contact rating of K-6A and K-6B must be lowered to a point where sparking does not occur.

(9) ANTENNA TRANSFER SWITCH S-18, control W provides manual transfer of the antenna to either the H.F. or I.F. transmitter circuits or direct to a receiver.

(10) REMOTE-LOCAL switch S-25 is used to place control of the transmitter either to the control switches on the transmitter unit front panel or to the standard remote control system used on Naval vessels. This standard control system may be either of the 4- or 6-wire type. If a particular installation requires 6-wire control, the equipment may be connected by following the instructions given on the interconnection diagrams Figs. 10-37, 38, 39 or 40, Dwgs. 7606326, 7608923, 7606327, or 7608924, respectively.

(11) START-STOP switch S-26 (4-wire control) or S-40 (6-wire control) is used to start or stop the motor-generator from the transmitter unit front panel. This control is operative regardless of the position of the REMOTE-LOCAL switch S-25. On 4-wire control systems, switch S-26 must be in the START position before the equipment can be started from the remote point. On 6-wire control systems, the position of switch S-40 is not important, the equipment being controlled from either the local or remote point at will.

(12) TUNE-OPERATE switch S-22 is intended for use as its name implies. It has three positions. The first, marked TUNING STEP 1, is for use in making adjustments of the *master oscillator frequency control settings.* When the switch is in this position, *plate voltage is removed from all of the amplifier stages.* In the second, or TUNING STEP 2, position, plate potential is applied to all the amplifier stages but at a safe value for tuning. When the switch is in the OPERATE position, plate potential is increased to that operating value determined by the setting of field rheostat R-41.

(13) EMERGENCY SWITCH S-24 is used to shut down the complete equipment in case of an emergency. This switch removes all power from the transmitter, including master oscillator heater power when open. Therefore, it is necessary to allow sufficient time for the master oscillator unit temperature to reach normal operating value of 60°C. before attempting to use the equipment after the EMERGENCY SWITCH has been operated.

(14) Toggle type TEST key S-27 performs the same function as the telegraph key. When this key is thrown to the UP position, it automatically locks in position, but when thrown in the DOWN position, it will reset to the OFF position as soon as it is released.

(15) Starting contactor K-2, K-4, K-13 functions whenever the START-STOP switch is placed in the START position. However, the REMOTE-LOCAL switch must be in the LOCAL position and door interlocks closed. When the contactor operates, its contacts A close the starting circuit of the magnetic controller. In series with the coil of the starting contactor are door interlocks S-28, S-29, and S-30. When any door on the transmitter unit is opened, the motor-generator unit is immediately shut down.

(16) Field contactor K-3, K-16 functions as soon as K-2, K-4, K-13 closes. Contacts A and B close both field circuits of the 1000 and 2000 volt generators. The contacts of overoad relays K-14, K-17, for the 1000 volt circuit, and K-10, K-15, K-18 for the 2000 volt circuit are both connected in series with the coil of relay K-3, K-16. An overload in either of these high voltage circuits will immediately remove field excitation from the generator.

(17) Switches, such as S-12, S-15, S-18, S-19, S-20, S-22 and S-34 have interlock contacts which open the keying relay circuit whenever these switches are operated.

(18) In order to permit rapid adjustment of the master oscillator to any desired frequency, provisions have been incorporated in the transmitter for connection of a standard frequency measuring equipment such as Model LD. R.F pick-up voltage from either the H.F. or I.F. master oscillator is obtained by utilizing the r-f voltage built up between the master oscillator unit casting and the frame of the transmitter. The r-f voltage provided is carried to the terminal board to which the external wiring for the frequency meter is connected. Available at the terminals is an r-f voltage of between 15 and 750 millivolts across 75 ohms. This voltage depends upon the frequency to which the master oscillator is tuned. In the case of the H.F. master oscillator, the H.F. DOUBLER CIRCUIT TUNING control D must be adjusted to resonance in order to obtain maximum frequency stability and r-f pick-up voltage for calibration purposes. On the left side of the TEST key, is located FREQUENCY METER AUDIO OUTPUT jack J-1. A pair of headphones may be connected through this jack to the audio output of the frequency meter to facilitate rapid adjustment of the master oscillator frequency. On certain installations, it may be found that insufficient pick-up voltage is available, especially in the I.F. band. It is possible to increase this pick-up voltage by removing the connector to capacitor C-97. This action is not recommended unless absolutely necessary. It will, however, provide considerably more r-f pick-up voltage for calibration purposes.

10. FILTER UNIT.

a. Filter Units, Type CAY-53036A and Type CAY-53037A are self-contained units. Assembled in these units are the filters for the generators, Type CC-21232, Type CC-21232A, Type CC-21233 and Type CC-21233B and an adjustable field resistor for generator Type CC-21233 and Type CC-21233B. See Figs. 10-13, 14, and 26, Dwg. 7613257 for general construction and overall dimensions.

b. The cabinets are similar to the cabinets of the magnetic controllers and may be mounted on either a bulkhead or a deck. Two mounting strips which come with the unit may be secured to the back of the case for bulkhead mounting or to the bottom of the cabinet for deck mounting.

c. The units contain filter capacitor C-150 for the 2000 volt plate supply, filter capacitor C-151 and reactor L-151 for the 1000 volt plate supply, and a filter network consisting of capacitors C-152, C-153, C-154 and reactor L-150 for the 250 volt bias supply. Adjustable field resistor R-150 for the 250/1000 volt generator is also located in the filter unit.

d. A.C. Filter Unit, Type CAY-53037A, is used with equipment operating from 220/440 volt, 3 phase, 60 cycle power supply. It contains, in addition to the parts listed in Par. 10*c.*, transformers T-150 and T-151. Transformer T-150 is used to step down the 220 or 440 volts to 110 volts for supplying heater power to the master oscillator temperature controlled compartment. Transformer T-151 steps down the 220 or 440 volts to 110 volts and supplies filament power to the vacuum tubes. Fuses F-150 and F-151 protect the primary circuit of these two transformers. See Figs. 10-14, 44, 45, 46 or 47; Dwgs. 7300405, 7300476, 7300492 or 7300720, respectively.

e. D.C. Filter Unit, Type CAY-53036A is used with equipment operating from either 115 volt D.C. or 230 volt D.C. It contains, in addition to the parts mentioned in Par. 10 *c.*, resistor R-151 and R-152. These resistors may be inserted in or removed from the heater power circuit of the master oscillator temperature controlled compartment by means of LINE VOLTAGE NORMAL-HIGH switch S-36 located on the transmitter unit front panel. See Figs. 10-13, 41, 42 or 43, Dwgs. 7300398, 7300491 or 7300721, respectively.

11. MOTOR-GENERATOR UNIT, TBL-5.

a. The motor-generator units supplied with Navy Model TBL-5 Radio Telegraph Transmitting Equipment are of rugged design. See Figs. 10-15, 10-16 for photographs of the units. They have ample capacity for the satisfactory operation of the transmitters. The motor-generators are of the three unit, six bearing type with all three units mounted on a common bed plate. Three combinations of units are employed. One is designed to operate from a power supply of 115 volt D.C., another for a 230 volt D.C. supply, and a third, for 440 volt, 3 phase, 60 cycle supply. A complete set consists of a driving motor, a 2000 volt D.C single commutator generator and a 250/1000 volt D.C. double commutator generator. The 250/1000 volt generator is also equipped with slip rings, which on D.C. installations, furnishes A.C. filament power. The three types of motor-generator units are identical except for the driving motors. These motors are mechanically interchangeable with one another, providing flexibility in case of power supply changes. The three combinations are as follows:

(1) 115 Volt D.C. Motor-Generator Unit, Type CC-21426, Main Plate Generator, 2000 Volt D.C. Type CC-21232. M.O. Plate and Bias Generator,

250/1000 Volt D.C. Type CC-21233. D.C. Motor, 115 Volt D.C., Type CC-21229A Cast iron bedplate. See Fig. 10-15.

(2) 230 Volt D.C. Motor-Generator Unit, Type CC-21427, Main Plate Generator, 2000 Volt D.C. Type CC-21232 M.O. Plate and Bias Generator, 250/1000 Volt D.C. Type CC-21233, D.C. Motor, 230 Volt D.C., Type CC-21230A. Cast iron bedplate. See Fig. 10-15.

(3) 440 Volt, 3 Phase, 60 Cycle Motor-Generator Unit, Type CC-21428, Main Plate Generator, 2000 Volt D.C. Type CC-21232. M.O. Plate and Bias Generator, 250/1000 Volt D.C. Type CC-21233. A.C. Induction Motor, 440 Volt, 3 Phase, 60 Cycle, Type CC-21231A. Cast iron bedplate. See Fig. 10-16.

b. All of the motors and generators are semi-enclosed constant speed, continuous duty, self-ventilating and drip-proof from all angles within the limits of 45° on either side of the vertical and included in any plane perpendicular to the axis. In addition, the D.C. units may be adjusted to maintain this drip-proof feature with the set installed so that the bedplate is normally 45° from the horizontal plane. The units are rated on the basis of 40°C. temperature rise in an ambient temperature of 50°C.

c. Various units of the motor-generator set are fitted with ball bearings, are flexibly coupled together and mounted on a cast iron bedplate. The bedplate is so designed and constructed that the entire motor-generator unit may be moved about or supported at its extreme ends while running without disturbing the alignment of the units. Any unit may be removed without necessitating the removal of any other unit on the bedplate.

d. The D.C. generators are excited from the 250 volt winding of the 250/1000 volt D.C. Generator, Type CC-21233. Fuses are installed on the terminal boards of all generators to protect them against damage due to the failure of any part of the equipment.

e. Main Plate Generator, Type CC-21232.

(1) The single commutator 2000 volt D.C. Plate Power Generator, Type CC-21232 is compound wound and separately excited from the 250 volt D.C. Bias Generator, Type CC-21233. It is rated at 1.4 KW for 40°C. temperature rise and will deliver 0.7 amperes at 2000 volts. The field consists of two main poles and two commutating poles. The main shunt field coils are excited from the 250 volt generator while the series and commutating field windings are connected in series with the 2000 volt armatures as shown on Drawing CAY-T-147, Sheet 5. Control of the output voltage is obtained by means of a generator field rheostat located in the transmitter unit. All terminals and fuses are mounted on ceramic insulators as shown on the reference drawing. This generator is used to supply plate and screen grid power to the intermediate amplifiers and power amplifier.

f. M.O. Plate and Bias Generator, Type CC-21233.

(1) The 250 and 1000 volt D.C. Generator, Type CC-21233 is shunt wound. Its shunt field is excited from the 250 volt winding. The generator is rated at 0.638 KW continuous load for 40°C. temperature rise. It will deliver 0.85 amperes at 250 volts D.C., 0.2 amperes at 1000 volt D.C. and 1.02 amperes at 220 volt, single phase, 60 cycle. The unit has a four pole field and double commutator two winding armature as shown on Drawing CAY-T-147, Sheet 6. Adjustment of output voltage is obtained by means of an adjustable shunt field resistor located in the filter unit. The generator is used to supply 250 volts for amplifier tube bias and generator excitation and 1000 volts for the master oscillator tube screen grid and plate power. On the D.C. installations, this generator is used to supply A.C. filament power also. The terminals and fuses of the 1000 volt circuit and 250 volt circuit are mounted on ceramic insulators.

g. D.C. Motor, Type CC-21229A

(1) The 115 volt D.C. Motor Type CC-21229A is compound wound and rated at 3½ horsepower, 1780 rpm. The field consists of four main poles and four commutating poles connected as shown on Drawing CAY-T-147 Sheet 2. The motor is equipped with a speed regulator to hold the speed substantially constant at 1780 rpm. for variations of plus 45% or minus 23% in the D.C. line voltage and for change in temperature and change in load. The speed regulating device consists of a 2-ring collector and a single contact vibrating regulator. The pair of contacts is connected across a resistance tube, mounted in the regulator which is in series with the shunt field of the motor. Connections between motor and collector rings are made through brushes mounted in the regulator housing.

h. D.C. Motor, Type CC-21230A.

(1) The 230 volt D.C. Motor, Type CC-21230A is compound wound and rated 3½ horsepower, 1780 rpm. The field consists of four main poles and four commutating poles connected as shown on Drawing CAY-T-147, Sheet 3. The motor is equipped with a speed regulator to hold the speed substantially constant at 1780 rpm. for variations of plus 45% or minus 23% in D.C. line voltage and for change in temperature and change in load. The speed regulating device consists of a 2-ring collector and a single contact vibrating regulator. The pair of contacts is connected across a resistance tube, mounted in the regulator, which is in series with the shunt field of the motor. Connections between motor and collector rings are made through brushes mounted in the regulator housing.

i. Induction Motor, Type CC-21231A.

(1) The 440 Volt, 3 Phase, 60 Cycle, Motor Type CC-21231A is of the induction type and rated 3½ horsepower, 1780 rpm. The stator winding consists of six groups of six coils each. There are,

therefore, two groups per phase. The motor is connected internally for 440 volts, 3 phase, 60 cycles. The two groups per phase are connected in series and the 3 phase windings connected into a single star. See Drawing CAY-T-147 Sheet 4. The motor is designed for full voltage starting. The motor may be reconnected for 220 volt, 3 phase, 60 cycle operation as indicated on Drawing CAY-T-147 Sheet 4. Other changes must be made in the controller transmitter and filter unit if the complete equipment is to be operated from a 220 volt, 3 phase, 60 cycle supply.

12. MOTOR-GENERATOR UNITS, TBL-6/7/12/13.

a. Refer to Figs. 10-17, 10-18 for photographs of the motor-generator units. The motor-generator units supplied with the Navy Model TBL-6/7/12/13 Radio Telegraph Transmitting Equipments are of rugged design. They have ample capacity for satisfactory operation of the transmitters. The motor-generators are of the three unit, six bearing type with all three units mounted on a common bed-plate. All castings which were previously made of cast iron for the Model TBL-5 equipments have been redesigned and made of cast steel, or welded steel construction. Three combinations of units are employed; one is designed to operate from a power supply of 115 volts D.C., another for a 230 volts D.C. and a third from 220/440 volts, 3 phase, 60 cycle A.C. supply. A complete set consists of a driving motor, a 2000 volt D.C. single commutator generator, and a 250/1000 volt D.C. double commutator generator. The 250/1000 volt generator is also equipped with slip rings, which on D.C. installations, furnish A.C. filament power. The three types of motor-generator units are identical except for the driving motors. They are mechanically interchangeable with one another thereby providing flexibility in case of power supply changes. The three combinations are as follows:

(1) *115 Volt D.C. Motor-Generator Unit, Type CC-21426A.* Main Plate Generator, 2000 Volts, D.C. Type CC-21232A. M.O. Plate and Bias Generator, 250/1000 Volt D.C. Type CC-21233B. D.C. Motor, 115 Volt D.C., Type CC-21229B. Welded steel bedplate. See Fig. 10-17.

(2) *230 Volt D.C. Motor-Generator Unit, Type CC-21427A.* Main Plate Generator, 2000 Volt D.C., Type CC-21232A. M.O. Plate and Bias Generator, 250/1000 Volt D.C. Type CC-21233B. D.C. Motor, 230 Volt D.C., Type CC-21230B. Welded steel bedplate. See Fig. 10-17.

(3) *220/440 Volt, 3 Phase, 60 Cycle Motor-Generator Unit, Type CC-21428A.* Main Plate Generator, 2000 Volt D.C., Type CC-21232A. M.O. Plate and Bias Generator, 250/1000 Volt D.C. Type CC-21233B. A.C. Induction Motor, 220/440 Volt, 3 Phase, 60 Cycle, Type CC-21231B. Welded steel bedplate. See Fig. 10-18.

b. All of the motors and generators are semi-enclosed constant speed, continuous duty, self-ventilating and drip-proof from all angles within the limits of 45° on either side of the vertical and included in any plane perpendicular to the axis. In addition, the D.C. units may be adjusted to maintain this drip-proof feature with the set installed so that the bedplate is normally 45° from the horizontal plane. The units are rated on the basis of 40°C. temperature rise in an ambient temperature of 50°C.

c. The various units of the motor-generator set are fitted with ball bearings, are flexibly coupled together and mounted on a welded steel bedplate. This bedplate is so designed and constructed that the entire motor-generator unit may be moved about or supported at its extreme ends while running without disturbing the alignment of the units. Any unit may be removed without necessitating the removal of any other unit on the bedplate.

d. The D.C. generators are excited from the 250 volt winding of the 250/1000 volt D.C. Generator, Type CC-21233B. Fuses are installed on the terminal boards of all generators to protect them against damage due to the failure of any part of the equipment.

e. Main Plate Generator, Type CC-21232A.

(1) The single commutator 2000 volt D.C. Plate Power Generator, Type CC-21232A is compound wound and separately excited from the 250 volt D.C. Bias Generator, Type CC-21233B. It is rated at 1.4 KW for 40°C. temperature rise and will deliver 0.7 ampere at 2000 volts. The field consists of two main poles and two commutating poles. The main shunt field coils are excited from the 250 volt generator. The series and commutating field windings are connected in series with the 2000 volt armatures as shown on Drawing CAY-T-147, Sheet 15. Control of the output voltage is obtained by means of a generator field rheostat located in the transmitter unit. All terminals and fuses are mounted on ceramic insulators as shown on the reference drawing. This generator is used to supply plate and screen grid power to the intermediate amplifiers and power amplifier.

f. M.O. Plate and Bias Generator, Type CC-21233B.

(1) The 250 and 1000 volt D.C. Generator, Type CC-21233B is shunt wound. Its shunt field is excited from the 250 volt winding. The generator is rated at 0.675 KW continuous load for 40°C. temperature rise. It will deliver 1.00 ampere at 250 volts D.C., 0.2 ampere at 1000 volts D.C. and 1.02 amperes at 220 volts, single phase, 60 cycle. The unit has a four pole field and double commutator two winding armature as shown on Drawing CAY-T-147, Sheet 16. Adjustment of the output voltage is obtained by means of an adjustable shunt field resistor located in the filter unit. The generator is used to supply 250 volts for amplifier tube bias and generator excitation and 1000 volts for the master oscillator tube screen

grid and plate power. On D.C. installations, this generator is used to supply A.C. filament power also. The terminals and fuses of the 1000 volt and 250 volt circuits are mounted on ceramic insulators.

g. D.C. Motor, Type CC-21229B.

(1) The 115 volt D.C. Motor, Type CC-21229B is compound wound and rated at 3½ horsepower, 1780 rpm. The field consists of four main poles and four commutating poles connected as shown on Drawing CAY-T-147 Sheet 12. The motor is equipped with a speed regulator to hold the speed substantially constant at 1780 rpm. for variations of plus 45% or minus 23% in the D.C. line voltage and for change in temperature and change in load. The speed regulating device consists of a 2-ring collector and a single contact vibrating regulator. The pair of contacts is connected across a resistance tube, mounted in the regulator, which is in series with the shunt field of the motor. Connections between motor and collector rings are made through brushes mounted in the regulator housing.

h. D.C. Motor, Type CC-21230B.

(1) The 230 volt D.C. Motor, Type CC-21230B is compound wound and rated 3½ horsepower, 1780 rpm. The field consists of four main poles and four commutating poles connected as shown on Drawing CAY-T-147, Sheet 13. The motor is equipped with a speed regulator to hold the speed substantially constant at 1780 rpm. for variations of plus 45% or minus 23% in D.C. line voltage and for change in temperature and change in load. The speed regulating device consists of a 2-ring collector and a single contact vibrating regulator. The pair of contacts is connected across a resistance tube, mounted in the regulator, which is in series with the shunt field of the motor. Connections between motor and collector rings are made through brushes mounted in the regulator housing.

i. Induction Motor, Type CC-21231B.

(1) The 220/440 Volt, 3 Phase, 60 Cycle, Motor Type CC-21231B is of the induction type and rated 3½ horsepower, 1780 rpm. The stator winding consists of six groups of six coils each. There are, therefore, two groups per phase. When the motor is connected for 440 volts, 3 phase, 60 cycles, the two groups per phase are connected in series and the 3 phase windings connected into a single star. See Drawing CAY-T-147 Sheet 14. The motor is designed for full voltage starting. The motor may be reconnected for 220 volt, 3 phase, 60 cycle operation as indicated on Drawing CAY-T-147 Sheet 14.

13. MAGNETIC CONTROLLER UNIT, TBL-5.

a. The Magnetic Controller units supplied with the Model TBL-5 and likewise for TBL-6/7/12/13 Radio Telegraph Transmitting Equipments are of the remote controlled, drip-proof, protected magnetic contactor type. All of the contactors, relays and resistors associated with the controllers are assembled on insulated panels and mounted in sheet steel boxes.

b. Magnetic Controller, Type CAY-21234A, 115 Volt, D.C. or CAY-21235A, 230 Volt D.C. is rated 3½ horsepower and is of the Class A shockproof type. The controller consists of a line switch, two line fuses, a line contactor, a thermal overload relay, a time delay accelerating contactor, two control circuit fuses, two control resistors, and the starting resistor all assembled on an insulating panel 11 inches wide, 16 inches high, and ¾ inch thick. This panel is mounted in a hinged metal box approximately 13½ inches wide, 12¼ inches deep and 20½ inches high. The complete assembly weighs approximately 60 pounds. See Drawing CAY-T-147 Sheets 9 and 10 for outline, schematic and wiring diagrams, overall and mounting dimensions. For a photograph of the unit, refer to Fig. 10-19.

c. Magnetic Controller, Type CAY-21425, 440 Volt, 3 Phase, 60 Cycle is rated 3½ horsepower and is of the across-the-line type. The Controller consists of two line fuses, a line contactor, a thermal overload relay, and an interlock disconnect switch mounted on an insulating panel 11 inches wide, 15 1/16 inches high and ¾ inch thick. This panel is mounted in a sheet steel cabinet 15 inches wide, 11⅝ inches deep, and 21¼ inches high. The complete controller weighs approximately 50 pounds. See Drawing CAY-T-147 Sheet 11 and photograph Fig. 10-20.

14. MAGNETIC CONTROLLER UNITS, TBL-6/7/12.

a. Magnetic Controller, Type CAY-21713, 115 Volt, D.C. or CAY-21714, 230 Volt D.C. is rated 3½ horsepower and is of the Class A shockproof type. The controller, as shown in Fig. 10-21, consists of a line switch, two line fuses, a line contactor, a thermal overload relay, a time delay accelerating contactor, two control circuit fuses, two control resistors, and the starting resistor all assembled on a shock mounted insulating panel 11 inches wide, 18 inches high and ⅜ inch thick. This panel is mounted in a hinged metal box 13 inches wide, 11 15/16 inches deep and 20 13/16 inches high. The complete assembly weighs 60 pounds. See Drawing CAY-T-147 Sheet 19 and 20 for outline schematic and wiring diagrams, overall and mounting dimensions.

b. Magnetic Controller, Type CAY-21715, 220 Volt, 3 Phase, 60 Cycle A.C. or Type CAY-21716, 440 Volt, 3 Phase, 60 Cycle A.C. is rated 3½ horsepower and is of the across-the-line type. The controller, as shown in Fig. 10-22, consists of three line fuses, a line contactor, a thermal overload relay, and an interlock disconnect switch all mounted on two insulating panels, 13 inches wide, each 8 inches high and ⅜ inch thick. The lower panel containing the overload relay and line contactor is shock mounted, and the upper panel to which are assembled the fuses and line switch is rigidly mounted, to the sheet steel cabinet. This cabinet is 16⅝ inches wide, 9 3/16 inches deep, and 18¾ inches high. The complete controller weighs approximately 50 pounds. See Dwg. CAY-T-147 Sheets 21 and 22.

c. The Magnetic Controller Type CAY-21716A, 440 volt, 3 phase, 60 cycle A.C. is rated 3½ horsepower and is of the across-the-line type. The complete controller consists of two line fuses, a line contactor, a thermal overload relay, and an interlock disconnect switch all mounted on two insulating panels, 13 inches wide, each 8 inches high and ⅜ inch thick. The lower panel, containing the overload relay and line contactor, is shock-mounted, and the upper panel, to which are assembled the fuses and line switch, is rigidly mounted to the sheet steel cabinet. This cabinet is 16⅝ inches wide, 9 3/16 inches deep, and 18¾ inches high. The complete controller weighs approximately 50 pounds. See Dwg. CAY-T-147, Sheet 23.

15. MAGNETIC CONTROLLER UNIT, TBL-13.

a. Magnetic Controller, Type CAY-211226, 115 Volt, D.C. or CAY-211227, 230 Volt, D.C. is rated 3½ horsepower and is of the Class A shockproof type. The complete controller, as seen in Fig. 10-23, consists of a line contactor, one control circuit fuse, one thermal overload relay, one control resistor, and the starting resistor all assembled on a shockmounted insulating panel 10 inches wide, 15 inches high and ¾ inch thick. The panel is mounted in a hinged metal box 11 11/16 inches wide, 9 13/16 inches deep and 18¾ inches high. Complete, the assembly weighs 45 pounds, approximately. See Drawing CAY-T-147, Sheets 24 and 25.

b. Magnetic Controller, Type CAY-211228, 440 Volt, 3 Phase, 60 Cycle is rated 3½ horsepower and is of the across-the-line type. The complete controller, as seen in Fig. 10-24, consists of a line contactor, one control circuit fuse, two thermal overload relays, all mounted on an insulating panel 6½ inches wide, and 8 1/16 inches high. The cabinet is 8 7/32 inches wide, 6¾ inches deep, and 11 9/32 inches high. Complete, the assembly weighs 18 pounds, approximately. See Drawing CAY-T-147 Sheet 26.

III. INSTALLATION AND INITIAL ADJUSTMENTS

16. GENERAL.

a. The installation force should become generally familiar with the Theory of Operation, Installation and Initial Adjustments and Operation sections of this book prior to proceeding with the installation. This instruction book has been compiled in such a manner that if carefully adhered to, will minimize installation time and insure proper operation after installation.

b. In the unpacking and handling of the units during process of installation, care should be exercised to prevent damage to equipment. The following precautions should be observed:

(1) Keep boxes and crates containing equipment in the upright position at all times. The upright position is indicated by an arrow pointing upward, stenciled on each box or crate.

(2) Observe weights marked on boxes, crates, and units. As the larger units weigh from 500 to 1000 pounds when packed, adequate transporting and lifting gear and sufficient handling personnel should be available to prevent equipment from being subjected to unwarranted shock.

(3) Remove at least three sides from boxes or crates by removing nails with a nail puller. Do not use a hammer or pinch bar for this purpose.

c. The various units should be carefully uncrated and all wrappings removed. The shields should be removed and each compartment given a thorough inspection to determine any damage caused by shipment. The test data secured inside the front cover of the radio transmitter unit packing box, after acceptance by the inspector, should be removed and placed in the copy of the Instruction Book for use during installation.

d. Any components or wiring which may have been displaced during shipment should be replaced in their proper locations. The shock absorbers on the tube shelves and master oscillator compartment should be inspected to see that they permit normal motion and are not cracked or unduly distorted.

17. TRANSMITTER.

a. The radio transmiiter unit is constructed in two separate frames which are bolted together. For installations where it is necessary to separate these two frames to allow passage through hatches or doors, care should be taken NOT to remove the 2″ x 4″ boards which are fastened to the under side of the left frame during shipment. These 2″ x 4″ boards should be left on the frame to afford protection for projecting relay parts until the two frames are ready to be reassembled on their base channels.

b. When separating or reassembling the two frames, care should be taken to disconnect and reconnect all interconnecting wires between the two frames. All radio frequency leads which must be removed should be ticketed with small white tags for identification. There are six radio frequency leads, two in the first intermediate amplifier tube compartment, two in the second intermediate amplifier tube compartment, one in the power amplifier tube compartment, and one in the antenna tuning circuit compartment. The control and power wiring between the two frames terminates at a terminal board located in lower left rear corner of the right-hand frame. All wires are tagged with a metal band indicating the proper terminal to which they are to connect.

c. The radio transmitter unit should be installed so that all sides are accessible. Provide for sufficient clearance on the right side of the transmitter *so that the master oscillator unit can be removed after installation* without making it necessary to unbolt the radio transmitter unit from its foundation. It is possible to reduce the clearance to a minimum of 16½ inches and still remove the master oscillator unit. However, every effort should be made to secure a clearance of *at least 18 inches.* Before the radio transmitter unit is secured in place, all of the wood blocking should be removed from around the master oscillator unit. After this is done, the shields should be replaced and the radio transmitter unit securely fastened to the foundation by means of one-half inch studs or bolts through the holes provided in the mounting channels. See Fig. 10-25, Dwg. 7610943, for location of mounting holes.

d. The interconnection wiring diagrams Figs. 10-37, 38, 39 and 40, Dwgs. 7606326, 7608923, 7606327 and 7608924, respectively show the interconnection between the radio transmitter unit, filter unit, motor-generator unit, and controller. These diagrams show type, size and insulation of wire and cable recommended for use. The proper interconnection diagram for the type of power supply involved (D.C. or A.C.) should be studied and followed carefully. Complete instructions for proper installation of either a 4- or 6-wire remote control system are contained on the interconnection diagrams for the particular installation being made.

e. The antenna lead should be made up of ⅜ or ½ inch O.D. copper tubing and should be kept at least six inches away from all grounded objects.

f. The frames of the units of the equipment should be electrically tied together and grounded by a copper strap at least 1 inch wide and $\frac{1}{32}$ inch thick. Make certain that a metal to metal contact is made at each point of contact. If the units are separated by considerable distance, each unit may be grounded separately.

18. FILTER UNITS.

a. The filter unit may be mounted on either a deck or bulkhead preferably near the motor-generator and

controller units. The two mounting strips for the filter unit can be secured to the bottom of the cabinet for deck mounting or to the back of the cabinet for bulkhead mounting. Similarly, two conduit or cable plates are provided, one on the back and the other on the bottom of the cabinet, so that cables may enter the unit regardless of the type of mounting employed. Either plate can be removed, then drilled to suit the incoming cables and replaced on the cabinet. The door of the filter unit may be removed completely from the unit for access in installations where space is limited. Fig. 10-26, Drawing 7613257, shows the overall and mounting dimensions for the two types of filter units. Check the fuses of the A.C. Filter Unit, Type CAY-53037A to see that they are not open.

19. MOTOR-GENERATORS.

a. The motor-generator unit should not be installed in the room with the radio unit. Mount the motor-generator securely to the deck or to some solid foundation with the shaft fore and aft rather than athwartship. Care should be taken to choose a position for the motor-generator so that there is sufficient room around the unit to facilitate maintenance. At least six inches of clearance should be allowed on the top and sides for routine maintenance. Eighteen inches either on one side or the top should be allowed for the removal of any of the component units. Any one of the three machines which make up the motor-generator unit may be individually removed from the bedplate for servicing. Fig. 10-27, Dwg. 7407503, Fig. 10-28, Dwg. 7407502, Fig. 10-29, Dwg. 7408182, and Fig. 10-30, Dwg. 7408183 show the overall and mounting dimensions for the various types of motor-generator equipments.

b. The motor-generator unit is designed such that it may be mounted up to 45 degrees from the horizontal. Terminal boards on all machines may be conveniently relocated on either the side or top of the units to facilitate interconnection.

20. MAGNETIC CONTROLLERS.

a. The controllers for TBL-5/6/7/12 should be mounted on the bulkhead or wall near the motor-generator. Allow sufficient room to completely open the access door and also to conveniently reach the overload reset button. If space is at a premium, access to the controller for servicing may be had by completely removing the door of the unit. The dash-pot on the overload relay should be filled with oil, Navy Type 2075, which is shipped in a small can attached to the controller and the relay adjusted to operate at a current value just above the normal load current. See Fig. 10-69 for current settings. The fuses should be checked to see that they are not open.

b. The controllers for TBL-13 are designed for mounting on bulkheads or on a wall near the motor-generator. Allow sufficient room to completely open the access door. The fuses should be checked to see that they are not open.

21. RATING AND FREQUENCY RANGE.

a. The radio transmitter unit is capable of operation at any frequency in the bands of 175 to 600 Kcs. (I.F) and 2000 to 18100 Kcs (H F.). The transmitter unit nominal output is as follows:

	I. F. Band	*H. F. Band*
CW	200 watts	200 watts
MCW	100 watts	.....
Phone	50 watts	50 watts

The actual output will vary with the type and characteristics of the antenna used.

b. The transmitter unit is capable of use with any antenna whose characteristics fall within the following limits:

(1) 175 to 600 Kcs. Range
Equivalent capacity—330 to 1750 mmfd.
Equivalent resistance—1.1 to 15 ohms.

(2) 2000 to 18100 Kcs. Range
Equivalent capacity—100 to infinity mmfd.
Equivalent resistance—35 to 1500 ohms.

c. POWER SUPPLY LINE REQUIREMENTS.

	115 V. D.C.	230 V. D.C.	220 V. 3 Ph. 60 Cy.	440 V. 3 Ph. 60 Cy.
Max. Power for Starting (KW)*	6.2 KW	6.2 KW	13.8 KW	14.6 KW
Power for Locked Key	3.4 KW	3.4 KW	3.2 KW	3.2 KW
Supply Voltage Variation Permitted	+45%-23%	+45%-23%	± 10%	± 10%
Supply Frequency Variation			± 5%	± 5%

* Power required for starting measured by a critically damped instrument.

22. WIRING.

a. The transmitter, filter, motor-generator and magnetic controller should be wired together as shown on the interconnection wiring diagrams Figs. 10-37, 10-38, Dwgs. 7606326 and 7608923 for D.C. equipment and Figs. 10-39, 10-40, Dwgs. 7606327 and 7608924 for A.C. equipment. Make all adjustments as indicated in the table located in the upper left side of the diagram. All link switches must be in their proper position before power is applied to the equipment. *On D.C. equipments utilizing 4-wire control system, line switches S-39 and S-41 should never be connected H to J or A to D. The main line will become grounded unless this precaution is taken.*

b. All wiring between units should be in armored or lead-covered cable. The recommended Navy type cables to be used are indicated on the diagrams.

c. The transmitter frame, filter unit case, motor-generator bedplate and controller case should be securely grounded to the hull by a copper strap at least one inch wide by $\frac{1}{32}$ inch thick.

d. It is recommended that $\frac{3}{8}$ inch copper tubing be used for the transmitting antenna lead. This lead should be kept *at least 6 inches* away from all grounded objects. The receiver lead coming out the top of the transmitter unit should be kept *at least 6 inches* from the incoming transmitting lead and should preferably be copper tubing of a smaller size than the transmitting antenna lead.

e. After completing the installation and before applying power to the transmitter, carefully check over all the units to see that all the circuits are complete according to diagrams and there are no loose connections.

f. When installation for telephone operation is required, additional speech input equipment, Navy Type_50064, etc., or equivalent, must be installed in accordance with instructions for speech input equipment.

g. Lubrication of motor-generator and blower motor should be thoroughly checked before applying any power. See Pars. 42.*a* and 42.*b*.

23. CHECKING.

WARNING

Operation of this equipment involves the use of high voltages which are dangerous to life. Operating personnel must at all times observe all safety regulations. See page xii. Do not change tubes or make adjustments inside the equipment with high voltage supply on. Do not depend upon door switches or interlocks for protection but always shut down the motor-generator or other power equipment and open the main switch in supply line to equipment.

a. The following check tests should be made before actual tuning or operation of the equipment is attempted: These tests are divided into three parts.

(1) Power Equipment and Control Circuit Tests.
(2) Preliminary Transmitter Operation Tests.
(3) Remote Control Unit Tests.

b. POWER EQUIPMENT AND CONTROL CIRCUIT TESTS.

(1) Refer to wiring diagrams, Figs. 10-48, 49, 50 and 51, Dwgs. 7300401, 7300493, 7300404 and 7300494 and schematic diagrams, Figs. 10-41, 42 and 43, Dwgs. 7300398, 7300491 and 7300721 for D.C. equipment. See wiring diagrams, Figs. 10-52, 53, 54, 55 and 56, Dwgs. 7300402, 7300495, 7300406, 7300477 and 7300496 and schematic diagrams, Figs. 10-44, 45, 46 and 47, Dwgs. 7300405, 7300476, 7300492 and 7300720 for A.C. equipment. The wiring diagrams show each part in its approximate relative position. The schematic diagrams show the elements as they appear in the circuits.

(2) Each electrical part throughout the equipment is indicated by a symbol letter and number, i.e., M-1, C-2, R-8, etc.

(3) Schematically, the circuits for all the power supplies are fundamentally the same. The same description of operation applies equally well to any one of the equipments. Parts which serve the same purpose in each of the types of transmitters and are identical are assigned the same symbol number. However, parts which serve the same purpose in each of the types of transmitters, but have a different rating because of the difference in equipment voltage, are assigned different symbol numbers.

(4) Throughout the discussion on operation, all symbol numbers which apply to a circuit part are listed following the name of the part. Therefore, it should be kept in mind that wherever more than one symbol number follows the name of the part, only one of the symbol numbers apply to the equipment under discussion. The proper symbol which applies is easily determined by referring to the schematic and wiring diagrams and parts list for the particular equipment. The parts list indicates the symbol number and the characteristics of the part as applied to each of the equipments.

c. Before power is applied to the equipment and without tubes in their sockets:

(1) Set the line disconnect switch in controller in open position. Leave controller door open.

(2) Place proper oil in the relays designated to require oil. The oil to be used is attached to each transmitter at the time of shipment. Nameplates on the relays indicate which require oil and how much.

(3) Turn FILAMENT VOLTAGE control R-12 to maximum counterclockwise position (all resistance in).

(4) Set local START-STOP switch S-26, S-40 to STOP position. For 6-wire control, no action is necessary as the switch is of the momentary contact type.

(5) Set EMERGENCY SWITCH S-24 to ON position.

(6) Set REMOTE-LOCAL switch S-25 to LOCAL position.

(7) Set LINE-VOLTAGE NORMAL-HIGH switch S-36 to NORMAL position. (D.C. sets only).

(8) Set PHONE-CW-MCW switch S-7 to CW position.

(9) Temporarily remove the two interconnection leads to terminals 10 and 11 in the transmitter. Refer to Figs. 10-37, 38, 39 and 40, Dwgs. 7606326, 7608923, 7606327 and 7608924, respectively.

(10) Close all doors on the transmitter and filter units.

(11) Set H.F.-M.O. FILAMENT STAND-BY ON-OFF switch S-32 to OFF position. (A.C. sets only.)

d. Application of supply line voltage is accomplished as explained in the following paragraphs.

(1) With a "DEAD" supply line, connect supply line to magnetic controller input terminals. Apply power. With external voltmeter, check line voltage at input terminals in controller. Line voltage should be practically normal for these preliminary checks.

(2) The following paragraph applies only to equipment utilizing a D.C. power supply: Close the LINE SWITCH in the magnetic controller. This will supply power to the radio transmitter unit. Power to the transmitter is for operation of M.O. heater R-4, R-46 and M.O. blower motor B-1, B-2. This power is always available at the radio transmitter regardless of whether or not the motor-generator is in operation.

(3) The following paragraph applies only to equipment utilizing an A.C. power supply: Close the LINE SWITCH in the magnetic controller to apply power to the equipment. The voltage is reduced by transformer T-150 in the filter unit for operation of M.O. heater R-46, M.O. blower motor B-3 and M.O. auxiliary filament transformer T-2 in the transmitter. This power is always available at the radio transmitter regardless of whether or not the motor-generator is in operation.

e. As soon as voltage is applied to transmitter terminals 6 and 7 in Model TBL-5/6, and 20 and 21 in Model TBL-7/12/13 equipments, the following operations should take place:

(1) Blower motor B-1, B-2 or B-3 should run.

(2) HEATER-POWER indicator light I-1, I-6 or I-7 (amber) should light.

(3) H.F. M.O. FILAMENT light I-5 (Clear) should light on A.C. sets, when S-32 is on. (On the D.C. sets, filament power is not available until the motor-generator unit is in operation.)

f. On A.C. equipment, place H.F. M.O. FILAMENT STAND-BY POWER switch S-32 to OFF position. The H.F. M.O. FILAMENT light I-5 (Clear) should go out.

g. Place the START-STOP switch S-26, S-40 on the transmitter to START.

(1) MOTOR SOLENOID indicator light I-2, I-8 or I-9 (Blue) should light.

(2) Starting contactor K-2 or K-13 should close.

(3) Motor-generator should start and come up to normal speed in approximately 5 to 10 seconds.

(4) Field contactor K-3 or K-16 should close.

(5) PLATE VOLTAGE indicator light I-3, I-10 or I-11 (Red) should light.

(6) PLATE VOLTAGE meter M-10 and BIAS VOLTAGE meter M-6 should not indicate because the two field leads were purposely left open at terminals 10 and 11 in the transmitter unit.

h. Test out door interlocks by opening one door at a time. The motor-generator and radio transmitter units should shut down, (except master oscillator heater and blower motor in the radio transmitter unit). Indicator lights I-2, I-8 or I-9 and I-3, I-10 and I-11 should go out when any access door is opened and light again when closed.

i. Place EMERGENCY SWITCH S-24 on the radio transmitter unit to STOP. The motor-generator should shut down and all power should be removed from the transmitter including master oscillator heater power. On D.C. equipment, one side of the D.C. line is left connected to the master oscillator heater circuit through switch S-36 if this switch is in the HIGH position. Under all other conditions, either A.C. or D.C., both sides of the line are opened when EMERGENCY SWITCH S-24 is opened. Reconnect the interconnection wire which was previously removed from terminal 10. Leave the lead to terminal 11 still open. This will apply bias and master oscillator plate voltage (1000 volts) when the motor-generator is started. On equipments using 4-wire control, the motor-generator should start when EMERGENCY SWITCH S-24 is placed in the ON position. However, on equipments using 6-wire control, it will be necessary to push the START button again after EMERGENCY SWITCH S-24 has been closed in order to re-start the motor-generator.

j. Operate TEST key S-27.

k. Check operation of control switch interlocks. Lock TEST key S-27 in the UP or locked position.

(1) Operate TRANSFER SWITCH H.F.-I.F. control A. Keying relay K-6 should open and close again as control A is transferred from one position to the other.

(2) Operate H.F. RANGE SWITCH control H. Keying relay K-6 should open and close again as control H is moved from one position to the other.

(3) Operate ANTENNA TRANSFER SWITCH I.F.-H.F.-RECEIVER switch S-18 control W. Keying relay K-6 should open and close when going from one point to another of control W.

(4) Operate I.F. ANTENNA INDUCTANCE switch S-19 control V. Keying relay K-6 should open and close again between every point on control V.

(5) Operate I.F. ANT. SERIES CAPACITOR switch S-34 control U. Keying relay K-6 should open and close when going from one position to the other of control U.

(6) Operate I.F. RANGE SWITCH control P switches S-20 and S-21. Keying relay K-6 should open and close between every point of control P.

(7) Operate TUNE-OPERATE switch S-22. Keying relay K-6 should open and close between points on this switch.

l. Place REMOTE-LOCAL switch S-25 on the transmitter to REMOTE. In the case of a 4-wire remote control system, the transmitter and motor-generator units should shut down (except master oscillator blower motor and heater). Start motor-generator by placing START-STOP switch on the Type _23005, 4-wire, Navy Standard Remote Control Unit, installed on the operator's desk, to ON or START. The motor-generator and transmitter should start. Close the telegraph key on the 4-wire remote control unit. Operation of the relays listed in Paragraph 23*k*. should be the same as when operating TEST key S-27. In the case of a 6-wire remote control system, the equipment will continue to run regardless of the operation of REMOTE-LOCAL switch S-25. When S-25 is changed to the REMOTE position, the indicator light on the remote control unit should light. Operation of the remote key should operate keying relay K-6 in accordance with Paragraph 23 *k*. The equipment should START and STOP from either the LOCAL or REMOTE position.

m. Shut down the motor-generator and radio transmitter units by placing START-STOP switch S-26, S-40 to STOP.

n. Return TUNE-OPERATE switch S-22 on radio transmitter unit to TUNING STEP 1.

o. Return REMOTE-LOCAL switch S-25 to LOCAL.

p. Throughout the above tests, power has been applied to the heater circuit of the master oscillator temperature control compartment. Heater indicator light I-1, I-6, I-7 should have been on all the time. Allow power to remain on the heater circuit for at least 3 hours. If all previous tests have been completed in less than 3 hours, stop the motor-generator set by means of START-STOP switch S-26. Do not open the line disconnect switch in the D.C. controller unit nor otherwise remove power from terminals 6 and 7 in the TBL 5/6 or terminals 20 and 21 in the TBL-7/12/13 transmitters. Usually, between the second and third hour, after power has been applied to the temperature control compartment heater, the box temperature approaches the normal operating temperature of 60°C. ± 2 degrees. When this occurs, the HEATER POWER light I-1, I-6, or I-7 should go off and then start flashing on and off as the temperature control thermostat S-3 and its control relay K-1, K-12 start to function. It may be noted that the panel thermometer does not indicate normal operating temperature of 60° C. ± 2 degrees until some time after the heater light has started flashing. This is due to time lag in the thermometer. After 10 or 15 minutes of temperature regulation, the box is up to temperature and is ready for use. Refer to Par. 30 for additional information regarding master oscillator compartment temperature control circuits.

24. PRELIMINARY TRANSMITTER OPERATION TESTS.

a. In conducting the following preliminary installation tests, have at hand one copy each of Routine Test Data or Type Test Data that bears the same serial number as the transmitter unit. This test data contains the exact dial and control settings for the various frequencies between 175 to 600 Kcs. and 2000 to 18100 Kcs. taken during Navy Acceptance Tests at the manufacturer's plant. Although in service, the frequencies desired may not be the same as those shown on Test Data. By interpolation, the approximate dial and control settings can be obtained. By carefully following this Test Data, it will be possible to select the correct harmonic of each tuned circuit and avoid the possibility of tuning to a harmonic of a previous stage when the fundamental was desired, or vice versa. Approximate calibration curves are given in Figs. 10-59, 60, 61, 62, 63, 64, 65, and 66. Dial settings and typical meter readings are given in Paragraphs 35 and 36. In the following text, the various tuning controls are identified by letters as marked on the panel, followed by symbol designations used on schematic diagrams, Figs. 10-41, 42, 43, 44, 45, 46 and 47, Dwgs. 7300398, 7300491, 7300721, 7300405, 7300476, 7300492, and 7300720, respectively.

b. APPLICATION OF FILAMENT POWER TO ALL TUBES.

(1) Place all tubes in their proper sockets and make all grid and plate connections.

(2) Secure all shields and doors on the transmitter, filter, and controller units. Failure to secure shielding in a positive manner may adversely affect equipment performance.

(3) With the generator field rheostat adjusted for minimum voltage, start the motor-generator unit by placing START-STOP switch S-26, S-40 to START. While observing FILAMENT VOLTAGE meter M-7, adjust FILAMENT VOLTAGE rheostat R-12, R-47 until exactly 10 volts are indicated.

(4) Place TRANSFER SWITCH H.F.-I.F control A in H.F. position. All tubes should light except the I.F. master oscillator tube located in the upper section of the master oscillator unit. With control A in the I.F. position, the I.F. master oscillator tube should light and the H.F. master oscillator tube should go

out. On A.C. installations, the H.F. master oscillator tube will remain lighted if H.F. master oscillator FILAMENT STAND-BY switch S-32 is in the ON position.

(5) With control A in I.F. position, PHONE-CW-MCW switch S-7 should turn the first amplifier tube *off* when in the CW position, and *on* when in the MCW position and *off* again in the PHONE position. Place S-7 back to the CW position after making this check.

(6) Place TRANSFER SWITCH H.F.-I.F. control A in the H.F. position. Start the motor-generator unit by means of START-STOP switch S-26, S-40. Close TEST key S-27 and note reading of M.O. PLATE CURRENT meter M-2 and M.O. PLATE VOLTAGE meter M-3. The M.O. PLATE CURRENT meter M-2 should not indicate over 100 milliamperes and the H.F. M.O. SCREEN CURRENT meter M-1 not over 20 milliamperes. The M.O. PLATE VOLTAGE meter M-3 should indicate between 0.95 and 1.05 KV.

(7) Place TRANSFER SWITCH H.F.-I.F. control A in I.F. position and note reading of M.O. PLATE CURRENT meter M-2. This meter should be reading between 25 and 50 milliamperes. The H.F.-M.O. SCREEN CURRENT meter M-1 should indicate zero current as this meter is not in the circuit when in the I.F. position of control A.

c. SETTING OF POWER AND TUNING CONTROLS FOR H.F.

(1) With the motor-generator unit stopped, replace the interconnection lead to terminal 11 in the transmitter unit.

(2) Set the TRANSFER SWITCH H.F.-I.F. control A in H.F. position. Place TEST key S-27 in open position. Set TUNE-OPERATE switch S-22 in TUNING STEP 2 position. Set REMOTE-LOCAL switch S-25 to LOCAL. Set EMERGENCY SWITCH S-24 to ON.

(3) Set all H.F. range and tuning controls for an output frequency of 2000 Kcs. by means of the tuning curves:

H.F.—M.O. Frequency Curves Fig. 10-59 Curve 250142
H.F.—Doubler Circuit Curve Fig. 10-60 Curve 250143
H.F.—1st Int. Amplifier Curve Fig. 10-61 Curve 250144
H.F.—2nd Int. Amplifier Curves Fig. 10-62 Curve 250145
H.F.—P.A. Frequency Curves Fig. 10-63 Curve 250146

Set H.F. ANTENNA COUPLING control J to zero

d. H.F. TUNING ADJUSTMENTS

(1) Start the motor-generator unit. After it is up to speed, adjust FILAMENT VOLTAGE rheostat R-12, R-47 until FILAMENT VOLTAGE meter M-7 indicates 10 volts. Adjust PLATE VOLTAGE rheostat R-41 until PLATE VOLTAGE meter M-10 indicates approximately 1000 volts. Place TEST key S-27 in the UP (locked) position.

(2) Adjust H.F. DOUBLER CIRCUIT TUNING control D C-17 for maximum 1st INT. AMP. PLATE CURRENT on meter M-5 to approximately 50 ma. but not in excess of 100 ma.

(3) Adjust H.F. 1st AMPLIFIER TUNING control E for minimum 1st INT. AMP. PLATE CURRENT on meter M-5, to approximately 30 ma., or maximum 2nd INT. AMP. PLATE CURRENT on meter M-8.

(4) Adjust H.F. 2nd AMPLIFIER TUNING control F for maximum GRID CURRENT on meter M-9.

(5) Adjust H.F.-P.A. TUNING control G for minimum P.A. PLATE CURRENT on meter M-11.

(6) If the antenna is under 50 feet long or over 80 feet long, set H.F. ANTENNA FEED CURRENT-VOLTAGE switch, control M to CURRENT feed. If between 50 and 80 feet in length, set control M to VOLTAGE feed. (The dimensions are only approximate).

(7) If H.F. ANTENNA FEED CURRENT-VOLTAGE switch control M is in CURRENT feed position, set H.F. ANTENNA INDUCTANCE control K to O and adjust H.F. ANTENNA CAPACITOR control L for maximum output as indicated on H.F. ANTENNA CURRENT meter M-13. It may be necessary to increase H.F. ANTENNA COUPLING control J to get an indication. The H.F. ANTENNA CURRENT meter under this condition should normally not exceed three amperes. If the meter exceeds this value, a careful check should be made on the final tuning as covered by Paragraph 32.*g.*

(8) If H.F. ANTENNA FEED CURRENT-VOLTAGE switch control M is in VOLTAGE feed position, set H.F. ANTENNA INDUCTANCE control K to 1000 divisions. Adjust H.F. ANTENNA CAPACITOR control L for maximum P.A. PLATE CURRENT on meter M-11. It may be necessary to increase H.F. ANTENNA COUPLING control J to get an indication.

(9) If P.A. PLATE CURRENT on meter M-11 exceeds 150 milliamperes, reduce H.F. ANTENNA COUPLING control J.

(10) In order to resonate the antenna, it may be necessary to try various combinations of H.F. ANTENNA INDUCTANCE control K and H.F. ANTENNA CAPACITOR control L also VOLTAGE or CURRENT feed to the antenna.

e. Operate TEST key S-27 a few times and note that each time the TEST key is open, the plate current falls to zero on all plate current meters.

f. The H.F. circuits are now ready for final tuning and operation into an antenna at any frequency throughout its frequency range.

g. SETTING OF POWER AND TUNING CONTROLS FOR I.F.

(1) Set TRANSFER SWITCH H.F.-I.F. control A in I.F. position. Place TEST key S-27 in open position. Set TUNE-OPERATE switch S-22 in TUNING STEP 2 position. Set REMOTE-LOCAL

switch S-25 to LOCAL. Set EMERGENCY SWITCH S-24 to ON.

(2) Set all I.F. range and tuning controls for an output frequency of 175 Kcs. by means of tuning curves:

I.F.—M.O. Frequency Curves Fig. 10-64, Curve 250141

I.F.—Int. Amplifier Curves Fig. 10-65, Curve 250140

I.F.—P.A. Frequency Curves Fig. 10-66, Curve 250139

Set I.F. ANTENNA COUPLING control S to zero.

h. I.F. TUNING ADJUSTMENTS.

(1) Start motor-generator, applying plate potential, approximately 1000 volts. After it is up to speed, adjust FILAMENT VOLTAGE rheostat R-12, R-47 until FILAMENT VOLTAGE meter M-7 indicates 10 volts. Adjust PLATE VOLTAGE rheostat R-41 until PLATE VOLTAGE meter M-10 indicates approximately 1000 volts. Set the TEST key S-27 in UP (locked) position.

(2) Adjust I.F. INT. AMP. TUNING control Q for maximum GRID CURRENT on meter M-9.

(3) Adjust I.F. P.A. TUNING Control R for minimum P.A. PLATE CURRENT on meter M-11.

(4) Tune antenna system to resonance by adjusting I.F. ANTENNA INDUCTANCE control V and I.F. ANTENNA TUNING Control T until maximum antenna current as indicated on I.F. ANTENNA CURRENT meter M-12 is obtained. If a high capacity antenna is used, it may be necessary to set I.F. SERIES CAPACITOR switch control U on the IN position to obtain resonance. It may be necessary to increase I.F. ANTENNA COUPLING control S to obtain an indication. With the antenna circuit tuned, note antenna current obtained. If the value is greater than 10 amperes, a careful check should be made on final tuning as covered by Paragraph 32.*g.*

(5) Return TEST key S-27 to mid-position. Set PHONE-CW-MCW switch S-7 to MCW. Audio oscillator tube filament should light. Operate TEST key S-27 a few times and note if audio oscillator is keyed. This can be determined by means of 1st INT. AMP. PLATE CURRENT meter M-5. Power output on MCW transmission as determined by I.F. ANTENNA CURRENT meter M-12 is approximately 50% of the normal CW power for the same settings. Return PHONE-CW-MCW switch S-7 to the CW position.

i. Operate the TEST key S-27 a few times and note that each time it is open, plate current falls to zero on all plate current meters. The I.F. transmitter is now in working order and ready for final tuning and operation at any frequency throughout its frequency range.

j. TESTS FOR PHONE OPERATION.

(1) If speech input equipment is available for use with the Model TBL-5/6/7/12/13 Series transmitters, further operation tests may be made to check PHONE operation.

(2) Leave the transmitter unit set up for I.F. operation. Place REMOTE-LOCAL switch S-25 to LOCAL, START-STOP switch S-26 to STOP, TEST key S-27 in mid-position, and PHONE-CW-MCW switch S-7 to PHONE. Place a single pole switch, or the carrier control circuit of the speech equipment across terminals 25 and 26.

(3) Set START-STOP switch to START, applying power amplifier plate voltage (approximately 2000 volts D.C.). Operation of switch or carrier control circuit across terminals 25 and 26 should key the transmitter unit. The power output with key down should be approximately one-fourth of normal CW power for same setting. Apply modulation from the speech equipment to terminals 27 and 28. Approximately 20 db. output will be required from the speech equipment to modulate the transmitter 85%. Listen to the output of the transmitter on a local receiver, while the transmitter is being modulated. The modulation should be clear and strong.

25. TESTS WITH TELEGRAPH REMOTE CONTROL UNIT, TYPE 23005.

a. Place REMOTE-LOCAL switch S-25 in REMOTE position. Place remote control unit START-STOP switch in STOP position, and the local START-STOP switch S-26, S-40 in the START position. Have TEST key S-27 in the open position and PHONE-CW-MCW switch S-7 in the CW position.

b. Make sure all doors on the transmitter are closed. Then, place the remote START-STOP switch in the START position, applying plate potential (approximately 1000 volts D.C.). The motor-generator should start up and the indicator light on the remote control unit should light.

(1) Operation of the remote key should cause keying relay K-6 to function and key the transmitter.

(2) Operation of the remote START-STOP switch should start and stop the motor-generator unit.

c. With the motor-generator running, after having been started from the remote position, operate START-STOP switch S-26, S-40 on the transmitter unit. This switch should stop and start the motor-generator unit in the normal manner.

d. Operation of EMERGENCY SWITCH S-24 should stop the motor-generator unit. With EMERGENCY SWITCH in the STOP position, it should not be possible to start the equipment from either the remote or local point.

e. Return START-STOP switch S-26, S-40 to STOP, and EMERGENCY SWITCH S-24 to ON. Return REMOTE-LOCAL switch S-25 to LOCAL. Return START-STOP switch of remote control unit to STOP.

f. The equipment is now ready for final tuning and calibration on the frequencies it is desired to operate. Final tuning should be performed exactly as explained in Par. 31.

IV. OPERATION

WARNING

Operation of this equipment involves the use of high voltages which are dangerous to life. Operating personnel must at all times observe all safety regulations. See page xii. Do not change tubes or make adjustments inside equipment with high voltage supply on. Do not depend upon door switches or interlocks for protection but always shut down the motor-generators or other power equipment and open main switch in supply line to equipment.

26. CONTROL CIRCUITS, CONTROL SWITCHES.

a. START-STOP switch S-26, S-40 is provided for normal starting and stopping of equipment from the front of the panel.

(1) The equipment may be started and stopped by means of START-STOP switch S-26, S-40. Remote starting and stopping can also be accomplished by a similar switch on the 4- or 6-wire remote control unit located on the operator's desk. *Local control is always supervisory* in that START-STOP switch S-26, S-40 will stop the equipment even when the remote control switch is in the START position. Two START-STOP switches (S-26 and S-40) are provided with each equipment. These switches allow use of the equipment with either a 4- or 6-wire remote control system. Switch S-26 is used with a 4-wire control system and S-40 with a 6-wire control system. In the 4-wire control system, one side of the key circuit and one side of the START-STOP switch circuit is common. The type of switch used for starting and stopping the equipment is a double pole single throw toggle switch (S-26) connected in series with starting contactor K-2, K-4, K-13 solenoid. With START-STOP switch S-26 closed, the equipment will be in operation and continue to operate until the starting contactor solenoid circuit is broken by the opening of switch S-26. In the 6-wire control system, the starting circuit and the keying circuit are entirely separate. The START-STOP circuit is of the momentary push-button type more commonly used for control of large electrical equipment. START-STOP switch S-40 used for this system, consists of two normally open switches S-40A and S-40B which control operation of the equipment over three control wires as follows.

(2) In this system, starting contactor K-2, K-4, K-13 must operate with an impedance in series with its operating solenoid. On each of the starting contactors K-2, K-4 and K-13, a small series resistor is included as a part of the contactor to provide this impedance. In either D.C. or A.C. equipments, START portion S-40B of START-STOP switch S-40 is connected in series with the starting contactor solenoid. Momentarily closing this START portion of switch S-40 closes starting contactor K-2, K-4, K-13. Contacts K-2B, K-4B, K-13B immediately interlocks or parallels S-40B. Upon releasing S-40B, the solenoid circuit remains closed and the equipment stays in the running condition. To stop the equipment, starting contactor K-2, K-4, K-13 solenoid is shorted by the STOP portion S-40A of S-40 causing the contactor to open. Contacts K-2B, K-4B, K-13B immediately break the holding circuit of the starting contactor. It remains open and the equipment shuts down. The solenoid series resistors incorporated on starting contactor K-2, K-4, K-13 prevents the line from becoming short circuited when STOP button S-40A is closed. Link switches S-39, S-41 (D.C.) and S-39, S-44 (A.C.) are provided to permit rapid selection of circuits for either 4- or 6-wire control. Rapid installation of the proper START-STOP switch, S-26 or S-40, is made possible by the use of a small terminal board near the switch mounting. Properly marked leads are attached to each switch to facilitate easy and correct wiring. Certain equipments are connected at the factory for 4-wire control. Therefore, on this type of installation, no changes are necessary. If 6-wire control is to be used it will be necessary to change START-STOP switches and adjust link switches S-39, S-41, S-44 in accordance with the instructions given on the interconnection diagrams, Figs. 10-37, 38, 39 or 40, Dwgs. 7606326, 7608923, 7506327, or 7608924, respectively.

CAUTION

The proper precautions for circuit adjustment as set forth on Figs. 10-37, 38, 39 and 40, Dwgs. 7606326, 7608923, 7606327 and 7608924 must be followed when installing the equipment to insure correct operation of the control circuits.

(3) Starting contactor K-2, K-4 and K-13 performs the function of starting the motor-generator by means of its contacts K-2A, K-4A, or K-13A-Closing of these contacts energizes the starting contactor in the magnetic controller provided door interlock S-151 in the filter unit is closed. At the same time, these contacts energize field contactor K-3, K-16 which in turn closes the field circuit to both generators by contacts K-3A, K-3B or K-16A, K-16B.

b. EMERGENCY SWITCH S-24 is provided to allow stopping the equipment quickly in case of an emergency or in case the START-STOP switch on the transmitter unit or remote control unit fails to function. In either the D.C. or A.C. equipments, this switch is connected in the circuit in such a manner that all power to the control and master oscillator

heater circuits is removed when the switch is opened. However, on D.C. equipments, the negative side of the D.C. line may be left connected to the master oscillator heater circuit, if the LINE VOLTAGE NORMAL-HIGH switch S-36 is in the HIGH position. To clear all potential from the master oscillator heater circuit by means of the EMERGENCY SWITCH, it will also be necessary to place S-36 in the NORMAL position. A more satisfactory manner of removing all power from the transmitter, however, is to open the disconnect switch in the magnetic controller.

c. REMOTE-LOCAL switch S-25, located on the transmitter control panel, is a two position, four section switch. The four sections A, B, C and D perform the proper circuit changes to permit either local or remote control. The exact function of each section of the switch for either 4- or 6-wire control is indicated in detail on the schematic diagrams, Figs. 10-41, 42, 43, 44, 45, 46, and 47, Dwgs. 7300398, 7300491, 7300721, 7300405, 7300476, 7300492, and 7300720, respectively. In the LOCAL position, the remote control unit is disconnected from the transmitter unit. Neither the START-STOP switch nor the indicator light at the remote point will function. When in the REMOTE position, the equipment may be controlled from either the LOCAL or REMOTE point.

d. On 4-wire systems, START-STOP switch S-26 must be in the START position before control from the remote position is possible. However, on 6-wire systems, control from the remote position is available regardless of the condition at the transmitter as long as REMOTE-LOCAL switch S-25 is in the REMOTE position. On a 4-wire system, with the equipment running, and REMOTE-LOCAL switch S-25 in REMOTE position, a shift of S-25 to LOCAL position will momentarily shut down the equipment. On 6-wire control, the equipment will remain in its original condition, either running or stopped, as REMOTE-LOCAL switch S-25 is operated.

e. PHONE-CW-MCW switch S-7 selects the mode of transmission desired. Its action in the various circuits is as follows:

f. CW POSITION.

(1) Section A connects one side of the remote key circuit into the keying circuit. Section B disconnects the terminal 26 from the keying relay circuit. Section C transfers control of the first intermediate amplifier tube to switch S-6, a part of TRANSFER SWITCH H.F.-I.F. control A. Section D connects the suppressor grids of the two power amplifier tubes to +30 +60 volts potential on high voltage potentiometer R-24, R-25, R-26, R-27, R-53 and R-54.

(2) Thus, keying of the transmitter is accomplished either locally or from the remote station in the normal manner.

g. MCW POSITION.

(1) Section A connects one side of the remote key circuit into the keying circuit. Section B disconnects terminal 26 from the keying relay circuit. Section C applies power to the filament of the first amplifier tube irrespective of the position of switch S-6, a part of the TRANSFER SWITCH H.F.-I.F. control A. When TRANSFER SWITCH H.F.-I.F., control is in the I.F. position, the first intermediate amplifier tube is transferred to the 800 cycle audio oscillator circuit. This circuit consists of transformer T-4 and capacitor C-20. Modulation of the power amplifier tube for MCW operation is effected by applying 800 cycle voltage from terminal 4 of transformer T-4 through coupling capacitor C-26 to the screen grids of the two Type _803 power amplifier tubes. Section D connects the suppressor grids of the two power amplifier tubes to +30 +60 volts potential on high voltage potentiometer R-24, R-25, R-26, R-27, R-53 and R-54.

(2) Thus, keying of the transmitter is accomplished either locally or from the remote station with MCW type of transmission if control A is in the I.F. position, and with CW type of transmission if control A is in the H.F. position.

h. PHONE POSITION.

(1) Section A connects one side of the remote key circuit into the keying circuit. Section B connects terminal 26 to the keying relay circuit. Section C transfers the control of the first intermediate amplifier tube to switch S-6, a part of control A. Section D connects the suppressor grids of the two power amplifier tubes through the secondary of modulation transformer T-6 to -80, -100 volts on bias potentiometer R-28, R-29 and R-30.

i. With switch S-7 in the PHONE position, two distinct circuit changes are made in the transmitter unit. These changes place the equipment in a condition for telephone transmission when suitable speech input equipment is used in conjunction with the transmitter. Sections A and B of PHONE-CW-MCW switch S-7 prevent keying the transmitter from the remote keying position when the switch is in the PHONE position. Keying or control of the carrier is effected by closing the circuit between terminals 25 and 26. This is normally accomplished by the Push-to-Talk switch on the microphone of the speech input equipment. Section D, in transferring the suppressor grids from positive to negative potential, reduces the output of the power amplifier tubes to approximately one quarter of CW value. If suitable speech input equipment is connected to the primary of transformer T-6, suppressor modulation of the power amplifier tubes is accomplished.

j. LINE VOLTAGE NORMAL-HIGH switch S-36 is provided on the D.C. equipments only. It is intended to protect the temperature control circuits and parts when the line voltage of either 115 or 230 volts

exceeds these normal values. This switch should be placed in the HIGH position whenever the line voltage, as indicated on LINE VOLTAGE meter M-4 or M-14, exceeds the normal value of 115 or 230 volts. Placing switch S-36 in the HIGH position, connects resistors R-151 and R-152, located in the filter unit in series with the heater circuit. This limits the voltage across heater resistors R-4, R-46 and R-40, R-48 to a safe value. LINE VOLTAGE NORMAL-HIGH switch S-36 is not used on A.C. equipments, as normal line voltage variation of an A.C. supply never exceeds +10%. Therefore, no such protection as that supplied by S-36 and R-151, R-152 is needed.

k. H.F.-M.O. FILAMENT STAND-BY ON-OFF switch S-32 is installed on A.C. equipment in place of LINE VOLTAGE NORMAL-HIGH switch S-36 on D.C. equipment. This switch, when in the ON position, supplies power to the H.F.-master oscillator tube through transformer T-2, during the time the rest of the transmitter is not in operation.

27. OVERLOAD PROTECTION.

a. Two overload relays are provided, one in each of the plate power circuits from the motor-generator unit. Relay K-8, K-14, K-17 has its operating coil in the negative side of the 1000 volt master oscillator plate supply and protects this circuit from overload. Similarly, the operating coil of K-10, K-15, K-18 is in the negative side of the 2000 volt main plate generator supply. The operating contacts of plate power overload relays K-8, K-14, K-17 and K-10, K-15, K-18 are connected in the field contactor coil circuit. Plate voltage from the generator is immediately removed the instant an overload occurs.

b. Each of the plate overload relays is of the electrical reset type. After an overload has occurred in either of the plate power circuits, causing one of the relays to function, the relay must be reset by operating OVERLOAD RESET button S-35 on the transmitter control panel. A glass cover is used on each of these relays. To remove or replace this glass cover, resistors R-42, R-17, R-30, R-29 and R-28 must first be removed.

c. The reset coils for these overload relays are connected in parallel across the control line. They are energized only when OVERLOAD RESET button S-35 is depressed. When an overload occurs in either one or both relays, the armature is drawn up and remains in the up or actuated position due to a latch on the relay Operation of reset button S-35 energizes the reset coils which trips the latch and allows the overload relay armatures to return to their normal operating position. Operating contacts of plate power overload relays K-8, K-14, K-17 and K-10, K-15, K-18 are connected in the field contactor coil circuit. Plate voltage from the generator is removed immediately after an overload occurs Relays K-8, K-10, K-14, K-15, K-17 and K-18 differ only in the type of current and reset coils used.

d. The 2000 and 1000 Volt D.C. circuits are additionally protected against overload by fuses located on the generator terminal boards. The 250 volt D.C. circuits are protected against overload by fuses located on the generator terminal board.

e. Overload relays in these equipments are not of the oil dash-pot type. Once adjusted, they should remain in adjustment over a long period of time. It is recommended that a periodical check be made on the setting of the overload relays. Proper setting of these relays is given in Fig. 10-69.

f. Heater circuit fuses F-1 and F-2 (6 amp. 250 volts), F-3 and F-4 (15 amp. 250 volts) located on the transmitter terminal board, protect the control circuit and master oscillator temperature control system including heater resistors R-4 and R-46, and blower motor B-1, B-2 or B-3.

g. On A.C. power supplies, additional fuses, F-150 and F-151 (6 amp. 250 volts) protect stepdown transformers T-150 and T-151 and associated circuits.

h. Fuses mounted on the generator terminal boards protect the generator high voltage winding against faults in the high voltage cable between the generators and the transmitter.

i. Line fuses in the controller provide short circuit protection to the controllers and motors. Control fuses in controller protect the controller control circuit.

j. In D.C. and A.C. controllers, a thermal overload relay protects the motor against overload. This relay is of the hand reset type.

28. KEYING CIRCUITS.

a. Keying relay K-6 is connected in the filament return circuit of all tubes except the power amplifier tubes. It keys by means of contacts K-6C, all tubes except the power amplifier tubes, regardless of whether the tubes are operating in the H.F. or I.F. transmitting circuits. The power amplifier tubes are supplied with sufficient bias. When excitation is removed by keying the preceding stages, they cease to draw plate current.

b. Contacts A and B of keying relay K-6, through terminals 36, 37 and 38 provide a means of controlling receiver attenuator relays. These relays may be of either the normally closed or normally open contact type. Terminals 36 and 37 should be used with the normally open type relay and terminals 37 and 38 should be used with a normally closed relay. A combination of both types of relay may be used by using all three terminals. See also discussion on the rating of contacts A and B of K-6 in Paragraph 9*l.* (8).

c. The D contacts of keying relay K-6 perform the function of closing the primary circuit to the H.F.-M.O. compensating capacitor transformer T-3, T-5. Every time the key is closed, the transformer becomes energized and supplies power to compensation capaci-

tor C-7, C-100. The small amount of power applied to C-7, C-100 causes it to change capacity in a direction opposite to the change in master oscillator tube capacity caused by application of power to the tube. The compensator capacitor thus offsets the capacity change due to master oscillator tube heating, whenever the key is closed.

29. VOLTAGE CONTROLS.

a. Filament power in D.C. equipments is obtained from slip rings on the 250/1000 volt D.C. generator at a frequency of 60 cycles and a voltage of 220 volts. For A.C. equipments, the filament power is obtained direct from the line through transformer T-151 at a voltage of 110 volts. In either case, filament voltage is adjusted to the proper value by means of FILAMENT VOLTAGE rheostat R-12 in D.C. equipments and R-47 in A.C. equipments.

b. Plate power for all vacuum tubes except the two individual master oscillator tubes is supplied by the 2000 volt D.C. generator, Type CC-21232 or CC-21232A. Output voltage of this generator is adjusted to proper operating point by means of field rheostat R-41.

c. Plate power for the two master oscillator tubes is supplied by the 1000 volt D.C. winding of generator Type CC-21233 or CC-21233B. Bias voltage is obtained from the 250 volt D.C. winding on this same generator. Output voltage of both windings is controlled by adjustable field resistor R-150, located in the filter unit. The value of R-150, is adjusted at the factory and should never be changed. Care should be taken, if ever a replacement of R-150 is necessary, to see that the same number of resistor steps are shorted out on the new R-150 as were shorted on the original. Reference to Figs. 10-57 or 10-58, Dwgs. 7605491 or 7605492 will also indicate the proper number of sections to be shorted on R-150.

30. M.O. TEMPERATURE CONTROL CIRCUITS.

a. The master oscillator temperature controlled compartment maintains the frequency determining parts at an approximately constant temperature of 60°C. throughout an ambient temperature change of from —1°C. to +50°C. To accomplish this, heat is supplied to the compartment by resistors R-4, R-46, R-40 and R-48. This heat is circulated throughout the compartment by means of blower B-1, B-2 or B-3. Amount of heat supplied to the compartment is controlled by mercury thermostat S-3 and its associated control relay K-1, K-12.

b. Throughout an ambient temperature range of approximately 10°C. to 55°C., only resistor R-4, R-46 is used to supply heat. Below an ambient temperature of approximately 10°C., thermal switch S-33, which is mounted outside of the compartment, closes its contacts and places resistor R-40, R-48 across the heater power circuit. In this manner, an additional amount of power is supplied to the compartment. Also, whenever the heat is first applied, after having been shut off for a sufficient length of time to allow the compartment temperature to drop well below the normal 60°C. operating point, thermal switch S-31 closes its contacts and connects resistor R-40, R-48 across the heater power circuit. An additional source of heat is thereby introduced to speed up the process of restoring normal operating temperature of the compartment. Thermal switch S-31, mounted inside the compartment, opens its contacts removing the extra power at approximately 50°C. to 55°C.

c. A third thermal switch S-2, is mounted inside the compartment. It protects the unit from excessive heat due to faulty operation of control circuit, by opening its contact which is directly in the heater power circuit. The contact opens at approximately 70°C. and recloses at approximately 50°C., to 55°C., again applying heat.

d. In the D.C. equipment, heater circuits of the temperature controlled compartment obtain power direct from the ship's supply line. The A.C. equipments, however, obtain heater power direct from the supply line through transformer T-150 which reduces voltage from 220 or 440 volts to 110 volts.

e. Thermostat control relay K-1 is a D.C. operated relay. Thermostat control relay K-12 is A.C. operated. In either case, the relay coil receives its operating power at approximately 11 volts from potentiometer R-2, R-20, R-51 connected across the heater power supply line. The contact of this relay controls power to the heater resistors and in both the A.C. and D.C. equipments. It has a capacitor-resistor C-52, R-36 spark absorbing combination across its contacts. In addition, on the D.C. equipments, a small permanent magnet acts as a "blow-out" to help suppress the spark or arc when the contact breaks the heater power circuit.

f. The temperature of the M.O. compartment is indicated by thermometer TH-1 having its bulb in the constant temperature compartment and its scale on the front panel of the transmitter. Under normal ambient temperature conditions of approximately 25°C., thermometer TH-1 should indicate a temperature between 59° and 61°C. provided that heater circuit power has been on for at least three hours. A slight fluctuation of thermometer reading of approximately plus or minus 0.1°C. may be noted. It is due to cycling of the temperature control apparatus. Because the thermometer bulb is not in intimate contact with the frequency determining circuit parts, and the thermometer is somewhat affected by ambient temperature due to exposure of stem and scale, the thermometer reading is not generally an exact indication of the temperature of the circuit parts. When ambient temperature is close to 0°C. the panel thermometer will indicate low. When ambient temperature is approximately 50°C., the thermometer will indicate high. This relatively slight variation in panel ther-

mometer indication should not be construed as an indication that the temperature control circuits are not maintaining the temperature accurately. If temperature indications fluctuate more than ± 4°C. from normal, an investigation should be made.

g. A test hole has been provided directly above the thermostat entrance hole. A test thermometer may be inserted for checking the actual temperature of the temperature controlled compartment. It may be inserted into the test hole by simply removing a small plug inserted in the test hole. The test thermometer must be of a type which requires only a small immersion length to produce accurate indications, otherwise considerable error may result.

31. TUNING, GENERAL.

a. The transmitting equipment, except the constant temperature compartment, may be started and stopped by means of START-STOP switch S-26, S-40 as previously explained under Par. 26*a*. Local control is always available by means of this switch. Local control is always supervisory, and the remote control can be interrupted by means of REMOTE-LOCAL switch S-25 on the transmitter.

b. In order to obtain the best performance regarding frequency stability and accuracy of calibration, the master oscillator temperature controlled compartment in which are located the frequency determining elements should always be up to approximately 60°C. temperature. Attainment of this normal operating temperature will require approximately three hours after power has been applied. For A.C. equipments, the H.F.-M.O. FILAMENT STANDBY ON-OFF switch S-32 is provided. The H.F. master oscillator filament should be turned on at least one hour before operation of the H.F. transmitter circuits, to insure maximum frequency stability. The filament stand-by feature is not incorporated in the radio transmitters for D.C. power supplies as the motor-generator unit must be operated to obtain A.C. for filament heating.

c. Typical dial settings and meter readings for various frequencies throughout the H.F. and I.F. ranges of the transmitter, are given in Paragraphs 35 and 36.

d. Each equipment is accompanied by one copy of the actual Government acceptance test data compiled at the manufacturer's plant and packed with the equipment. Where the equipment has been subjected to production tests only, the accompanying test data will include a copy of complete type test data on similar equipment. This data should be retained on file for reference, by the ship or station on which the equipment is installed, in order to permit a comparison of performance under service and acceptance test conditions. This data may also be used as a guide to determine proper operation of the equipment.

e. To tune the transmitting circuits to any desired frequency in the bands of 175 to 600 or 2000 to 18100 Kcs., the following procedure should be followed:

(1) When first tuning up the transmitter with no previously determined calibrated frequencies, approximate setting to the desired frequency should be made by using the tuning curves, Figs. 10-59 to 66, inclusive. These curves are supplied for this purpose. Reference should also be made to type test data and typical dial and meter readings.

(2) After the circuits have been tuned approximately to the frequency desired, the exact frequency settings should be determined by use of an external frequency monitor or other suitable apparatus. The final dial settings should be recorded in their proper place on the calibration charts.

(3) Start up and set to frequency the frequency standard that is to be used to calibrate the transmitter. This frequency standard can be any type of heterodyne meter used in the Service that is capable of covering the required frequency range. Due to the frequency stability of the transmitter, it is only necessary to set the master oscillator to the desired frequency by the frequency standard. Then, adjust the intermediate amplifiers, power amplifier and antenna tuning circuits to resonance. The audio output from the frequency standard is available at the FREQUENCY METER AUDIO OUTPUT jack, J-1, which facilitates calibration.

(4) The R.F. coupling terminals provided on the transmitter unit, for connection to the frequency standard, supply between 15 and 750 millivolts of r-f. across 75 ohms. To use this available pick-up voltage for calibrating purposes, the following procedure should be followed:

(5) The H.F. oscillating circuit operates at ½ the output frequency of the master oscillator unit. (See discussion on the H.F.-master oscillator under Par. 9*b*.)

(6) The approximate calibration data given on Fig. 10-59 shows output frequency of the H.F.-master oscillator when the controls are set as indicated, and the H.F.-master oscillator doubler circuit control D is set per Fig. 10-60. When calibrating this oscillator by means of a frequency standard, the controls should be set to the approximate point as indicated by Figs. 10-59, 10-60. Then, exact adjustment may be made by tuning to "zero beat" with the frequency standard. The frequency standard should be adjusted to the same frequency as the *output* frequency desired from the H.F.-master oscillator. Final adjustment should be made with the doubler circuit control D in exact resonance. This is indicated by maximum grid current of the first intermediate amplifier tube.

(7) The I.F.-master oscillator circuit operates at ½ the output frequency of the transmitter. However, the approximate calibration of the master oscillator shown on Fig. 10-64 is given in master oscillator control settings to produce the desired output frequency. Procedure for calibration of the I.F.-master oscillator

is the same as for the H.F.-master oscillator in that the frequency standard is to be adjusted to the output frequency desired.

f. Under certain conditions of operation of TUNE-OPERATE switch S-22, it may be possible to obtain a reading of approximately 300 to 500 volts on PLATE VOLTAGE meter M-10 with the TUNE-OPERATE switch on No. 1 position. Normally there is no voltage across meter M-10 with switch S-22 on No. 1 position. Should the keying relay be held closed either by the TEST key or by the operator's key while the TUNE-OPERATE switch is moved from No. 2 to No. 1 position, a voltage of 300 to 500 volts will remain on meter M-10. This voltage persists after switch S-22 has removed normal plate potential because the charge on capacitors C-27, C-37, C-48, C-76 and C-87 is partially maintained by conduction through either of the intermediate amplifier tubes. To remove this voltage, it is only necessary to open the keying relay for 2 or 3 seconds. This blocks the tube, stops conduction through the tube and permits the charge on the above capacitors to leak off to ground through meter M-10. With the capacitors discharged, closing the keying relay will not cause the capacitors to charge up again and meter M-10 will read zero. Whether this potential is allowed to exist across the capacitors and the voltmeter, or is removed by opening the keying relay, no output will be found in the power amplifier tube plate circuits or antenna circuits. Adjustment of the master oscillator frequency while on TUNING STEP 1, therefore, will cause no radiation.

32. H.F. CIRCUIT TUNING.

a. To tune the H.F. transmitter circuits to any desired frequency in the specified band, the following procedure should be followed:

(1) Place TRANSFER SWITCH H.F.-I.F. control A in the H.F. position and ANTENNA TRANSFER H.F.-I.F.-REC. SWITCH control W in the H.F. position.

(2) Place TUNE-OPERATE switch S-22 in TUNING STEP 1 position and start motor-generator unit.

(3) Check filament voltage and adjust, if necessary, to 10 volts by means of FILAMENT VOLTAGE rheostat R-12, R-47.

(4) Set H.F. RANGE control B to desired point as determined by Fig. 10-59, or tuning chart.

(5) Set H.F. TUNING control C to proper setting as given on Fig. 10-59, or tuning chart.

(6) Set H.F. DOUBLER CIRCUIT TUNING control D to proper point as given on Fig. 10-60, or tuning chart.

(7) Set H.F. RANGE SWITCH control H to proper position as given on Fig. 10-61, or tuning chart.

(8) Set H.F. 1st AMP. TUNING control E to proper dial setting as given on Fig. 10-61, or tuning chart.

(9) Set H.F. 2nd AMP. TUNING control F to proper dial setting as given on Fig. 10-62, or tuning chart.

(10) Set H.F. P.A. TUNING control G to proper dial setting as given on Fig. 10-63, or tuning chart.

(11) Set H.F. ANTENNA COUPLING control J at approximately zero dial setting.

(12) Set P.A. GRID CURRENT CONTROL switch S-38 to the right or TO RAISE position.

(13) Set PHONE-CW-MCW switch S-7 to the CW position.

b. Start the motor-generator. Operate TEST key S-27. The M.O. PLATE CURRENT meter M-2 and H.F.-M.O. SCREEN GRID CURRENT meter M-1 should indicate current of about 60 and 11 milliamperes respectively.

c. Place TUNE-OPERATE switch S-22 in TUNING STEP 2. Close the TEST key. Tune each stage to exact resonance as follows:

(1) Tune H.F. DOUBLER CIRCUIT TUNING control D for maximum plate current on 1st INT. AMP. PLATE CURRENT meter M-5.

(2) Tune H.F. 1st AMP. TUNING control E for maximum plate current on 2nd INT. AMP. PLATE CURRENT meter M-8.

(3) Tune H.F. 2nd AMP. TUNING control F for maximum P.A. GRID CURRENT on meter M-9.

(4) Tune H.F. P.A. TUNING control G for minimum P.A. PLATE CURRENT on meter M-11.

d. Select either VOLTAGE or CURRENT feed on H.F. ANTENNA FEED CURRENT-VOLTAGE switch S-17, control M, depending on size of antenna employed. Adjust H.F. ANTENNA INDUCTANCE control K and H.F. ANTENNA CAPACITOR control L until maximum H.F. ANTENNA CURRENT is obtained. H.F. ANTENNA COUPLING control J may have to be increased from the approximate setting of zero to obtain an antenna current reading. Do not increase antenna coupling any more than just enough to obtain a good indication. This is especially true when voltage-feeding a high resistance antenna. Under this condition, rated antenna current is necessarily small.

e. As soon as an indication of antenna current has been obtained, and controls K and L have been adjusted to give a maximum of antenna current, place TUNE-OPERATE switch S-22 in OPERATE position and adjust PLATE VOLTAGE rheostat R-41 for 2000 volts. Increase H.F. ANTENNA COUPLING control J and readjust controls K and L for maximum antenna current until the P.A. PLATE CURRENT reads 350 milliamperes.

f. The H.F. antenna current obtained varies with different types of antennas and with frequency. At this time, a careful check should be made throughout the frequency range of the transmitter to determine

the maximum value of antenna current encountered. If the maximum value never exceeds 5 amperes with full power amplifier input, it may be advisable to request a 0 to 5 ampere meter from the Bureau of Ships to replace the normal 0 to 10 ampere meter supplied with the equipment. If the maximum antenna current exceeds the full scale value of 10 amperes on the meter supplied with the equipment, a permanent shunt should be connected across the meter terminals. Varying degrees of shunting can be obtained by use of different sizes of wire for the shunt. Normally, a short direct connection between meter studs made from # 10 copper wire will increase the range a sufficient amount to cover most conditions. The use of larger than # 10 wire will increase the range of the meter still further. In extreme cases, it may be necessary to request a higher rating ammeter from the Bureau of Ships.

g. It may be impossible to obtain maximum antenna current with the H.F. ANTENNA FEED CURRENT-VOLTAGE switch control M in the position first selected. With a given antenna, VOLTAGE feed may be necessary at some frequencies and CURRENT feed at others. It is, therefore, necessary to carefully try various combinations of controls K and L as well as ANTENNA COUPLING, control J for both voltage and current feed. This must be done until the combination is found which gives maximum antenna current with an input of 350 milliamperes to the power amplifier tubes.

h. Note P.A. GRID CURRENT meter M-9 indication. If it is above 90 milliamperes, transfer P.A. GRID CURRENT CONTROL switch S-38 to left or TO LOWER position. Always leave this switch in the position for high grid current except in those cases where grid current exceeds 90 milliamperes. This control has no effect on frequency. It can be operated at will without affecting the signal frequency.

i. As a final check, all stages should be retuned for best performance. The plate voltmeter should be set at the normal operating point of 2000 volts. This readjustment is especially necessary on the P.A. PLATE TUNING control G.

CAUTION

NEVER EXCEED THE VALUES OF 350 MILLIAMPERES FOR THE POWER AMPLIFIER PLATE CURRENT AND 2000 VOLTS PLATE VOLTAGE AT ANY TIME DURING THE OPERATION OF THE TRANSMITTER.

33. I.F. CIRCUIT TUNING.

a. To tune the I.F. transmitter circuits to any desired frequency in the 175 to 600 Kcs. band, the following procedure is recommended:

(1) Place TRANSFER SWITCH H.F.-I.F. control A in I.F. position and ANTENNA TRANSFER SWITCH REC. I.F.-H.F.-S-18 control W in I.F. position.

(2) Place TUNE-OPERATE switch S-22 in TUNING STEP 1 position and start the motor-generator.

(3) Check filament voltage and adjust, if necessary, to 10 volts by means of FILAMENT VOLTAGE rheostat R-12, R-47.

(4) Set I.F.-M.O. RANGE control N to desired point as given on Fig. 10-64, or tuning chart.

(5) Set I.F.-M.O. TUNING control O to desired dial setting as given on Fig. 10-64, or tuning chart.

(6) Set I.F. RANGE SWITCH control P to desired point as given on Fig. 10-65, or tuning chart.

(7) Set I.F. INT. AMP. TUNING control Q to proper dial setting as given on Fig. 10-65, or tuning chart.

(8) Set I.F. P.A. TUNING control R on proper dial setting as given on Fig. 10-66, or tuning chart.

(9) Set I.F. ANTENNA COUPLING control S at zero setting.

b. Place the P.A. GRID CURRENT CONTROL switch S-38 to the right or RAISE position. When tuning the I.F. transmitter, little difference will be noted in power amplifier grid current regardless of the position of this switch. However, it is desirable to have as much grid current as possible without exceeding a value of 90 milliamperes. Switch S-38 can be left in the TO RAISE position under practically all conditions of operation encountered on the I.F. transmitter without exceeding the 90 milliampere power amplifier grid current.

c. Operate TEST key S-27. M.O. PLATE CURRENT meter M-2 should read approximately 45 milliamperes.

d. Place TUNE OPERATE switch on TUNING STEP 2 position. Adjust PLATE VOLTAGE rheostat R-41 until PLATE VOLTAGE meter M-10 indicates 2000 volts with key up. Close the TEST key and tune each stage to exact resonance as follows:

(1) Tune I.F. INT. AMP. TUNING control Q for maximum P.A. GRID CURRENT on meter M-9.

(2) Tune I.F.-P.A. TUNING control R for minimum P.A. CURRENT on meter M-11.

e. Place TUNE-OPERATE switch in OPERATE position. Tune the antenna circuit to resonance as described in the following paragraphs:

f. Adjust I.F. ANTENNA INDUCTANCE control V and I.F. ANTENNA TUNING control T until maximum antenna current is obtained. Tap No. 1 on I.F. ANT. INDUCTANCE control V gives maximum inductance, and Tap No. 15 minimum inductance. I.F. ANTENNA TUNING control T provides for adjustment of inductance between taps on control V.

g. When an extremely high capacity antenna is used at the 600 Kcs. end of the band, it may be necessary to place I.F. ANT. SERIES CAPACITOR C-92 in the circuit by means of control U.

h. After the antenna circuit has been tuned as indicated by maximum antenna current, gradually increase I.F. ANTENNA COUPLING control S until the P.A. PLATE CURRENT meter indicates 350 milliamperes. The suitability of the antenna ammeter should, at this time, be investigated throughout the I.F. frequency range in the same manner as described in Paragraph 32*f.* for the H.F. tranmitters. Action similar to that recommended for the H.F. transmitter should be followed if it is found that maximum antenna current obtained exceeds the 15 amperes full scale value of the meter supplied with the equipment.

i. Readjust I.F. ANTENNA TUNING control T and I.F. ANTENNA COUPLING control S for maximum antenna current with exactly 350 milliamperes of power amplifier plate current. A final readjustment of I.F. INT. AMP. TUNING control Q for maximum power amplifier grid current should be made.

NOTE

Do not readjust power amplifier tuning control R as proper setting is to be obtained with I.F. ANTENNA COUPLING control S set at zero. It is not to be returned after coupling is increased.

IMPORTANT

Do not exceed the value of *350 ma.* for P.A. plate current and *2000 volts* plate voltage at anytime during the operation of the transmitter. Never exceed antenna current of 10 amps. H.F. or 15 amps. I.F. See Paragraphs 32*f.* and 33*h.*

j. The receiver attenuator relays should remain closed when keying normally. Instructions as to connection and operation of attenuator units are contained in the Navy Type_50064 Speech Input Equipment instruction book.

34. ROUTINE OPERATION.

a. TO START AND STOP THE EQUIPMENT.

(1) For local control, place REMOTE-LOCAL switch S-25 to LOCAL. The equipment is then started by placing START-STOP switch S-26 to START, or stopped by placing S-26 to STOP. For remote control, place REMOTE-LOCAL switch S-25 to REMOTE. Place START-STOP switch S-26, S-40 to START. The equipment is then controlled by the operator's switch at the remote operating position.

b. TO CHANGE FREQUENCY.

(1) Open TEST key S-27. Set TUNE-OPERATE switch S-22 to TUNING STEP 2. Set controls A to W according to the calibration chart, for the desired frequency. If operating conditions permit, close TEST key S-27 and note that P.A. PLATE CURRENT meter M-11 indicates between 150 and 250 milliamperes. Set TUNE-OPERATE switch S-22 to OPERATE. With TEST key closed, all meters should indicate normally.

c. TO INCREASE OR DECREASE POWER, CW-MCW OPERATION.

(1) To decrease power, rotate PLATE VOLTAGE rheostat R-41 counterclockwise until the desired reduction is obtained. Quarter power can be obtained by this method. To increase power, rotate PLATE VOLTAGE rheostat R-41 in clockwise direction. Do not exceed 2000 volts as indicated by PLATE VOLTAGE meter M-10.

d. TO INCREASE OR DECREASE POWER, PHONE OPERATION.

(1) For phone operation, tune the transmitter on CW to the desired frequency at full power output. Change PHONE-CW-MCW switch S-7 to PHONE. To decrease power, reduce ANTENNA COUPLING control S or J until desired reduction is obtained. To increase power increase ANTENNA COUPLING control S or J. Do not exceed 220 milliamperes as indicated by P.A. PLATE CURRENT meter M-11. When operating on H.F., retune H.F. P.A. TUNING control G for minimum plate current after H.F. ANTENNA COUPLING control J has been changed. When operating on I.F., do not change I.F. P.A. TUNING control R after it has once been adjusted regardless of setting of I.F. ANTENNA COUPLING control S.

35. TABLE OF TYPICAL DIAL SETTINGS AND METER READINGS.

a. TYPICAL METER AND CONTROL READINGS, 2000 to 18100 KCS.

Freq. Kcs.	(1) Controls											P.A. Grid Current Control
	B.	C.	D.	E.	F.	G.	H.	J.	K.	L.	M.	
2000	1	2300	18	18	196	304	1	1529	0	25	Current	Low
	1	2300	18	18	196	318	1	1637	0	44	Current	Low
	1	2300	18	18	196	318	1	1757	0	59	Current	Low
3000	4	3100	53	77	985	1072	1	2093	1679	81	Current	Low
	4	3100	53	77	985	1072	1	2030	0	43	Voltage	Low
4000	7	1500	76	95	1342	1406	1	1404	198	88	Voltage	Low
8000	7	1500	76	89	1490	1621	2	1919	1200	75	Voltage	Low
12000	4	3100	53	66	1735	1847	2	833	1877	78	Voltage	High
16000	7	1500	76	89	1865	1983	2	482	2023	87	Voltage	High
18100	8	2100	85	95	1913	2049	2	328	2056	95	Voltage	High

Freq. Kcs.	Type Emission	(2) Meter Readings											
		Antenna		M.O.		1st I.A.	2nd I.A.	P.A.		Plate Voltage	M.O. Plate Voltage	Ant. Amps.	Ant. Watts
		Cap. MMFD	Res. OHMS	Isg M.A.	Ip M.A.	Ip M.A.	Ip M.A.	Ig M.A.	Ip M.A.				
2000	CW	1000	9.9	12	46	41	60	76	350	2000	930	6.5	416
	Phone							76	140	2030		2.7	75
	CW	1000	14.9	12	46	41	60	76	350	2000	930	5.3	419
	Phone							87	130	2025		2.1	65.5
	CW	1000	19.8	12	45	43	60	73	350	2000	930	4.6	420
	Phone							75	130	2030		1.8	64
3000	CW	1000	20.9	11	50	17	55	50	350	2000	930	4.3	387
	Phone							60	150	2030		2.0	84
	CW	1000	29.8	11	49	17	56	46	350	2000	930	3.8	430
	Phone							55	165	2000		1.6	76.5
4000	CW	1000	29.8	11.5	60	16	53	34	350	2000	930	3.6	386
	Phone							43	180	2000		1.7	87
8000	CW	(110 V-500 Watt		11	63	58	45	44	350	2000	930	3.7	390
	Phone	Type C Lamp)						52	210	2030		3.4	76
12000	CW	(110 V.-500 Watt		11	59	65	79	88	350	2000	930	3.4	428
	Phone	Type C Lamp)						38	210	2020		3.3	104
16000	CW	(110 V.-500 Watt		11.5	62	54	86	72	350	2000	930	2.6	375
	Phone	Type C Lamp)						96	195	2020		2.6	73
18100	CW	(110 V.-500 Watt		11	64	52	85	60	350	2000	930	2.2	320
	Phone	Type C Lamp)						81	200	2000		2.4	78

36. TYPICAL METER AND CONTROL READINGS 175 TO 600 KCS.

a. ANTENNA—SMALL SURFACE CRAFT FLAT TOP

Freq. Kcs.	Controls										P.A. Grid Cur. Control
	A	N	O	P	Q	R	S	T	U	V	
175	I.F.	1	925	1	36	49	88	62	Out	8	Low
245	I.F.	2	1115	2	58	74	62	29	Out	13	Low
375	I.F.	4	1384	4	50	40	55	33	Out	15	Low
500	I.F.	6	1220	5	61	61	44	64	Out	15	Low
600	I.F.	7	1805	5	83	88	25	64	In	15	Low

b. ANTENNA—LARGE SURFACE CRAFT FLAT TOP

175	I.F.	1	925	1	36	50	57	29	Out	3	Low
245	I.F.	2	1115	2	60	75	44	59	Out	10	Low
375	I.F.	4	1384	4	51	40	46	30	Out	15	Low
500	I.F.	6	1220	5	62	61	35	56	In	15	Low
600	I.F.	7	1805	5	83	88	18	83	In	15	Low

c. ANTENNA—SUBMARINE LOOP

175	I.F.	1	925	1	36	49	40	27	Out	3	Low
245	I.F.	4	1115	2	58	74	31	58	Out	10	Low
375	I.F.	4	1384	4	51	40	48	42	Out	14	Low
500	I.F.	6	1220	5	61	61	37	55	Out	15	Low
600	I.F.	7	1805	5	83	88	26	90	Out	15	Low

d. ANTENNA—SUBMARINE FLAT TOP

175	I.F.	1	925	1	36	49	38	20	Out	5	Low
245	I.F.	2	1115	2	59	74	28	46	Out	11	Low
375	I.F.	4	1384	4	51	40	47	43	Out	14	Low
500	I.F.	6	1220	5	61	61	33	63	Out	15	Low
600	I.F.	7	1805	5	83	88	21	79	Out	15	Low

e. ANTENNA CHARACTERISTICS SIMILAR TO SMALL SURFACE CRAFT FLAT TOP ANTENNA

Meter Readings											
Freq. Kcs.	Type Emission	Antenna		M.O. Ip MA	IA Ip MA	P.A.		Plate Voltage	M.O. Plate Voltage	Antenna Amps.	Antenna Watts
		Cap. MMFD.	Res. OHMS			Ig MA	Ip MA				
175	CW	768	12.01	38	50	61	350	2000	950	5.7	390
	MCW					60	235	2000		4.3	222
	PHONE					60	172	2020		2.9	101
245	CW	780	11.01	35	50	62	350	2000	950	6.1	410
	MCW					62	254	2000		4.9	265
	PHONE					62	176	2010		3.2	113
355	CW	825	5.87	31	55	68	350	2000	950	7.6	340
	MCW					64	260	2000		6.3	233
	PHONE					64	180	2020		4.0	94
500	CW	871	4.63	29	58	65	350	2000	955	8.1	304
	MCW					67	260	2000		6.6	202
	PHONE					66	180	2000		4.2	82
600	CW	982	3.69	31	54	55	350	2000	955	8.2	248
	MCW					55	260	2000		6.8	170
	PHONE					55	182	2020		4.3	68

f. ANTENNA CHARACTERISTICS SIMILAR TO LARGE SURFACE CRAFT FLAT TOP ANTENNA

Freq. Kcs.	Type Emission	Meter Readings: Antenna Cap. MMFD.	Antenna Res. OHMS	M.O. Ip MA	IA Ip MA	P.A. Ig MA	P.A. Ip MA	Plate Voltage	M.O. Plate Voltage	Antenna Amps.	Antenna Watts
175	CW	591	6.16	38	50	59	350	1990	950	7.3	277
	MCW					57	200	1990		5.0	130
	PHONE					58	175	2000		4.0	71.2
245	CW	591	6.01	35	51	59	350	1990	950	8.1	320
	MCW					58	235	1990		6.0	198
	PHONE					58	180	2000		4.3	91.7
355	CW	982	3.93	32	55	66	350	1980	950	9.9	291
	MCW					66	255	1980		8.0	198
	PHONE					67	175	2000		5.0	79.6
500	CW	1245	2.49	29	57	65	350	1990	950	10.8	240
	MCW					65	260	1990		9.0	163
	PHONE					65	180	2000		5.7	68.5
600	CW	1359	1.49	30	56	59	350	1990	950	12.4	184
	MCW					58	260	1990		9.8	121
	PHONE					58	180	2000		6.2	52

g. ANTENNA CHARACTERISTICS SIMILAR TO SUBMARINE LOOP

175	CW	463	2.51	38	50	60	350	2000	950	8.1	165
	MCW					59	170	2010		4.6	53
	PHONE					59	172	2020		4.1	42
245	CW	463	2.46	37	49	64	350	2000	950	9.4	217
	MCW					62	210	2000		6.4	101
	PHONE					62	177	2010		4.8	57
355	CW	463	2.87	31	53	65	350	2000	950	9.0	232
	MCW					64	252	2000		7.2	150
	PHONE					65	178	2020		4.6	61
500	CW	523	3.04	29	58	67	350	2000	950	8.8	236
	MCW					66	256	2000		7.2	158
	PHONE					67	180	2020		4.6	65
600	CW	622	4.73	31	56	58	350	2000	950	8.1	310
	MCW					57	260	2000		6.6	206
	PHONE					57	180	2000		4.2	84

h. ANTENNA CHARACTERISTICS SIMILAR TO SUBMARINE FLAT TOP

175	CW	523	2.04	38	48	59	350	2000	940	8.7	155
	MCW					57	170	2000		5.0	51
	PHONE					59	175	2020		4.4	39.5
245	CW	523	1.72	35	49	63	350	2000	950	10.4	186
	MCW					62	198	2000		6.9	82
	PHONE					62	175	2010		5.3	48.4
355	CW	591	2.28	32	57	69	350	2000	950	9.4	202
	MCW					65	250	2000		7.4	125
	PHONE					64	179	2020		4.9	55
500	CW	622	2.30	29	60	68	350	2000	950	9.8	221
	MCW					67	260	2000		8.0	147
	PHONE					67	177	2010		5.1	60
600	CW	641	2.63	31	56	58	350	2000	950	9.1	217
	MCW					57	260	2000		7.5	148
	PHONE					57	183	2020		5.0	66

37. D.C. POWER EQUIPMENT.

a. D.C. MOTOR-GENERATOR AND CONTROLLER OPERATION, TBL-5/6/7/12/13.

(1) Starting of the motor is initiated by closing starting contactor K-2, K-4, in the transmitter unit after the line switch in the controller has been closed. The motor will stop if the contacts of starting contactor K-2, K-4 open, controller overload relay trips, or if the main line switch is opened. Any of these operations will open the line contactor and disconnect the motor from the line. If the controller overload relay has tripped it must be reset by hand before the motor can be started.

(2) Normally, no further action is necessary to operate the controller and motor generator. However, if the output voltages of the 250/1000 volt generator are low or high, the speed of the motor-generator should be checked.

(3) If the speed of the motor differs materially from normal (1780 rpm.), it should be brought back to the desired value by adjusting the speed regulator. Refer to Par. 40*k*. for instruction regarding adjustment of speed regulator.

b. OPERATION SEQUENCE, TBL-5.

(1) The following sequence of operation is given to explain the function of the parts comprising the controller and motor-generator. Refer to schematic diagrams CAY-T-147, Sheets 9 and 10.

(2) Closing of starting contactor K-2, K-4 will energize the main coil of accelerating contactor K-202, K-212. It should be noted that interlock K-201C, K-211C, of contactor K-201, K-211 will prevent contactor K-202, K-212 from becoming energized unless contactor K-201, K-211 is open. Main contact K-202A, K-212A of contactor K-202, K-212 will open and insert starting resistor R-201, R-204, R-205, R-211, R-214, R-215 in the motor armature circuit.

(3) The "make" interlock contact K-202B, K-212B will close and complete the circuit to the coil of line contactor K-201, K-211. Contacts K-201A, K-211A and K-201B, K-211B will close and connect the motor to the line with starting resistor R-201, R-204, R-205, R-211, R-214, R-215 in the circuit. The "make" interlock K-211D will close and seal contactor K-211 on the line through protective resistor R-202, R-212 and the contacts of starting contactor K-2, K-4. The "break" interlock K-201C, K-211C will open and de-energize the main coil of contactor K-202, K-212. After a definite time, determined by the current through contactor neutralizing coil K-202N, K-212N, main contact K-202A, K-212A will close and short out starting resistor R-201, R-204, R-205, R-211, R-214, R-215. The motor is now connected for normal running.

(4) Constant speed is attained in the motor-generator by means of a centrifugal speed governor operating directly on the motor shaft. The function of the speed regulator is to insert resistor R-250 (230 V. D.C.), R-251 (115 V. D.C.) in the motor field circuit if the speed is below normal and to short out the resistor if the speed is above normal. A spark suppressor circuit composed of C-250 and R-252 in series is included to reduce sparking at the contacts of S-250.

(5) As the speed of the motor increases above rated speed, speed regulator contacts S-250 close and short resistor R-250, R-251 in the field and the speed decreases. At a little below rated speed, the contacts open again and the motor speeds up. This cycle is continually repeated but is very rapid. With a properly adjusted governor, changes in speed are hardly perceptible.

c. OPERATION SEQUENCE, TBL-6/7/12.

(1) The followlng sequence of operation is given to explain the function of the parts comprising the controller and motor-generator. Refer to schematic diagrams CAY-T-147, Sheet 19 and Sheet 20.

(2) Closing of starting contactor K-2, K-4 will energize the main coil of accelerating contactor K-302, K-312. It should be noted that interlock K-301C, K-311C, of contactor K-301, K-311 will prevent contactor K-302, K-312 from becoming energized unless contactor K-301, K-311 is open. Main contact K-302A, K-312A of contactor K-302, K-312 will open and insert starting resistor R-301, R-304, R-305, R-311, R-314, R-315 in the motor armature circuit.

(3) The "make" interlock contact K-302B, K-312B will close and complete the circuit to the coil of line contactor K-301, K-311. Contacts K-301A, K-311A and K-301B, K-311B will close and connect the motor to the line with starting resistor R-301, R-304, R-305, R-311, R-314, R-315 in the circuit. "Make" interlock K-301D, K-311D will close and seal contactor K-301, K-311 on the line through protective resistor R-302, R-312 and the contacts of starting contactor K-2, K-4. "Break" interlock K-301C, K-311C will open and de-energize the main coil of contactor K-302, K-312. After a definite time, determined by the current through contactor neutralizing coil K-302N, K-312N, the main contact K-302A, K-312A will close and short out starting resistor R-301, R-304, R-305, R-311, R-314, R-315. The motor is now connected for normal running.

(4) Constant speed is attained in the motor-generator by means of a centrifugal speed governor operating directing on the motor shaft. The function of the speed regulator is to insert resistor R-401 (115 V.D.C.), R-421 (230 V.D.C.) in the motor field circuit if the speed is below normal and to short out the resistor if speed is above normal. A spark suppressor circuit, composed of C-401 and R-402 (115 V.D.C.), C-421 and R-422 (230 V.D.C.) in series, is included to reduce sparking at the contacts of S-250.

(5) As the speed of the motor increases above rated speed, speed regulator contacts S-401 (115 V.D.C.), S-421 (230 V.D.C.) close and short out resistance R-401 (115 V.D.C.), R-421 (230 V.D.C.) in the field and speed decreases. At a little below rated speed, the contacts open again and the motor speeds up. This cycle is continually repeated but is very rapid. With a properly adjusted governor, the changes in speed are hardly perceptible.

d. OPERATION SEQUENCE, TBL-13.

(1) The following sequence of operation is given to explain the function of the parts comprising the controller and motor-generator. Refer to Drawing CAY-T-147, Sheets 24 and 25.

(2) Closing of starting contactor K-2, K-4 will energize the coil of accelerating contactor K-352A, K-362A. Its main contact K-352B, K-362B will open and insert starting resistance R-351, R-361, R352, R-362 in the motor armature circuit.

(3) The "make" interlock contact K-352C, K-362C will close and complete the circuit to the coil of the line contactor K-351A, K-361A. Contacts K-351B, K-351C, K-361B, K-361C will close and connect the motor to the line with resistors R-351, R-352, R-361, R-362 in the armature circuit. "Make" interlock contact K-351E, K-361E will close and seal contactor K-351, K-361 on the line through protective resistor R-353, R-363. The "break" interlock contact K-351D, K-361D will open and de-energize coil K-352A, K-362A. After a definite time interval, the main contact K-352B, K-362B will close and short out the starting resistor. The motor is now connected for normal running.

(4) Constant speed is attained in the motor-generator unit by means of a centrifugal speed governor operating directly on the motor shaft. The function of the speed regulator is to insert resistor R-401, R-421 in the motor field circuit if the speed is below normal and short out this resistor if the speed is above normal.

(5) As the speed of the motor increases above rated speed, the regulator contacts S-401, S-421 close and short resistor R-401, R-421 in the field and speed decreases. At a little below rated speed, the contacts open again and the motor speeds up. This cycle is continually repeated, but is very rapid. With a properly adjusted governor the changes in speed are hardly perceptible.

38. A.C. POWER EQUIPMENT.

a. A.C. MOTOR-GENERATOR AND CONTROLLER OPERATION, TBL-5/6/7/12/13.

(1) Starting of the motor is initiated by closing of starting contactor K-13 in the transmitter unit, after the main line switch has been closed. The motor will stop if the contacts of starting contactor K-13 open or if the controller over-load relay trips. Either of these operations will open the line contactor and disconnect the motor from the line. If the controller overload relay has tripped, it must be reset by hand before the motor can be started.

(2) The following sequence of operation is given to explain the function of the parts comprising the controller and motor-generator. Refer to Schematic Diagram CAY-T-147, Sheets 11, 21, 22, 23, and 26.

(3) Operation of the control equipment, as described below, is based on the assumption that normal power supply is available at the controller terminals. The controller is operative providing all the fuses are in place and unblown, and that the contacts of the overload relay are closed. If the relay has been tripped, its contacts can be reset by pulling a reset button, located on the right hand side of the cabinet. Note: The reset button is located on the door of the controller for TBL-13 equipment.

b. SEQUENCE OF OPERATION, TBL-5.

(1) The motor can be started by closing contacts K-13A located on the transmitter, after the main line switch S-221 in the controller has been closed. This will energize the coil of line contactor K-221 through the closed contacts of overload relay K-222, and its contacts will close. The motor terminals will thereby be connected directly to the supply line and the motor will start.

(2) The motor will stop if contacts K-13A are opened or the overload relay trips interrupting the coil circuit of contactor K-221. In the latter case, the overload relay must be reset by pulling a reset button on the right hand side of the cabinet before the motor can be restarted. The motor will also stop if the voltage drops below a certain value, which is not sufficient to hold the contactor armature closed.

(3) The overload relay will trip if the motor is overloaded continuously 20% or more, or if the motor is stalled. This relay has inherent time delay features provided for tripping times inversely proportional to the value of the overload current. On direct short circuits, occurring in motor leads and windings, the time delay is of sufficient duration to allow the line fuses to blow before the relay contacts open. Therefore, the line contactor will not be called upon to open short circuit currents. The time for the relay to trip at 120% of rated relay current, at 28°C. ambient temperature, is approximately 5 minutes. Refer to CAY-T-147, Sheets 9, 10, and 11.

c. SEQUENCE OF OPERATION, TBL-6.

(1) The motor can be started by closing contacts K-13A located on the transmitter, after the main line switch S-321, S-331 in the controller has been closed. This will energize the coil of line contactor K-321, K-331 through the closed contacts of overload relay K-322, K-332, and its contacts will close. The motor terminals will thereby be connected directly to the supply line and the motor will start.

(2) The motor will stop if contacts K-13A are opened or the overload relay trips interrupting the coil circuit of contactor K-321, K-331. In the latter case, the overload relay must be reset by pushing a reset button on the right hand side of the cabinet before the motor can be restarted. The motor will also stop if the voltage drops below a certain value, which is not sufficient to hold the contactor armature closed.

(3) The overload relay will trip if the motor is overloaded continuously 20% or more, or if the motor is stalled. The relay has inherent time delay features provided for tripping times inversely proportional to the value of the overload current. On direct short circuits, occurring in motor leads and windings, the time delay is of sufficient duration to allow the line fuses to blow before the relay contacts open. Therefore, the line contactor will not be called upon to open short circuit currents. The time for the relay to trip at 120% of rated relay current at 28°C. ambient temperature is approximately 5 minutes. Refer to CAY-T-147, Sheets 19, 20, 21, and 22.

d. SEQUENCE OF OPERATION, TBL-7/12.

(1) The motor can be started by closing contacts K-13A located on the transmitter, after the main line switch S-331 in the controller has been closed. This will energize the coil of line contactor K-331 through the closed contacts of overload relay K-332, and its contacts will close. The motor terminals will thereby be connected directly to the supply line and the motor will start.

(2) The motor will stop if contacts K-13A are opened or the overload relay trips interrupting the coil circuit of contactor K-331. In the latter case, the overload relay must be reset by pushing a reset button on the right hand side of the cabinet before the motor can be restarted. The motor will also stop if the voltage drops below a certain value, which is not sufficient to hold the contactor armature closed.

(3) The overload relay will trip if the motor is overloaded continuously 20% or more, or if the motor is stalled. The relay has inherent time delay features provided for tripping times inversely proportional to the value of the overload current. On direct short circuits, occurring in the motor leads and windings, the time delay is of sufficient duration to allow the line fuses to blow before the relay contacts open. Therefore, the line contactor will not be called upon to break short circuit currents. The time for the relay to trip at 120% of rated relay current at 28°C. ambient temperature is approximately 5 minutes. Refer to CAY-T-147, Sheets 19, 20, and 23.

e. SEQUENCE OF OPERATION, TBL-13.

(1) The motor can be started by closing contacts K-13A located on the transmitter. This will energize the coil of line contactor K-341 through the closed contacts of overload relay K-342, and its contacts will close. The motor terminals will thereby be connected directly to the supply line and the motor will start.

(2) The motor will stop if contacts K-13A are opened or the overload relay trips interrupting the coil circuit of contactor K-341. In the latter case, the overload relay must be reset by pushing a reset button on the door of the cabinet before the motor can be restarted. The motor will also stop if the voltage drops below a predetermined value, which is not sufficient to hold the contactor armature closed.

(3) The overload relay will trip if the motor is overloaded continuously 20% or more or if the motor is stalled. The relay has inherent time delay features provided for tripping times inversely proportional to the value of the overload current. Refer to Drawings CAY-T-147, Sheets 24, 25 and 26.

V. MAINTENANCE

39. GENERAL, TRANSMITTER.

a. Keeping the equipment in good operating condition is absolutely essential for proper performance. Becoming familiar with the design of any equipment is the first essential for obtaining optimum performance. The following points should be observed for this reason as well as for safety reasons.

b. An accurate record must be kept on all vacuum tubes. This record should contain date of receipt, date placed in service, use intended, hours operated, date of failure, and other pertinent information. Do not allow hot tubes to chill quickly by coming in contact with cold or moist surfaces as breakage may result. Important information on the care and operation of vacuum tubes will be found under Part VI, VACUUM TUBES, Paragraph 45.

c. Do not adjust zero reading of meters with power ON. It is desirable to have a grounding rod (insulated rod with a flexible insulated wire fastened at one end of the rod and to ground) to attach to circuits or parts before touching them with the hands.

CAUTION

When servicing the radio transmitter unit, always discharge the filter capacitors which may be holding dangerous charges even though power may not be on the set. There are discharge circuits across the power filter capacitors. This additional precaution of grounding capacitors is essential should the circuit accidentally be open. Always ground internal apparatus before touching it, even though the power switch has been opened. Remember to take full precautions when investigating trouble.

d. The appearance of the transmitter may be maintained by carefully dusting the exterior surfaces daily with a soft dry cloth. Occasionally, it may be desirable to clean the back and side shields with a cloth that has been moistened with alcohol or uncolored carbon tetrachloride. When painting within the vicinity of the transmitting equipment, cover the units with wrapping paper so that the exterior of sets can be kept free from globules of paint. Do not paint over or attempt to refinish exteriors of units. If proper care is given, the original finish can be maintained throughout the life of equipment. Molded or composition insulation, capacitor plates, and moving mechanical parts should be cleaned with a dry cloth. Take care to see that no scratching or damage is performed during the cleaning process. Where DRY compressed air is available, it should be used to blow the dust from the interior of the set. In the absence of a dry compressed air source, a hand bellows should be used.

e. When cleaning, never pull or strain the wiring as continued movement may cause breaks which are difficult to locate and repair. The felt strips between the wire clamps and the wire should be kept in place to prevent chafing of the wire. Some of these felt strips are secured by marine cement.

f. Relays should be inspected regularly for rust, noise, and condition of contacts. If the contacts have become rough, they should be smoothed with a jeweler's file or crocus cloth. If badly burned, they should be replaced with spares. Rust on the magnet armature or pole faces may cause noise and chattering, and should be removed carefully. A thin coating of Vaseline on the bright surface will prevent rust. *Do not oil or grease relay bearings as oil will collect dirt and introduce friction.* See that all relays and interlocks work freely and are kept in proper adjustment. To neglect them, may result in serious trouble which might be difficult to locate. For the care, operation and maintenance of all relays, see Figs. 10-68 and 69 and the Commercial Bulletins in back of the book.

g. Keying relay K-6 should be checked regularly to see that its contacts are clean, and the keying action is satisfactory. *Do not adjust contacts unless absolutely necessary.* The contacts of the keying relay are set at the factory to produce proper keying. Therefore, it is imperative that they be left as set, unless adjustment is absolutely necessary to eliminate arcing or to correct faulty keying. The contacts should be adjusted as shown on Fig. 10-68.

h. Special care should be observed in keeping all switches in good condition, keeping them clean and with good contact. The switch bearings should be given an occasional drop of oil such as Navy lubricant # 2075.

i. Slider guides and contacts on the rotating coils should be kept clean and free from binding. A very thin application of lubricant # 14-P-1-C may be used on these surfaces to keep them in good operating condition. The roller and coil wire on the rotating coils are silver-clad and should require only occasional dusting. The brass rod on which the roller travels should, under normal conditions, require the same attention that is taken for the roller and wire. Should the rod become corroded, it should be polished bright and clean with a very fine grade of crocus cloth. Make certain that no abrasive remains on the rod.

j. In order to obtain the extreme frequency stability of which the transmitter is capable, the master oscillator unit should be kept in good condition. Inspect the unit regularly to see that the heated compartment is holding temperature correctly and thermostat relay K-1, K-12 functions properly. If possible, it is advisable to keep the heated compartment up to temperature continuously. This prevents large variations in temperature of all parts of the frequency control circuit. All connections in the master oscillator unit

should be kept tight and free from corrosion or dirt. Usually any trouble in unstable frequency can be traced to loose or dirty connections in the master oscillator unit.

k. Capacitor C-6, located in the master oscillator heater compartment, is the H. F. master oscillator calibration reset capacitor. Adjustment is made from the front panel of the unit by unlocking the knurled locknut and inserting a long slender screwdriver in the hole provided. Refer to Figs. 10-3 or 10-4 for location. Adjustment changes the capacity of a small variable capacitor. In this manner, small changes in dial calibration, due to aging of parts or changing of master oscillator tubes, may be corrected.

l. Access to parts of the master oscillator assembly that may need servicing may be obtained without removing the master oscillator unit from the frame. Access to parts located in the temperature controlled compartment is accomplished by removing the right-hand side shield of the transmitter unit and the constant temperature compartment cover plate. Access to other parts of the master oscillator assembly may be accomplished by removing the rear shield of the transmitter and rear cover of the master oscillator assembly or by opening the tube access door.

m. Should it be necessary to remove the master oscillator assembly from the transmitter unit, proceed as follows:

(1) Remove the right and rear shields on the transmitter frame. Remove the midsection of the right rear frame angle by unbolting it from the gussets. This frame angle is 38¾ inches in length and is secured by machine screws at each end.

(2) Remove all connections to the unit at the terminal board at the rear. Disconnect the two leads to the "Westinghouse Watchman" thermostat which is attached to the transmitter unit frame near the lower rear right-hand corner. Disconnect the four connections on the left-hand side of the M.O. unit. Mark all leads for convenience.

(3) Loosen hose clamps and remove hose connection between unit and blower located below the unit.

(4) The M.O. unit is supported on four shockmounts near the lower corners of the unit. The top of the unit is prevented from swaying by a single guide pin through a shock-mount. To remove the unit from the transmitter frame proceed as follows:

(a) Unscrew the four screws holding the unit to the four mounting studs.

(b) Unscrew the guide pin from the master oscillator unit casting.

(c) Lift the M.O. unit off the four mounting studs and carefully slide it out of the transmitter frame.

o. The unit can be replaced in the transmitter frame by reversing the process as described.

p. The rubber used for shockmounting the vacuum tubes should be inspected regularly. It should be replaced if it becomes badly cracked or loses its resiliency. Rubber used for tube mountings may be replaced by removing the mounting screws from the holders. Mountings, made of rubber, and used to support and shockmount the master oscillator unit can be replaced without removing the complete unit from the frame. Only one rubber mount at a time should be replaced.

q. Mercury thermostats and mercury or spirit thermometers are delicate instruments which must be handled with extreme care to avoid breakage. In spite of such care, the column may separate while the glass is intact. In such situations, it is usually practicable to reunite the column by placing the instrument in a beaker of water at a temperature of about 40°C. Then, gradually add warmer water until the column reunites. In the case of a thermostat operating at 60°C., the final temperature of the water in the beaker will rarely have to exceed 65° or 70°C. After the column reunites, the instruments should be gradually cooled and tested for proper operation.

r. Where thermostats with leads are supplied for use or as replacements in equipment provided with mounting clips which do not require leads, it is preferable to cut the leads carefully rather than using a soldering iron. The reason for such care is that the leads are soldered to rings on the thermostat which is constructed of copper wire and solder. These leads in turn connect with the platinum wires extending through the glass to make contact with the mercury. The high heat of a soldering iron will usually break the glass at this joint.

s. Inspect brushes on the D.C. blower motor (D.C. sets only). See that they slide easily in the boxes and are not worn down. Replace worn brushes with spares. The spares should be of the same grade as those originally supplied.

t. Inspect the commutators every week and keep them in good condition. They should be wiped clean with a clean piece of canvas, free from lint. A slightly rough commutator may be smoothed by using a very fine sandpaper. *Never use emery cloth.* If the commutator develops flat spots or is rough, the armature should be removed from the frame and the commutator turned down on a lathe. The use of a diamond cutting tool is recommended.

u. See Paragraph 42 regarding lubrication.

40. MOTOR-GENERATOR.

a. The motor-generator unit should be inspected occasionally to see that the brushes are not sparking excessively and that the commutators are not burned or grooved. The commutators and collector rings must be kept clean, and the brushes properly adjusted and fitted to the commutator or collector rings. Carbon dust forms on the parts adjacent to the brushes. Occasionally, this should be removed by means of a hand-bellows, if available, or it can be wiped clean by a soft cloth. No other attention is required by the commutator when it is taking on a polish and shows no signs of wear. The commutator and slip rings eventually become darkened from brush friction.

This is not harmful but it is advisable to clean them occasionally with fine (# 00) sandpaper. Should the commutator or slip rings become grooved or roughened excessively, the armature should be removed from the frame and the commutator or slip rings accurately turned down on a lathe. After the commutator is turned down, the mica should be undercut. If the machine has been idle for a long period, it is well to examine the commutators before starting operation. If used on a ship board installation, salt water may have gotten onto the commutator. This eventually results in corrosion, pitting and green spots. It is obvious that such roughness should be removed before running the machine. When using paper or stone to touch up the commutator, lift the brushes and do not replace them until all grit is removed.

CAUTION

Never use emery cloth or emery paper on the commutator. Never attempt to make repairs to commutators and brushes while the machine is running as the generator voltage is dangerous to life. Turn the generator over by hand.

b. The brushes are set in position at the factory for best commutation. This adjustment should not be altered.

c. Brushes should be replaced when they have worn down to the extent that the brush spring is approaching the end of its travel, and spring tension is destroyed. When new brushes are installed, they should be fitted accurately to the curvature of the commutator or collector, first using coarse sandpaper, then # 00 sandpaper.

d. New brushes should be the same make and grade as those shipped with the machines. Brushes should have only sufficient clearance in the box to slide easily.

e. To replace the brushes, unloosen the brush pigtail screws. The pig-tails are equipped with spade type terminals and it is not necessary to remove the screw entirely. Remove the old brushes and insert the new and connect the pig-tails properly. If the new brushes fit tightly, remove them and slightly sandpaper them to fit. After inserting, they should be "ground in" to fit the radius of the commutator. This is accomplished by raising the brushes and wrapping a strip of fine sandpaper of the approximate width of the commutator around the commutator, rough side toward the brushes. Apply spring tension to the brushes and feed the armature around by hand until a radius has been formed on the brush surface. About 70% of the brush area should be so formed for good commutation. Blow out or wipe away the carbon dust before replacing the covers. The "grinding-in' process is not so important on A.C. slip rings.

f. To replace the speed governor brushes, refer to Drawings, CAY-T-147, Sheets 2, 3, 12 and 13, Dwgs. N-27551, N-27550, N-30142 and N-30141, respectively. Remove the enclosing cover. With a screwdriver, remove the brush cartridge screws from the cartridge. The brushes and springs come out as one piece. Insert the new brushes and replace the cartridge screws. It is not necessary to grind-in these brushes.

g. The bearings of the motor-generator unit should be inspected regularly to make sure that they are free and that the armature turns easily. The bearings used in this motor-generator unit are of the ball bearing type and should require very little attention. See section on Lubrication, Paragraph 42.

h. If for any reason the housing covers over the bearings are removed, be very careful to keep all dirt out of the bearings and housings. To replace the motor bearings, it is first necessary to remove the speed governor. Unfasten the enclosing cover by means of the four thumb screws. Remove the brushes by unscrewing the two cartridge screws. Loosen the Allen set screw which is located near the edge of the governor slip ring assembly and adjacent to the rotating insulated disc. A special wrench is supplied with each machine for this purpose. The entire governor assembly can now be twisted off the shaft.

i. The contacts of the speed regulator on the D.C. motor-generator units should be checked periodically for worn or pitted contacts. If the contacts are badly pitted, they may be cleaned with a very fine file or crocus cloth. The contacts should be replaced when badly worn.

j. The regulator is set at factory for proper speed. It should not be changed until wear necessitates adjustment. Speed should be checked with a good tachometer.

k. By proper adjustment of contact gap and spring tension, speed can be adjusted over a considerable range. The shorter the gap between the contacts, the more rapid the operation. Therefore, the points should be adjusted to the minimum gap which gives satisfactory speed regulation. Increasing the spring tension speeds up the machine and vice versa. Approximate correct settings are $\frac{1}{64}$ inch contact gap and one pound spring tension. The governor is correctly adjusted during test at the factory and all adjustments locked. No adjustment should be required on a new machine.

l. The method of securing the motors and generators to the bed-plates is by means of bolts screwed into tapped holes in the bedplate. All machines are doweled as any misalignment will cause excessive ripple voltage. Special dowel pins are used which permit the pins to be removed from the holes. *The units can be lifted from the bedplate by removing the bolts and dowel pins.* The shafts are designed to permit disengaging the coupling without moving the units apart.

41. MAGNETIC CONTROLLER.

a. The controller should require very little care except for inspection of the contactors. *Be sure there is no voltage on the controller.*

b. The controller contacts normally wear to give best contact surface without attention. Roughened appearance of the contacts is no indication that good contact is not being obtained. If the contacts become badly pitted or blackened, they may be cleaned and smoothed with a fine file and crocus cloth. Copper contacts should be renewed when their tips are burned away to the extent that current carrying surfaces are materially affected. Neglect to change contact tips may cause the arc to burn the contact screw, making it difficult to remove.

c. Push the contactor closed by hand to see that no friction is present and make sure of proper alignment. Friction may be removed by lining up the bearings. *Do not use oil as it is not required.* The contacts should make at the tips first and then roll to a seat. If the heels of the contacts do not line up, they may be made to line up by bending the stationary contact support.

d. The sealing surface of the magnet core and armature should be kept clean to insure proper contact.

42. LUBRICATION.

a. TRANSMITTER.

(1) Tuning dial bearings, rotating coil bearings, variable capacitor bearings and switch bearings should be lubricated at least once every six months with a few dops of a light penetrating oil such as Navy lubricant # 2075.

(2) Contact surfaces of the rotating coils and their sliding contacts should be lubricated with Navy lubricant # 14-P-1-C if they show signs of cutting or binding.

(3) Switch contacts and blades should be lubricated with a thin coating of Navy lubricant # 14-P-1-C. *Do not lubricate* the H.F. or I.F.M.O. RANGE SWITCH contacts S-1 or S-23, control B or N.

(4) No excess Navy lubricant # 14-P-1-C should remain on the contact surfaces.

(5) Blower motor B-1, B-2 or B-3 in the master oscillator compartment is fitted with ball bearings. These bearings should be greased once or twice a year, depending upon the service, with Grade A Soft N.S. Spec. 14L3 grease. The bearings should never be more than two-thirds full.

b. MOTOR-GENERATOR.

(1) The motor-generator is equipped with ball bearings and is shipped with sufficient grease in the bearings to provide for six months or more of service. Check to be sure grease cups are filled with grease. Do not screw down the grease cups unless the bearings actually require lubrication. Excessive grease is detrimental to ball bearings. A hot bearing is not an indication of insufficient lubrication, but rather may be caused by an excess of grease. Clicking bearings is an indication of insufficient lubrication or possibly a defective bearing. At intervals of about six months or more of service, for normal operation, the bearings should be greased. Use a high grade sodium base, clean ball bearing grease, similar to that supplied with the set, or Navy Grade A Soft. When lubricating, remove bearing drain plug. With set running, force in clean grease via the grease cups until clean grease appears at the outlets, then stop supplying grease. Allow set to operate for about fifteen minutes and replace drain plugs. At intervals of about two years, the bearing cups should be removed and the bearing washed out and repacked with clean grease.

NOTE

Keep grease and bearings clean. Dirt destroys ball bearings.

c. MAGNETIC CONTROLLER.

(1) The switch blades should be lubricated with a very thin coating of Navy lubricant # 14-P-1-C if they show signs of cutting or binding. No excess Navy lubricant # 14-P-1-C should remain on the contact surfaces.

(2) The sealing surfaces of the magnet core and armature may be given a very light coating of Navy lubricant # 14-P-1-C if they show any signs of rust.

NOTE

Do not oil any bearings in the controller. Oil quickly collects dust and unless parts are frequently cleaned, it will interfere with the operation of contactors or relays.

43. MAINTENANCE SCHEDULE.

a. A maintenance schedule, based on the following hints, and strictly adhered to, will do much to keep the transmitting equipment in good operating condition.

b. DAILY.

(1) Check all control circuits for proper operation.

(2) Check and record all meter and thermometer readings in log book.

(3) Check tuning of equipment on at least three frequencies.

(4) Dust exterior of equipment.

c. WEEKLY.

(1) Carefully clean equipment inside and out.

(2) Inspect and tighten all electrical connections.

(3) Clean and inspect all contactors and relay contacts.

(4) Clean all switch blade contacts. A thin layer of Navy lubricant # 14-P-1-C will aid in keeping these from cutting.

(5) Check speed of D.C. motor-generator unit, if used, and adjust speed regulator if necessary.

(6) Clean and inspect all commutators and brushes.

(7) Replace brushes when necessary.

d. MONTHLY.

(1) Check all tubes. This can be done by checking the daily meter readings in the log of the transmitter. Any gradual change in the tube will be indicated by a gradual change in plate current, all other factors being constant. The tubes in need of replacement can thereby be attended to without serious loss of power.

(2) Check bearings for lubrication. Be very careful not to get any dirt in the bearings.

e. SEMI-ANNUALLY.

(1) Clean and repack the bearings of the blower motor.

(2) Lubricate the bearings of the motor-generator unit.

44. TROUBLES AND CAUSES.

a. OPERATING START-STOP SWITCH DOES NOT OPERATE THE STARTING SOLENOID:

(1) REMOTE-LOCAL control switch S-25 in wrong position.

(2) No line voltage or line voltage too low.

(3) Power switch open.

(4) Interlock circuits open.

(5) Controller fuses open.

(6) EMERGENCY SWITCH S-24 in off position.

(7) Some access door open.

b. START-STOP SWITCH CAUSES STARTING CONTACTOR TO CLOSE, BUT MOTOR-GENERATOR SET DOES NOT START:

(1) Overload relay in controller not reset.

(2) Open connection between transmitter terminals 12 and 21, and controller unit.

(3) Fuses in controller open.

(4) Contactor coil in controller open circuited.

c. MOTOR-GENERATOR RUNS, BUT AT IRREGULAR SPEED:

(1) Speed regulator not operating correctly. Refer to Pars. 40.*b.*, 40.*i.* and 40.*j.*

d. MOTOR-GENERATOR RUNS SATISFACTORILY BUT LOW OR NO PLATE VOLTAGE AT TRANSMITTER:

(1) Generator high voltage fuses blown.

(2) Overload relays in transmitter not reset.

(3) Field rheostats R-41 or R-150 open.

(4) Open connection in wiring between transmitter and motor-generator unit.

(5) Field contactor not closing.

(6) Adjust TUNE-OPERATE switch S-22 in STEP 1 position.

e. CONTROL CIRCUIT INDICATOR LAMPS, EXCEPT BIAS VOLTAGE INDICATOR GLOW WHEN START-STOP SWITCH IS CLOSED; BUT MOTOR-GENERATOR UNIT DOES NOT START:

(1) Fuse in magnetic controller open.

NOTE

In the event that the center fuse of a 3 phase line blows, when the control circuit power is taken from the two outside fuses, the indicator lights all light except the BIAS VOLTAGE Indicator light when the control circuits are energized. When the center fuse blows, the control circuits are not affected. The above condition does not exist when only two of the three phases are fused.

f. NO FILAMENT VOLTAGE, D.C. EQUIPMENT:

(1) Generator A.C. fuse blown.

(2) A.C. slip ring brushes at generator not making contact.

(3) FILAMENT VOLTAGE rheostat R-12 open.

(4) Transformer T-1 connection open.

g. NO FILAMENT VOLTAGE, A.C. EQUIPMENT:

(1) Filter A.C. fuse blown.

(2) Transformer T-101 connection open.

(3) Open connection in line between filter unit and transmitter.

(4) FILAMENT VOLTAGE rheostat R-47 open.

(5) Transformer T-1 connection open.

(6) Filament contactor K-11 not making contact.

h. OPERATING TEST KEY CAUSES NO INDICATION ON MASTER OSCILLATOR METERS:

(1) Some one or more range switches not in proper position.

(2) No plate voltage on master oscillator tubes.

(3) Open grid leak.

(4) Open screen or plate series resistor.

(5) Screen or plate by-pass capacitors broken down.

(6) Keying relay inoperative.

(7) Dirty keying contacts.

(8) Open interlocks on range, or tap switches.

i. AMPLIFIER CIRCUITS DO NOT TUNE PROPERLY:

(1) Range switches in wrong position.

(2) Range switches not making proper contact.

j. ANTENNA CIRCUITS DO NOT TUNE—NO ANTENNA CURRENT:

(1) Antenna shorted or open.

(2) Antenna ammeter open.

(3) Antenna circuit switches not making contact.

(4) Antenna transfer switch in wrong position.

k. SET OPERATES NORMALLY WHEN KEY IS DOWN BUT AMPLIFIER TUBES DO NOT BLOCK WHEN KEY IS UP:

(1) Insufficient bias on tubes. Check brushes on bias generator.

(2) Open connection to bias supply. Check fuse on bias generator.

(3) Open bias potentiometer resistor.

(4) Defective amplifier tubes.

(5) Ground on keying circuit causing tubes to run all the time.

l. SET OPERATES NORMALLY BUT POWER AMPLIFIER GRID CURRENT IS HIGHER THAN NORMAL:

(1) Check for an open circuit, either in resistors R-28 and R-29, or between these two resistors. With key up and with an open circuit between R-28 and R-29, the power amplifier plate current meter will indicate approximately 100 milliamperes.

m. SET OPERATES NORMALLY WITH KEY DOWN; BUT STAGES DO NOT BLOCK COMPLETELY WHEN KEY IS IN THE H.F. POSITION:

(1) Check for lack of bias voltage.

(2) Note bias voltmeter and if not reading, check fuses and brushes on bias generator.

n. ALL STAGES APPEAR TO FUNCTION AND TUNE PROPERLY BUT NO GRID OR PLATE CURRENT CAN BE OBTAINED ON POWER AMPLIFIER:

(1) Open power amplifier grid circuit.

(2) Check for open circuit in R-21.

(3) Check for loose connection at bias potentiometer R-28, R-29, R-30.

(4) Check for open circuit in L-18, L-19, or L-20.

(5) If more than one stage fails to draw plate current, check for open grid circuit in the earliest stage which does not function.

o. AMPLIFIER TUBES HEAT EXCESSIVELY WHEN KEY IS CLOSED AND ANTENNA CIRCUIT IS IN TUNE:

(1) Antenna too tightly coupled.

(2) Excessive plate voltage.

(3) Defective amplifier tubes.

(4) Shorted screen grid resistors.

p. FREQUENCY SKIPS OR JUMPS:

(1) Defective master oscillator tube. Be sure anchored filament type tube is used in both master oscillators.

(2) Variable ground around master oscillator circuits caused by loose box covers, loose screws, etc.

(3) Mounting screws of master oscillator tube socket making variable contact with tube base.

(4) Tube bases grounded.

(5) Defective grid leak R-13.

(6) Loose grid or plate connection to tube.

(7) Master oscillator unit grounding to lead sheath of wiring. The master oscillator is grounded at one point by a flexible strap. Any additional intermittent grounds will produce frequency variations.

q. MOTOR-GENERATOR UNIT RUNS BUT AT TOO LOW A SPEED:

(1) Speed regulator not functioning properly. Correct per Paragraphs 40*h.*, 40*i.* and 40*j.*

r. MOTOR-GENERATOR UNIT RUNS BUT AT TOO HIGH A SPEED:

(1) Speed regulator not functioning properly. Correct per Paragraphs 40*h.*, 40*i.* and 40*j.*

(2) Motor field resistor may be open. Replace with proper resistor from Spare Parts Box.

s. Should information be desired on winding data for coils or transformers, it may be found by referring to the Electrical Parts Lists, Section IX. Applicable information is included, for the part desired, in the Description column. General information for motors and generator windings is included on the CAY-T-147 Plans for Record Drawings, in the rear of this Instruction Book.

t. A table of typical dial settings and meter readings may be found by referring to Paragraphs 35 and 36.

VI. VACUUM TUBE DATA

45. GENERAL.

a. All tubes supplied with the equipment or as spares on the equipment contract shall be used in the equipment prior to employment of tubes from general stock.

b. The Type _860 tube used in the master oscillator circuits of the transmitter should be of the anchored filament type, filament supported top and bottom in such a manner as to prevent contact variation and resultant variation in emitted signal. The use of an unanchored filament type tube may cause unstable operation of the transmitter. The anchored type of filament may usually be recognized by the color of the filament turn which wraps around the center support. When the tube is lighted at normal voltage, this turn on the anchored type will be cold, whereas on the unanchored type this turn will glow.

c. The Type _860 tube and the Type _803 tube must be operated with an average filament voltage equal to the rated value. Variation of this voltage should be within plus or minus 5%. Use of filament voltage less than that recommended will in time result in loss of emission due to too low a rate of diffusion of the active material to the filament surface. More than rated voltage will shorten the life of the tube by too rapid evaporation of the active material from the filament surfaces. During stand-by periods, the filament voltage should be maintained at rated value.

d. A total of six vacuum tubes, four Type _860 and two Type _803 are used in each of the transmitter units covered by this instruction book.

e. The Type _860 tube is a four element or screen grid tube designed for use as an oscillator or power amplifier in transmitting circuits. It has a typical output of 75 watts at 2000 volts plate potential. The filament requires 3.25 amperes at 10 volts which should not fluctuate more than 5% from rated value. Under normal operating conditions, the plate dissipation should never exceed 100 watts. The screen grid required very little power for proper functioning, therefore, its potential should be kept at as low a value as possible. The total dissipation on this grid should never exceed 10 watts.

f. The Type _803 tube is a five element or pentode type tube. Its filament requires 5 amperes at a potential of 10 volts which should not fluctuate more than 5% from rated value. Normal plate dissipation is 125 watts and its screen dissipation should never exceed 30 watts. Its maximum operating plate voltage is 2000 volts, and maximum operating screen grid volts, key down, is 600 volts. Maximum operating suppressor voltage is 500 volts positive for CW and MCW transmission and is 60 volts positive for suppressor grid modulation.

g. Both the Type _860 and the Type _803 vacuum tubes are made with thoriated filaments which provide a large filament emission at low temperatures. In order to obtain satisfactory tube life, these tubes should always be handled with extreme care. They should never be operated above their rating, and should always be stored in their original containers in an upright position.

h. In cases of severe overloading, resulting in the overheating of the tube, the electron emission may be reduced to a point where oscillations will not start or may be very slight. Unless the overload has liberated a large amount of gas, the activity of the filament can usually be restored by operating the tube at normal filament potential for ten minutes or longer with the plate potential off. This reactivating process can be accelerated by raising the filament potential to 12 volts but no higher.

i. The useful life of all thoriated filament tubes is usually ended long before the filament burns out. If a tube loses its emission and cannot be reactivated within a reasonable length of time by the method described above, it should be replaced by a new tube.

j. When placing a tube in operation for the first time, it is desirable to operate the filament from five to ten minutes before plate power is applied. This serves a two fold purpose. The hot filament tends to absorb any traces of gas that may be present in the tube and also permits the active material in the filament to diffuse to the surface of the filament.

k. Ordinary care in the handling and use of tubes will minimize accidental damage to the tubes. The tubes should be handled carefully and should not be allowed to snap into position when being turned in the socket. In all cases, regardless of the use to which the tubes are put, careful handling and conservative operation will be amply repaid by the longer and more uniform tube life which will be obtained.

CAUTION

Except where indicating instruments are already incorporated in the equipment, operating personnel should be extremely cautious when measuring potentials in excess of 500 volts due to hazards to life. Should measurement be necessary, remove power, discharge and ground all circuits and capacitors prior to touching them. Connect meter to the test point, making certain that one lead is grounded. Restore power to the equipment, and stand away from the meter should an unforeseen accident occur.

l. The following tabulation provides actual operating conditions of the tubes as taken on a production model of the Model TBL-Series transmitters.

46. PERTINENT OPERATING DATA.

NOTE

The following readings were taken with full load applied to the Transmitter.

a. H.F. Master Oscillator Tube Type _860

	Full Load Operating Data
A.C. Filament Voltage	10 Volts
D.C. Plate Voltage	700 Volts
D.C. Plate Current	60 Ma.
D.C. Grid Voltage	-100 Volts
D.C. Grid Current	10 Ma.
R.F. Grid Current	0.050 Amps.
Plate Dissipation	20 Watts
Plate Power Input	42 Watts
Screen Input	6 Watts
Screen Voltage	300 Volts

b. H.F. First Intermediate Amplifier Tube Type _860

A.C. Filament Voltage	10 Volts
D.C. Plate Voltage	2000 Volts
D.C. Plate Current	60 Ma.
D.C. Grid Voltage	-300 Volts
D.C. Grid Current	3 Ma.
R.F. Grid Current	0.100 Amps.
Plate Dissipation	40 Watts
Plate Power Input	120 Watts
Screen Input	8 Watts
Screen Voltage	500 Volts

c. H.F. Second Intermediate Amplifier Tube Type _860.

A.C. Filament Voltage	10 Volts
D.C. Plate Voltage	2000 Volts
D.C Plate Current	85 Ma.
D.C Grid Voltage	-350 Volts
D.C. Grid Current	20 Ma
R.F. Grid Current	0.500 Amps.
Plate Dissipation	80 Watts
Plate Power Input	170 Watts
Screen Input	8 Watts
Screen Voltage	400 Volts

d. H.F. Power Amplifier Tube Type _803.

	Full Load Operating Data Suppressor Modulated Class C	Class C Telegraph	Suppressor Modulated Class C Telegraph
A.C. Filament Voltage	10 Volts	10 Volts	10 Volts
D.C. Plate Voltage	2000 Volts	2000 Volts	2000 Volts
D.C. Plate Current	90 Ma.	175 Ma.	110 Ma.
D.C. Grid Voltage	−130 Volts	−130 Volts	−500 Volts
D.C. Grid Current	50 Ma.	45 Ma.	50 Ma.
Suppressor Input	.....	3 Watts	.....
Suppressor Voltage	.....	60 Volts	.....
Screen Input	20 Watts	20 Watts	30 Watts
Screen Voltage	350 Volts	350 Volts	600 Volts
Plate Input	180 Watts	350 Watts	180 Watts
Plate Dissipation	100 Watts	120 Watts	125 Watts

e. I.F. Master Oscillator Tube Type _860.

	Full Load Operating Data
A.C. Filament Voltage	10 Volts
D.C. Plate Voltage	1000 Volts
D.C. Plate Current	40 Ma.
D.C. Grid Voltage	−100 Volts
D.C. Grid Current	20 Ma.
R.F. Grid Current	.....
Plate Dissipation	15 Watts
Plate Power Input	40 Watts
Screen Input	3 Watts
Screen Voltage	250 Volts

f. I.F. Audio Oscillator Tube Type _860.

A.C. Filament Voltage	10 Volts
D.C. Plate Voltage	2000 Volts
D.C. Plate Current	75 Ma.
D.C. Grid Voltage	−200 Volts
D.C. Grid Current	30 Ma.
R.F. Grid Current	.....
Plate Dissipation	50 Watts
Screen Input	8 Watts
Screen Voltage	350 Watts
Plate Power Input	150 Watts

g. I.F. Intermediate Amplifier Tube Type _860.

	Full Load Operating Data
A.C. Filament Voltage	10 Volts
D.C. Plate Voltage	2000 Volts
D.C. Plate Current	50 Ma.
D.C. Grid Voltage	-200 Volts
D.C. Grid Current	3 Ma.
R.F. Grid Current	.....
Plate Dissipation	50 Watts
Plate Power Input	100 Watts
Screen Input	4 Watts
Screen Voltage	400 Volts

h. I.F. Power Amplifier Tube Type _803.

	Suppressor Modulated Class C	Class C CW Telegraph	Full Load Operating Data Class C Teleg. Sup. Mod.	Suppressor Mod. Class C
A.C. Fil. Voltage	10 Volts	10 Volts	10 Volts	10 Volts
D.C. Plate Voltage	2000 Volts	2000 Volts	2000 Volts	2000 Volts
D.C. Plate Cur.	90 Ma.	175 Ma.	130 Ma.	110 Ma.
D.C. Grid Voltage	-200 Volts	-200 Volts	-200 Volts	-500 Volts
D.C. Grid Cur.	35 Ma.	35 Ma.	35 Ma.	50 Ma.
Sup. Input	.....	.....	.....	.....
Sup. Voltage	.....	.....	.....	.....
Screen Input	20 Watts	20 Watts	20 Watts	30 Watts
Screen Voltage	400 Volts	400 Volts	400 Volts	600 Volts
Plate Input	180 Watts	350 Watts	260 Watts	180 Watts
Plate Dissip.	100 Watts	120 Watts	100 Watts	125 Watts

VII. CONVERSION KIT INSTRUCTIONS

FOR NAVY MODELS TBL-5, 6, AND 7 EQUIPMENTS

47. GENERAL.

a. Conversion kits have been supplied for a small percentage of the TBL-5, 6, and 7 transmitting equipments. The following text is only applicable to those equipments which were furnished with the conversion material. These kits are interchangeable and can be used on any of the three TBL transmitters covered in this section. Conversion kits have not been supplied for use with the TBL-12 and TBL-13 equipments. The conversion kits used to convert 230 V.D.C. equipments for operation on 115 V.D.C. are designated as 115 V.D.C. kits. Likewise, the kits used to convert the 115 V.D.C. equipments for operation on 230 V.D.C. are designated as 230 V.D.C. kits.

b. LIST OF EQUIPMENT.

(1) 115 Volt D.C. Conversion Kits.

1—Steel Box containing 115 volt D.C. armature for D.C. Motor Type CC-21229A or Type CC-21229B.

1—Box containing 1 Motor 115 volt D.C. Type CC-21229A or Type CC-21229B.

1—Steel box containing miscellaneous conversion parts and spare parts for transmitter unit, D.C. motor, and magnetic controller, listed in Section VIII.

(2) 230 Volt D.C. Conversion Kits.

1—Steel box containing 230 volt D.C. armature for D.C. Motor Type CC-21230A or CC-21230B.

1—Box containing 1 Motor 230 volt D.C. Type CC-21230A or Type CC-21230B.

1—Steel box containing miscellaneous conversion parts and spare parts, for transmitter unit, D.C. motor, and magnetic controller, listed in Section VIII.

c. The 115 and 230 volt D.C. conversion kits contain all parts necessary for conversion of a Model TBL-5, 6, or 7 D.C. Equipment from 230 volt D.C. operation to 115 volt D.C. operation, or from 115 volt D.C. operation to 230 volt D.C. operation, as the case may be. The conversion kits also contain spare parts for all parts which are not interchangeable between 230 volt and 115 volt Model TBL-5, 6, or 7 Equipment.

d. After the conversion has been completed according to the following text, the parts and spare parts which were replaced by conversion parts should be carefully packed in the boxes which contained the conversion parts. As this is done, the 115 or 230 volt parts and spare parts, should be checked off against the parts lists supplied with 115 or 230 volt conversion kits, listed in Section VIII. The 115 volt conversion kit then becomes a 230 volt conversion kit, or the 230 volt conversion kit becomes a 115 volt conversion kit. Stenciling on the conversion kit boxes should be changed to indicate this change.

48. TRANSMITTER UNIT CHANGES.

a. The transmitter unit used as a part of the Model TBL-5, 6 or 7 D.C. Equipment may be converted for operation from a 230 or 115 volt D.C. power supply by making the connections given below:

b. 115 VOLT D.C. OPERATION.

(1) The two frames of the transmitter unit must be separated in order to replace several of the conversion parts. Reference should be made to Paragraphs 47*a.* and 47*b.* The leads referred to in Paragraph 48*b.* are as follows and should be disconnected:

(2) Lead from M-13 left frame to S-18 right frame at M-13.

(3) Lead from S-15 left frame to L-22 right frame at S-15.

(4) Lead from C-80 left frame to C-79 right frame at C-80.

(5) Lead from S-11 left frame to L-15 right frame at insulator.

(6) Lead from L-13 left frame to ins. XX right frame at XX.

(7) Lead from S-4 left frame to ins. YY right frame at YY.

(8) All leads on terminal board at rear bottom of right hand frame.

(9) Tag all wires that are not marked.

(10) Remove four bolts holding the right and left-hand frames together at the rear, the four bolts holding the right and left-hand frame together at the front and the four bolts holding the frame to the channel.

(11) Place two blocks of the same height as the channel at the bottom, next to the left-hand frame. Separate the right and left-hand frames using the two blocks to hold the left-hand frame.

c. To change relays K-4, K-8 and K-10, first remove resistors R-42, R-17, R-36, R-29, R-28, R-31 and R-32 to permit access to the relays. Disconnect the wires to relays K-4, K-8 and K-10 and tag each wire as it is taken off. Remove relays K-4, K-8 and K-10 and proceed as follows:

(1) Remove starting contactor coil K-4D and replace with K-2D (TBL-5/6).

(2) Remove starting contactor Aux. coil K-4E and replace with K-2E (TBL-5/6).

(3) Remove contactor series resistor K-4R and replace with K-2R (TBL-5/6).

(4) Remove 230 V. D.C. nameplate on K-4 and replace with 115 V. D.C. nameplate.

(5) Remove starting contactor K-4 and replace with K-2.

(6) Remove 230 V. D.C. nameplate on K-4 and replace with 115 V. D.C. nameplate.

(7) Remove stamped symbol K-4 and replace with K-2.

*(8) Remove relay K-8 and replace with relay K-14.

*(9) Remove relay K-10 and replace with relay K-15.

(10) Remove wire from K-15 on terminal 7 of K-3 and connnect to terminal 2 on K-3 (TBL-5/6).

(11) Remove contactor series resistor K-3R2 and replace with K-3R1 (TBL-7).

(12) Remove 230 V. D.C. nameplate on K-3 and replace with 115 V. D.C. nameplate.

(13) Remove stamped symbols K-8 and K-10 and replace with symbols K-14 and K-15 respectively.

*(14) Note. Transmitters of the Model TBL-5 Equipment utilize the Type SC overload relays, while the transmitters of the Model TBL-6 and 7 Equipment use Type MN overload relays. For transmitters, using the Type SC relays, the spare parts list should be changed to include the spare parts for relays K-14 and K-15.

d. Replace relays, reconnect the leads, and replace resistors R-42, R-17, R-36, R-29, R-28, R-31 and R-32 in their proper positions. Replace indicator light I-1 with I-6, I-2 with I-8 and I-3 with I-10. Replace line voltmeter M-4 with M-14. Access to the above items may be had by removing the mounting screws on the control panel and pulling it forward until items are exposed. Stamp on proper symbols after removing symbols, I-1, I-2, and I-3.

e. Remove resistors R-3, R-35 and R-39, also remove tabs for each of the resistors.

f. Replace fuses F-1 and F-2 with fuses F-3 and F-4. Replace stamped symbols F-1 and F-2 with F-3 and F-4.

g. To replace blower motor B-1 with B-2, it is necessary to remove resistors R-6, R-7 and R-9 and their standoff insulators. Also, take the relay panel off after disconnecting and tagging the wires. Disconnect motor leads and loosen flexible hose couplings. Remove blower B-1 and replace with B-2. On the relay panel, replace resistor R-2 with R-20 and take R-36 off. Reassemble all parts after removing old stamped symbols and adding stamped symbols of new parts.

h. On the panel at the bottom of the right hand corner, remove resistors R-45 and R-18.

i. Remove the panel on the back of the heater and replace R-4 with R-46, and R-40 with R-48. Change stamped symbols to agree with new resistors. The flexible leads should be as short as possible.

j. Reassemble the right and left hand frames and connect all leads to their respective terminals.

k. After converting the transmitter unit for operation from 115 V. D.C., the proper nameplate for the transmitter unit should be mounted on the front panel.

l. 230 VOLT D.C. OPERATION.

(1) Remove the right and left-hand frames as indicated in Paragraph 48.*b.*

m. Remove resistors R-42, R-17, R-36, R-29, R-28, R-31 and R-32 in the left hand frame to permit access to the relay panel. Disconnect the wires on relays K-2, K-14 and K-15 tagging each wire as it is taken off. Remove the relays and proceed as follows:

(1) Remove starting contactor coil K-2D and replace with K-4D. (TBL-5/6).

(2) Remove starting contactor aux. coil K-2E and replace with K-4E. (TBL-5/6).

(3) Remove contactor series resistor K-2R and replace with K-4R. (TBL-5/6).

(4) Remove 115 V. D.C. nameplate on K-2 and replace with 230 V. D.C. nameplate.

(5) Remove starting contactor K-4 and replace with K-2.

(6) Remove stamped symbol K-2 and replace with symbol K-4.

*(7) Remove Relay K-14 and replace with K-8.

*(8) Remove Relay K-15 and replace with K-10.

(9) Remove wire from K-10 terminal 2 of K-3 and connect to terminal 7 of K-3.

(10) Remove contactor series resistor K-3R1 and replace with K-3R2.

(11) Remove 115 V. D.C. nameplate on K-3 and replace with 230 V. D.C. nameplate.

(12) Remove stamped symbols K-14 and K-15 and replace with symbols K-8 and K-10 respectively.

(13) Replace relays, reconnect the leads and replace the resistors R-42, R-17, R-36, R-29, R-28, R-31 and R-32 in their proper places.

*(14) Note. Transmitters of the Model TBL-5 Equipment have the Type SC overload relays; while the transmitters of the Model TBL-6 Equipment have Type MN overload relays. For transmitters using the Type SC relays, the spare parts list should be changed to include the spare parts for relays K-14 and K-15.

(15) For transmitters of the Model TBL-5 Equipment run in 3 lead covered wires, the first from R-3 top to C stud; the secoad from R-39 top to B stud; the third from R-39 bottom to K-4. Connect bottom R-3 to bottom R-35 and top R-35 to top R-39 with buss wire.

n. Remove the mounting screws on the control panel and pull the panel forward until the parts are exposed. Remove I-6 and replace with I-1, remove I-8 and replace with I-2, remove I-10 and replace with I-3. Also, remove M-14 and replace with M-4. Replace panel after stamping new symbol numbers.

o. Place resistors R-3, R-35, and R-39 in their respective clips as shown by the wiring diagram, after the resistor tabs have been changed.

p. Replace fuses F-3 and F-4 with fuses F-1 and F-2. Replace stamped symbols with new symbols.

q. To replace blower motor B-2 with B-1, it is necessary to remove resistors R-6, R-7 and R-9 and their standoff insulators. Also, take the relay panel off after disconnecting and tagging the leads. Disconnect the motor leads and loosen flexible hose couplings. Remove B-2 and replace with B-1. On the relay panel, replace R-20 with R-2 and add R-36 in its proper position. Reassemble all parts after removing obsolete symbols and adding symbol of new parts.

r. On the panel, at the bottom of the right-hand corner, place resistors R-45 and R-18 in their proper places.

s. Remove the panel in the back of the heater box and replace R-46 with R-4, and R-48 with R-40. Change stamped symbols to agree with new resistors.

t. Reassemble the right and left-hand frames and connect all leads to their proper positions.

u. After converting the transmitter unit for operation from 230 volt D.C. the proper transmitter unit nameplate should be mounted on the front panel.

v. Parts that are removed from the transmitter unit should be placed in the box in which the conversion parts were packed. The spare parts of the conversion kit should be added to the transmitter spare parts after removing from the transmitter spare parts those items now belonging in the conversion kit. After packing the parts and spare parts that were removed from the transmitter unit, the box should be restenciled. That is, if the conversion kit was a 115 volt D.C. conversion kit, it now should be marked as a 230 volt D.C. conversion kit.

49. MOTOR-GENERATOR CHANGES.

a. In order to convert a 230 volt D.C. Motor-Generator Unit, Type CC-21427 or CC-21427A to a 115 volt D.C. Motor-Generator Unit, Type CC-21426 or CC-21426A, the 230 volt D.C. Motor Type CC-21230A or CC-21230B must be replaced by a 115 volt D.C. Motor Type CC-21229A or CC-21229B supplied as part of the conversion kits.

b. After the Motor-Generator Unit, Type CC-21427 or CC-21427A has been converted to a Type CC-21426 or CC-21426A, the Motor-Generator unit nameplate must be replaced by the motor-generator unit nameplate supplied as a part of the 115 Volt D.C. Conversion Kits.

c. In order to convert a 115 volt D.C. Motor-Generator Unit, Type CC-21426 or CC-21426A to a 230 volt D.C. Motor-Generator Unit, Type CC-21427 or CC-21427A the 115 volt D.C. Motor, Type CC-21229A or CC-21229B must be replaced by the 230 volt D.C. Motor, Type CC-21230A or CC-21230B supplied as a part of the 230 volt D.C. Conversion Kits.

d. After the Motor-Generator Unit, Type CC-21426 or CC-21426A has been converted to a Type CC-21427 or CC-21427A, the motor-generator unit nameplate must be replaced by the motor-generator unit nameplate supplied as part of the 230 Volt D.C. Conversion Kits.

NOTE

Motor-Generator, Type CC-21426, Type CC-21427; Motor, Type CC-21229A and CC-21230A are part of the TBL-5 equipment. Motor-Generator, Type CC-21426A, Type CC-21427A; Motor, Type CC-21229B and CC-21230B are used with the TBL-6 or TBL-7 Equipments.

e. After completing the conversion of the motor-generator unit, the motor spare parts consisting of one armature, two main field coils, two interpole field poles, and one speed regulator resistor must be removed from the power equipment spare parts and packed as a part of the conversion kit. The equivalent parts for 115 or 230 V. D.C. operation should be removed from the kit and used as power equipment spare parts.

50. MAGNETIC CONTROLLER CHANGES.

a. In order to replace the 230 V. D.C. magnetic controller, disconnect all leads and remove the controller unit. Reconnect for operation, using a Type CAY-21713 for 115 V. D.C. operation.

b. Repeat the same procedure when changing from 115 V. D.C. to 230 V. D.C. operation. However, in this case, connect the Type CAY-21714 Controller for 230 V. D.C. power supply.

c. After changing the magnetic controller, the spare parts for the new controller should be placed in the power equipment spare parts box. The spares for the controller which was removed, placed in the conversion kit box.

SECTION VIII
LIST OF PARTS, EQUIPMENT CONVERSION KITS

CONVERSION KIT FOR MODIFYING MODELS TBL-5, TBL-6 AND TBL-7 RADIO TRANSMITTING EQUIPMENT FROM 230 VOLT D.C. EQUIPMENT TO 115 VOLT D.C. EQUIPMENT OR FROM 115 VOLT D.C. EQUIPMENT TO 230 VOLT D.C. EQUIPMENT

PARTS TO BE INSTALLED FOR 115 V.D.C. OPERATION					PARTS TO BE INSTALLED FOR 230 V.D.C. OPERATION					QUANTITY		
Symbol Desig.	Navy Type Number	Description	Mfr.	Mfr. Desig.	Symbol Desig.	Navy Type Number	Description	Mfr.	Mfr. Desig.	For Installation	For Spare Parts Box	Total
B-2	-21131B	Blower Motor, 115 V.D.C	1	S#952446	B-1	-21132B	Blower Motor, 230 V.D.C.	1	S#952734	1	1	2
F-3, F-4		Fuse, 15 Amps., 250 Volts	2 3	#7058 #1012	F-1, F-2		Fuse, 6 Amps., 250 Volts	2 3	#7054 #1006	2	2	4
F-3A, F-4A		Fuse Link, 15 Amps., 250 Volts	2 3	#7158 #1112	F-1A, F-2A		Fuse Link, 6 Amps., 250 Volts	2 3	#7154 #1106		10	10
I-6A, I-8A, I-10A		Receptacle, Indicator Lights	1	S#867326B	I-1A, I-2A, I-3A		Receptacle, Indicator Lights	1	S#867324B	3	3	6
K-2		Relay, Starting Contactor, 3 Pole, Single Throw, Normally Open, Coil to Operate on 115 V.D.C. −23% + 45%. Contacts to make and break, 5 Amps., 115 V.D.C.	4	CXA-2995	K-4		Relay, Starting Contactor, 3 Pole, Single Throw, Normally Open, Coil to Operate on 230 V.D.C. −23% + 45%. Contacts to make and break, 5 Amps., 230 V.D.C.	4	CXA-2996	1		1
K-2D		Main Coil, Starting Contactor, 60 V.D.C. for Relay CXA-2995	4	Coil "X"	K-4D		Main Coil, Starting Contactor, 115 V.D.C. for Relay CXA-2996	4	Coil "XB"		1	1
K-2E		Aux. Coil, Starting Contactor, for Relay CXA-2995	4	#3226-37	K-4E		Aux. Coil, Starting Contactor, for Relay CXA-2996	4	#3226-38		1	1
					K-4R		Resistor, Contactor Series, 2500 Ohms, Vitreous Enamel Coating, Salt Water Immersion Type, for Relay CXA-2996	4			1	1
K-3		Nameplate Only, as Furnished with 115 V.D.C. Relay CX-1970	4		K-3		Nameplate Only, as Furnished with 230 V.D.C. Relay CX-1970	4		1		1
K-3R1		Resistor, Contactor Series, 300 Ohms, Vitreous Enamel Coating, Salt Water Immersion Type, for Relay CX-1970	4		K-3R2		Resistor, Contactor Series, 3000 Ohms, Vitreous Enamel Coating, Salt Water Immersion Type, for Relay CX-1970	4		1	1	2
K-14	-29137	Relay, M.O. Overload, Single Pole, Single Throw, One Break per Circuit, Normally Closed, Contact Rating 0.5 Amp., 230 V.D.C., Operating Coil 0.1—0.4 Amp., 50 Ohms. Reset Coil 115 V.D.C.	1	S#1161103	K-8	-29138	Relay, M.O. Overload, Single Pole, Single Throw, One Break per Circuit, Normally Closed, Contact Rating 0.5 Amp., 230 V.D.C., Operating Coil 0.1—0.4 Amp., 50 Ohms. Reset Coil 230 V.D.C.	1	S#1161104	1		1

CONVERSION KIT FOR MODIFYING MODELS TBL-5, TBL-6 AND TBL-7 RADIO TRANSMITTING EQUIPMENT FROM 230 VOLT D.C. EQUIPMENT TO 115 VOLT D.C. EQUIPMENT OR FROM 115 VOLT D.C. EQUIPMENT TO 230 VOLT D.C. EQUIPMENT

PARTS TO BE INSTALLED FOR 115 V.D.C. OPERATION					PARTS TO BE INSTALLED FOR 230 V.D.C. OPERATION					QUANTITY		
Symbol Desig.	Navy Type Number	Description	Mfr.	Mfr. Desig.	Symbol Desig.	Navy Type Number	Description	Mfr.	Mfr. Desig.	For Installation	For Spare Parts Box	Total
K-14A, K-15A		Contact—Stationary	1	S#1202083	K-8A, K-10A		Contact—Stationary	1	S#1202083		4	4
K-14B, K-15B		Contact—Moving	1	S#1202082	K-8B, K-10B		Contact—Moving	1	S#1202082		4	4
K-14C, K-15C		Reset Coil	1	S#1158887	K-8C, K-10C		Reset Coil	1	S#1158888		1	1
K-14D		Operating Coil	1	S#1158883	K-8D		Operating Coil	1	S#1158883		1	1
K-15	-29140	Relay, H.V., Overload, Single Pole, Single Throw, One Break per Circuit, Normally Open, Contact Rating 0.5 Amp., 230 V.D.C. Operating Coil 0.5—2 Amps., 2.5 Ohms. Reset Coil 115 V.D.C.	1	S#1161106	K-10	-29141	Relay, H.V., Overload, Single Pole, Single Throw, One Break per Circuit, Normally Closed, 0.5 Amp., 230 V. D.C., Operating Coil 0.5—2 Amps., 2.5 Ohms. Reset Coil 230 V.D.C.	1	S#1161107	1		1
K-15D		Operating Coil	1	S#1158885	K-10D		Operating Coil	1	S#115885		1	1
M-14	-22256	Line Voltmeter, 0 to 200 V.D.C. 1000 Ohms per Volt.	1	Type NX-35	M-4	-22225	Line Voltmeter, 0 to 500 V. D.C., 1000 Ohms per Volt	1		1	1	2
R-20	-63553F	Thermostat Relay Potentiometer, 2000 Ohms, Tapped at 300 Ohms	5		R-2	-63506F	Thermostat Relay Potentiometer, 8000 Ohms, Tapped at 500 Ohms	5		1	1	2
					R-3	-63065F	Keying Relay Potentiometer, 300 Ohms.	5		1	1	2
R-46	-63561	Resistor, M.O. Heater, 38.5 Ohms, 2.5 Amps. (Ohmspun)	6		R-4	-63563	Heater Resistor, 155 Ohms, 1 Amp., (Ohmspun)	6		1	1	2
					R-18	-63289	Spark Suppressor Resistor, 1 Ohm, 3 Watts, Composition	13		1	1	2
					R-35	-63065F	Keying Relay Potentiometer, 300 Ohms	5		1	1	2
					R-36	-63289	Spark Suppressor Resistor, 1 Ohm, 3 Watts, Composition	13		1	1	2
					R-39	-63077F	Keying Relay Potentiometer, 1200 Ohms	5		1	1	2

CONVERSION KIT FOR MODIFYING MODELS TBL-5, TBL-6 AND TBL-7 RADIO TRANSMITTING EQUIPMENT FROM 230 VOLT D.C. EQUIPMENT TO 115 VOLT D.C. EQUIPMENT OR FROM 115 VOLT D.C. EQUIPMENT TO 230 VOLT D.C EQUIPMENT

PARTS TO BE INSTALLED FOR 115 V.D.C. OPERATION					PARTS TO BE INSTALLED FOR 230 V.D.C. OPERATION					QUANTITY		
Symbol Desig.	Navy Type Number	Description	Mfr.	Mfr. Desig.	Symbol Desig.	Navy Type Number	Description	Mfr.	Mfr. Desig.	For Installation	For Spare Parts Box	Total
R-48	-63562	Resistor, M.O. Heater, 66.5 Ohms, 2 Amps., (Ohmspun)	6		R-40	-63564	Heater Resistor, 250 Ohms, 0.5 Amp., (Ohmspun)	6		1	1	2
					R-45	-63289	Spark Suppressor Resistor, 1 Ohm, 3 Watts, Composition	13		1	1	2
		Cable, 600 Volt, Lead Covered P.D.S. #7275-1	1				Cable, 600 Volt, Lead Covered P.D.S. #7275-1			10 Ft.		10 Ft.
	-21229B	Motor, 115 V.D.C., 3.5 H.P., 1780 R.P.M.	7	7502380 G5		-21230B	Motor, 230 V.D.C., 3.5 H.P., 1780 R.P.M.	7	7502380 G6	1		1
		Motor Set of Spare Parts consisting of:					Motor Set of Spare Parts consisting of:					
C-401		Capacitor, 0.5 Mfd., 600 V.D.C. Working, Paper	10	N-30142 P97	C-421		Capacitor, 0.5 Mfd., 600 V.D.C. Working, Paper	10	N-30141 P97		1	1
E-401		Comm. Brush 3/8" x 1" x 1 1/2	8	N-30142 P2	E-421		Comm. Brush 3/8" x 1" x 1 1/2	8	N-30141 P2		40	40
E-402		Brush Speed Reg. 5/32 x 1/4 x 1/2	9	N-30142 P3	E-422		Brush Speed Reg. 5/32 x 1/4 x 1/2	9	N-30141 P3		20	20
E-403		Comm. Brush Holder	7	N-30142 P4	E-423		Comm. Brush Holder	7	N-30141 P4		2	2
E-404		Speed Reg. Brush Holder	7	N-30142 P5	E-424		Speed Reg. Brush Holder	7	N-30141 P5		2	2
E-405		Comm. Brush Holder Spring	7	N-30142 P7	E-425		Comm. Brush Holder Spring	7	N-30141 P7		3	3
E-406		Speed Reg. Brush Spring (20 supplied with E-402)	7	N-30142 P8	E-426		Speed Reg. Brush Spring (20 supplied with E-422)	7	N-30141 P8		X	X
E-407		Com. Brush Holder Rigging Insulation	7	N-30142 P9	E-427		Comm. Brush Holder Rigging Insulation	7	N-30141 P9		20	20
E-408		Main Pole Coil	7	N-30142 P10	E-428		Main Pole Coil	7	N-30141 P10		2	2
E-409		Interpole Coil	7	N-30142 P11	E-429		Interpole Coil	7	N-30141 P11		2	2
E-410		Armature, Motor—115 V.D.C.	7	N-30142	E-430		Armature, Motor—230 V.D.C.	7	N-30141		1	1
O-401		Ball Bearing, #205SF	11	N-30142 P1	O-421		Ball Bearing, #205SF	11	N-30141 P1		2	2
R-401		Resistor, 300 Ohms, 25 Watts, Speed Reg.	12	N-30142 P12	R-421		Resistor, 1000 Ohms, 25 Watts, Speed Reg.	12	N-30141 P12		1	1
R-402		Resistor, 1000 Ohms, 10 Watts	12	N-30142 P86	R-422		Resistor, 1000 Ohms, 10 Watts	12	N-30141 P86		1	1
S-401A		Contact, Speed Reg., Long	7	N-30142 P13	S-421A		Contact, Speed Reg., Long	7	N-30141 P13		4	4

CONVERSION KIT FOR MODIFYING MODELS TBL-5, TBL-6 AND TBL-7 RADIO TRANSMITTING EQUIPMENT FROM 230 VOLT D.C. EQUIPMENT TO 115 VOLT D.C. EQUIPMENT OR FROM 115 VOLT D.C. EQUIPMENT TO 230 VOLT D.C. EQUIPMENT

PARTS TO BE INSTALLED FOR 115 V.D.C. OPERATION					PARTS TO BE INSTALLED FOR 230 V.D.C. OPERATION					QUANTITY		
Symbol Desig.	Navy Type Number	Description	Mfr.	Mfr. Desig.	Symbol Desig.	Navy Type Number	Description	Mfr.	Mfr. Desig.	For Installation	For Spare Parts Box	Total
S-401B		Contact, Speed Reg., Short	7	N-30142 P14	S-421B		Contact, Speed Reg., Short	7	N-30141 P14		4	4
	-21713	Magnetic Controller	1	7502389 G1		-21714	Magnetic Controller	1	7502389 G2	1		1
		Magnetic Controller Spare Parts consisting of:					Magnetic Controller Spare Parts consisting of:					
F-303, F-304		Control Fuse	1 3	S # 292812 S # 1252684	F-313, F-314		Control Fuse	1 3	S # 292812 S # 1252684		2	2
F-303A, F-304A		Fuse Link	1 3	S # 292829 S # 1252685	F-313A, F-314A		Fuse Link	1 3	S # 292829 S # 1252685		10	10
K-301A K-301B		Main Contact	1	S # 184665	K-311A, K-311B		Main Contact	1	S # 184665		4	4
K-301C, K-301D		Contact—Stationary	1	S # 809443	K-311C, K-311D		Contact—Stationary	1	S # 809443		4	4
K-301C, K-301D		Contact—Moving	1	S # 424699 or S # 841366	K-311C, K-311D		Contact—Moving	1	S # 424699 or S # 841366		1	1
K-301E		Contact Spring	1	S # 461816	K-311E		Contact Spring	1	S # 461816		2	2
K-301F		Kick-out Spring	1	S # 714386	K-311F		Kick-out Spring	1	S # 714386		1	1
K-301G		Magnet Coil—115 V.D.C.	1	S # 285640	K-311G		Magnet Coil—230 V.D.C.	1	S # 285641		1	1
K-301H		Contact Spring, Upper	1	S # 422530	K-311H		Contact Spring, Upper	1	S # 422530		2	2
K-301J		Contact Spring, Lower	1	S # 420605	K-311J		Contact Spring, Lower	1	S # 420605		2	2
K-302A		Contact—Stationary	1	S # 793015	K-312A		Contact—Stationary	1	S # 793015		1	1
K-302A		Contact—Moving	1	S # 816937	K-312A		Contact—Moving	1	S # 816937		1	1
K-302B		Contact—Aux. Stationary	1	S # 755077	K-312B		Contact—Aux. Stationary	1	S # 755077		2	2
K-302C		Contact Spring	1	S # 793018	K-312C		Contact Spring	1	S # 793018		1	1
K-302D		Kick-out Spring	1	S # 816888	K-312D		Kick-out Spring	1	S # 816888		1	1
K-302E		Contact—Aux. Moving	1	S # 793013	K-312E		Contact—Aux. Moving	1	S # 793013		2	2
K-302F		Magnet Coil—115 V.D.C.	1	S # 895672	K-312F		Magnet Coil—230 V.D.C.	1	S # 895671		1	1
K-303A		Contact—Stationary	1	S # 467961	K-313A		Contact—Stationary	1	S # 467961		1	1

CONVERSION KIT FOR MODIFYING MODELS TBL-5, TBL-6 AND TBL-7 RADIO TRANSMITTING EQUIPMENT FROM 230 VOLT D.C. EQUIPMENT TO 115 VOLT D.C. EQUIPMENT OR FROM 115 VOLT D.C. EQUIPMENT TO 230 VOLT D.C. EQUIPMENT

PARTS TO BE INSTALLED FOR 115 V.D.C. OPERATION					PARTS TO BE INSTALLED FOR 230 V.D.C. OPERATION					QUANTITY		
Symbol Desig.	Navy Type Number	Description	Mfr.	Mfr. Desig.	Symbol Desig.	Navy Type Number	Description	Mfr.	Mfr. Desig.	For Installation	For Spare Parts Box	Total
K-303A		Contact—Moving	1	S#782689	K-313A		Contact—Moving	1	S#782689		1	1
K-303B		Contact Spring	1	S#808654	K-313B		Contact Spring	1	S#808654		1	1
K-303C		Main Spring	1	S#194510	K-313C		Main Spring	1	S#194510		1	1
K-303D		Coil—115 V.	1	S#244715	K-313D		Coil—230 V.	1	S#258717		1	1
K-303E		Reset Spring	1	S#266599	K-313E		Reset Spring	1	S#266599		2	2
R-301, R-304, R-305	-63163E	Resistor, 0.4 Ohm, Style A, 200 Watts	5		R-311, R-314, R-315	-63170E	Resistor, 1.5 Ohms, Style A, 200 Watts	5			1	1
R-302	-63197E	Resistor, 500 Ohms, Style A, 200 Watts	5		R-312	-63205E	Resistor, 2000 Ohms, Style A, 200 Watts	5			1	1
R-303	-63212E	Resistor, 5000 Ohms, Style A, 200 Watts	5		R-313	-63219E	Resistor, 20,000 Ohms, Style A, 200 Watts	5			1	1
		Terminal Lug	1	S#867476			Terminal Lug	1	S#867476	8		8
		Tab for R-20	1	7708558 P31			Tab for R-2	1	7708558 P30	1		1
							Tab for R-3	1	7708558 P50	1		1
		Modification Instructions, See Instruction Book	1				Modification Instructions, See Instruction Book	1		X		X
		Transmitter—Nameplate Only	1	NP-36111			Transmitter—Nameplate Only	1	NP-36112	1		1
		Model Nameplate Only	1	NP-36114			Model Nameplate Only	1	NP-36116	1		1
		Nameplate Only for M.G. Set Complete CC-21426A	7				Nameplate Only for M.G. Set Complete CC-21427A	7		1		1
							Tab for R-35	1	7708558 P49	1		1
							Tab for R-39	1	7708558 P47	1		1

INDEX TO MANUFACTURERS

Code Number	Mfr. Prefix	NAME	ADDRESS
1	CAY	Westinghouse Elec. & Mfg. Co.	2519 Wilkens Avenue, Baltimore, Maryland
2	CYD	Bryant Electric Co.	Bridgeport, Conn.
3	CFA	Bussman Mfg. Co.	St. Louis, Mo.
4	CSD	Struthers–Dunn	139 N. Juniper Street, Philadelphia, Pa.
5	CAO	Ward Leonard Electric Co.	Mt. Vernon, N. Y.
6	CSO	States Mfg. Co.	Hartford, Conn.
7	CC	Continental Electric Co., Inc.	Newark, N. J.
8	CNC	National Carbon Co., Inc.	Cleveland, Ohio
9	CPQ	Speer Carbon Co.	St. Mary's, Pa.
10	CD	Cornell-Dubilier Electric Co.	South Plainfield, N. J.
11		Marlin Rockwell Corp.	Jamestown. N. Y.
12	CHD	Hardwick Hindle, Inc.	Chicago, Ill.
13	CCC	Continental Carbon Co.	13900 Loraine Avenue, Cleveland, Ohio

SECTION IX

SERIES PARTS LISTS

FOR SPARE PARTS LISTS REFER TO NAVSHIPS 900,383-(1)

This electrical parts list has been compiled in accordance with Navy specification RE13A730B with modification as directed by the resident inspector of Naval Material and approved in accordance with Bureau of Ships letters to all inspectors, Serial 1095 (930CB) EN28/A2-11, dated 11 May 1944.

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	B-1	Blower Motor	230.V.D.C., 1/75 H.P.	—21132B		1	S#952734	1	7607470-P1	B-1
0	2	0	0	2	0	0	0	0	2	0	0	2	0	0	0	2	0	0	2	0	0	2	B-1A	Bearing for B-1				1	2-D-695-P9	2	7607470-P2	B-1A, B-2A
0	2	0	0	2	0	0	0	0	2	0	0	2	0	0	0	2	0	0	2	0	0	2	B-1B	Brushes for B-1				1	8-D-2461-P2	3	7607470-P3	B-1B, B-2-B
0	2	0	0	2	0	0	0	0	2	0	0	2	0	0	0	2	0	0	2	0	0	2		Holders for B-1B				1	8-D-2457-G1	4	8-D-2483-P2	
0	2	0	0	2	0	0	0	0	2	0	0	2	0	0	0	2	0	0	2	0	0	2		Springs for B-1B					426293	5	S#952734	
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0	B-2	Blower Motor	115 V.D.C., 1/75 H.P.	—21131B	17-M-9C	1	S#952446	6	7607470-P5	B-2
2	0	0	2	0	0	0	0	2	0	0	2	0	0	0	2	0	0	2	0	0	2	0	B-2A	Bearings for B-2	Same as B-1A					7		
2	0	0	2	0	0	0	0	2	0	0	2	0	0	0	2	0	0	2	0	0	2	0	B-2B	Brushes for B-2	Same as B-1B					8		
2	0	0	2	0	0	0	0	2	0	0	2	0	0	0	2	0	0	2	0	0	2	0		Holder for B-2B	Same as Item 4					9		
2	0	0	2	0	0	0	0	2	0	0	2	0	0	0	2	0	0	2	0	0	2	0		Spring for B-2B	Same as Item 5					10		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	B-3	Blower Motor	110 V., 60 Cycle A.C., 1/75 H.P.	—21130B	17-M-10	1	S#954111	11	7607470-P9	B-3
0	0	2	0	0	2	2	2	0	0	2	0	0	2	2	0	0	2	0	0	2	0	0	B-3A	Bearings for B-3					71-D-919 IT-3	12		B-3A
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Insulator for B-1, B-2, B-3	Isolantite 1 Long x 3/4 Dia.			29	7602239-P34	13	7810312-P26	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	B-250	Motor for M.G. Set	115 V., .27 Amp., 3.5 H.P., 1780 R.P.M.	—21229B				14		B-250
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	B-250	Motor for M.G. Set	230 V., 13.8 Amp., 3.5 H.P., 1780 R.P.M.	—21230B				15		B-250
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	B-270	Motor for M.G. Set	440/3/60 3.5 H.P., 5.2 Amp., 1780 R.P.M.	—21231B				16		B-270
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	B-401	Motor for M.G. Set	115V., .27 Amp., 3.5 H.P., 1780 R.P.M.	—21229B		42		17	N-30142	B-401

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	B-421	Motor for M.G. Set	230 V.D.C., 13.8 Amp., 3.5 H.P., 1780 R.P.M.	—21230B		42		18	N-30141	B-421
0	0	1	0	0	1	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	B-441	Motor for M.G. Set	440/3/60 5.2 Amp., 3.5 H.P. 1780 R.P.M.	—21231B		42		19	N-30143	B-441
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B-701	Blower Motor	220/440/3/50/60, 1/7–1/4 H.P., 950/1140 R.P.M.	—211050		1	S#1171099 Type FS	20	7610037-P1	B-701
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-1	H.F. M.O. Tank Capacitor	0.00075 Mfd., 5000 V. Eff. Test #(5, 3.5, 2, 1) Mica	—48477-D2	RE48AA131C	15 2	1550-H-215 PL-654-6H	21	7607470-P16	C-1, C-3, C-79, C-86
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-2	H.F. M.O. Tank Capacitor	0.000375 Mfd., 5000 V. Eff. Test #(–, 2.5,–,–,) Mica	—48481-D2	RE48AA131C	15 2	1550-H-250 PL-656-6H	22	7607470-P17	C-2
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-3	H.F. M.O. Tank Capacitor	Same as C-1	—48477-D2				23		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-4	H.F. M.O. Tank Capacitor	0.003 Mfd., 3000 V. Eff. Test #(10, 8, 5, 2), Mica	—48365-D2	RE48AA131C	15 2	1550-H-225 PL-655-6H	24	7607470-P19	C-4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-5	H.F. M.O. Tank Capacitor	0.015 Mfd., 1500 V. Eff. Test #(12, 10, 7, 4), Mica	—48204-D2	RE48AA131C	15 2	1550-H-311 PL-140-6H	25	7607470-P20	C-5
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-6	H.F. M.O. Calibration Capacitor	Single Round Disc Type Variable Air			1	7405440-G2	26	7607470-P21	C-6
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Extension for C-6	Micarta 3-3/16 of 3/4 O.D. x 3/8 I.D.			1	7808525-P1	27	7405440-P20	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Insulator for C-6	Isolantite 1-1/4 x 23/32 Sq.			29	7705360-P11	28	7405440-P10	
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		Insulator for C-6	Isolantite 2 x 1/2 Sq.			29	7705360-P14	29	7405440-P12	

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																																
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2	Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-7	H.F. M.O. Compensating Capacitor	Automatic Variable Bimetal Type, Part of T-3			1	7407913-G2	30	7607470-P22	C-7
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-8	Filament By-Pass Capacitor	0.01 Mfd., 1000 V.D.C. Test, Mica	–48027-B10	RE48AA112H			31	7607470-P23	C-8, C-9, C-10, C-11, C-43, C-44, C-66, C-70
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-9	Filament By-Pass Capacitor	Same as C-8	–48027-B10				32		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-10	Filament By-Pass Capacitor	Same as C-8	–48027-B10				33		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-11	Filament By-Pass Capacitor	Same as C-8	–48027-B10				34		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-12	H.F. M.O. Screen By-Pass Capacitor	0.1 Mfd., 1000 V. Eff. Test, #(18, 15, 12, 7) Mica	–48478-B5	RE48AA121C			35	7607470-P27	C-12
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-13	Meter By-Pass Capacitor	0.006 Mfd., 1000 V. D.C. Test Mica, Type E Bracket Separate	–48410-B10	RE48AA112N			36	7607470-P28	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Capacitor—Spare for C-13	Same as C-13 without E Brackets					37	7607470-P15	C-13, C-31, C-53, C-65, C-73, C-77, C-82, C-83, C-88, C-89, C-90, C-97, C-98
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-14	H.F. M.O. Plate By-Pass Capacitor	0.002 Mfd., 5000 V.D.C., Test, Mica	–48037-B2	RE48AA112N			38	7607470-P29	C-14, C-19, C-30, C-39, C-72
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-15	Doubler Circuit Coupling Capacitor	0.01 Mfd., 2500 V.D.C. Test, Mica	–48035-B10	RE48AA112N			39	7607470-P30	C-15, C-22, C-23, C-24, C-32, C-33, C-34

Total Per Equipment																									Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-16	Doubler Circuit Coupling Capacitor	22 Mmf. Max., 5 Mmf. Min., Variable Air, Special			3	Type MC Spec. #1872	40	7607470-P31	C-16
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Insulator for C-16	Isolantite			29	#1870	41	7809663-P2	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-17	Doubler Circuit Tuning Capacitor	750 Mmf. Max., 24 Mmf. Min., Variable Air			4		42	7607470-P32	C-17
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-18	1st Intermediate Amp. Grid Coupling Capacitor	0.00007 Mfd. ±2%, 5000 V.D.C. Test, Mica	—48039-B2	RE48AA112N			43	7607470-P33	C-18
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-19	1st Intermediate Amp. Grid By-Pass Capacitor	Same as C-14	—48037-B2				44		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-20	Audio Oscillator Tank Capacitor	4 Mfd., 150 V., 800 Cycles Paper	—48880-5	RE13A488C			45	7607470-P35	C-20
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-21	Audio Oscillator Grid Capacitor	0.5 Mfd., 1000 V.D.C. Working Paper	—48723	RE13A488C			46	7607470-P36	C-21
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-22	Filament By-Pass Capacitor	Same as C-15	—48035-B10				47		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-23	Filament By-Pass Capacitor	Same as C-15	—48035-B10				48		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-24	1st Intermediate Amp. Screen By-Pass Capacitor	Same as C-15	—48035-B10				49		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-25	Audio Oscillator Screen Capacitor	1 Mfd., 1500 V.D.C. Working Paper	—48724-10	RE13A488C			50	7607470-P40	C-25
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-26	Audio Oscillator Coupling Capacitor	0.065 Mfd., 1000 V. D.C. Working #(13, 15, 12, 7), Mica	—481102-B5	RE48AA131C			51	7607470-P41	C-26

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-27	1st Intermediate Ampl. Plate By-Pass Capacitor	0.01 Mfd., 5000 V.D.C. Test, Mica	—48382-B10	RE48AA112N			52	7607470-P42	C-27, C-37, C-40, C-45, C-48, C-54, C-59, C-71, C-76, C-78, C-87, C-99
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-28	1st Intermediate Ampl. Tuning Capacitor	450 Mmf., Max., 42 Mmf. Min., Variable Air			3		53	7607470-P-43	C-28
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		Insulator for C-28	Isolantite			29	7204-1	54	7607256-P3	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	C-29	2nd Intermediate Ampl. Grid Coupling Capacitor	0.00004 Mfd., 5000 V.D.C. Test, Mica	—48255			7809208-P3	55		C-29
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	C-29	2nd Intermediate Ampl. Grid Coupling Capacitor	0.00007 Mfd., 6000 V.D.C. Test, Mica	—481078-B10	RE48AA112			56	7607470-P44	C-29
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-30	2nd Intermediate Ampl. Grid By-Pass Capacitor	Same as C-14	—48037-B2				57		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-31	Meter By-Pass Capacitor	Same as C-13	—48410-B10				58		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Capacitor—Spare for C-31	Same as Item 37					59		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-32	Filament By-Pass Capacitor	Same as C-15	—48035-B10				60		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-33	Filament By-Pass Capacitor	Same as C-15	—48035-B10				61		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-34	2nd Intermediate Screen By-Pass Capacitor	Same as C-15	—48035-B10				62		

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-35	2nd Intermediate Ampl. Tank Capacitor	0.0002 Mfd., 6000 V. Eff. Test #(5, 4, 1.5, 0.4), Mica	—48446-5	RE48AA132			63	7607470-P50	C-35, C-46
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-36	2nd Intermediate Tuning Capacitor	320 Mmf. Max., 38 Mmf. Min. per Section, 160 Mmf. Max., 19 Mmf. Min. in Series, Variable Air, Split Stator				3 7607256-P5	64	7607470-P51	C-36, C-47
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		Insulator for C-36	Same as Item 54					65		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Gear for C-36					35 7604940-P3	66	7604940-G6	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Worm for C-36					35 7604940-P5	67	7604940-G6	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Gear for C-36					35 7604940-P15	68	7604940-G6	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Gear for C-36					35 7604940-P25	69	7604940-G6	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-37	2nd Intermediate Ampl. Plate By-Pass Capacitor	Same as C-27	—48382-B10				70		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-38	H.F. P.A. Grid Coupling Capacitor	100 Mmf. Max., 15 Mmf. Min., Variable Air				4 7605863-P7	71	7607470-P53	C-38
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-39	H.F. P.A. Grid By-Pass Capacitor	Same as C-14	—48037-B2				72		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-40	H.F. P.A. Suppressor By-Pass Capacitor	Same as C-27	—48382-B10				73		
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	C-41	Spark Suppressor Capacitor	0.5 Mfd., 400 V.D.C. Working Paper	—48205-A10				74	7607470-P56	C-41, C-42, C-52, C-97, C-502, C-503

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
2	2	0	2	2	0	0	0	2	2	0	2	2	0	0	2	2	0	2	2	0	2	2		Spacer for C-41	Micarta 7/8 x 5/16 O.D. x 3/16 I.D.			1	7604858-P13	75	7604858-G4	
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	C-42	Spark Suppressor Capacitor	Same as C-41	—48205-A10				76		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-43	Filament By-Pass Capacitor	Same as C-8	—48027-B10				77		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-44	Filament By-Pass Capacitor	Same as C-8	—48027-B10				78		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-45	P.A. Screen By-Pass Capacitor	Same as C-27	—48382-B10				79		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-46	H.F. P.A. Tank Capacitor	Same as C-35	—48446-5				80		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-47	H.F. P.A. Tuning Capacitor	Same as C-36					81		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Gear for C-47	Same as Item 66					82		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Worm for C-47	Same as Item 67					83		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Gear for C-47	Same as Item 68					84		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Gear for C-47	Same as Item 69					85		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-48	H.F. P.A. Plate By-Pass Capacitor	Same as C-27	—48382-B10				86		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-49	H.F. Antenna Blocking Capacitor	0.004 Mfd., 3000 V. Eff. Test #(11, 8.5, 5.5, 2.5), Mica	—48218-B5	RE48AA131			87	76074,0-P64	C-49
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-50	H.F. Antenna Coupling Capacitor	75 Mmf. Max.,10 Mmf. Min., Variable Air			1	7604831-G3	88	7607470-P65	C-50
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-51	H.F. Antenna Tuning Capacitor	300 Mmf. Max., 77 Mmf. Min., Variable Air			3	7607256-P4	89	7607460P-66	C-51

Total Per Equipment																						Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2									
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		Insulator for C-51	Same as Item 54				90		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-52	Spark Suppressor Capacitor	Same as C-41	−48205-A10			91		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-53	Meter By-Pass Capacitor	Same as C-13	−48410-B10			92		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Capacitor—Spare for C-53	Same as Item 37				93		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-54	I.F. M.O. Plate By-Pass Capacitor	Same as C-27	−48382-B10			94		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-55	I.F. M.O. Tank Capacitor	0.0011 Mfd., 5000 V. Eff. Test, #(7, 6, 3, 1.5), Mica Constant Capacity at 60°C	−48706-B2	RE48AA131	2 15	PL-846-6H 1550-H-140	95	7607470-P70	C-55
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-56	I.F. M.O. Tank Capacitor	0.001 Mfd., 5000 V. Eff. Test, #(7, 4, 2, 1), Mica Constant Capacity at 60°C	−48337-D2	RE48AA131	2 15	PL-246-6H 1550-H-116	96	7607470-P71	C-56, C-58
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-57	I.F. M.O. Tank Capacitor	0.0015 Mfd., 5000 V. Eff. Test, #(9, 5, 3, 1.5), Mica Constant Capacity at 60°C	−48485-D2	RE48AA131	2 15	PL-234-6H 1550-H-319	97	7607470-P72	C-57
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-58	I.F. M.O. Tank Capacitor	Same as C-56	−48337-D2			98		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-59	R.F. By-Pass Capacitor	Same as C-27	−48382-B10			99		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-60	Key Click Filter Capacitor	0.03 Mfd., 2000 V. Eff. Test #(12, 12, 10, 5), Mica	−48726-B5	RE48AA131			100	7607471-P75	C-60

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-61	I.F. M.O. Tank Capacitor	0.01 Mfd., 2000 V. Eff. Test #(10, 8, 5, 2), Mica Constant Capacity at 60°C	—48736-D2		2 15	PL-1551-6H 1550-H-320	101	7607471-P76	C-61
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-62	I.F. M.O. Tank Capacitor	0.006 Mfd., 3500 V. Eff. Test #(13, 10, 7, 3), Mica Constant Capacity at 60°C	—48740-D2	RE48AA131	2 15	PL-439-6H 1550-H-321	102	7607471-P77	C-62, C-63, C-64
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-63	I.F. M.O. Tank Capacitor	Same as C-62	—48740-D2				103		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-64	I.F. M.O. Grid Capacitor	Same as C-62	—48740-D2				104		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-65	Meter By-Pass Capacitor	Same as C-13	—48410-B10				105		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Capacitor—Spare for C-65	Same as Item 37					106		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-66	I.F. M.O. Grid By-Pass Capacitor	Same as C-8	—48027-B10				107		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-67	Filament By-Pass Capacitor	0.03 Mfd., 2500 V.D.C. Mica	—48727-B10	RE48AA112			108	7607471-P82	C-67, C-68, C-69
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-68	Filament By-Pass Capacitor	Same as C-67	—48727-B10				109		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-69	I.F. M.O. Screen By-Pass Capacitor	Same as C-67	—48727-B10				110		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-70	R.F. By-Pass Capacitor	Same as C-8	—48027-B10				111		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-71	Meter Multiplier By-Pass Capacitor	Same as C-27	—48382-B10				112		

Total Per Equipment																						Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2									
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-72	I.F. Intermediate Ampl. Grid By-Pass Capacitor	Same as C-14	—48037-B2				113		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-73	Meter By-Pass Capacitor	Same as C-13	—48410-B10				114		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Capacitor—Spare for C-73	Same as Item 37					115		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-74	I.F. Intermediate Ampl. Tank Capacitor	0.0003 Mfd., 5000 V. Eff. Test #(3, 1.2, .8, .4), Mica	—48738-B2	RE48AA131			116	7607471-P89	C-74
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-75	I.F. Intermediate Ampl. Tank Capacitor	0.00045 Mfd., 5000 V. Eff. Test #(4, 2.5, 1.3, .6), Mica	—48739-B2	RE48AA131			117	7607471-P90	C-75
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-76	I.F. Intermediate Ampl. Plate By-Pass	Same as C-27	—48382-B10				118		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-77	Meter By-Pass Capacitor	Same as C-13	—48410-B10				119		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Capacitor—Spare for C-77	Same as Item 37					120		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-78	R.F. By-Pass Capacitor	Same as C-27	—48382-B10				121		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-79	I.F. Intermediate Ampl. Tank Capacitor	Same as C-1	—48477-D2				122		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-80	I.F. Intermediate Ampl. Tank Capacitor	0.001 Mfd., 6000 V. Eff. Test #(10, 7, 4, 2), Mica	—48737-B2	RE48AA131			123	7607471-P95	C-80, C-84, C-85

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-81	By-Pass Capacitor	2 Mfd., 2000 V.D.C. Paper Same as S#949133 Except Nickel Plate	—48708-10	RE13A488C	1	7605848 P26	124	7607471-P96	C-81
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-82	Meter By-Pass Capacitor	Same as C-13	—48410-B10				125		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Capacitor—Spare for C-82	Same as Item 37					126		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-83	Meter By-Pass Capacitor	Same as C-13	—48410-B10				127		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Capacitor—Spare for C-83	Same as Item 37					128		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-84	I.F. P.A. Tank Capacitor	Same as C-80	—48737-B2				129		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-85	I.F. P.A. Tank Capacitor	Same as C-80	—48737-B2				130		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-86	I.F. P.A. Tank Capacitor	Same as C-1	—48477-D2				131		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-87	I.F. P.A. Plate By-Pass Capacitor	Same as C-27	—48382-B10				132		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-88	Meter By-Pass Capacitor	Same as C-13	—48410-B10				133		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Capacitor—Spare for C-88	Same as Item 37					134		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-89	Meter By-Pass Capacitor	Same as C-13	—48410-B10				135		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Capacitor—Spare for C-89	Same as Item 37					136		

Total Per Equipment																						Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2									
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	C-90	Meter By-Pass Capacitor	Same as C-13	—48410-B10				137		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Capacitor—Spare for C-90	Same as Item 37					138		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-91	I.F. Ant. Blocking Capacitor	0.02 Mfd., 2000 V. Eff. Test #(12, 11, 10, 7), Mica	—48728-B5	RE48AA131			139	7607471-P106	C-91, C-95
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-92	I.F. Antenna Series Capacitor	0.0012 Mfd., 20,000 V. Eff. Test #(16, 14, 7, 2.5), Mica	—48729-5	RE48AA132			140	7607471-P107	C-92
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-93	Line Filter Capacitor	2 Mfd., 400 V.D.C. Working, Paper	—48403-A10	RE48A129C			141	7607471-P108	C-93, C-94, C-101, C-102
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	C-94	Line Filter Capacitor	Same as C-93	—48403-A10				142		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-95	I.F. Antenna Blocking Capacitor	Same as C-91	—48728-B5				143		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-96	Meter By-Pass Capacitor	0.005 Mfd., 3000 V. Eff. Test #(9, 6, 4, 2), Mica	—48406-B5	RE48A131			144	7607471-P111	C-96
0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	C-97	M.O. Frame Grounding Capacitor	Same as C-41	—48205-A10				145		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	C-97	Meter By-Pass Capacitor	Same as C-13	—48410-B10				146		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Capacitor—Spare for C-97	Same as Item 37					147		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	C-98	Meter By-Pass Capacitor	Same as C-13	—48410-B10				148		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Capacitor—Spare for C-98	Same as Item 37					149		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	C-98	R.F. Pick-up Capacitor	Same as C-14	—48037-B2				150		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-99	R.F. By-Pass Capacitor	Same as C-27	—48382-B10				151		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	C-100	H.F. M.O. Compensating Capacitor	Automatic Variable			1	7407913-G1	152	7607471-P115	C-100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	C-101	Line Filter Capacitor	Same as C-93	—48403-A10				153		
1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	C-101	R.F. Pick-up Capacitor	Special Air			1	7408372-G1	154	7607[illegible]71-P116	C-101
1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0		Insulator for C-101	Isolantite			37	7407320-P3	155	7408372-P1	
1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0		Insulator for C-101	Isolantite 1-1/2 Long x 3/4 Dia.			29	7602239-P23	156	7408372-P6	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	C-102	Line Filter Capacitor	Same as C-93	—48403-A10				157		
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-150	H.V. Filter Capacitor	6 Mfd., 2000 V.D.C. Working Paper	—48730	RE13A488C	1	7605848-P17	158	7607478-P1	C-150
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-151	M.O. Filament Capacitor	6 Mfd., 1500 V.D.C. Working Paper	—48731	RE13A488C	1	7605848-P19	159	7607478-P2	C-151
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-152	Bias Filter Capacitor	5 Mfd., 600 V.D.C. Working, Paper	—48733	RE13A488C	1	7605848-P15	160	7607478-P3	C-152
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-153	Bias Filter Capacitor	30 Mfd., 600 V.D.C. Working, Paper	—48732	RE13A488C	1	7605848-P18	161	7607478-P4	C-153
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C-154	Bias Filter Capacitor	3 Mfd., 600 V.D.C. Working, Paper	—48734	RE13A488C	1	7605848-P16	162	7607478-P5	C-154
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	C-250	Suppressor Capacitor	0.5 Mfd., 400 V.D.C. Working, Paper	—48205-A		2	DH-4050-A	163	N-27551-P97	C-250
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	C-250	Suppressor Capacitor	Same as C-250	—48205-A				164		

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.— TBL-13	230 V.D.C.— TBL-13	440/3/60— TBL-13	115 V.D.C.— TBL-12	230 V.D.C.— TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	C-401	Suppressor Capacitor	0.5 Mfd., 600 V.D.C. Working, Paper			2	DY-6050	165	N-30142-P97	C-401, C-421
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	C-421	Suppressor Capacitor	Same as C-401					166		
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	C-501	Filter Capacitor	2 Mfd., ±10%, 600 Volts, Paper	−48687-10		1	7605848-P25	167	7606570-P1	C-501
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	C-502	Spark Suppressor Capacitor	Same as C-41	−48205-A10				168		
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	C-503	Spark Suppressor Capacitor	Same as C-41	−48205-A10				169		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	C-701	Capacitor	30.0 Mfd., ±10%, 600 V.D.C. Working, Paper	−48732-10	RE13A488C	1	S#1247903 Type FL	170	7610037-P7	C-701, C-702
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	C-702	Capacitor	Same as C-701	−48732-10				171		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	C-703	Capacitor	0.25 Mfd., ±5%, 1500 V.D.C. Working, Paper	−481757-5	RE13A488C	1	S#1258269 Type FL	172	7610037-P9	C-70,
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	C-704	Capacitor	16 Mfd., ±10%, 1500 V.D.C. Working, Paper	−481763-10	RE13A488C	1	S#1291789 Type FL	173	7610037-P10	C-704
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	C-705	Capacitor	6 Mfd., ±10%, 2500 V.D.C.	−481764-10	RE13A488C		S#1291255	174	7610037-P11	C-705, C-706
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	C-706	Capacitor	Same as C-705	−481764-10				175		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	C-707	Capacitor	0.2 Mfd., ±10%, 3000 V.D.C., Paper	−48527-10	RE13A488C	1	S#1247096	176	7610037-P13	C-707
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	CR-701	Rectox	100 Type "HA" Discs per Stack, Connected 1-100-1			1	S#1303807 7709078-P4	177	7610038-P91	CR-701, CR-702, CR-703, CR-704, CR-705, CR-706
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	CR-702	Rectox	Same as CR-701					178		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	CR-703	Rectox	Same as CR-701					179		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	CR-704	Rectox	Same as CR-701					180		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	CR-705	Rectox	Same as CR-701					181		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	CR-706	Rectox	Same as CR-701					182		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	CR-707	Rectox	80 Type "HA" Discs per Stack, Connected 1-80-1			1	S#1292368 7709078-P2	183	7610038-P97	CR-707, CR-708, CR-709, CR-710
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	CR-708	Rectox	Same as CR-707					184		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	CR-709	Rectox	Same as CR-707					185		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	CR-710	Rectox	Same as CR-707					186		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	CR-711	Rectox	80 Type "HA" Discs per Stack, Connected 4-20-1			1	S#1292369 7709078-P3	187	7610038-P101	CR-711
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	E-250	Armature	115 Volts, for B-250			42		188	N-30142	E-250, E-410
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	E-251	Commutator Brush	3/8 x 1 x 1-1/2 for B-250			26	SA-35	189	N-30142-P2	E-251, E-401, E-421
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	E-252	Speed Reg. Brush	5/32 x 1/4 x 1/2 for B-250			27	E23	190	N-30142-P3	E-252, E-263, E-402, E-422
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	E-253	Comm. Brush Holder	For B-250			42		191	C-32449	E-253, E-403
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	E-524	Speed Reg. Brush Holder Assembly	For B-250			8		192	N-30142-P5	E-254, E-404
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	E-255	Comm. Brush Holder Spring	For B-250			8		193	N-30142-P7	E-255, E-405
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	E-256	Speed Reg. Brush Holder Spring	Spring Steel—A Part for B-250			8		194	N-30142-P8	E-256, E-406

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	E-257	Comm. Brush Holder Rigging Insulation	Bakelite for B-250			8		195	N-30142-P9	E-257, E-407
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	E-258	Main Pole Coil	For B-250			8		196	N-30142-P10	E-258, E-408
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	E-259	Interpole Coil	For B-250			8		197	N-30142-P11	E-259, E-409
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	E-260	Speed Reg. Spring	For B-250			8		198	N-30142-P15	E-260
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	E-261	Armature	230 Volts, for B-250			8		199	N-30141	E-261, E-430
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	E-262	Comm. Brush	3/8 x 1 x 1-1/2 for B-250			26	#259	200	N-27550-P2	E-262
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	E-263	Speed Reg. Brush	Same as E-252, for B-250					201		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	E-264	Comm. Brush Holder	For B-250			8		202	N-30141-P4	E-264, E-423
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	E-265	Speed Reg. Brush Holder Assembly	For B-250			8		203	N-30141-P5	E-265, E-424
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	E-266	Comm. Brush Holder Spring	For B-250			8		204	N-30141-P7	E-266, E-425
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	E-267	Speed Reg. Brush Holder Spring	For B-250			8		205	N-30141-P8	E-267, E-426
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	E-268	Comm. Brush Holder Rigging Insulation	For B-250			8		206	N-30141-P9	E-268, E-427
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	E-269	Main Pole Coil	For B-250			8		207	N-30141-P10	E-269, E-428
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	E-270	Interpole Coil	For B-250			8		208	N-30141-P11	E-270, E-429
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	E-271	Speed Reg. Spring	For B-250			8		209	N-27550-P15	E-271
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	E-272	Armature	Armature for G-250			8		210	N-30144	E-272, E-457
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	E-273	Brush	1/4 x 1/4 x 1-1/8 for G-250			23		211	N-30144-P21	E-273, E-451
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	E-274	Brush Holder	For G-250			8	C-21339	212	N-30144-P22	E-274, E-452

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	E-275	Brush Holder Spring	For G-250			8	C-21339	213	N-30144-P23	E-275, E-453
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	E-276	Brush Rigging Insulation	For G-250	-61067		29		214	N-30144-P24	E-276, E-454
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	E-277	Main Pole Coil	For G-250			8		215	N-30144-P2	E-277, E-455
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	E-278	Interpole Coil	For G-250			8		216	N-30144-P7	E-278, E-456
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	E-279	Armature	Armature for G-251			8		217	N-30145	E-279, E-474
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	E-280	Slip Ring Brush	3/8 x 5/8 x 1-1/8 for G-251			26		218	N-30145-P31	E-280, E-281, E-282, E-461, E-462, E-463
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	E-281	H.V. Commutator Brush	Same as E-280 for G-251					219		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	E-282	L.V. Commutator Brush	Same as E-280 for G-251					220		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	E-283	Slip Ring Brush Holder	For G-251			8	C-19661	221	N-30145-P34	E-283, E-464
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	E-284	H.V. Comm. Brush Holder	For G-251			8	C-22540	222	N-30145-P35	E- 284, E-465
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	E-285	L.V. Comm. Brush Holder	For G-251			8	C-19704	223	N-30145-P36	E-285, E-466
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	E-286	Slip Ring Brush Holder Spring	For G-251			8	C-7391	224	N-30145-P37	E-286, E-467
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	E-287	H.V. Comm. Brush Holder Spring	For G-251			8	C-7391	225	N-30145-P38	E-287, E-468
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	E-288	L.V. Comm. Brush Holder Spring	For G-251			8	C-7391	226	N-30145-P39	E-288, E-469
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	E-289	Slip Ring Brush Rigging Ins.	For G-251			8	C-21457	227	N-30145-P40	E-289, E-290, E-470, E-471

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	E-290	L.V. Comm. Brush Rigging Ins.	Same as E-289, for G-251					228		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	E-291	H.V. Comm. Brush Rigging Insulation	For G-251	—61232		29	C-19696	229	N-30145-P42	E-291, E-472
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	E-292	Main Pole Coil	For G-251					230	N-22042-P3	E-292
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	E-292	Main Pole Coil	For G-251					231	N-23508-P3	E-292
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	E-292	Main Pole Coil	For G-251					232	N-27554-P3	E-292
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	E-401	Commutator Brush	Same as E-251, for B-401					233		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	E-402	Speed Reg. Brush	Same as E-252, for B-401					234		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	E-403	Commutator Brush Holder	Same as E-253, for B-401					235		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	E-404	Speed Reg. Brush Holder Assy	Same as E-254, for B-401					236		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	E-405	Commutator Brush Holder Spring	Same as E-255, for B-401					237		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	E-406	Speed Reg. Brush Spring	Same as E-256, for B-401 Supplied with E-402					238		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	E-407	Comm. Brush Holder Rigging Insulation	Same as E-257, for B-401					239		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	E-408	Main Pole Coil	Same as E-258, for B-401					240		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	E-409	Interpole Coil	Same as E-259, for B-401					241		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	E-410	Armature	Same as E-250, for B-401					242		
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	E-421	Commutator Brush	Same as E-251, for B-421					243		
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	E-422	Speed Reg. Brush	Same as E-252, for B-421					244		
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	E-423	Comm. Brush Holder	Same as E-264, for B-421					245		
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	E-424	Speed Reg. Brush Holder Assembly	Same as E-265, for B-421					246		
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	E-425	Comm. Brush Holder Spring	Same as E-266, for B-421					247		
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	E-426	Speed Reg. Brush Spring	Same as E-267, for B-421 Supplied with E-422					248		
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	E-427	Comm. Brush Holder Rigging Insulation	Same as E-268, for B-421					249		
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	E-428	Main Pole Coil	Same as E-269, for B-421					250		
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	E-429	Interpole Coil	Same as E-270, for B-421					251		
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	E-430	Armature	Same as E-261, for B-421					252		
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	E-451	Brush	Same as E-273, for G-451					253		
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	E-452	Brush Holder	Same as E-274, for G-451					254		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																									Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	E-453	Brush Holder Spring	Same as E-275, for G-451					255		
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	E-454	Brush Rigging Insulation	Same as E-276, for G-451	—61067				256		
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	E-455	Main Pole Coil	Same as E-277, for G-451					257		
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	E-456	Interpole Coil	Same as E-278, for G-451					258		
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	E-457	Armature	Same as E-272, for G-451					259		
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	E-461	Slip Ring Brush	Same as E-280, for G-461					260		
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	E-462	H.V. Commutator Brush	Same as E-280, for G-461					261		
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	E-463	L.V. Commutator Brush	Same as E-280, for G-461					262		
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	E-464	Slip Ring Brush Holder	Same as E-283, for G-461					263		
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	E-465	H.V. Comm. Brush Holder	Same as E-284, for G-461					264		
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	E-466	L.V. Comm. Brush Holder	Same as E-285, for G-461					265		
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	E-467	Slip Ring Brush Holder Spring	Same as E-286, for G-461					266		
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	E-468	H.V. Comm. Brush Holder Spring	Same as E-287, for G-461					267		
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	E-469	L.V. Comm. Brush Holder Spring	Same as E-288, for G-461					268		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	E-470	Slip Ring Brush Rigging Insulation	Same as E-289, for G-461					269		
1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	E-471	L.V. Comm. Brush Rigging Insualtion	Same as E-289, for G-461					270		
1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	E-472	H.V. Comm. Brush Rigging Insulation	Same as E-291, for G-461	--61232				271		
1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	E-473	Main Pole Coil	For G-461			8		272	N-30145-P3	E-473
1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	E-474	Armature	Same as E-279, for G-461					273		
0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	F-1	Control Circuit Fuse	6 Amps., 250 V., Non-Renewable		17-F-2G	23	#25006	274	7607471-P124	F-1, F-2, F-150, F-151,
0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	F-2	Control Circuit Fuse	Same as F-1					275		
1	0	1	1	0	1	1	1	1	0	1	1	0	1	1	1	0	1	1	0	1	1	F-3	Control Circuit Fuse	15 Amps., 250 V., Non-Renewable		17-F-2G	23	#25015	276	7607471-P128	F-3, F-4
1	0	1	1	0	1	1	1	1	0	1	1	0	1	1	1	0	1	1	0	1	1	F-4	Control Circuit Fuse	Same as F-3					277		
0	0	1	0	0	1	0	0	0	0	1	0	0	0	1	0	0	1	0	0	1	0	F-150	Heater Power Fuse	Same as F-1					278		
0	0	1	0	0	1	0	0	0	0	1	0	0	0	1	0	0	1	0	0	1	0		Receptable for F-150 and F-151	Porcelain for 2 Fuses			5	#1917	279	7407907-P155	
0	0	1	0	0	1	0	0	0	0	1	0	0	0	1	0	0	1	0	0	1	0	F-151	Filament Power Fuse	Same as F-1					280		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	F-201	Main Fuse	50 Amps.			23	S#37169	281		F-201, F202
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	F-202	Main Fuse	Same as F-201					282		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	1	F-203	Control Fuse	10 Amps., 250 Volts			23	S#25010	283	33-J-828-P18	F-203, F-204, F-303, F-304, F-313, F-314
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	1	F-204	Control Fuse	Same as F-203					284		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	F-221	Fuse	30 Amps., 250 Volts			23	S#25030	285		F-221, F-222

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	F-222	Fuse	Same as F-221					286		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	F-250	H.V. Fuse	1.5 Amps., 5000 Volts, Non-Renewable			30	S#3025-AC	287	N-30144-P27	F-250, F-451
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	F-251	L.V. Fuse	3 Amps., 250 Volts, Non-Renewable			23		288	N-30145-P44	F-251, F-252, F-461, F-462
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	F-252	L.V. Fuse	Same as F-251					289		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	F-253	H.V. Fuse	0.5 Amps., 5000 V., Non-Renewable			30	S#3024C	290	N-30145-P46	F-253, F-463
0	0	0	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	F-303	Control Fuse	Same as F-203					291		
0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	F-304	Control Fuses	Same as F-203					292		
0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	F-313	Control Fuse	Same as F-203					293		
0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	F-314	Control Fuse	Same as F-203					294		
0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	F-331	Fuse	20 Amps., 250 Volts			23	S#1252688	295	35-J-705-P16	F-331, F-332
0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	F-332	Fuse	Same as F-331					296		
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F-341	Fuse	10 Amps., 250 Volts, Non-Renewable			1	S#37160	297	45-J-409-P4	F-341, F-351, F-361
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F-351	Fuse	Same as F-341					298		
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F-361	Fuse	Same as F-341					299		
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	F-451	H.V. Fuse	Same as F-250					300		
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	F-461	L.V. Fuse	Same as F-251					301		
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	F-462	L.V. Fuse	Same as F-251					302		
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	F-463	H.V. Fuse	Same as F-253					303		
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F-501	Fuse	6 Amps., 250 Volts, Non-Renewable		17-F-2G	23 43	#25006 #2003	304	7606570-P7	F-501, F-704, F-705

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F-701	Fuse	3 Amps., 250 Volts, Non-Renewable		17-F-2G	23	#25003	305	7610037-P16	F-701
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F-702	Fuse	1/2 Amp., 5000 Volts, Non-Renewable			30	Cat. #3024C	306	7610037-P18	F-702
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F-703	Fuse	1-1/2 Amp., 5000 Volts			30	Cat #3025C	307	7610037-P19	F-703
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F-704	Fuse	Same as F-501					308		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F-705	Fuse	Same as F-501					309		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	G-250	H.V. Generator		—21232				310	N-27553	G-250
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	G-251	L.V. Generator		—21233				311	N-27554	G-251
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	G-451	H.V. Generator		—21232A		8		312	N-30144	G-451
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	G-461	L.V. Generator		—21233B		8		313	N-30145	G-461
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	I-1A	Heater Power Indicator Light	Receptacle—Finish Outside Ferrule Black Nickel			1	S#867324B	314	7607471-P136	I-1A, I-2A, I-3A
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	I-1B	Indicator Light	Bulb—18 Volts, 0.11 Amps.	TS-51		1	S#549474	315	7607471-P137	I-1B, I-2B, I-3B, I-4B, I-5B, I-6B, I-7B, I-8B, I-9B, I-10B, I-11B, I-501C, I-701C, I-702C
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	I-1C	Indicator Light	Lens—Amber			1	S#549472	316	7607471-P138	I-1C, I-6C, I-7C
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	I-2A	Motor Solenoid Indicator Light	Receptacle—Same as I-1A					317		
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	I-2B	Indicator Light	Bulb—Same as I-1B	TS-51				318		

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	I-2C	Indicator Light	Lens—Blue			1	S#549471	319	7607471-P141	I-2C, I-8C, I-9C, I-701B
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	I-3A	Plate Voltage Indicator Light	Receptacle—Same as I-1A					320		
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	I-3B	Indicator Light	Bulb—Same as I-1B	TS-51				321		
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	I-3C	Indicator Light	Lens—Red			1	S#549468	322	7607471-P144	I-3C, I-10C, I-11C, I-501B I-702B
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	I-4A	Bias Voltage Indicator Light	Receptacle			1	S#867328B	323	7607472-P145	I-4A, I-5A, I-701A, I-702A
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	I-4B	Indicator Light	Bulb—Same as I-1B	TS-51				324		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	I-4C	Indicator Light	Lens—Green			1	S#549469	325	7607472-P147	I-4C
0	0	1	0	0	1	1	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0	0	I-5A	H.F. M.O. Filament Indicator Light	Same as I-4A					326		
0	0	1	0	0	1	1	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0	0	I-5B	Indicator Light	IBulb—Same as I-1B	TS-51				327		
0	0	1	0	0	1	1	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0	0	I-5C	Indicator Light	Lens—Clear			1	S#549470	328	7607472-P150	I-5C
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0	I-6A	Heater Power Indicator Light	Receptacle—Finish Outside Ferrule Black Nickel			1	S#867326B	329	7607472-P151	I-6A, I-8A, I-10A
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0	I-6B	Indicator Light	Bulb—Same as I-1B	TS-51				330		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0	I-6C	Indicator Light	Lens—Same as I-1C					331		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	I-7A	Indicator Light	Receptacle			1	S#867327B	332	7607472-P154	I-7A, I-9A, I-11A, I-501A
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	I-7B	Indicator Light	Bulb—Same as I-1B	TS-51				333		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	I-7C	Indicator Light	Lens—Same as I-1C					334		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0	I-8A	Motor Solenoid Indicator Light	Receptacle—Same as I-6A					335		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0	I-8B	Indicator Light	Bulb—Same as I-1B	TS-51				336		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0	I-8C	Indicator Light	Lens—Same as I-2C					337		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	I-9A	Motor Solenoid Indicator Light	Receptacle—Same as I-7A					338		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	I-9B	Indicator Light	Bulb—Same as I-1B	TS-51				339		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	I-9C	Indicator Light	Lens—Same as I-2C					340		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0	I-10A	Plate Voltage Indicator Light	Receptacle—Same as I-6A					341		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0	I-10B	Indicator Light	Bulb—Same as I-1B	TS 51				342		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0	I-10C	Indicator Light	Lens—Same as I-3C					343		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	I-11A	Plate Voltage Indicator Light	Receptacle—Same as I-7A					344		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	I-11B	Indicator Light	Bulb—Same as I-1B	TS-51				345		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	I-11C	Indicator Light	Lens—Same as I-3C					346		
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	I-501A	Power on Indicator Light	Receptacle—Same as I-7A					347		
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	I-501B	Indicator Light	Lens—Red—Same as I-3C					348		
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	I-501C	Indicator Light	Bulb—Same as I-1B	TS-51				349		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	I-701A	Indicator Light Supply on	Receptacle—Same as I-4A					350		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	I-701B	Indicator Light	Lens—Same as I-2C					351		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	I-701C	Indicator Light	Bulb—Same as I-1B	TS-51				352		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	I-702A	H.V. on Indicator Light	Receptacle— Same as I-4A					353		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	I-702B	Indicator Light	Lens—Same as I-3C					354		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	I-702C	Indicator Light	Bulb—Same as I-1B	TS-51				355		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	J-1	Frequency Meter Jack	Jack and Cup Assembly	—49110		6		356	7607472-P172	J-1
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	K-1	Thermostat Relay	Single Contact, Normally Closed, Coil to Operate on 11 V. D.C. -23% +45% Volts at 12 M.A. Contact to Make and Break 5 Amps., 230 V.D.C.			7	7609921-P1 CX-1968	357	7607472-P175	K-1
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	K-1A	Contact—Stationary	For K-1			7	S#2964	358	7607472-P176	K-1A, K-12A
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	K-1B	Contact—Moving	For K-1			7	S#2071	359	7607472-P177	K-1B
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	K-1C	Coil	For K-1, 11 V.D.C., 12 M.A.			7	Coil "I"	360	7607472-P178	K-1C
1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-2	Starting Contactor Relay	3 Make, Rating 4 Amps., 115 V.D.C.			7	CXA-2995 7606138 P17	361	7607472-P179	K-2
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	K-2	Starting Contactor Relay	2 Make Contacts, No Blowout Coils, Contacts to Carry 1 Amp. at 230 V.D.C. to Operate at 115 or 230 V. D.C. -23% +45% Voltage			7	CX-1969	362	7604878-P2	K-2

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	K-2	Starting Contactor Relay	Three Pole, Single Throw, Normally Open. Coil to Operate on 115 V.D.C. -23% +45% Contacts to Make and Break 5 Amps., 115 V.D.C.	—29334		7	CX-2995	363	7606138-P14	K-2
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	1	0	1	1	K-2A	Contact—Stationary	For Relay K-2			7	#600	364	7607472-P181	K-2A, K-2C, K-4A, K-4C, K-11A, K-13A, K-13C
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	1	0	1	1	K-2A1	Contact—Moving L.H.	For Relay K-2			7	#4464	365	7607472-P182	K-2A1, K-2C1, K-3A2, K-3B2, K-4A1, K-4C1, K-13A1, K-13C1, K-16B2
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	1	0	1	1	K-2A2	Contact—Moving R.H.	For Relay K-2			7	#4463	366	7607472-P183	K-2A2, K-2C2, K-3A1, K-3B1, K-4A2, K-4C2, K-13A2, K-13C2, K-16B1
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	1	0	1	1	K-2B	Contact—Stationary	For Relay K-2			7	#2189A	367	7607472-P184	K-2B, K-4B, K-13B
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	1	0	1	1	K-2B	Contact—Moving	For Relay K-2			7	#4465	368	7607472-P185	K-2B, K-4B, K-13B
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	1	0	1	1	K-2C	Contact—Stationary	Same as K-2A, Sta.					369		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment 115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2	Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	1	0	1	1	K-2C1	Contact—Moving L.H.	Same as K-2A1, Mov. L.H.					370		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	1	0	1	1	K-2C2	Contact—Moving R.H.	Same as K-2A2, Mov. R.H.					371		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	1	0	1	1	K-2D	Coil	Main Coil -60 V.D.C.			7	#60	372	7607472-P186	K-2D
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	1	0	1	1	K-2E	Coil	Aux. Coil for K-2			7	#3035-34	373	7607472-P187	K-2E
0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	K-2R	Resistor for K-2	500 Ohms, Salt Water Immersion Type, Vitreous Enamel Coating		RE13A372J	7	For Relay CX-2995	374	7607472-P188	K-2R
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0	K-3	Field Contactor Relay	Two Pole, Single Throw, Normally Open, with Blowout. Coil to Operate on 115 V.D.C. -23% +45% with 300 Ohms Series Resistor	-29327		7	CX-1970	375	7607472-P191	K-3
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	K-3	Field Contactor Relay	Two Pole, Single Throw Normally Open, with Blowout Coil to Operate on 230 V.D.C. -23% +45% with 3000 Ohms Series Resistor	-29327		7	CX-1970	376	7607472-P192	K-3
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	K-3A	Contact—Stationary	For Relay K-3			7	#2072	377	7607472-P193	K-3A, K-3B, K-16A
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	K-3A1	Contact—Moving R.H.	For Relay K-3, Same as K-2A2			7		378		
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	K-3A2	Contact—Moving L.H.	For Relay K-3, Same as K-2A1			7		379		
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	K-3B	Contact—Stationary	Same as K-3A, Sta.					380		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																									Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	K-3B1	Contact—Moving R.H.	Same as K-2A2, Mov. R.H.					381		
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	K-3B2	Contact—Moving L.H.	Same as K-2A1, Mov. L.H.					382		
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	K-3C	Coil—for K-3	115 V.D.C. for Relay K-3 on 115 and 230 V.D.C.			7	Coil "H"	383	7607472-P196	K-3C
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0	K-3R1	Resistor for K-3	For K-3, Item 375, 300 Ohms Salt Water Immersion Type Vitreous Enamel Coating		RE13A372J	7		384	7607472-P197	K-3R1, K-16R
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	K-3R2	Resistor for K-3	For K-3, Item 376, 3000 Ohms Salt Water Immersion Type, Vitreous Enamel Coating		RE13A372J	7		385	7607472-P198	K-3R2
0	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	K-4	Starting Contactor Relay	Three Pole, Single Throw, Normally Open, Coil to Operate on 230 V.D.C. −23% +45% Contacts to Make and Break 2 Amps., 230 V.D.C.	−29329	RE13A372J	7	CXA-2996 7609921-P8	386	7607472-P200	K-4
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	K-4	Starting Contactor Relay	Three Pole, Single Throw, Normally Open. Coil to Operate on 230 V.D.C. −23% +45% Contacts to Make and Break 5 Amps., 230 V.D.C.	−29331		7	CX-2996 7606138-P15	387	7607472-P201	K-4
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	K-4	Starting Contactor Relay				44	Z-1859	388	7604878-P4	K-4

Total Per Equipment																																				Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13		230 V.D.C.—TBL-13		440/3/60— TBL-13		115 V.D.C.—TBL-12		230 V.D.C.—TBL-12		440/3/60— TBL-12		220/3/60— TBL-11		220/3/60— TBL-10		115 V.D.C.— TBL-7		230 V.D.C.— TBL-7		440/3/60— TBL-7		115 V.D.C.— TBL-6		230 V.D.C.— TBL-6		220/3/60— TBL-6		440/3/60— TBL-6		115 V.D.C.— TBL-5		230 V.D.C.— TBL-5		440/3/60— TBL-5		115 V.D.C.— TBL-3		230 V.D.C.— TBL-3		440/3/60— TBL-3		115 V.D.C.— TBL-2		230 V.D.C.— TBL-2											
0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	K-4A	Contact—Stationary	Same as K-2A, Sta.					389		
0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	K-4A1	Contact—Moving L.H.	Same as K-2A1, Mov. L.H.					390		
0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	K-4A2	Contact—Moving R.H.	Same as K-2A2, Mov. R.H.					391		
0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	K-4B	Contact—Stationary	Same as K-2B, Sta.					392		
0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	K-4B	Contact—Moving	Same as K-2B, Mov.					393		
0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	K-4C	Contact—Stationary	Same as K-2A, Sta.					394		
0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	K-4C1	Contact—Moving L.H.	Same as K-2A1, Mov. L.H.					395		
0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	K-4C2	Contact—Moving R.H.	Same as K-2A2, Mov. R.H.					396		
0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	K-4D	Coil for K-4	Main Coil, 115 V.D.C.			7	#105	397	7607472-P207	K-4D
0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	K-4E	Coil for K-4	Auxiliary Coil			7	#3035-37	398	7607472-P208	K-4E
0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	K-4E	Coil for K-4	Auxiliary Coil			7	#3226-38	399	7607472-P174	K-4E
0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	K-4R	Resistor for K-4	1700 Ohms, Salt Water Immersion Type, Vitreous Enamel Coating		RE13A372J	7	For Relay CX-2996	400	7607472-P209	K-4R
0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	K-4R	Resistor for K-4	2500 Ohms, Salt Water Immersion Type, Vitreous Enamel Coating			7	For Relay CXA-2996	401	7607472-P210	K-4R
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	K-5	Slow Pick-up Relay	One Make Contact, Coil and Resistor for 115 V.D.C. -23% +45% Voltage			44	Z-1857	402	7604878-P9	K-5

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	K-6	Keying Relay	Three Pole, Single Throw, Two Breaks per Circuit, Normally Open, Contact Rating 5 Amps. Coil to Operate on 115 V.D.C.	—29169		1	7604741-G12	403	7607472-P211	K-6
0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	K-6	Keying Relay	Three Pole, Single Throw, Two Breaks per Circuit, Normally Open, 5 Amps., 2000 V.D.C., Coil to Operate on 115 V.D.C.			1	S#867353 7604741-G6 For Replacement, Use Item 403	404	7607472-P212	K-6
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	K-7	Compensating Capacitor Relay	1 Make Contact, Coil and Resistor for 115 V.D.C. -23% +45% Voltage			7	CX-2119	405	7604878-P5	K-7
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	K-8	M.O. Overload Relay	Single Pole, One Throw, One Break per Circuit, Normally Closed, Contact Rating 0.5 Amps., 230 V.D.C. Operating Coil 0.1 to 0.4 Amp., 50 Ohms, Reset Coil 230 V.D.C.	—29138		1	S#1161104	406	7607473-P220	K-8
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	K-8	M.O. Overload Relay	Single Pole, One Throw, One Break per Circuit, Normally Closed, Contact Rating 0.5 Amps., 230 V.D.C. Operating Coil 0.25–0.7 Amps. Reset Coil 230 V.D.C. 2400 Ohms	—29074		1	S# 1155097B	407	7606174-P21	K-8

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	K-8A	Contact—Stationary	For Relay K-8			1	S# 1058889	408		K-8A, K-10A K-14A, K-15A, K-17A, K-18A
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	K-8A	Contact—Stationary	For Relay K-8			1	S# 1202083	409	7607473-P221	K-8A, K-10A K-14A, K-15A, K-17A, K-18A
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	K-8B	Contact—Moving	For Relay K-8			1	S#1156277	410		K-8B, K-10B, K-14B, K-15B, K-17B, K-18B
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	K-8B	Contact—Moving	For Relay K-8			1	S#1202082	411	7607473-P222	K-8B, K-10B, K-14B, K-15B, K-17B, K-18B
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	K-8C	Reset Coil	For Relay K-8			1	S#878398	412		K-8C, K-10C
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	K-8C	Reset Coil	For Relay K-8			1	S#1158888	413	7607473-P223	K-8C, K-10C
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	K-8D	Operating Coil	For Relay K-8			1	S#1156527	414		K-8D,K-14D, K-17D
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	K-8D	Operating Coil	For Relay K-8			1	S#1158883	415	7607473-P224	K-8D, K-14D K-17D
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1		Base for K-8	Molded			1	3-B-1651	416	7-A-414-P1	
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1		Insulator for K-8	Micarta 1-11/16 of 1/16 Thick x 3/8 x 11/16			1	3-B-1678 P1	417		
																							K-9	Not Used								

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	K-10	H.V. Overload Relay	Single Pole, One Throw, One Break per Circuit, Normally Closed, 0.5 Amp., 230 V.D.C. Operating Coil 0.75-2 Amps. Reset Coil 230 V.D.C.	—29075		1	S# 1155098B	418	7606174-P22	K-10
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	K-10	H.V. Overload Relay	Single Pole, One Throw, One Break per Circuit, Normally Closed, 0.5 Amps., 230 V.D.C. Operating Coil 0.5 to 2 Amps. 2.5 Ohms. Reset Coil 230 V.D.C.			1	S#1161107 7710112-P11	419	7607473-P227	K-10
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	K-10A	Contact—Stationary	Same as K-8A, Item 408					420		
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	K-10A	Contact—Stationary	Same as K-8A, Sta., Item 409					421		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	K-10B	Contact—Moving	Same as K-8B, Item 410					422		
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	K-10B	Contact—Moving	Same as K-8B, Mov. Item 411					423		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	K-10C	Reset Coil	Same as K-8C,Item 412					424		
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	K-10C	Coil	Reset Coil, Same as K-8C, Item 413					425		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	K-10D	Operating Coil	For K-10			1	S#1155101	426		K-10D, K-15D, K-18D
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	K-10D	Operating Coil	For Relay K-10			1	S#1158885	427	7607473-P231	K-10D, K-15D, K-18D

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13		230 V.D.C.—TBL-13		440/3/60— TBL-13		115 V.D.C.—TBL-12		230 V.D.C.—TBL-12		440/3/60— TBL-12		220/3/60— TBL-11		220/3/60— TBL-10		115 V.D.C.— TBL-7		230 V.D.C.— TBL-7		440/3/60— TBL-7		115 V.D.C.— TBL-6		230 V.D.C.— TBL-6		220/3/60— TBL-6		440/3/60— TBL-6		115 V.D.C.— TBL-5		230 V.D.C.— TBL-5		440/3/60— TBL-5		115 V.D.C.— TBL-3		230 V.D.C.— TBL-3		440/3/60— TBL-3		115 V.D.C.— TBL-2		230 V.D.C.— TBL-2									
0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0		Base for K-10	Same as Item 416						428		
0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0		Insulator for K-10	Same as Item 417						429		
0	0	1	0	0	1	1	0	0	1	1	0	0	0	1	1	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	K-11	H.F. M.O. Filament Transfer Relay	Two Pole, Double Throw, Two Make and Two Break Circuits	—29325		7	7609921-P6 CX-2122	430	7607473-P234	K-11
0	0	1	0	0	1	1	0	0	1	1	0	0	0	1	1	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	K-11A	Contact—Stationary	For Relay K-11, Same as K-2A					431		
0	0	1	0	0	1	1	0	0	1	1	0	0	0	1	1	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	K-11B1	Contact—Moving	For Relay K-11			7	#3566	432	7607473-P236	K-11B1
0	0	1	0	0	1	1	0	0	1	1	0	0	0	1	1	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	K-11B2	Contact—Moving	For Relay K-11			7	#3567	433	7607473-P237	K-11B2
0	0	1	0	0	1	1	0	0	1	1	0	0	0	1	1	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	K-11C	Coil for Relay K-11	115 V.D.C. for Relay CX-2122			7	Coil "H"	434	7607473-P238	K-11C
0	0	1	0	0	1	1	0	0	1	1	0	0	0	1	1	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	K-11R	Resistor for Relay K-11	3000 Ohms, Salt Water Immersion Type, Vitreous Enamel Coating		RE13A372J	7	For Relay CX-2122	435	7607473-P239	K-11R
0	0	1	0	0	1	1	0	0	1	1	0	0	0	1	1	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	K-12	Thermostat Relay	Single Pole, Single Throw, One Break per Circuit, Normally Closed. Coil to Operate on 11 Volts, 60 Cycle			7	7609921-P5 CX-2120	436	7607473-P242	K-12
0	0	1	0	0	1	1	0	0	1	1	0	0	0	1	1	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	K-12A	Contact—Sta. for K-12	Same as K-1A, Sta.					437		
0	0	1	0	0	1	1	0	0	1	1	0	0	0	1	1	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	K-12B	Contact—Mov.	For Relay K-12			7	#2071A	438	7607473-P244	K-12B
0	0	1	0	0	1	1	0	0	1	1	0	0	0	1	1	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	K-12C	Coil for K-12	11 V.A.C., 12 M.A., for Relay CX-2120			7	Coil "AB"	439	7607473-P245	K-12C

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	1	0	0	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	K-13	Starting Contactor Relay	Three Pole, Single Throw, One Break per Circuit, Normally Open, Contact Rating 5 Amps., 110 V.A.C., Coil to Operate on 60 V.A.C. or 110 V.A.C. with Series Resistor 175 Ohms			7	CXA-2997	440	7607473-P247	K-13
0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	K-13	Starting Contactor Relay	Three Pole, Single Throw, One Break per Circuit, Normally Open, Contact Rating 5 Amps., 110 V.A.C. Coil to Operate on 60 V.A.C. or 110 V.A.C. with Series Resistor 175 Ohms	−29330		7	CX-2997	441	7607473-P248	K-13
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	K-13	Starting Contactor Relay	Three Pole, Single Throw, One Break per Circuit, Normally Open, Contact Rating 5 Amps., 110 V.A.C. Coil to Operate on 60 V.A.C. or 110 V.A.C. with Series Resistor 175 Ohms	−29332		7	CX-2121	442	7604878-P11	K-13
0	0	1	0	0	1	0	0	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	K-13A	Contact—Sta. for K-13	Sane as K-2A, Sta.					443		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	K-13A1	Contact—Mov. for K-13	Moving L.H. Same as K-2A1 Mov. L.H.					444		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	K-13A2	Contact—Mov. for K-13	Moving R.H. Same as K-2A2 Mov. R.H.					445		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	K-13B	Contact—Stationary	For Relay K-13—Same as K-2B Sta.					446		

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13		230 V.D.C.—TBL-13		440/3/60— TBL-13		115 V.D.C.—TBL-12		230 V.D.C.—TBL-12		440/3/60— TBL-12		220/3/60— TBL-11		220/3/60— TBL-10		115 V.D.C.— TBL-7		230 V.D.C.— TBL-7		440/3/60— TBL-7		115 V.D.C.— TBL-6		230 V.D.C.— TBL-6		220/3/60— TBL-6		440/3/60— TBL-6													
0		0		1		0		0		1		1		1		0		0		1		0		0		1		1		0		0	K-13B	Contact—Moving	Same as K-2B, Mov.					447		
0		0		1		0		0		1		1		1		0		0		1		0		0		1		1		0		0	K-13C	Contact—Stationary	Same as K-2A, Sta.					448		
0		0		1		0		0		1		1		1		0		0		1		0		0		1		1		0		0	K-13C1	Contact—Moving L.H.	Same as K-2A1, Mov. L.H.					449		
0		0		1		0		0		1		1		1		0		0		1		0		0		1		1		0		0	K-13C2	Contact—Moving R.H.	Same as K-2A2, Mov. R.H.					450		
0		0		1		0		0		1		0		0		0		0		1		0		0		1		1		0		0	K-13D	Coil for K-13	Main Coil, 60 V.A.C., 60 Cycle			7	#13	451	7607473-P254	K-13D
0		0		0		0		0		0		1		1		0		0		0		0		0		0		0		0		0	K-13D	Coil for K-13	Main Coil, 60 V.A.C., 60 Cycle			7	#30	452	7607473-P257	K-13D
0		0		1		0		0		1		0		0		0		0		1		1		0		0		1		0		0	K-13E	Coil for K-13	Auxiliary Coil			7	#3035-29	453	7607473-P255	K-13E
0		0		0		0		0		0		1		1		0		0		0		0		0		0		0		0		0	K-13E	Coil for K-13	Auxiliary Coil			7	#3226-30	454	7607473-P258	K-13E
1		0		0		1		0		0		0		0		1		0		0		0		0		0		0		0		0	K-14	M.O. Overload Relay	Single Pole, Single Throw, One Break per Circuit, Normally Closed, Contact Rating 0.5 Amp., 230 V. D.C. Operating Coil 0.1–0.4 Amp. 50 Ohms Reset Coil 115 V.D.C.	−29137		1	S#1161103	455	7607473-P259	K-14
0		0		0		0		0		0		0		0		0		0		0		0		1		0		0		1		0	K-14	M.O. Overload Relay	Single Pole, Single Throw One Break per Circuit, Normally Closed, Contact Rating 0.5 Amp., 230 V.D.C. Operating Coil 0.25–0.7 Amp. Reset Coil 115 V.D.C. 620 Ohms	−29072		1	S#1155095	456	7606174-P19	K-14
0		0		0		0		0		0		0		0		0		0		0		0		1		0		0		1		0	K-14A	Contact—Stationary	Same as K-8A, It. 408					457		
1		0		0		1		0		0		0		0		1		0		0		0		0		0		0		0		0	K-14A	Contact—Stationary	Same as K-8A, It. 409					458		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-14B	Contact—Moving	Same as K-8B, It. 410					459		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-14B	Contact—Moving	Same as K-8B, It. 411					460		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-14C	Reset Coil	For K-14, It. 456			1	S#935681	461		K-14C, K-15C, K-17C, K-18C
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-14C	Reset Coil	For K-14, It. 455			1	S#1158887	462	7607473-P262	K-14C, K-15C
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-14D	Operating Coil	For K-14, It. 456, Same as K-8D, It. 414					463		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-14D	Operating Coil	For K-14, It. 455, Same as K-8D, It. 415					464		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0		Base for K-14	Same as It. 416					465		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0		Insulator for K-14	Same as It. 417					466		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-15	H.V. Overload Relay	Single Pole, Single Throw, One Break per Circuit, Normally Closed. Contact Rating 0.5 Amps., 230 V.D.C. Operating Coil 0.75–2 Amps. Reset Coil 115 V.D.C. 620 Ohms	—29073		1	S# 1155096B	467	7606174-P20	K-15
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-15	H.V. Overload Relay	Single Pole, Single Throw, One Break per Circuit, Normally Closed, Contact Rating 0.5 Amp., 230 V.D.C. Operating Coil 0.5–2 Amp., 2.5 Ohms, Reset Coil 115 V.D.C.	—29140		1	S#1161106 7710112-P7	468	7607473-P266	K-15

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-15A	Contact—Stationary	For K-15, It. 467, Same as K-8A, Sta. It. 408					469		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-15A	Contact—Stationary	For K-15, It. 468, Same as K-8A, Sta. It. 409					470		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-15B	Contact—Moving	For K-15, It. 467, Same as K-8B, Mov. It. 410					471		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-15B	Contact—Moving	For K-15, It. 468, Same as K-8B, Mov. It. 411					472		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-15C	Reset Coil	For K-15, It. 467, Same as K-14C, It. 461					473		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-15C	Reset Coil	For K-15, It. 468, Same as K-14C, It. 462					474		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-15D	Operating Coil	For K-15, It. 467, Same as K-10D, It. 426					475		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-15D	Operating Coil	For K-15, It. 468, Same as K-10D, It. 427					476		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0		Base for K-15	Same as Item 416					477		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0		Insulator for K-15	Same as Item 417					478		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	K-16	Field Contactor Relay	Double Pole, Single Throw, One Break per Circuit, Normally Open, Contact Rating 1 Amp., 230 V.D.C. Operating Coil 0.75-2 Amp. Reset Coil 115 V.D.C., 620 Ohms.			7	CXA-1970 7609921-P4	479	7607473-P273	K-15
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	K-16A	Contact—Stationary	For K-16, Same as K-3A Sta.					480		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	K-16B1	Contact—Moving R.H.	For K-16, Same as K-2A2 Moving R.H.					481		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	K-16B2	Contact—Moving L.H.	For K-16, Same as K-2A1 Moving L.H.					482		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0		K-16C	Coil	For Relay K-16, CXA-1970			7	Coil "D"	483	7607473-P277	K-16C
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	K-16R	Resistor	For K-16, Same as K-3R1					484		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	K-17	M.O. Overload Relay	Single Pole, Single Throw, One Break per Circuit, Normally Closed, Contact Rating 0.5 Amp., 230 V.D.C. Operating Coil 0.25–0.7 Amp. Reset Coil 115 V., 60 Cycle, 620 Ohms	−29067		1	S#1155093	485	7606174-P18	K-17
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	K-17	M.O. Overload Relay	Single Pole, Single Throw One Break per Circuit, Normally Closed, Contact Rating 0.5 Amp., 230 V.D.C. Operating Coil 0.1–0.4 Amp., 64 Ohms. Reset Coil 115 V., 60 Cycle	−29139		7	S#1161105	486	7607473-P281	K-17
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	K-17A	Contact—Stationary	Same as K-8A, Sta., It. 408					487		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	K-17A	Contact—Stationary	Same as K-8A, Sta., It. 409					488		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	K-17B	Contact—Moving	Same as K-8B, Mov. It. 410					489		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	K-17B	Contact—Moving	Same as K-8B, Mov. It. 411					490		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	K-17C	Reset Coil	Same as K-14C, It. 461					491		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	K-17C	Reset Coil	For Relay K-17			1	S#1158889	492	7607473-P284	K-17C, K-18C
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	K-17D	Coil—Operating	For K-17, Same as K-8D, It. 414					493		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	K-17D	Coil—Operating	For K-17 Same as K-8D, It. 415					494		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0		Base for K-17	Same as Item 416					495		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0		Insulator for K-17	Same as Item 417					496		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	K-18	H.V. Overload Relay	Single Pole, Single Throw, One Break per Circuit, Normally Closed, Contact Rating 0.5 Amp., 230 V.A.C. Operating Coil 0.75–2 Amps., Reset Coil 115 V., 60 Cycle, 620 Ohms	−29068		1	S#1155094	497	7606174-P2	K-18
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	K-18	H.V. Overload Relay	Single Pole, Single Throw, One Break per Circuit, Normally Closed, Contact Rating 0.5 Amp., 230 V.A.C. Operating Coil 0.5–2 Amps., 2.5 Ohms. Reset Coil 115 V., 60 Cycle	−29142		1	S#1161108 7710112-P15	498	7607474-P289	K-18
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	K-18A	Contact—Stationary	Same as K-8A, Sta. It. 408					499		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	K-18A	Contact—Stationary	Same as K-8A, Sta. It. 409					500		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	K-18B	Contact—Moving	Same as K-8B, Mov. It. 410					501		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	K-18B	Contact—Moving	Same as K-8B, Mov. It. 411					502		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	K-18C	Reset Coil	Same as K-14C, It. 461					503		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	K-18C	Reset Coil	Same as K-17C					504		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	K-18D	Operating Coil	Same as K-10D, It. 426					505		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	K-18D	Operating Coil	Same as K-10D, It. 427					506		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0		Base for K-18	Same as Item 415					507		
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0		Insulator for K-18	Same as Item 417					508		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	K-201	Contactor—Line	22-C-2A Contactor with L-7 Interlock					509	23-J-693 P3 & 5	K-201
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	K-201A	Main Contact				1	S#184665	510		K-201A, K-201B, K-211A, K-211B, K-301A, K-301B, K-311A, K-311B
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	K-201B	Main Contact	Same as K-201A					511		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	K-201C	Contact—Stationary				1	S#809443	512		K-201C, K-201D, K-211C, K-211D, K-301C, K-301D, K-311C, K-311D

Total Per Equipment																																				Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V D.C.—TBL-13			230 V D.C.—TBL-13			440/3/60—TBL-13			115 V D.C.—TBL-12			230 V D.C.—TBL-12			440/3/60—TBL-12			220/3/60—TBL-11			220/3/60—TBL-10			115 V D.C.—TBL-7			230 V D.C.—TBL-7			440/3/60—TBL-7																	
0			0			0			0			0			0			0			0			0			0			0			K-201C	Contact—Moving				1	S#841366* S#424699	513		K-201C, K-201D, K-211C, K-211D, K-301C, K-301D, K-311C, K-311D
0			0			0			0			0			0			0			0			0			0			0			K-201D	Contact—Stationary	Same as K-201C, Sta.					514		
0			0			0			0			0			0			0			0			0			0			0			K-201D	Contact—Moving	Same as K-201C, Mov.					515		
0			0			0			0			0			0			0			0			0			0			0			K-201G	Magnet Coil	230 Volts			1	S#285641	516		K-201G, K-311G
0			0			0			0			0			0			0			0			0			0			0				Insulation for K-201	Arc Shield			1	S#332357	517		
0			0			0			0			0			0			0			0			0			0			0			K-202	Accelerating Contactor	"AT" 14 Timetactor	—29332		1	S#845831	518	23-J-693-P8	K-202, K312
0			0			0			0			0			0			0			0			0			0			0			K-202A	Contact—Stationary				1	S#793015	519		K-202A, K-212A, K-302A, K-312A
0			0			0			0			0			0			0			0			0			0			0			K-202A	Contact—Moving				1	S#816937	520		K-202A, K-212A, K-302A, K-312A
0			0			0			0			0			0			0			0			0			0			0			K-202B	Interlock Contact—Sta.				1	S#755077	521		K-202B, K-212B, K-302B, K-312B
0			0			0			0			0			0			0			0			0			0			0			K-202B	Interlock Contact—Mov.				1	S#793013	522		K-202B, K-212B, K-302E, K

*For Replacement, Order S#841366

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	K-202M	Magnet Coil	230 Volts			1	S#895671	523	33-J-829-P9	K-202M, K-202N, K-312F
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	K-202N	Magnet Coil	Same as K-202M					524		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	K-203	Overload Relay	Type Tan			1		525	23-J-693-P11	K-203
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	K-203A	Contact—Stationary				1	S#467961	526		K-203A, K-213A, K-222C, K-303A, K-313A
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	K-203A	Contact—Moving				1	S#490053	527		K-203A, K-213A, K-222C
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	K-203D	Heater				1	S#474422	528		K-203D
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	K-211	Line Contactor	22-C-2A Contactor with L-7 Interlock			1		529	23-J-694-P3 & P5	K-211
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-211A	Contact—Main	Same as K-201A					530		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-211B	Contact—Main	Same as K-201A					531		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-211C	Contact—Stationary	Same as K-201C, Sta.					532		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-211C	Contact—Moving	Same as K-201C, Mov.					533		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-211D	Contact—Stationary	Same as K-201C, Sta.					534		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-211D	Contact—Moving	Same as K-201C, Mov.					535		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-211G	Coil	115 Volts			1	S#285640	536		K 211G, K-301G
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	2	0		Insulation for K-211	Arc Shield, Same as It. 517					537		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-212	Accelerating Contactor	"AT" 14 Timetactor	–29323		1		538	23-J-694-P8	K-212
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-212A	Main Contact—Sta.	Same as K-202A, Sta.					539		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-212A	Main Contact—Mov.	Same as K-202A, Mov.					540		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-212B	Interlock Contact—Sta.	Same as K-202B, Sta					541		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-212B	Interlock Contact—Mov.	Same as K-202B, Mov.					542		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-212M	Magnet Coil	115 Volts			1	S#895672	543		K-212M, K-212N, K-302F
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-212N	Magnet Coil	Same as K-212M					544		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-213	Overload Relay	Type Tan			1	S#860064	545	23-J-694-P11	K-213, K-222
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-213A	Contact—Stationary	Same as K-203A, Sta.					546		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-213A	Contact—Moving	Same as K-203A, Mov.					547		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	K-213D	Heater				1	S#474429	548		K-213D
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	K-221	Line Contactor	DN-130-N Contactor			1	S#973644	549	31-J-137-P4	K-221
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	K-221A	Contact—Sta.				1	S#899826	550		K-221A, K-221B, K-221C
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	K-221A	Contact—Mov.				1	S#899837	551		K-221A, K-221B, K-221C
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	K-221B	Contact—Sta.	Same as K-221A, Sta.					552		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	K-221B	Contact—Mov.	Same as K-221A, Mov.					553		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	K-221C	Contact—Sta.	Same as K-221A, Sta.					554		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																																
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2	Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	K-221C	Contact--Mov.	Same as K-221A, Mov.					555		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	K-221D	Magnet Coil				1	S#968339	556		K-221D
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	K-221E	Magnet Coil					S#944720	557		K-221E
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	K-222	Overload Relay	Type Tan, Same as K-213					558		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	K-222A	Heaters	6.7 Amps.			1	S#551938	559		K-222A, K-222B
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	K-222B	Heaters	Same as K-222A					560		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	K-222C	Contact—Sta.	Same as K-203A, Sta.					561		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	K-222C	Contact—Mov.	Same as K-203A, Mov.					562		
0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-301	Line Contactor	22-C-2A with L-7 Interlock			1	S#1292364	563	33-J-828-P3	K-301
0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-301A	Main Contact	Same as K-201A					564		
0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-301B	Main Contact	Same as K-201A					565		
0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-301C	Contact—Stationary	Same as K-201C, Sta.					566		
0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-301C	Contact—Moving	Same as K-201C, Mov.					567		
0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-301D	Contact—Stationary	Same as K-201C, Sta.					568		
0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-301D	Contact—Moving	Same as K-201C, Mov.					569		
0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-301G	Coil	Same as K-211G					570		
0	0	0	2	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0		Insulation for K-301	Arc Shield				S#332357	571		
0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-302	Accelerating Contactor	AT-14 Timetactor			1	S#485831	572	33-J-828-P8	K-302
0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-302A	Contact—Stationary	Same as K-202A, Sta.					573		

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-302A	Contact—Moving	Same as K-202A, Mov.					574		
0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-302B	Contact—Aux. Sta.	Same as K-202B, Sta.					575		
0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-302E	Contact—Aux. Mov.	Same as K-202B, Mov.					576		
0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-302F	Coil	Same as K-212M					577		
0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-303	Overload Relay	Type KNSP			1	S#1115387	578	33-J-828-P11	K-303,K-313
0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-303A	Contact—Stationary	Same as K-203A, Sta.					579		
0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-303A	Contact—Moving				1	S#782689	580	24-J-432-P32	K-303A, K-313A
0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	K-303D	Coil	115 Volts			1	S#244715	581		K-303D
0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	K-311	Line Contactor	22-C-2A with L-7 Interlock			1	S#512101	582	33-J-829-P5	K-311
0	0	0	0	2	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0		Insulation for K-311	Same as Insulation for K-301					583		
0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	K-311A	Main Contact	Same as K-201A					584		
0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	K-311B	Main Contact	Same as K-201A					585		
0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	K-311C	Contact—Stationary	Same as K-201C, Sta.					586		
0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	K-311C	Contact—Moving	Same as K-201C, Mov.					587		
0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	K-311D	Contact—Stationary	Same as K-201C, Sta.					588		
0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	K-311D	Contact—Moving	Same as K-201C, Mov.					589		
0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	K-311G	Coil	Same as K-201G					590		
0	0	0	0	2	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0		Insulation for K-311	Arc Shield, Same as Item 571					591		
0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	K-312	Accelerating Contactor	AT-14 Timetactor, Same as K-202					592		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																																				Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13			230 V.D.C.—TBL-13			440/3/60— TBL-13			115 V.D.C.—TBL-12			230 V.D.C.—TBL-12			440/3/60— TBL-12			220/3/60— TBL-11			220/3/60— TBL-10			115 V.D.C.— TBL-7			230 V.D.C.— TBL-7			440/3/60— TBL-7															
0			0			0			0			1			0			0			0			0			1			0			K-312A	Contact—Stationary	Same as K-202A, Sta.					593		
0			0			0			0			1			0			0			0			0			1			0			K-312A	Contact—Moving	Same as K-202A, Mov.					594		
0			0			0			0			1			0			0			0			0			1			0			K-312B	Contact—Aux. Sta.	Same as K-202B, Sta.					595		
0			0			0			0			1			0			0			0			0			1			0			K-312E	Contact—Aux. Mov.	Same as K-202B, Mov.					596		
0			0			0			0			1			0			0			0			0			1			0			K-312F	Coil	Same as K-202M					597		
0			0			0			0			1			0			0			0			0			1			0			K-313	Overload Relay	Type KNSP, Same as K-303					598		
0			0			0			0			1			0			0			0			0			1			0			K-313A	Contact—Stationary	Same as K-203A, Sta.					599		
0			0			0			0			1			0			0			0			0			1			0			K-313A	Contact—Moving	Same as K-303A, Mov.					600		
0			0			0			0			1			0			0			0			0			1			0			K-313D	Coil	230 Volts			1	S#258717	601	33-J-829-P4	K-313D
0			0			0			0			0			0			0			0			0			0			1			K-321	Line Contactor	Type NDN-130			1		602	33-J-830	K-321
0			0			0			0			0			0			0			0			0			0			1			K-321A	Magnet Coil	110 Volts			1	S#1224850	603	32-J-682-P6	K-321A, K-331A
0			0			0			0			0			0			0			0			0			0			1			K-321B	Contact—Stationary				1	S#1190278	604	32-J-682-P31	K-321B, K-321C, K-321D, K-331B, K-331C, K-331D, K-341B, K-341C, K-341D, K-701B, K-701C, K-701D, K-701E, K-702B, K-702C, K-702D

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	K-321B	Contact—Moving				S#1190279	605	32-J-682-P30	K-321B, K-321C, K-321D, K-331B, K-331C, K-331D, K-341B, K-341C, K-341D, K-701B, K-701C, K-701D, K-701E, K-702B, K-702C, K-702D
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	K-321C	Contact—Stationary	Same as K-321B, Sta.				606		
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	K-321C	Contact—Moving	Same as K-321B, Mov.				607		
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	K-321D	Contact—Stationary	Same as K-321B, Sta.				608		
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	K-321D	Contact—Moving	Same as K-321B, Mov.				609		
0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0		Insulation for K-321	Arc Shield			S#1190684	610	3-B-877-P11	
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	K-322	M.G. Overload Relay					611	33-J-830	K-322
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	K-322A	Primary Coil	12.5 Amps.			S#1190161	612	32-J-15-P11	K-322A, K-322B
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	K-322B	Primary Coil	Same as K-322A				613		
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	K-322C	Contact—Stationary				S#1226194	614	32-J-15-P18	K-322C, K-332C
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	K-322C	Contact Ring				S#1186647	615	32-J-15-P12 &P 13	K-322C, K-332C
0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	K-331	Line Contactor	Type NDN-130			S#1190273	616	35-J-705-P2	K-331

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	K-331A	Magnet Coil	Same as K-321A					617		
0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	K-331B	Contact—Stationary	Same as K-321B, Sta.					618		
0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	K-331B	Contact—Moving	Same as K-321B, Mov.					619		
0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	K-331C	Contact—Stationary	Same as K-321B, Sta.					620		
0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	K-331C	Contact—Moving	Same as K-321B, Mov.					621		
0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	K-331D	Contact—Stationary	Same as K-321B, Sta.					622		
0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	K-331D	Contact—Moving	Same as K-321B, Mov.					623		
0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0		Insulation for K-331	.059 Thick Treated Paper #981				S#1190672	624		
0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0		Insulation for K-331 Arm	Micarta				S#1190685	625		
0	0	0	0	0	0	2	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0		Insulation for K-331	Arc Shield, Same as It. 610					626		
0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	K-332	M.G. Overload Relay				1	S#1186641	627	35-J-705-P3	K-332
0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	K-332A	Primary Coil	6.72 Amps.			1	S#1190155	628	35-J-705-P13	K-332A, K-332B
0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	K-332B	Primary Coil	Same as K-332A					629		
0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	K-332C	Contact—Stationary	Same as K-322C, Sta.					630		
0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	K-332C	Contact Ring	Same as K-322C					631		
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-341	Coil	1DN-130 Contactor Coil					632	45-J-409-P1	K-341
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-341A	Magnet Coil	110 Volts, 60 Cycle, En. C. Wire				S#103514	633	36-J-643-P5	K-341A
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-341B	Contact	Stationary Same as K-321B, Sta.					634		

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-341B	Contact	Moving Same as K-321B, Mov.					635		
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-341C	Contact	Sta., Same as K-321B, Sta.					636		
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-341C	Contact	Mov., Same as K-321B, Mov.					637		
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-341D	Contact	Sta., Same as K-321B, Sta.					638		
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-341D	Contact	Mov., Same as K-321B, Mov.					639		
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-342	M.I. Overload Relay						640	45-J-409-P3	K-342
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-342A	Heater	5.95 A.			1	S#1265715	641	36-J-639-P22	K-342A, K-342B
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-342B	Heater	Same as Heater K-342A					642		
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-351	Contactor	IM-120			1		643	45-J-108-P1	K-351
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-351A	Coil	115 Volts D.C.			1	S#1320648	644	37-J-922-P5	K-351A
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-351B	Main Contact	Stationary			1	S#1303972	645	37-J-922-P1	K-351B, K-351C, K-361B, K-361C
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-351B	Main Contact	Moving			1	S#1303971	646	37-J-922-P2	K-351B, K-351C, K-361B, K-361C
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-351C	Main Contact	Sta., Same as K-351B, Sta.					647		
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-351C	Main Contact	Mov., Same as K-351B, Mov.					648		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																																
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2	Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-351D	Contact	Stationary			1	S#1308214	649	37-J-922-P9	K-351D, K-361D
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-351D	Contact	Moving			1	S#1308317	650	37-J-922-P10	K-351D, K-361D
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-351E	Contact	Stationary			1	S#1308250	651	37-J-922-P6	K-351E, K-361E
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-351E	Contact	Moving			1	S#1308251	652	37-J-922-P7	K-351E, K-361E
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-352	Relay	1 A.Q.Z. Tuning Relay			1		653	45-J-108-P5	K-352
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-352A	Coil	115 V.D.C.			1	S#1315392	654	37-J-890-P5	K-352A
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-352B	Main Contact	Moving			1	S#1308319	655	37-J-890-P1	K-352B, K-362B
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-352B	Main Contact	Stationary			1	S#1308318	656	37-J-890-P2	K-352B, K-362B
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-352C	Contact	Stationary			1	S#1258707	657	37-J-890-P6	K-352C, K-362C
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-352C	Contact	Moving			1	S#1257419	658	37-J-890-P7	K-352C, K-362C
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-352D	Contact	Stationary			1	S#1258708	659	37-J-890-P9	K-352D, K-362D
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-352D	Contact	Moving			1	S#1312152	660	37-J-890-P10	K-352D, K-362D
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-352F	Armature Spring				1	S#1258963	661	37-J-890-P4	K-352F, K-362F
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-353	M.I. Overload Relay				1		662	45-J-108-P10	K-353
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-353A	Heater	41 Amps.			1	S#1265731	663	36-J-639-P22	K-353A

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13		230 V.D.C.—TBL-13		440/3/60— TBL-13		115 V.D.C.—TBL-12		230 V.D.C.—TBL-12		440/3/60— TBL-12		220/3/60— TBL-11		220/3/60— TBL-10		115 V.D.C.— TBL-7		230 V.D.C.— TBL-7		440/3/60— TBL-7		115 V.D.C.— TBL-6		230 V.D.C.— TBL-6		220/3/60— TBL-6		440/3/60— TBL-6		115 V.D.C.— TBL-5		230 V.D.C.— TBL-5		440/3/60— TBL-5		115 V.D.C.— TBL-3		230 V.D.C.— TBL-3		440/3/60— TBL-3		115 V.D.C.— TBL-2		230 V.D.C.— TBL-2										
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-361	Contactor	IM-120			1		664	45-J-109-P1	K-361
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-361A	Coil	230 V.D.C.			1	S#1320627	665	37-J-922-P5	K-361A
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-361B	Main Contact	Stationary, Same as K-351B, Sta.					666		
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-361B	Main Contact	Moving, Same as K-351B, Mov.					667		
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-361C	Main Contact	Sta., Same as K-351B, Sta.					668		
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-361C	Main Contact	Mov., Same as K-351B, Mov.					669		
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-361D	Contact	Stationary, Same as K351D, Sta.					670		
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-361D	Contact	Moving, Same as K-351D, Mov.					671		
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-361E	Contact	Stationary, Same as K-351E, Sta.					672		
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-361E	Contact	Moving, Same as K-351E, Mov.					673		
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-362	Timing Relay	1 A.Q.Z. —4111			1		674	45-J-109-P5	K-362
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-362A	Coil	230 V.D.C.			1	S#1315393	675	37-J-890-P5	K-362A
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-362B	Main Contact	Moving, Same as K-352B, Mov.					676		
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-362B	Main Contact	Stationary, Same as K-352B, Sta.					677		
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-362C	Contact	Stationary, Same as K-352C, Sta.					678		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																																				Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13			115 V.D.C.—TBL-12			115 V.D.C.—TBL-11			115 V.D.C.—TBL-10			115 V.D.C.—TBL-7			115 V.D.C.—TBL-6			115 V.D.C.—TBL-5			115 V.D.C.—TBL-3			115 V.D.C.—TBL-2																			
230 V.D.C.—TBL-13			230 V.D.C.—TBL-12			230 V.D.C.—TBL-7			230 V.D.C.—TBL-6			230 V.D.C.—TBL-5			230 V.D.C.—TBL-3			230 V.D.C.—TBL-2																											
440/3/60—TBL-13			440/3/60—TBL-12			220/3/60—TBL-7			440/3/60—TBL-7			440/3/60—TBL-6			220/3/60—TBL-6			440/3/60—TBL-6			440/3/60—TBL-5			440/3/60—TBL-3			440/3/60—TBL-3																			
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-362C	Contact	Moving, Same as K-352C, Mov.					679		
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-362D	Contact	Stationary, Same as K-352D, Sta.					680		
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-362D	Contact	Moving, Same as K-352D, Mov.					681		
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-362F	Armature Spring	Same as K-352F					682		
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-363	M.I. Overload Relay					1	683	45-J-109-P7	K-363
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-363A	Heater	20.5 Amps.				1	S#1265725	684	36-J-639-P22	K-363A
0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-501	Line Keying Relay	S.P.D.T., One Break per Circuit, Coil Operate 0.015 Amp., 85 Ohms, each Parallel Winding, Contacts Rated 110 M.A.	−29090			45	Type 215H with Mtg. Block Type 18B	685	7606570-P19	K-501
0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-502	Transfer Relay	D.P.D.T., One Break per Circuit, Contact Rating 50 Amps. at 110 Volts A.C. or D.C. Coil Operating Voltage 110 Volts A.C., Coil Operating Current 0.07 Amp.				7	CXC-1946	686	7606570-P25	K-502
0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-502A	Coil	For K-502				7	#3226-35	687	7606570-P27	K-502A
0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-502B	Contact—Moving	For K-502				7	#3801-A	688	7606570-P28	K-502B, K-502C, K-502D, K-502E
0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-502B	Contact—Stationary	Make Contact for Relay K-502				7	#3111-A	689	7606570-P30	K-502B, K-502E
0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-502C	Contact—Moving	Same as K-502B, Mov.						690		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-502C	Contact—Stationary	Break Contact forK-502			7	#3112A	691	7606570-P29	K-502C, K-502D
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-502D	Contact—Moving	Same as K-502B, Mov.					692		
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-502D	Contact—Stationary	Same as K-502C, Sta.					693		
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-502E	Contact—Moving	Same as K-502B, Mov.					694		
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-502E	Contact—Stationary	Same as K-502B, Sta.					695		
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-503	Mechanical Latching Starting Relay	3 P.S.T., Three Double Break Contacts, Contact Rating 10 Amps. at 110 V.A.C. or D.C. Tripping Coil Rating 110 V. at 0.055 Amp. Closing Coil 110 V. at 0.085 Amp.	−29105		46	Type R-900	696	7606570-P44	K-503
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-503A	Tripping Coil	For Relay K-503			46	R-900-P17	697	7606570-P45	K-503A
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-503B	Closing Coil	For Relay K-503			46	R-900-P21	698	7606570-P46	K-503B
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-503C	Contact—Moving	For Relay-K-503			46	R-900-P10	699	7606570-P47	K-503C, K-503D, K-503E
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-503C	Contact—Stationary	For Relay K-503			46	R-900-P22	700	7606570-P48	K-503C, K-503D, K-503E
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-503D	Contact—Moving	Same as K-503C, Mov.					701		
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-503D	Contact—Stationary	Same as K-503C, Sta.					702		
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-503E	Contact—Moving	Same as K-503C, Mov.					703		
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-503E	Contact—Stationary	Same as K-503C, Sta.					704		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-504	Buffer Relay	S.P.S.T., Slow Release Relay, One Break per Circuit, Normally Closed, Release 1.5 to 2 Seconds, Coil Rating 71 Milliamperes at 110 V. ±15% 60 Cycle, Contact Rating 1 Amp. at 110 V.A.C.	—29087		47	#1040-78 PC# 463158	705	7606570-P60	K-504
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-504A	Coil	For Relay K-504			47	PC# 463203	706	7606570-P61	K-504A, K-506A
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-504B	Contact	For Relay K-504			47	PC# 463204	707	7606570-P62	K-504B
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Base for K-504	Micarta, 4-7/8 x 2-5/8 of 3/16 TK					708		
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-505	Timing Relay	1 Set S.P.D.T., 2 Sets S.P.S.T., Contacts may be Adjusted to Operate Simultaneously or Sequentially. Contact Rating 20 Amps. at 110 V.A.C., 15 Amps. 230 V.A.C., 3 Amps. at 125 V.D.C.	—29107		1	S#1158879	709	7606570-P70	K-505
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-505A	Coil—Contactor	For Relay K-505			1	S#937021	710	7606570-P71	K-505A
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-505B	Contact—Stationary	Make Contact (Left Side)			1	S#1102935	711	7606571-P77	K-505B, K-505D
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-505B	Contact—Moving	Arm & Pigtail (Left Side)			1	S#1201830	712	7606571-P76	K-505B, K-505C
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-505C	Contact—Stationary	Break Contact (Left Side)			1	S#1096710	713	7606570-P72	K-505C
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-505C	Contact—Moving	A Part of K-505B					714		
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-505D	Contact—Stationary	Same as K-505B, Sta.					715		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-505D	Contact—Moving	Arm & Pigtail (Right Side)			1	S#1201831	716	7606571-P75	K-505D, K-505E
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-505E	Contact—Moving	A Part of K-505D (Right Side)					717		
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-505E	Contact—Stationary Front Break	For Motor Contact			1	S#1096709	718	7606571-P74	K-505E
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-505E	Contact—Moving Rear Break	For Motor Contact			1	S#1096708	719	7606571-P73	K-505E
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-506	Buffer Relay	S.P.S.T., Slow Release Relay, One Break per Circuit, Normally Open, Release Time 1.5 to 2 Seconds, Coil Rated 50 Milliamperes at 110 V., 60 Cycle, Contact Rating 1 Amp. at 110 V.A.C.	−29085		47	#1040-79	720	7606571-P94	K-506
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-506A	Coil	For K-506—Same as K-504A					721		
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-506B	Contact Assembly	For K-506			47	PC #463205	722	7606571-P96	K-506B
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Base for K-506	Same as Item 708					723		
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-507	Primary Control Relay	D.P.S.T., Single Make, Normally Open, Coil Single Wound 25, 155 Turns, 1800 Ohms Resistance #36 E.C. Wire 0.010 Milliamperes	−29051		48	Type C 7407636-P1	724	7606571-P104	K-507
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-507A	Coil	For Relay K-507			48	#W2-1064-5	725	7606571-P105	K-507A
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-507B	Contact Assembly	Two Form "A" Silver Size #18			48		726	7606571-P106	K-507B, K-507C

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-507C	Contact Assembly	Same as K-507B					727		
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-508	Transfer Relay	S.P.D.T., One Break per Circuit, 115 V., 60 Cycle, 30 M.A.	−29113		48	Type A	728	7606571-P109	K-508
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-508A	Coil for Relay K-508	4000 Turns #31 Formex Wire, 110 V.A.C., 60 Cycle, 90 Ohms			48	#W5-1008	729	7606571-P110	K-508A
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-508B	Contact for Relay K-508	One Form "C" Silver Size #14			48		730	7606571-P111	K-508B
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-701	Motor Starting & M.O. Bias Contactor	4 P.S.T., One Break per Circuit, 600 Volts, 25 Amps.			1	S#1190273 Type NDN-130	731	7610037-P37	K-701, K-702
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-701A	Contactor Coil for K-701	115 Volts, 50/60 Cycle			1	S#1264399	732	7610037-P38	K-701A, K-702A
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-701B	Contact—Moving	For K-701, Same as K-321B, Mov.					733		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-701B	Contact—Stationary	For K-701, Same as K-321B, Sta.					734		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-701C	Contact—Moving	Same as K-321B, Mov.					735		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-701C	Contact—Stationary	Same as K-321B, Sta.					736		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-701D	Contact—Moving	Same as K-321B, Mov.					737		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-701D	Contact—Stationary	Same as K-321B, Sta.					738		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-701E	Contact—Moving	Same as K-321B, Mov.					739		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-701E	Contact—Stationary	Same as K-321B, Sta.					740		
0	0	0	0	0	0	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Insulation for K-701	Arc Shield, Same as Item 610					741		

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-702	High Voltage Contactor	Same as K-701					742		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-702A	Contactor Coil for K-702	Same as K-701A					743		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-702B	Contact—Moving	Same as K-321B, Mov.					744		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-702B	Contact—Stationary	Same as K-321B, Sta.					745		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-702C	Contact—Moving	Same as K-321B, Mov.					746		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-702C	Contact—Stationary	Same as K-321B, Sta.					747		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-702D	Contact—Moving	Same as K-321B, Mov.					748		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	K-702D	Contact—Stationary	Same as K-321B, Sta.					749		
0	0	0	0	0	0	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Insulation for K-702	Arc Shield, Same as Item 610					750		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-1	H.F. M.O. Tank Coil Assembly	C-1, C-2, C-3, C-4, C-6, S-1A and S-1B	—47460		1	7407910-G1	751	7607474-P300	L-1, S-1A, S-1B
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		H.F. M.O. Tank Coil Only Spare for L-1	16 Turns, Edgewise Wound of 261.5 Inch 1/2 x 1/16 Copper Strap			1	7407910-G2	752		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		End for L-1 (Front)	Micalex 10-3/16 x 6-3/4 x 5/16			1	7605522-P1	753	7605523-P3	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		End for L-1 (Rear)	Micalex 10-3/16 x 6-3/4 x 5/16			1	7605522-P4	754	7605523-P4	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6		Insulator for L-1	Isolantite 7-1/4 x 3/4 x 1/2			29	7806537-P1	755	7605523-P9	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Contact for L-1	Sliding			1	7705733-G2	756	7605523-P44	

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																																
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2	Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-2	H.F. M.O. Filament Choke Coil	Two Coaxial Windings Bottom Windings 50 Turns, Top Winding 48 1/2 Turns 3.5 Amps A.C. or D.C.	−47478		1	7705707-G6	757	7607474-P301	L-2, L-3
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-3	H.F. M.O. Filament Choke Coil	Part of L-2					758		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-4	H.F. M.O. Plate Choke Coil	Inductance 2.5 Millihenries D.C. Resistance 8 Ohms, 500 M.A. D.C.	−47400		1	7407506-G1	759	7607474-P304	L-4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-5	Doubler Circuit Tank Coil	28 Turns #14, .064″ Dia. Tinned Copper Wire	−47461		1	7705697-G1	760	7607474-P306	L-5
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Coil Form for L-5	Isolantite 6-1/16 x 2-1/2 O.D. x 2-1/16 I.D.			29	7705697-P2	761	7705697-G1	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-6	Thump Filter Reactor Coil	1 Henry, 1000 V.D.C., 0.75 Amp., 1560 Turns 21.5 Ohms	−30329		1	L-332743	762	7607474-P307	L-6
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-7	H.F. 1st Amp., Grid Choke Coil	480 Inches .0159 Inch Dia. S.C.C. Enamel Copper Wire, Space Wound 20-20-20 Turns			1	7405204-G4	763	7607474-P308	L-7, L-14
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-8	I.F. M.O. Plate Choke Coil	Coils Duo-Lateral Wound #26 D.S.C. Copper Wire	−47473		1	7700874-G6	764	7607474-P310	L-8, L-13, L-20
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-9	I.F. M.O. Tank Variometer Coil		−47462		1	7605548-G1	765	7607474-P314	L-9
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Stator Assembly for L-9	83 Ft. Litz 3 x 3 x 18 of 004				7706416-G1	766	7605548-P2	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Rotor Assembly for L-9	54 1/2 Ft. Litz 3 x 27 of .004				7706416-G2	767	7605548-P3	

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																						Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2									
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Insulator for L-9	Isolantite			29	7602239-P1	768	7407907-P53	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6		Insulator for L-9	Prestite			1	50-C-692-P2	769	7605548-P18	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6		Insulator for L-9	Prestite			1	50-C-692-P1	770	7605548-P19	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-10	I.F. M.O. Grid Choke Coil	Same as L-8, Except Mtg. Insulators			1	7700874-G5	771	7607474-P315	L-10
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-11	H.F. 1st Amp. Tank Inductance Coil	230" of .064" Dia. #14 Tinned Copper Wire, 26 Turns Tapped at 6-1/2 and 23-3/4 Turns	—47480		1	7406479-G1	772	7607474-P319	L-11
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-12	H.F. 1st Amp. Plate Choke Coil	375 Turns of #24 0.0201" Dia. D.C.C. Copper Wire, Basket Wound, 4 Milli-henries, 5.15 Ohms			1	L-303481	773	7607474-P320	L-12, L-17, L-21, L-24, L-28, L-31, L-32
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-13	I.F. Int. Amp. Grid Choke Coil	Same as L-8	—47473				774		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-14	H.F. 2nd Amp. Grid Choke Coil	Same as L-7 (Without Bracket)	—47463				775		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-15	I.F. Int. Amp. Tank Variometer Coil				1	7605542-G1	776	7607474-P328	L-15
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Stator Assembly for L-15	81-1/3 Turns #16 D.C.C. Copper Wire				7605551-G1	777	7605542-P2	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Rotor Assembly for L-15	47-1/2 Turns #17 D.C.C. Copper Wire	—47454			7605551-G2	778	7605542-P3	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		Insulator for L-15	Same as Item 769					779		
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		Insulator for L-15	Same as Item 770					780		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-16	H.F. 2nd Ampl. Tuning Ind. Coil	22 Turns of 220 Inches of #10 .102 Dia. Half Hard Copper Wire, Silver Covered	—47468		1	7604676-G7	781	7607474-P329	L-16
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		End Plate for L-16	Micalex 4-11/16 x 4-3/8 x 1/4			1	7406755-P1	782	7604676-P2	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		End Plate for L-16	Micalex 4-11/16 x 4-3/8 x 1/4			1	7406755-P2	783	7604676-P3	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Sliding Contact for L-16	Nickel Silver			1	7604676-G4	784	7604676-P16	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Spring for L-16	Phos. Bronze 18T#23 Wire 1/8″ O.D.			1	7809703-P1	785	7604676-P15	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Roller Contact for L-16	Bronze—1″ Long 1″ Dia.			1	7605179-P34	786	7604676-P12	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-17	H.F. 2nd Ampl. Plate Choke Coil	Same as L-12					787		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-18	H.F. P.A. Grid Choke Coil	240 Inches of .010 Dia. D.C.C. Copper Wire, Space Wound 5-10-10-5 Turns			1	7405204-G3	788	7607474-P332	L-18
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-19	H.F., P.A. Grid Choke Coil	65 Turns of #24, 0.201 Dia. D.C.C. Copper Wire, Basket Wound, 0.1 Millihenry, 0.7 Ohms	—47470		1	L-303602	789	7607474-P333	L-19
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-20	I.F. P.A. Grid Choke Coil	Same as L-8	—47473				790		
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Insulator for L-20	Same as Item 28					791		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-21	I.F. Int. Ampl. Plate Choke Coil	Same as L-12					792		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																																
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2	Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-22	I.F. P.A. Tank Variometer Coil		—47471		1	7605526-G1	793	7607474-P341	L-22, L-29
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Stator Assembly for L-22	12 & 26 Turns #12 Tinned Copper Wire				7605527-G1	794	7605526-P2	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Rotor Assembly for L-22	36-1/2 Turns Litz 3 x 3 x 18 of .004 Dia.				7605527-G3	795	7605526-P3	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Rotor Assembly for L-22	186″ Litz 3 x 10 x 20 of .004 Dia.				7605527-G2	796	7605526-P4	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Insulator for L-22	Isolantite 1-3/4 x 23/32 Sq.			29	7705360-P29	797	7605526-P18	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		Insulator for L-22	Same as Item 769					798		
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		Insulator for L-22	Same as Item 770					799		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-23	H.F. P.A. Tuning Inductance Coil	Same as L-16, Except Mounting			1	7604676-G6	800	7607474-P342	L-23
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		End Plate for L-23	Same as Item 782					801		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		End Plate for L-23	Same as Item 783					802		
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Sliding Contact for L-23	Same as Item 784					803		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Spring for L-23	Same as Item 785					804		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Contact—Roller for L-23	Same as Item 786					805		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-24	H.F. P.A. Plate Choke Coil	Same as L-12					806		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-25	H.F. Antenna Tuning Inductance Coil	Same as L-16 Except Mounting			1	7604676-G9	807	7607474-P345	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		End Plate for L-25	Same as Item 782					808		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		End Plate for L-25	Same as Item 783					809		
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Sliding Contact for L-25	Same as Item 784					810		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Spring for L-25	Same as Item 785					811		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Contact Roller for L-25	Same as Item 786					812		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-26	I.F. Antenna Inductance Coil	135 Turns Litz 3 x 5 x 20 of .004 Dia.	—47472		1	7605519-G1	813	7607474-P346	L-26
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		End Plate for L-26	Micarta 10 x 10 x 1/2			1	7406154-P1	814	7605519-P2	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		End Plate for L-26	Micarta 10 x 10 x 1/2			1	7406154-P2	815	7605519-P12	
13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13		Spacer for L-26	Isolantite 1/4 x 3/4O.D. x 17/32 I.D.			29	7602239-P59	816	7605519-P4	
13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13		Spacer for L-26	Prestite			1	50-C-695P2	817	7605519-P22	
13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13		Insulator for L-26	Isolantite 15 x 1/2 Dia.			29	7602239-P63	818	7605519-P3	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	L-27	I.F. Antenna Tuning Variometer Coil	Wire 3 x 5 x 20 Litz .004			1	7604879-G3	819	7604968-P61	L-27
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	L-27	I.F. Antenna Tuning Variometer Coil	Wire 3 x 5 x 20 Litz .004			1	7606670-G1	820	7607474-P347	L-27
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Form for L-27 (Rotor)	Bakelite			38	7610454-P1	821	7606669-P6	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Form for L-27 (Stator)	Micarta			1	7606669-G3	822	7606669-P9	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		Insulator for L-27	Same as Item 769					823		
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		Insulator for L-27	Same as Item 770					824		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Wire for Item 819	365 Inches of 3 x 5 x 20 Litz .004			1	7606669-P11	825	760669-G2	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Wire for Item 820	510 Inches of 3 x 5 x 20 Litz .004			1	7606669-P10	826	7606669-G1	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Spring for L-27	Nickel Silver			1	7605543-P10	827	7606670-P8	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-28	I.F. P.A. Plate Choke Coil	Same as L-12					828		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-29	I.F. Antenna Coupling Inductance Coil	Part of L-22					829		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-30	I.F. M.O. Tank Inductance Coil	124 Turns, 2 Layers Bank Wound, 1500 Inches of .07 Dia. Litz 3 x 3 x 18 of .004 Dia. Tapped at 45, 59, 81 and 91 Turns	—47475		1	7705719-G-1	830	7607474-P352	L-30
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	L-31	R.F. Line Choke Coil	Same as L-12					831		
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	L-32	R.F. Line Choke Coil	Same as L-12					832		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	L-33	P.A. Screen Modulation Reactor Coil	2 Henries, 0.1 Amp., 1000 V. Insulation	—30321		1	317190B	833	7604902-P56	L-33
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	L-33	P.A. Screen Modulation	5 Henries, 0.1 Amp., 1000 V. Insulation, 1300 Turns, 65 Ohms			1	L-340136	834	7607474-P357	L-33
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-150	Bias Filter Reactor	2 Henries, 1 Amp., 300 V.D.C. #22 Wire	—30318		1	L-332700	835	7607478-P20	L-150
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Insulator for L-150	Moldarta			1	7809106-P1	836	7604920-P6	

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																																
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2	Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	L-151	M.O. Filter Reactor	13 Henries, 0.16 Amp., 1000 V.D.C. #29 Wire	—30337		1	L-332746	837	7607478-P21	L-151
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Terminal Block for L-151	Isolantite			29	7406307-P2	838		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	L-701	Bias Reactor	1.5 Henry, 0.5 Amp. D.C. 118 Volts, 100 Cycle Ripple 1500 V. Test, 8.0 Ohms D.C. Resistance Max. 833 Turns #18 Wire	—301085		1	S#1304059	839	7610037-P54	L-701, L-702
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	L-702	Bias Reactor	Same as L-701	—301085				840		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	L-703	M.O. Reactor	10 Henries, Tapped at 6.8 Henries, 0.2 Amp. D.C., 500 V., 1000 Cycle Ripple, 2500 Volt Test, 50 Ohms Max. D.C. Resistance 1924 Turns Tapped at 1589 Turns #22 Wire	—301083		1	S#1304060	841	7610037-P55	L-703
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	L-704	H.V. Reactor	0.7 Henry, 0.7 Amp. D.C., 100 Volts, 300 Cycle Ripple, 4000 Volts Test, 28 Ohms Max. D.C. Resistance, 906 Turns #22 Wire	—301082		1	S#1304061	842	7610037-P56	L-704
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	M-1	H.F. M.O. Screen Current Meter	0 to 50 M.A. D.C.	—22056	17-I-12A	1	NX-35 7605997-P17	843	7607475-P361	M-1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	M-2	M.O. Plate Current Meter	0 to 100 M.A. D.C.	—22159	17-I-12A	1	NX-35 7605997-P16	844	7607475-P362	M-2
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	M-3	M.O. Plate Voltmeter Meter	0 to 1.5 Kv. D.C., 1000 Ohms per Volt	—22305	17-I-12A	1	NX-35 7605997-P22	845	7607475-P363	M-3, M-3R

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																															
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2	Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	M-3R	Multiplier Meter	Part of M-3, 1.5 Megohms	—63755				846		
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	M-4	Line Voltmeter	0–500 V.D.C., 1000 Ohms per Volt	—22225	17-I-12A	1	NX-35 7605997-P21	847	7607475-P365	M-4, M-6
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	M-5	1st Ampl. Plate Current Meter	0 to 250 M.A. D.C.	—22065	17-I-12A	1	NX-35 7605997-P4	848	7607475-P366	M-5, M-8
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	M-6	Bias Voltmeter	Same as M-4	—22225				849		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	M-7	Filament Meter	0–15 V.A.C.	—22080	17-I-12A	1	NA-35 7605997-P6	850	7607475-P368	M-7
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	M-8	2nd Ampl. Plate Current Meter	Same as M-5	—22065				851		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	M-9	P.A. Grid Current Meter	0–150 M.A. D.C.	—22061	17-I-12A	1	NX-35 7605997-P2	852	7607475-P370	M-9
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	M-10	Plate Voltmeter	0–2.5 Kv., D.C. 1000 Ohms per Volts	—22306	17-I-12A	1	NX-35 7605997-P23	853	7607475-P371	M-10
0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	M-10R	Multiplier Meter	Part of M-10, 1 Megohm, 1.5 Megohm	—63754 —63755				854	7607475-P372	M-10R
1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	M-10R	Multiplier Meter	Part of M-10, 2.5 Meg.	—63774		1		854A		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	M-11	P.A. Plate Current Meter	0–500 M.A. D.C.	—22067	17-I-12A	1	NX-35 7605997-P1	855	7607475-P373	M-11
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	M-12	I.F. Antenna Current Meter	0–15 Amps. R.F.	—22035	17-I-12A	1	NT-35 7605997-P15	856	7607475-P374	M-12
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	M-13	H.F. Ant. Current Meter	0–5 Amps. R.F.	—22025	17-I-12A	1	NT-35 7605997-P3	857	7604890-P7	M-13
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	M-13	H.F. Ant. Current Meter	0–10 Amps. R.F.	—22031	17-I-12A	1	NT-35 7605997-P18	858	7607475-P375	M-13

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0	M-14	Line Voltmeter	0-200 V.D.C.	—22256	17-I-12A	1	NX-35 7605997-P9	859	7607474-P376	M-14
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	2	0	O-250	Ball Bearing	For B-250 (1st)			50	#1205	860	N-27551-P1	O-250
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	2	O-260	Ball Bearing	For B-250 (2nd)			50	#1205	861	N-27550-P1	O-260
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	O-270	Ball Bearing	For B-270			50	#1306	862	N-27552-P1	O-270
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	O-271	Ball Bearing	For B-270			50	#1205	863	N-27552-P2	O-271
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	2	O-280	Ball Bearing	For G-250			50	#1205	864	N-27553-P20	O-280
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	2	O-290	Ball Bearing	For G-251			50	#1205	865	N-22554-P30	O-290
2	0	0	2	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	O-401	Ball Bearing	For B-401			31	#205SF	866	N-30142-P1	O-401, O-421
0	2	0	0	2	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	O-421	Ball Bearing For B-421	Same as O-401, For B-421			31	#205SF	867	N-30141-P1	
0	0	1	0	0	1	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	O-441	Ball Bearing	For B-441			31	#306SF	868	N-30143-P1	O-441
0	0	1	0	0	1	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	O-442	Ball Bearing for B-441	Same as O-401 for B-441			31	#205SF	869	N-30143-P2	O-442
2	2	2	2	2	2	0	0	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	O-451	Ball Bearing for G-451	Same as O-401 for G-451			31	#205SF	870	N-30144-P20	O-451
2	2	2	2	2	2	0	0	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	O-461	Ball Bearing for G-461	Same as O-401 for G-461			31	#205SF	871	N-30145-P30	O-461
0	0	0	0	0	0	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	O-701	Ball Bearing	For B-701			8		872	7610037-P2	O-701
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-1	Thermostat Arc Suppressor Resistor	30,000 Ohms, 1 Watt ±10%, Composition	—63288	RE13A372G	8	Type G-1	873	7607475-P385	R-1
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	R-2	Thermostat Relay Potentiometer Resistor	8000 Ohms, 60 Watts, Tapped at 500 Ohms	—63506	RE13A372J			874	7607475-P386	R-2

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	R-3	Keying Relay Pot. Resistor	2000 Ohms, 250 Volts	—63079	RE13A372G	8		875	7604902-P135	R-3
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	R-3	Keying Relay Pot. Resistor	300 Ohms, Grade 1, Class 1	—63065F	RE13A372J	8		876	7607475-P387	R-3, R-35
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	R-4	Heater Resistor	155 Ohms, 1 Amp. ±5%, Special "Ohmspun"	—63563		17	7707024-P1	877	7607475-P388	R-4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-5	H.F. M.O. Grid Bias Potentiometer Resistor	5000 Ohms, Grade 1, Class 1 Tapped 10 Equal Values	—63507F	RE13A372J	24		878	7607475-P389	R-5
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-6	H.F. M.O. Screen Resistor	50,000 Ohms,200 Watts	—63222E	RE13A372J	24	7407908-P228	879	7607477-P527	R-6, R-43, R-44
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-7	H.F. M.O. Plate Series Resistor	5000 Ohms, Grade 1, Class 1	—63149F	RE13A372J	24		880	7607475-P391	R-7
0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	R-8	Key Thump Resistor	300 Ohms, 3 Watts, Carbon	—63289	RE13A372G	24	7604902-P210	881	7604902-P210	R-8
1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	R-8	Key Thump Resistor	300 Ohms, 10 Watts		RE13A372J	8	7407907-P362	882	7607476-P440	R-8
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-9	Key Click Filter Resistor	20,000 Ohms, 60 Watts	—63095E	RE13A372J	24	7407908-P229	883	7607477-P528	R-9, R-15
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-10	H.F. 1st Amp. Grid Resistor	25,000 Ohms, 60 Watts	—63096E	RE13A372J		7407907-P328	884	7607477-P529	R-10
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-11	Audio Oscillator Grid Resistor	5000 Ohms, Grade 1, Class 1	—63085F	RE13A372J	24		885	7607475-P395	R-11, R-13, R-14, R-19, R-501
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	R-12	Filament Rheostat Resistor	30 Ohms, 2.7 Amps.			24		886	7604968-P36	R-12

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	0	0	R-12	Filament Rheostat Resistor	40 Ohms, 2.2 Amps., 6″ Plate Equal Steps, Resistance to Decrease with Clockwise Rotation of Shaft	−632400		24	7606130-P1	887	7607475-P396	R-12
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-13	I.F. M.O. Grid Resistor	Same as R-11	−63085F				888		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-14	I.F. M.O. Screen Resistor	Same as R-11	−63085F				889		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-15	I.F. Amp. Screen Resistor	Same as R-9	−63095E				890		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	R-16	Filament Load Resistor	3.2 Ohms, 250 Volts	−63311	RE13A372G	24		891	7604902-P114	R-16
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	R-16	Filament Load Resistor	1.6 Ohms, Grade 1, Class 1	−63608F	RE13A372J	24		892	7607475-P400	R-16, R-55
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-17	2nd Ampl. Grid Resistor	30,000 Ohms, 100Watts	−63160E	RE13A372J	24	7407907-P329	893	7607477-P530	R-17, R-42
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	R-18	Spark Suppressor Resistor	1 Ohm., 3 Watts, ±10%	−63289	RE13A372G	8	D-3	894	7607475-P402	R-18, R-36, R-45
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-19	2nd Ampl. Screen Resistor	Same as R-11	−63085F				895		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0	R-20	Thermostat Relay Potentiometer	2000 Ohms, Grade 1, Class 1, Tapped at 300 Ohms	−63553F	RE13A372J	24		896	7607475-P404	R-20
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-21	I.F. P.A. Grid Resistor	2500 Ohms, Grade 1, Class 1	−63080F	RE13A372J	24		897	7607475-P405	R-21, R-701, R-702, R-703
																							R-22	Not Used								
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-23	Tune Operate Resistor	2500 Ohms, Grade 1, Class 1	−63144F	RE13A372J	24		898	7607475-P407	R-23, R-37

Total Per Equipment																																				Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13			115 V.D.C.—TBL-12			115 V.D.C.—TBL-7			115 V.D.C.—TBL-6			115 V.D.C.—TBL-5			115 V.D.C.—TBL-3			115 V.D.C.—TBL-2																											
230 V.D.C.—TBL-13			230 V.D.C.—TBL-12			230 V.D.C.—TBL-7			230 V.D.C.—TBL-6			230 V.D.C.—TBL-5			230 V.D.C.—TBL-3			230 V.D.C.—TBL-2																											
440/3/60—TBL-13			440/3/60—TBL-12			440/3/60—TBL-7			440/3/60—TBL-6			440/3/60—TBL-5			440/3/60—TBL-3																															
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	R-24	2000 Volt Supply Potentiometer Resistor	4000 Ohms, Grade 1, Class 1 Tapped 10 Equal Values	—63237	RE13A372G	24		899	7604902-P137	R-24
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	R-24	2000 Volt Supply Potentiometer Resistor	2000 Ohms, Grade 1, Class 1 Tapped 10 Equal Values	—63234F	RE13A372J	24		900	7607475-P408	R-24, R-25, R-53, R-54
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-25	2000 Volt Supply Potentiometer Resistor	Same as R-24, Item 900	—63234F				901			
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-26	2000 Volt Supply Potentiometer Resistor	6000 Ohms, Grade 1, Class 1 Tapped 10 Equal Values	—63265F	RE13A372J	24		902	7607475-P410	R-26, R-27
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-27	2000 Volt Supply Potentiometer Resistor	Same as R-26	—63265F				903			
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-28	Bias Supply Potentiometer Resistor	500 Ohms, Grade 1, Class 1 Tapped 10 Equal Values	—63227F	RE13A372J	24		904	7607475-P412	R-28, R-29, R-30, R-150
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-29	Bias Supply Potentiometer Resistor	Same as R-28	—63227F				905			
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-30	Bias Supply Potentiometer Resistor	Same as R-28	—63227F				906			
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-31	1000 Volt Supply Potentiometer Resistor	5000 Ohms, Grade 1, Class 1	—63212F	RE13A372J	24		907	7607475-P415	R-31, R-32
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-32	1000 Volts Supply Potentiometer Resistor	Same as R-31	—63212F				908			
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-33	P.A. Grid Resistor	25 Ohms, 5 Watts ±10%, Composition	—63368	RE13A372G	8	D-5	909	7607475-P417	R-33, R-34
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-34	P.A. Grid Resistor	Same as R-33	—63368				910			

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	R-35	Keying Relay Potentiometer Resistor	1300 Ohms, 250 Volts	—63509	RE13A372G			911	7604902-P136	R-35
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	R-35	Keying Relay Potentiometer Resistor	Same as R-3, Item 876	—63065F				912		
0	1	1	0	1	1	1	1	0	1	1	0	1	1	1	0	1	1	0	1	1	0	1	R-36	Spark Suppressor Resistor	Same as R-18	—63289				913		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-37	Tune Operate Resistor	Same as R-23	—63144F				914		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	R-38	Keying Relay Series Resistor	2000 Ohms, 250 Volts	—63079		24		915	7604902-P134	R-38
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	R-38	Keying Relay Series Resistor	400 Ohms, Grade 1, Class 1	—63067F	RE13A372J	24		916	7607475-P422	R-38
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	R-39	Control Resistor	1100 Ohms, 250 Volts	—63511	RE13A372G	24		917	7604902-P133	R-39
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	R-39	Keying Relay Potentiometer Resistor	1200 Ohms, Grade 1, Class 1	—63077F	RE13A372J	24		918	7607475-P423	R-39
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	R-40	Heater Resistor	250 Ohms, 0.5 Amp., ±5%	—63564		17		919	7607475-P424	R-40
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	R-41	Field Rheostat Resistor	3600 Ohms, 6″ Plate			24		920	7604968-P37	R-41
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	R-41	Field Rheostat Resistor	4500 Ohms, 6″ Plate Tapered to Give Equal Voltage and Increase Voltage with Clockwise Rotation	—632401		24	7606130-P2	921	7607475-P425	R-41
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-42	2nd Ampl. Grid Resistor	Same as R-17	—63160E				922		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-43	Screen Potent. Resistor	Same as R-6	—63222E				923		

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.— TBL-13	230 V.D.C.— TBL-13	440/3/60— TBL-13	115 V.D.C.— TBL-12	230 V.D.C.— TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-44	Screen Potent. Resistor	Same as R-6	−63222E				924		
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	R-45	Spark Suppressor Resistor	Same as R-18	−63289				925		
1	0	1	1	0	1	1	1	1	0	1	1	0	1	1	1	0	1	1	0	1	1	0	R-46	Heater Resistor	38.5 Ohms, 2.5 Amps. ±5%	−63561		17		926	7607475-P430	R-46
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	R-47	Filament Rheostat Resistor	20 Ohms, 2.1 Amps., 6″ Plate Equal Steps, Resistance to Decrease with Clockwise Rotation	−632402		24	7606130-P3	927	7607475-P431	R-47
1	0	1	1	0	1	1	1	1	0	1	1	0	1	1	1	0	1	1	0	1	1	0	R-48	Heater Resistor	66.5 Ohms, 2 Amps. ±5%	−63562		17		928	7607475-P432	R-48
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	R-49	Control Resistor	100 Ohms, 250 Volts		RE13A372G	24		929	7604903-P257	R-49
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	R-50	Relay Series Resistor	4000 Ohms, 250 Volts	−63083	RE13A372G	24		930	7604903-P258	R-50
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	R-51	Thermostat Relay Potentiometer Resistor	2000 Ohms, Grade 1, Class 1 Tapped 400 Volts	−63554F	RE13A372J	24		931	7607476-P435	R-51
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-52	Mod. Transformer Load Resistor	10,000 Ohms, 3 Watts ±10% Composition	−63289	RE13A372G	8	Type D-3	932	7607476-P436	R-52
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	R-53	2000 Volt Supply Potentiometer Resistor	Same as R-24, Item 900	−63234F				933		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	R-54	2000 Volt Supply Potentiometer Resistor	Same as R-24, Item 900	−63234F				934		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	R-55	Filament Load Resistor	Same as R-16, Item 892	−63608F				935		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																																
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2	Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	R-56	Spark Suppressor Resistor	2000 Ohms, 3 Watts ±10%	−63289		8	Type E-2	936	7605849-P19	R-56
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	R-57	Spark Suppressor Resistor	15 Ohms, 3 Watts ±10%	−63289		8	Type E-2	937	7605849-P20	R-57
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	R-150	1000 V. Generator Field Resistor	Same as R-28	−63227F		8		938		
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	R-151	Heater Circuit Resistor	25 Ohms, Grade 1, Class 1	−63178F	RE13A372J	24		939	7607478-P26	R-151, R-152
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	R-152	Heater Circuit Resistor	Same as R-151	−63178F				940		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	R-201	Starting Resistor	1.5 Ohms	−63170E	RE13A372J	24	Type CAO	941	33-J-829-P19	R-201, R-204, R-205, R-311, R-314, R-315
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	R-202	Protective Resistor	2000 Ohms	−63205E	RE13A372J	24	Type CAO	942	33-J-829-P20	R-202, R-312
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	R-203	Timing Resistor	20,000 Ohms	−63219E	RE13A372J	24	Type CAO	943	33-J-829-P21	R-203, R-313
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	R-204	Starting Resistor	Same as R-201	−63170E				944		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	R-205	Starting Resistor	Same as R-201	−63170E				945		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	R-211	Starting Resistor	0.4 Ohms	−63163E		24		946	33-J-828-P19	R-211, R-214, R-215, R-301, R-304, R-305
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	R-212	Protective Resistor	500 Ohms	−63197E		24		947	33-J-828-P20	R-212, R-302
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	R-213	Timing Resistor	5000 Ohms	−63212E		24		948	33-J-828-P21	R-213, R303
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	R-214	Starting Resistor	Same as R-211	−63163E				949		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	R-215	Starting Resistor	Same as R-211	−63163E				950		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	R-250	Suppressor Resistor	1000 Ohms, 25 Watts					951		R-250
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	R-250	Speed Reg. Resistor	1000 Ohms, 25 Watts			32	2-P-5	952	N-30141-P12	R-250, R-421

Total Per Equipment																																				Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13																																													
	230 V.D.C.—TBL-13																																													
		440/3/60— TBL-13																																												
			115 V.D.C.—TBL-12																																											
				230 V.D.C.—TBL-12																																											
					440/3/60— TBL-12																																											
						220/3/60— TBL-11																																										
							220/3/60— TBL-10																																										
								115 V.D.C.— TBL-7																																										
									230 V.D.C.— TBL-7																																									
										440/3/60— TBL-7																																								
											115 V.D.C.— TBL-6																																								
												230 V.D.C.— TBL-6																																							
													220/3/60— TBL-6																																							
														440/3/60— TBL-6																																						
															115 V.D.C.— TBL-5																																					
																230 V.D.C.— TBL-5																																				
																	440/3/60— TBL-5																																			
																		115 V.D.C.— TBL-3																																		
																			230 V.D.C.— TBL-3																																	
																				440/3/60— TBL-3																																
																					115 V.D.C.— TBL-2																															
																						230 V.D.C.— TBL-2																													
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	R-251	Speed Reg. Resistor	300 Ohms, 25 Watts			32	2-P-5	953	N-30142-P12	R-251, R-401
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	R-251	Speed Reg. Resistor	300 Ohms, 25 Watts			32	2-P-5	954		R-251
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	R-252	Suppressor Resistor	1000 Ohms, 10 Watts			32	1-3/8-J-5	955	N-30142-P86	R-252, R-402 R-422
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	R-252	Suppressor Resistor	1000 Ohms, 10 Watts			32	1-3/8-J-5	956	N-30141-P86	R-252
0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R-301	Starting Resistor	Same as R-211	−63163E				957		
0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R-302	Protective Resistor	Same as R-212	−63197E				958		
0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R-303	Timing Resistor	Same as R-213	−63212E				959		
0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R-304	Starting Resistor	Same as R-211	−63163E				960		
0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R-305	Starting Resistor	Same as R-211	−63163E				961		
0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R-311	Starting Resistor	Same as R-201	−63170E				962		
0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R-312	Protective Resistor	Same as R-202	−63205E				963		
0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R-313	Timing Resistor	Same as R-203	−63219E				964		
0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R-314	Starting Resistor	Same as R-201	−63170E				965		
0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R-315	Starting Resistor	Same as R-201	−63170E				966		
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R-351	Starting Resistor				1	S#1308657	967	45-J-108	R-351
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R-352	Starting Resistor				1	S#1298837	968	45-J-108	R-352
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R-353	Coil Resistor				1	S#388806	969	45-J-108	R-353
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R-361	Starting Resistor				1	S#1298839	970	45-J-109	R-361, R-362
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R-362	Starting Resistor	Same as R-361					971		
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R-363	Potentiometer Resistor				1	S#774002	972	45-J-109	R-363

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13		230 V.D.C.—TBL-13		440/3/60— TBL-13		115 V.D.C.—TBL-12		230 V.D.C.—TBL-12		440/3/60— TBL-12		220/3/60— TBL-11		220/3/60— TBL-10		115 V.D.C.— TBL-7		230 V.D.C.— TBL-7		440/3/60— TBL-7		115 V.D.C.— TBL-6													
1		0		0		1		0		0		0		0		1		0		0		R-401	Speed Regulator Resistor	Same as R-251					973		
1		0		0		1		0		0		0		0		1		0		0		R-402	Suppressor Resistor	Same as R-252 Item 955					974		
0		1		0		0		1		0		0		0		0		1		0		R-421	Speed Regulator Resistor	Same as R-250 Item 952					975		
0		1		0		0		1		0		0		0		0		1		0		R-422	Suppressor Resistor	Same as R-252 Item 955					976		
0		0		0		0		0		0		1		1		0		0		0		R-501	Plate Series Resistor	Same as R-11	−63085F				977		
0		0		0		0		0		0		1		1		0		0		0		R-502	Spark Suppressor Resistor	500 Ohms ±10%, 1 Watt, Composition	−63288	RE13A372G	49		978	7606571-P121	R-502, R-503
0		0		0		0		0		0		1		1		0		0		0		R-503	Spark Suppressor Resistor	Same as R-502	−63288				979		
0		0		0		0		0		0		1		1		0		0		0		R-504	Bleeder Resistor	250,000 Ohms, 3 Watts, Composition	−63289		8		980	7606571-P124	R-504
0		0		0		0		0		0		1		2		0		0		0		R-701	Resistor	Same as R-21	−63080F				981		
0		0		0		0		0		0		1		2		0		0		0		R-702	Resistor	Same as R-21	−63080F				982		
0		0		0		0		0		0		1		2		0		0		0		R-703	Resistor	Same as R-21	−63080F				983		
0		0		0		0		0		0		0		0		0		0		0		S-1	H.F. M.O. Range Switch	4 Gang, 3 Position			1	7604851-G1	984	7604848-P5	S-1
1		1		1		1		1		1		1		1		1		1		1		S-1A	M.O. Range Switch	Part of L-1					985		
1		1		1		1		1		1		1		1		1		1		1		S-1B	M.O. Range Switch	Part of L-1					986		
1		1		1		1		1		1		1		1		1		1		1		S-2	Thermal Switch	S.P.S.T., 330 V., 3 Amps. or 220 V., 2.5 Amps., 70°C to Operate 69°–71° C and Close at 55°–60°C., Bi-Metallic Thermostat Type	−40034		1	S#1022783 7406282-P1	987	7607476-P446	S-2

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-3	Mercury Thermostat Switch	60°C Angle Type	—40010	RE13A488C		7603330-P32 See Note 9	988	7607476-P447	S-3
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-4	1st Ampl. Grid Transfer Switch	S.P.D.T. One Break per Circuit, 20 Amps., 3000 V.D.C. Rotary Type			1	7704417-G5	989	7607476-P448	S-4
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		Insulator for S-4	Same as Item 768					990		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Contact Arm for S-4	Molded 2-3/8 x 1-3/4 x 1/4			1	7809098-P1	991	7704417-P44	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Insulator for S-4	Isolantite 1-1/8 Long 1-3/4 Dia.			29	7705360-P25	992	7704417-P45	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Panel for S-4	Micarta 5 x 3-1/4 x 1/4			1	7809097-P2	993	7704417-P53	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-4	Nickel Silver			1	7708696-P10	994	7704417-P54	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-4	Nickel Silver			1	7708696-P11	995	7704417-P55	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-4	Nickel Silver			1	7708696-P12	996	7704417-P56	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-5	1st Ampl. Plate Transfer Switch	S.P.D.T., One Break per Circuit, 20 Amps., 3000 V.D.C., Rotary Type			1	7704417-G3	997	7607476-P449	S-5, S-9, S-15
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		Insulator for S-5	Same as Item 768					998		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Panel for S-5	Micarta 5 x 3-1/4 x 1/4			1	7809097-P1	999	7704417-P43	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Contact Arm for S-5	Same as Item 991					1000		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Insulator for S-5	Same as Item 992					1001		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																																
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2	Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-5	Nickel Silver			1	7708696-P7	1002	7704417-P49	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-5	Nickel Silver			1	7708696-P8	1003	7704417-P50	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-5	Nickel Silver			1	7708696-P9	1004	7704417-P51	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-6	1st Ampl. Filament Switch	S.P.D.T., One Break per Circuit, 10 Amps., 125 Volts, Toggle Type	—24095A		11	8929QA 7706780-P1	1005	7607476-P450	S-6, S-8, S-32, S-36, S-37, S-38, S-43, S-601
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	S-7	CW-MCW Phone Switch	4 Gang, 3 Positions			1	7406364-P1	1006	7604901-P13	S-7
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	S-7A	CW-MCW Phone Switch	S.P., Three Positions, One Break per Circuit, 2 Amps., 250 V.D.C., Rotary Type			12	7406364-P3	1007	7607476-P451	S-7A, S-7B, S-7C ,S-7D
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	S-7B	CW-MCW Phone Switch	Part of S-7A					1008		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	S-7C	CW-MCW Phone Switch	Part of S-7A					1009		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	S-7D	CW-MCW Phone Switch	Part of S-7A					1010		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-8	I.F. M.O. and H.F. Filament Transfer Switch	Same as S-8	—24095A				1011		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-9	H.F. 1st Ampl. Range Switch	Same as S-5					1012		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Insulator for S-9	Same as Item 768					1013		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Panel for S-9	Same as Item 999					1014		

Total Per Equipment																										Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Contact Arm for S-9	Same as Item 991					1015		
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		Insulator for S-9	Same as Item 992					1016		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-9	Same as Item 1002					1017		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-9	Same as Item 1003					1018		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-9	Same as Item 1004					1019		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-10	2nd Grid Transfer Switch	S.P.D.T., One Break per Circuit, 20 Amps., 3000 V.D.C. Rotary Type			1	7704417-G6	1020	7607476-P457	S-10, S-16
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		Insulator for S-10	Same as Item 768					1021		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Panel for S-10	Same as Item 999					1022		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Contact Arm for S-10	Same as Item 991					1023		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Insulator for S-10	Same as Item 992					1024		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-10	Same as Item 994					1025		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-10	Same as Item 995					1026		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-10	Same as Item 996					1027		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-11	2nd Ampl. Plate Transfer Switch	D.P.D.T., One Break per Circuit, 20 Amps., 3000 V.D.C. Rotary Type			1	7704417-G2	1028	7607476-P458	S-11, S-14
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6		Insulator for S-11	Same as Item 768					1029		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																						Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2									
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Contact Arm for S-11	Molded 2-3/4 x 1-3/4 x 1/4			1	7806466-P1	1030	7704417-P11	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Panel for S-11	Micarta 7-1/2 x 3-1/4 x 1/4			1	7809096-P1	1031	7704417-P40	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Insulator for S-11	Same as Item 992					1032		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-11	Same as Item 1002					1033		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-11	Same as Item 1003					1034		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-11	Same as Item 1004					1035		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-11	Same as Item 994					1036		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-11	Same as Item 995					1037		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-11	Same as Item 996					1038		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-12	H.F. 2nd Ampl. Range Switch	D.P.D.T., One Break per Circuit, 20 Amps., 3000 V.D.C., Rotary Type			1	7704417-G7	1039	7607476-P459	S-12, S-13
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6		Insulator for S-12	Same as Item 768					1040		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Contact Arm for S-12	Same as Item 1030					1041		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Panel for S-12	Same as Item 1031					1042		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Insulator for S-12	Same as Item 992					1043		
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Sliding Contact for S-12	Same as Item 1002					1044		

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.— TBL-13		230 V.D.C.— TBL-13		440/3/60— TBL-13		115 V.D.C.— TBL-12		230 V.D.C.— TBL-12		440/3/60— TBL-12		220/3/60— TBL-11		220/3/60— TBL-10		115 V.D.C.— TBL-7		230 V.D.C.— TBL-7		440/3/60— TBL-7		115 V.D.C.— TBL-6		230 V.D.C.— TBL-6		220/3/60— TBL-6		440/3/60— TBL-6		115 V.D.C.— TBL-5		230 V.D.C.— TBL-5		440/3/60— TBL-5		115 V.D.C.— TBL-3		230 V.D.C.— TBL-3		440/3/60— TBL-3		115 V.D.C.— TBL-2		230 V.D.C.— TBL-2											
2		2		2		2		2		2		2		2		2		2		2		2		2		2		2		2		2		2		2			Sliding Contact for S-12	Same as Item 1003					1045		
2		2		2		2		2		2		2		2		2		2		2		2		2		2		2		2		2		2		2			Sliding Contact for S-12	Same as Item 1004					1046		
1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		S-13	H.F. P.A. Grid Range Switch	A Part of S-12					1047		
1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		S-14	R.A. Grid Transfer Switch	A Part of S-11					1048		
1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		S-15	P.A. Plate Transfer Switch	Same as S-5					1049		
1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		S-15A	Interlock for S-15				1	7414045-G2	1050	7705783-P48	S-15A, S-16A
3		3		3		3		3		3		3		3		3		3		3		3		3		3		3		3		3		3		3			Insulator for S-15	Same as Item 768					1051		
1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1			Panel for S-15	Same as Item 999					1052		
1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1			Contact Arm for S-15	Same as Item 991					1053		
1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1			Insulator for S-15	Same as Item 992					1054		
1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1			Sliding Contact for S-15	Same as Item 1002					1055		
1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1			Sliding Contact for S-15	Same as Item 1003					1056		
1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1			Sliding Contact for S-15	Same as Item 1004					1057		
1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		S-16	H.F. P.A. Range Switch	Same as S-10					1058		
1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		S-16A	Interlock for S-16	Same as S-15A					1059		
3		3		3		3		3		3		3		3		3		3		3		3		3		3		3		3		3		3		3			Insulator for S-16	Same as Item 768					1060		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																																
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2	Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Panel for S-16	Same as Item 999					1061		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Contact Arm for S-16	Same as Item 991					1062		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Insulator for S-16	Same as Item 992					1063		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S 16	Same as Item 994					1064		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-16	Same as Item 995					1065		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-16	Same as Item 996					1066		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	S-17	H.F. Voltage Current Switch				1	7603486-G3	1067		S-17
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1		Panel for S-17	Micarta 10-1/4 x 4-1/2 x 1/4			1	7705722-P1	1068		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	S-17	H.F. Voltage Current Switch				1	7603486-G5	1069		S-17
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	S-17	H.F. Voltage Current Switch	D.P.D.T., Two Breaks per Circuit, 30 Amps., 20,000 V.R.M.S., Rotary Type			1	7603486-G6	1070	7607476-P464	S-17
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		Insulator for S-17	Isolantite, 2 Lg. x 3/4 Dia.			29	7602239-P4	1071	7603486-P10	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6		Insulator for S-17	Isolantite				7602239-P2	1072	7407907-P189	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Sliding Contact for S-17	Nickel Silver			1	7602913-P2	1073	7407907-P16	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Sliding Contact for S-17	Nickel Silver			1	7602913-P3	1074	7407907-P17	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Sliding Contact for S-17	Nickel Silver			1	7602913-P4	1075	7407907-P18	

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.— TBL-13	230 V.D.C.— TBL-13	440/3/60— TBL-13	115 V.D.C.— TBL-12	230 V.D.C.— TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0		Panel for S-17	Micarta 10-3/4 x 4-1/2 x 1/4			1	7705722-P7	1076	7407907-P71	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	S-18	Antenna Transfer Switch				1	7604905-G1	1077		S-18
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	S-18	Antenna Transfer Switch	S.P. Three Positions, One Break per Circuit, 30 Amps., 30,000 V. Peak, Rotary Type			1	7604905-G2	1078	7607476-P465	S-18, S-19
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-18A	Interlock for S-18				1	7414055-G2	1079	7604967-P32	S-18A
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Contact for S-18				1	7705774-P8	1080	7604905-P4	
14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14		Contact for S-18				1	7705774-P9	1081	7604905-P5	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Contact Ring for S-18				1	7604906-P6	1082	7604905-P6	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Center Contact Panel	Micalex 4-1/2 x 4 x 1/4			1	7604906-P3	1083	7604905-P7	
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		Spacer for S-18	Micarta 1/2 x 1/2 x 5/16			1	7604906-P5	1084	7604905-P8	
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		Spacer for S-18	Isolantite 1 Long 3/4 Dia.			29	7602239-P9	1085	7604905-P9	
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		Insulator for S-18	Isolantite 2 x 1 x 1			29	7700978-P5	1086	7604905-P10	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-18	Nickel Silver			1	7705774-P11	1087	7604905-P16	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-18	Nickel Silver			1	7705774-P12	1088	7604905-P17	
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		Contact for S-18				1	7705774-P2	1089	7604905-P18	
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		Insulator for S-18	Same as Item 768					1090		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-18				1	7705774-P13	1091	7604905-P25	

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-18	Nickel Silver			1	7705774-P14	1092	7604905-P26	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Support for S-18	Micalex 4-3/4 x 2 x 3/8			1	7604906-P4	1093	7604905-P27	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Panel for S-18	Micalex 13 x 10-1/2 x 3/8			1	7707303-P1	1094	7604905-P49	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Upper Contact Panel	Insanol 6-3/16 x 2-1/2 x 5/16			1	7407522-P1	1095	7604905-P50	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Link for S-18	Insanol 10-23/32 x 1-1/4 x 5/16			1	7406158-P5	1096	7705806-P6	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	S-19	I.F. Antenna Tap Switch				1	7604905-G1	1097	7605531-P79	S-19
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	S-19	I.F. Antenna Tap Switch	Part of S-18, Item 1078					1098		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-19A	Interlock for S-19				1	7414041-G1	1099	7707438-P30	S-19A, S-21A S-34A
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-20	I.F. P.A. Range Switch	D.P. Five Positions, One Break per Circuit, Rotary Type, Special			1	7605671-G1	1100	7607476-P467	S-20
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-20				1	7605671-P4	1101	7605671-G1	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Panel for S-20	Micalex 6-1/2 x 7 x 1/4			1	7605671-P11	1102	7605671-G1	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-20				1	7605671-P12	1103	7605671-G1	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-20				1	7605671-P13	1104	7605671-G1	
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5		Contact for S-20				1	7605671-P14	1105	7605671-G1	

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Insulator for S-20	Isolantite 1 Lg. 1-3/4 Dia.			29	7705360-Ps	1106	7605671-P15	
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5		Contact for S-20				1	7605671-P18	1107	7605671-G1	
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5		Insulator for S-20	Same as Item 768					1108		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Contact for S-20				1	7605141-P1	1109	7606571-P23	
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5		Insulator for S-20	Isolantite 1 x 1/2 Square			29	7705360-P7	1110	7605671-P25	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Contact Segment for S-20				1	7605671-P9	1111	7605671-G1	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-21	I.F. Int. Ampl. Range Switch	D.P. Five Positions, One Break per Circuit, 10 Amps., 3000 V.D.C., Rotary Type			1	7705760-G1	1112	7607476-P468	S-21
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-21A	Interlock for S-21	Same as S-19A					1113		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Panel for S-21	Insanol 5-15/16 x 4-9/16 x 1/4			1	7705760-P2	1114	7705760-G1	
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5		Contact for S-21				1	7705760-P3	1115	7705760-G1	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Contact Segment for S-21				1	7705760-P4	1116	7705760-G1	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-21	Nickel Silver			1	7705760-P5	1117	7705760-G1	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-21	Nickel Silver			1	7705760-P6	1118	7705760-G1	
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5		Contact for S-21				1	7705710-P11	1119	7705760-P7	

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-22	Tune Operate Switch	D.P. Three Positions, One Break per Circuit, 15 Amps., 5000 V.D.C., Rotary Type			1	7604978-G5	1120	7607476-P469	S-22
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-22	Nickel Silver			1	7708696-P4	1121	7604978-P9	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-22	Nickel Silver			1	7708696-P5	1122	7604978-P10	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-22	Nickel Silver			1	7708696-P6	1123	7604978-P11	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Spacer for S-22	Micarta 1 x 3/8 x 1/8			1	7806620-P1	1124	7604978-P21	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Support for S-22	Micarta 2-7/8 x 3/8 x 1/8			1	7808571-P1	1125	7604978-P24	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Contact for S-22				1	7604479-G16	1126	7604978-P25	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Contact Arm for S-22	Micarta 2-1/4 x 1-3/4 x 1/4			1	7808565-P3	1127	7604978-P84	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Panel for S-22	Micarta 5-1/4 x 5-1/4 x 1/4			1	7406149-P1	1128	7604978-P85	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		Insulator for S-22	Moldarta			1	7708564-G1	1129	7604978-P99	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Insulator for S-22	Moldarta 1-3/16 of 1-3/4 Dia.			1	7708567-G1	1130	7604978-P102	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		Contact for S-22				1	7805141-P6	1131	7604978-P104	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Contact Spring for S-22				1	7412109-G2	1132	7604978-P106	

Total Per Equipment																									Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-23	I.F. M.O. Range Switch	S.P. Seven Positions, One Break per Circuit, 5 Amps., 1000 V. R.M.S., Rotary Type			1	7705701-G2	1133	7607476-P470	S-23
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6		Contact for S-23				1	7705701-P4	1134	7705701-G2	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Panel for S-23	Micalex 5-7/16 x 4-3/32 x 1/4			1	7705701-P5	1135	7705701-G2	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Contact Segment for S-23				1	7705701-P10	1136	7705701-G2	
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7		Contact for S-23				1	7705701-P11	1137	7705701-G2	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-23				1	7705701-P15	1138	7705701-G2	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Sliding Contact for S-23				1	7705701-P16	1139	7705701-G2	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-24	Emergency Switch	D.P.S.T., 2 Breaks per Circuit, 20 Amps., 250 Volts	—24390		5	7407473-P1 #3982	1140	7607476-P471	S-24
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	S-25	Remote Local Switch		—24068		1	#339-A	1141	7407251-P1	S-25
0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	S-25	Remote Local Switch	4 Pole, D.T., One Break per Circuit, Contact 5 Amps. A.C. 1 Amp. D.C., 110 V.	—24104				1142	7606297-P12	S-25
1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	S-25	Remote Local Switch	4 Pole, D.T., One Break per Circuit, Contact 5 Amps. A.C. 1 Amp. D.C., 110 V	—24104A		14 16	7707082-P6	1143	7607476-P494	S-25
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	S-26	Stop-Start Switch (4 Wire)	S.P.D.T., One Break per Circuit, 10 Amps., 125 V. Toggle Type	—24064				1144		S-26

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	S-26	Stop-Start Switch (4 Wire)	D.P.S.T., One Break per Circuit, 10 Amps., 250 V., Push Button Type					1145	7707242-G6	S-26
1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	S-26	Stop-Start Switch (4 Wire)	D.P.S.T., One Break per Circuit, 10 Amps., 250 V., Push Button Type			1	7707242-G6	1146	7607476-P473	S-26
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	S-27	Test Key Switch	D.P.D.T.			54		1147	7300300-P40	S-27
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	S-27	Test Key Switch	D.P.D.T.			54		1148	7406761-P7	S-27
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	S-27	Test Key Switch	D.P.D.T., One Break per Circuit, 2 Amps., at 125 Volts Toggle Type	−24069A		14 16	7707082-P1	1149	7607476-P475	S-27
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-28	Door Interlock Switch	S.P.S.T., Two Breaks per Circuit, 1 Amp., 500 Volts, Interlock Type	−24067		1	S#867378	1150	7607476-P476	S-28, S-29, S-30, S-151, S-602, S-702
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-29	Door Interlock Switch	Same as S-28	−24067				1151		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-30	Door Interlock Switch	Same as S-28	−24067				1152		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-31	Thermal Switch	S.P.S.T., 330 V., 1.25 Amps. or 220 Volts, 1 Amp. 55°C–57°C and Close at 40°C–45°C Bi-Metallic, Thermostat Type	−40150		1	S#1022784 7406282-P4	1153	7607476-P479	S-31
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	S-32	H.F. M.O. Filament Standby Switch	Same as S-6	−24095A				1154		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																																	
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2	Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-33	Thermal Switch	S.P.S.T., 330 Volts, 1.25 Amp. or 220 V., 1 Amp., 15°C., to Open at 25°-30°C, and Close at 13°-17°C., Bi-Metallic, Thermostat Type	—40151		1	S#1022786 7406282-P10	1155	7607476-P481	S-33
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-34	I.F. Antenna Capacity Switch	S.P.S.T., One Break per Circuit, 20 Amps., 10,000 V., Knife Switch Type			1	7604964-P5 P6, P10 to P14	1156	7607476-P482	S-34
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-34A	Interlock for S-34	Same as S-19A					1157		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-35	Overload Relay Reset Switch	S.P.D.T., Momentary Contact, Two Breaks per Circuit, 1 Amp., 250 Volts, Push Button Type			1	S#588353	1158	7607476-P483	S-35, S-504
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	S-36	Line Voltage Switch	Same as S-6	—24095A				1159		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-37	H.F. M.O. Compensation Transformer Switch	Same as S-6	—24095A				1160		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-38	P.A. Grid Current Control Switch	Same as S-6	—24095A				1161		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-39	Control Link Switch	Connecting Link			1	7606288-P22	1162	7607476-P487	S-39, S-41, S-42, S-44
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-40	Stop-Start Switch (6 Wire)	Two Button, Two Circuit, Two Breaks per Circuit, 10 Amps., 250 V. Momentary Contact, Push Button Type			1	7707242-C5	1163	7607476-P488	S-40
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-41	Control Link Switch	Same as S-39					1164		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-42	Control Link Switch	Same as S-39					1165		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-43	H.F. I.F. Transfer Switch	Same as S-6	—24095A				1166		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-44	Control Link Switch	Same as S-39					1167		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	S-151	Door Interlock Switch	Same as S-28	—24067				1168		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	S-201	Main Switch	D.P.S.T., 30 Amps., 250 V., Rear Connected, Knife Type Switch			1		1169	23-J-694-P23	S-201
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	S-201	Main Switch	D.P.S.T., 30 Amps., 250 V., Rear Connected, Knife Type Switch			1		1170	33-J-829-P23	S-201, S-311
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	S-250A	Speed Reg. Contact	Long			8		1171	N-30142-P13	S-250A
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	S-250A	Speed Reg. Contact	Long			8		1172	N-30141-P13	S-250A
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	S-250B	Speed Reg. Contact	Short			8		1173	N-30142-P14	S-250B
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	S-250B	Speed Reg. Contact	Short			8		1174	N-30141-P14	S-250B
0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	S-301	Main Switch	D.P.S.T., 30 Amps., 250 Volts, Rear Connected, Knife Type Switch			1		1175	33-J-828-P23	S-301
0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	S-311	Main Switch	Same as S-201, Item 1170					1176		
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	S-321	Disconnect Switch	3 P.S.T., 60 Amps.			1		1177	33-J-830-P8	S-321
0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	S-331	Disconnect Switch	3 P.S.T., 60 Amps.			1	S#1240605	1178	35-J-705-P4	S-331
0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0		Spring for S-331				1	S#835041	1179	8-A-4686 11 to 20	

Total Per Equipment																																				Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13			115 V.D.C.—TBL-12			115 V.D.C.—TBL-11			115 V.D.C.—TBL-10			115 V.D.C.—TBL-7			115 V.D.C.—TBL-6			115 V.D.C.—TBL-5			115 V.D.C.—TBL-3			115 V.D.C.—TBL-2																				
230 V.D.C.—TBL-13			230 V.D.C.—TBL-12			230 V.D.C.—TBL-12			230 V.D.C.—TBL-7			230 V.D.C.—TBL-7			230 V.D.C.—TBL-6			230 V.D.C.—TBL-5			230 V.D.C.—TBL-3			230 V.D.C.—TBL-2																						
440/3/60—TBL-13			440/3/60—TBL-12			220/3/60—TBL-11			220/3/60—TBL-10			440/3/60—TBL-7			220/3/60—TBL-6			440/3/60—TBL-5			440/3/60—TBL-3			440/3/60—TBL-2																						
1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	S-401A	Speed Reg. Contact	Long			8		1180	N-30142-P13	S-401A
1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	S-401B	Speed Reg. Contact	Short			8		1181	N-30142-P14	S-401B
1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0		Spring for S-401A and S-401B				8		1182	N-30142-P15	
0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	S-421A	Speed Reg. Contact	Long			8		1183	N-30141-P13	S-421A
0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	S-421B	Speed Reg. Contact	Short			8		1184	N-30141-P14	S-421B
0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0		Spring for S-421A and S-421B	Same as Item 1182					1185		
0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S-501	Power Switch	D.P.S.T., One Break per Circuit, 10 Amps., 125 Volts, Toggle Type			5	Cat. #4962	1186	7606571-P126	S-501, S-502, S-503
0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S-502	Shut Down Time Switch	Same as S-501					1187		
0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S-503	Stand-By Switch	Same as S-501					1188		
0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S-504	Start or Test Switch	Same as S-35					1189		
0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S-505	Keying Switch	5 P.D.T., 2 Amps., 110 Volts, Toggle Type	—24087		14 16	7707082-P4	1190	7606571-P130	S-505
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S-601	Stop-Start Switch	Same as S-6	—24095A				1191		
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S-602	Door Interlock Switch	Same as S-28	—24067				1192		
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S-603	Transfer Switch	14 Pole, Double Throw, Knife Type Switch			1		1193	7607446-P10	S-603
0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S-701	Main Line Switch	3 Pole, 600 V.A.C., 15 Amps.			1	S#1222032	1194	7610038-P73	S-701
0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S-702	Door Interlock Switch	Same as S-28	—24067				1195		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Spacer for S-702	Micarta 2-5/16 x 15/16 of 1/8					1196	7609368-P25	
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S-703	Tap Switch	34 Amps., 440 Volts			51	Cat. #412-7-T3	1197	7610038-P75	S-703
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S-704	Air Interlock Switch	Single Pole, Thermal Relay			1		1198	7610038-P76	S-704
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Base for S-704	Porcelain				S#899867	1199		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S-705	Push Button Switch	Interlock Reset			1		1200	7610038-P77	S-705
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Extension for Button for S-705	Micarta 57/64 of 1/2 Dia.					1201	7811680-P1	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	T-1	Filament Transformer	200 V.A., 60 Cycle Wdg. Term Volts P1 4-5 30 P1 5-6 70 P2 1-2 70 P2 2-3 30 S1 7-8 .4 S1 8-9 5.1 S1 9-10 5.1 S1 10-11 4 S2 12-13 5 S2 13-14 5	—30316 Amps. Turns 1 33 1 77 1 77 1 33 3.25 1/2 3.25 6 3.25 6 3.25 1/2 10 6 10 6	 Ohm .4 .92 .92 .4 .001 .019 .019 .001 .017 .017	1	L-317189	1202	7607476-P499	T-1
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	T-2	H.F. M.O. Stand-By Filament Transformer	36 V.A., 60 Cycle Wdg. Term Volts P1 1-2 115 P2 3-4 115 S1 5-6 5.5 S1 6-7 5.5 Test 1500 Volts, Between Windings and Core	—30317 Amps. Turns 0.151 670 0.151 670 3.25 34 3.25 34	 Ohm 18 18 .042 .042	1	L 317197	1203	7607476-P500	T-2

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	T-3	H.F. M.O. Compensator Transformer	1.2 V.A., 200 Volts, 60 Cycle Wdg. Term Volts Amps. Turns Ohm P Yellow 220 0.005 9200 2500 S Black 0.125 9.5 10 0.01 Test 1500 Volts Between Winding and Core			1	L-317188	1204	7607476-P501	T-3
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	T-4	Audio Oscillator Transformer	40 Watts, 1200/140 Volts, 800 Cycle Wdg. Term Volts Amps. Turns Ohm P 3-5 1200 .033 1030 57 S 1-2 140 .285 128 0.57	—30332		1	L-317185	1205		T-4
0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	T-4	Audio Oscillator Transformer	40 Watts, 1200/140 Volts, 800 Cycle Wdg. Term Volts Amps. Turns Ohm P 3-5 1200 0.063 1030 65 S 1-2 140 .0285 128 0.65 Test 600 Volts Between Primary Winding and Core and Secondary. 1500 Volts to Core	—30332A		1	L-365774	1206		T-4
1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	T-4	Audio Oscillator Transformer	40 Watts, 1200/140 Volts, 800 Cycle Wdg. Term Volts Amps. Turns Ohm P 3-4 430 0.063 370 23.3 P 4-5 770 0.063 660 41.7 S 1-2 140 .0285 128 .65 Test 6000 Volts, 60 Cycle Between Primary Windings and Core and Secondary, 1500 Volts, 60 Cycle from Secondary to Core	—30800		1	L-382672	1207	7607476-P498	T-4

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13			230 V.D.C.—TBL-13			440/3/60—TBL-13			115 V.D.C.—TBL-12			230 V.D.C.—TBL-12			440/3/60—TBL-12			220/3/60—TBL-11			220/3/60—TBL-10											
0	0	1	0	0	1	1	1	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0	0	T-5	H.F. M.O. Compensator Transformer	1.2 Watts, 100/.125 Volts, 60 Cycle Wdg. Term Volts Amps. Turns Ohm P Yellow 100 0.01 4600 680 S Black .125 9.5 10 .009 Test 1500 Volts, 60 Cycle Between Windings and from each Winding to Core			1	L-303598	1208	7607476-P503	T-5
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	T-6	Modulation Transformer	Ratio 1 to 4, Rated 30/120 Volts, 300 to 3000 Cycle A.C. Wdg. Term Volts Turns Ohms P 1-2 30 750 43 S 3-4 140 3000 880 Test 1500 Volts Between Winding and Core	−30339		1	L-332753	1209	7607476-P504	T-6
0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	T-150	Heater Power Transformer	335 V.A., 60 Cycle 400-220/220-110 Volts Wdg. Term Volts Amps. Turns Ohm P1 1-2 220 0.76 240 4.8 P2 3-4 220 0.75 240 4.8 S1 5-6 110 1.52 125 1.3 S2 7-8 110 1.52 125 1.3 Test 2000 Volts Between Winding and Core	−30301		1	L-317195	1210	7607478-P33	T-150
0	0	2	0	0	2	0	0	0	0	0	2	0	0	2	2	0	0	2	0	0	2	0	0		Spacer for T-150	Micarta Tube 3/4 x 1/2 O.D. by 1/4 I.D.			1	7606333-P36	1211	7606333-G2	
0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0		Support for T-150	Micarta 3-3/4 x 2-3/4 x 3/16			1	7406756-P2	1212	7606333-P34	
0	0	4	0	0	4	0	0	0	0	0	4	0	0	4	4	0	0	4	0	0	4	0	0		Spacer for T-150	Micarta Tube 1 x 1/4 I.D. x 1/2 O.D.			1	7708036-P11	1213	7708036-G1 and 2	
0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0		Terminal Board for T-150	Micarta 6-3/4 x 3-3/4 x 3/16			1	7705796-P2	1214	7604945-P8	

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	1	0	0	1	0	0	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	T-151	Filament Power Transformer	250 V.A., 60 Cycle 440-220/210-110 Volts Wdg. Term Volts Amps. Turns Ohm P1 1-2 220 0.57 320 9.25 P2 3-4 220 0.57 320 9.25 S1 5-6 110 1.02 168 1.5 S2 7-8 110 1.02 168 1 5 Test 2000 Volts Between Winding and Core	−30300		1	L-317194	1215	7607478-P34	T-151
0	0	4	0	0	4	0	0	0	0	4	0	0	4	4	0	0	4	0	0	4	0	0		Spacer for T-151	Same as Item 1211				1216		
0	0	1	0	0	1	0	0	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0		Terminal Board for T-151	Micarta 5-3/4 x 3-3/4 x 3/16		*	1	7705796-P3	1217	7604945-P9	
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	T-501	Power Transformer	25 V.A., 50/60 Cycle Wdg. Term Volts Amps. Turns Ohm P1 1-2 110 0.29 560 20.8 S1 3-4 5 2 29 0.06 S2 5-6 205 0.05 1170 59 S2 6-7 205 0.05 1170 59 S3 11-12 25 0.0006 141 8.5 S4 8-9 3.1 0.9 18 0.25 S4 9-10 3.2 0.9 19 0.25 Test Voltage 1600 Volts, 60 Cycle	−30590		1	L-372133	1218	7606571-P132	T-501
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	T-701	Power Amplifier Transformer	Rating 220/440 V., 1 Ph., 50/60 Cycle Input, 1875 V., 700 V.A. Output	−301086		1	S#1304058	1219	7610038-P79	T-701, T-702, T-703
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	T-702	Power Amplifier Transformer	Same as T-701	−301086				1220		
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	T-703	Power Amplifier Transformer	Same as T-701	−301086				1221		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																																				Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2																							
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	T-704	M.O. Bias Supply Transformer	Rating 655 V.A., Input 220/440 V., Single Ph., 50/60 Cycle, Output 1385/328 Volts	—301053		1	S# 1293865A	1222	7610038-P82	T-704
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	T-705	Power Transformer	220/440 to 110/220 Volts, 1 Phase, 50/60 Cycle, 250 V.A., Regulations 1% at 100% P.F. Series Parallel Both Primary and Secondary	—301081		1	S#1304062	1223	7610038-P83	T-705
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	T-706	Power Transformer	220/440 to 110/220 Volts, 1 Phase, 50/60 Cycle, 425 V.A., Regulation 1% at 100% P.F. Series Parallel Both Primary and Secondary	—301084		1	S#1304063	1224	7610038-P84	T-706
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	T-707	Interlock Transformer	220 Volts, to 10.5 Volts Tapped at 9.6, 8.8, 8.0, 7.3, 6.7 and 6.2 Volts, 1 Phase 50/60 Cycle, 34 V.A. at 10.5 Volts Tap	—301103		1	S#1304064	1225	7610038-P85	T-707
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	TH-1	Heater Thermometer	30° to 70°C Vertical Mounting, Angle Type	—40025		10	7603258-P28	1226	7607477-P508	TH-1

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	V-1	H.F. M.O. Tube	Vacuum Tube (Transmitting Tetrode) R.F. Screen Grid Oscillator or Power Amplifier, Glass, Base, Medium 4 Pin Bayonet, Ceramic, Grid and Plate Leads are Separate Leads Through Glass Bulb. Heater Current 3.25 Amp. at 10 V.A.C. or D.C., Plate Dissipation 100 Watts	—860		9	CWL-860 DL-7502592 G-2, L-1	1227	7607477-P512	V-1, V-2, V-3, V-4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	V-2	H.F. 1st Int. Amp. I.F. Audio Oscillator Tube	Same as V-1	—860				1228		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	V-3	I.F. M.O. Tube	Same as V-1	—860				1229		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	V-4	H.F. 2nd Int. Amp. Tube	Same as V-1	—860				1230		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	V-5	Power Amp. Tube	Vacuum Tube (Transmitting Pentode) R.F. Power Amp. Pentode, Glass, Base, Giant 5 Pin Bayonet, Phenolic, Medium Metal Cap, Filament Current 5 Amps. at 10 V.A.C. or D.C., Plate Dissipation 125 Watts	—803		9	WL-803 DL-7502592 G-3, L-4	1231	7607477-P516	V-5, V-6
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	V-6	Power Amp. Tube	Same as V-5	—803				1232		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																									Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	V-501	Rectifier Tube	Vacuum Tube (Rectifier Full Wave High Vacuum) Rectifier Low Voltage, Base, Medium 4 Pin Bayonet, Phenolic, Heater Current, 3 Amps. at 5 V.A.C.	—5Z3		52	5Z3	1233	DL-7502592 G-2, L-10	V-501
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	V-502	Relay Tube	Vacuum Tube (Transmitting Beam Power Amp.) Relay Pentode, Glass, Base, Medium 5 Pin Bayonet, Phenolic, Small Metal Cap, Heater Current 0.9 Amp. at 6.3 Volt A.C. or D.C. Plate Dissipation 25 Watts	—807		9	807	1234	DL-7502592 G-2, L-7	V-502
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	V-503	Relay Tube	Vacuum Tube (Voltage Regulator) Glow Discharge Type, Glass, Base, Small Shell Octal, 6 Pin Bayonet, D.C. Maximum at Approximately 105 V.D.C.	—38205		52	VR-105-130	1235	DL-7502592 G-2, L-18	V-503
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	W-1	Flexible Lead	25 Ft. of #12 Stranded 5000 Volts, White with Blue and Green Tracer, Aeroglas Hookup Wire			13	5 MV	1236	7607477-P537	W-1
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	W-2	Flexible Lead	2 Ft. 9 MM Packard Cable			25	341	1237	7607477-P541	W-2
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	W-3	Terminal	For #10 Screw (50)			1	S#171560	1238	7607477-P543	W-3
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	W-4	Terminal	For #10 Screw (10)			1	S#867474	1239	7607477-P544	W-4

Total Per Equipment																																				Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2																							
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	W-5	Terminal	For #10 Screw (10)			1	S#867475	1240	7607477-P545	W-5
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	X-1	M.O. Tube Socket	7-1/2 Watt, 4 Contacts, Bayonet Type	—49309		1	7605251-P16	1241	7607477-P521	X-1, X-2, X-3, X-4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	X-2	1st Int. Amp. Tube Socket	Same as X-1	—49309				1242		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	X-3	M.O. Tube Socket	Same as X-1	—49309				1243		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	X-4	2nd Int. Amp. Tube Socket	Same as X-1	—49309				1244		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	X-5	Power Socket	Special Double Socket	—49461		1	7705999-G1	1245	7607477-P525	X-5, X-6
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	X-6	Power Socket	Part of X-5					1246		
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	X-501	Rectifier Tube Socket	4 Prongs, Wafer Type	—49362		53	#224	1247	7606571-P137	X-501
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	X-502	Control Tube Socket	5 Prongs, Wafer Type	—49363		53	#225	1248	7606571-P138	X-502
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	X-503	Voltage Regulator Tube Socket	8 Prongs, Wafer Type	—49361		53	#228	1249	7606571-P139	X-503
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Terminal Board for Control Panel on Trans.	Micarta 3-1/4 x 1-1/2 x 1/8			1	7706388-P3	1250	7706388-G2	
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1		Terminal Board for Inter-connection of L.H. and R.H. Trans. Frames	Micarta 9-1/2 x 5-15/16 x 5/16			1	7606299-P3	1251	7606299-G1	
0	0	1	0	0	1	0	0	0	0	1	0	0	0	1	0	0	1	0	0	1	0	0		Terminal Board for Inter-connection of L.H. and R.H. Trans. Frames	Micarta 9-1/2 x 5-15/16 x 5/16			1	7606299-P4	1252	7606299-G2	
74	82	74	74	82	74	74	74	74	82	74	74	82	74	74	74	82	74	74	82	74	74	82		Insulator	Prestite			1	50-C-682-P4	1253	7407907-P367	

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																																
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2	Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Insulator for M.O. Tube Comp.	Same as Item 768					1254		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Stand-Off Insulator for H.V. Lead in Trans.	Same as Item 1072					1255		
18	18	18	18	18	18	0	0	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18		Insulator for 1251 and 1252	Same as Item 1253					1256		
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8		Beehive Stand-Off Insulator for M.O. Unit and M.O. Tube Compartment				29		1257	7702572-P1	
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8		Lead Through Insulator Bottom of M.O. Tube Compartment				1	50-C-692 P1	1258	7702097-P43	
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8		Lead Through Insulator Bottom of M.O. Tube Compartment	Prestite			1	1-C-9300-P1	1259	7702097-P44	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1		Coupling for S-17				1	7604407 G13	1260	7604902-P35	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Coupling for C-28				1	7604407-G15	1261	7605529-P193	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Coupling for C-50				1	7607465-G1	1262	7604831-P39	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Coupling for C-36 and L-16				1	7604940-G5	1263	7604940-P27	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Coupling for C-47 and L-23	Same as Item 1263					1264		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Coupling for L-16 and L-23					7604407-G24	1265	7604903-P212	

Total Per Equipment																																Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13		230 V.D.C.—TBL-13		440/3/60— TBL-13		115 V.D.C.—TBL-12		230 V.D.C.—TBL-12		440/3/60— TBL-12		220/3/60— 1BL-11		220/3/60— TBL-10		115 V.D.C.— TBL-7		230 V.D.C.— TBL-7		440/3/60— TBL-7		115 V.D.C.— TBL-6		230 V.D.C.— TBL-6		220/3/60— TBL-6		440/3/60— TBL-6		115 V.D.C.— TBL-5		230 V.D.C.— TBL-5		440/3/60— TBL-5		115 V.D.C.— TBL-3		230 V.D.C.— TBL-3		440/3/60— TBL-3		115 V.D.C.— TBL-2		230 V.D.C.— TBL-2											
1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1			Coupling for S-20				1	7607465-G21	1266	7407908-P55	
1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1			Coupling for S-21				1	7607465-G8	1267	7407908-P78	
1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1			Coupling for L-15					7607465-G9	1268	7407908-P77	
1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1			Coupling for L-25					7607465-G4	1269	7407907-P287	
1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1			Coupling for L-22					7607465-G7	1270	7407908-P92	
1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1			Coupling for L-27	Same as Item 1268					1271		
1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1			Coupling for S-19				1	7604905-G3	1272	7604905-G2	
1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1			Coupling for C-17				1	7607465-G5	1273	7407909-P29	
9		9		9		9		9		9		9		9		9		9		9		9		9		9		9		9		9		9		9		9			Insulator—Spare for Couplings C-50, L-15, L-16, L-22, L-23, L-27, S-17, S-19, S-20, S-21	Isolantite Special			29	7402096-P1	1274	7607465-G1	
4		4		4		4		4		4		4		4		4		4		4		4		4		4		4		4		4		4		4		4			Insulator—Spare for Couplings C-17, C-36, C-47, L-16, L-23, L-25	Isolantite Special			29	7402096-P2	1275	7607465-G4	
13		13		13		13		13		13		13		13		13		13		13		12		12		12		12		12		12		12		13		13			Basket for C-10, C-14, C-19, C-24, C-32, C-33, C-34, C-54, C-66, C-67, C-68, C-69, C-98	Micarta 1 x 1/2 x 1-7/8 x 1/4 ⌀. Rad. of 1/8 Tk			1	7405902-P3	1276	7407909-P50	
1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1			Strip for C-15 and C-18	Micalex 5-7/8 x 2 x 3/16			1	7705732-P11	1277	7407909-P26	

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																																				Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2																						
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		Base for C-27 and L-12, C-37 and L-17, C-39 and L-19, C-48 and L-24	Moldarta			1	7408574-P1	1278	7707963-P57	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Strip for C-29	Micarta 4-1/4 x 1/8 x 1/8			1	7809208-P2	1279	7407907-P73	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Bracket for C-30 and C-72	Micarta 2-1/4 x 1/8 Tk x 5/8 1-7/8 x 3/16 O. Rad.			1	7405902-P5	1280	7407907-P66	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6		Insulator C-35, C-46, C-71, M-3R	Isolantite 1 x 23/32 Sq.			29	7705360-P15	1281	7407907-P69	
14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14		Insulator Stand-Off for C-36, C-50, L-15	Same as Item 1072					1282		
14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14		Insulator Stand-Off for C-38, C-47, L-11	Same as Item 768					1283		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Insulator Board for C-41, C-42, S-33	Micarta 5 x 3-1/3 x 1/8			1	7604858-P7	1284	7604858-G4	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Support for C-52	Micarta 2-1/2 x 1-5/8 x 5/8 x 1/8			1	7705763-P4	1285	7705763-G1, 2 and 3	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Panel Support for C-52, K-1, R-2 and R-36				1	7705763-P2	1286	7705763-G1, 2 and 3	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Panel for C-59, C-70, C-78	Micarta 6-9/16 x 1-1/2 x 1/8			1	7705790-P9	1287	7705790-G3	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Base for C-76, L-21, C-27, L-28	Isolantite			29	7406134-P1	1288	7705781-P5	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Insulator—Stand-Off for C-92	Isolantite			29	7602239-P3	1289	7604964-P3	

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
1	1	2	1	1	2	1	1	1	1	2	1	1	1	2	1	1	2	1	1	2	1	1		Receptacle for F-1, F-2, F-3, F-4, F-150, F-151	Same as Item #279					1290		
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Support for R-3, R-35, R-38, R-39	Micarta 9-5/16 x 1-1/4 x 3/8			1	7705737-P3	1291	7407907-P145	
28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28		Insulator for R-10, R-11, R-15, R-16, R-19, R-21, R-55	Prestite			1	50-C-682-P4	1292	7706403-P14	
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		Insulator for R-13, R-14	Moldarta 1 x 3/4 Sq.			1	7708566-G3	1293	7407907-P361	
20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20		Insulator for R-17, R-28, R-29, R-30, R-42	Prestite			1	50-C-682 P4	1294	7407907-P367	
0	0	1	0	0	1	0	0	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0		Insulator for R-150	Isolantite 1 Long 3/4 Dia.			29	7602239-P34	1295	7606333-P31	
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1		Support for R-150, R-151, R-152	Micarta 5-1/2 x 2 x 1/4			1	7604963-P3	1296	7604963-G1	
1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1		Support for R-150, R-151, R-152	Micarta 5-5/8 x 2 x 1/4			1	7604963-P4	1297	7604963-G2	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Insulator—Spare for Coupling C-28	Isolantite Special			29	7402096-P3	1298	7604407-G15	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Insulator Shaft S-34	Isolantite 6-3/4 x 5/8 x 1/2			29	7700898-P4	1299	7407908-P65	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Insulator Stand-Off for V-4 Lead	Same as Item 1072					1300		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Insulator Stand-Off for V-4 Lead	Same as Item 768					1301		
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		Spacer for R-4 and R-46	Micarta Tube 5/8 of 3/8 O.D. x 5/32 I.D.			1	7604835-P16	1302	7604835-G3 and G4	

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																																				Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13			115 V.D.C.—TBL-12			220/3/60—TBL-11			115 V.D.C.—TBL-7			220/3/60—TBL-10			115 V.D.C.—TBL-6			220/3/60—TBL-6			115 V.D.C.—TBL-5			115 V.D.C.—TBL-3			115 V.D.C.—TBL-2																	
230 V.D.C.—TBL-13			230 V.D.C.—TBL-12			440/3/60—TBL-12			230 V.D.C.—TBL-7			440/3/60—TBL-7			230 V.D.C.—TBL-6			440/3/60—TBL-6			230 V.D.C.—TBL-5			230 V.D.C.—TBL-3			230 V.D.C.—TBL-2																	
440/3/60—TBL-13			440/3/60—TBL-12						440/3/60—TBL-7						440/3/60—TBL-6						440/3/60—TBL-5			440/3/60—TBL-3																					
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Panel for R-4, R-40, R-46, R-48, S-2, S-31	Micarta 11-1/8 x 7-15/16 x 1/4			1	7604858-P1	1303	7604835-P1	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		Spacer for R-40 and R-48	Micarta Tube 7/8 x 3/8 O.D. x 5/32 I.D.			1	7604835-P25	1304	7604835-G3 and G4	
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8		Insulator for R-5, R-7, R-13, R-14, R-24, R-25, R-26, R-27, R-43, R-44, R-53, R-54	Moldarta 1 x 3/4 Square			1	7708566-G3	1305	7407907-P361	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Support for R-24, R-25, R-26, R-27, R-43, R-44, R-53, R-54	Mycalex 13-1/4 x 1-3/8 x 3/8			1	7706401	1306	7407907-P214	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Insulator for R-6	Moldarta 3 x 1 Square			1	7708566-G6	1307	7407908-P233	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Support for R-10, R-11, R-15	Micarta 6-3/4 x 1-1/4 x 3/8			1	7705788-P4	1308	7705788-G4 and 6	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Support for R-16, R-19, R-21, R-55	Micarta 6-5/8 x 1-1/4 x 3/8			1	7706403-P2	1309	7706403-G1 and 2	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Support for R-17, R-28, R-29, R-30, R-31, R-32, R-42	Micarta 19-1/2 x 1-3/4 x 3/8			1	7705737-P13	1310	7407907-P351	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Support for R-17, R-28, R-29, R-30, R-31, R-32, R-42	Micarta 15-1/2 x 3-9/16 x 3/8				7705737-P14	1311	7407907-P352	
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8		Insulator for R-31, R-32	Prestite			1	50-C-682-P3	1312	7407907-P368	
0	2	0	0	2	0	0	0	0	0	2	0	0	2	0	0	2	0	0	2	0	0	2	0	0	2	0	0	2	0		Support for R-3, R-35, R-38, R-39	Micarta 9-5/16 x 1-1/4 x 3/8			1	7705737-P3	1313	7407907-P145	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Insulator—Stand-Off for V-3 Lead	Same as Item 1072					1314		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																															
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2	Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Insulator—Stand-Off for V-3 Lead	Same as Item 768					1315		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Insulator—Stand-Off for V-2 Lead	Same as Item 768					1316		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Panel for C-40, C-43, C-44, C-45, R-33, R-34, X-5, X-6	Mycalex 7-1/2 x 4-3/4 x 3/16			1	7705999-P1	1317	7604870-P2	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Support for L-26	Mycalex 5-5/16 x 1-1/2 x 1/2			1	7705804-P1	1318	7605519-P9	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Support for L-26	Mycalex 4-1/8 x 1-1/2 x 1/2			1	7705804-P2	1319	7605519-P10	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Support for L-26	Mycalex 5-5/16 x 2-1/4 x 1/2			1	7705804-P8	1320	7605519-P17	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Control "L"	H.F., Antenna Capacitor Dial with Nameplate 24245 "L" Attached			1	7609159-G3	1321	7605525-P4	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Control "K"	H.F. Antenna Inductance Dial with NP 24245 "K" Attached			1	7609291-G1	1322	7605525-P3	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Control "J"	H.F. Antenna Coupling Dial with NP 24245 "J" Attached			1	7609291-G2	1323	7605525-P40	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Control "G"	H.F., P.A. Tuning Dial with NP 24245 "G" Attached			1	7609291-G4	1324	7605536-P46	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Control "F"	H.F. 2nd Amp. Tuning Dial with NP 24245 "F" Attached			1	7609291-G3	1325	7605536-P45	

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Control "E"	H.F. 1st Amp. Tuning Dial with NP 24245 "E" Attached			1	7609159-G9	1326	7609159-P44	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Control "T"	I.F., Antenna Tuning Dial with NP 24246 "T" Attached			1	7609159-G4	1327	7606501-P3	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Control "S"	I.F. Antenna Coupling Dial with NP 24246 "S" Attached			1	7609159-G5	1328	7606501-P34	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Control "Q"	I.F. Intermediate Amp. Tuning Dial with NP 24246 "Q" Attached			1	7609159-G6	1329	7606501-P35	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Control "R"	I.F., P.A. Dial with NP 24246 "R" Attached			1	7609159-G7	1330	7606501-P36	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Control "D"	H.F. Doubler Circuit Tuning Dial with NP 24245 "D" Attached			1	7609159-G8	1331	7604962-P57	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Control "O", Control "C" Spare	M.O. Dial Less Detent Mechanism for S-1			1	7605479-G3	1332	7605479-G2	
22	28	22	22	28	22	22	22	22	28	22	22	28	22	22	22	28	22	22	28	22	22	28		Clips (Trans)	For Mounting Resistors			1	7403619-P1	1333	7706403-P4 and P11	
46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46		Clips (Trans)	For Mounting Resistors			1	7610465-P3	1334	7407908-P13	
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		Clips (Trans)	For Mounting Resistors			1	S#42340	1335	7604870-P40	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Clips (Trans)	For Mounting Resistors			1	7403088-P2	1336	7705763-P8	
69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69		Thumb Screws (Trans)	Slotted for Shields 1-3/8 Long			1	7406179-P7	1337	7604951-P26	

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Thumb Screw (Trans)	Slotted for Shields 1 Long			1	7406179-P9	1338	7604900-P61	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Shoulder Screw (Trans)	For Door Stay			1	7705787-P9	1339	7705787-G1 and G4	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Clip—for Door Stay (Trans)	Same as Item 1335					1340		
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12		Screw—Fulcrum (Trans)	For Detent Arms			1	7806704-P2	1341	7705783-P37	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Shockmount for M.O. Unit—Top				33	7706786-P4	1342	7407908-P97	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Shockmount for M.O. Unit—Front Left & Rear Right				33	7706786-P6	1343	7407908-P42	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Shockmount for M.O. Unit—Front Right				33	7706786-P3	1344	7407908-P41	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Shockmount for M.O. Unit—Rear Left				33	7706786-P5	1345	7407908-P155	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		Shockmounts for B-1, B-2, B-3				33	7706786-P1	1346	7407909-P9	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Gear & Pinion—H.F. I.F. Transfer Switches Drive				35	G-487	1347	7407907-P20	
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5		Spring for Detent Arms (Trans)	Phosphor Bronze 3/8 O.D.			36	7807511-P4	1348	7705783-P41	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Spring for Detent Arms (Trans)	Stainless Steel 3/8 O.D.			36	7810320-P1	1349	7707438-P25	
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		Shockmount for X-5, X-6	Rubber Part Only			34	7806449-P1	1350	7604870-P6	

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																										Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2											
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Fulcrum Screw (Trans)	For Detent Arms				1	7604967-P2	1351	7604967-G3	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Spring for Detent Arms (Trans)	Phos. Bronze 3/8 O.D.				36	7808632-P1	1352	7604967-P12	
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5		Spring for Doors (Trans)	Phos. Bronze .599 O.D.				36	7805297-P3	1353	7706392-P5	
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		Spring for Door Stay (Trans)	Nickel Silver Special				1	7705787-P7	1354	7705787-G1 and G4	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Terminal Board Filter Unit	Micarta 12-13/16 x 2-3/4 x 1/4				1	7706379-P2	1355	7706379-G1	
0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0		Support for Item 1355	Micarta Chan. 2-3/4 x 3/4 of 1/8 Thick x 1 x 1 Legs				1	7406756-P1	1356	7606333-P38	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		Insulator for Item 1355	Isolantite				29	7710363-P12	1357	7706379-P4	
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0		Panel for Magnetic Controller	Micarta 11 x 18 x 3/8		17-P-5		1		1358	33-J-828-P1	
8	0	0	8	0	0	0	0	8	0	0	8	0	0	0	0	0	0	0	0	0	0	0		Shockmount for Magnetic Controller Panel	Rubber Part Only				1	4-D-4962-P1	1359	4-D-4962 Comb. 11	
4	0	0	4	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0		Shockmount for Magnetic Controller Panel	Rubber Part Only				1	4-D-4962-P2	1360	4-D-4962 Comb. 11	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	2	2	0	2	2		Grease Cup for B-250	1/8 Std. #00 Internal Thread				8		1361	N-22046P52	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0		Grease Cup for Motor B-250	Same as Item 1361						1362		
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0		Grease Cup for Motor B-401	1/8" #000 Internal Thread				8		1363	N-30142-P52	

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.— TBL-13	230 V.D.C.— TBL-13	440/3/60— TBL-13	115 V.D.C.— TBL-12	230 V.D.C.— TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0		Grease Cup for Motor B-401	1/8"#000 Standard			8		1364	N-30142-P98	
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0		Grease Cup for B-421	Same as Item 1363					1365		
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0		Grease Cup for B-421	Same as Item 1364					1366		
0	0	1	0	0	1	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0		Grease Cup for B-441	Same as Item 1363					1367		
0	0	1	0	0	1	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0		Grease Cup for B-441	Same as Item 1364					1368		
4	0	0	4	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0		Clip for Mounting Fuse (Mag. Cont.)				1	S#835983	1369	33-J-828-P51	
10	0	0	10	0	0	0	0	10	0	0	10	0	0	0	10	0	0	10	0	0	10	0		Clip for Mounting Resistors (Mag. Cont.)				1	S#947781 S#42342	1370	326149-P5	
2	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Thumb Screw for Door (Mag. Cont.)				1	S#1279362	1371	8-4535-P13	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	0	0	4	0		Clip for Mounting Fuses (Mag. Cont.)				1	S#947782	1372		
0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1		Panel for Magnetic Controller	Same as Item 1358					1373		
0	8	0	0	8	0	0	0	0	8	0	0	8	0	0	0	0	0	0	0	0	0	0		Shockmount for Magnetic Controller Panel	Same as Item 1359					1374		
0	4	0	0	4	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0		Shockmount for Magnetic Controller Panel	Same as Item 1360					1375		
0	4	0	0	4	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0		Clips for Fuses (Mag. Cont.)	Same as Item 1369					1376		
0	10	0	0	10	0	0	0	0	10	0	0	10	0	0	0	10	0	0	10	0	0	10		Clips for Resistors (Mag. Cont.)	Same as Item 1370					1377		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																								Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60— TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60— TBL-12	220/3/60— TBL-11	220/3/60— TBL-10	115 V.D.C.— TBL-7	230 V.D.C.— TBL-7	440/3/60— TBL-7	115 V.D.C.— TBL-6	230 V.D.C.— TBL-6	220/3/60— TBL-6	440/3/60— TBL-6	115 V.D.C.— TBL-5	230 V.D.C.— TBL-5	440/3/60— TBL-5	115 V.D.C.— TBL-3	230 V.D.C.— TBL-3	440/3/60— TBL-3	115 V.D.C.— TBL-2	230 V.D.C.— TBL-2										
0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Thumb Screw for Door (Mag. Cont.)	Same as Item 1371					1378		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	0	0	4		Clip for Fuses (Mag. Cont.)	Same as Item 1372					1379		
0	0	1	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0		Panel for Mag. Controller	Micarta 13 x 8 x 3/8				1	1380	35-J-705-P10	
0	0	1	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0		Panel for Mag. Controller	Micarta 13 x 7-3/4 x 3/8				1	1381	35-J-705-P12	
0	0	8	0	0	8	0	0	0	0	8	0	0	0	8	0	0	0	0	0	0	0	0		Shockmount for Magnetic Controller Panel	Same as Item 1359				1	1382		
0	0	4	0	0	4	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	0		Shockmount for Magnetic Controller Panel	Same as Item 1360				1	1383		
0	0	4	0	0	4	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	0		Fuse Clips (Mag. Cont.)	Same as Item 1369				1	1384		
0	0	2	0	0	2	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0		Thumb Screw for Door (Mag. Cont.)	Thumb Screws for Door				1	1385	12-A-4363 Item 10	
4	4	4	4	4	4	0	0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		Fuse Clip for H.V. Gen.		-28003			30	1386	C-30685-P4	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	2		Grease Cup for H.V. Gen.	Same as Item 1361				8	1387		
2	2	2	2	2	2	0	0	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0		Grease Cup for H.V. Gen.	Same as Item 1363				8	1388		
3	3	3	3	3	3	0	0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		Fuse Insulator for H.V. Gen.	Isolantite				29	1389	C-30685-P5	
4	4	4	4	4	4	0	0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		Fuse Clip for L.V. Gen.	Same as Item 1386	-28003			30	1390		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																																
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2	Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
4	4	4	4	4	4	0	0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		Fuse Clip for L.V. Gen.		—28002		1		1391	C-30687-P8	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	2		Grease Cup for L.V. Gen.	Same as Item 1361					1392		
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0		Grease Cup for L.V. Gen.	Same as Item 1363					1393		
1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0		Grease Cup for L.V. Gen.	Same as Item 1364					1394		
3	3	3	3	3	3	0	0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		Fuse Insulator for L.V. Gen.	Isolantite 1 x 3/4	—61109		29		1395	C-30687 It. 18	
4	4	4	4	4	4	0	0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		Spacer for L.V. Gen.	Bakelite 7/16 of 1/2 O.D. x .201 I.D.			38		1396	C-30687 It. 15	
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Terminal Board (Rect.)	Micarta 5 x 3-1/2 of 1/4 Tk.				7609368-P20	1397	7610082-P5	
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Support for CR-707, CR-708, CR-709, CR-710, CR-711	Micarta Angle 17 x 4 x 2-1/2 Leg x 3/8 Tk.				7409320-P1	1398	7610066-P7	
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Support for CR-707, CR-708, CR-709, CR-710, CR-711	Micarta Angle 17 x 4 x 2-1/2 Leg of 3/8 Tk.				7409319-P1	1399	7610066-P20	
0	0	0	0	0	0	13	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Insulator for H.V. Lead Through on Rectox Assembly	Prestite (Female)				1-C-9310-P1	1400	7610066-P12	
0	0	0	0	0	0	13	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Insulator for H.V. Lead Through on Rectox Assembly	Prestite (Male)				44-D-846-P1	1401	7610066-P13	
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Support for CR-701, CR-702, CR-703, CR-704, CR-705, CR-706	Micarta Angle 17 x 4 x 2-1/2 Leg of 3/8 Tk.				7409321-P1	1402	7610067-P8	

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																							Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2										
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Support for CR-701, CR-702, CR-703, CR-704, CR-705, CR-706	Micarta Angle 17 x 4 x 2-1/2 Leg of 3/8 Tk.				7409322-P1	1403	7610067-P16	
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Spacer for S-702	Micarta 2-5/16 x 15/16 of 1/8 Tk.				7609368-P25	1404	7409373-P32	
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Support for R-701, R-702, R-703, F-701, F-702, F-703	Micarta 18-15/16 of 6-3/8 of 3/8 Tk.				7409337-P1	1405	7609367-P28	
0	0	0	0	0	0	4	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Stand-Off Insulator for F-702, F-703	Moldarta 1-1/4 x 3/4 Sq.				7708566-G2	1406	7609367-P14	
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Terminal Block (Rect.)					7609039-P8	1407	7409373-P34	
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Terminal Block (Rect.)					7609039-P9	1408	7409373-P35	
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Terminal Block (Rect.)					7609039-P10	1409	7409373-P36	
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Support for Items 1407, 1408 & 1409	Micarta 10 x 1-1/2 of 1 x 1 Legs of 1/8 Tk.				7709644-P1	1410	7409373-P41	
0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Receptacle for F-704, F-705	Same as Item 279					1411		
0	0	0	0	0	0	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Thumbscrew (Rect.)	For Shield				7407718-P1	1412		
0	0	0	0	0	0	45	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Thumbscrew (Rect.)	Slotted for Shield 1-1/16 LG.				7608662-P33	1413	7409365-P15	
0	0	0	0	0	0	12	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Clips (Rect.)	For Mounting Resistors and Fuses				7403619-P1	1414		

ELECTRICAL PARTS FOR MODEL TBL SERIES RADIO TRANSMITTING EQUIPMENTS (Continued)

Total Per Equipment																																
115 V.D.C.—TBL-13	230 V.D.C.—TBL-13	440/3/60—TBL-13	115 V.D.C.—TBL-12	230 V.D.C.—TBL-12	440/3/60—TBL-12	220/3/60—TBL-11	220/3/60—TBL-10	115 V.D.C.—TBL-7	230 V.D.C.—TBL-7	440/3/60—TBL-7	115 V.D.C.—TBL-6	230 V.D.C.—TBL-6	220/3/60—TBL-6	440/3/60—TBL-6	115 V.D.C.—TBL-5	230 V.D.C.—TBL-5	440/3/60—TBL-5	115 V.D.C.—TBL-3	230 V.D.C.—TBL-3	440/3/60—TBL-3	115 V.D.C.—TBL-2	230 V.D.C.—TBL-2	Symbol Designations	Function	Description	Navy Type Number	Navy Spec. Number	Component Mfr.	Component Mfr. Desig.	Contractor's Item No.	Contractor's Drawing Number	All Symbol Designations Involved
0	0	0	0	0	0	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Clips—Fuse (Rect.)					S#867425	1415	7609368-P9	
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Receptacle for F-501	Porcelain for 1 Fuse				#3929	1416	7606569-P30	
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Terminal Block (Landline)					S#1225376	1417	7606569-P31	
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Terminal Block (Landline)					S#1225374	1418	7606569-P40	
0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Insulator for R-501	Isolantite				7602239-P9	1419	7606569-P52	

LIST OF MANUFACTURERS—TBL SERIES LISTS

Code Number	Mfr. Prefix	Name	Address
1	CAY	Westinghouse Electric & Mfg. Company	2519 Wilkens Avenue, Baltimore, Maryland
2	CD	Cornell Dubilier	South Plainfield, N. J.
3	CHC	Hammarlund Mfg. Co.	424 West 33rd Street, New York, N. Y.
4	CBK	Allen B. Cardwell	81 Prospect Street, Brooklyn, N. Y.
5	CYD	Bryant Electric Co.	Bridgeport, Conn.
6	CN	National Elect. Mach. Shops	Washington, D. C.
7	CSD	Struthers-Dunn, Inc.	1315 Cherry Street, Philadelphia, Pa.
8	CCC	Continental Carbon Co.	13900 Lorain Avenue, Cleveland, Ohio
9	CWL	Westinghouse Lamp Co.	Bloomfield, N. J.
10	CPT	Precision Inst. & Thermometer Company	1433 Brandywine Street, Philadelphia, Pa.
11	CHH	Arrow Hart & Hegeman	Hartford, Conn.
12	CBN	Centralab	900 E. Keefe Avenue, Milwaukee, Wisc.
13	CLE	Lenz Electric Co.	Chicago, Ill.
14	CGC	General Control Co.	Cambridge, Mass.
15	CAW	Aerovox Corp.	742 Belleville Avenue, New Bedford, Mass.
16	CDM	D. P. Mossman, Inc.	6021 N. Northwest Highway, Chicago, Ill.
17	CSO	States Company	Hartford, Conn.
18	CSL	Solar Mfg. Corp.	Bayonne, N. J.
19	CAN	Sangamo Elec. Co.	Springfield, Ill.
20	CMR	Micamold Products Corp.	Brooklyn, N. Y.
21	CSF	Sprague Specialties	North Adams, Mass.
22	CIE	Industrial Condenser Corp.	1725 W. North Avenue, Chicago, Ill.
23	CFA	Bussman Mfg. Co.	St. Louis, Mo.
24	CAO	Ward Leonard Elec. Co.	Mt. Vernon, N. Y.
25		Packard Electric Co.—Division of Gen. Mtrs. Corp.	Warren, Ohio
26	CNC	National Carbon Co.	Cleveland, Ohio
27	CPQ	Speer Carbon Company	St. Mary's, Pa.

LIST OF MANUFACTURERS — TBL SERIES LISTS — Continued

Code Number	Mfr. Prefix	Name	Address
28		Morganite Brush Co.	3304 48th Avenue, Long Island City, N. Y.
29	CBU	Isolantite, Inc.	343 Courtland Street, Belleville, N. J.
30	CLF	Littelfuse, Inc.	Chicago, Ill.
31		Marlin Rockwell Corp.	Jamestown, N. Y.
32	CHD	Hardwick-Hindle, Inc.	65 Johnson Street, Newark, N. J.
33		Lord Manufacturing Co.	1639 W. 12th Street, Erie, Pa.
34		Featheredge Rubber Co.	340 W. Huron Street, Chicago, Ill.
35	CBH	Boston Gear Works	10 Hayward Street, Quincy, Mass.
36		Wallace Barnes	Bristol, Conn.
37	CAS	American Lava Corp.	Cherokee Blvd. & Mfgr's Rd., Chattanooga, Tenn.
38		Bakelite Corp.	30 E. 42nd Street, New York, N. Y.
39	CHB	H. & B. Instrument Co.	Philadelphia, Pa.
40	CPL	Philadelphia Thermometer Co.	Philadelphia, Pa.
41	CEG	Electric Glass Co.	Hatboro, Pa.
42	CC	Continental Elec.	Newark, N. J.
43		Chase Shawmut	Merrimac Street, Newburyport, Mass.
44	CAU	Automatic Elec. Co.	1033 W. Van Buren Street, Chicago, Ill.
45	CW	Western Electric Co.	Kearny, New Jersey
46	CPB	Price Brothers	Frederick, Md.
47	CWE	Adams & Westlake	Elkhart, Ind.
48	CRY	C. P. Clare & Co.	Chicago, Ill.
49	CER CIR CBZ	Erie Resistor Corp. International Resistor Allen Bradley Co.	Erie, Pa. Philadelphia, Pa. Milwaukee, Wisc.
50		SKF Industries Co.	Philadelphia, Pa.
51	COM	Ohmite Mfg. Co.	4835 W. Flournoy Street, Chicago, Ill.
52	CRC	RCA Radiotron	Harrison, N. J.
53	CEJ	E. F. Johnson	Waseca, Minn.
54		Federal Anticapacity Switch Co.	Buffalo, N. Y.

SECTION X

PHOTOGRAPHS AND DRAWINGS

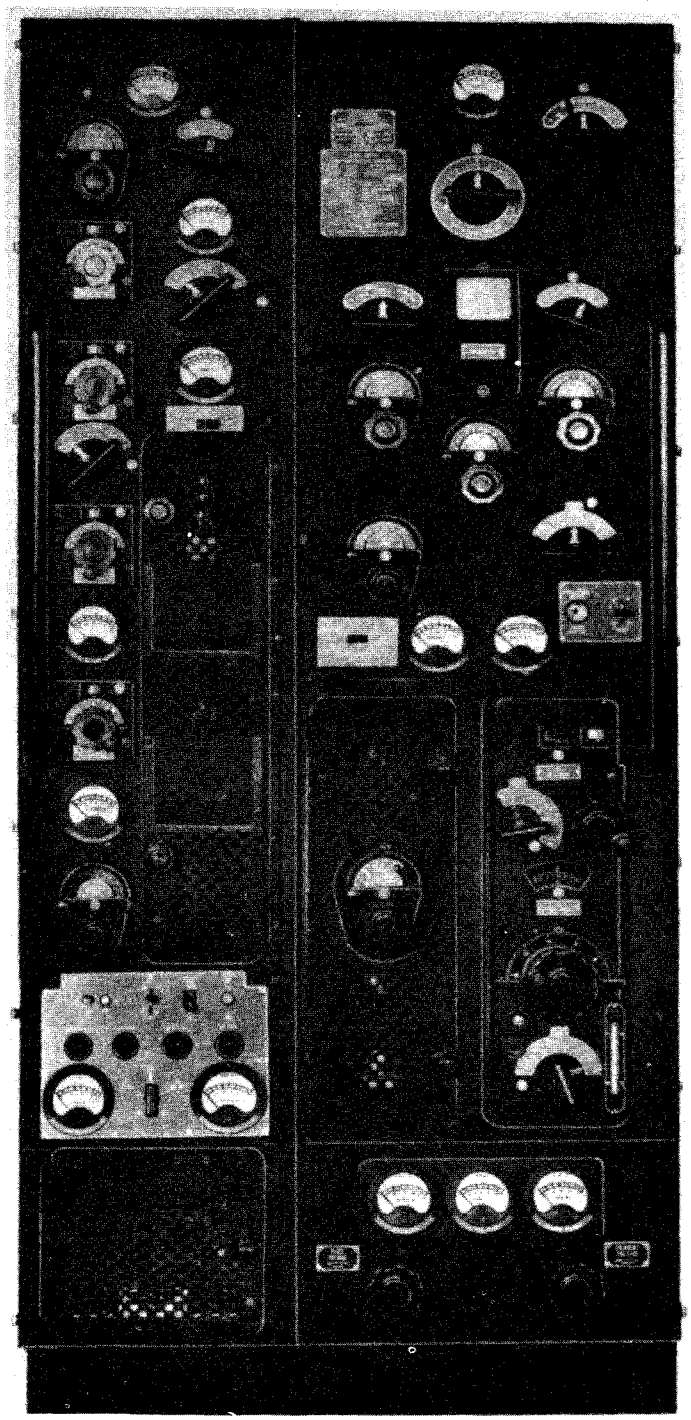


Figure 10-1—Transmitter Unit, TBL-Series for 115/230 V. D.C. Operation. Front View (Photo C-5154)

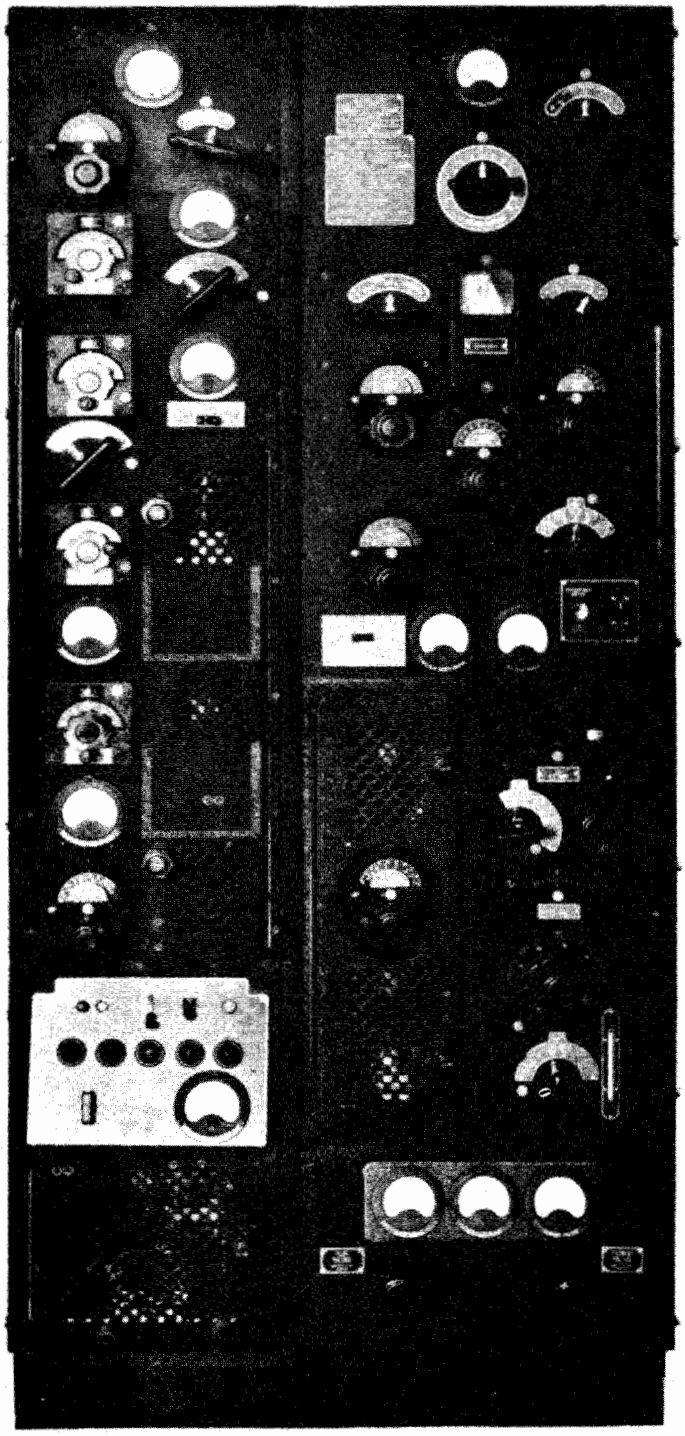


Figure 10-2—Transmitter Unit, TBL-Series for 220/440/3/60 A.C. Operation. Front View (Photo C-5155)

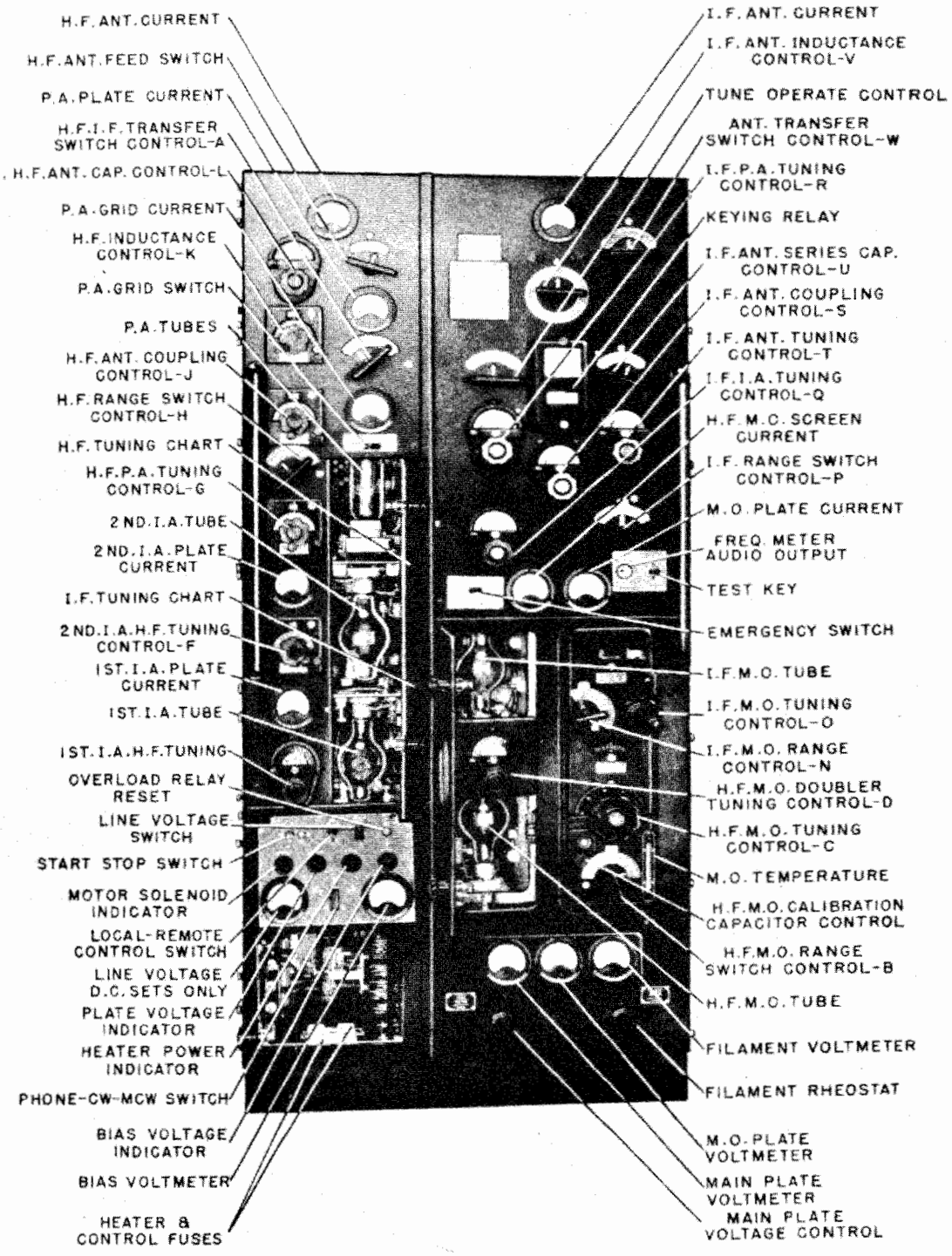


Figure 10-3—Transmitter Unit, TBL-Series for 115/230 V. D.C. Operation. Front View Access Doors Open (Photo C-5152)

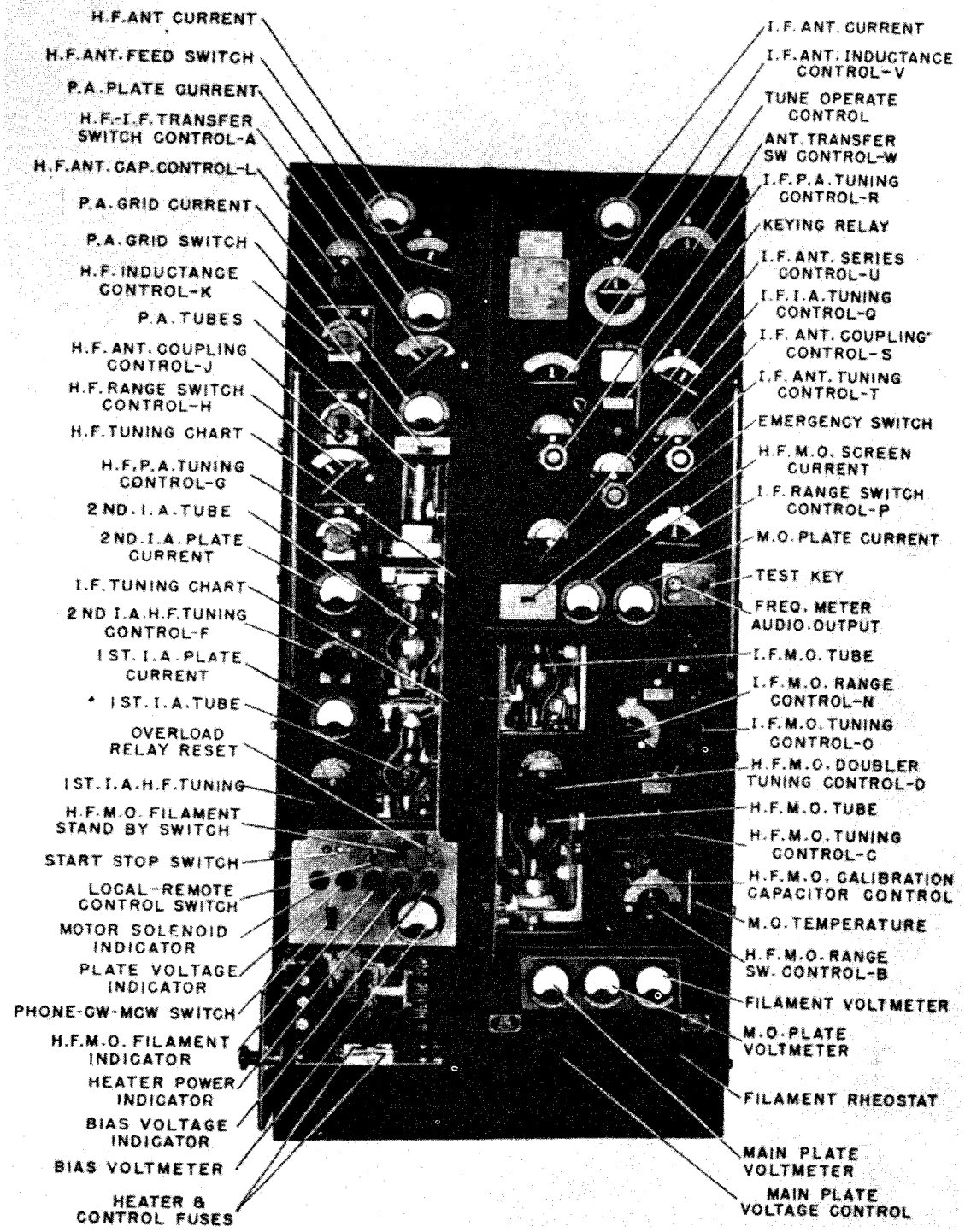


Figure 10-4—Transmitter Unit, TBL-Series for 220/440/3/60 A.C. Operation. Front View Access Doors Open (Photo C-5149)

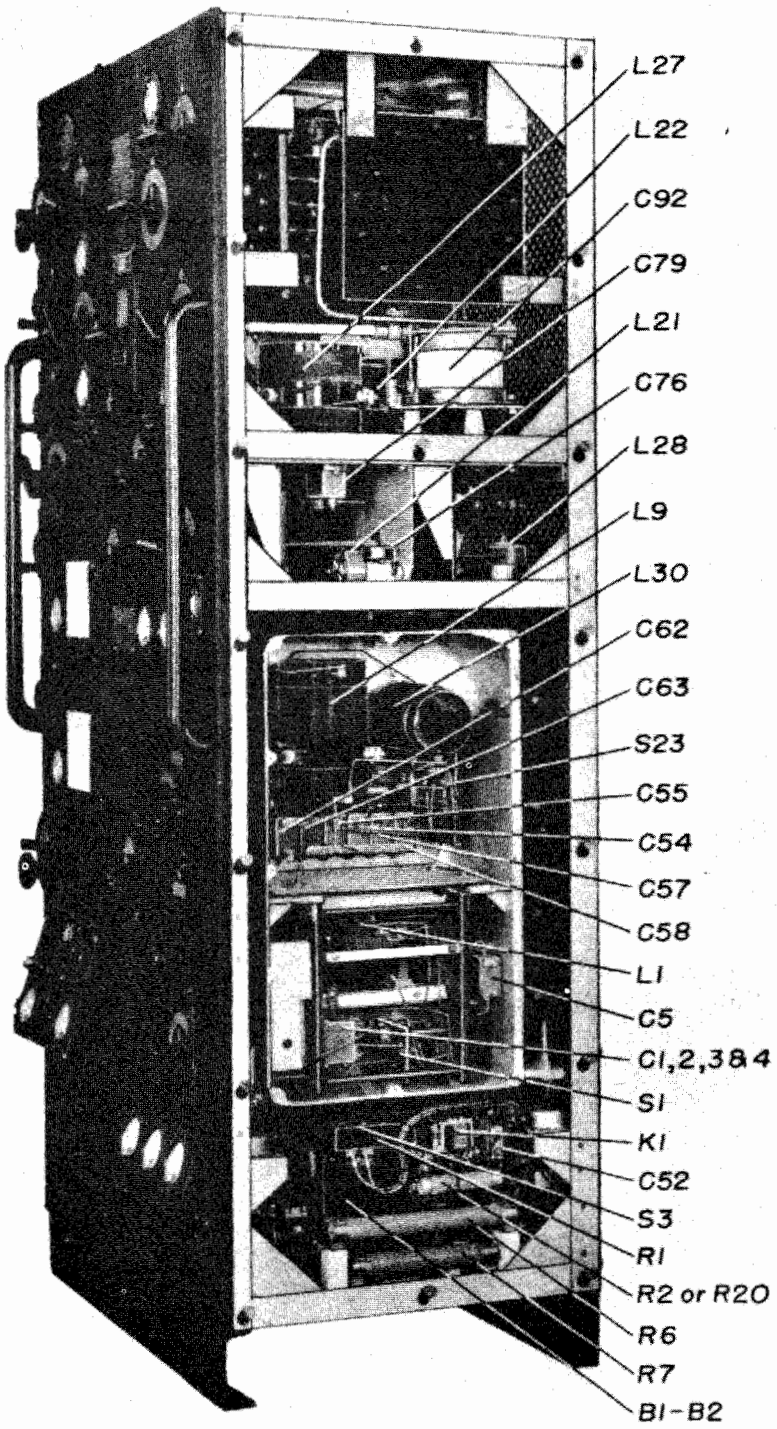


Figure 10-5—Transmitter Unit, TBL-Series for 115/230 V. D.C. Operation. Front Right Oblique, Shields Removed (Photo C-4458)

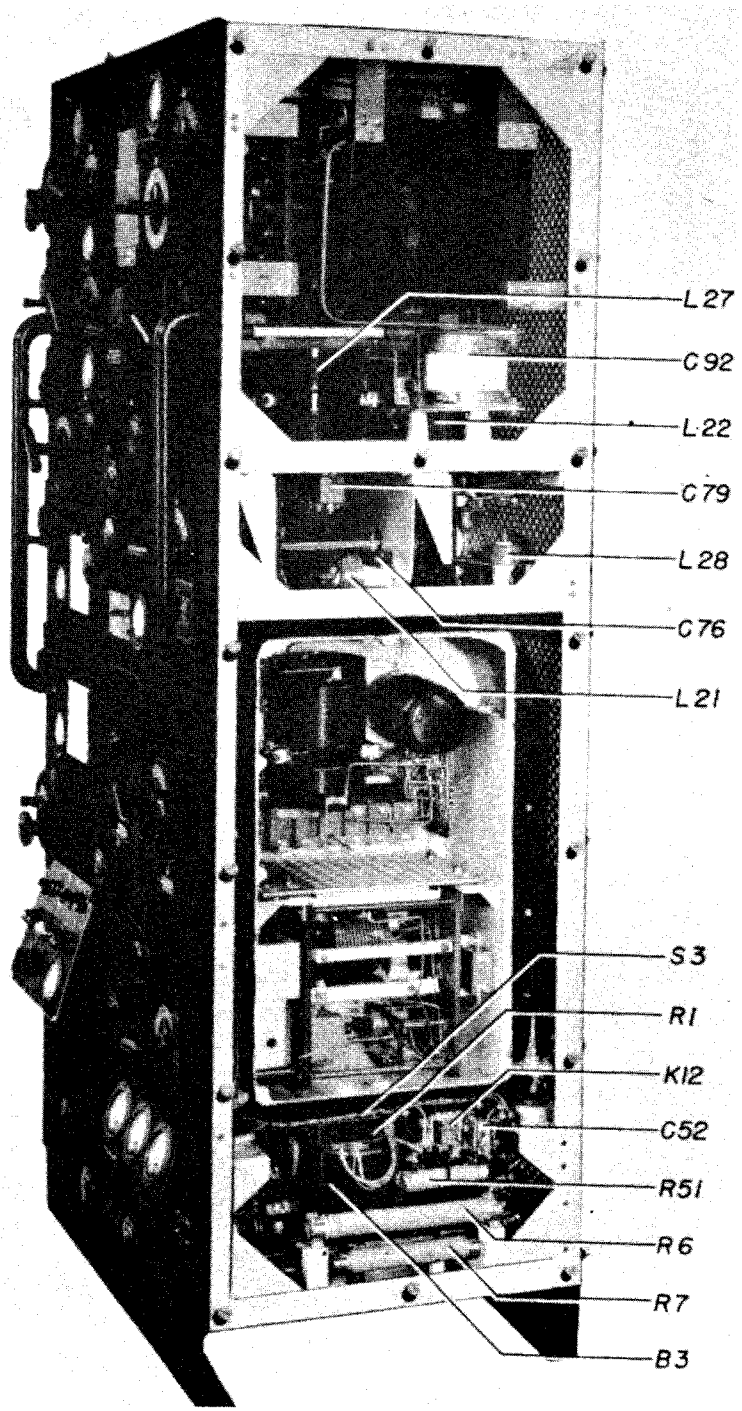


Figure 10-6—Transmitter Unit, TBL-Series for 220/440/3/60 A.C. Operation. Front Right Oblique, Shields Removed (Photo C-4528)

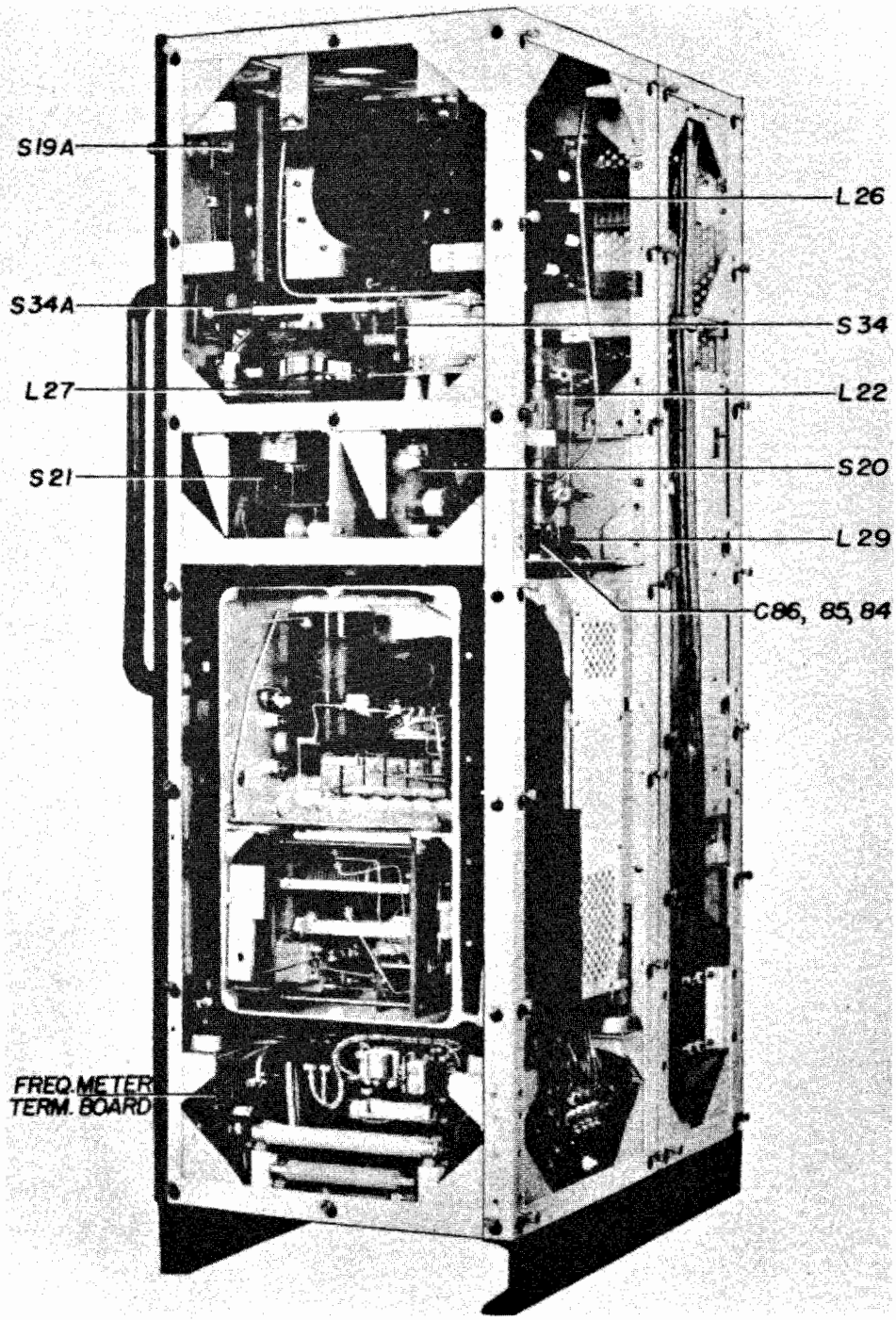


Figure 10-7—Transmitter Unit, TBL-Series for 115/230 V. D.C. and 220/440/3/60 A.C. Operation. Rear Right Oblique, Shields Removed (Photo C-4456)

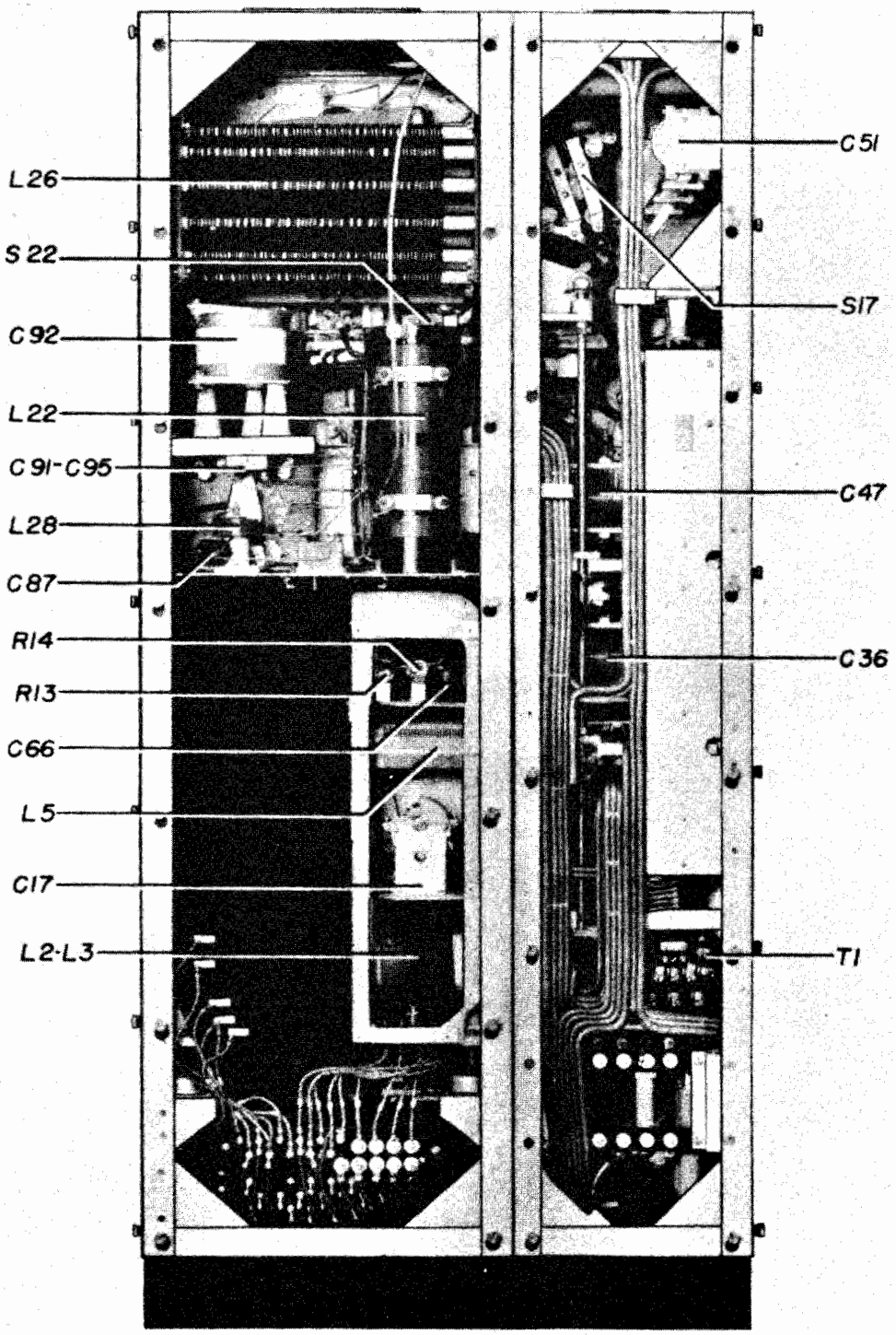


Figure 10-8—Transmitter Unit, TBL-Series for 115/230 V. D.C. and 220/440/3/60 A.C. Operation. Rear View, Two Frames Bolted Together, Shields Removed (Photo C-4455)

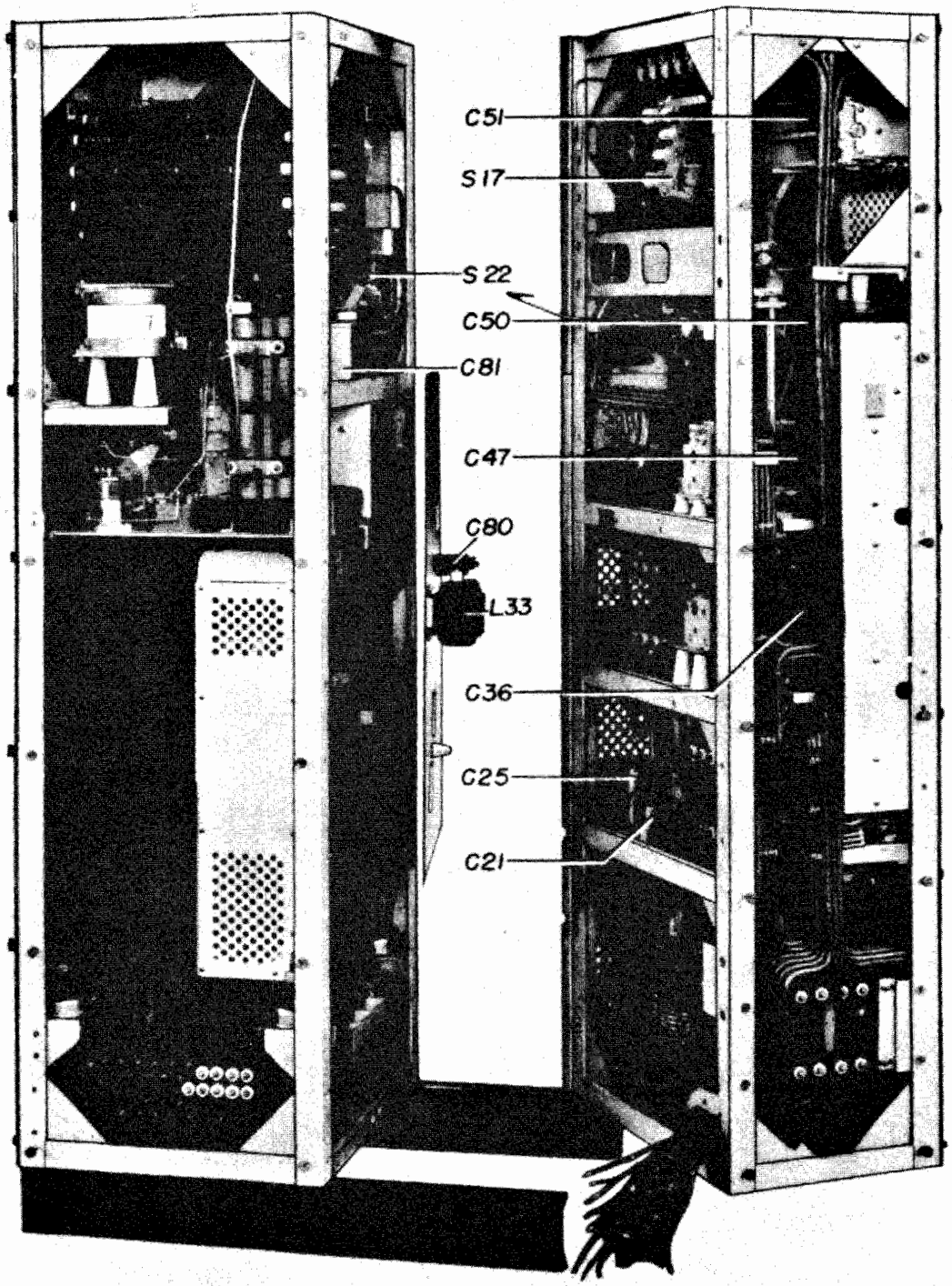


Figure 10-9—Transmitter Unit, TBL-Series for 115/230 V. D.C. and 220/440/3/60 A.C. Operation. Rear View, Two Frames Separated, Shields Removed (Photo C-4470)

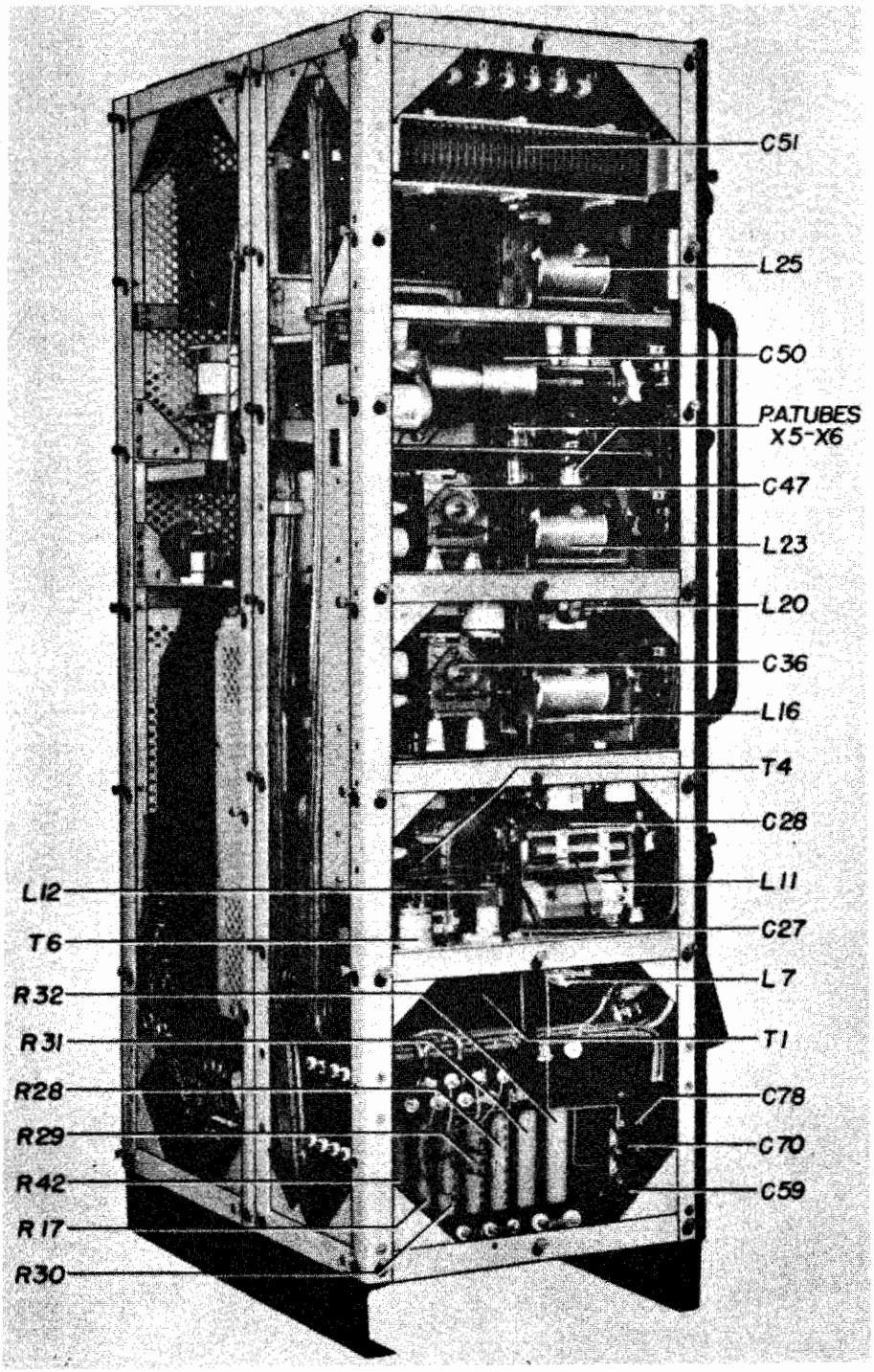


Figure 10-10—Transmitter Unit, TBL-Series for 115/230 V. D.C. and 220/440/3/60 A.C. Operation. Rear Left Oblique, Shields Removed (Photo C-4463)

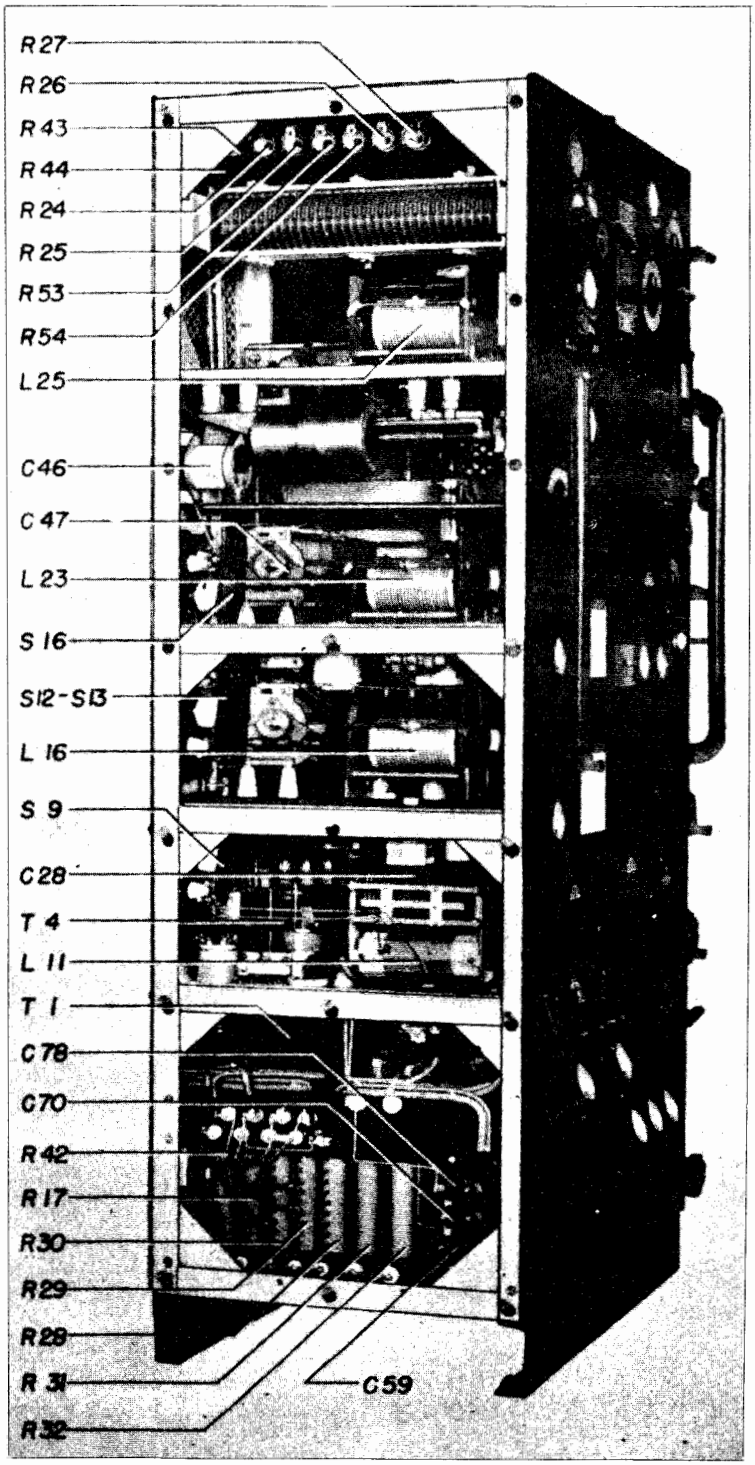


Figure 10-11—Transmitter Unit, TBL-Series for 115/230 V. D.C. Operation. Front Left Oblique, Shields Removed (Photo C-4462)

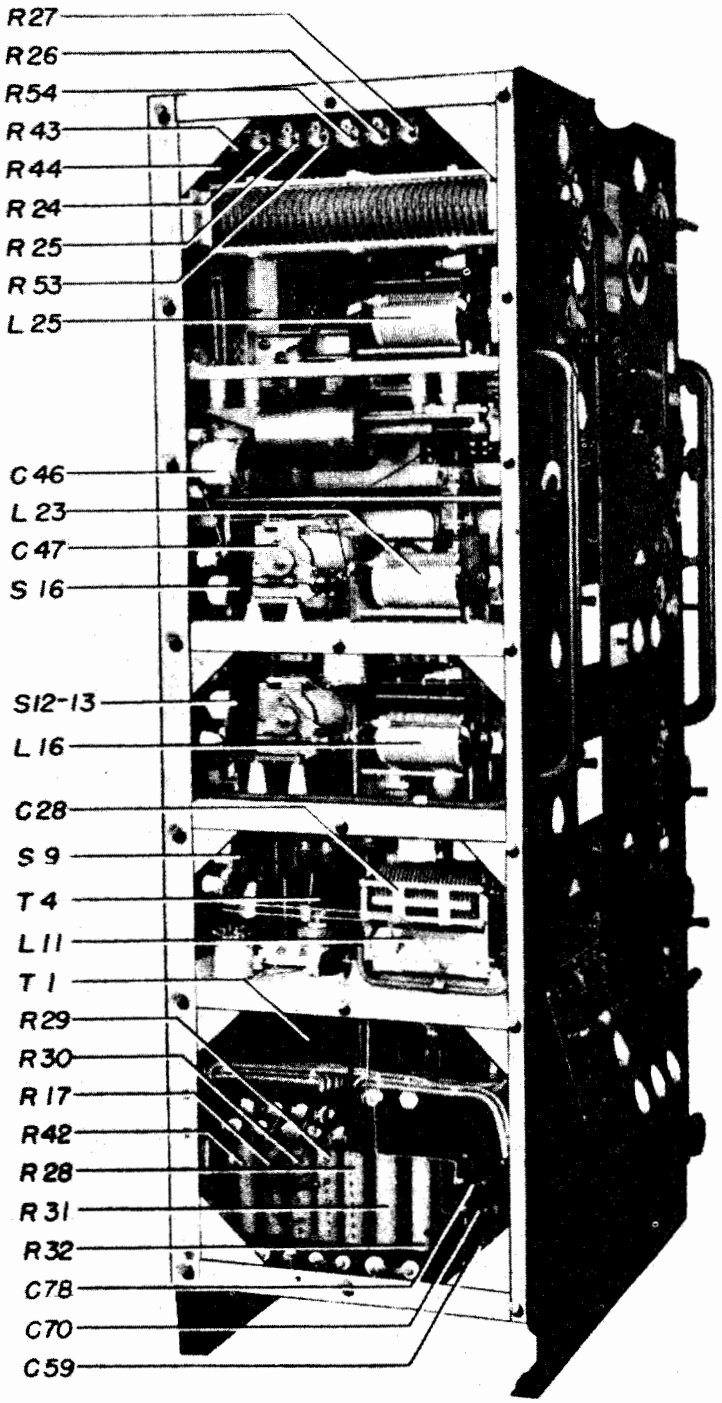


Figure 10-12—Transmitter Unit, TBL-Series for 220/440/3/60 A.C. Operation. Front Left Oblique, Shields Removed (Photo C-4529)

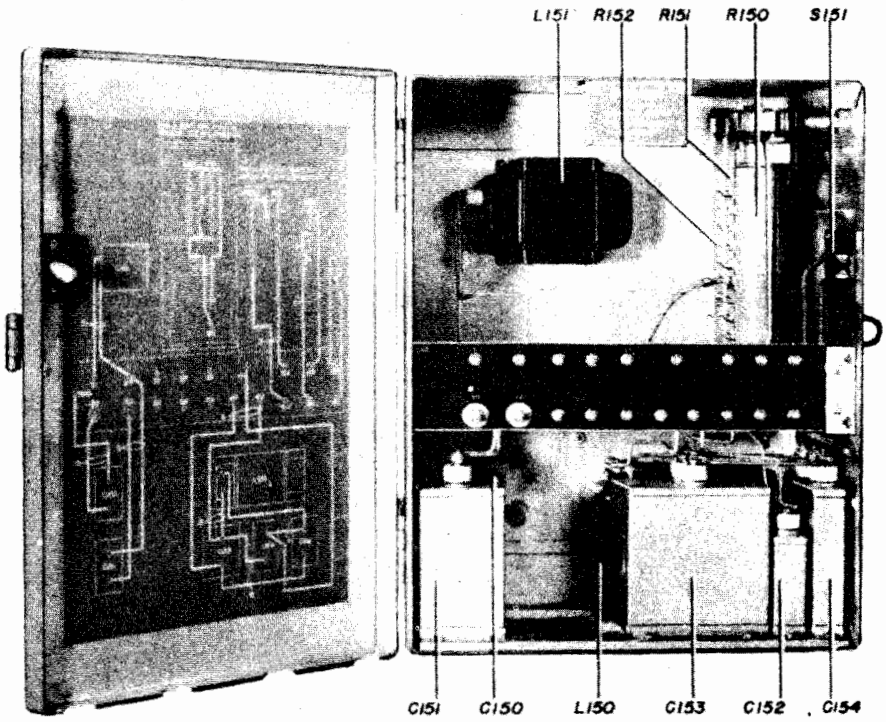


Figure 10-13—Filter Unit, TBL-Series for 115/230 V. D.C. Operation, Type CAY-53036A. Front View Access Door Open (Photo C-4173)

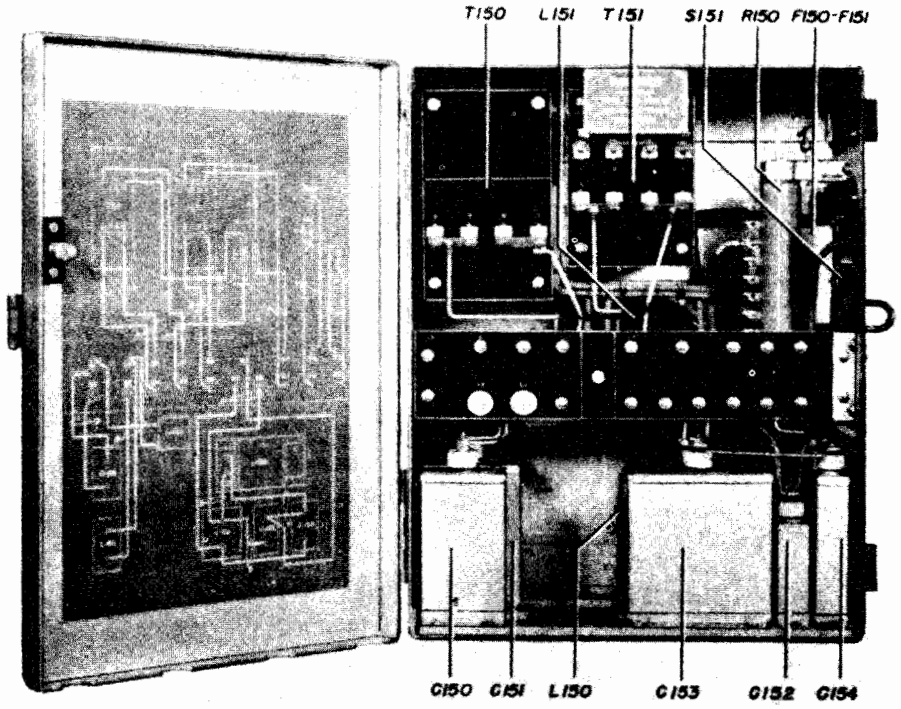


Figure 10-14—Filter Unit, TBL-Series for 220/440/3/60 A.C. Operation, Type CAY-53037A. Front View Access Door Open (Photo C-4174)

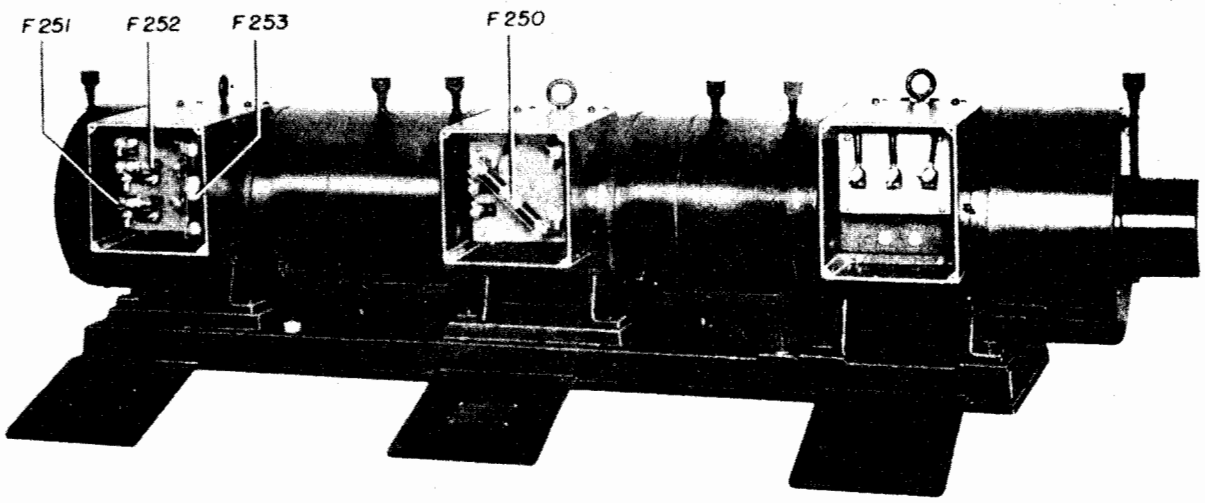


Figure 10-15—Motor-Generator Unit Type CC-21426—115 V. D.C. and CC-21427—230 V. D.C. Operation. A Unit of Model TBL-5 (Photo C-4459)

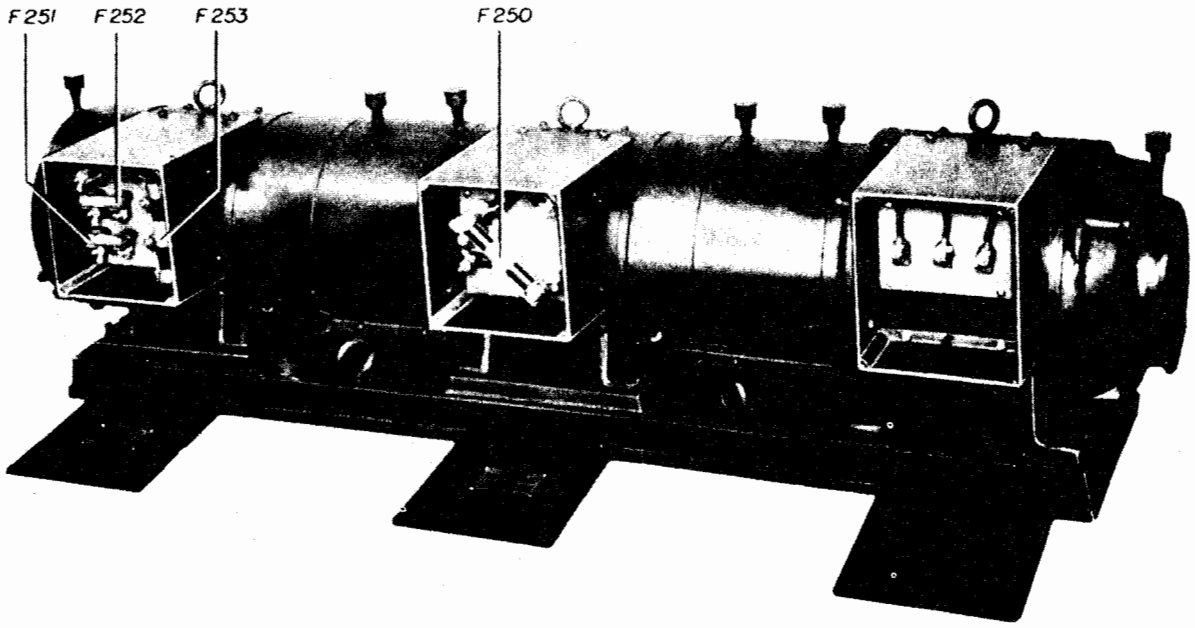


Figure 10-16—Motor-Generator Unit, Type CC-21428—440/3/60 A.C. Operation. A Unit of Model TBL-5 (Photo C-4526)

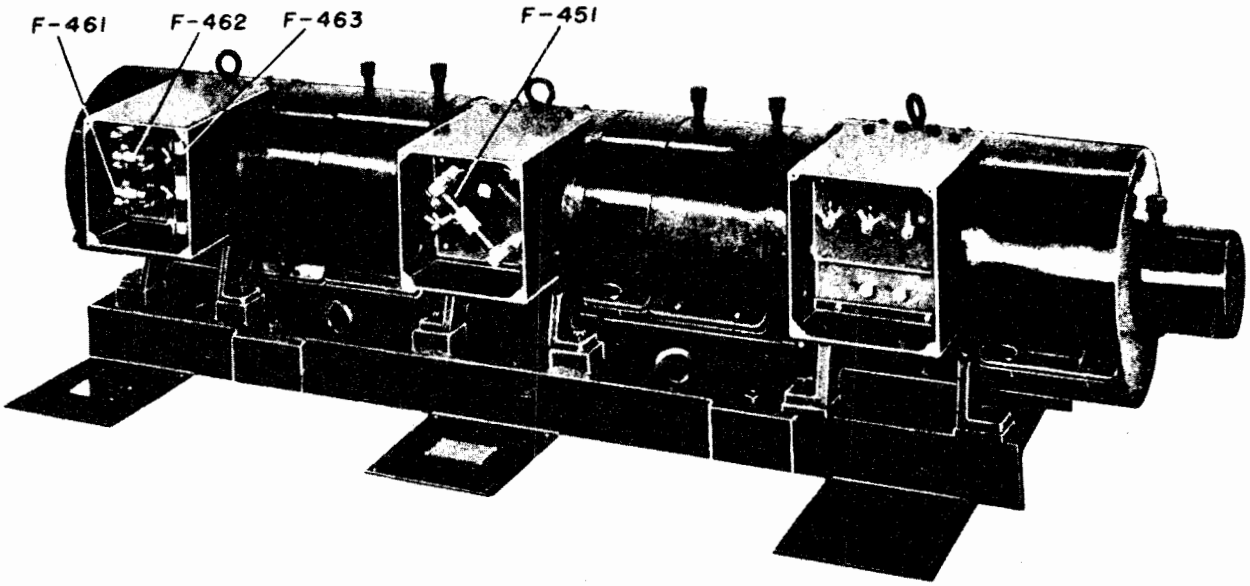


Figure 10-17—Motor-Generator Unit, TBL-6/7/12/13 for 115/230 V. D.C. Operation. Type CAY-21426A (Photo C-5137)

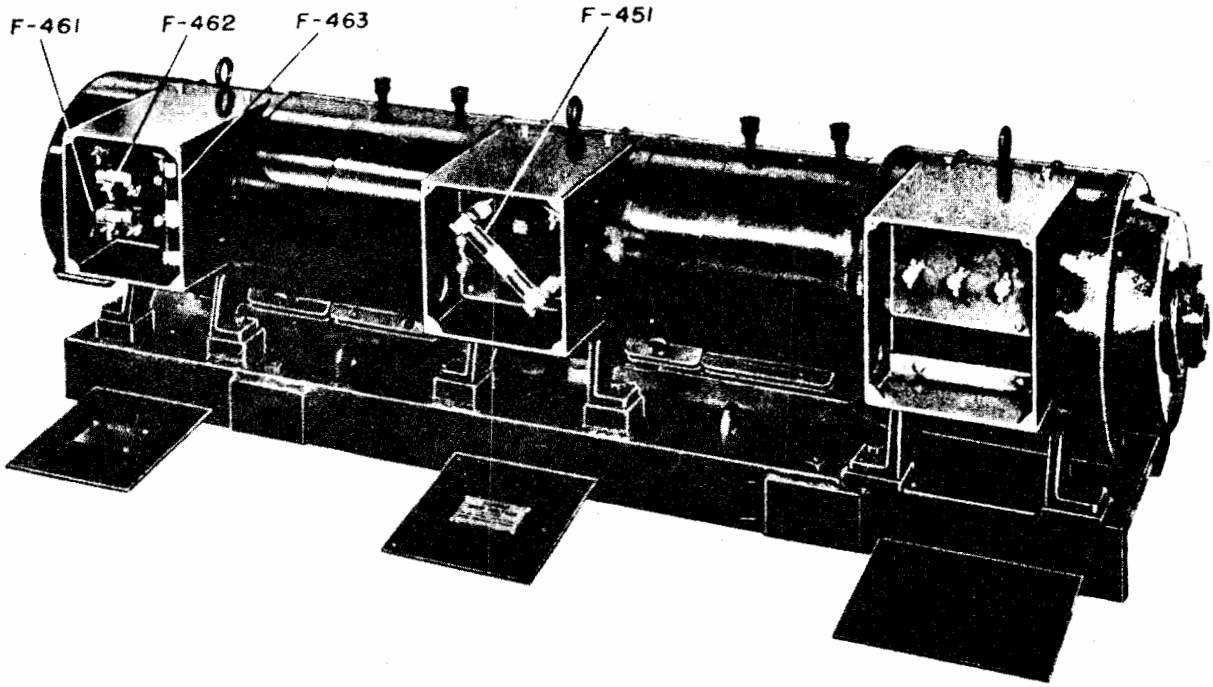


Figure 10-18—Motor-Generator Unit, TBL-6/7/12/13 for 440/3/60 A.C. Operation. Type CAY-21428A (Photo C-5112)

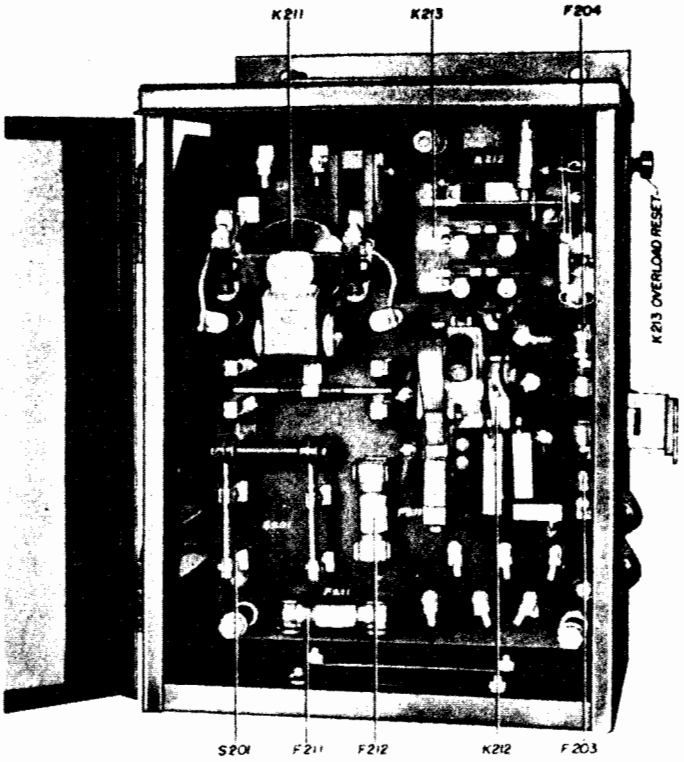


Figure 10-19—Magnetic Controller, Type CAY-21234A—115 V. D.C. and CAY-21235A—230 V. D.C. Operation. A Unit of Model TBL-5 (Photo C-4461)

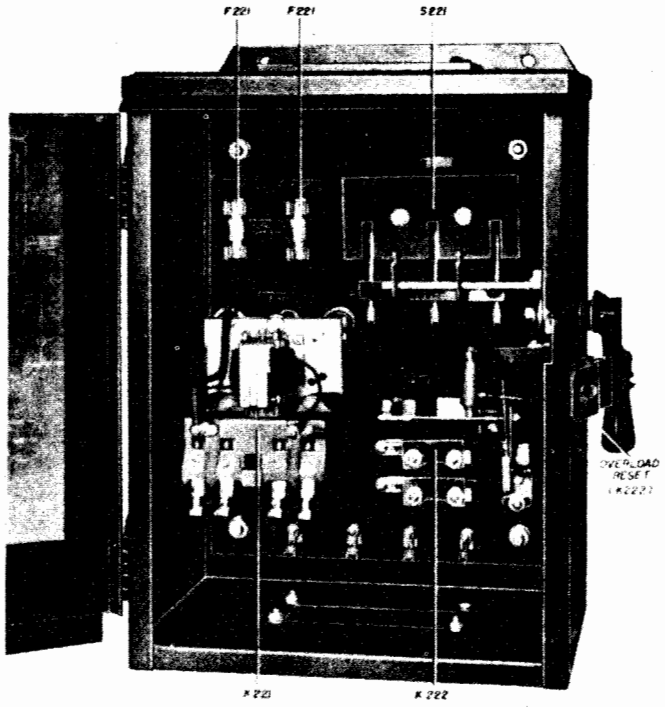


Figure 10-20—Magnetic Controller, Type CAY-21425—440/3/60 A.C. Operation. A Unit of Model TBL-5 (Photo C-4527)

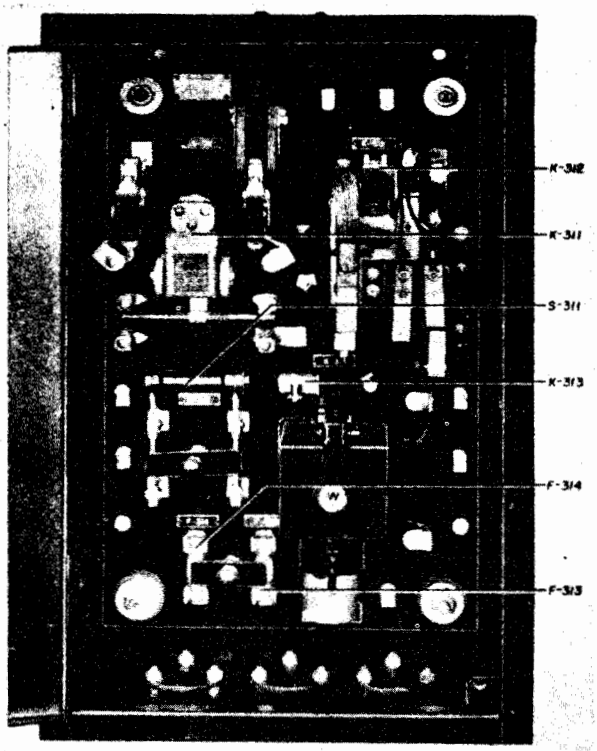


Figure 10-21—Magnetic Controller, TBL-6/7/12 for 115/230 V. D.C. Operation. Types CAY-21713 and CAY-21714 (Photo C-5141)

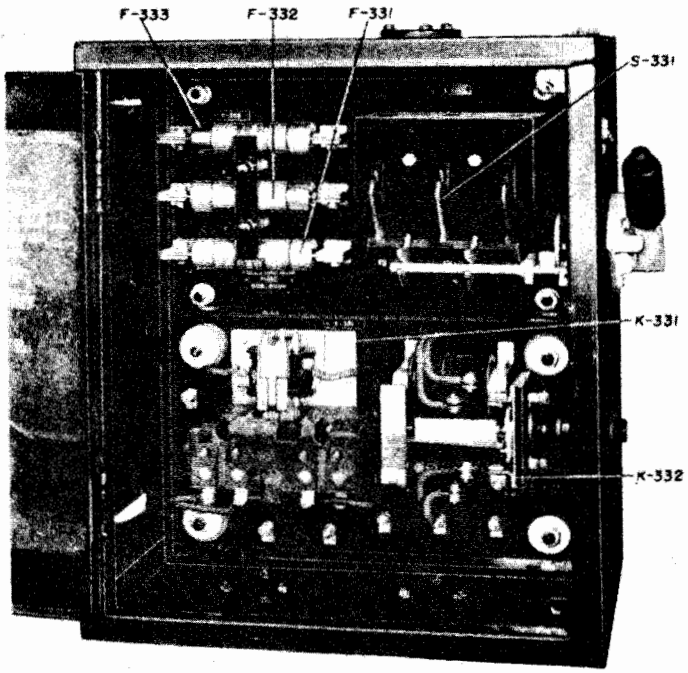


Figure 10-22—Magnetic Controller, TBL-6/7/12 for 220/440/3/60 A. C. Operation. Types CAY-21715 and CAY-21716 (Photo C-5111)

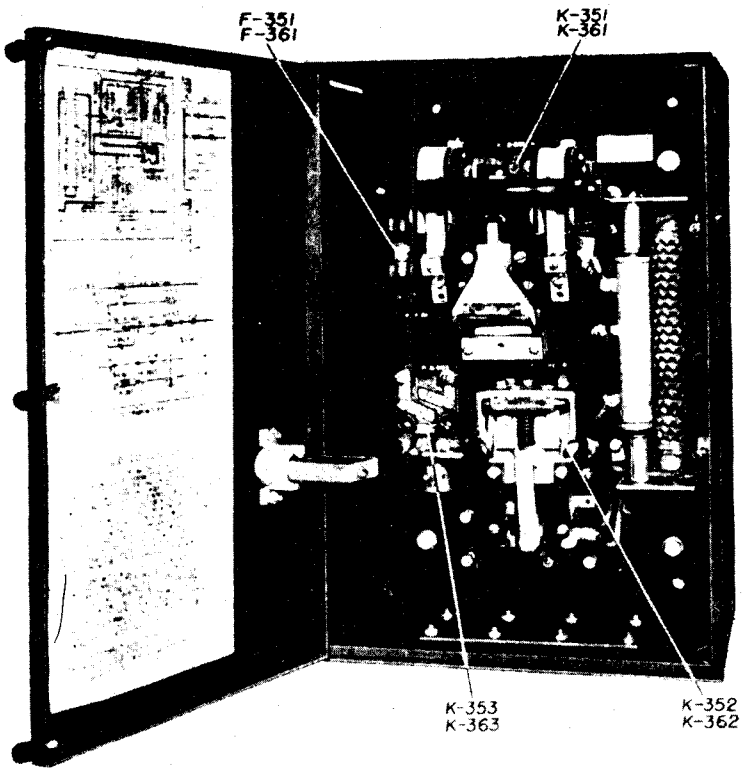


Figure 10-23—Magnetic Controller, Type CAY-211226 and Type CAY-211227 for 115/230 V. D.C. Operation. A Unit of Model TBL-13 (Photo C-7000)

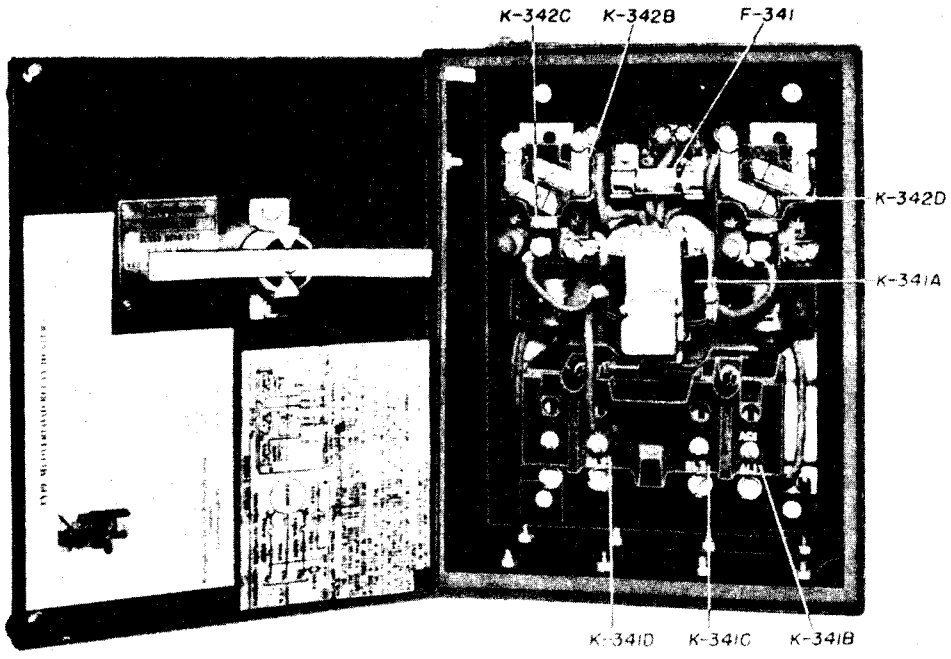
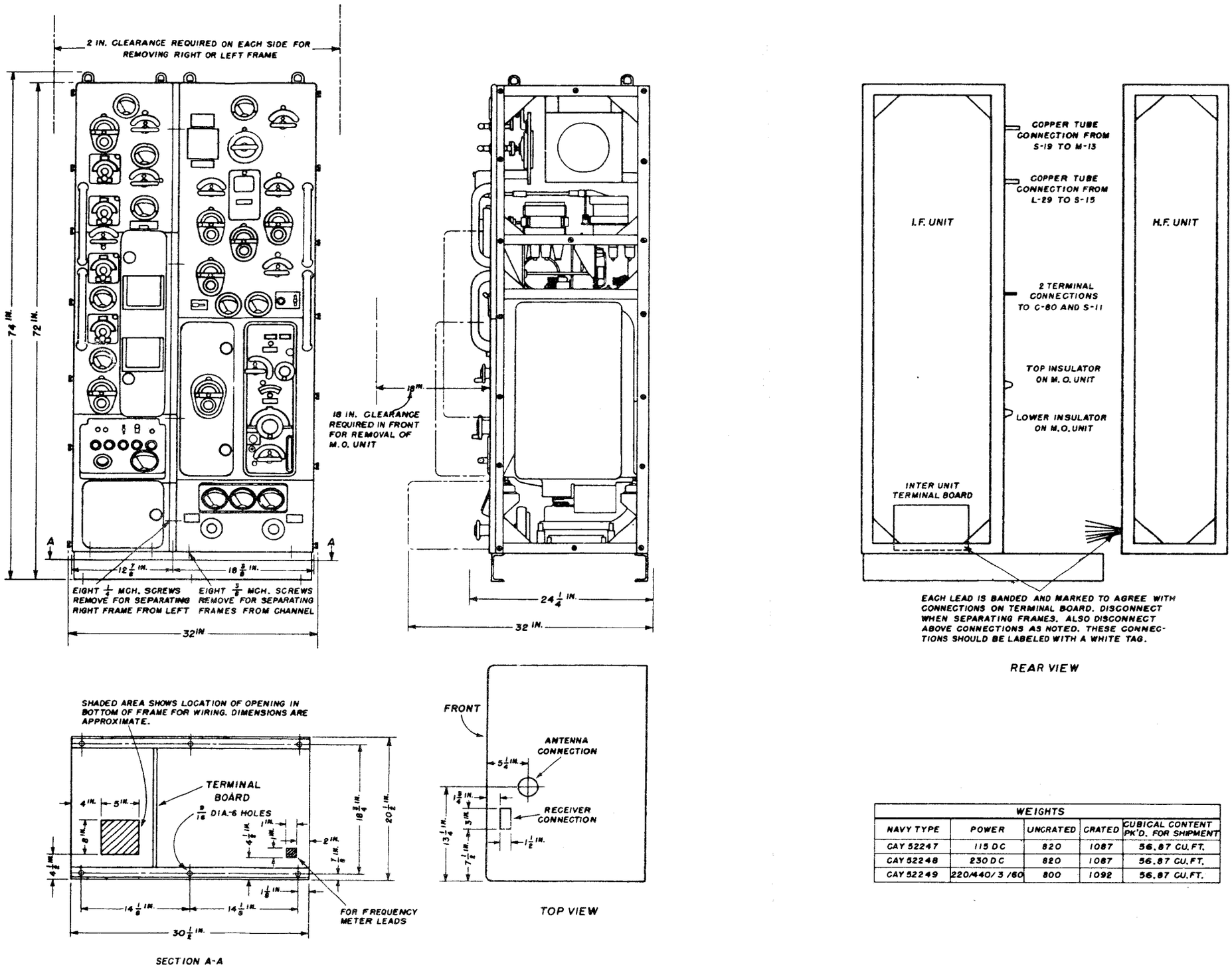


Figure 10-24—Magnetic Controller, Type CAY-211228 for 440/3/60 A.C. Operation. A Unit of Model TBL-13 (Photo C-7001)



WEIGHTS				
NAVY TYPE	POWER	UNCRATED	CRATED	CUBICAL CONTENT PK'D. FOR SHIPMENT
CAY 52247	115 D C	820	1087	56.87 CU. FT.
CAY 52248	230 D C	820	1087	56.87 CU. FT.
CAY 52249	220/440/3 /60	800	1092	56.87 CU. FT.

Figure 10-25—Transmitter Unit, TBL-Series. Outline Drawing (Dwg. 7610943)

MODEL	NAVY TYPE	VOLTAGE	WEIGHT UNCRATED	WEIGHT CRATED	CUBICAL CONTENT PACKED FOR SHIPMENT
TBL-12	CAY-53036A PKD WITH MAGNETIC CONTROLLER	DC	115 LBS.	202 LBS.	9.33 CU. FT.
	CAY-53037A PKD WITH MAGNETIC CONTROLLER	AC	137 LBS.	222 LBS.	9.33 CU. FT.
TBL-13	CAY-53036A PKD WITH MAGNETIC CONTROLLER	DC			
	CAY-53037A PKD WITH MAGNETIC CONTROLLER	AC			

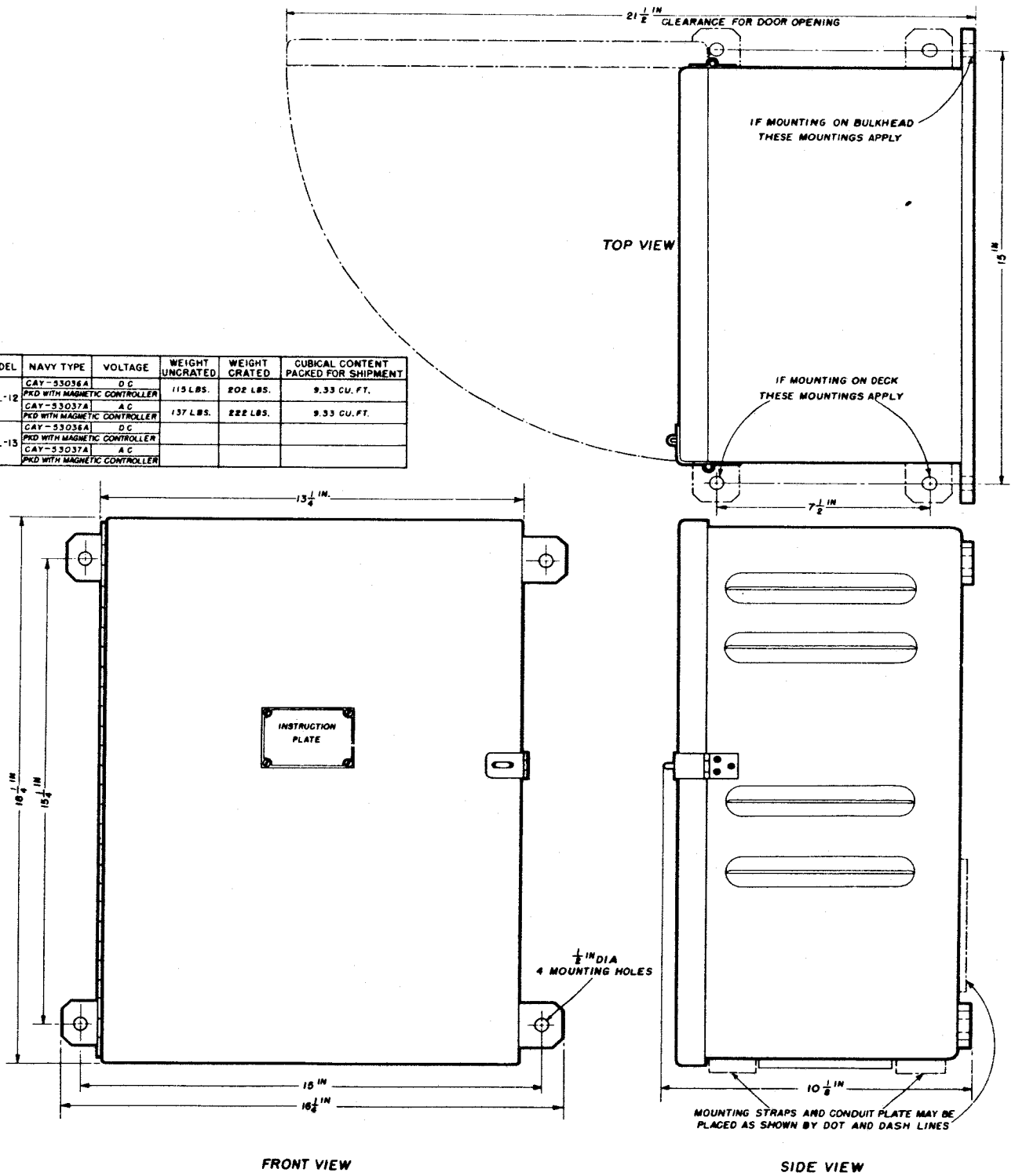
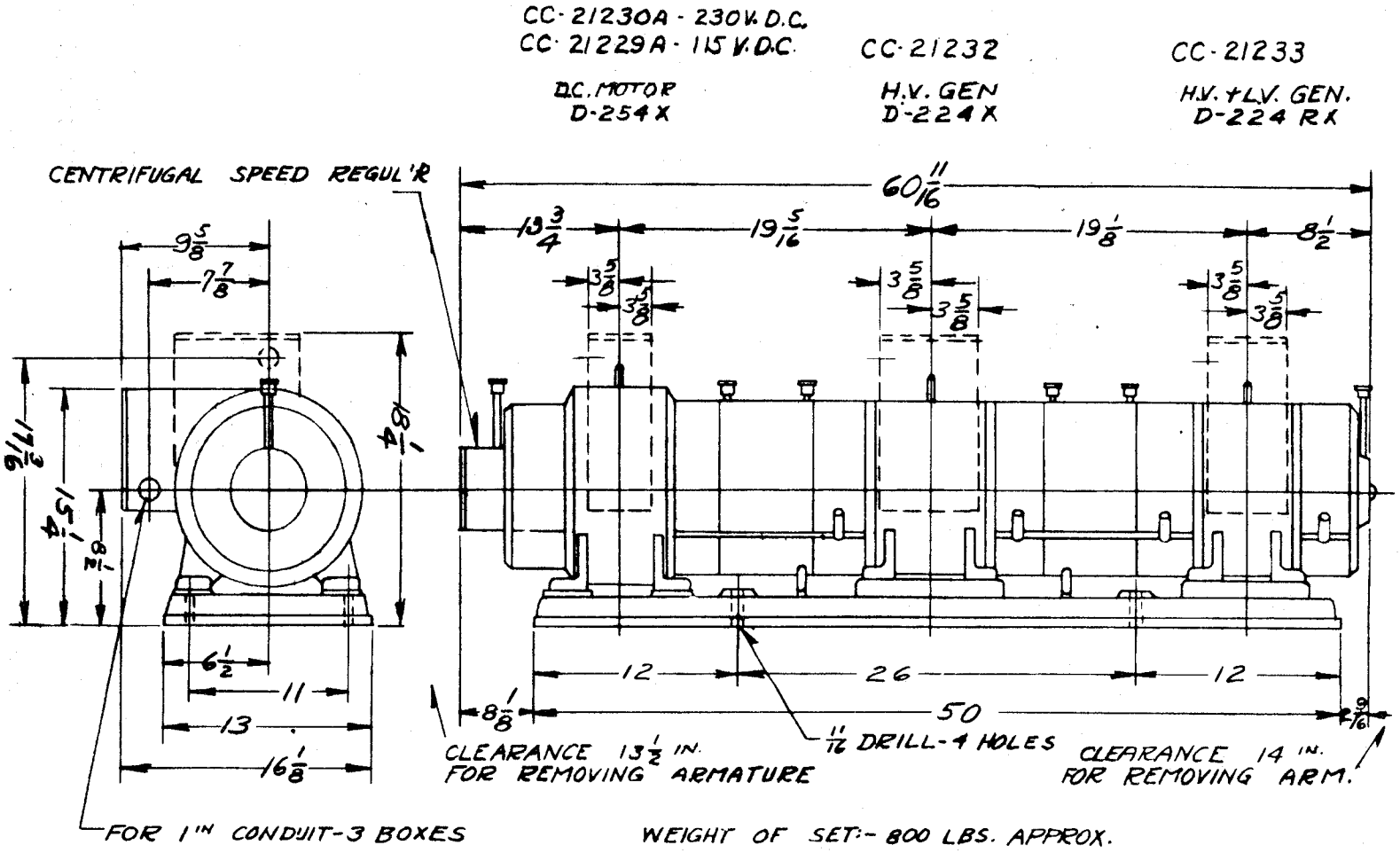


Figure 10-26—Filter Unit, TBL-Series Type CAY-53036A and CAY-53037A. Outline Drawing (Dwg. 7613257)



MOTOR GENERATOR UNIT
115 V. D.C. CC-21426
230 V. D.C. CC-21427

Figure 10-27—Motor-Generator Unit, Type CC-21426, 115 V. D.C. and Type CC-21427, 230 V. D.C. Operation. A Unit of Model TBL-5. Outline Drawing (Dwg. 7407503)

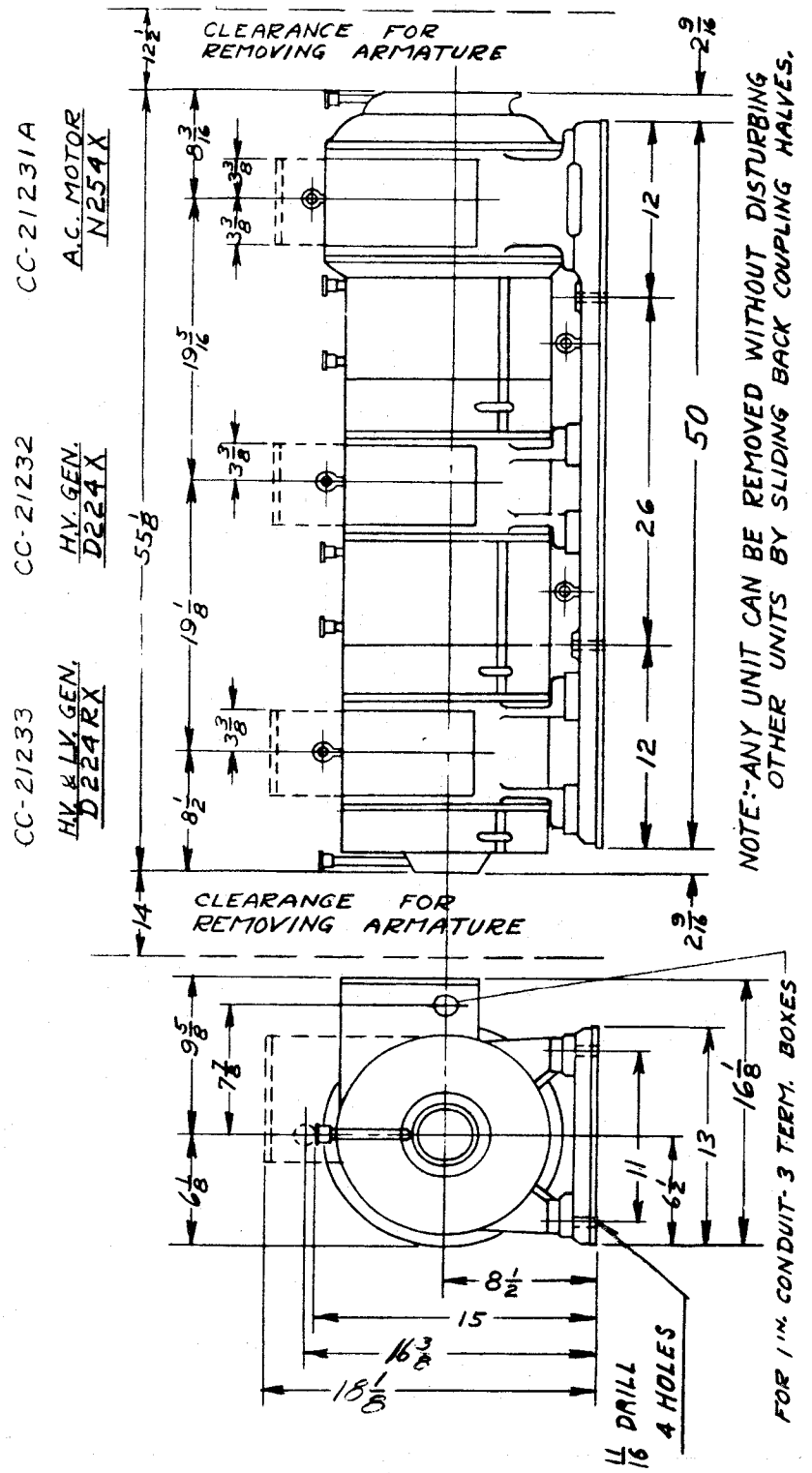


Figure 10-28—Motor-Generator Unit, Type CC-21428, 440/3/60 A.C. Operation. A Unit of Model TBL-5. Outline Drawing (Dwg. 7407502)

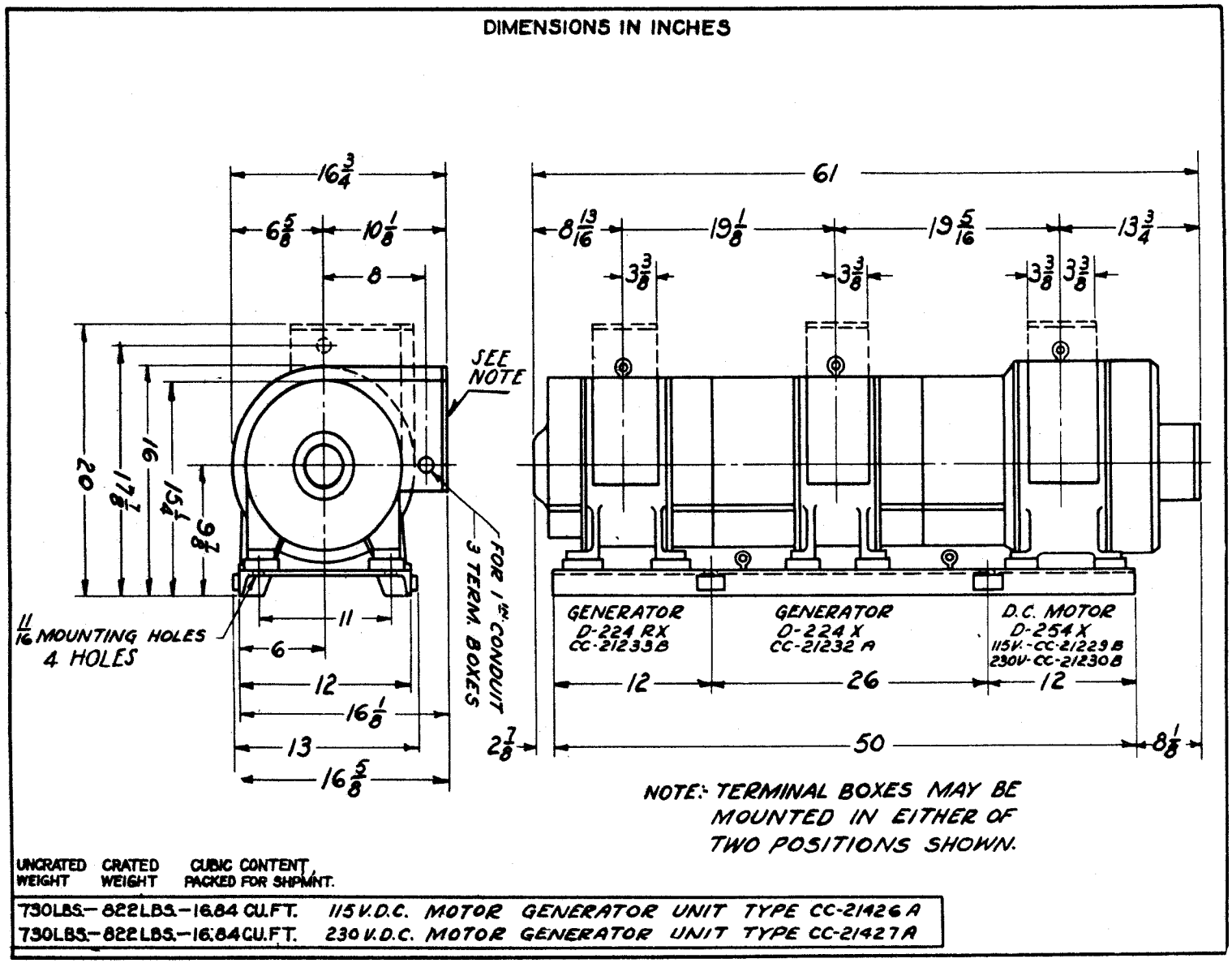


Figure 10-29—Motor-Generator Unit, TBL-6/7/12/13, Type CC-21426A, 115 V. D.C. and Type CC-21427A, 230 V. D.C. Operation. Outline Drawing (Dwg. 7408182)

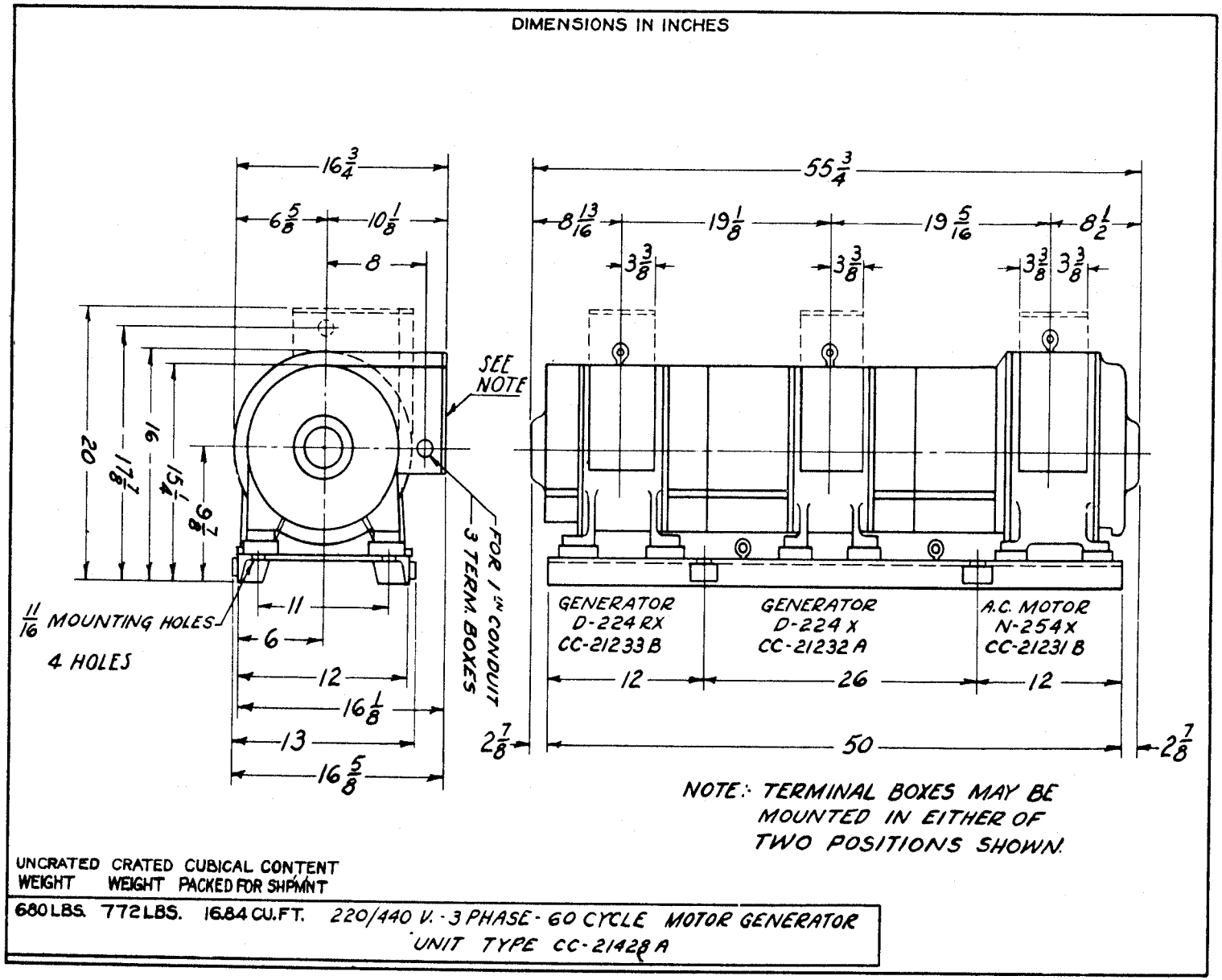


Figure 10-30—Motor-Generator Unit, TBL-6/7/12/13, Type CC-21428A, 220/440/3/60 A.C. Operation. Outline Drawing (Dwg. 7408183)

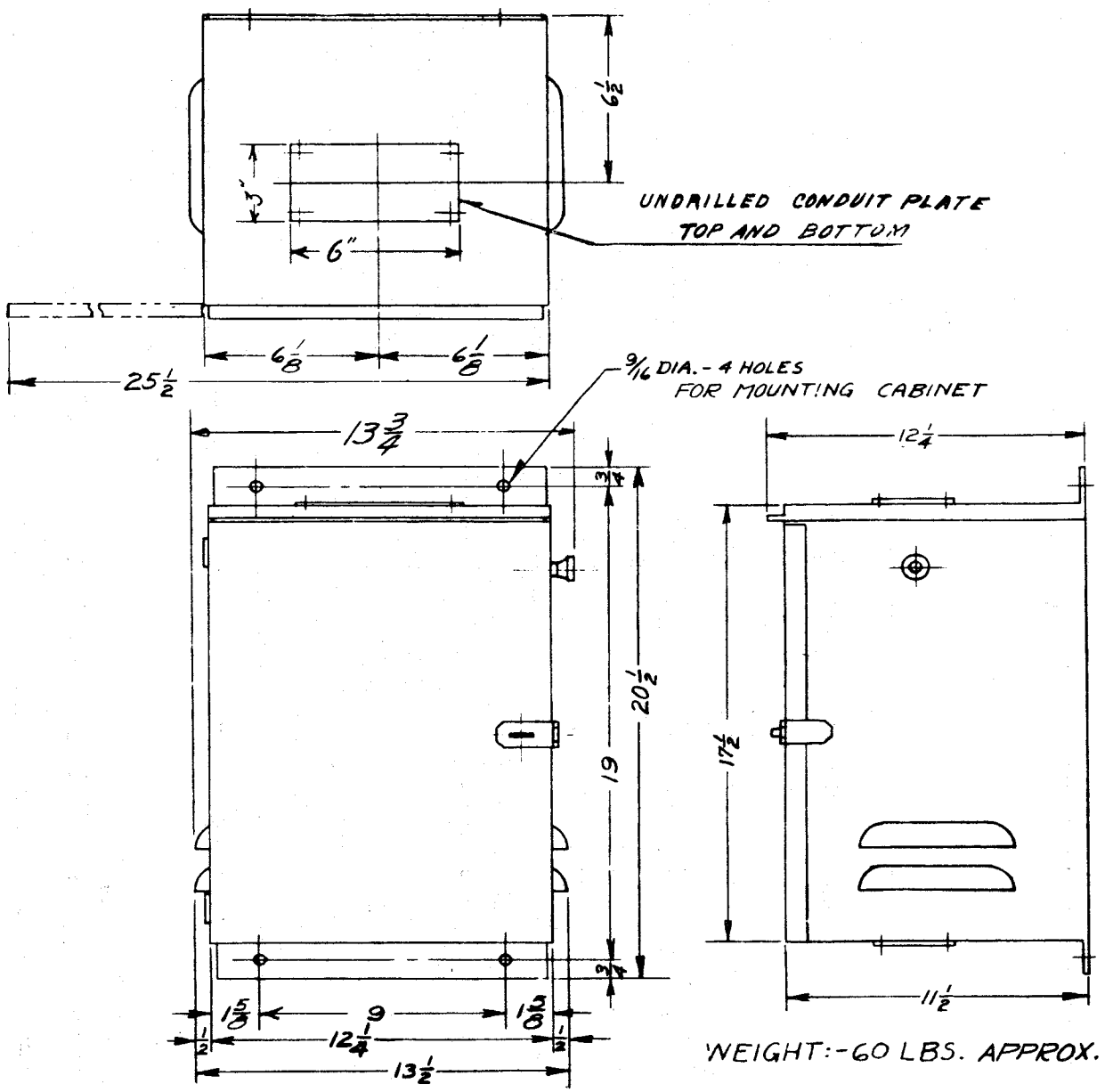


Figure 10-31—Magnetic Controller, Type CAY-21234A, 115 V. D.C. and Type CAY-21235A, 230 V. D.C. Operation. A Unit of TBL-5. Outline Drawing (Dwg. 7407501)

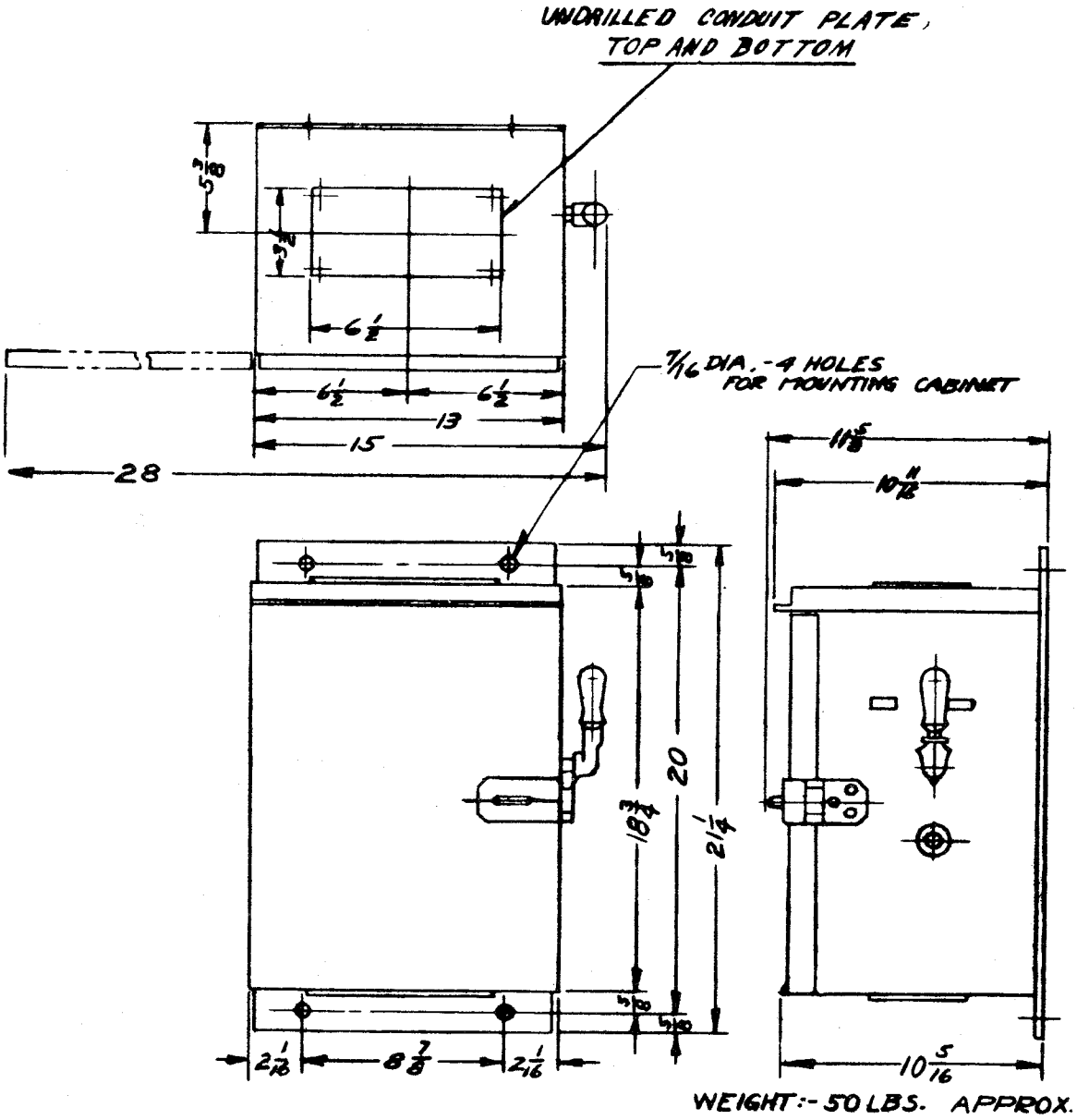


Figure 10-32—Magnetic Controller, Type CAY-21425, 440/3/60 A.C. Operation.. A Unit of TBL-5. Outline Drawing (Dwg. 7407500)

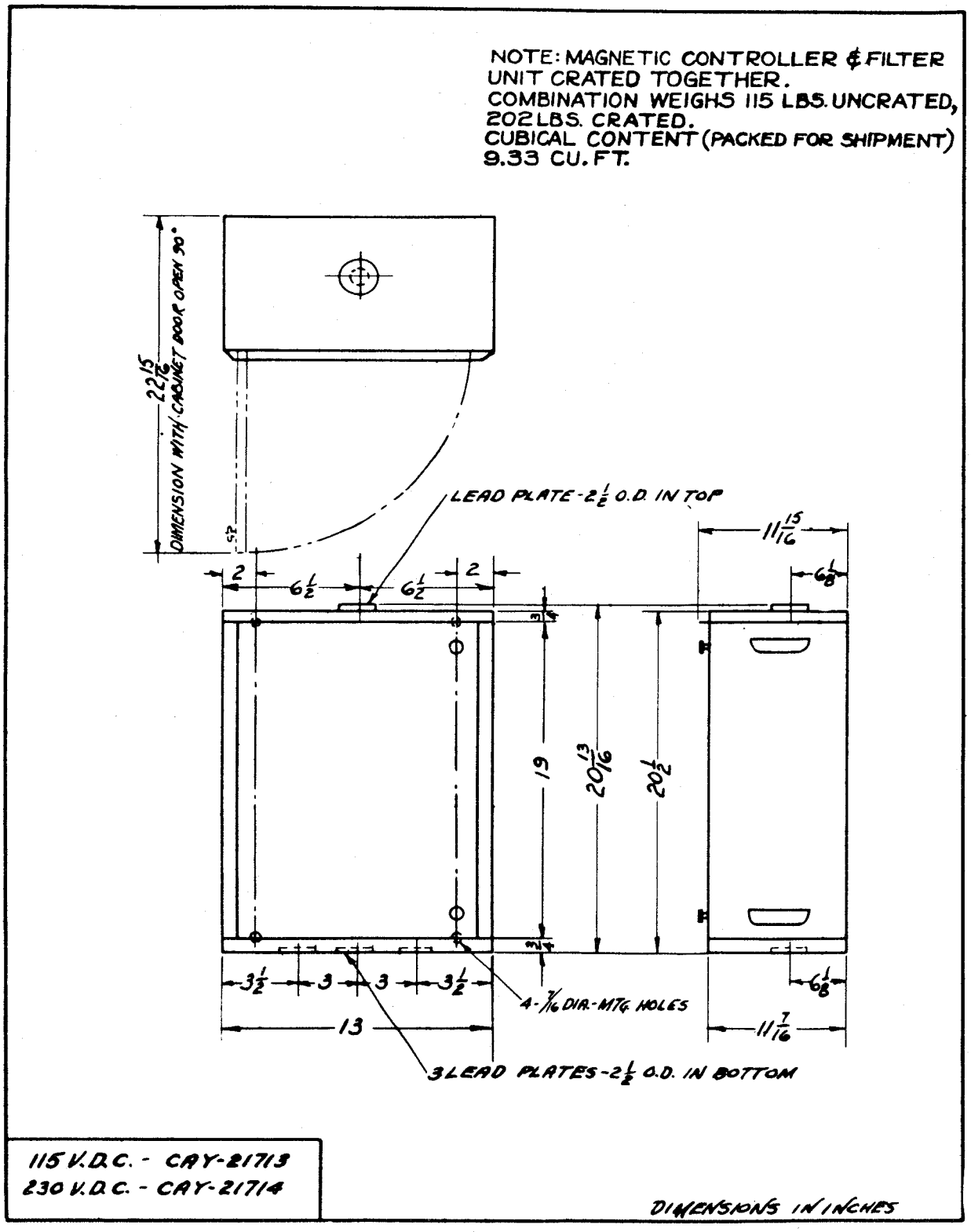


Figure 10-33—Magnetic Controller, TBL-6/7/12, Type CAY-21713, 115 V. D.C. and Type CAY-21714, 230 V. D.C. Operation. Outline Drawing (Dwg. 7408185)

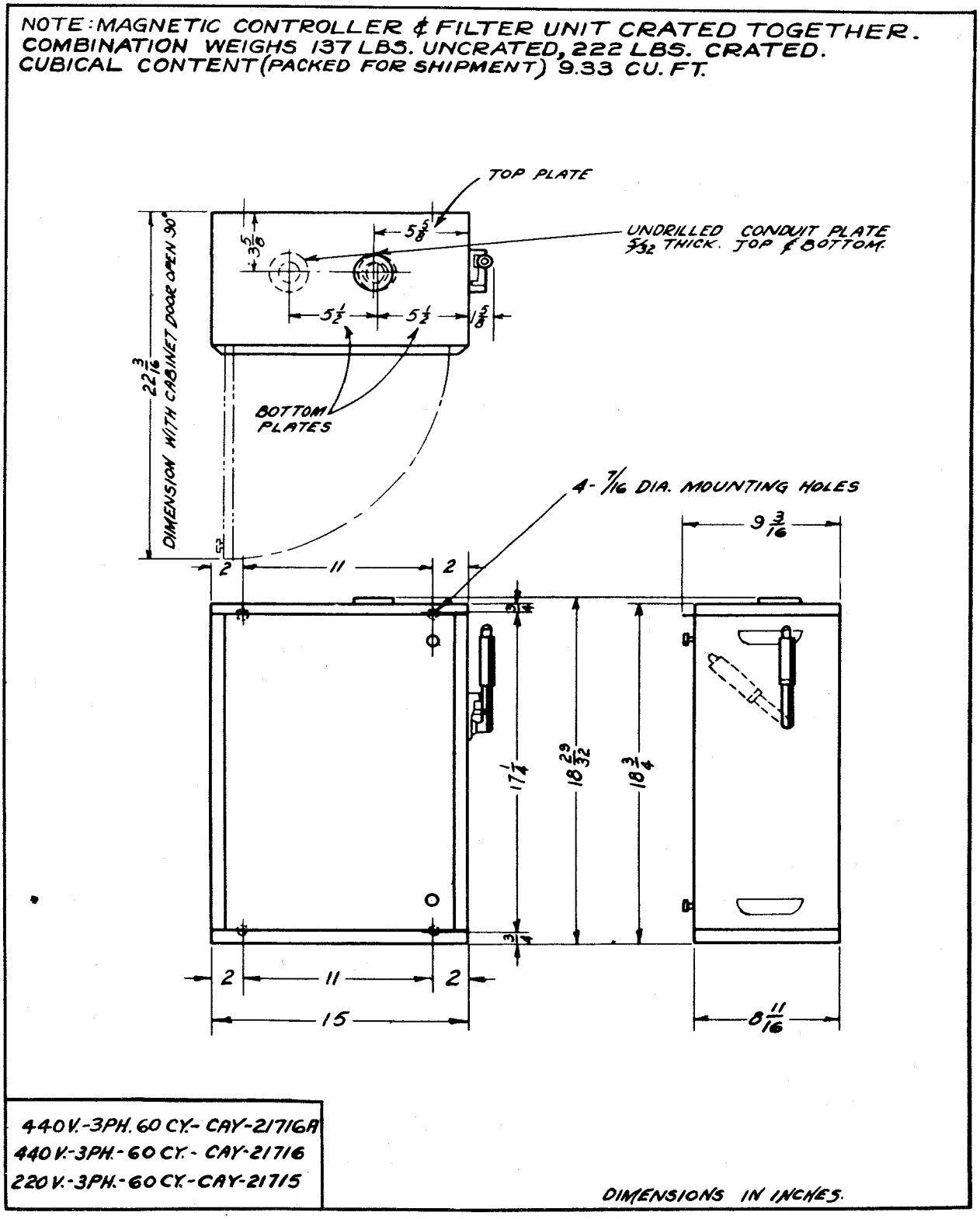
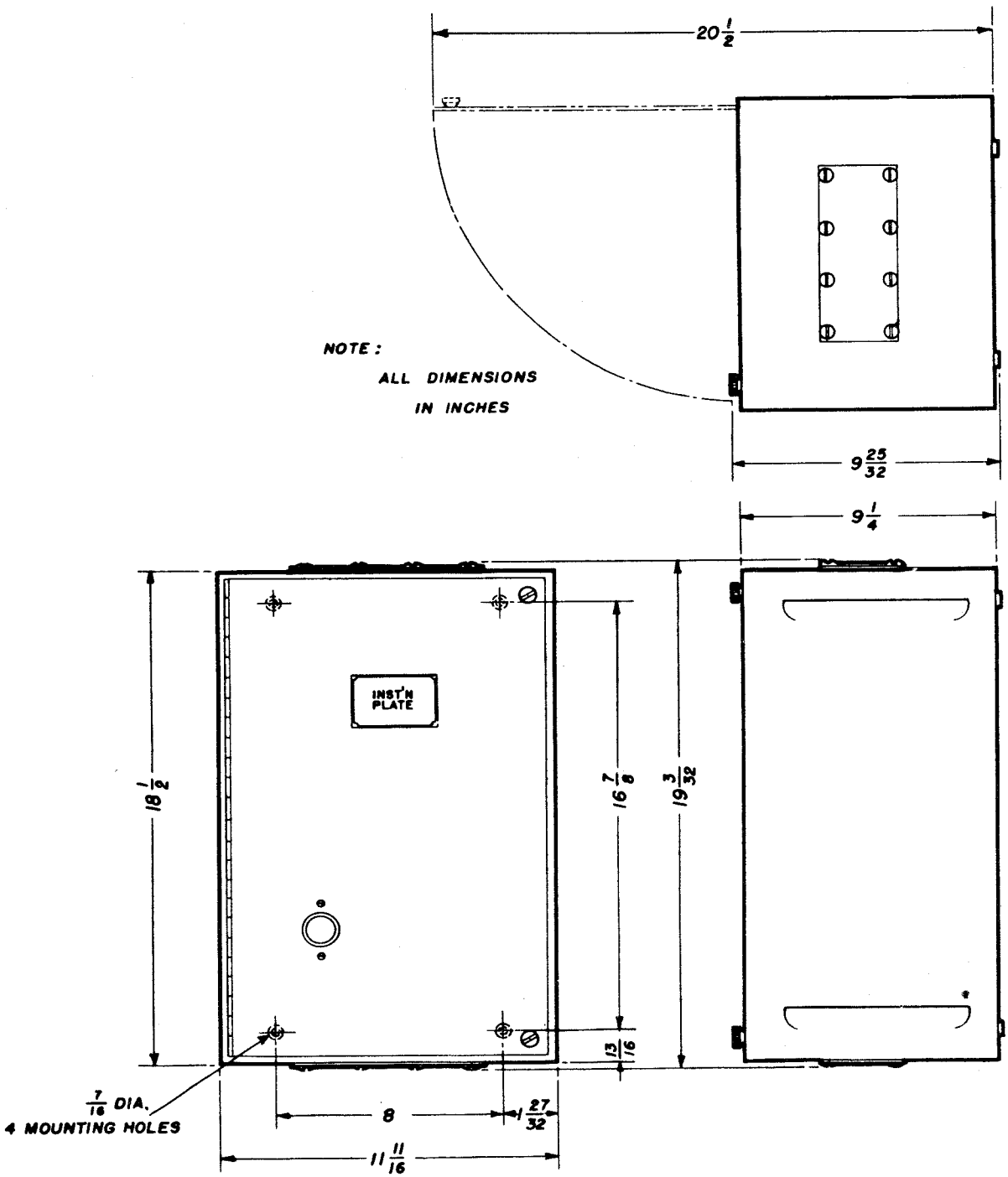


Figure 10-34—Magnetic Controller, TBL-6/7/12, Type CAY-21715, 220/3/60 and Type CAY-21716, 440/3/60 A.C. Operation. Outline Drawing (Dwg. 7408184)



INSTALLATION PLAN

NAVY TYPE NUMBER	WEIGHT (POUNDS) CRATED	WEIGHT (POUNDS) UNCRATED	CUBICAL CONTENT (CU. FT.) CRATED
CAY-211226 CAY-211227			

Figure 10-35—Magnetic Controller, TBL-13, Type CAY-211226, 115 V. D.C. and Type CAY-211227, 230 V. D.C. Operation. Outline Drawing (Dwg. 7713250)

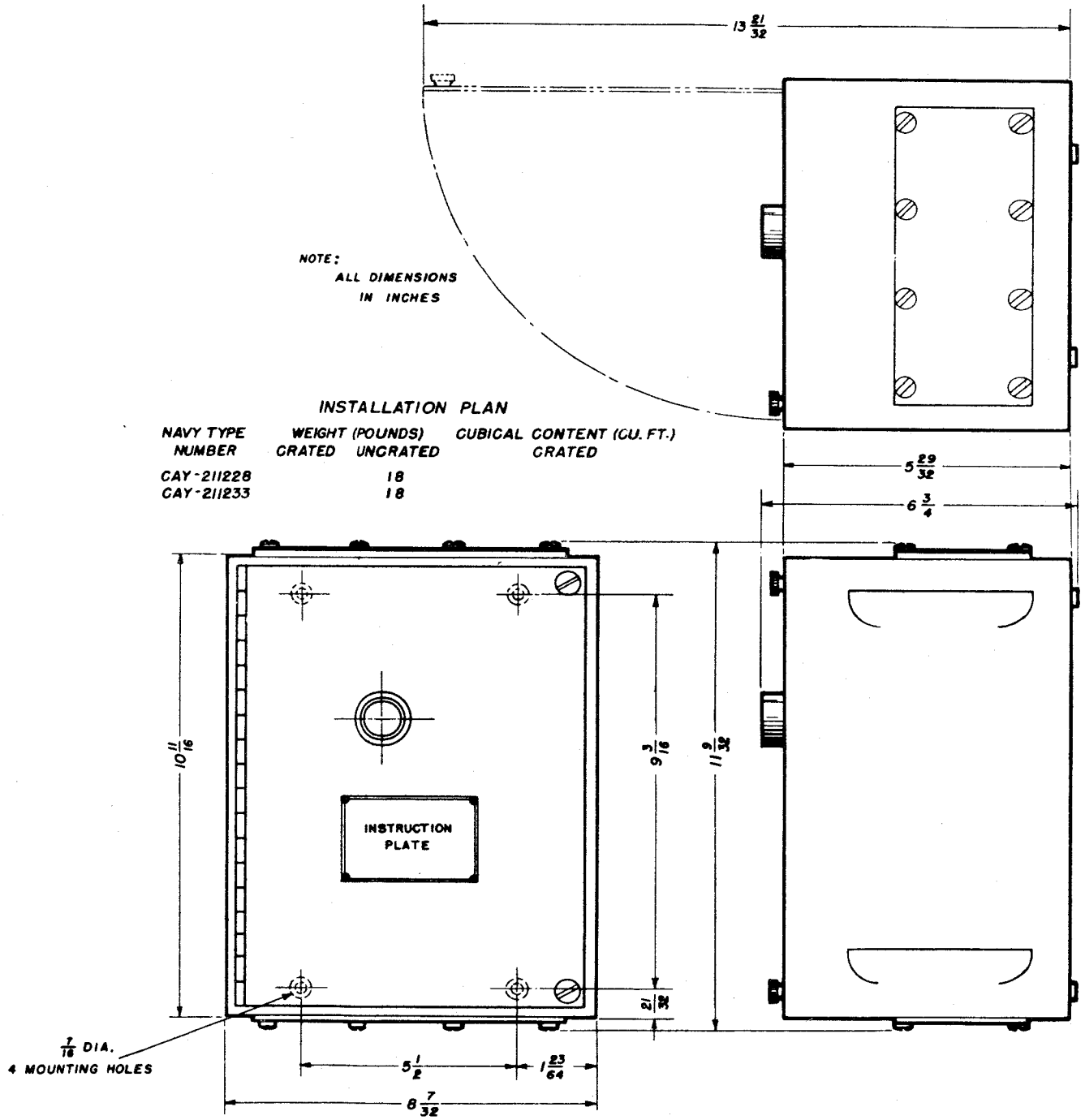
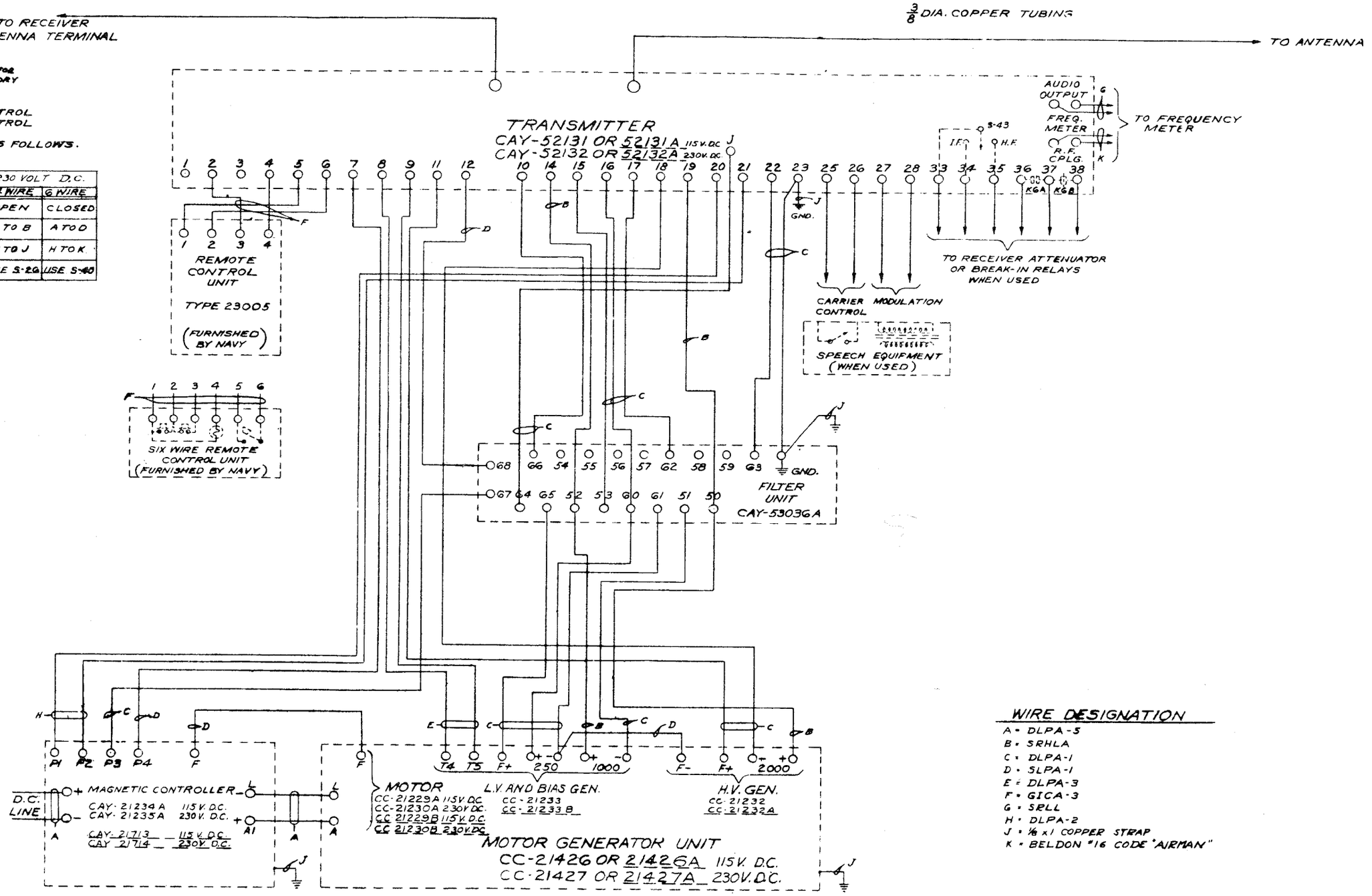


Figure 10-36—Magnetic Controller, TBL-13, Type CAY-211228, 440/3/60 A.C. Operation. Outline Drawing (Dwg. 7713237)

NOTE:-
ALL EQUIPMENT CONNECTED FOR 4 WIRE CONTROL AT THE FACTORY

FOR 4 OR 6 WIRE REMOTE CONTROL CONNECT NAVY TYPE REMOTE CONTROL UNIT AS SHOWN.
IN TRANSMITTER PLACE LINKS AS FOLLOWS.

CIRCUIT SYMBOL	TERMINAL MARKING	115 VOLT D.C.		230 VOLT D.C.	
		4 WIRE	6 WIRE	4 WIRE	6 WIRE
S-39	G-F	OPEN	CLOSED	OPEN	CLOSED
S-41	A-B-C-D	A TO C	A TO D	A TO B	A TO D
S-42	H-J-K	H TO J	H TO K	H TO J	H TO K
S-26 OR S-40	SEE WIRING DIAGRAM	USE S-26	USE S-40	USE S-26	USE S-40



WIRE DESIGNATION
A = DLPA-5
B = SRHLA
C = DLPA-1
D = SLPA-1
E = DLPA-3
F = GICA-3
G = SRLL
H = DLPA-2
J = 1/8 x 1 COPPER STRAP
K = BELDON #16 CODE "AIRMAN"

TYPE NUMBERS UNDERLINED THUS CAY-21713 APPLY TO TBL-6 EQUIPMENT

Figure 10-37—Interconnection Diagram, Model TBL-5/6 for 115/230 V. D.C. Power Supply (Dwg. 7606326)

NOTE:-
ALL EQUIPMENT CONNECTED FOR 6 WIRE CONTROL AT THE FACTORY.

FOR 4 OR 6 WIRE REMOTE CONTROL CONNECT NAVY TYPE REMOTE CONTROL PANEL AS SHOWN.

TRANSMITTER LINK CONNECTIONS					
CIRCUIT SYMBOL	TERMINAL MARKING	115 VOLT D.C. 4 WIRE	115 VOLT D.C. 6 WIRE	230 VOLT D.C. 4 WIRE	230 VOLT D.C. 6 WIRE
S-39	G-F	OPEN	CLOSED	OPEN	CLOSED
S-41	A-B-C-D	A TO C	A TO D	A TO B	A TO D
S-42	H-J-K	H TO J	H TO K	H TO J	H TO K
S-26 OR S-40	SEE WIRING DIAGRAM	USE S-26	USE S-40	USE S-26	USE S-40

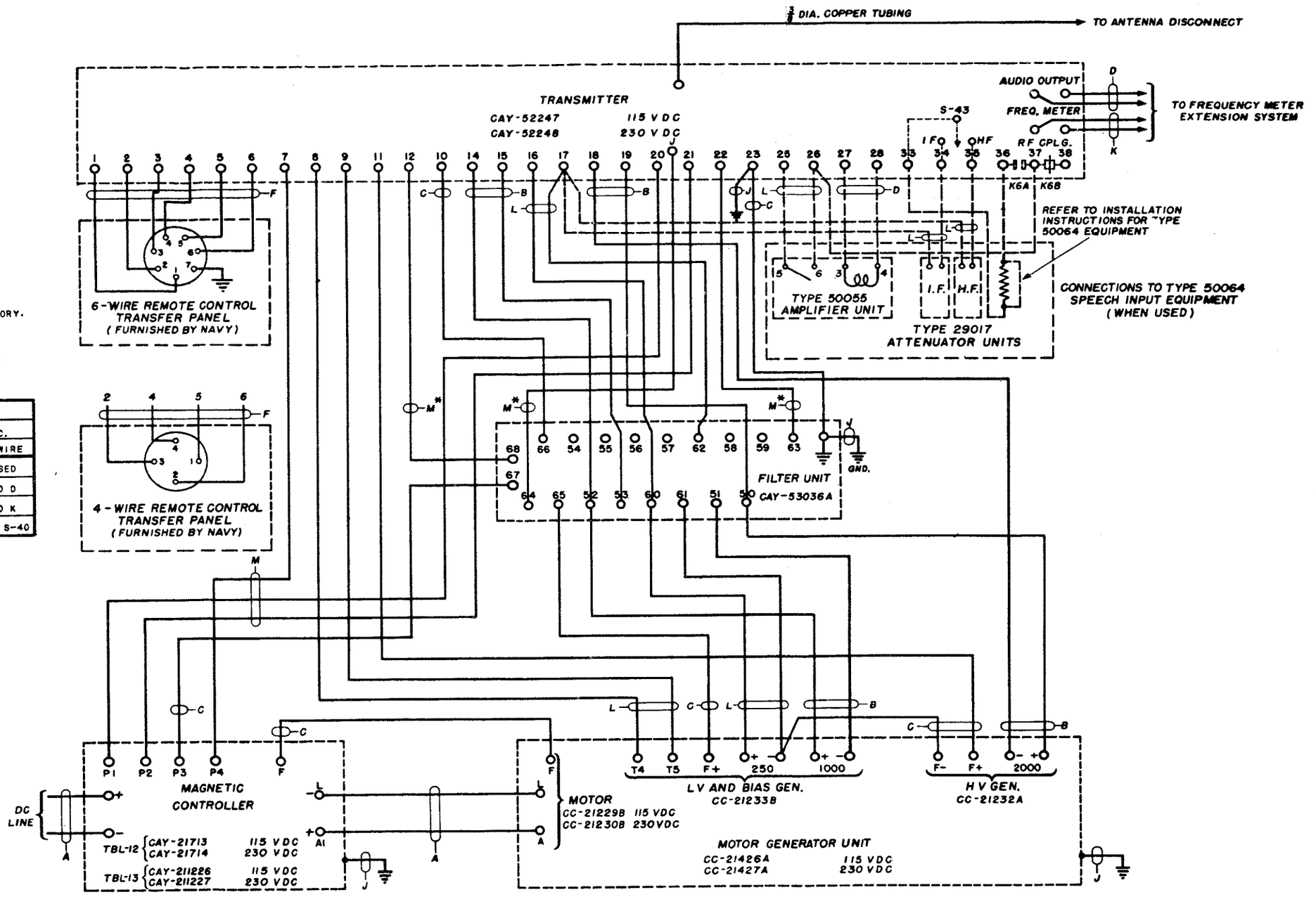
TBL-12/13

POWER SUPPLY	115 V.D.C.	230 V.D.C.
STARTING CONDITIONS		
LINE AMPERES	53	27
KILOWATTS REQUIRED FROM LINE	6.1	6.1
LOCKED KEY CONDITIONS		
LINE AMPERES	31.0	15.5
KILOWATTS REQUIRED FROM LINE	3.56	3.56
KEY OPEN CONDITIONS		
LINE AMPERES	18.6	9.3
KILOWATTS REQUIRED FROM LINE	2.14	2.14

ANTENNA CHARACTERISTICS

MAXIMUM LENGTH OF ANTENNA	180 FT.
MINIMUM LENGTH OF ANTENNA	40 FT.
MAXIMUM LENGTH OF TRUNK	20 FT.
MINIMUM LENGTH OF TRUNK	NONE
DIAMETER OF TRUNK	8 TO 12 INCHES
MAXIMUM DISTANCE TO ENTERING INSULATOR	20 FT.
MINIMUM DISTANCE TO ENTERING INSULATOR	2 FT.

CAPACITY 500-1000 MMFD.: RESISTANCE 6-30 OHMS



WIRE LEGEND							
SYMBOL	CONDUCTOR SIZE	ALLOWABLE LINE DROP	CURRENT RATING	VOLTAGE RATING	TYPE INSULATION	COMMERCIAL DESIGNATION	NAVY DESIGNATION
A	8		50	2000	ASBESTOS		DHFA-14
B	14		20	8000	ASBESTOS		SHFR- 4
C	14		20	2000	ASBESTOS		SHFA- 4
D	14		20	2000	ASBESTOS		TTHFA-1,
F	16		10	2000	ASBESTOS		MHFA- 7
J	1 x 1/8	COPPER STRAP					
K						ARMY-NAVY	RG-12/U

WIRE LEGEND		
SYMBOL		NAVY DESIGNATION
L		DHFA-4
M		THFA-4
N		THFA-14

* THESE 3 WIRES TO BE GROUPED IN ONE CABLE

Figure 10-38—Interconnection Diagram, Model TBL-7/12/13 for 115/230 V. D.C. Power Supply (Dwg. 7608923)

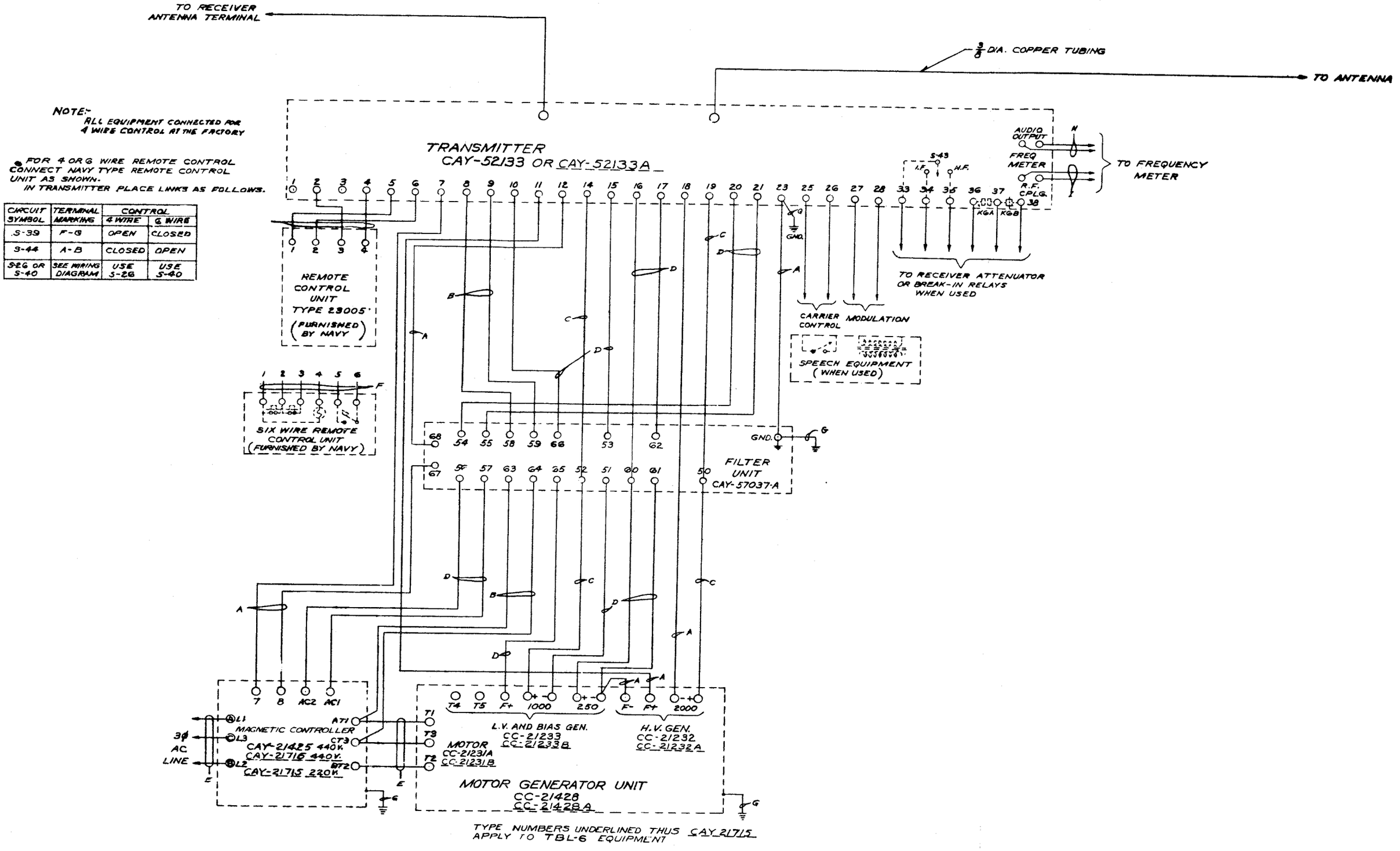
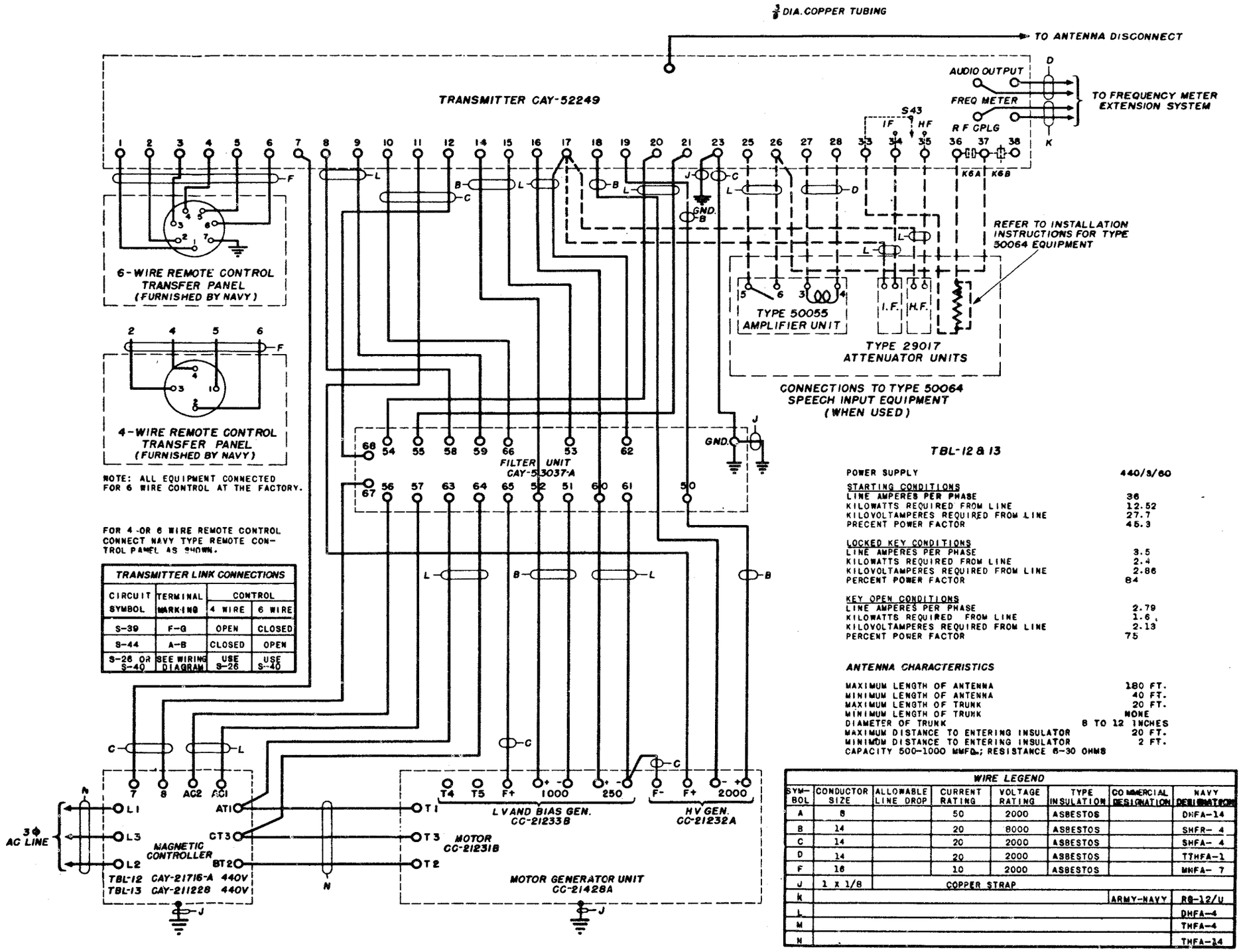


Figure 10-39—Interconnection Diagram, Model TBL-5/6 for 220/440/3/60 A.C. Power Supply (Dwg. 7606327)



TRANSMITTER LINK CONNECTIONS

CIRCUIT SYMBOL	TERMINAL MARKING	CONTROL 4 WIRE	CONTROL 6 WIRE
S-39	F-G	OPEN	CLOSED
S-44	A-B	CLOSED	OPEN
S-26 OR S-40	SEE WIRING DIAGRAM	USE S-26	USE S-40

TBL-12 & 13

POWER SUPPLY	440/3/60
STARTING CONDITIONS	
LINE AMPERES PER PHASE	36
KILOWATTS REQUIRED FROM LINE	12.52
KILOVOLTAMPERES REQUIRED FROM LINE	27.7
PRECENT POWER FACTOR	45.3
LOCKED KEY CONDITIONS	
LINE AMPERES PER PHASE	3.5
KILOWATTS REQUIRED FROM LINE	2.4
KILOVOLTAMPERES REQUIRED FROM LINE	2.86
PERCENT POWER FACTOR	84
KEY OPEN CONDITIONS	
LINE AMPERES PER PHASE	2.79
KILOWATTS REQUIRED FROM LINE	1.6
KILOVOLTAMPERES REQUIRED FROM LINE	2.13
PERCENT POWER FACTOR	75

ANTENNA CHARACTERISTICS

MAXIMUM LENGTH OF ANTENNA	180 FT.
MINIMUM LENGTH OF ANTENNA	40 FT.
MAXIMUM LENGTH OF TRUNK	20 FT.
MINIMUM LENGTH OF TRUNK	NONE
DIAMETER OF TRUNK	8 TO 12 INCHES
MAXIMUM DISTANCE TO ENTERING INSULATOR	20 FT.
MINIMUM DISTANCE TO ENTERING INSULATOR	2 FT.
CAPACITY 500-1000 MMFD.; RESISTANCE 6-30 OHMS	

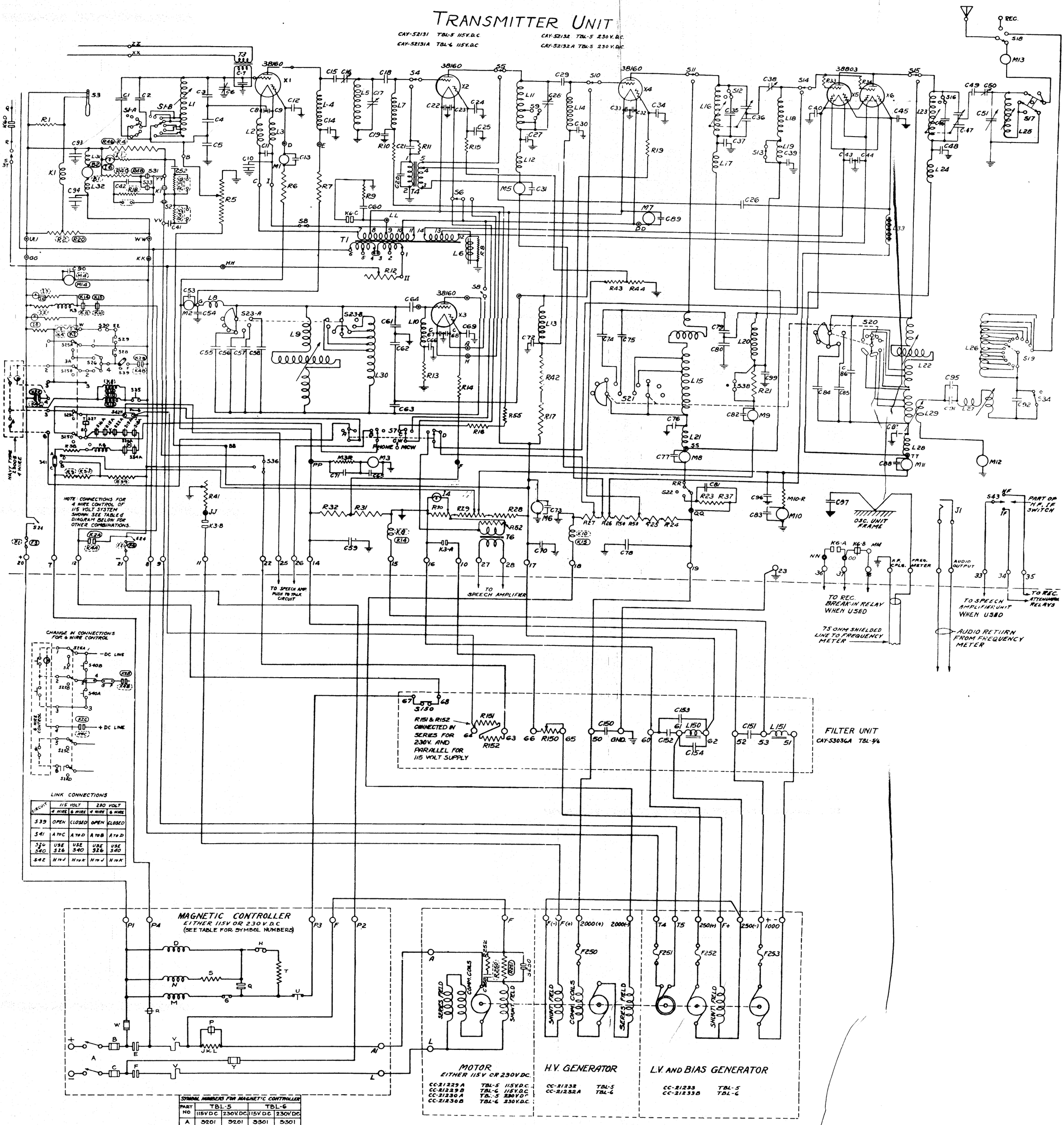
WIRE LEGEND

SYMBOL	CONDUCTOR SIZE	ALLOWABLE LINE DROP	CURRENT RATING	VOLTAGE RATING	TYPE INSULATION	COMMERCIAL DESIGNATION	NAVY DESIGNATION
A	8		50	2000	ASBESTOS		DNFA-14
B	14		20	8000	ASBESTOS		SHFR- 4
C	14		20	2000	ASBESTOS		SHFA- 4
D	14		20	2000	ASBESTOS		TTHFA-1
F	18		10	2000	ASBESTOS		MHFA- 7
J	1 x 1/8	COPPER STRAP					
K						ARMY-NAVY	RG-12/U
L							DNFA-4
M							THFA-4
N							THFA-14

Figure 10-40—Interconnection Diagram, Model TBL-7/12/13 for 220/440/3/60 A.C. Power Supply (Dwg. 7608924)

TRANSMITTER UNIT

CAY-52131 TBL-5 115V.D.C. CAY-52132 TBL-5 230 V. D.C.
CAY-52131A TBL-6 115V.D.C. CAY-52132A TBL-5 230 V. D.C.



LINK CONNECTIONS

CIRCUIT	115 VOLT		230 VOLT	
	4 WIRE	6 WIRE	4 WIRE	6 WIRE
S39	OPEN	CLOSED	OPEN	CLOSED
S41	A TO C	A TO D	A TO B	A TO D
S26 S40	USE S26	USE S40	USE S26	USE S40
S42	H TO J	H TO K	H TO J	H TO K

SYMBOL NUMBERS FOR MAGNETIC CONTROLLER

PART NO	TBL-5		TBL-6	
	115V D.C.	230V.DC.	115V D.C.	230V DC.
A	S201	S201	S301	S301
B	F-211	F-201	OMIT	OMIT
C	F-212	F-202	OMIT	OMIT
D	K-211	K-201	K-301	K-311
E	K-211A	K-201-A	K-301-A	K-311-A
F	K-211-B	K-201-B	K-301-B	K-311-B
G	K-211-C	K-201-C	K-301-C	K-311-C
H	K-211-D	K-201-D	K-301-D	K-311-D
J	R-211	R-201	R-301	R-311
K	R-214	R-204	R-304	R-314
L	R-215	R-205	R-305	R-315
M	K-212	K-202	K-302	K-312
N	K-212	K-202	K-302	K-312
P	K-212-A	K-202-A	K-302-A	K-312-A
Q	K-212-B	K-202-B	K-302-B	K-312-B
R	K-212-C	K-202-C	K-302-C	K-312-C
S	R-213	R-203	R-303	R-313
T	R-212	R-202	R-302	R-312
U	K-213	K-203	K-303	K-313
V	K-213	K-203	K-303	K-313
W	F-203	F-203	F-303	F-313
Y	F-204	F-204	F-304	F-314
	CAY-21234A	CAY-21235A	CAY-21713	CAY-21714

Figure 10-41—Schematic Diagram, Model TBL-5/6 for 115/230 V. D.C. Power Supply (Dwg. 7300398)

TRANSMITTER UNIT

CAY 52247 TBL-7/2 115 V. D.C.
CAY 52248 TBL-7/2 230 V. D.C.

FOR 230 V.D.C.

FOR 115 V.D.C.

NOTE: CONNECTIONS FOR 4 WIRE CONTROL OF 115 VOLT SYSTEM SHOWN SEE TABLE & DIAGRAM BELOW FOR OTHER COMBINATIONS.

CHANGE IN CONNECTIONS FOR 6 WIRE CONTROL

LINK CONNECTIONS

CIRCUIT	115 VOLT		230 VOLT	
	4 WIRE	6 WIRE	4 WIRE	6 WIRE
339	OPEN	CLOSED	OPEN	CLOSED
341	A TO C	A TO D	A TO B	A TO D
326 340	USE 326	USE 340	USE 326	USE 340
S-42	H TO J	H TO K	H TO J	H TO K

FOR K1 & K2 SEE TOP OF DRAWING

HAVY TYPE 4 DIODE 4 WIRE

R151 & R152 CONNECTED IN SERIES FOR 230V. AND PARALLEL FOR 115 VOLT SUPPLY

FILTER UNIT
CAY-53036A TBL-7/12

TO SPEECH AMP PUSH TO TALK CIRCUIT

TO SPEECH AMPLIFIER

TO SCREEN OF 1ST H.F. INTERMEDIATE AMP

TO SCREEN OF I.F. M. O. TUBE.

TO REC. BREAK-IN RELAY WHEN USED

75 OHM SHIELDED LINE TO FREQUENCY METER

TO SPEECH AMPLIFIER UNIT WHEN USED

AUDIO RETURN FROM FREQUENCY METER

TO REC. ATTENUATION RELAYS

PART OF H.F. I.F. SWITCH

MAGNETIC CONTROLLER
CAY-21713-TBL 7/12 115 V.D.C.
CAY-21714-TBL 7/12 230 V.D.C.

MOTOR
115 OR 230 V.D.C.
CC-21229B TBL-7/12 115 V.D.C.
CC-21230B TBL-7/12 230 V.D.C.

H.V. GENERATOR
CC-21232A TBL-7/12

L.V. AND BIAS GENERATOR
CC-21233B TBL-7/12

115 OR 230 VOLT D.C. SUPPLY

ELECTRICAL PARTS SHOWN THUS:-

R10 (NOT OUTLINED) INDICATES SAME PART IS USED FOR BOTH 115 V.D.C. & 230 V D.C.

R12 (DOTTED OUTLINE) INDICATES PART USED FOR 230 V. D.C. ONLY

R13 (SOLID OUTLINE) INDICATES PART USED FOR 115 V. D.C. ONLY

Figure 10-42 –Schematic Diagram, Model TBL-7/12 for 115/230 V. D.C. Power Supply (Dwg. 7300491)

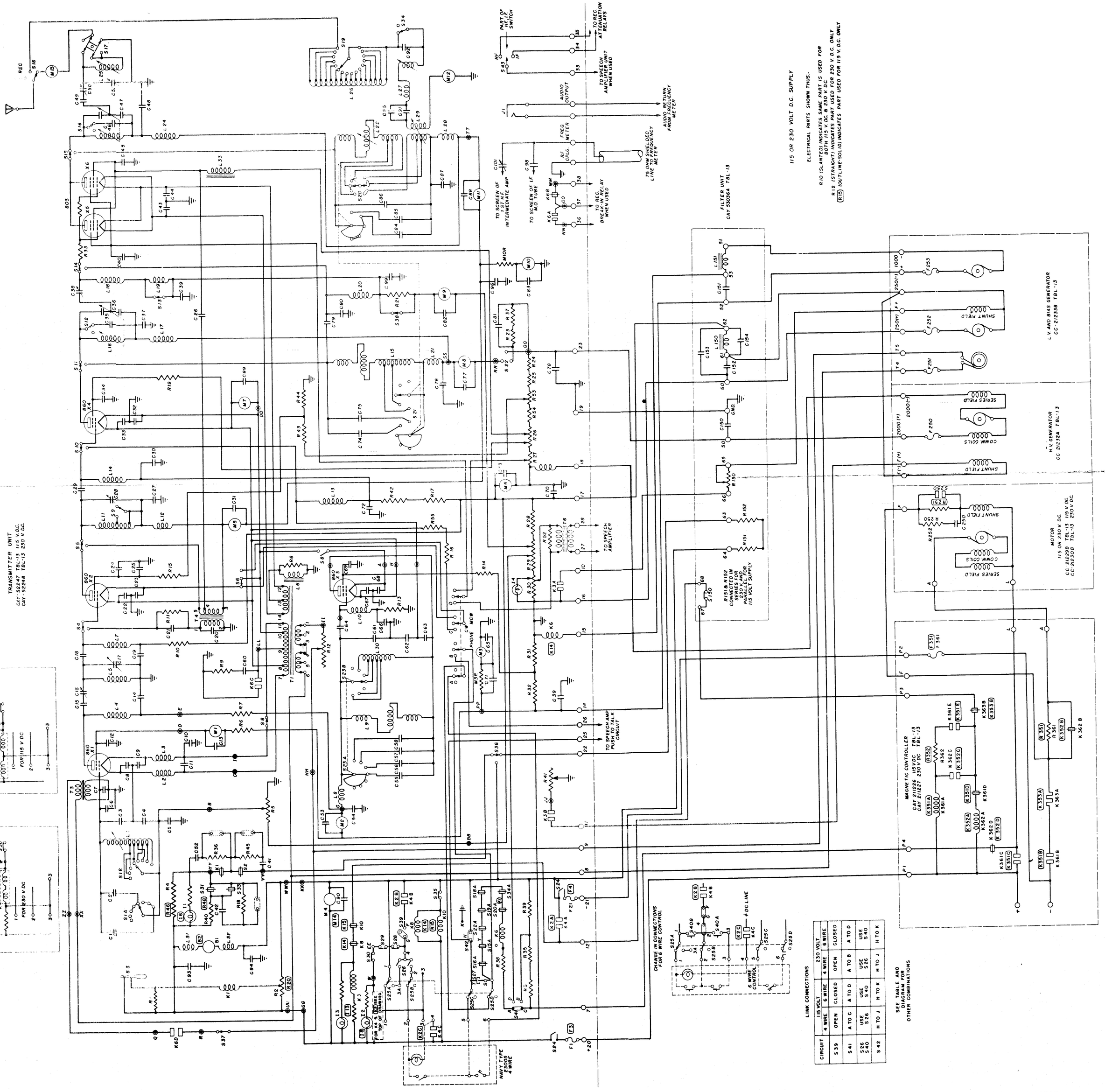


Figure 10-43—Schematic Diagram, Model TBL-13 for 115/230 V. D.C. Power Supply (Dwg. 7300721)

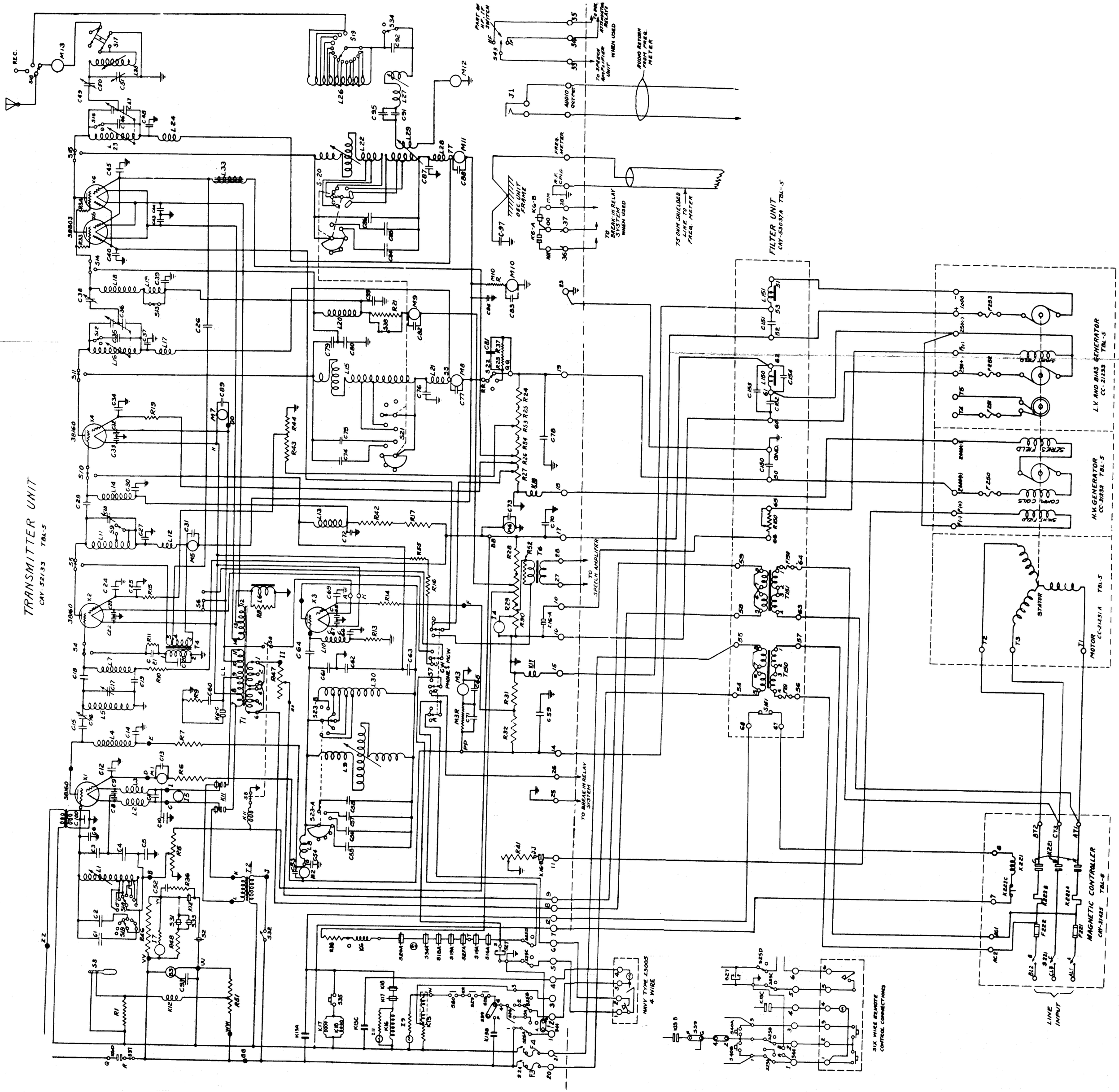


Figure 10-44—Schematic Diagram, Model TBL-5 for 440/3/60 A.C. Power Supply (Dwg. 7300405)

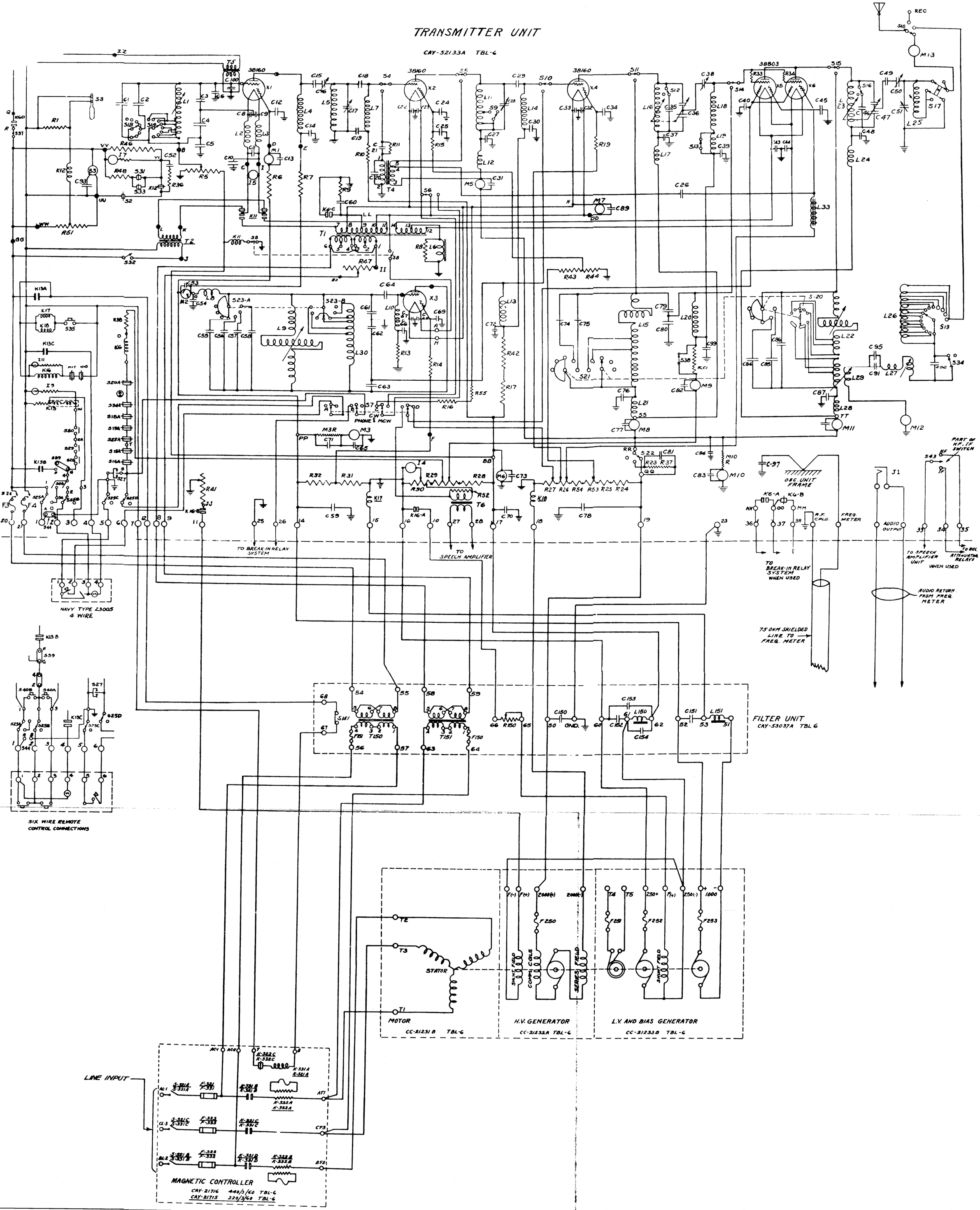
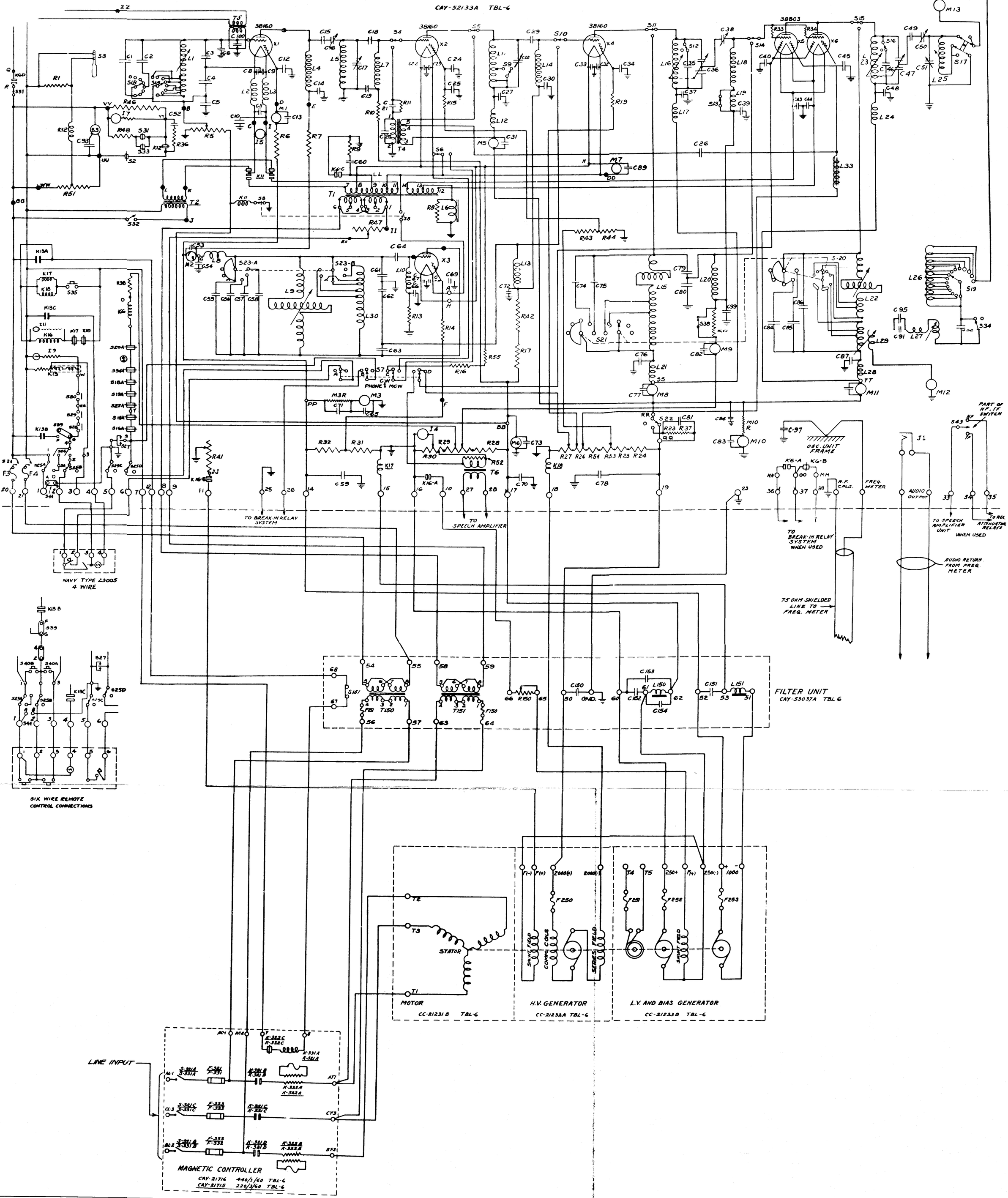


Figure 10-45—Schematic Diagram, Model TBL-6 for 220/440/3/60 A.C. Power Supply (Dwg. 7300476)

TRANSMITTER UNIT

CAY-52133A TBL-6



W-7300492

TRANSMITTER UNIT
CAY 52249 TBL-7/12

FILTER UNIT
AY-33037A TBL-7/12

L.V. AND BIAS GENERATOR
CC-81233B TBL-7/12

H.V. GENERATOR
CC-24338A TBL-7/12

MAGNETIC CONTROLLER
CAY-21176 440/3/60 TBL-7/12

LINE INPUT

Figure 10-46—Schematic Diagram, Model TBL-7/12 for 220/440/3/60 A.C. Power Supply (Dwg. 7300492)

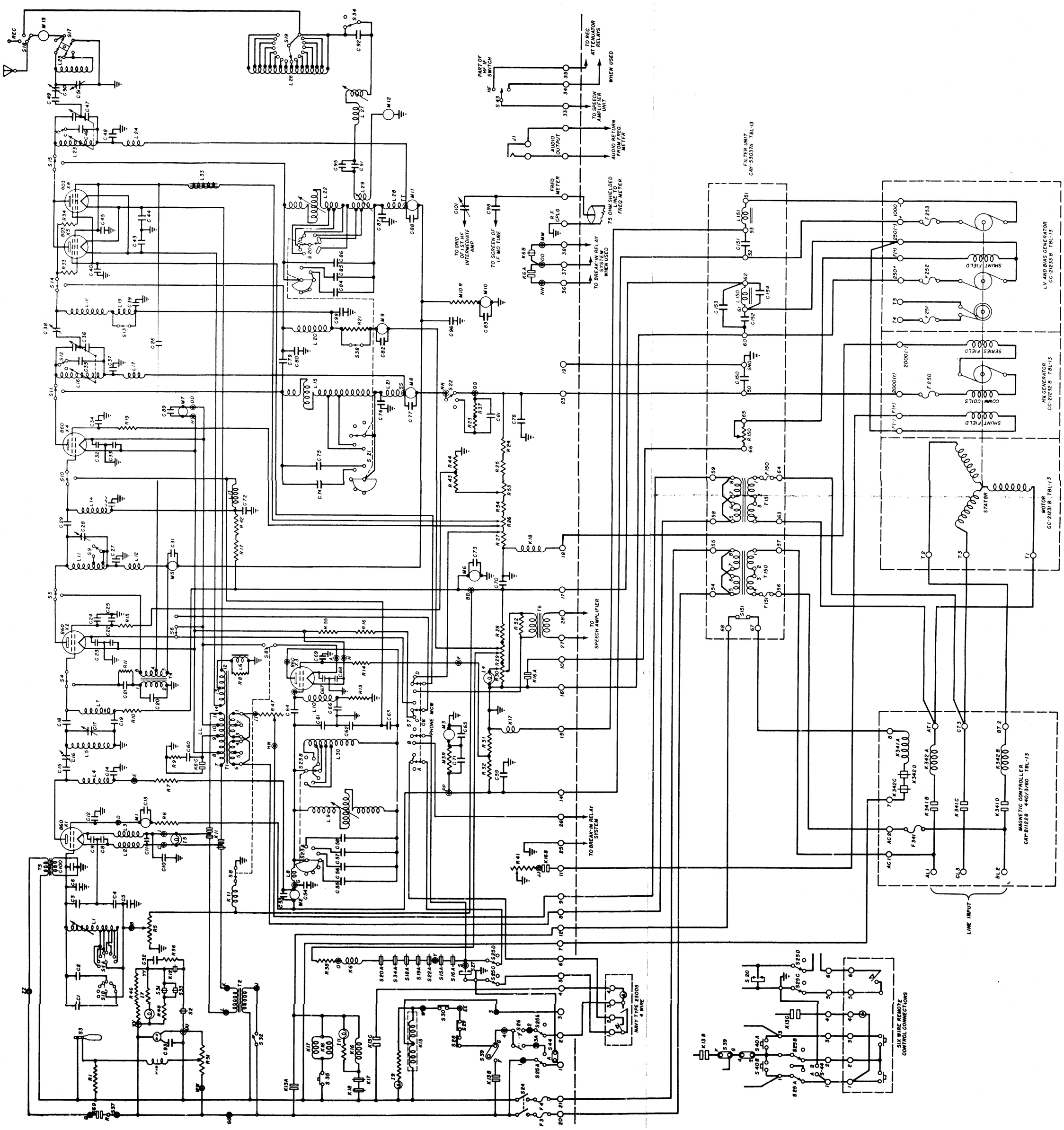


Figure 10-47—Schematic Diagram, Model TBL-13 for 220/440/3/60 A.C. Power Supply (Dwg. 7300720)

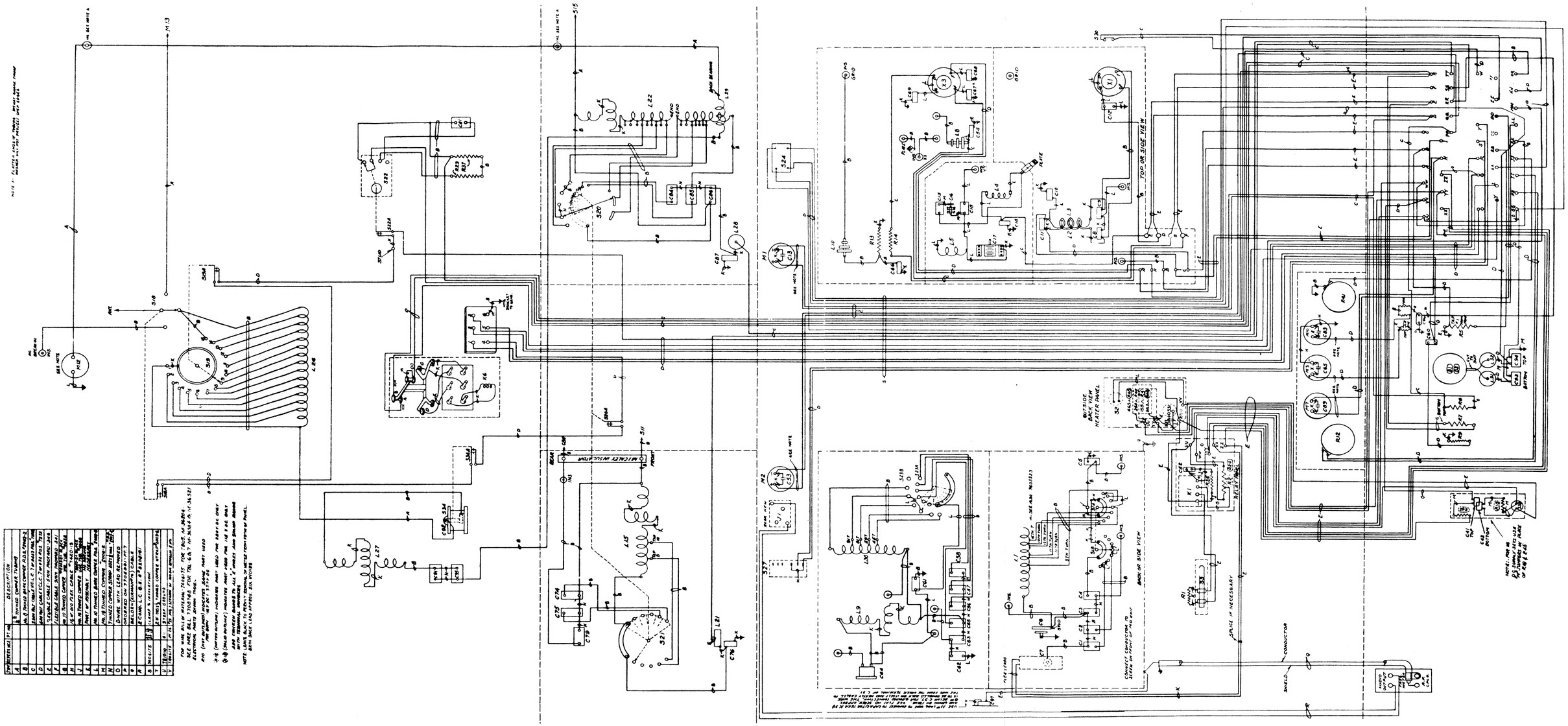
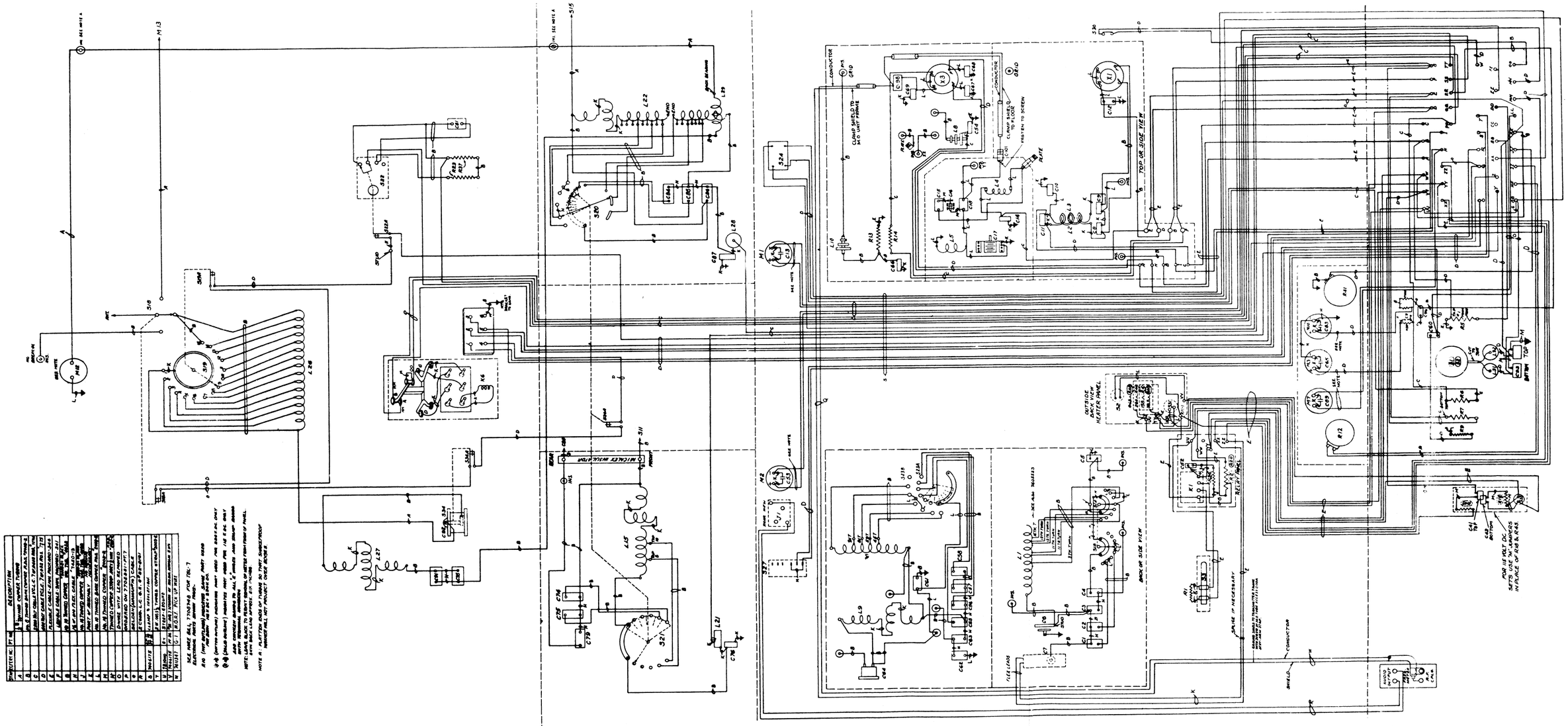


Figure 10-48—Wiring Diagram Transmitter Right-Hand Frame TBL-5/6 for 115/230 V. D.C. Power Supply (Dwg. 7300401)



WIRING DIAGRAM RIGHT HAND FRAME
FOR 115-230 VOLT DC SUPPLY
REFER TO 7300495 FOR AC WIRING DIAGRAM

Figure 10-49—Wiring Diagram, Transmitter Right-Hand Frame, TBL-7/12/13 for 115/230 V. D.C. Power Supply (Dwg. 7300493)

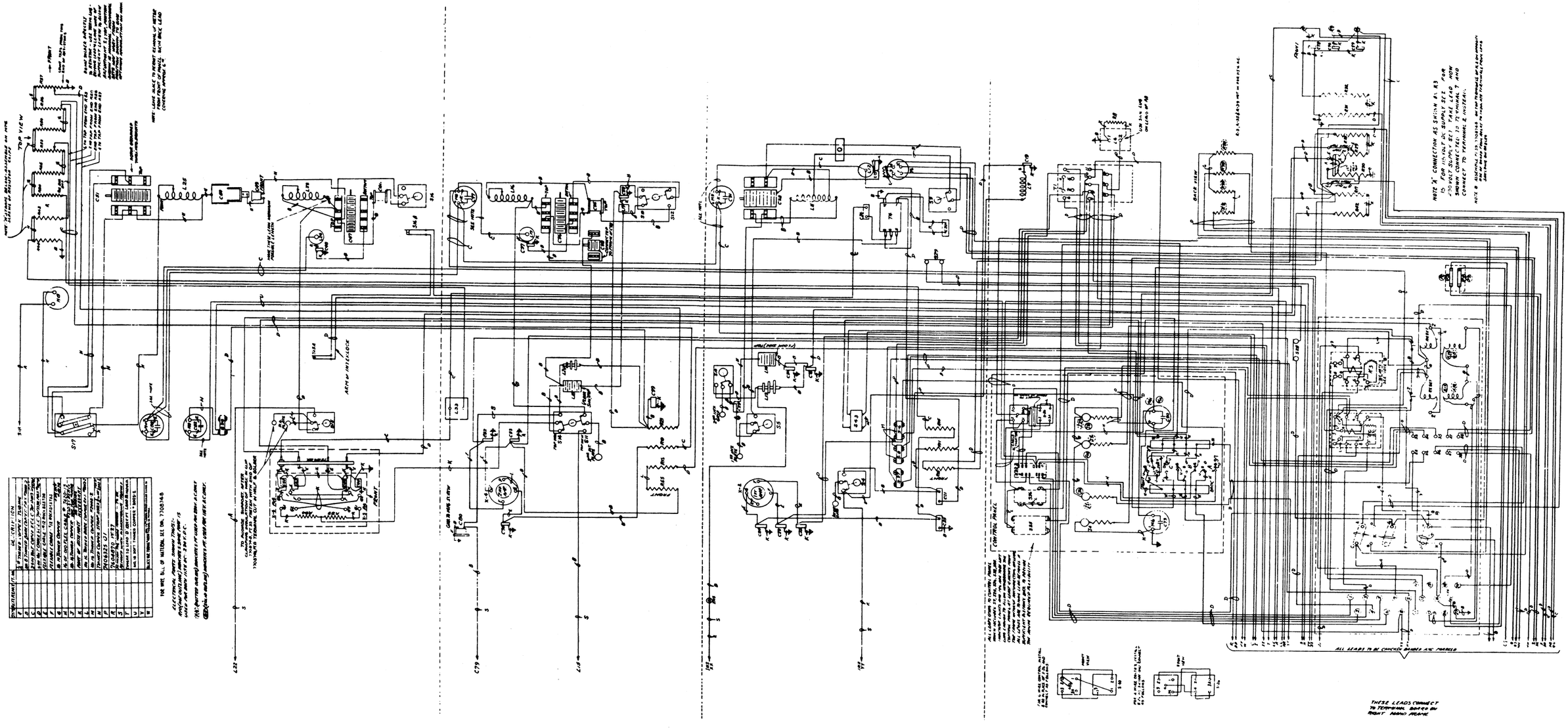


Figure 10-50—Wiring Diagram, Transmitter Left-Hand Frame, TBL-5/6 for 115/230 V. D.C. Power Supply (Dwg. 7300404)

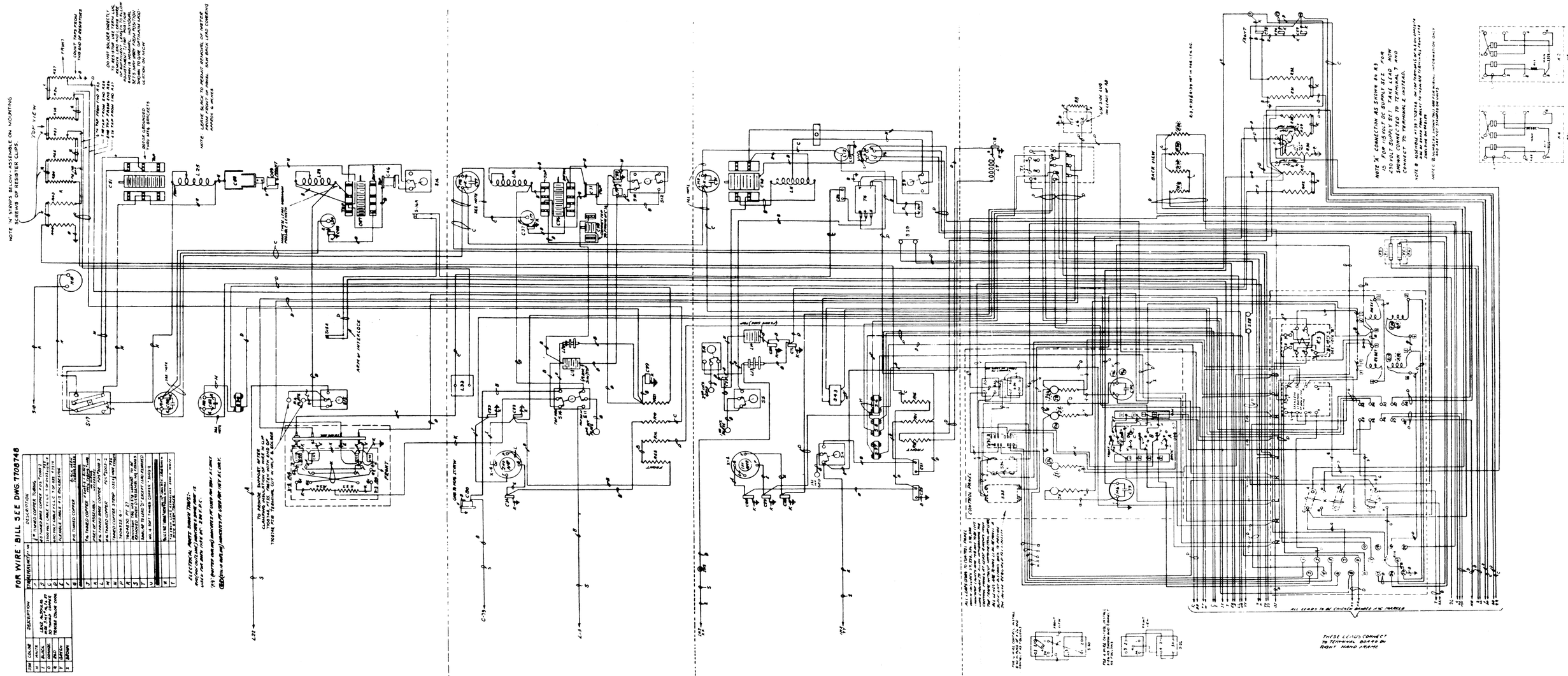


Figure 10-51—Wiring Diagram, Transmitter Left-Hand Frame, TBL-7/12/13 for 115/230 V. D.C. Power Supply (Dwg. 7300494)

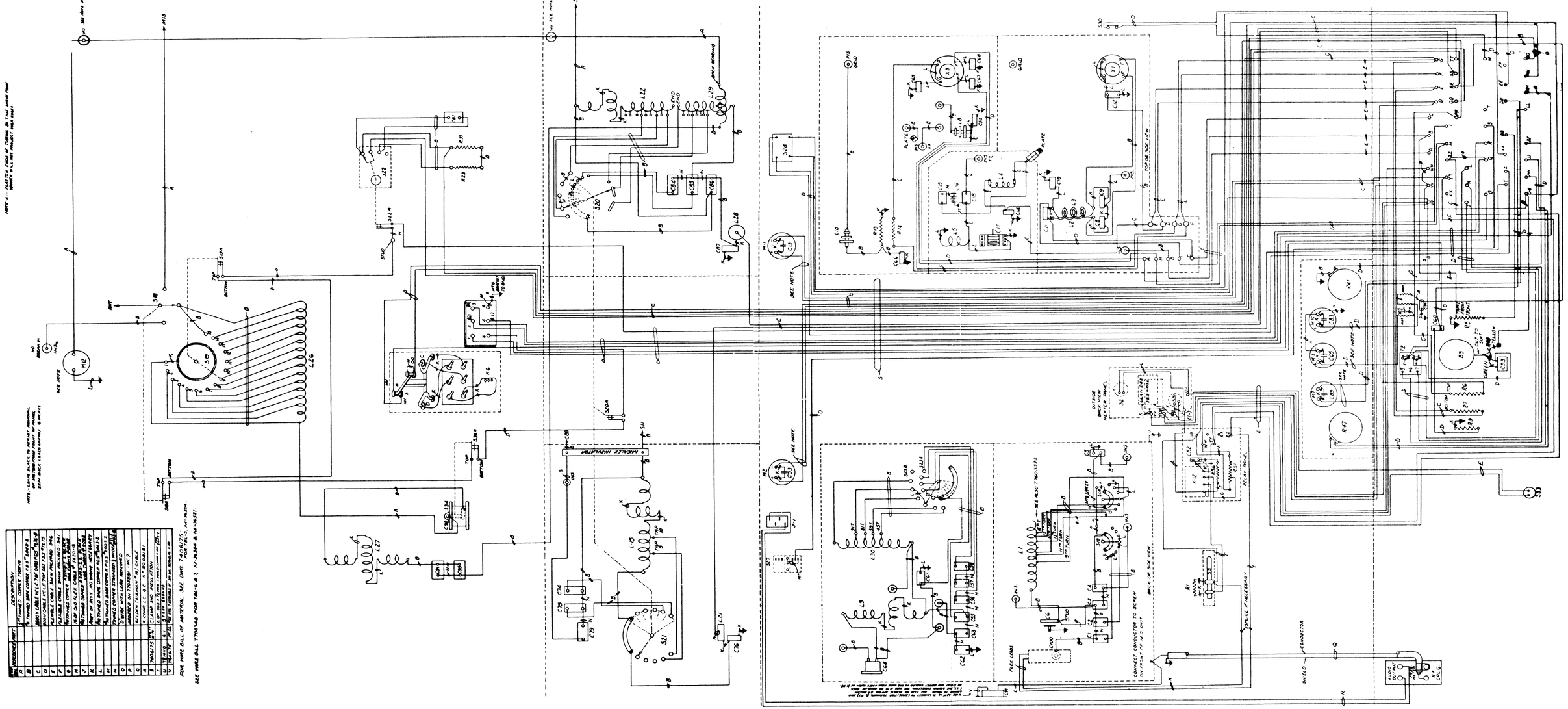


Figure 10-52—Wiring Diagram, Transmitter Right-Hand Frame, TBL-5/6 for 220/440/3/60 A.C. Power Supply (Dwg. 7300402)

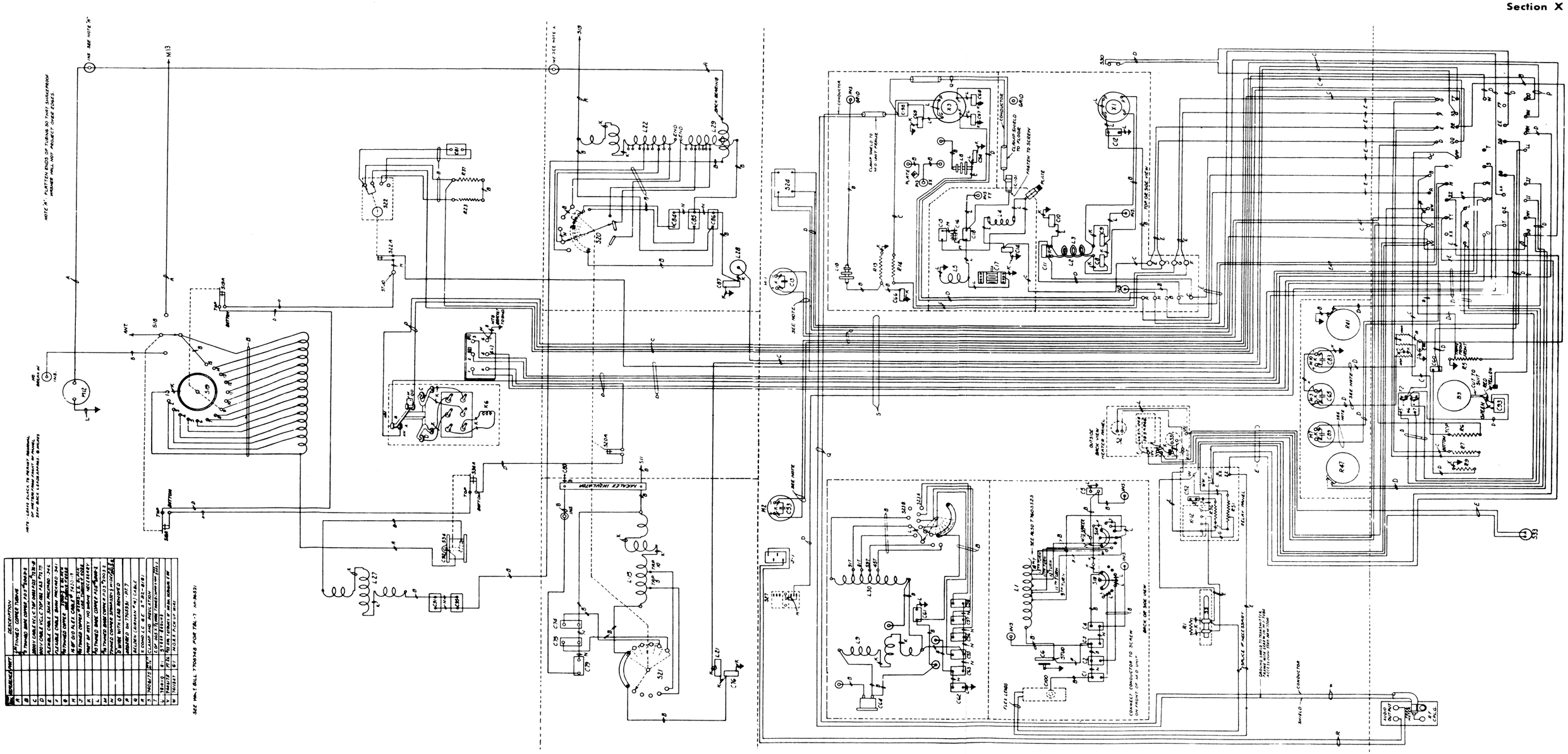


Figure 10-53—Wiring Diagram, Transmitter Right-Hand Frame, TBL-7/12/13 for 220/440/3/60 A.C. Power Supply (Dwg. 7300495)

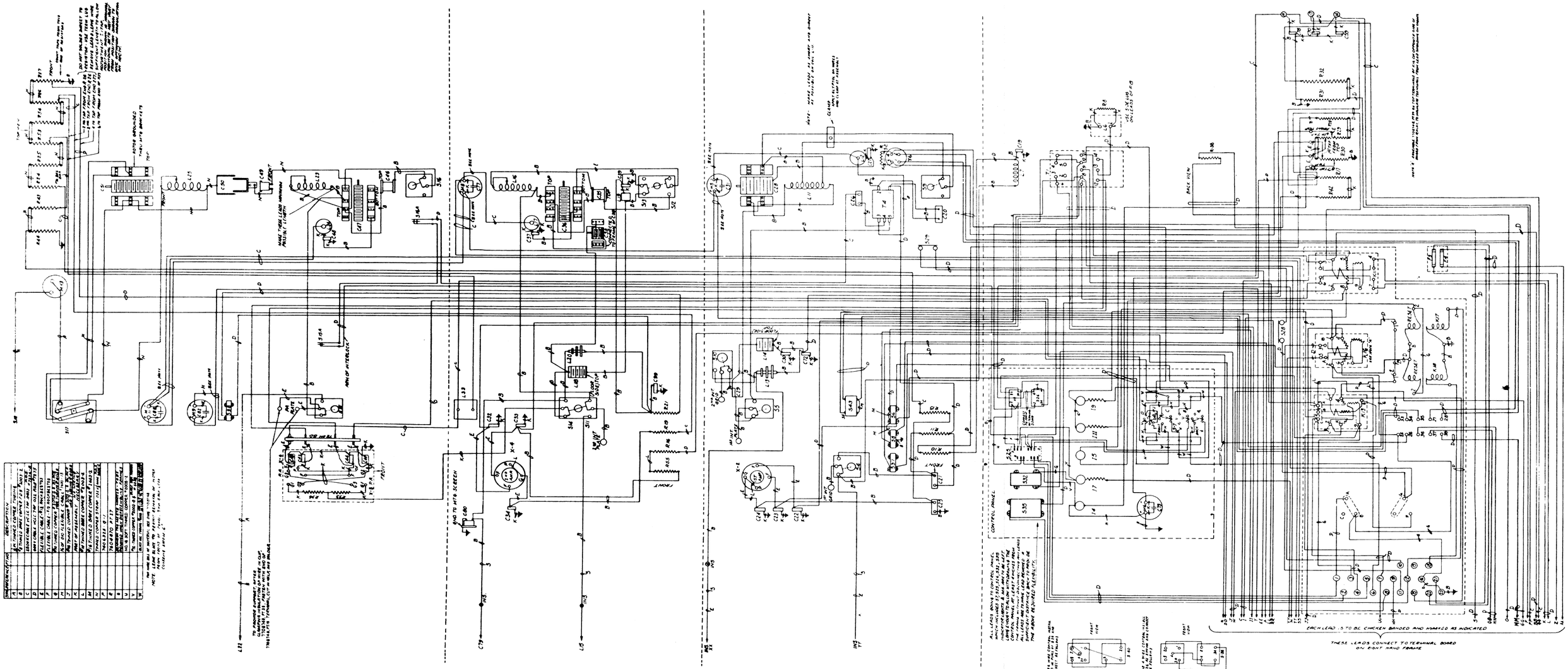


Figure 10-54—Wiring Diagram, Transmitter Left-Hand Frame, TBL-5 for 440/3/60 A.C. Power Supply (Dwg. 7300406)

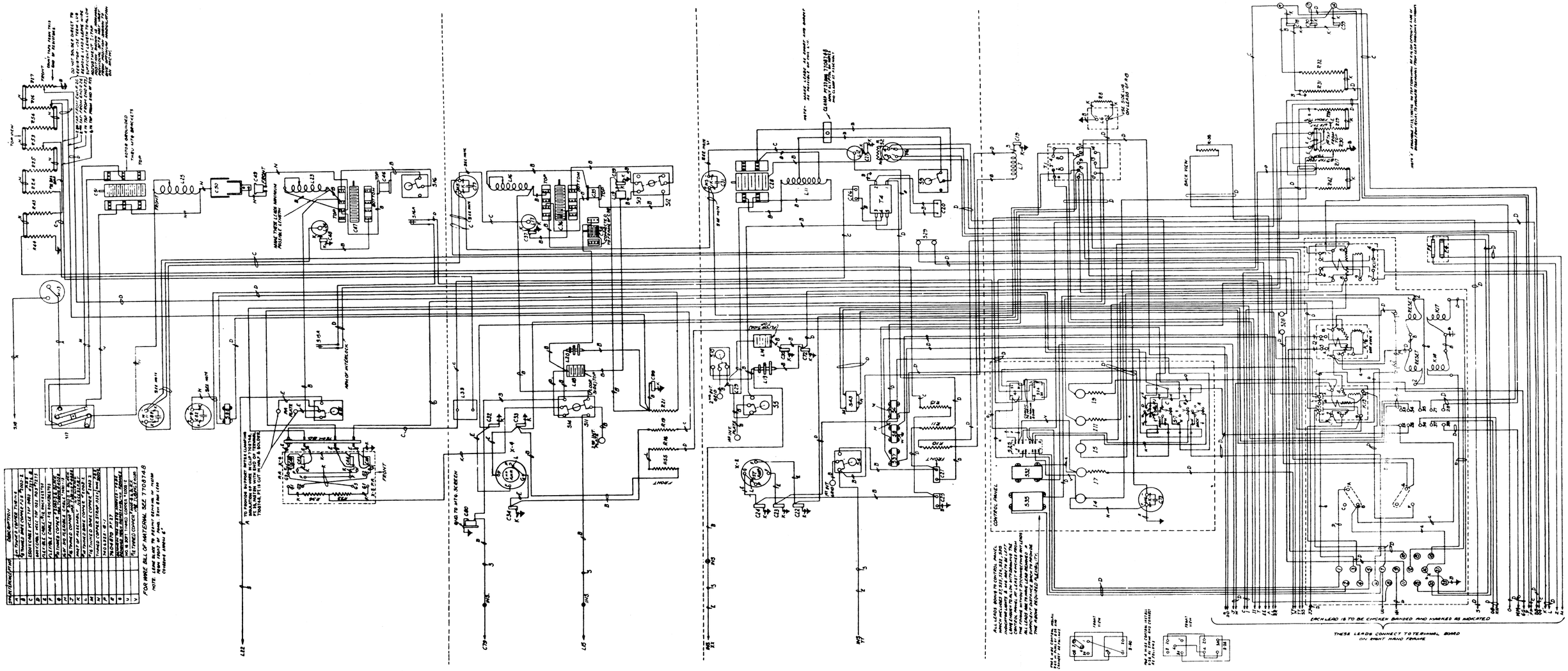


Figure 10-55—Wiring Diagram, Transmitter Left-Hand Frame, TBL-6 for 220/440/3/60 A.C. Power Supply (Dwg. 7300477)

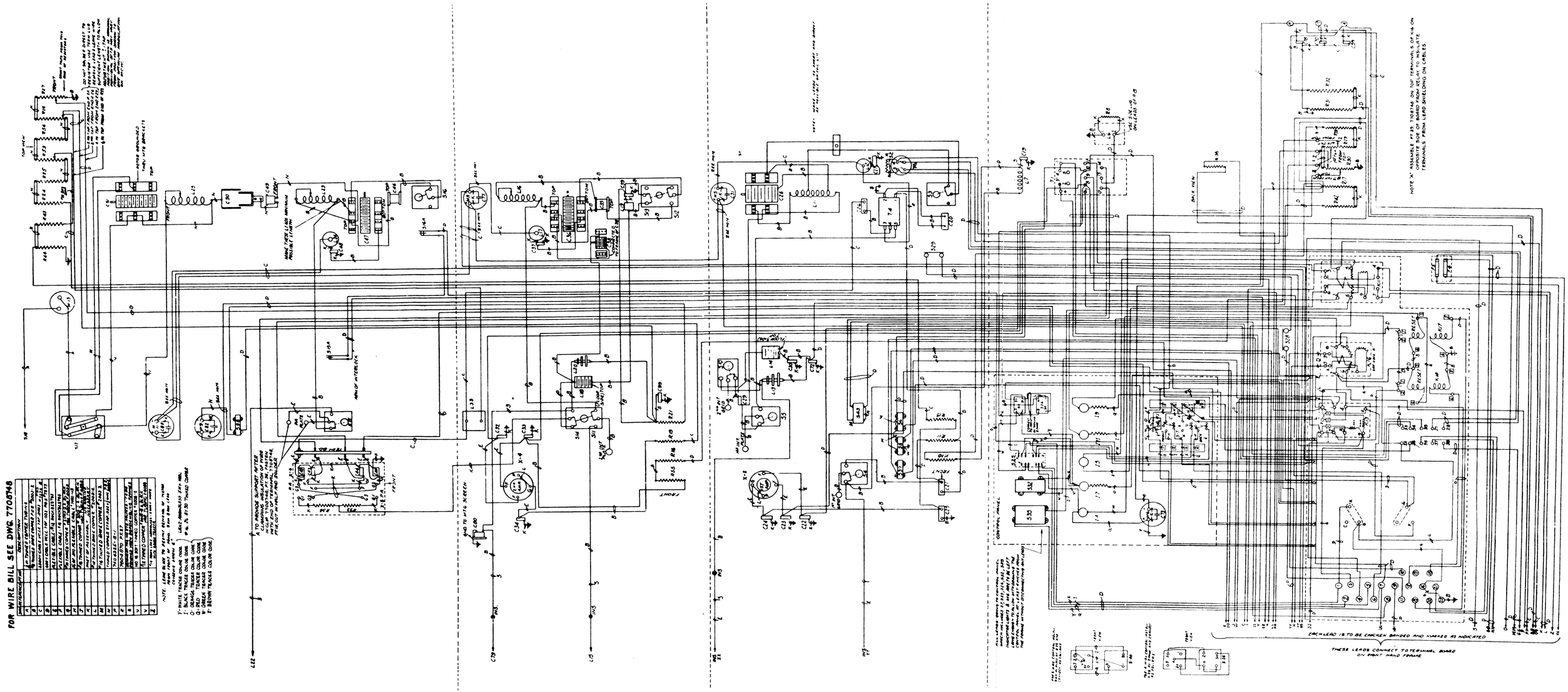


Figure 10-56—Wiring Diagram, Transmitter Left-Hand Frame, TBL-7/12/13 for 220/440/3/60 A.C. Power Supply (Dwg. 7300496)

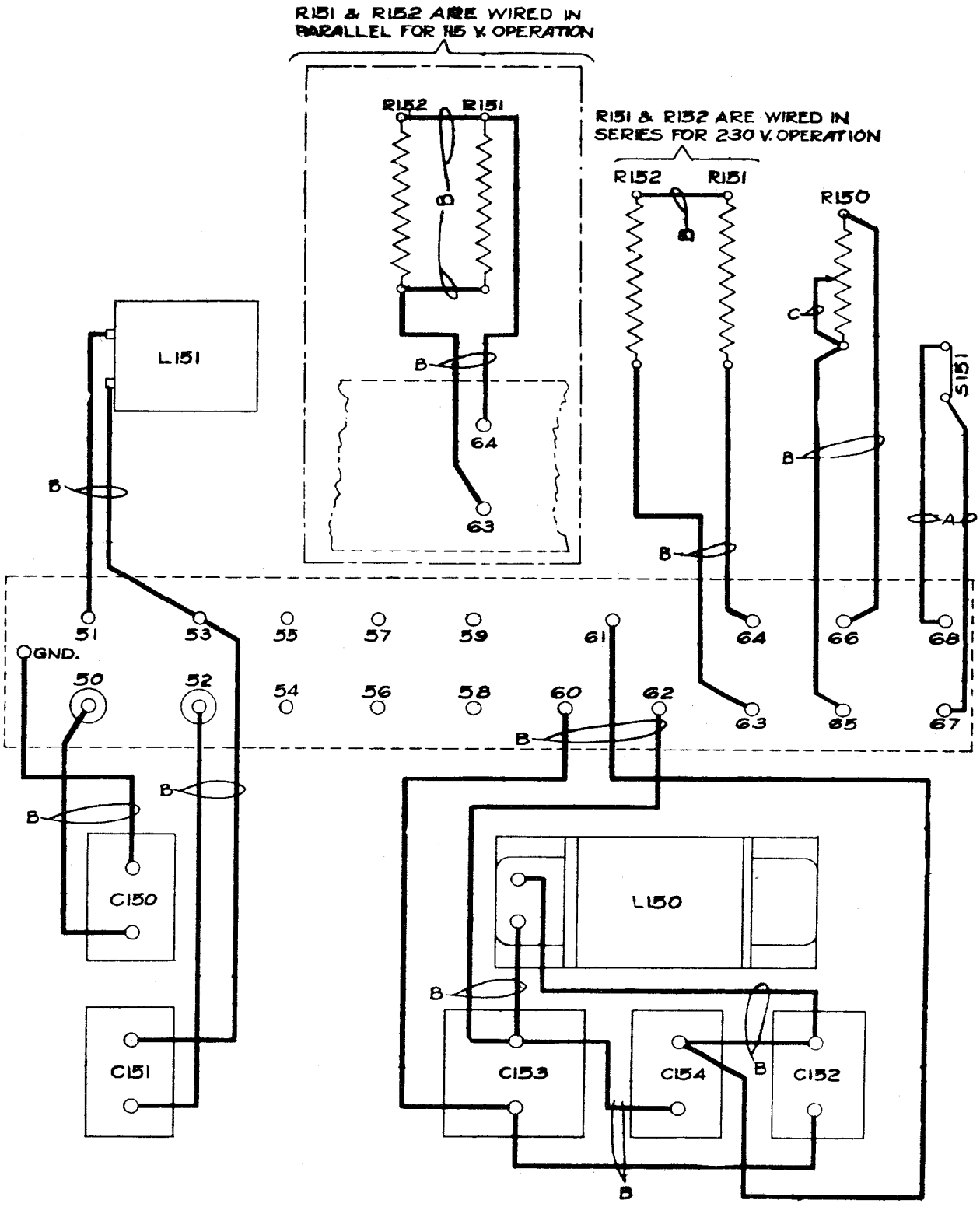


Figure 10-57—Wiring Diagram, TBL-Series Filter Unit, Type CAY-53036A for 115/230 V. D.C. Power Supply (Dwg. 7605491)

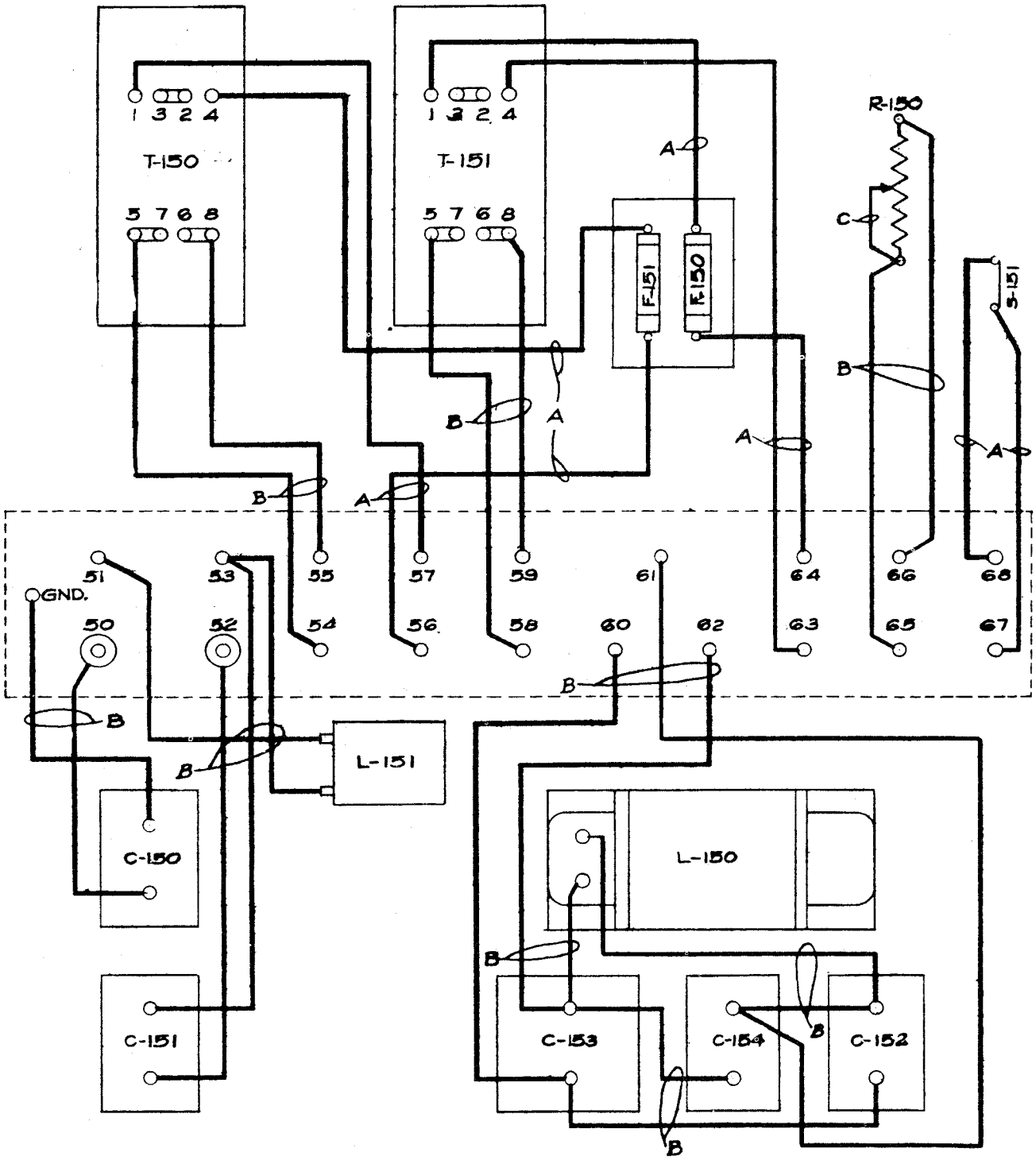


Figure 10-58—Wiring Diagram, TBL-Series Filter Unit, Type CAY-53037A for 220/440/3/60 A.C. Power Supply (Dwg. 7605492)

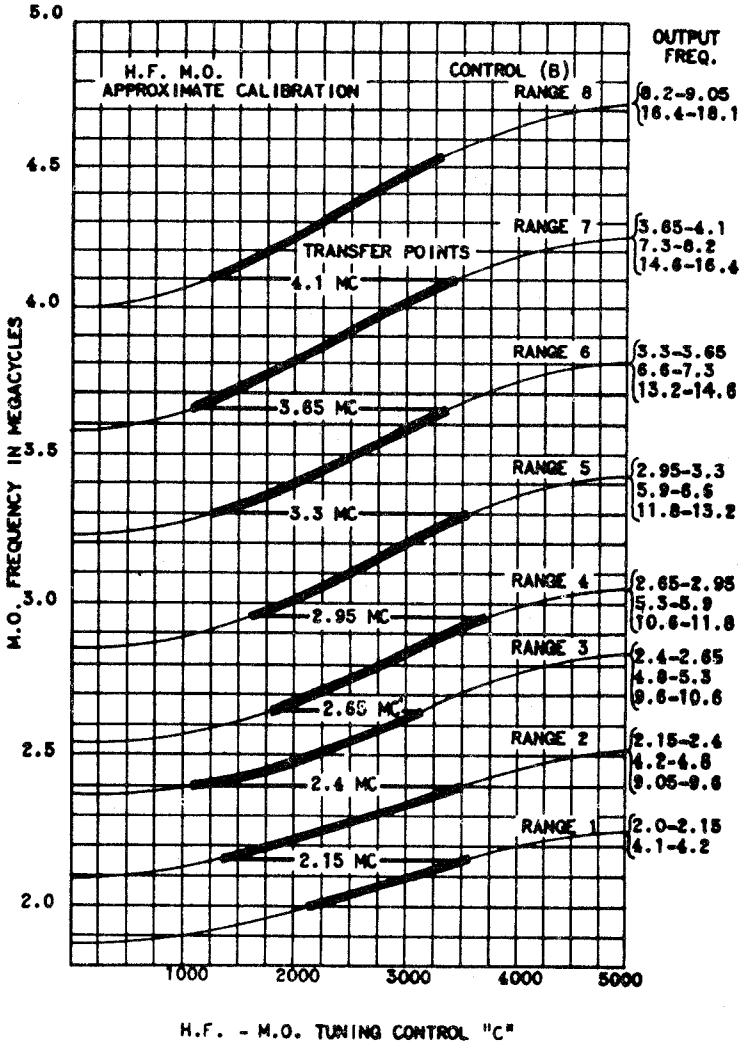


Figure 10-59—Tuning Curves for H.F. Master Oscillator (Curve #250142)

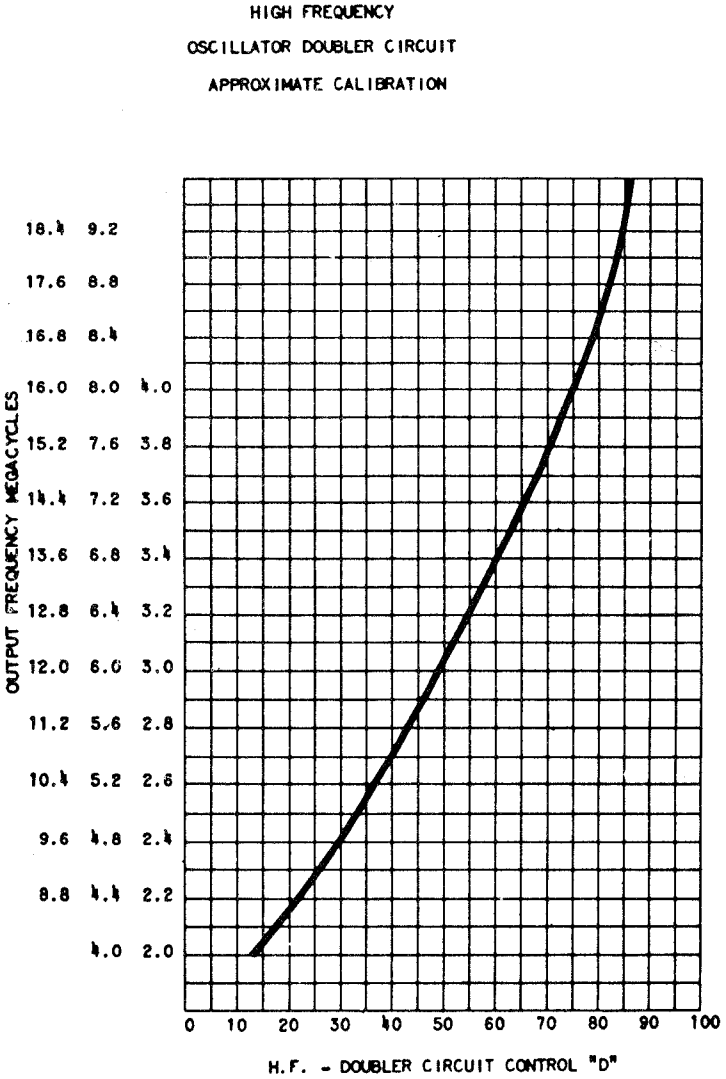


Figure 10-60—Tuning Curves for H.F. Doubler Circuit (Curve #250143)

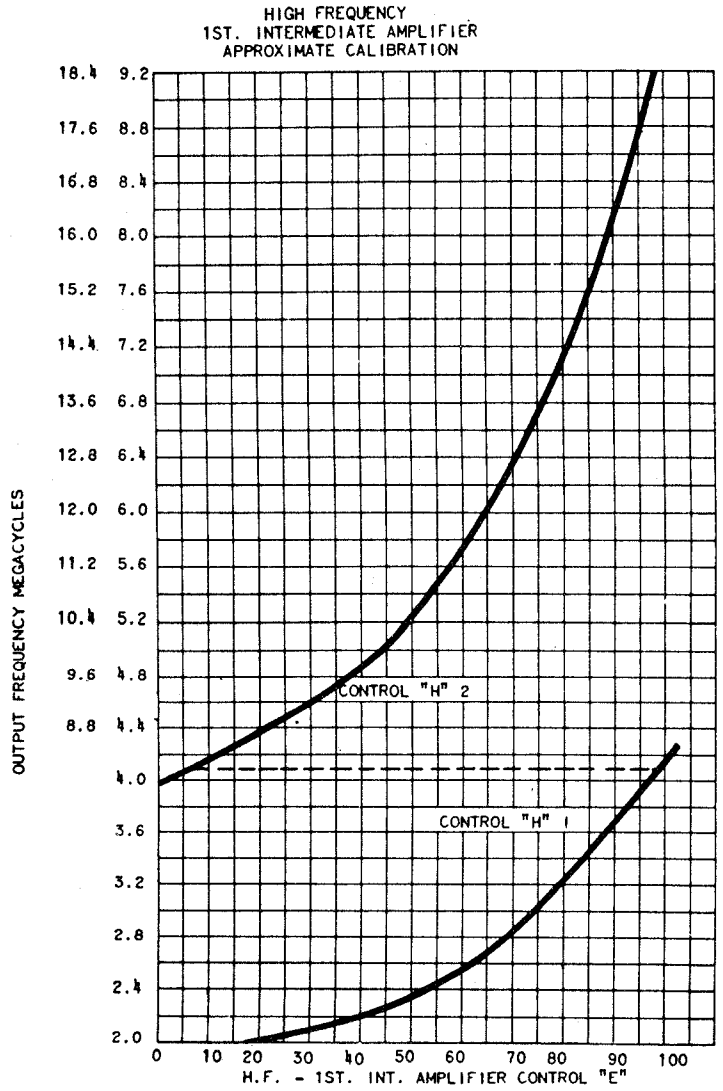


Figure 10-61—Tuning Curves for H.F. 1st Intermediate Amplifier. (Curve #250144)

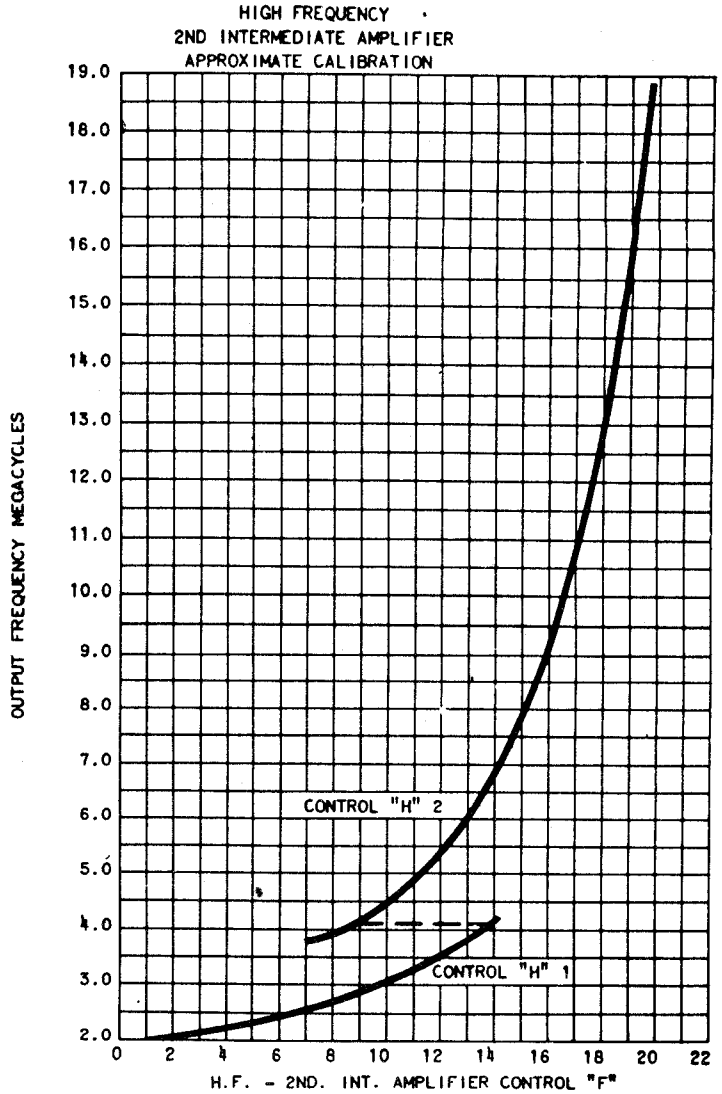


Figure 10-62—Tuning Curves for H.F. 2nd Intermediate Amplifier. (Curve #250145)

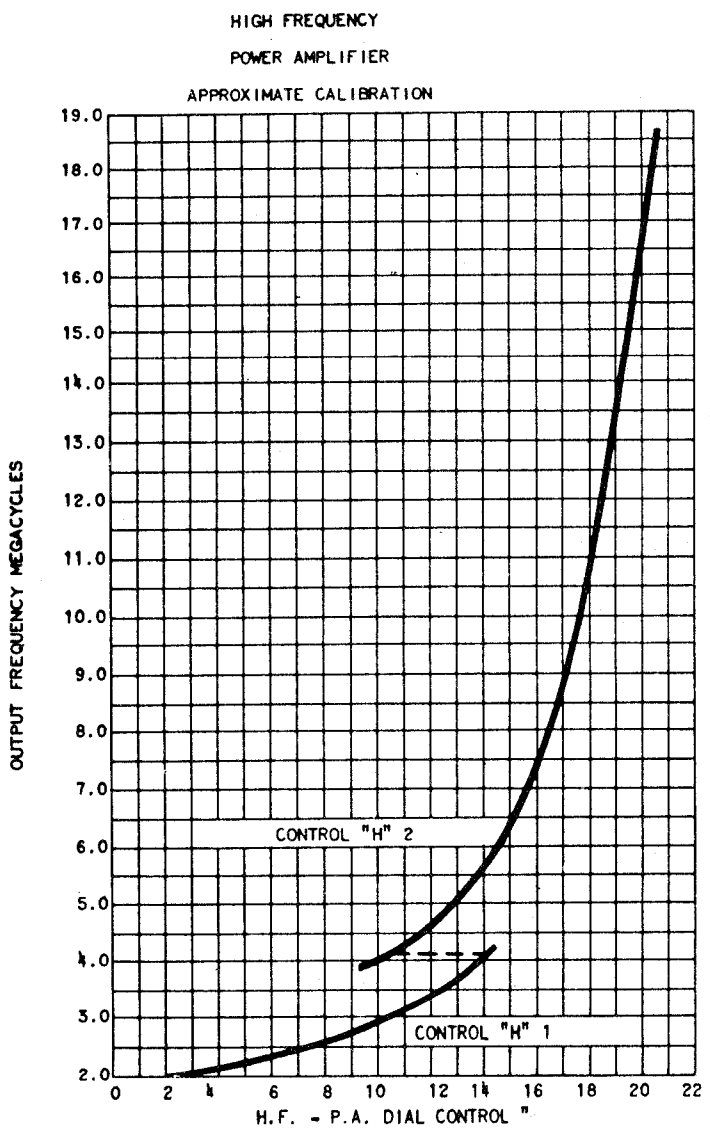


Figure 10-63—Tuning Curves for H.F. Power Amplifier. (Curve #250146)

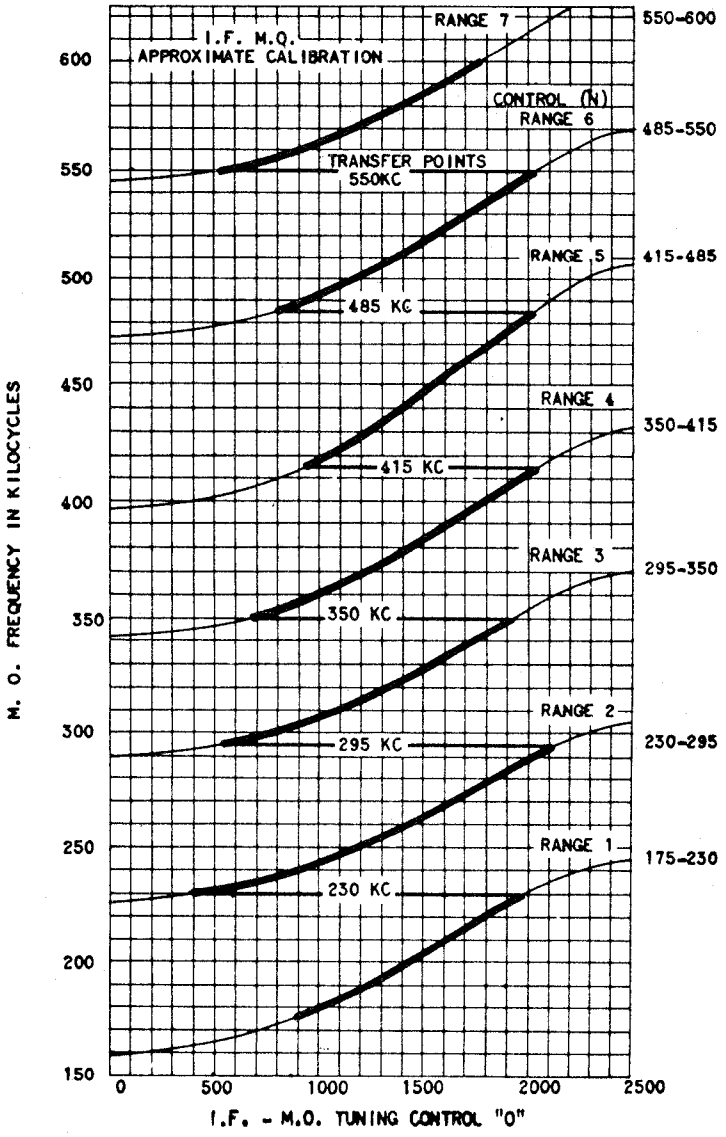


Figure 10-64—Tuning Curves for I.F. Master Oscillator. (Curve #250141)

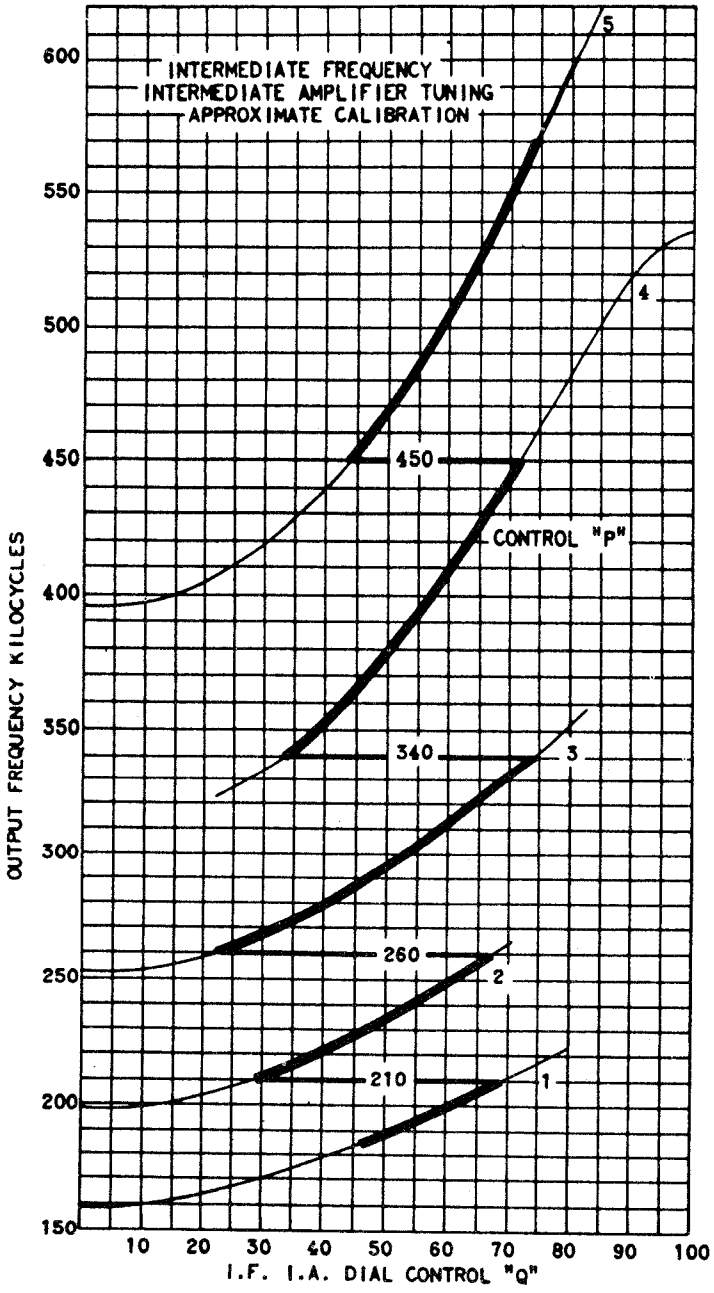


Figure 10-65—Tuning Curves for I.F. Intermediate Amplifiers (Curve #250140)

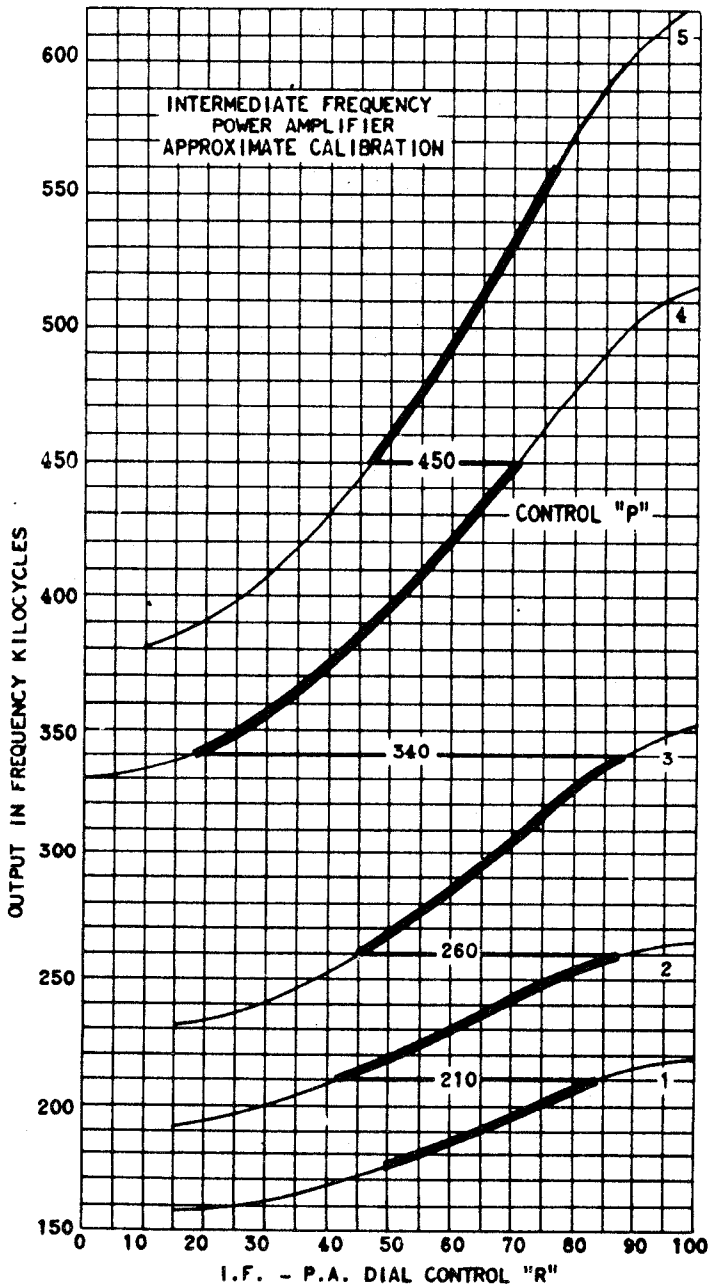
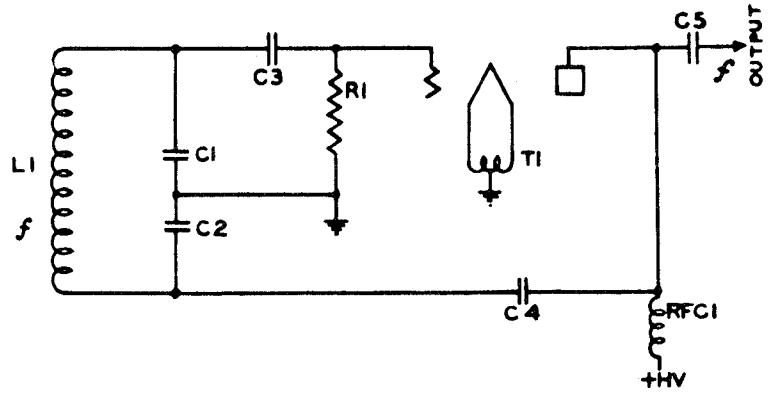
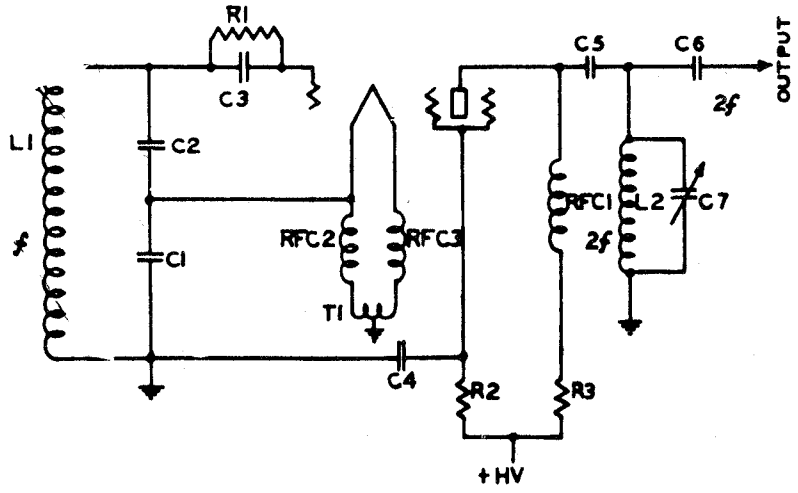


Figure 10-66—Tuning Curves for I.F. Power Amplifier. (Curve #250139)

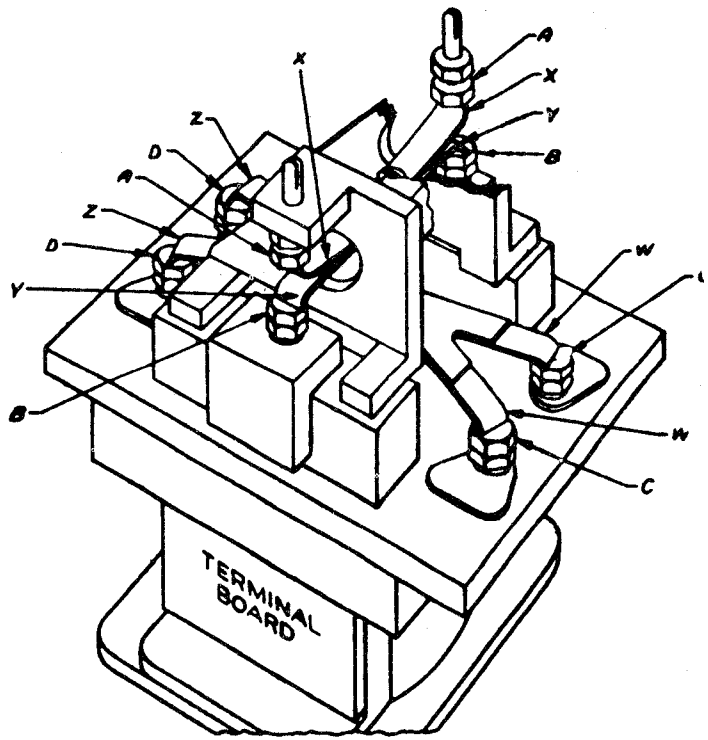


STANDARD COLPITTS OSCILLATOR CIRCUIT



ELECTRON COUPLED OSCILLATOR CIRCUIT

Figure 10-67—Standard Colpitts Oscillator Circuit and Electron Coupled Oscillator Circuit (Dwg. 7705422)



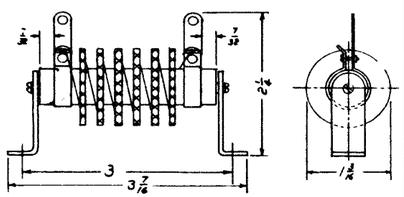
KEYING RELAY ADJUSTMENT

The contact timing is adjusted as follows: Press plunger down until it bottoms. Then raise plunger .009 inches and adjust contacts (C-W) to just make. Raise plunger .001 inches and adjust contacts (D-Z), (Y-B), and (A-X) to just make. Final adjustment is to be made by observing keying waveform on oscillograph. The relay contacts shall close reliably and there shall be no chatter. Relays with plungers that strike bottom will be considered satisfactory, provided all other requirments are met. Stretching of guide springs, to remove slight breaks in keying waveform, is permissible.

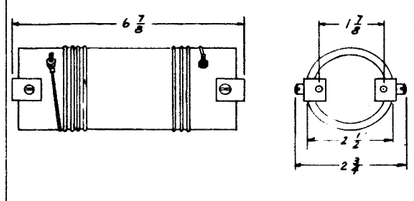
Figure 10-68—Keying Relay Contact Adjustment (Dwg. 7405832)

Relay or Contactor No.	Name	Oil Filled	Oil Type No.	NORMAL OPERATION			Remarks
				Voltage	Current	Trip. Current	
					Amp.	Amps.	
K-1	Thermostat Relay (D.C.)	No	...	11 D.C.	.015	...	
K-2	Starting Contactor (D.C.)	No	...	115 D.C.	.120	...	
K-3	Field Contactor (D.C.)	No	...	115/230 D.C.	.07	...	Series resistor of 300/3000 ohms on contactor used for 115/230 volt D.C. operation.
K-4	Starting Contactor (D.C.)	No	...	230 D.C.	.07	...	Series resistor of 2500 ohms on contactor.
K-6	Keying Relay	No	...	85 D.C.	.10	...	
K-8	M.O. Overload Relay	No	...	.....	.20	.25	Adjustable to max. of 1 Amp.
	Reset Coil for K-8	...	...	230 D.C.	.05	...	
K-10	Plate Overload Relay	No	...	.....	.65	.75	Adjustable to max. of 2 Amp.
	Reset Coil for K-10	...	...	230 D.C.	.05	...	
K-11	H.F. M.O. Fil. Relay	No	...	110 A.C.	.037	...	
K-12	Thermostat Relay (A.C.)	No	...	11 A.C.	.015	...	
K-13	Starting Contactor (A.C.)	No	...	110 A.C.	.350	...	
K-14	M.O. Overload Relay	No	...	.....	.20	.25	Adjustable to max. of 1 Amp.
	Reset Coil for K-14	...	...	115 D.C.	.11	...	
K-15	H.V. Overload Relay	No	...	.....	.65	.75	Adjustable to max. of 2 Amp.
	Reset Coil for K-15	...	...	115 D.C.	.11	...	
K-16	Field Contactor (A.C.)	No	...	110 A.C.	.065	...	Series resistor of 300 ohms
K-17	M.O. Overload Relay	No	...	.....	.20	.25	Adjustable to max. of 1 Amp.
	Reset Coil for K-17	...	...	110 A.C.	9.0	...	
K-18	H.F. Overload Relay	No	...	.....	.65	.75	Adjustable to max. of 2 Amp.
	Reset Coil for K-18	...	...	110 A.C.	9.0	...	

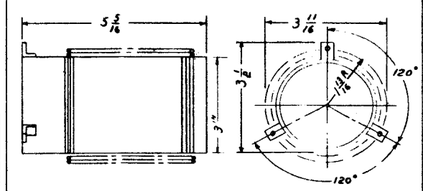
Fig. 10-69—Contactor and Relay Operating Table



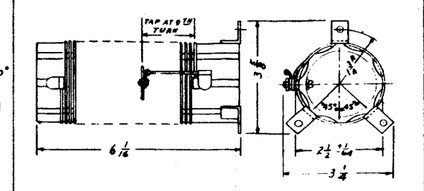
L-4 7407506 G-1
INDUCTANCE 2.5 MILLIHENRIES D.C.
RESISTANCE 8 OHMS. 300 M.A. D.C.
#28 DS. GREEN
96 PER PI TOTAL 576 TURNS 4 CROSSES PER TURN



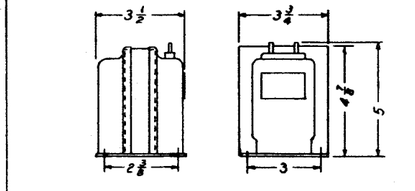
L11 7406479 G-1
230 IN. OF .064 DIA. #14 TINNED COPPER WIRE, 26 TURNS TAPPED AT 6½ & 23¾ TURNS.



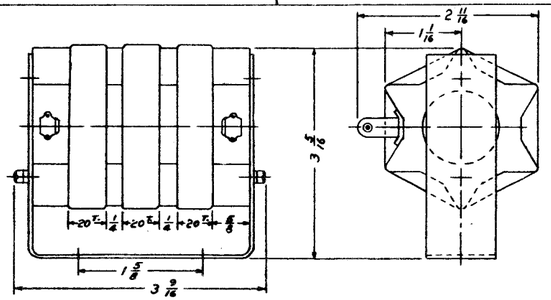
L2 & L3 7705707 G-6
TWO COAXIAL WINDINGS, BOTTOM WINDING 50 TURNS, TOP WINDING 48½ TURNS #14 S.C.E. ENAM. WIRE (.064") 35 AMPS. A.C. OR D.C. L3 IS A PART OF L2.



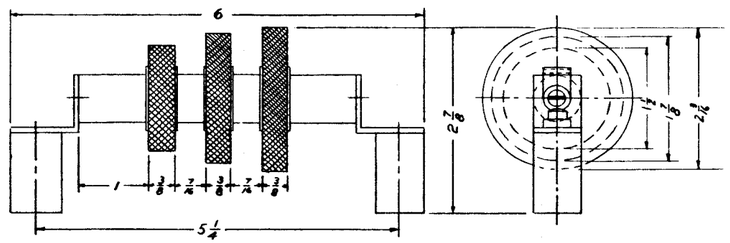
L5 7705697 G-1
28 TURNS #14, .064" DIA. TINNED COPPER WIRE.



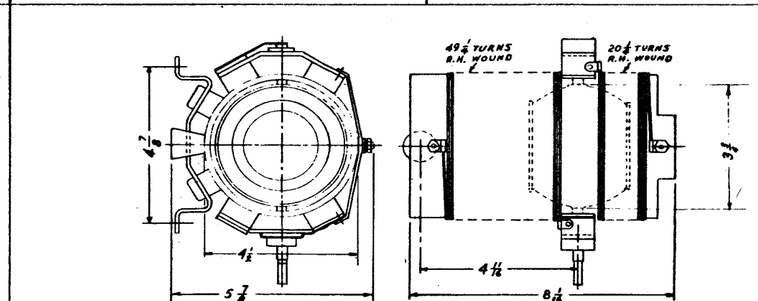
L6 L 332743 CAY-30329
1 HENRY, 1000 V.D.C., 0.75 AMPS., 1560 TURNS OF #24 ENAM. WIRE, 21.5 OHMS. INSULATED FOR 2500 V.



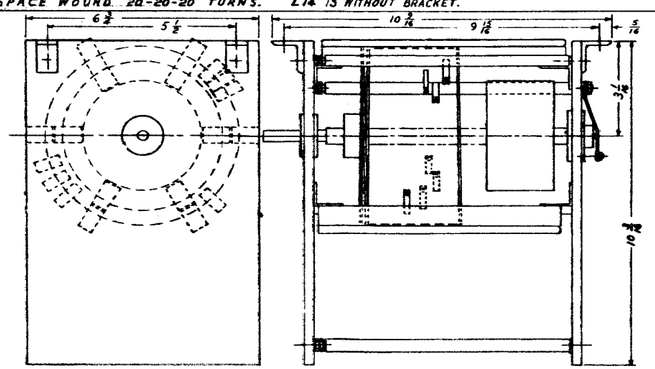
L7 & L14 7405204 G4 & G5
#30 INCHES .0159 DIA. S.C.C. ENAMEL COPPER WIRE, SPACE WOUND. 20-20-20 TURNS. L14 IS WITHOUT BRACKET.



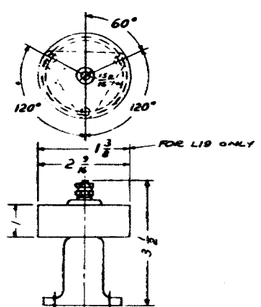
L8, L10, L13 & L20 7700874 G-5 & G-6 L 303476, L 303478 & L 303479
COILS DUO-LATERAL WOUND #26 D.S.C. COPPER WIRE. 4.35 MILLIHENRIES, 6.4 OHMS, 350 TURNS. 2.16 MILLIHENRIES, 4.2 OHMS, 250 TURNS. 0.75 MILLIHENRIES, 2.25 OHMS, 150 TURNS. L10 SAME, EXCEPTING MOUNTING INSULATORS



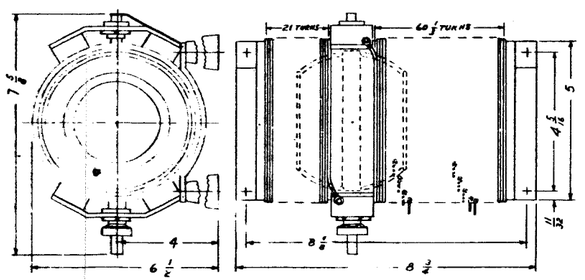
L9 7605548 G-1
STATOR 83 FT. LITZ 3X3X18 OF .004"
ROTOR 32 FT. LITZ 3X27 OF .004"



L1 7603523 G-1
16 TURNS OF ½" X 1/16" COPPER STRAP WOUND EDGEWISE, 5 5/8" O.D.

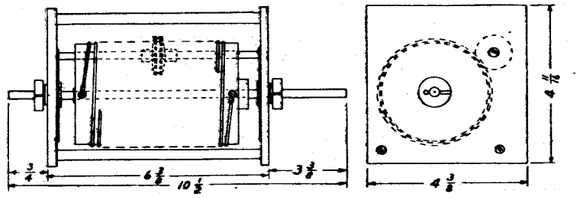


L12, L17, L19, L21, L24 & L28 L 303481
375 TURNS #24, .0201 DIA. D.C.C. COPPER WIRE, BASKET WOUND, 4 MILLIHENRIES, 5.15 OHMS
L19 HAS 65 TURNS, 0.1 MILLIHENRY, 0.7 OHM, L-303602



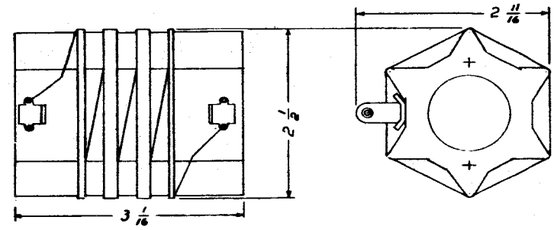
L15 7605542 G-1
STATOR 81⅓ TURNS #16 D.C.C. COPPER WIRE,
ROTOR 47½ TURNS #16 D.C.C. COPPER WIRE.

Figure 10-70—Outline and Winding Data for Inductors and R.F. Chokes (Dwg. 7611332)



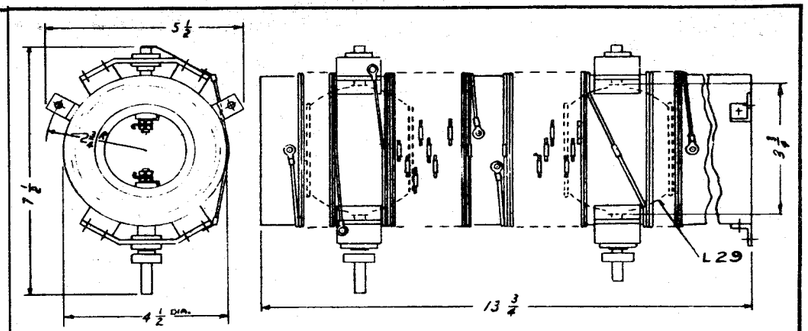
L16, L23 & L25 7604676 G-7 & G-9

22 TURNS OF 220 WIRE OF #10 .102 DIA. HALF HARD COPPER WIRE, SILVER COVERED.
L23 & L25 SAME AS L16, EXCEPT MOUNTING.



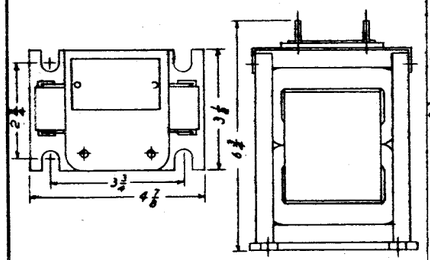
L18 7405204 G-3

240 IN OF .010 DIA. D.C.C. COPPER WIRE, SPACE WOUND 5-10-10-5 TURNS.



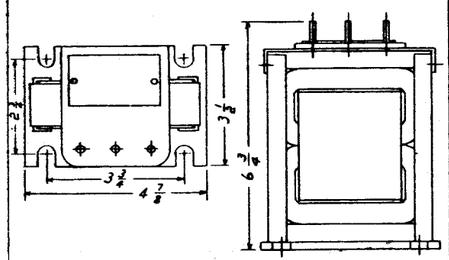
L22 & L29 7605526 G-1

STATOR 12 & 26 TURNS #12 TINNED COPPER WIRE.
ROTOR 36 1/2 TURNS LITZ 3 X 3 X 18 OF .004 DIA.
L29 IS A PART OF L22.



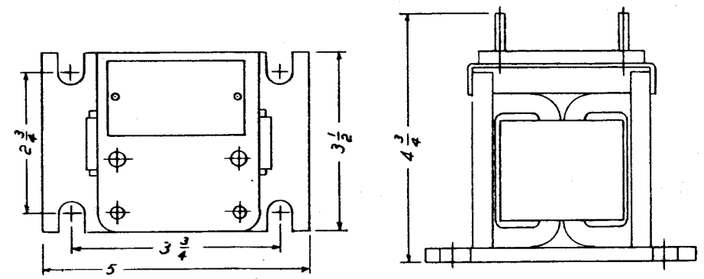
L701 & L702 7610439 PT-8 & 9

1.5 HENRY, 0.5 AMP. D.C., 118 V. 100 CYCLE RIPPLE, 1500 V. TEST 8.0 OHMS D.C. RESISTANCE MAX. 2500 VOLTS, .040 RND. EN. COP WIRE



L703 7610439 PT-10

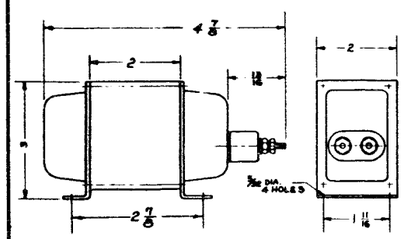
10 HENRY, TAPPED AT 6.8 HENRY, 0.2 AMP. D.C., 500 V., 100 CYCLE RIPPLE 2500 V. TEST. 50 OHMS D.C. RESISTANCE MAX. .0254 RD. EN WIRE



L704 7610439 PT-11

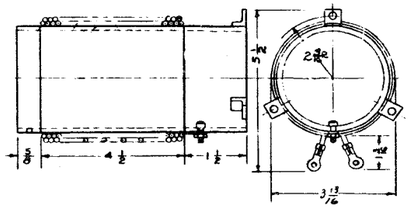
0.7 HENRY, 0.1 AMP. D.C., 100 V., 300 CYCLE RIPPLE, 4000 V. TEST, 28 OHMS D.C. RESISTANCE MAX. .0254 RD. EN. WIRE

Figure 10-71—Outline and Winding Data for Inductors and R.F. Chokes (Dwg. 7611333)



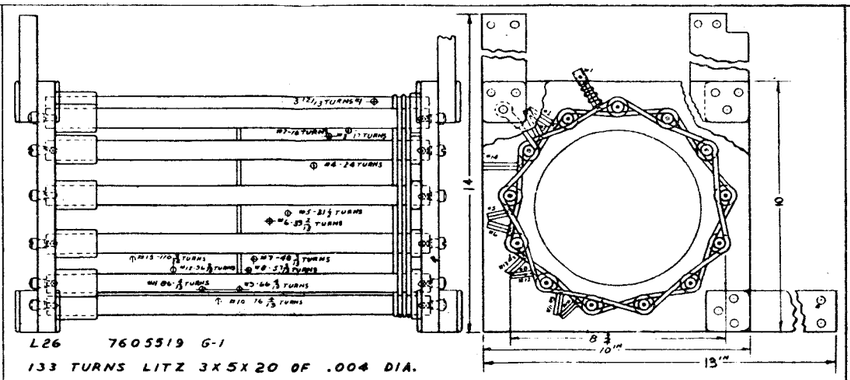
L33 L 340136

5 HENRIES, 0.1 AMP., 1000 VOLTS INSULATION 1300 TURNS, 65 OHMS ± 15%. INSULATION 98 X 98 X .003 TK.



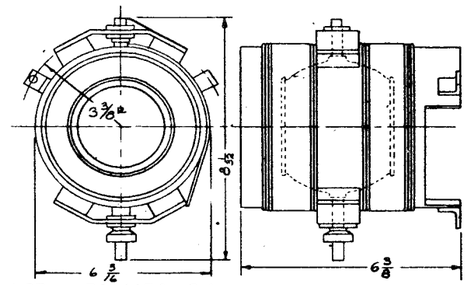
L30 7705719 G-1

124 TURNS, 2 LAYER BANK WOUND 125 PT. OF .07 DIA., LITZ 3X33X18 .004 DIA. TAPPED AT 45, 49, 81 & 91 TURNS.



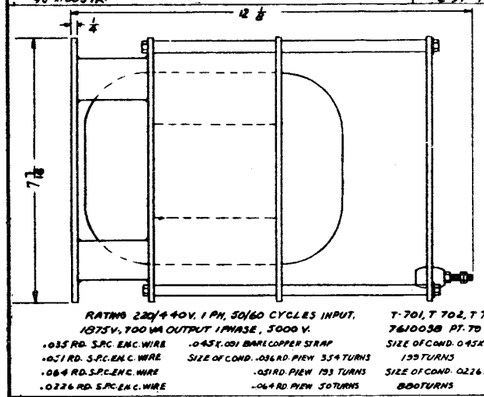
L26 7605519 G-1

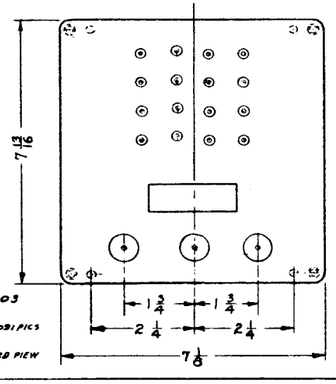
133 TURNS LITZ 3X5X20 OF .004 DIA.



L27 7606670 G-1

STATOR 27¼ TURNS, LITZ 2X5X20 OF .004 DIA.
ROTOR 25½ TURNS, LITZ 3X5X20 OF .004 DIA.

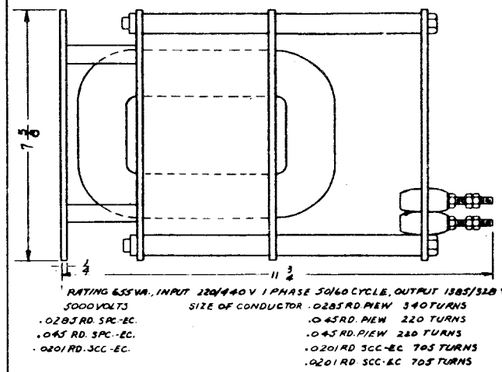




RATING 220/440 V. 1 PH, 50/60 CYCLES INPUT, 1975 V., 700 VA OUTPUT 1 PHASE, 5000 V.

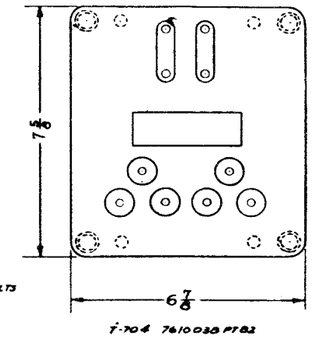
.035 RD. S.P.C. ENC. WIRE	.045 X .001 BARE COPPER STRAP	
.051 RD. S.P.C. ENC. WIRE	SIZE OF COND. .036 RD. P/EW	334 TURNS
.064 RD. S.P.C. ENC. WIRE	.051 RD. P/EW	193 TURNS
.0226 RD. S.P.C. ENC. WIRE	.064 RD. P/EW	30 TURNS

T-701, T 702, T 703
7610038 PT-70
SIZE OF COND. 045 X 091 PICS 199 TURNS
SIZE OF COND. 0226 RD P/EW 880 TURNS

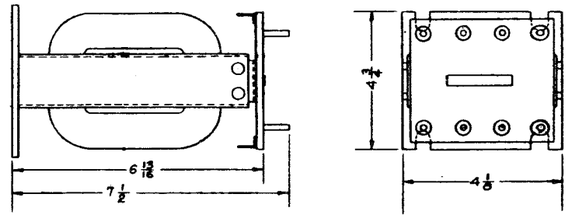


RATING 655 VA., INPUT 220/440 V 1 PHASE 50/60 CYCLE, OUTPUT 1385/328 VOLTS 5000 VOLTS

SIZE OF CONDUCTOR	
.0285 RD. S.P.C.-E.C.	.0285 RD. P/EW 340 TURNS
.045 RD. S.P.C.-E.C.	.045 RD. P/EW 220 TURNS
.0201 RD. 3 C.C.-E.C.	.0201 RD. 3 C.C.-E.C. 705 TURNS
	.0201 RD. S.C.C.-E.C. 705 TURNS

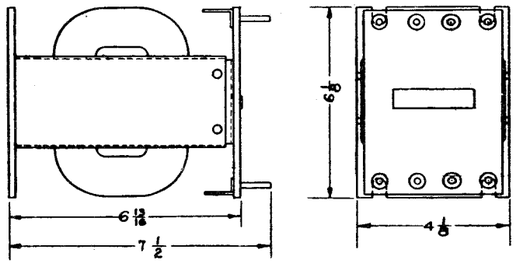


T-704 7610038 PT-82



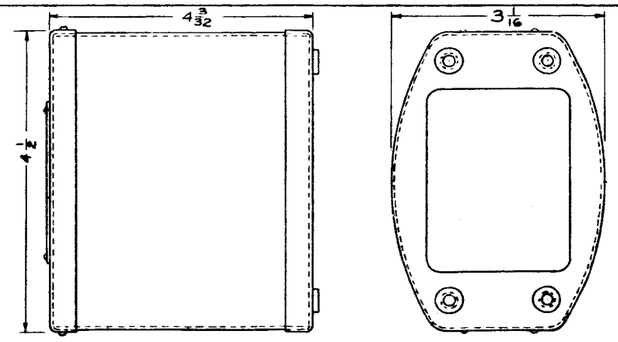
SIZE OF COND. .032 RD ENAM. 242 TURNS
.0254 RD. ENAM 460 TURNS

T-705 7610038 PT-83
220/440 TO 110/220 VOLTS, 1 PHASE 50/60 CYCLE, 250 VA, REGULATION 1% AT 100% P.F. SERIES PARALLEL BOTH PRIMARY AND SECONDARY. 2500V



T-706 7610038 PT-84
220/440 TO 110/220 VOLTS, 1 PHASE 50/60 CYCLE, 425 VA.
REGULATIONS 1% AT 100% P.F. SERIES PARALLEL BOTH PRIMARY AND SECONDARY. 2500V.

.045 RND. ENAM WIRE
.032 RND. ENAM. WIRE
SIZE OF COND. .045 RD ENAM. 144 TURNS
.032 RD. ENAM. 276 TURNS



T-707 7610038 PT-85
220 VOLTS, TO 10.5 VOLTS TAPPED AT 9.6, 8.8, 8.0, 7.3, 6.7 AND 6.2 VOLTS, 1 PHASE, 50/60 CYCLE, 34 VA. AT 10.5 VOLTS TAR 1500 V

COPPER WIRE .0113 ENAM PRIM. 1330 TURNS
COPPER WIRE .0508 S.C.C.E. SECON. 72 TURNS

Figure 10-72—Outline and Winding Data for Inductors, Reactors and Transformers (Dwg. 7611336)

CONTINUED ON LOWER LEFT HAND SIDE

A1-SUB COL. WAS NOT ON.
A2-IN DESC. PARAS. 23 TO 26 INCL. WERE NOT ON.
A3-IN TITLE, TBL-5/6/7/12/13 WAS TBL-5/TBL-6.
A4-NO. OF SHEETS 26 WAS 22.
A5-IN DWG. NO. DESC. COL., CONT. ON L.L. HAND SIDE WAS NOT ON.
A6-IN DWG. NO. "P" WAS NOT ON.
S.C. 16875 - C.G.H. - 8-19-44

R.G. Pilkington 7/A 8/17/44 — 1

INDEX OF PLANS FOR RECORD DRAWINGS TBL-5/6/7/12/13 RADIO TELEGRAPH TRANSMITTING EQUIPMENT

SCALE _____ DIMENSIONS IN INCHES _____ DATE June 3 1942

WESTINGHOUSE ELECTRIC & MFG. CO. BALTIMORE MARYLAND U. S. A.

S. O. _____ D. _____
DRAWN BY J. J. Cook 6/2/42
CHECKED BY J. J. Cook 6/2/42
DESIGN APPROVED _____
INS. APPROVED _____
MECH. ENGINEER _____

APPROVED

APPROVAL LETTER

CONTRACTOR'S FILE NUMBER	BUREAU OF ENGINEERING FILE NUMBER		
	INDEX	GROUP	FILE NUMBER
P-7708967	CAY	T	147

SUB-1

I. L. 43-350-F

Westinghouse

——35 LINE——
MINIATURE PANEL INSTRUMENTS
THREE AND ONE-HALF-INCH CLASSIFICATION
INSTRUCTIONS

Cases—The first letter in type designates the form of case used.

N = Round flush moulded case, 3½" diameter flange mounting.

R = Rectangular Flush Moulded Case, 3" x 3⅛" flange mounting.

S = Round Projection moulded case, 3½" diameter case mounting.

U = Rectangular projection moulded case, 3" x 3⅛" case mounting.

V = Round Flush Moulded Case, 3⅜" diameter flange mounting.

Mechanisms

The second letter in type designates the principle of operation

A—Repulsion Moving Iron.

X—Permanent Magnetic Moving Coil

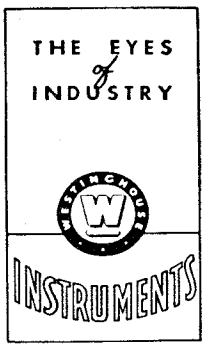
C—Rectifier plus X

T—Thermocouple plus X

Insulation—All Type "35" moulded case instruments are insulated for 750 volt service between terminals and panel, unless otherwise specified.

Dial Notes—Reference to type, style number, use of external components if required, calibration data, etc., are marked on the dial.

Magnetic Panels—Types X-35, A-35, T-35, and C-35 are calibrated for use with non-magnetic panels unless otherwise specified. A-35 instruments read high about 1% when mounted on $\frac{1}{16}$ to $\frac{1}{8}$ inch magnetic panels unless calibrated for such panels. Types X-35, T-35, and C-35 may read low from ½ to 6% if mounted in a panel of magnetic material, unless calibrated for that particular panel.



External Fields—This being an unshielded instrument, the following precautions should be taken to prevent influence greater than ½ of 1% due to external fields.

1. A-35 instruments above 15 amperes should have their leads brought directly down at least 6 inches before turning. Other leads carrying currents of the order of 50 amperes should be spaced at least 6 inches from all A-35 instruments.
2. All instruments should be mounted at least 4 inches between centers. Instruments with very high sensitivity have very strong permanent magnets and should be spaced at least 8 inches from other instruments.

Grounding—When voltmeters are used with an external resistor on voltages higher than the insulation rating, one terminal should be kept at ground potential.

Ammeters with external shunts must use specified leads. If the circuit voltage exceeds the insulation rating, the ammeter or shunt should be connected in the grounded side of the circuit.

Radio frequency ammeters, particularly those with separate thermocouples, should be arranged with suitable filters or grounding connections to minimize capacity currents.

Repairs and Renewal Parts—Repair work can be done most satisfactorily at the factory. When returning an instrument for repairs, obtain a return material tag from your nearest Westinghouse Sales Office to assure proper identification at the factory.

Orders for renewal parts should include the name of the part, the style number of the instrument and other data marked on the dial.

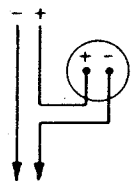


FIG. 1

X-35 Ammeter or Milliammeter, Self-Contained.

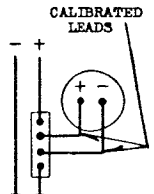


FIG. 2

X-35 Ammeter with External Shunt.

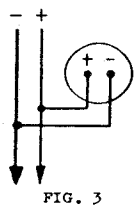


FIG. 3

X-35 Voltmeter Self-Contained; for C-33 Rectifier Voltmeter Omit Polarity Signs.

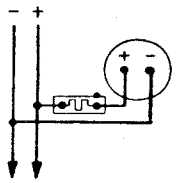


FIG. 4

X-35 Voltmeter with External Resistor.

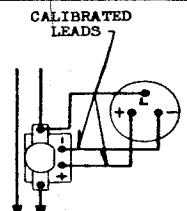


FIG. 5

T-35 Ammeter with External Thermo-Couple "L" Terminal Is Connected to Chassis.

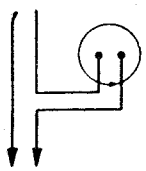


FIG. 6

T-35 Ammeter or C-35 Milliammeter, Self-Contained.

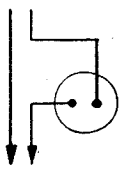


FIG. 7

A-35 Self-Contained Ammeter or Milliammeter.

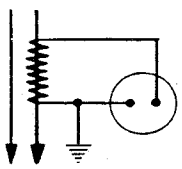


FIG. 8

A-35 Ammeter with Current Transformer.

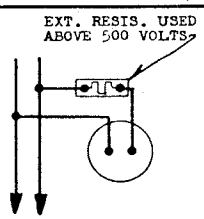


FIG. 9

A-35 Voltmeter

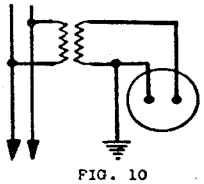
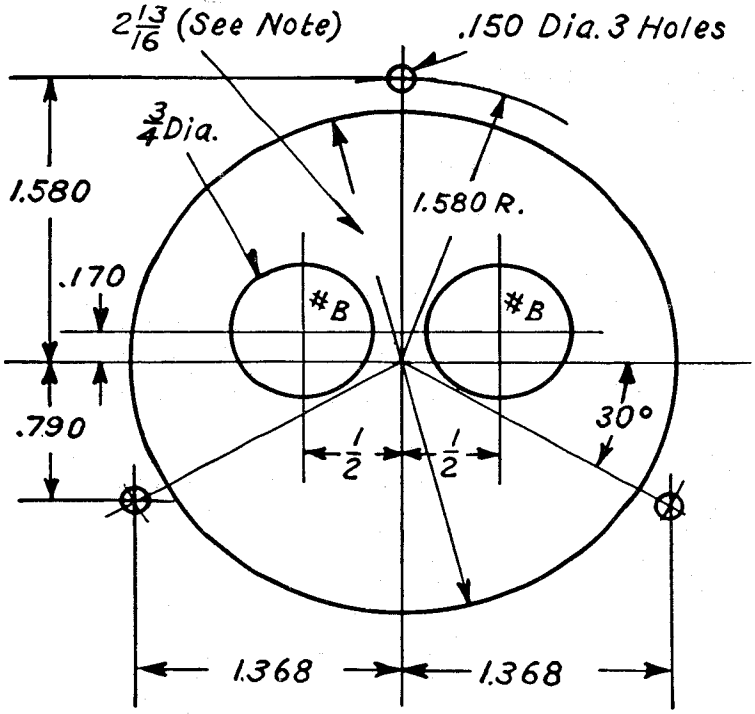


FIG. 10

A-35 Voltmeter with Potential Transformer.

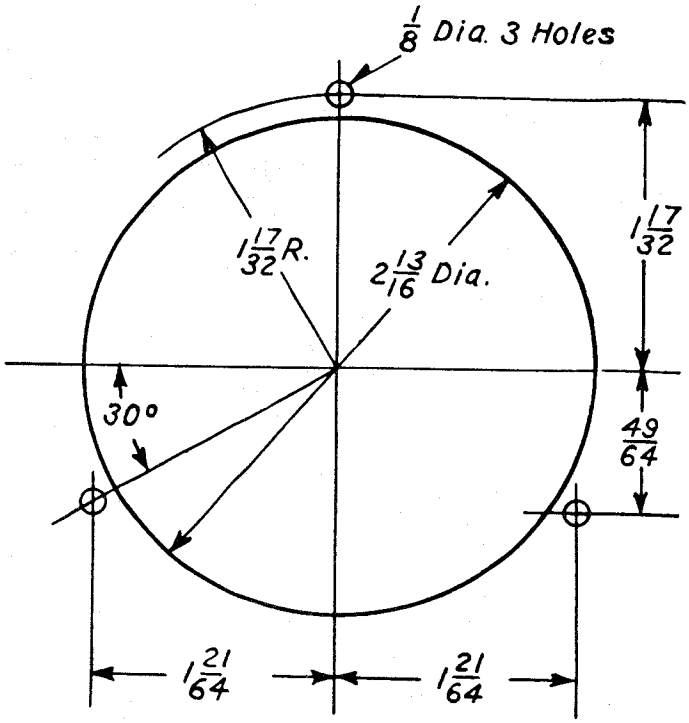
Note: All connections of instruments proper are rear view with dial upright.



Drilling Plan

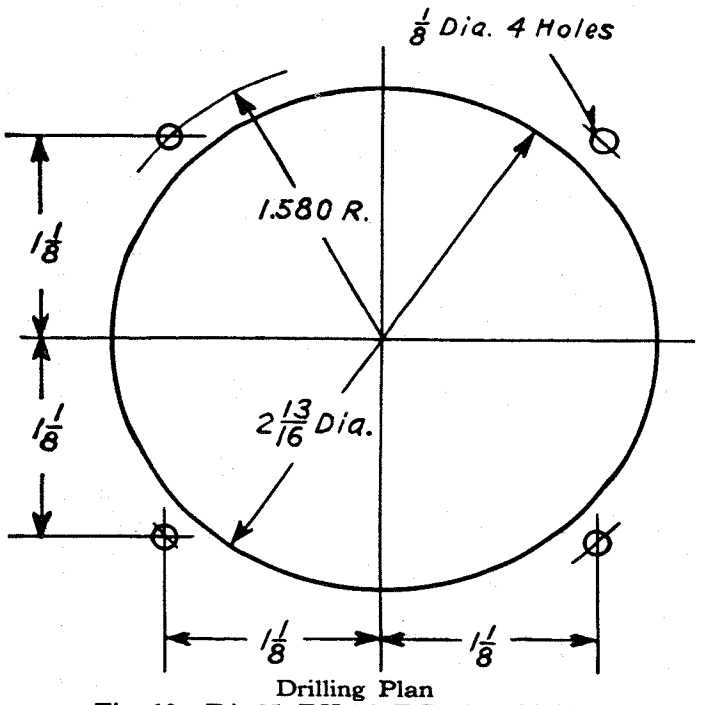
Fig. 11—NA-35, SA-35, NX-35, SX-35 NC-35, SC-35, NT-35 and ST-35

Note: The small holes #B may be used instead of the large hole for insulated panel mounting of all S-35 instruments.



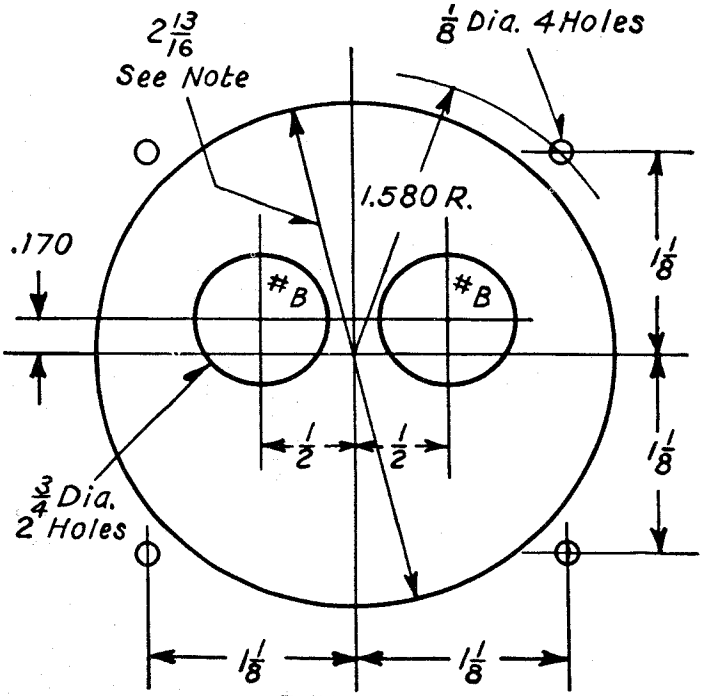
Drilling Plan

Fig. 12—VA-35, VX-35, VC-35 and VT-35



Drilling Plan

Fig. 13—RA-35, RX-35, RC-35 and RT-35



Drilling Plan

Fig 14—UA-35, UX-35, UC-35 and UT-35

Note: The small holes #B may be used instead of the large hole for insulated panel mounting.

Westinghouse Press
Printed in U.S.A. (Rev. 4-45)

Westinghouse

Instruments

INSTRUCTIONS

Type H-35—Total Hour Meter

Cases

The first letter in type designation on dial refers to case, thus type "NH-35" includes "N-35" case, "RH-35" includes "R-35" case, etc. Drilling plans for the various cases are given on the back of this sheet.

Dial Notes

Voltage and frequency ratings are given on dial. External resistor is specified when necessary.

Insulation

Types "H-35" are insulated for 750 volts between terminals and panel.

Grounding

When instruments are used with an external resistor on voltages higher than the insulation rating, one terminal should be kept at ground potential.

Lubrication

Bearings and motor may be oiled once a year though two years operation can generally be obtained without attention. The gears and their bearings may be oiled with Stanolind #200 oil which is bottled for your convenience by the Westinghouse Elec. & Mfg. Company as style 821308. The motor oil is contained in a wool washer in base of motor. Remove entire mechanism from the base and then unscrew the bearing cap thus disclosed. The proper oil for this application is put up in eight ounce bottles under style 930615. A special oil is also available, on special order, for use where ambient temperatures below 100 F. are common.

Repair and Renewal Parts

Orders for renewal parts should include the name of the part wanted, style number of the instrument, and a description of the scale, including voltage and frequency rating.

If an instrument is to be returned to the factory for repairs, obtain a return material tag from the dealer or Westinghouse Sales Office, so that the apparatus will be properly identified at the factory.

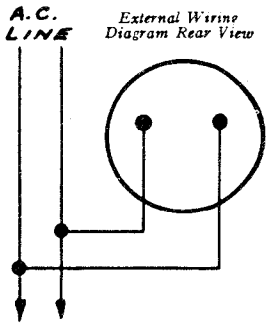


Fig. 1—Total Hour Meter Without External Resistor.

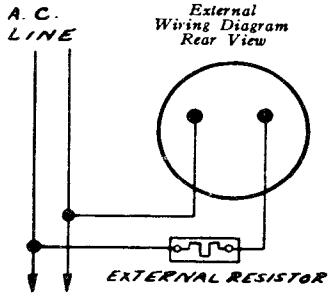


Fig. 2—Total Hour Meter With External Resistor.

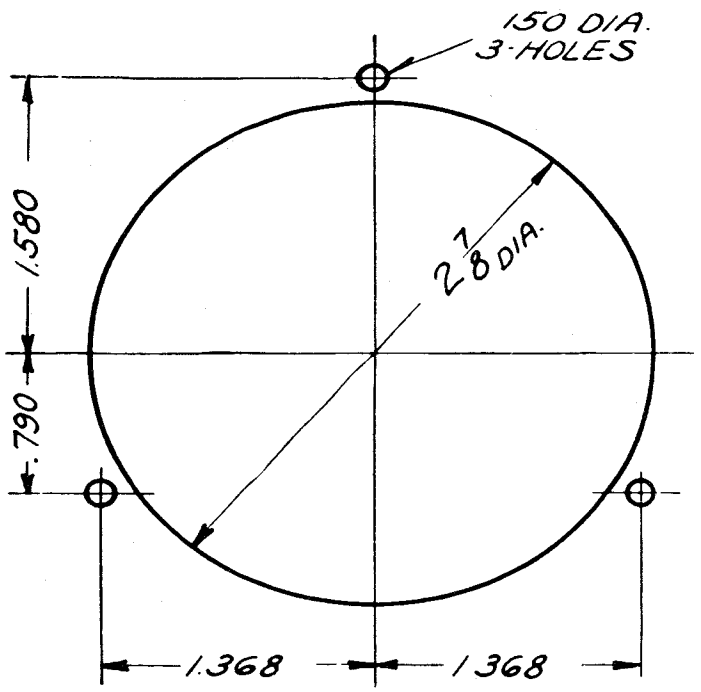


Fig. 3—Drilling Plan, N-35 Case

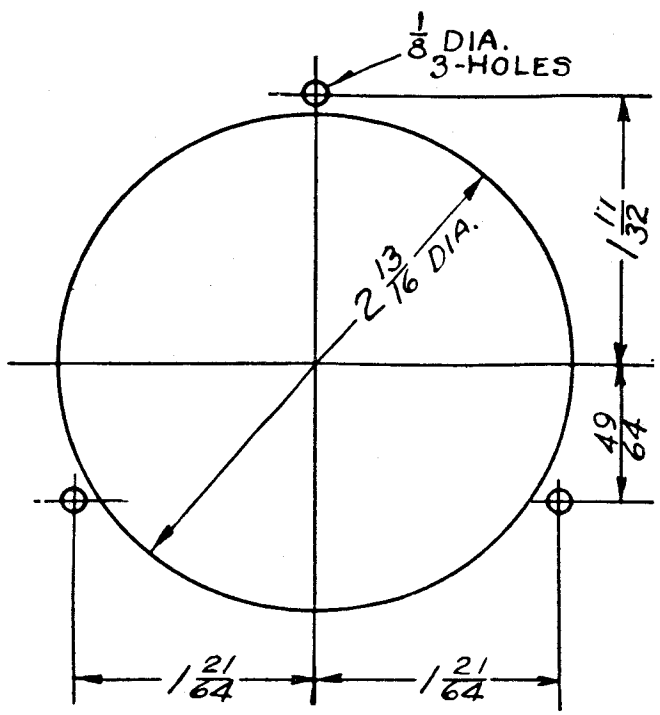


Fig. 4—Drilling Plan, V-35 Case

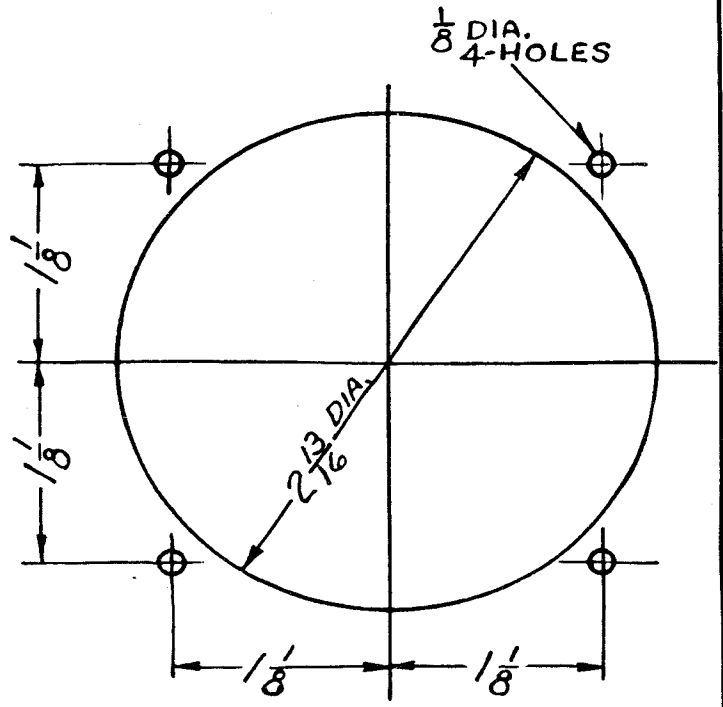
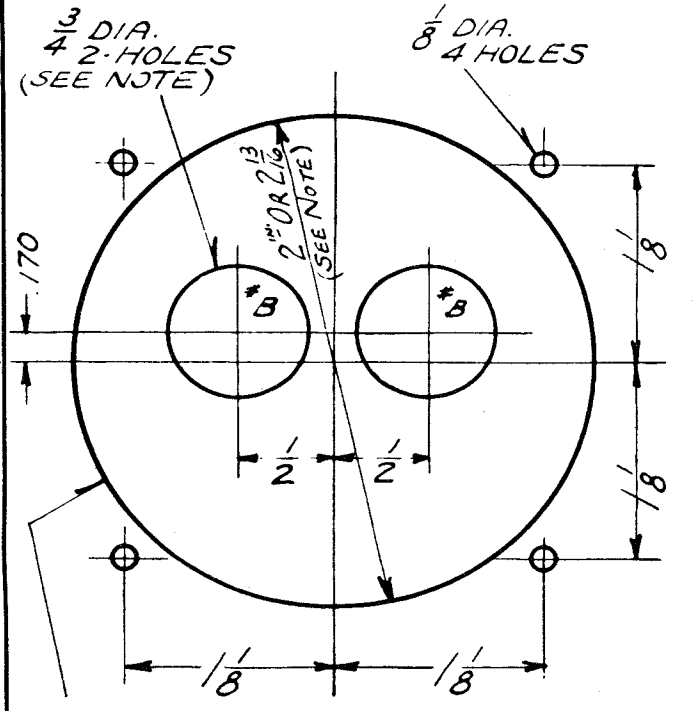


Fig. 5—Drilling Plan, R-35 Case



Note:—
For Insulating Panels Holes # B may be used.
Use 2 in. Dia. Hole up to 150 Volts.
Use 2 13/16 in. Dia. Hole Above 150 Volts.

Fig. 6—Drilling Plan, U-35 Case

Westinghouse

Type MN-D.C. Overcurrent Relay

INSTRUCTIONS

CAUTION

Before putting relays into service, remove all blocking which may have been inserted for the purpose of securing the parts during shipment, make sure that all moving parts operate freely, inspect the contacts to see that they are clean and close properly, and operate the relay to check the settings and electrical connections.

APPLICATION

The type MN relay is intended for d-c applications requiring substantially instantaneous overcurrent protection, where the relay must maintain its accuracy through conditions of severe shock and sustained vibration. It is available only with circuit opening contacts, which normally latch in the operated position and must be reset either manually or electrically.

In certain applications of the MN relay, the characteristics of the associated equipment may require a slight delay in the operation of the relay after it is energized. For such applications, the operation of the relay is retarded by winding the operating coil upon a copper spool. However, this restricts the winding space and reduces the continuous current capacity of the coil.

CONSTRUCTION

The type MN relay consists of a clapper type electromagnet mounted on a base moulded from insulating material and provided with a glass cover. The armature of the electromagnet is balanced about its bearings and when energized is held against a stop by a strong spring. This armature restraining spring is attached to a clamp which slides in a slot in the armature. A pointer on the clamp indicates on a calibrated scale the position of the spring for the desired operating current.

The armature bearing pins are pressed into the side edges of the armature, and are made of a hardened and polished stainless steel. The bearing pins are carried in bronze bearing screws mounted in the frame casting, and a stainless steel ball pressed into each bearing screw takes any end thrust which may exist.

When the armature is closed against the core of its operating coil, a piece of insulating material riveted to its upper end engages a flat spring in which the moving contact is riveted and moves this contact away from the stationary contact. At the same time a latch arm drops below the upper edge of the armature and prevents it from returning to its normal position when the coil is de-energized. The latch arm also is balanced to minimize the effect of vibration.

The latch may be released by pressing the reset button at the outer end of the stud by which the glass cover is held in place. When electrical as well as manual reset is desired, a coil and core are mounted on the frame directly below the rear extension of the latch arm and above the main coil. An armature riveted to the arm is attracted when the reset coil is energized. This raises the front end of the latch arm and disengages it from the main armature.

All metal parts of the relay either are resistant to the corrosive effects of salt sea or tropical atmospheres or are protected against such atmospheres by suitable finishes.

CHARACTERISTICS

Because of the balanced armature and the characteristics of the restraining spring, the operating current of the relay when subjected to vibration up to $\frac{1}{32}$ inch amplitude ($\frac{1}{16}$ inch total travel) at frequencies up to 40 cycles per second is only about 15% less than the operating current under static conditions. For lower amplitudes and frequency of vibration, the reduction in operating current is correspondingly less. Also, at the higher operating current settings the relay is less affected by vibration than at the lower settings.

Operating coils are available for currents ranging from .04 to 4.0 amperes. The spread from maximum to minimum operating current for any range is 4 to 1. Standard reset coil ratings are 115 volts d-c., 230 volts d-c. and 115 volts 60 cycles.

The operating time of the MN relay with the instantaneous coil varies from about .017 second at 125% of the current setting to .007 second at 300% of setting. The "delayed-action" coil gives an operating time of about .08 second at 125% and .024 second at 300% of setting.

Coil and Contact Ratings

The operating coils which are wound on copper spools can be energized continuously at two and one half times their minimum rated operating values. The other coils can be energized continuously at three times the minimum rated values. Since the normal current will always be somewhat less than the relay setting and since its application may not require that the relay be energized continuously, the full scale range is usable in practically any application. The reset coil is designed for intermittent service only, and will overheat if energized longer than a few minutes. Reset coils are available for operation on either a-c. or d-c.

The contacts will carry 5 amperes continuously and will interrupt this current at 115 or 230 volts a-c. They will interrupt 1.5 amperes at 125 volts d-c.

SETTINGS

The operating current of the relay under static conditions is indicated on a calibrated scale adjacent to the slot in the armature. The setting is made by varying the position of the restraining spring clamp in the slot for the desired operating current.

INSTALLATION

The relay should be mounted on a suitable panel of either steel or insulating material. Although the relay is designed for service where severe vibration is unavoidable it is desirable that the location be as free from dirt, moisture or excessive heat as possible. Mount the relay by means of the two mounting studs provided. While the usual mounting position is with the base vertical and the contacts at the top, the operation of the relay is not affected appreciably if it is mounted in any other position. The electrical connections may be made

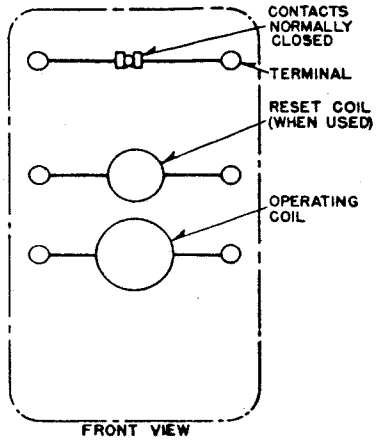


FIG. 1—INTERNAL WIRING DIAGRAM OF THE TYPE MN RELAY

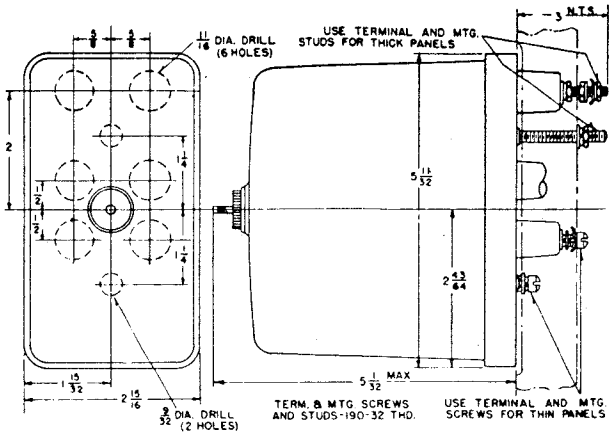


FIG. 2—OUTLINE AND DRILLING PLAN FOR THE TYPE MN RELAY

direct to the terminals by means of screws for steel mounting or to terminal studs furnished with the relay for ebony-asbestos or slate panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the studs and then turning the proper nut with a wrench.

ADJUSTMENTS AND MAINTENANCE

The proper adjustments to insure correct operation of the relay have been made at the factory and should not be disturbed after receipt by the customer. If the adjustments have been changed, the relay taken apart for repair or if it is desired to check the adjustments at regular maintenance periods, the adjustments should be made or checked in the following order since some of them affect others.

The bearing screws should be adjusted so that the armature is approximately centered in the frame, and the latch arm has sufficient clearance to both sides of the notch through which it passes. The end play in the bearings should be perceptible but not more than a few thousandths of an inch.

The L-shaped bracket which supports the latch arm should be located so that there is a gap of approximately 1/64 inch between the ends of the latch armature and the frame casting when the main armature is latched closed.

On the relay with the electrical reset coil, adjust the bushing which passes through the front of the cover so that with the push rod held in and the main armature closed, there is a gap of about .005 inch between the reset armature and the bronze pin in the center of the reset coil core. On relays without the electrical reset coil, adjust the bushing to obtain a gap of 1/64 inch to 1/32 inch between the latch plate and the armature when the reset rod is held in and the main armature is closed. The armature stop screw, located directly below the nameplate, should be screwed in until the armature just touches the bronze pin in the center of the core. Then it should be backed out exactly three turns and the lock nut should be tightened securely.

The adjustable latch plate which is on the outer end of the latch arm should be located so that there is a gap of .005 to .010 inch between the main armature and the core pin when the operating coil is de-energized but the armature is latched.

With the main armature restraining spring horizontal and the armature open, the spring should be extended by one or two turns of the screw into which the spring is hooked.

The stationary contact stud should be adjusted to obtain a contact gap of 5/64 to 3/32 inch when the armature is latched closed. With the contacts closed, the screw which adjusts the contact pressure should be turned in until the back-up spring just touches the back of the contact and then it should be turned in 1½ turns further.

If the relay has been dismantled and reassembled, discrepancies may be found between the scale markings and the actual operating values since the original adjustments may not have been duplicated exactly. However, by further variation of the initial tension of the armature restraining spring it should be possible to obtain a scale substantially the same as the original one.

The contacts should be cleaned periodically with a fine file. S# 1002110 file is recommended for this purpose. The use of abrasive material for cleaning contacts is not recommended, because of the danger of embedding small particles in the face of the soft silver and thus impairing the contacts.

RENEWAL PARTS

Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to the customers who are equipped for doing repair work. When ordering parts, always give the complete nameplate data.

ENERGY REQUIREMENTS

The energy taken by any of the operating coils which are wound on a copper spool is approximately .9 watt at the minimum rated current. The energy taken by the other operating coils is approximately .65 watt at the minimum rated current. Reset coils require considerable energy, (approximately 30 watts at rated d-c. voltage) to assure positive resetting when the relay is set at the maximum operating value, and should not be energized longer than 1½ to 2 minutes.