

NOTICE

THE CONTENTS AND INFORMATION CONTAINED IN THIS INSTRUCTION MANUAL IS PROPRIETARY TO THE TECHNICAL MATERIEL CORPORATION TO BE USED AS A GUIDE TO THE OPERATION AND MAINTENANCE OF THE EQUIPMENT FOR WHICH THE MANUAL IS ISSUED AND MAY NOT BE DUPLICATED EITHER IN WHOLE OR IN PART BY ANY MEANS WHATSOEVER WITHOUT THE WRITTEN CONSENT OF THE TECHNICAL MATERIEL CORPORATION.



THE TECHNICAL MATERIEL CORPORATION

COMMUNICATIONS ENGINEERS

700 FENIMORE ROAD

MAMARONECK, N. Y.

Warranty

The Technical Materiel Corporation, hereinafter referred to as TMC, warrants the equipment (except electron tubes,* fuses, lamps, batteries and articles made of glass or other fragile or other expendable materials) purchased hereunder to be free from defect in materials and workmanship under normal use and service, when used for the purposes for which the same is designed, for a period of one year from the date of delivery F.O.B. factory. TMC further warrants that the equipment will perform in a manner equal to or better than published technical specifications as amended by any additions or corrections thereto accompanying the formal equipment offer.

TMC will replace or repair any such defective items, F.O.B. factory, which may fail within the stated warranty period, PROVIDED:

1. That any claim of defect under this warranty is made within sixty (60) days after discovery thereof and that inspection by TMC, if required, indicates the validity of such claim to TMC's satisfaction.
2. That the defect is not the result of damage incurred in shipment from or to the factory.
3. That the equipment has not been altered in any way either as to design or use whether by replacement parts not supplied or approved by TMC, or otherwise.
4. That any equipment or accessories furnished but not manufactured by TMC, or not of TMC design shall be subject only to such adjustments as TMC may obtain from the supplier thereof.

Electron tubes* furnished by TMC, but manufactured by others, bear only the warranty given by such other manufacturers. Electron tube warranty claims should be made directly to the manufacturer of such tubes.

TMC's obligation under this warranty is limited to the repair or replacement of defective parts with the exceptions noted above.

At TMC's option any defective part or equipment which fails within the warranty period shall be returned to TMC's factory for inspection, properly packed with shipping charges prepaid. No parts or equipment shall be returned to TMC, unless a return authorization is issued by TMC.

No warranties, express or implied, other than those specifically set forth herein shall be applicable to any equipment manufactured or furnished by TMC and the foregoing warranty shall constitute the Buyers sole right and remedy. In no event does TMC assume any liability for consequential damages, or for loss, damage or expense directly or indirectly arising from the use of TMC Products, or any inability to use them either separately or in combination with other equipment or materials or from any other cause.

*Electron tubes also include semi-conductor devices.

PROCEDURE FOR RETURN OF MATERIAL OR EQUIPMENT

Should it be necessary to return equipment or material for repair or replacement, whether within warranty or otherwise, a return authorization must be obtained from TMC prior to shipment. The request for return authorization should include the following information:

1. Model Number of Equipment.
2. Serial Number of Equipment.
3. TMC Part Number.
4. Nature of defect or cause of failure.
5. The contract or purchase order under which equipment was delivered.

PROCEDURE FOR ORDERING REPLACEMENT PARTS

When ordering replacement parts, the following information must be included in the order as applicable:

1. Quantity Required.
2. TMC Part Number.
3. Equipment in which used by TMC or Military Model Number.
4. Brief Description of the Item.
5. The *Crystal Frequency* if the order includes crystals.

PROCEDURE IN THE EVENT OF DAMAGE INCURRED IN SHIPMENT

TMC's Warranty specifically excludes damage incurred in shipment to or from the factory. In the event equipment is received in damaged condition, the carrier should be notified immediately. Claims for such damage should be filed with the carrier involved and not with TMC.

All correspondence pertaining to Warranty Claims, return, repair, or replacement and all material or equipment returned for repair or replacement, within Warranty or otherwise, should be addressed as follows:

THE TECHNICAL MATERIEL CORPORATION
Engineering Services Department
700 Fenimore Road
Mamaroneck, New York

CHANGE NO. 1



INSTRUCTION BOOK CHANGE NOTICE

Date 9/23/66

Manual affected: Transmitter Converter Model TTRT IN - 2030A
(Issue Date: 7 July 1965)

Page 1-2, Table 1-2.

Under COMMON column in Table 1-2 change statements for the F1 crystals to read as follows:

*F1 crystal
(for use with oven)

*F1 crystal
(for use without oven)

SHOULD ADDITIONAL COPIES OF THIS CHANGE NOTICE BE REQUIRED, PLEASE CONTACT:

THE TECHNICAL MATERIEL CORP., 700 Fenimore Road, Mamaroneck, New York

Attn.: Director of Eng. Services.

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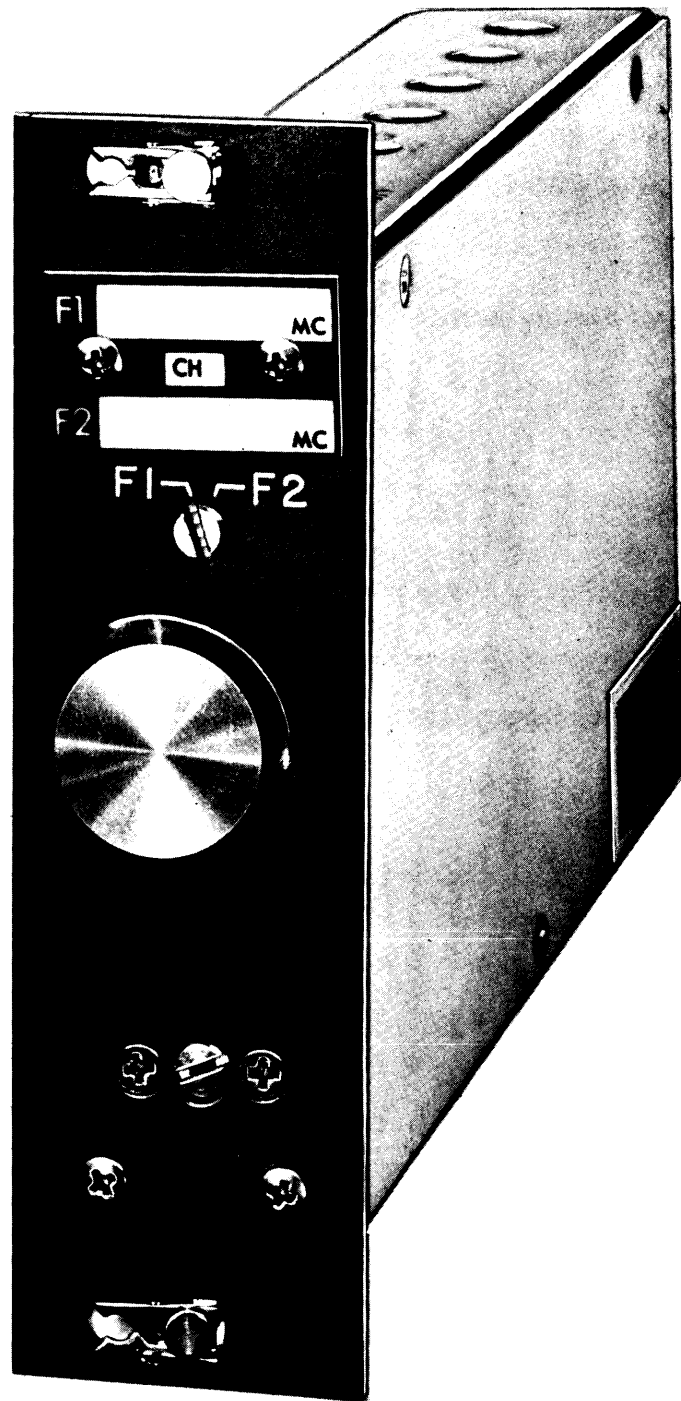
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2030A-1

Figure 1-1. Transmitter Converter, Model TTRT

SECTION 1 GENERAL INFORMATION

1-1. FUNCTIONAL DESCRIPTION.

Transmitter Converter, Model TTRT (figure 1-1), is a completely transistorized, plug-in, r-f module that is used with several types of TMC exciters. The TTRT accepts a 1.75 mc i-f signal (modulated or unmodulated) from the exciter, and provides the final stage of frequency translation and r-f amplification. Four Modules (Model TTRT-1, TTRT-2, TTRT-3, and TTRT-4) cover the frequency range from 2- to 32- megacycles (refer to paragraph 1-3).

The TTRT contains a balanced mixer, a crystal-controlled oscillator, and three linear r-f amplifiers. Two crystals may be provided for the local oscillator; a crystal selector switch permits transmission on one of two frequencies (F1 or F2) that fall within the r-f amplifier bandpass. The balanced mixer, and sharp selectivity of the r-f amplifiers minimize local oscillator radiation and undesirable heterodyne product output. Frequency stability for the local oscillator is 1 part in 10^5 per day; crystal ovens are available on special order to provide even greater stability (refer to paragraph 1-4).

1-2. PHYSICAL DESCRIPTION.

a. EXTERNAL. - The front panel of the TTRT is provided with a knob to facilitate handling of the unit

when inserting or removing it from the associated exciter. Two screwdriver controls (F1/F2) frequency selector switch and fine frequency trimmer are located on the front panel; a plate above the F1/F2 switch identifies the transmission frequencies associated with the two crystals in the TTRT.

The plug-in interchangeability feature of the TTRT is provided by an etched connector at the rear of the unit; two slide-latches on the front panel hold the TTRT in place after it has been plugged into the associated exciter. Covers on both sides of the TTRT provide electrostatic shielding and protect the components when the unit is removed from the exciter. Each TTRT is 1-1/2 inches wide, 5-3/8 inches high, 8 inches deep, and weighs 1-1/2 pounds.

b. INTERNAL. - Most of the smaller components in the TTRT are located on a printed circuit board mounted to the chassis; the remaining components are chassis mounted. Table 1-1 lists the semiconductor complement of the TTRT. Removable metal shields are provided to minimize interaction between stages.

1-3. EQUIPMENT SUPPLIED.

Table 1-2 lists items optionally supplied with the TTRT.

TABLE 1-1. SEMICONDUCTOR COMPLEMENT

REFERENCE DESIGNATION				TYPE	FUNCTION
TTRT-1	TTRT-2	TTRT-3	TTRT-4		
Q501	Q601	Q701	Q801	2N2084	Oscillator
Q502	Q602	Q702	----	2N2084	Buffer
----	----	----	Q802	2N2084	Doubler
Q503	Q603	Q703	Q803	2N2084	Balanced Mixer
Q504	Q604	Q704	Q804	2N2084	
Q505	Q605	----	----	2N2084	Amplifier
----	----	Q705	Q805	2N2495	Amplifier
Q506	Q606	----	----	2N2084	Driver
----	----	Q706	Q806	2N2495	Driver
Q507	Q607	Q707	Q807	2N2219	Power Amplifier

TABLE 1-2. OPTIONAL ITEMS AVAILABLE
(These items supplied in accordance with individual order.)

FORMAL	COMMON	TMC P/N	SYMBOL
Crystal Oven, TCO-1	12 vdc crystal oven	OC100-1	
Crystal Oven, TCO-2	24 vdc crystal oven	OC100-2	Z501 Z601
Crystal Oven, TCO-3	115 vac crystal oven	OC100-3	Z701 Z801
Crystal Oven, TCO-4	32 vdc crystal oven	OC100-4	
	*F1 crystal (for use without oven)	CR110-1-FREQ.	Y501 Y601
	*F1 crystal (for use with oven)	CR110-3-FREQ.	Y701 Y801
	F2 crystal	Same as F1 crystal	Y502 Y602 Y702 Y802
*Crystal frequency determined in accordance with information provided in Section 5.			

1-4. TECHNICAL SPECIFICATIONS.

Technical specifications for the TTRT are as follows:

Frequency Range:

TTRT-1	2-4 mc
TTRT-2	4-8 mc
TTRT-3	8-16 mc
TTRT-4	16-32 mx

Tuning Systems:

Fixed Tuned.

Frequency Control:

Crystal controlled oscillator with crystal selector switch and provision for two crystals.

Types of Transmission:

Dependent on exciter with which TTRT is used.

Input:

1.75 mc i-f, modulated or unmodulated, from associated exciter.

Output Power:

250 mw.

Output Impedance:

50 ohms, unbalanced.

R-F Bandpass:

Approximately 0.5% of frequency to which module is tuned.

Frequency Stability:

1 part in 10^5 per day is standard.
1 part in 10^6 per day without crystal oven.

Power Requirement:

+12 vdc, -12 vdc, -36 vdc provided by associated exciter.

Dimensions:

Height 5-3/8 inches.
Width 1-1/2 inches.
Depth 8 inches.

Weight:

1-1/2 pounds.

SECTION 2 INSTALLATION

2-1. INITIAL INSPECTION.

Each TTRT is tested at the factory and is carefully packaged to prevent damage during shipment. Upon receipt of the equipment, inspect the packaging case and its contents for damage that might have occurred during transit. Unpack the equipment carefully, and inspect all packaging material for parts that may have been shipped as loose items. With respect to damage to the equipment for which the carrier is liable, The Technical Materiel Corporation will assist in

describing methods of repair and the furnishing of replacement parts.

2-2. INSTALLATION PROCEDURE.

Since the TTRT is a plug-in module and can be installed in the associated exciter by inserting the unit into its receptacle, no specific installation procedures are given in this manual. Installation and initial check-out procedures for the TTRT are, therefore, given in the associated exciter (or transmitter) manual.

SECTION 3 OPERATING PROCEDURES

3-1. GENERAL.

Before attempting to operate the TTRT, the operator should familiarize himself with the controls listed in table 3-1. Refer to figure 1-1 for control locations.

NOTE

The descriptions given in table 3-1 are not operating instructions. Refer to the associated exciter (or transmitter) manual for specific operating instructions.

3-2. WARM-UP PERIOD.

When a crystal oven is used in the TTRT module, a 30-minute warm-up is required to attain proper frequency and stability. When the TTRT is used without a crystal oven, no warmup is required.

3-3. OPERATOR'S MAINTENANCE.

Operator's maintenance is not required on TTRT modules. Detailed maintenance and alignment procedures are given in section 5 of this manual.

TABLE 3-1. OPERATOR'S CONTROLS

CONTROL	DESCRIPTION
F1/F2 Switch (S501, S601, S701, S801)	A two-position, screwdriver-controlled switch that selects appropriate local oscillator crystal for transmission on F1 frequency or F2 frequency.
Fine Frequency Trimmer (C501, C601, C701, C801)	A screwdriver-controlled capacitor for fine tuning the local oscillator.

SECTION 4

PRINCIPLES OF OPERATION

4-1. GENERAL.

With one exception (refer to the NOTE below), the operating principles for each TTRT module (TTRT-1, TTRT-2, TTRT-3, and TTRT-4) are similar, and therefore only TTRT-1 is explained in this section. Refer to the block diagrams, figures 4-1 through 4-4, and the schematic diagrams, figures 7-1 through 7-4.

NOTE

In TTRT-4 a frequency doubler multiplies the local oscillator output; the difference in operation is noted in the text.

4-2. CIRCUIT ANALYSIS.

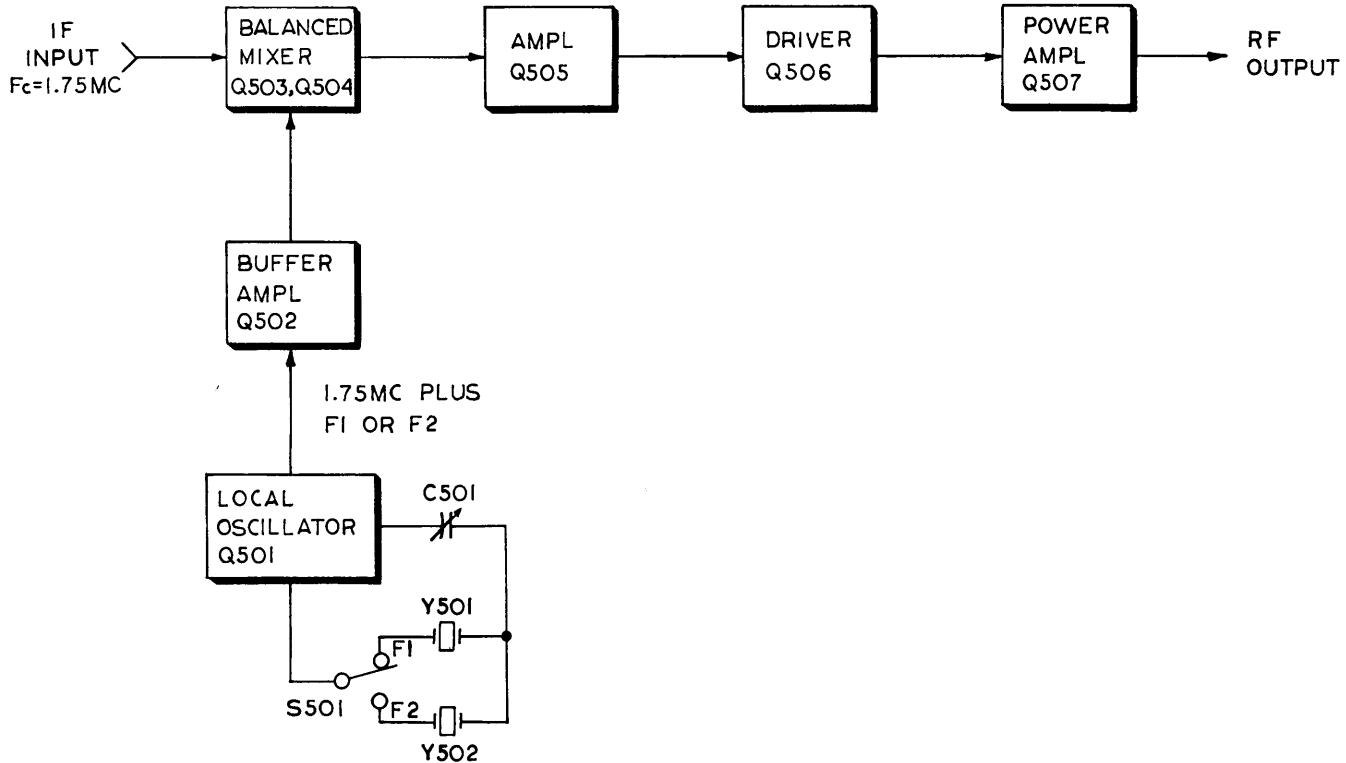
NOTE

The following discussion, written for TTRT-1, will apply equally as well to TTRT-2 through TTRT-4 (refer to figure 4-1 through figure 4-4).

The associated exciter supplies the TTRT with a 1.75 mc i-f signal (modulated or unmodulated). This signal is supplied to balanced mixer Q503/Q504. The mixer is also supplied with the output of local oscillator Q501 through buffer amplifier Q502. Buffer amplifier Q502 ensures maximum stability of the local oscillator.

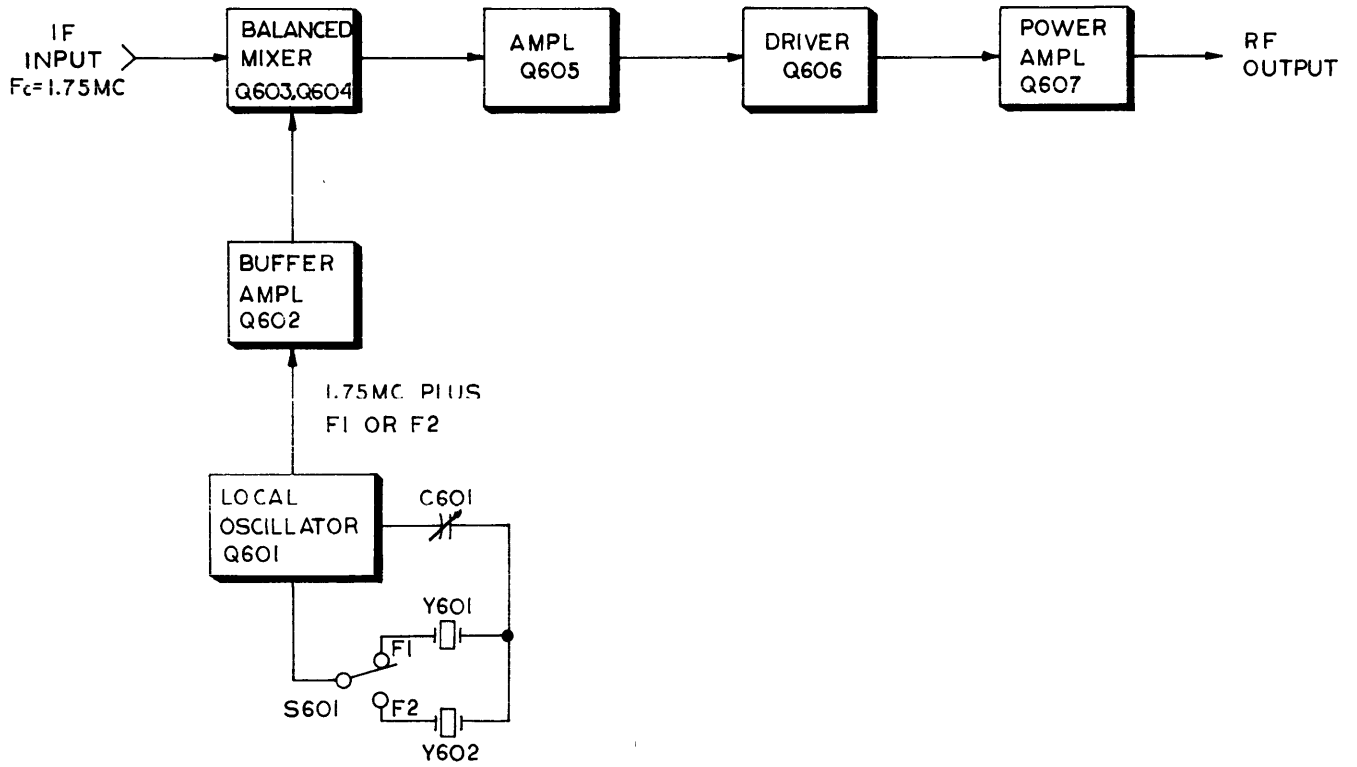
In the TTRT-1, -2, and -3, the local oscillator operates 1.75 mc above the desired output frequency (F1, F2). In the TTRT-4, the local oscillator operates between 8.875 and 16.875 mc. Frequency doubler Q802 multiplies the local oscillator to the required mixer injection frequency (17.75- to 33.75-mc).

The output of the balanced mixer is amplified by two common emitter, tuned collector, class A, r-f amplifiers (Q505 and Q506), and an emitter follower (power amplifier Q507). Each of the amplifiers is fixed-tuned so that only the desired signal is passed; undesirable noise and heterodyne products are eliminated. Resistors R517 and R524 (unbypassed emitter resistors) provide negative feedback for amplifiers Q505 and Q506, respectively. Capacitor C523 provides negative feedback for power amplifier Q507.



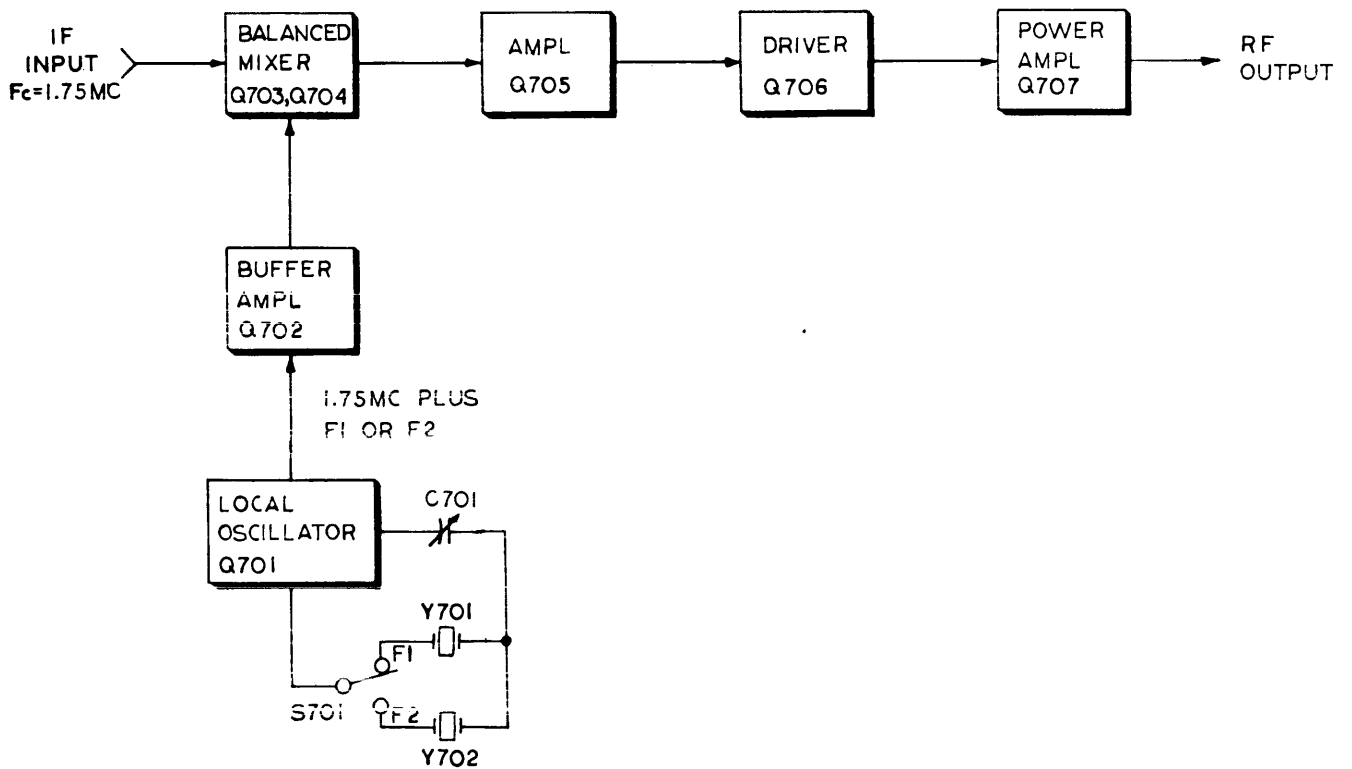
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Figure 4-1. Simplified Block Diagram, TTRT-1



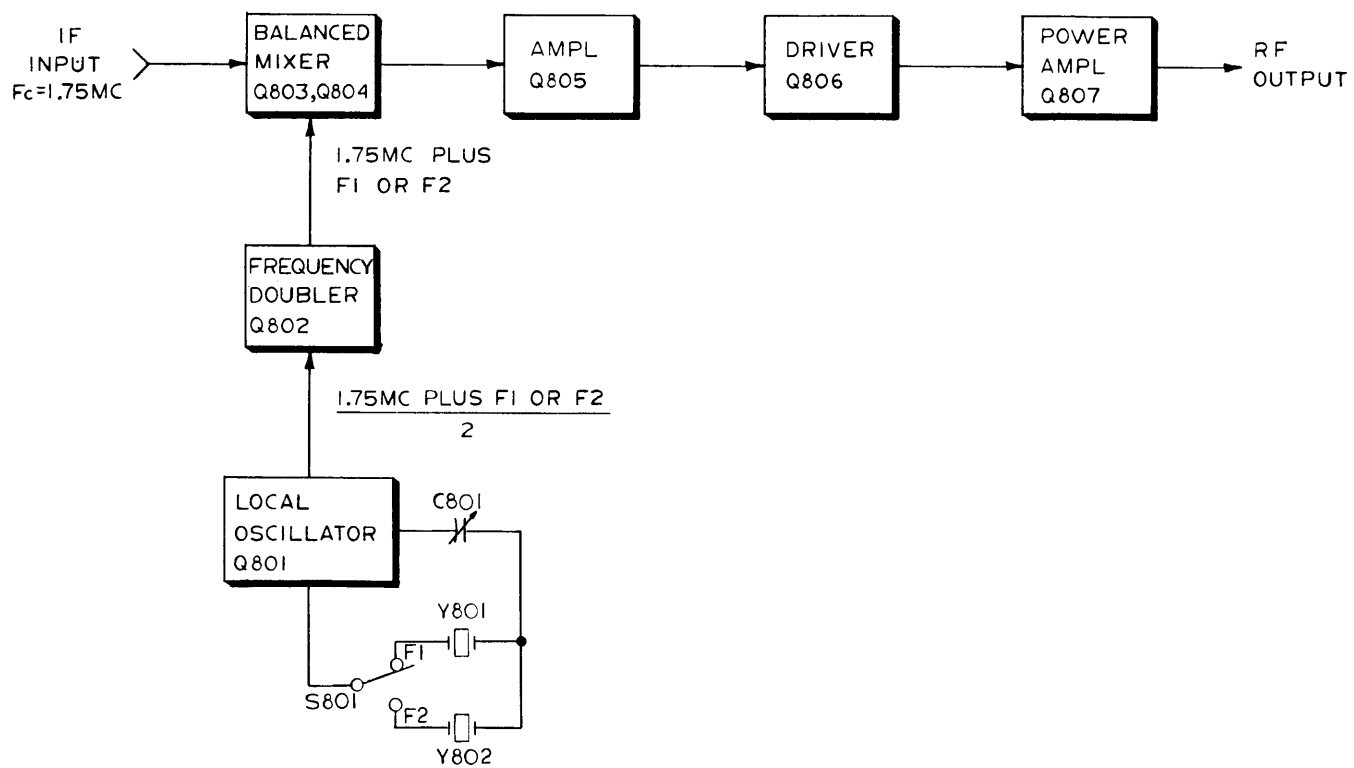
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Figure 4-2. Simplified Block Diagram, TTRT-2



2030A-4

Figure 4-3. Simplified Block Diagram, TTRT-3



2030A-5

Figure 4-4. Simplified Block Diagram, TTRT-4

SECTION 5 MAINTENANCE

5-1. PREVENTIVE MAINTENANCE.

Periodically, remove the TTRT module from its associated exciter and inspect for general cleanliness and condition of etched connector at the rear of the unit. Remove side covers and check for discolored components, damaged wiring, broken or loose solder connections, leaking capacitors, and warped printed circuit board. Clean the components with a soft brush, vacuum cleaner, or dry, filtered, compressed air. Check all hardware for tightness.

5-2. TROUBLESHOOTING.

Test equipment required for troubleshooting is listed in table 5-1. Refer to figure 5-1 for component locations.

TABLE 5-1. TEST EQUIPMENT

ITEM	FUNCTION
47 ohm, 1/2 watt resistor Frequency counter (Hewlett Packard Model 524C, or equiv.)	Used during troubleshooting and alignment procedures.
Oscilloscope (Tektronix Model 545, or equiv.)	
Volt-ohm milliammeter (Simpson Model 260 equiv.)	

- a. Remove TTRT module from the associated exciter.
- b. Remove right-side cover of TTRT.
- c. Re-connect module to exciter; if necessary use service extension module (supplied with exciter) to gain access to alignment controls and interior of TTRT.
- d. Connect a 47 ohm, 1/2 watt dummy load to exciter output. If the exciter output is not accessible, disconnect wire from pin 3 of module receptacle, and connect a 47 ohm 1/2 watt resistor between pin 3 and ground.
- e. Check the following d-c supply voltages at the receptacle:
 - (1) +12 v at pin 1
 - (2) -12 v at pin 8
 - (3) -36 v at pin 7

If these voltages are not present, check power supply circuitry of associated exciter.

f. Check r-f signal level at collector of buffer Q502 with oscilloscope; level should be approximately 0.6 peak-to-peak. If this level is not observed, check local oscillator Q501 and buffer.

g. Adjust exciter to deliver a locked key MCW signal to the TTRT. Check signal level at pin 6 of module receptacle with oscilloscope; level should be approximately 45 mv peak-to-peak. If this level is not observed, check a-f and i-f circuitry of associated exciter.

h. Measure r-f signal at output of module with oscilloscope (across dummy load resistor). Level should be approximately 8 v peak-to-peak. If this level is not observed, check circuitry of mixer stage and r-f amplifiers.

5-3. REPAIR.

Repair of the TTRT module consists of component replacement and resoldering connections. The following precautions should be observed:

a. Use replacement components identical to defective components in exact place on the board.

NOTE

After a component has been repaired or replaced, the TTRT may require alignment (refer to paragraph 5-4).

b. Use long nose pliers or alligator clips when soldering near semiconductor devices in order to transfer heat from the junction and thus prevent damage to the component.

c. Use a soldering iron of 50 watt rating or lower. Use suitable flux remover to clean soldered joints.

CAUTION

Excess heat near the board surface may damage the printed circuit wiring.

5-4. ALIGNMENT.

Test equipment required for alignment is listed in table 5-1. Refer to figure 5-1 for component locations.

After repairing or replacing component in the TTRT, the unit must be checked for alignment. Also, when operating frequency (F1, F2) of the module is to be changed, the alignment procedure

given here is to be followed (refer to paragraph 5-6 to determine local oscillator crystal frequency).

Proceed as follows:

CAUTION

Always remove power from the exciter when removing or inserting TTRT modules.

- a. Remove TTRT module from the associated exciter.
- b. Remove right-side cover of TTRT.
- c. Re-connect module to exciter; if necessary, use service extension module (supplied with exciter) to gain access to alignment controls and interior of TTRT.

NOTE

For TTRT-4 alignment only: Connect oscilloscope to collector of frequency multiplier Q802. Adjust screw F to obtain maximum deflection on oscilloscope. Connect frequency counter to vertical amplifier output of oscilloscope. Check that frequency multiplier output is approximately 1.75 mc above TTRT operating frequency (F1, F2).

- d. Set R513 (R613, R713, or R813) maximum counterclockwise or maximum clockwise. Connect

oscilloscope to stator of adjustment E capacitor; adjust screw E for maximum deflection on oscilloscope. Adjust R513 for minimum deflection on oscilloscope.

- e. Adjust associated exciter to deliver a locked key MCW signal.

CAUTION

When performing steps f, g, and h below, keep r-f drive as low as possible (screw D) consistent with usable oscilloscope deflection. Excess r-f drive may damage the power amplifier transistor.

- f. Adjust screw E to obtain maximum deflection on oscilloscope.

- g. Connect oscilloscope to stator of screw C capacitor. Adjust screw D to obtain a slight deflection on oscilloscope; adjust screws C and E (in that order) to obtain maximum deflection on oscilloscope.

- h. Connect oscilloscope to stator of screw B capacitor; adjust screws B, E, and C to obtain maximum deflection on oscilloscope. Disconnect oscilloscope and replace right-side cover of TTRT.

- i. Connect oscilloscope across dummy load at output of exciter (or across resistor at output of module). Adjust screws A, F, E, C, and B to obtain maximum deflection on oscilloscope. Adjust screw D until signal level across dummy load resistor is

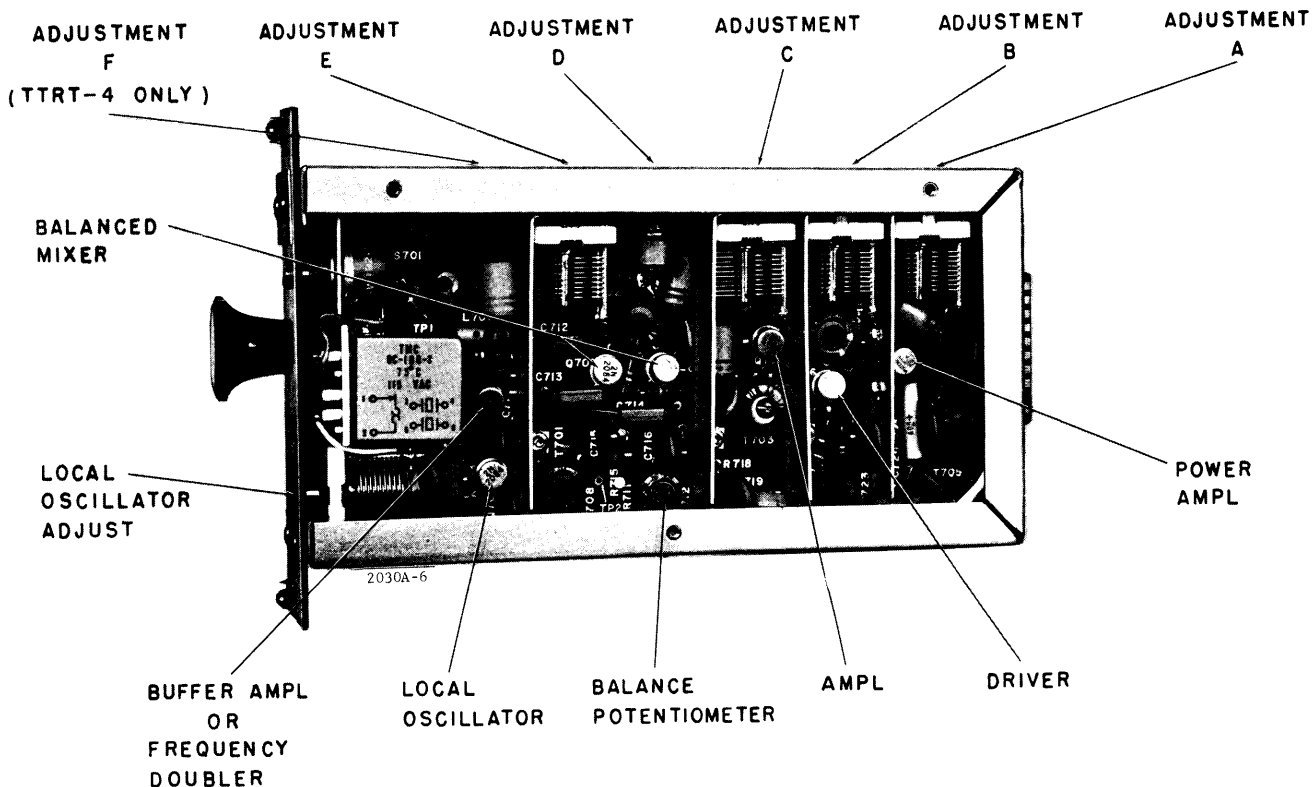


Figure 5-1. Transmitter Converter TTRT, Right-Side Cover Removed

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approximately 8 v peak-to-peak. If output signal is excessively distorted (refer to figure 5-2), readjust screws A and D.

NOTE

If a crystal oven is used, a 30-minute warm-up is required before performing step j.

j. Adjust exciter to deliver an unmodulated carrier signal. Connect counter to oscilloscope vertical amplifier output; adjust local oscillator trimmer capacitor (on front panel of module) until exact desired output frequency is obtained.

5-5. DETERMINATION OF LOCAL OSCILLATOR CRYSTAL FREQUENCY.

Each TTRT module may be equipped with two local oscillator crystals. Care should be taken that the desired transmission frequencies fall within the r-f bandpass of the amplifier stages.

NOTE

The desired sideband of the signal to be transmitted must also fall within the 0.5% r-f bandpass.

EXAMPLE:

If a TTRT module has been aligned at 4020 kc, appropriate crystals may be installed for transmission on any two frequencies between 4010 and 4030 kc.

a. TTRT-1, TTRT-2, TTRT-3.

The local oscillator operates approximately 1750 kilocycles above the signal to be transmitted.

$$f_x = f_0 + 1750 \text{ kc}$$

Where:

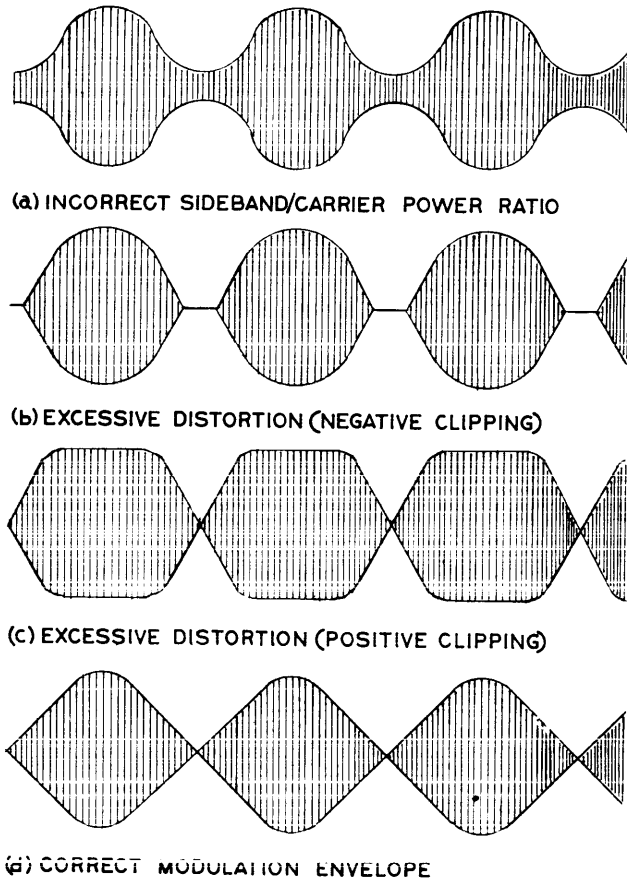
f_x = local oscillator crystal frequency (in kilocycles).

f_0 = frequency of signal to be transmitted (in kilocycles).

b. TTRT-4.

Transmitter Converter, Model TTRT-4 has a frequency doubler stage between its local oscillator and mixer; therefore, the formula is modified.

$$f_x = \frac{f_0 + 1750 \text{ kc}}{2}$$



1004-10

Figure 5-2. Modulation Envelopes

c. CW, FSK, and FAX.

For CW, FSK, or FAX transmissions, the exciters in which the TTRT module is used may provide an i-f signal slightly displaced from 1750 kc. For CW operation, the i-f output of the exciter would be 1749 or 1750; therefore, the formula becomes:

$$\begin{aligned} f_x &= f_o + 1751 \text{ kc} \\ &\text{or} \\ f_x &= f_o + 1749 \text{ kc} \end{aligned}$$

For FSK or FAX transmission, the i-f signal displacement will be equal to the center frequency of the

tone telegraph terminal used with the exciter. The local oscillator in the TTRT must be displaced to compensate for this.

EXAMPLE:

If a tone telegraph terminal that has an output center frequency of 2550 cps is used with the exciter, the crystal frequency formula would become:

$$\begin{aligned} f_x &= f_o + 1752.55 \\ &\text{or} \\ f_x &= f_o + 1747.45 \end{aligned}$$

SECTION 6 PARTS LIST

6-1. INTRODUCTION.

Reference designations have been assigned to identify all electrical parts of the equipment. These designations are used for marking the equipment (adjacent to the part they identify) and are included on drawings, diagrams and the parts list. The letters of a reference designation indicate the kind of part (generic group), such as resistor, capacitor, transistor, etc. The number differentiates between parts of the same generic group. Sockets associated with a particular plug-in device, such as transistor or fuse, are identified by a reference designation which includes the reference designation of the plug-in device. For example, the socket for crystal Y501 is designated XY501. To expedite delivery, when ordering replacement parts, specify the TMC part number and the model number of the equipment.

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PARTS LIST

TRANSMITTER CONVERTER MODULE, TTRT-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C501	CAPACITOR, VARIABLE, AIR DIELECTRIC: capacitance range 3.2 to 50 uuf; one section, 19 plates; 600 VAC peak.	CT104-3
C502	CAPACITOR, VARIABLE, AIR DIELECTRIC: capacitance range 3.2 to 50 uuf; 19 plates.	CT103-1
C503 thru C505	Same as C502.	
C506	CAPACITOR, FIXED, MICA DIELECTRIC: 5 uuf, $\pm 5\%$; 500 WVDC; char. B.	CM15B050J
C507	CAPACITOR, FIXED, MICA DIELECTRIC: 680 uuf, $\pm 5\%$; 500 WVDC; char. C.	CM20C681J
C508	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 25,000 uuf, $+80\%$ -20%; 500 WVDC.	CC100-25
C509	CAPACITOR, FIXED, MICA DIELECTRIC: 100 uuf, $\pm 5\%$; 500 WVDC; char. B.	CM15B101J
C510	CAPACITOR, FIXED, MICA DIELECTRIC: 82 uuf, $\pm 5\%$; 500 WVDC; char. B.	CM15B820J
C511	Same as C508.	
C512	CAPACITOR, FIXED, MICA DIELECTRIC: 180 uuf, $\pm 10\%$; 500 WVDC; char. B.	CM15B181K
C513	CAPACITOR, FIXED, MICA DIELECTRIC: 33 uuf, $\pm 5\%$; 500 WVDC; char. B.	CM15B330J
C514	Same as C513.	
C515	Same as C505.	
C516	Same as C508.	
C517	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 2.0 uuf, ± 0.25 uuf; 500 WVDC; char. RH.	CC20RH020C
C518	Same as C508.	
C519	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 200,000 uuf, $+80\%$ -20%; 25 WVDC.	CC100-33
C520	Same as C508.	
C521	Same as C519.	
C522	Same as C519.	
C523	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10,000 uuf, GMV; 500 WVDC.	CC100-16
C524	CAPACITOR, FIXED, ELECTROLYTIC: 50 uf, $+50\%$ -15%; 60 WVDC.	CE107-1
C525 thru C527	Same as C523.	

PARTS LIST (CONT)

TRANSMITTER CONVERTER MODULE, TTRT-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C528	NOT USED	
C529	Same as C523.	
C530	Same as C523.	
C531	Same as C519.	
C532	Same as C523.	
C533	Same as C519.	
C534	Same as C519.	
L501	COIL, RADIO FREQUENCY: fixed; 100 mh, $\pm 10\%$; 2.8 ohms DC resistance; molded case.	CL240-100
L502	COIL, RADIO FREQUENCY: fixed; 0.560 mh, $\pm 10\%$; current rating 100 ma; molded case.	CL140-5
L503 thru L508	Same as L502.	
Q501	TRANSISTOR: germanium; PNP; JEDEC type 2N2084 transistor with a controlled hfe limit of 100-150; JEDEC type T033 case.	TX109
Q502 thru Q506	Same as Q501.	
Q507	TRANSISTOR: silicon; NPN; JEDEC type 2N2219A transistor with beta linearity characteristics.	TX100
R500	RESISTOR, FIXED, COMPOSITION: 39 ohms, $\pm 5\%$; 1/2 watt.	RC20GF390J
R501	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, $\pm 10\%$; 1/2 watt.	RC20GF102K
R502	RESISTOR, FIXED, COMPOSITION: 27,000 ohms, $\pm 10\%$; 1/2 watt.	RC20GF273K
R503	RESISTOR, FIXED, COMPOSITION: 4,700 ohms, $\pm 10\%$; 1/2 watt.	RC20GF472K
R504	Same as R501.	
R505	Same as R502.	
R506	Same as R503.	
R507	RESISTOR, FIXED, COMPOSITION: 220 ohms, $\pm 5\%$; 1/2 watt.	RC20GF221J
R508	NOT USED	
R509	RESISTOR, FIXED, COMPOSITION: 18,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF183J
R510	Same as R509.	
R511	RESISTOR, FIXED, COMPOSITION: 560 ohms, $\pm 10\%$; 1/2 watt.	RC20GF561K
R512	Same as R511.	

PARTS LIST (CONT)

TRANSMITTER CONVERTER MODULE, TTRT-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R513	RESISTOR, VARIABLE, COMPOSITION: 500 ohms, $\pm 10\%$; nom. power rating 0.25 watt at 70°C; linear taper.	RV111U501A
R514	RESISTOR, FIXED, COMPOSITION: 330 ohms, $\pm 10\%$; 1/2 watt.	RC20GF331K
R515	Same as R514.	
R516	RESISTOR, VARIABLE, COMPOSITION: 500 ohms, $\pm 10\%$; continuous power rating 0.5 watt at 70°C; 350 V RMS; linear taper.	RV106UX8B501A
R517	RESISTOR, FIXED, COMPOSITION: 68 ohms, $\pm 10\%$; 1/2 watt.	RC20GF680K
R518	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, $\pm 10\%$; 1/2 watt.	RC20GF222K
R519	Same as R514.	
R520	Same as R518.	
R521	RESISTOR, FIXED, COMPOSITION: 12,000 ohms, $\pm 10\%$; 1/2 watt.	RC20GF123K
R522	Same as R511.	
R523	RESISTOR, FIXED, COMPOSITION: 56 ohms, $\pm 10\%$; 1/2 watt.	RC20GF560K
R524	RESISTOR, FIXED, COMPOSITION: 47 ohms, $\pm 10\%$; 1/2 watt.	RC20GF470K
R525	Same as R514.	
S501	SWITCH, ROTARY: miniature; 1 deck, 2 position, non-shorting type; rated to break at 1 amp, 115 VAC non-inductive; 5 amps, 115 VAC.	SW192-12NSJ
T501	TRANSFORMER, RADIO FREQUENCY: primary inductance not rated.	TZ141
T502	TRANSFORMER, RADIO FREQUENCY: primary inductance 100 uh, $\pm 15\%$.	TZ142
T503	TRANSFORMER, RADIO FREQUENCY: primary inductance 100 uh, $\pm 15\%$.	TZ143
T504	TRANSFORMER, RADIO FREQUENCY: primary inductance 100 uh, $\pm 15\%$.	TZ144
T505	TRANSFORMER, RADIO FREQUENCY: primary inductance 100 uh, $\pm 15\%$.	TZ145
W501	CABLE ASSEMBLY, SHIELDED: 2 conductor wire.	CA808-2
W502	CABLE ASSEMBLY, RF: RG188/U type coaxial cable; no ferrules.	CA418-9
XY501	BRACKET, CRYSTAL SOCKET: 6 sub-miniature jack tips and swage nuts.	LD1342/MS3414
XY502	Same as XY501.	
XZ501	Same as XY501.	
Y501	CRYSTAL UNIT, QUARTZ, OVEN (SEE NOTE 1)	CR110-1-FREQ
Y501	CRYSTAL UNIT, QUARTZ, AMBIENT (SEE NOTE 2)	CR110-3-FREQ

PARTS LIST (CONT)

TRANSMITTER CONVERTER MODULE, TTRT-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
Y502	Same as Y501. (SEE NOTE 1)	
Y502	Same as Y501. (SEE NOTE 2)	
Z501	OVEN, CRYSTAL: 12 VDC (SEE NOTE 1)	OC100-1
Z501	OVEN, CRYSTAL: 24 VDC (SEE NOTE 1)	OC100-2
Z501	OVEN, CRYSTAL: 115 VAC (SEE NOTE 1)	OC100-3
Z501	OVEN, CRYSTAL: 32 VDC (SEE NOTE 1)	OC100 4
<u>NOTES</u>		
1. Used when crystal ovens are required by customers. 2. Used when no crystal ovens are required by customers.		

PARTS LIST (CONT)

TRANSMITTER CONVERTER MODULE, TTRT-2

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C601	CAPACITOR, VARIABLE, AIR DIELECTRIC: capacitance range 3.2 to 50 uuf; one section, 19 plates; 600 VAC peak.	CT104-3
C602	CAPACITOR, VARIABLE, AIR DIELECTRIC: capacitance range 3.2 to 50 uuf; 19 plates.	CT103-1
C603 thru C605	Same as C602.	
C606	CAPACITOR, FIXED, MICA DIELECTRIC: 22 uuf, $\pm 5\%$; 500 WVDC; char. B.	CM15B220J
C607	CAPACITOR, FIXED, MICA DIELECTRIC: 820 uuf, $\pm 5\%$; 500 WVDC; char. C.	CM20C821J
C608	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10,000 uuf, GMV; 500 WVDC.	CC100-16
C609	CAPACITOR, FIXED, MICA DIELECTRIC: 100 uuf, $\pm 5\%$; 500 WVDC; char. B.	CM15B101J
C610	CAPACITOR, FIXED, MICA DIELECTRIC: 43 uuf, $\pm 5\%$; 500 WVDC; char. B.	CM15B430J
C611	Same as C608.	
C612	CAPACITOR, FIXED, MICA DIELECTRIC: 82 uuf, $\pm 5\%$; 500 WVDC; char. B.	CM15B820J
C613	CAPACITOR, FIXED, MICA DIELECTRIC: 33 uuf, $\pm 5\%$; 500 WVDC; char. B.	CM15B330J
C614	Same as C613.	
C615	Same as C608.	
C616	Same as C608.	
C617	CAPACITOR, FIXED, MICA DIELECTRIC: 2.0 uuf, ± 0.25 uuf; 500 WVDC; char. RH.	CC20RH020C
C618	Same as C608.	
C619	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 200,000 uuf, $+80\%$ -20% ; 25 WVDC.	CC100-33
C620	Same as C608.	
C621	Same as C619.	
C622	Same as C619.	
C623	Same as C608.	
C624	CAPACITOR, FIXED, ELECTROLYTIC: 50 uf, $+50\%$ -15% ; 60 WVDC.	CE107-1
C625 thru C627	Same as C608.	

PARTS LIST (CONT)

TRANSMITTER CONVERTER MODULE, TTRT-2

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C628	NOT USED	
C629	Same as C608.	
C630	Same as C608.	
C631	Same as C619.	
C632	Same as C608.	
C633	Same as C619.	
C634	Same as C619.	
L601	COIL, RADIO FREQUENCY: fixed; 100 mh, $\pm 10\%$; 2.8 ohms DC resistance; molded case.	CL240-100
L602	COIL, RADIO FREQUENCY: fixed; 0.270 mh, $\pm 10\%$; 200 ma.	CL140-3
L603 thru L608	Same as L602.	
Q601	TRANSISTOR: germanium; PNP; JEDEC type 2N2084 transistor with a controlled hfe limit of 100-150; JEDEC type T033 case.	TX109
Q602 thru Q606	Same as Q601.	
Q607	TRANSISTOR: silicon, NPN; JEDEC type 2N2219A transistor with beta linearity characteristics.	TX100
R600	RESISTOR, FIXED, COMPOSITION: 39 ohms, $\pm 5\%$; 1/2 watt.	RC20GF390J
R601	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, $\pm 10\%$; 1/2 watt.	RC20GF102K
R602	RESISTOR, FIXED, COMPOSITION: 27,000 ohms, $\pm 10\%$; 1/2 watt.	RC20GF273K
R603	RESISTOR, FIXED, COMPOSITION: 4,700 ohms, $\pm 10\%$; 1/2 watt.	RC20GF472K
R604	Same as R601.	
R605	Same as R602.	
R606	Same as R603.	
R607	RESISTOR, FIXED, COMPOSITION: 220 ohms, $\pm 5\%$; 1/2 watt.	RC20GF221J
R608	NOT USED	
R609	RESISTOR, FIXED, COMPOSITION: 18,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF183J
R610	Same as R609.	
R611	RESISTOR, FIXED, COMPOSITION: 560 ohms, $\pm 10\%$; 1/2 watt.	RC20GF561K
R612	Same as R611.	
R613	RESISTOR, VARIABLE, COMPOSITION: 500 ohms, $\pm 10\%$; nom. power rating 0.25 watt at 70°C; linear taper.	RV111U501A

PARTS LIST (CONT)

TRANSMITTER CONVERTER MODULE, TTRT-2

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R614	RESISTOR, FIXED, COMPOSITION: 330 ohms, $\pm 10\%$; 1/2 watt.	RC20GF331K
R615	Same as R614.	
R616	RESISTOR, VARIABLE, COMPOSITION: 500 ohms, $\pm 10\%$; continuous power rating 0.5 watt at 70°C; 350 V RMS; linear taper.	RV106UX8B501A
R617	RESISTOR, FIXED, COMPOSITION: 68 ohms, $\pm 10\%$; 1/2 watt.	RC20GF680K
R618	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, $\pm 10\%$; 1/2 watt.	RC20GF222K
R619	Same as R614.	
R620	Same as R618.	
R621	RESISTOR, FIXED, COMPOSITION: 12,000 ohms, $\pm 10\%$; 1/2 watt.	RC20GF123K
R622	Same as R611.	
R623	RESISTOR, FIXED, COMPOSITION: 56 ohms, $\pm 10\%$; 1/2 watt.	RC20GF560K
R624	RESISTOR, FIXED, COMPOSITION: 47 ohms, $\pm 10\%$; 1/2 watt.	RC20GF470K
R625	Same as R614.	
S601	SWITCH, ROTARY: miniature; 1 deck, 2 position, non-shorting type; rated to break at 1 amp, 115 VAC non-inductive; 5 amps, 115 VAC.	SW192-12NSJ
T601	TRANSFORMER, RADIO FREQUENCY: primary inductance not rated.	TZ141
T602	TRANSFORMER, RADIO FREQUENCY: primary inductance 29 uh, $\pm 15\%$.	TZ146
T603	TRANSFORMER, RADIO FREQUENCY: primary inductance 29 uh, $\pm 15\%$.	TZ147
T604	TRANSFORMER, RADIO FREQUENCY: primary inductance 29 uh, $\pm 15\%$.	TZ148
T605	TRANSFORMER, RADIO FREQUENCY: primary inductance 30 uh, $\pm 15\%$.	TZ149
W601	CABLE ASSEMBLY, SHIELDED: 2 conductor wire.	CA808-2
W602	CABLE ASSEMBLY, RF; RG188/U coaxial cable; no ferrules.	CA418-9
XY601	BRACKET, CRYSTAL SOCKET: 6 sub-miniature jack tips and swage nuts.	LD1342/MS3414
XY602	Same as XY601.	
XZ601	Same as XY601.	
Y601	CRYSTAL UNIT, QUARTZ, OVEN (SEE NOTE 1)	CR110-1-FREQ
Y601	CRYSTAL UNIT, QUARTZ, AMBIENT (SEE NOTE 2)	CR110-3-FREQ
Y602	Same as Y601. (SEE NOTE 1)	
Y602	Same as Y601. (SEE NOTE 2)	

PARTS LIST (CONT)

TRANSMITTER CONVERTER MODULE, TTRT-2

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
Z601	OVEN, CRYSTAL: 12 VDC (SEE NOTE 1)	OC100-1
Z601	OVEN, CRYSTAL: 24 VDC (SEE NOTE 1)	OC100-2
Z601	OVEN, CRYSTAL: 115 VAC (SEE NOTE 1)	OC100-3
Z601	OVEN, CRYSTAL: 32 VDC (SEE NOTE 1)	OC100-4
<p align="center"><u>NOTES</u></p> <p>1. Used when crystal ovens are required by customers. 2. Used when no crystal ovens are required by customers.</p>		

PARTS LIST (CONT)

TRANSMITTER CONVERTER MODULE, TTRT-3

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C701	CAPACITOR, VARIABLE, AIR DIELECTRIC: capacitance range 3.2 to 50 uuf; one section, 19 plates; 600 VAC peak.	CT104-3
C702	CAPACITOR, VARIABLE, AIR DIELECTRIC: capacitance range 3.2 to 50 uuf; 19 plates.	CT103-1
C703 thru C705	Same as C702.	
C706	CAPACITOR, FIXED, MICA DIELECTRIC: 20 uuf, $\pm 5\%$; 500 WVDC; char. B.	CM15B200J
C707	CAPACITOR, FIXED, MICA DIELECTRIC: 510 uuf, $\pm 5\%$; 500 WVDC; char. C.	CM20C511J
C708	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10,000 uuf, GMV; 500 WVDC.	CC100-16
C709	CAPACITOR, FIXED, MICA DIELECTRIC: 100 uuf, $\pm 5\%$; 500 WVDC; char. B.	CM15B101J
C710	CAPACITOR, FIXED, MICA DIELECTRIC: 15 uuf, $\pm 5\%$; 500 WVDC; char. B.	CM15B150J
C711	Same as C708.	
C712	Same as C709.	
C713	CAPACITOR, FIXED, MICA DIELECTRIC: 33 uuf, $\pm 5\%$; 500 WVDC; char. B.	CM15B330J
C714	Same as C713.	
C715	Same as C708.	
C716	Same as C708.	
C717	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 2.0 uuf, ± 0.25 uuf; 500 WVDC; char. RH.	CC20RH020C
C718	Same as C708.	
C719	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 200,000 uuf, $+80\%$ -20% ; 25 WVDC.	CC100-33
C720	Same as C708.	
C721	Same as C719.	
C722	Same as C719.	
C723	Same as C708.	
C724	CAPACITOR, FIXED, ELECTROLYTIC: 50 uf, $+50\%$ -15% ; 60 WVDC.	CE107-1
C725 thru C727	Same as C708.	

PARTS LIST (CONT)

TRANSMITTER CONVERTER MODULE, TTRT-3

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C728	NOT USED	
C729	Same as C708.	
C730	Same as C708.	
C731	Same as C719.	
C732	Same as C708.	
C733	Same as C719.	
C734	Same as C719.	
L701	COIL, RADIO FREQUENCY: fixed; 27.0 uh, $\pm 10\%$; 1.1 ohms DC resistance; molded case.	CL240-27
L702	COIL, RADIO FREQUENCY: fixed; .220 mh, $\pm 10\%$; current rating 200 ma; molded case.	CL140-6
L703 thru L708	Same as L702.	
Q701	TRANSISTOR: germanium; PNP; JEDEC type 2N2084 transistor with a controlled hfe limit of 100-150; JEDEC type T033 case.	TX109
Q702 thru Q704	Same as Q701.	
Q705	TRANSISTOR: germanium; PNP; JEDEC type 2N2495 transistor with a controlled hfe limit of 95-150; JEDEC type T033 case.	TX104
Q706	Same as Q705.	
Q707	TRANSISTOR: silicon, NPN; JEDEC type 2N2219A transistor with beta linearity characteristics.	TX100
R700	RESISTOR, FIXED, COMPOSITION: 39 ohms, $\pm 5\%$; 1/2 watt.	RC20GF390J
R701	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, $\pm 10\%$; 1/2 watt.	RC20GF102K
R702	RESISTOR, FIXED, COMPOSITION: 27,000 ohms, $\pm 10\%$; 1/2 watt.	RC20GF273K
R703	RESISTOR, FIXED, COMPOSITION: 4,700 ohms, $\pm 10\%$; 1/2 watt.	RC20GF472K
R704	Same as R701.	
R705	Same as R702.	
R706	Same as R703.	
R707	RESISTOR, FIXED, COMPOSITION: 220 ohms, $\pm 5\%$; 1/2 watt.	RC20GF221J
R708	NOT USED	
R709	RESISTOR, FIXED, COMPOSITION: 18,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF183J
R710	Same as R709.	

PARTS LIST (CONT)

TRANSMITTER CONVERTER MODULE, TTRT-3

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R711	RESISTOR, FIXED, COMPOSITION: 560 ohms, $\pm 10\%$; 1/2 watt.	RC20GF561K
R712	Same as R711.	
R713	RESISTOR, VARIABLE, COMPOSITION: 500 ohms, $\pm 10\%$; nom. power rating 0.25 watt at 70°C; linear taper.	RV111U501A
R714	RESISTOR, FIXED, COMPOSITION: 330 ohms, $\pm 10\%$; 1/2 watt.	RC20GF331K
R715	Same as R714.	
R716	RESISTOR, VARIABLE, COMPOSITION: 500 ohms, $\pm 10\%$; continuous power rating 0.5 watt at 70°C; 350 V RMS; linear taper.	RV106UX8B501A
R717	RESISTOR, FIXED, COMPOSITION: 68 ohms, $\pm 10\%$; 1/2 watt.	RC20GF680K
R718	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, $\pm 10\%$; 1/2 watt.	RC20GF222K
R719	Same as R714.	
R720	Same as R718.	
R721	RESISTOR, FIXED, COMPOSITION: 12,000 ohms, $\pm 10\%$; 1/2 watt.	RC20GF123K
R722	Same as R711.	
R723	RESISTOR, FIXED, COMPOSITION: 56 ohms, $\pm 10\%$; 1/2 watt.	RC20GF560K
R724	RESISTOR, FIXED, COMPOSITION: 47 ohms, $\pm 10\%$; 1/2 watt.	RC20GF470K
R725	RESISTOR, FIXED, COMPOSITION: 150 ohms, $\pm 10\%$; 1/2 watt.	RC20GF151K
S701	SWITCH, ROTARY: miniature; 1 deck, 2 position, non-shorting type; rated to break at 1 amp, 115 VAC non-inductive; 5 amps, 115 VAC.	SW192-12NSJ
T701	TRANSFORMER, RADIO FREQUENCY: primary inductance not rated.	TZ141
T702	TRANSFORMER, RADIO FREQUENCY: primary inductance 9.8 uh, $\pm 10\%$.	TZ150
T703	TRANSFORMER, RADIO FREQUENCY: primary inductance 7.9 uh, $\pm 10\%$.	TZ151
T704	TRANSFORMER, RADIO FREQUENCY: primary inductance 9.8 uh, $\pm 10\%$.	TZ152
T705	TRANSFORMER, RADIO FREQUENCY: primary inductance 7.9 uh, $\pm 10\%$.	TZ153
W701	CABLE ASSEMBLY, SHIELDED: 2 conductor wire.	CA808-2
W702	CABLE ASSEMBLY, RF: RG188/U type coaxial cable; no ferrules.	CA418-9
XY701	BRACKET, CRYSTAL SOCKET: 6 sub-miniature jack tips and swage nuts.	LD1342/MS3414
XY702	Same as XY701.	
XZ701	Same as XY701.	

PARTS LIST (CONT)

TRANSMITTER CONVERTER MODULE, TTRT-3

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
Y701	CRYSTAL UNIT, QUARTZ, OVEN (SEE NOTE 1)	CR110-1-FREQ
Y701	CRYSTAL UNIT, QUARTZ, AMBIENT (SEE NOTE 2)	CR110-3-FREQ
Y702	Same as Y701. (SEE NOTE 1)	
Y702	Same as Y701. (SEE NOTE 2)	
Z701	OVEN, CRYSTAL: 12 VDC (SEE NOTE 1)	OC100-1
Z701	OVEN, CRYSTAL: 24 VDC (SEE NOTE 1)	OC100-2
Z701	OVEN, CRYSTAL: 115 VAC (SEE NOTE 1)	OC100-3
Z701	OVEN, CRYSTAL: 32 VDC (SEE NOTE 1)	OC100-4
<p><u>NOTES</u></p> <p>1. Used when crystal ovens are required by customers. 2. Used when no crystal ovens are required by customers.</p>		

PARTS LIST (CONT)

TRANSMITTER CONVERTER MODULE, TTRT-4

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C801	CAPACITOR, VARIABLE, AIR DIELECTRIC: capacitance range 3.2 to 50 uuf; one section, 19 plates; 600 VAC peak.	CT104-3
C802	CAPACITOR, FIXED, MICA DIELECTRIC: 22 uuf, $\pm 5\%$; 500 WVDC; char. B.	CM15B220J
C803	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10,000 uuf, GMV; 500 WVDC.	CC100-16
C804	CAPACITOR, FIXED, MICA DIELECTRIC: 110 uuf, $\pm 5\%$; 500 WVDC; char. B.	CM15B111J
C805	CAPACITOR, FIXED, MICA DIELECTRIC: 100 uuf, $\pm 5\%$; 500 WVDC; char. B.	CM15B101J
C806	Same as C803.	
C807	CAPACITOR, FIXED, MICA DIELECTRIC: 20 uuf, $\pm 5\%$; 500 WVDC; char. B.	CM15B200J
C808	CAPACITOR, FIXED, MICA DIELECTRIC: 33 uuf, $\pm 5\%$; 500 WVDC; char. B.	CM15B330J
C809	Same as C808.	
C810	Same as C803.	
C811	Same as C803.	
C812	CAPACITOR, VARIABLE, AIR DIELECTRIC: capacitance range 3.2 to 50 uuf; 19 plates.	CT103-1
C813	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 2.0 uuf, ± 0.25 uuf; 500 WVDC; char. RH.	CC20RH020C
C814	Same as C812.	
C815	Same as C803.	
C816	Same as C803.	
C817	Same as C812.	
C818	CAPACITOR, FIXED, MICA DIELECTRIC: 510 uuf, $\pm 5\%$; 500 WVDC; char. B.	CM20B511J
C819	CAPACITOR, FIXED, ELECTROLYTIC: 50 uf, $+50\%$ - 15% ; 60 WVDC.	CE107-1
C820	Same as C812.	
C821 thru C826	Same as C803.	
C827	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 200,000 uuf, $+80\%$ - 20% ; 25 WVDC.	CC100-33
C828	Same as C803.	
C829	Same as C803.	

PARTS LIST (CONT)

TRANSMITTER CONVERTER MODULE, TTRT-4

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C830	Same as C827.	
C831	Same as C803.	
C832	Same as C827.	
C833	CAPACITOR, VARIABLE, MICA DIELECTRIC: capacitance range 5 to 80 uuf; 2 plates, one section; 175 WVDC.	CV113-11
C834	Same as C803.	
C835	Same as C827.	
L801	COIL, RADIO FREQUENCY: fixed; 0.68 uh, $\pm 20\%$; approx. res. freq. 290 MC; max. DC resistance 0.08 ohms; phenolic coil form.	CL270-0.68
L802	COIL, RADIO FREQUENCY: fixed; 100 mh, $\pm 10\%$; 2.8 ohms DC resistance; molded case.	CL240-100
L803 thru L808	Same as L802.	
Q801	TRANSISTOR: germanium; PNP; JEDEC type 2N2084 transistor with a controlled hfe limit of 100-150; JEDEC type T033 case.	TX109
Q802 thru Q804	Same as Q801.	
Q805	TRANSISTOR: germanium; PNP; JEDEC type 2N2495 transistor with a controlled hfe limit of 95-150; JEDEC type T033 case.	TX104
Q806	Same as Q805.	
Q807	TRANSISTOR: silicon, NPN; JEDEC type 2N2219A transistor with beta linearity characteristics.	TX100
R800	RESISTOR, FIXED, COMPOSITION: 39 ohms, $\pm 5\%$; 1/2 watt.	RC20GF390J
R801	RESISTOR, FIXED, COMPOSITION: 4,700 ohms, $\pm 5\%$; 1/2 watt.	RC20GF472J
R802	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, $\pm 10\%$; 1/2 watt.	RC20GF102K
R803	RESISTOR, FIXED, COMPOSITION: 27,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF273J
R804	Same as R801.	
R805	RESISTOR, FIXED, COMPOSITION: 220 ohms, $\pm 5\%$; 1/2 watt.	RC20GF221J
R806	NOT USED	
R807	RESISTOR, FIXED, COMPOSITION: 18,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF183J
R808	Same as R807.	
R809	RESISTOR, FIXED, COMPOSITION: 560 ohms, $\pm 10\%$; 1/2 watt.	RC20GF561K
R810	Same as R809.	

PARTS LIST (CONT)

TRANSMITTER CONVERTER MODULE, TTRT-4

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R811	RESISTOR, VARIABLE, COMPOSITION: 500 ohms, $\pm 10\%$; nom. power rating 0.25 watt at 70°C; linear taper.	RV111U501A
R812	RESISTOR, FIXED, COMPOSITION: 330 ohms, $\pm 10\%$; 1/2 watt.	RC20GF331K
R813	Same as R812.	
R814	RESISTOR, VARIABLE, COMPOSITION: 500 ohms, $\pm 10\%$; continuous power rating 0.5 watt at 70°C; 350 V RMS; linear taper.	RV106UX8B501A
R815	RESISTOR, FIXED, COMPOSITION: 68 ohms, $\pm 10\%$; 1/2 watt.	RC20GF680K
R816	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, $\pm 10\%$; 1/2 watt.	RC20GF222K
R817	Same as R812.	
R818	RESISTOR, FIXED, COMPOSITION: 47 ohms, $\pm 10\%$; 1/2 watt.	RC20GF470K
R819	Same as R816.	
R820	RESISTOR, FIXED, COMPOSITION: 12,000 ohms, $\pm 10\%$; 1/2 watt.	RC20GF123K
R821	Same as R809.	
R822	RESISTOR, FIXED, COMPOSITION: 56 ohms, $\pm 10\%$; 1/2 watt.	RC20GF560K
R823	Same as R803.	
R824	Same as R802.	
R825	Same as R822.	
S801	SWITCH, ROTARY: miniature; 1 deck, 2 position, non-shorting type; rated to break at 1 amp, 115 VAC non-inductive; 5 amps, 115 VAC.	SW192-12NSJ
T801	TRANSFORMER, RADIO FREQUENCY: primary inductance not rated.	TZ141
T802	TRANSFORMER, RADIO FREQUENCY: primary inductance 1.0 uh, $\pm 10\%$.	TZ154
T803	TRANSFORMER, RADIO FREQUENCY: primary inductance 0.96 uh, $\pm 10\%$.	TZ155
T804	TRANSFORMER, RADIO FREQUENCY: primary inductance 0.96 uh, $\pm 10\%$.	TZ156
T805	TRANSFORMER, RADIO FREQUENCY: primary inductance 0.96 uh, $\pm 10\%$.	TZ157
W801	CABLE ASSEMBLY, SHIELDED: 2 conductor wire.	CA808-2
W802	CABLE ASSEMBLY, RF; RG188/U type coaxial cable; no ferrules.	CA418-9
XY801	BRACKET, CRYSTAL SOCKET: 6 sub-miniature jack tips and swage nuts.	LD1342/MS3414
XY802	Same as XY801.	
XZ801	Same as XY801.	

PARTS LIST (CONT)

TRANSMITTER CONVERTER MODULE, TTRT-4

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
Y801	CRYSTAL UNIT, QUARTZ, OVEN (SEE NOTE 1)	CR110-1-FREQ
Y801	CRYSTAL UNIT, QUARTZ, AMBIENT (SEE NOTE 2)	CR110-3-FREQ
Y802	Same as Y801. (SEE NOTE 1)	
Y802	Same as Y801. (SEE NOTE 2)	
Z801	OVEN, CRYSTAL: 12 VDC (SEE NOTE 1)	OC100-1
Z801	OVEN, CRYSTAL: 24 VDC (SEE NOTE 1)	OC100-2
Z801	OVEN, CRYSTAL: 115 VAC (SEE NOTE 1)	OC100-3
Z801	OVEN, CRYSTAL: 32 VDC (SEE NOTE 1)	OC100-4
<u>NOTES</u>		
1. Used when crystal ovens are required by customers. 2. Used when no crystal ovens are required by customers.		

SECTION 7
SCHEMATIC DIAGRAMS

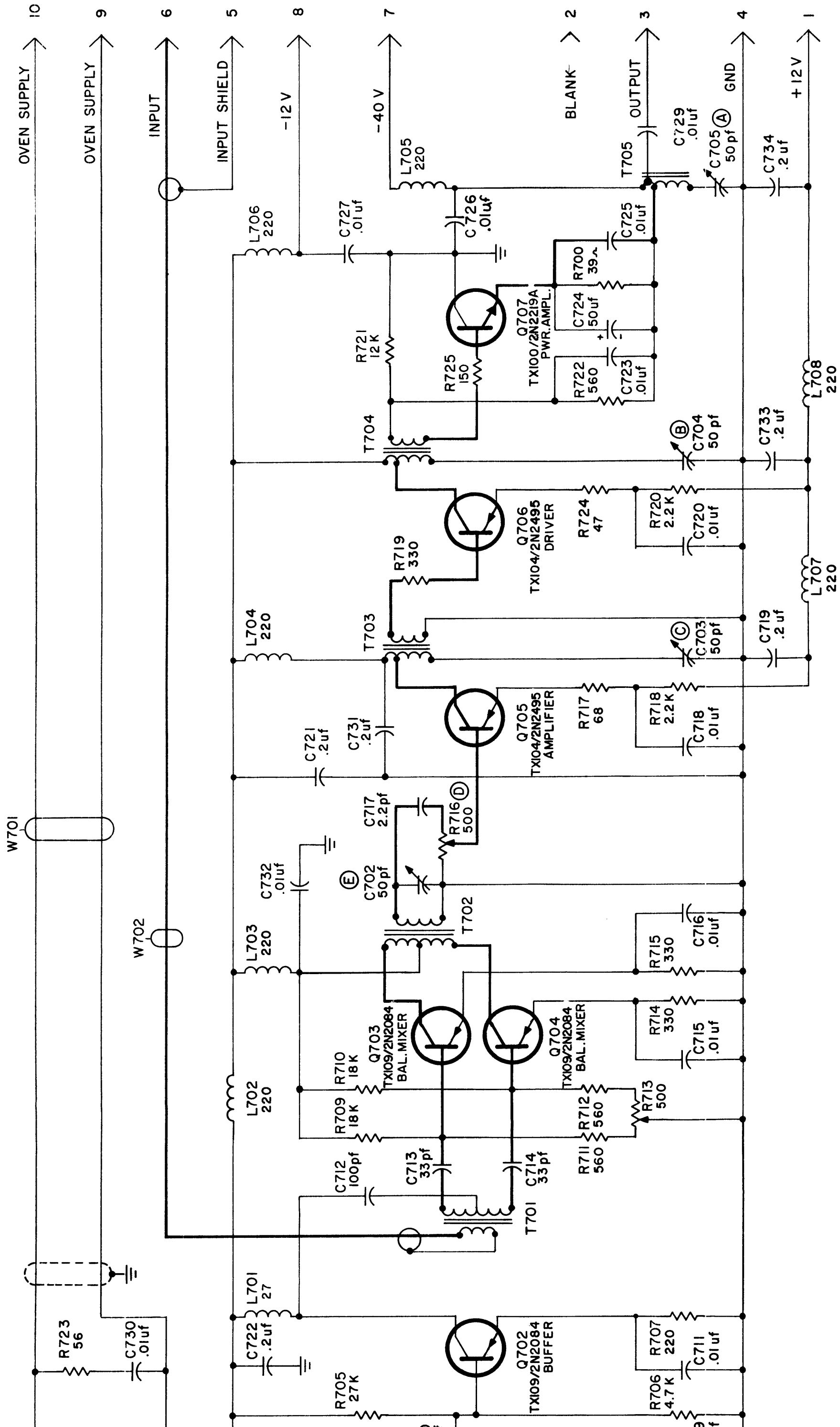
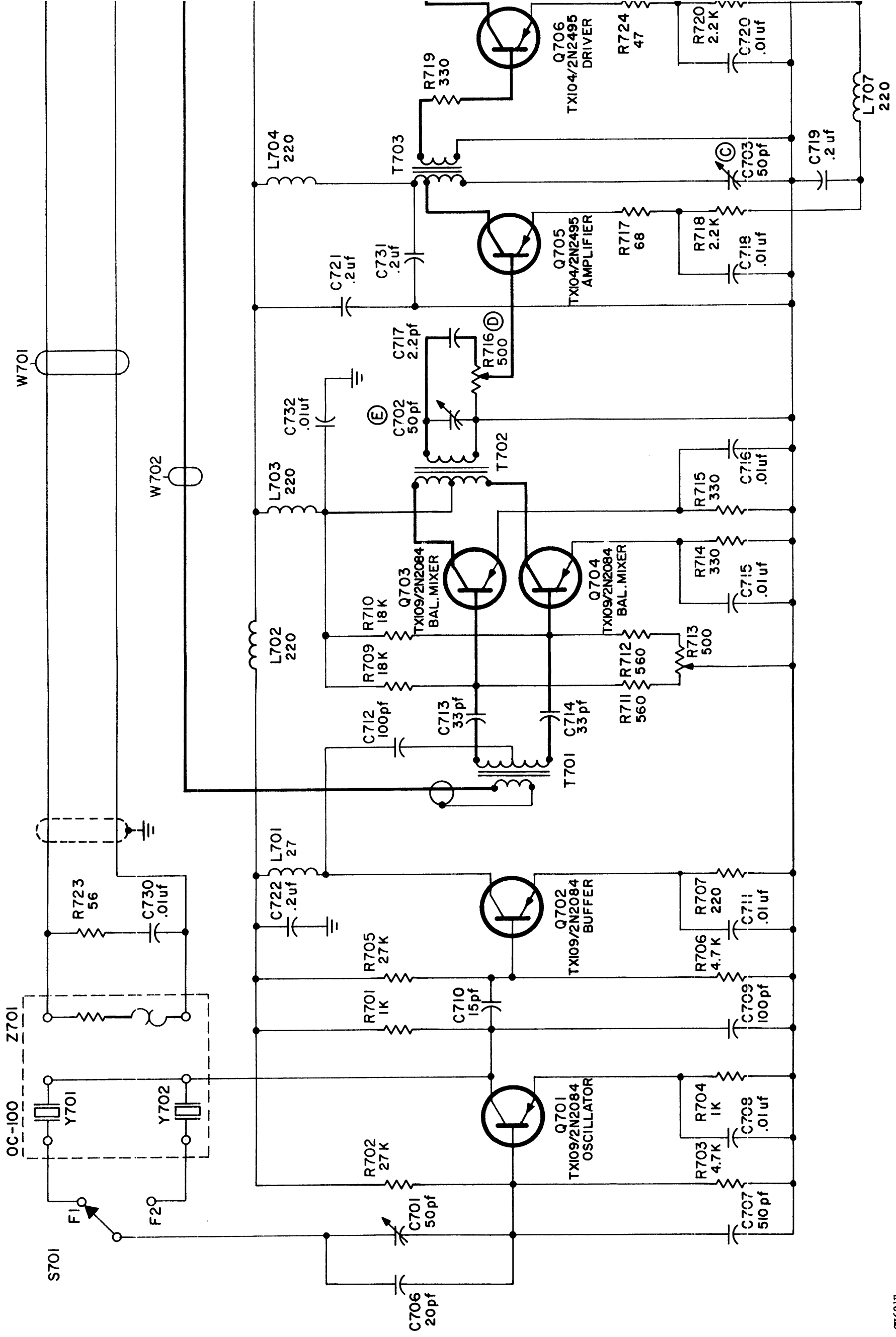


Figure 7-3. Schematic Diagram, Transmitter Converter, Model TTRT-3



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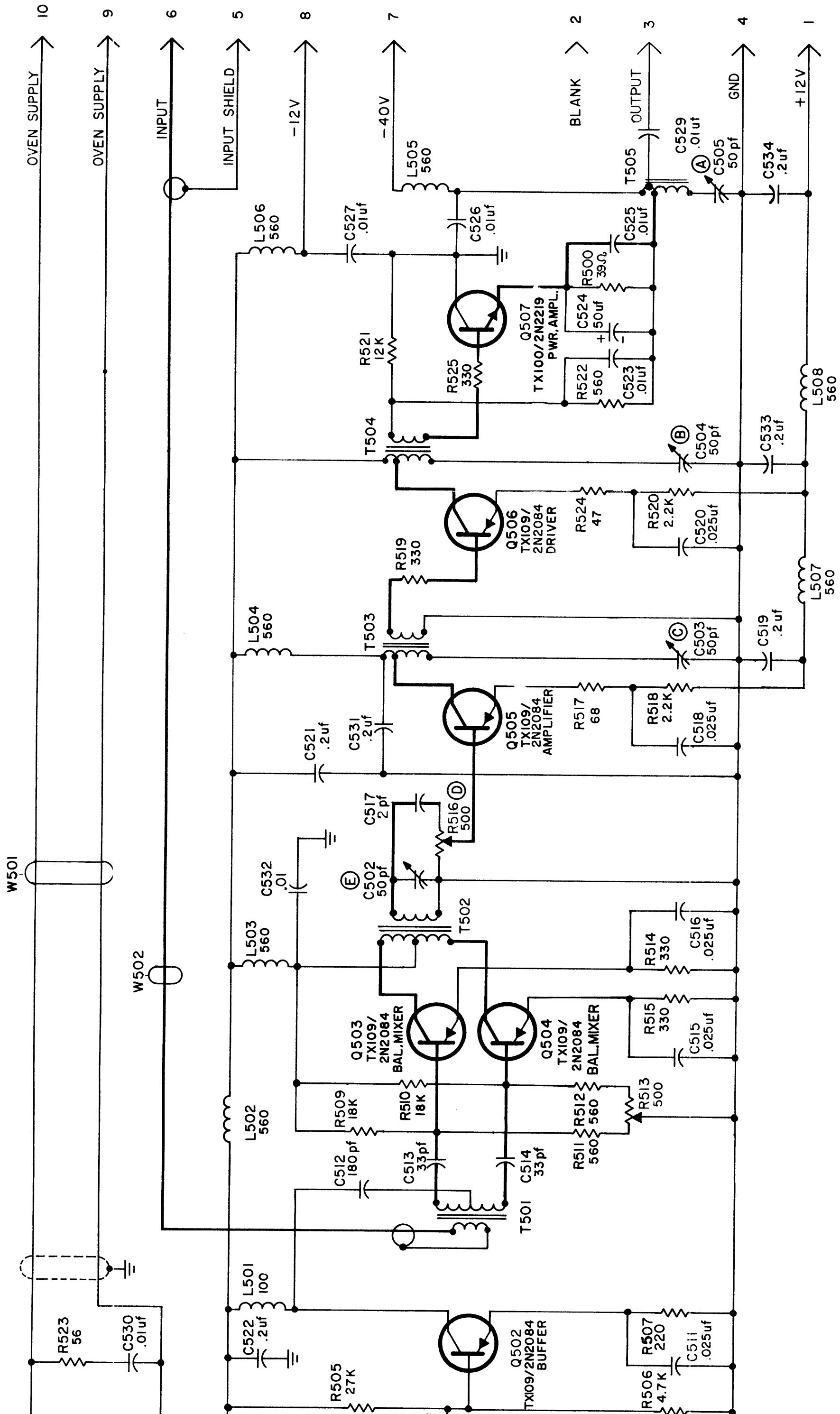
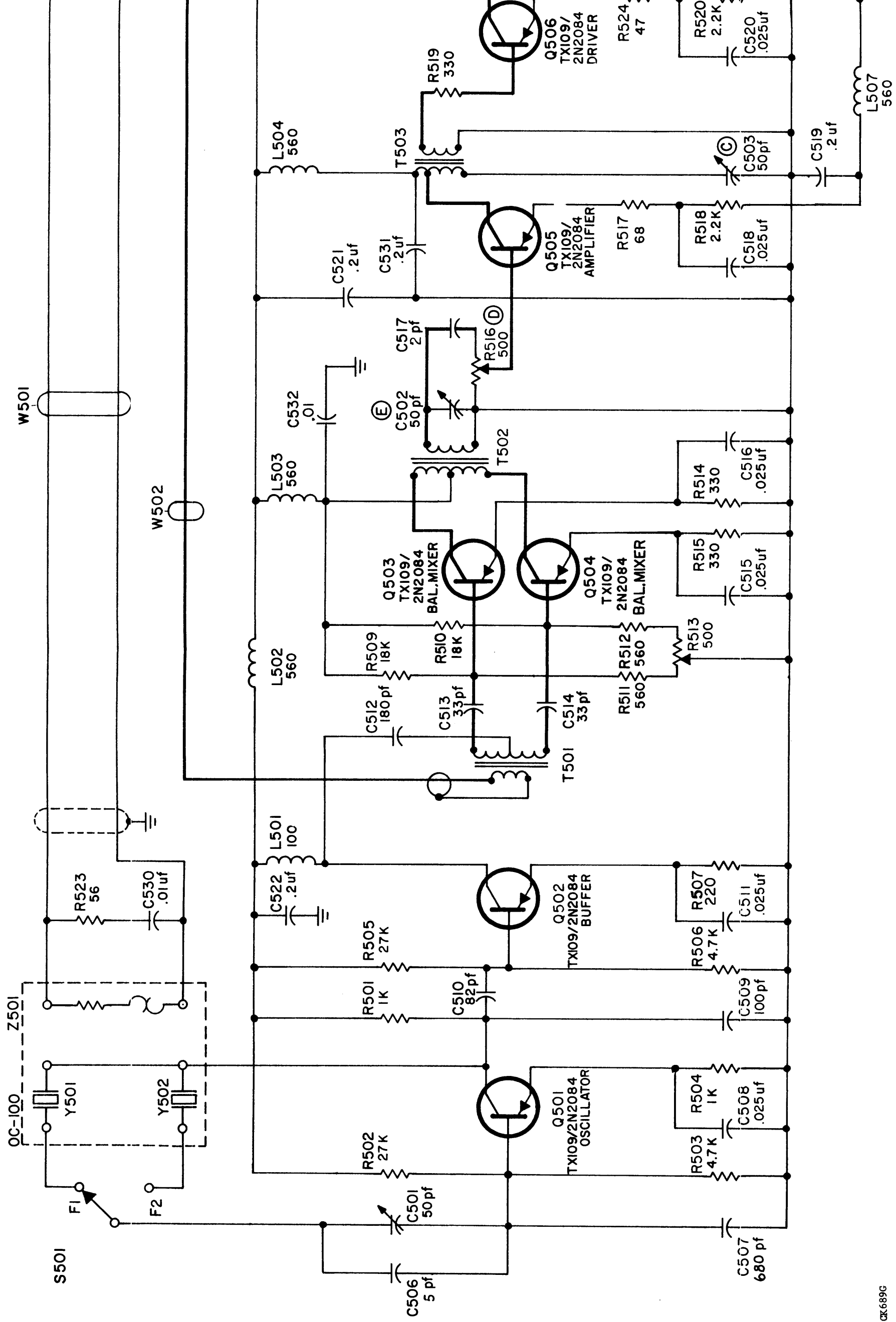


Figure 7-1. Schematic Diagram, Transmitter Converter, Model TTRT-1



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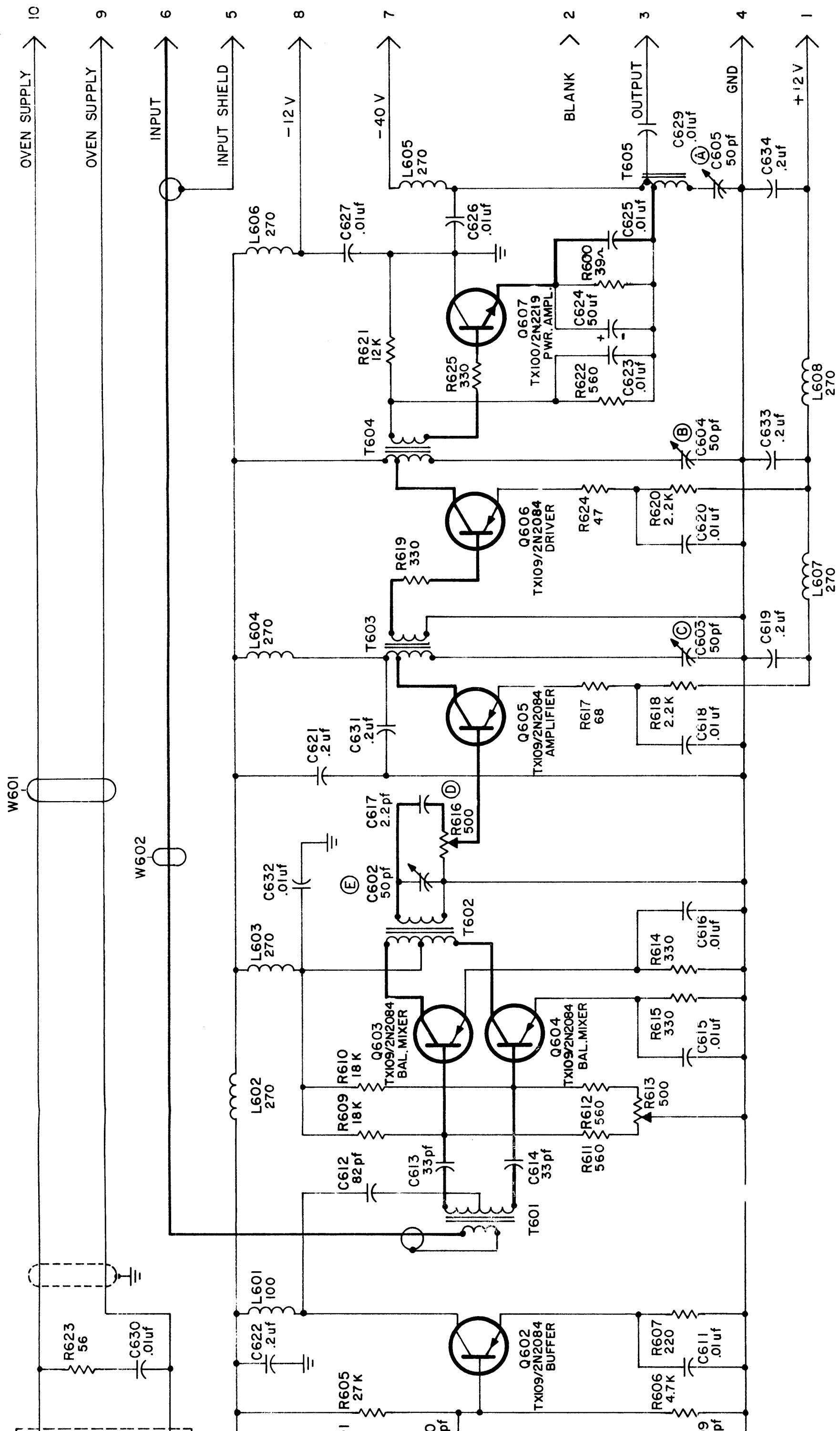
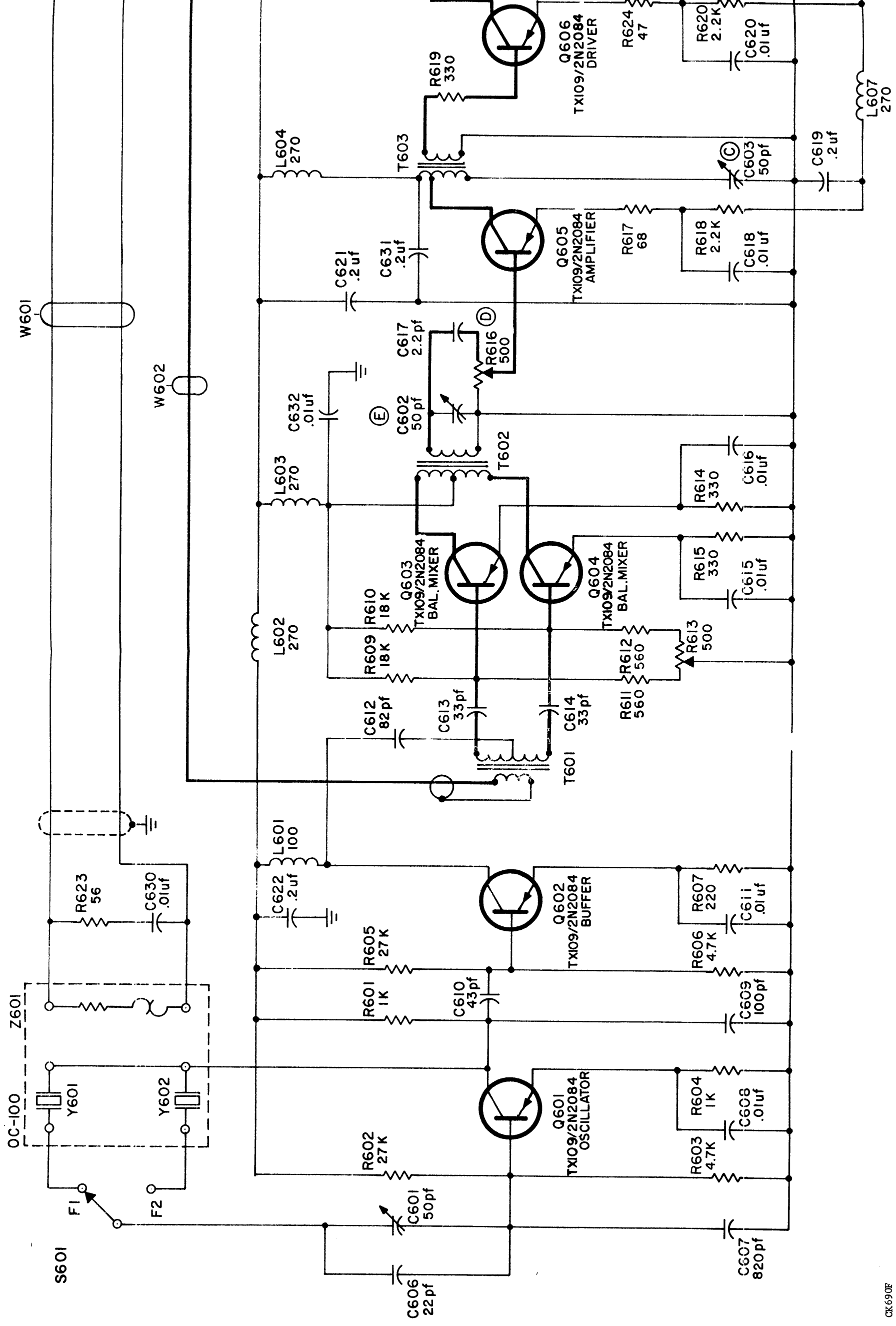


Figure 7-2. Schematic Diagram, Transmitter Converter, Model TIRT-2 7-5/7-6



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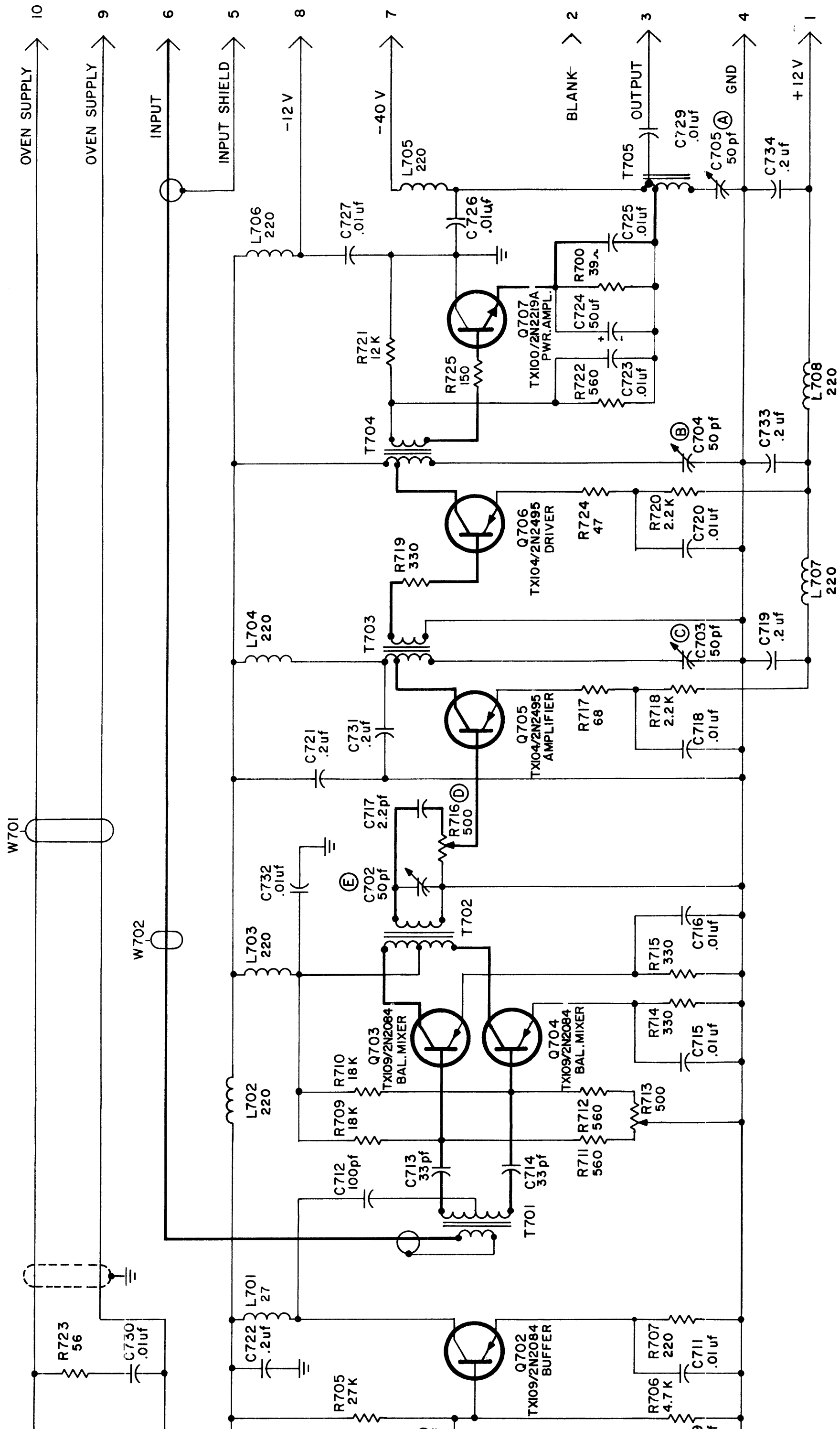
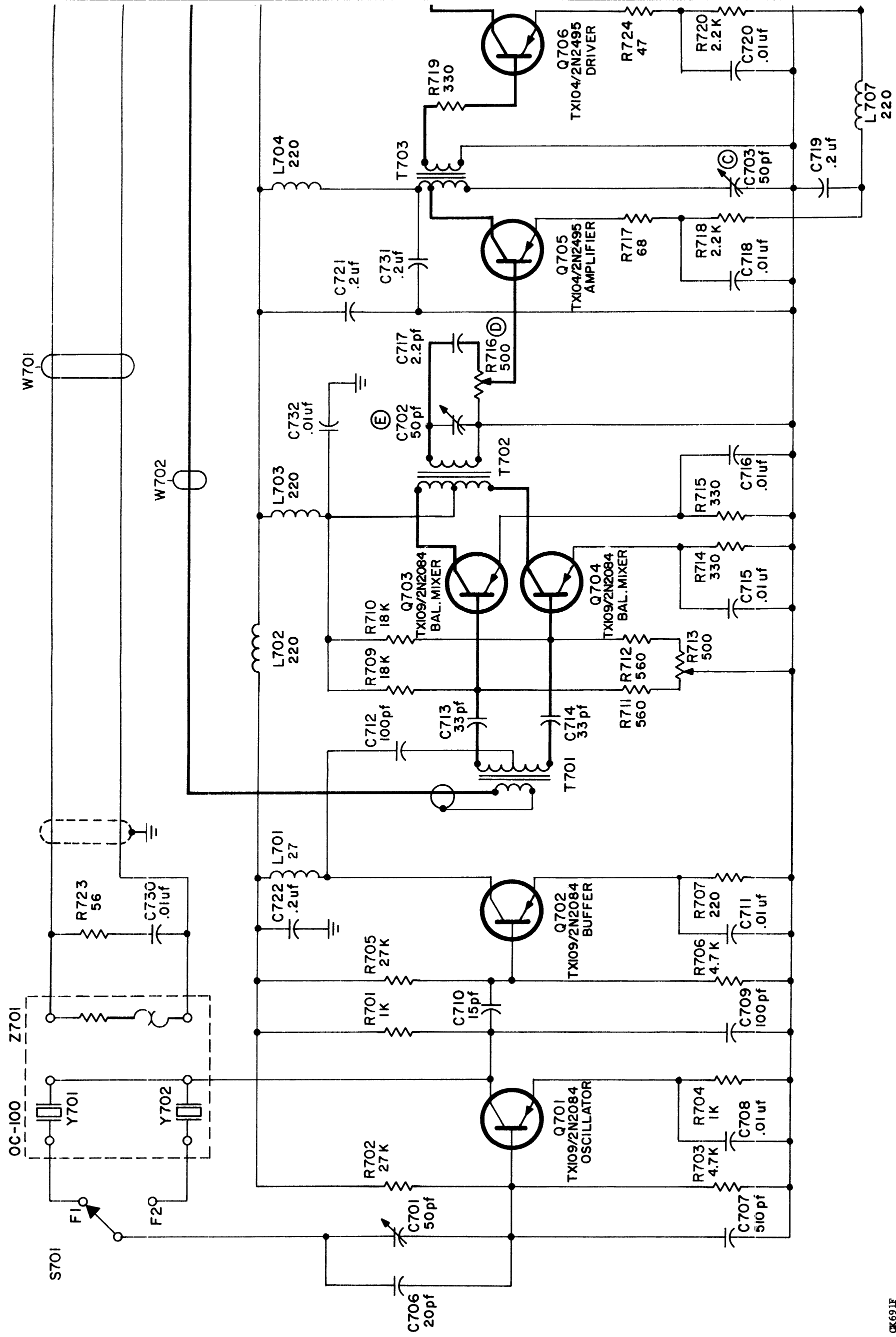


Figure 7-3. Schematic Diagram, Transmitter Converter, Model TTRT-3



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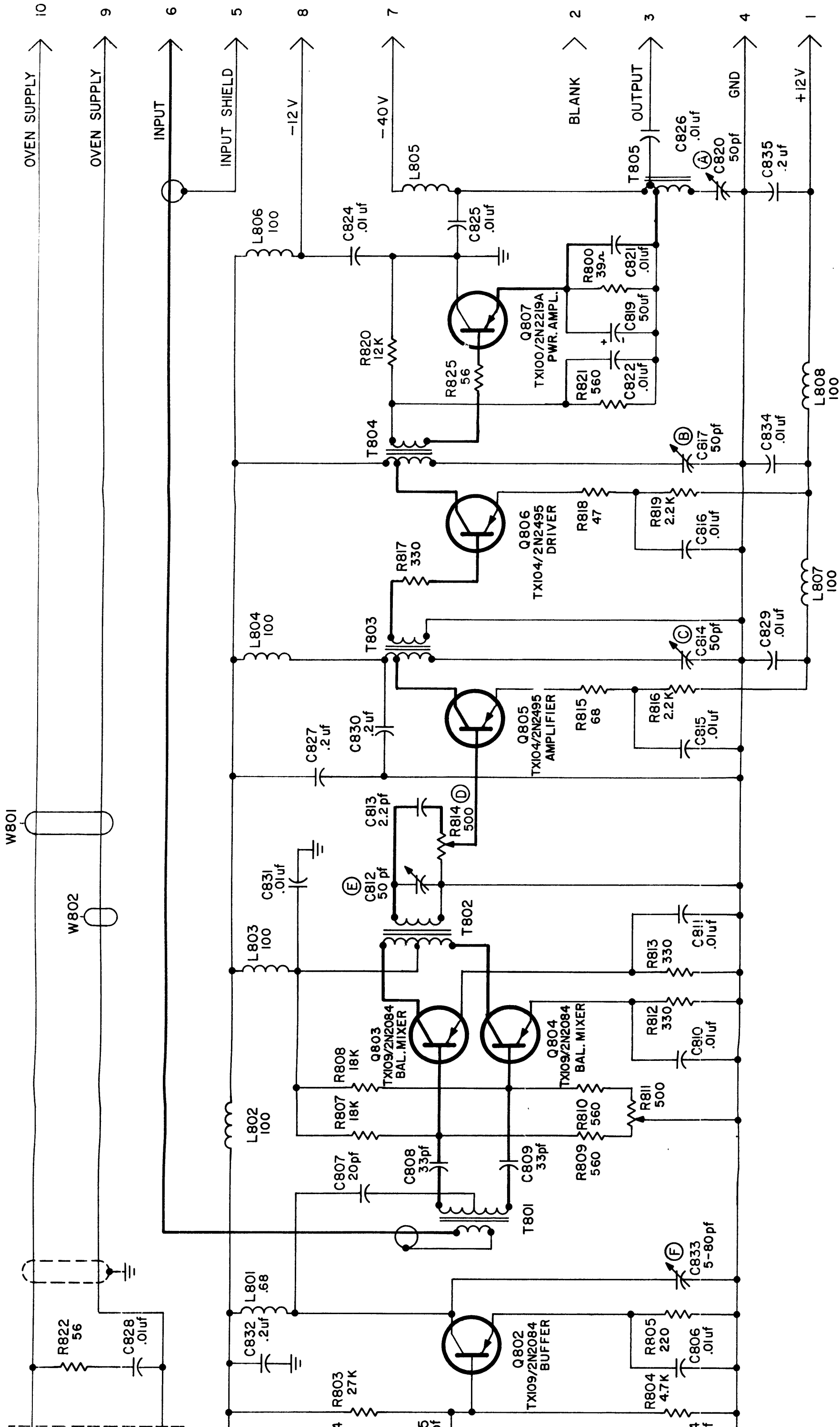
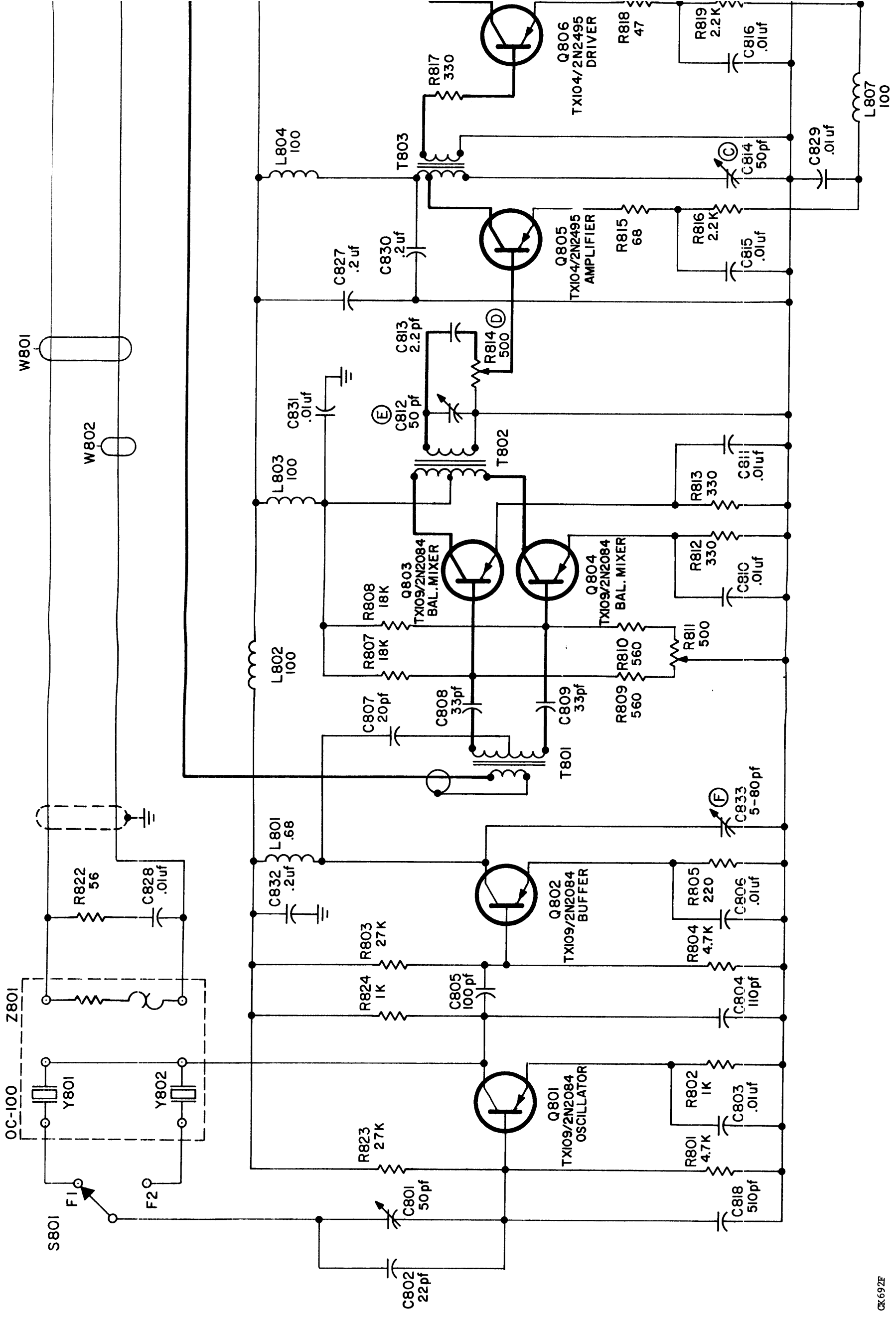


Figure 7-4. Schematic Diagram, Transmitter Converter, Model TTRT-4



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