UNCLASSIFIED

TECHNICAL MANUAL

for

RECEIVER CONVERTER MODEL TTRR

THE TECHNICAL MATERIEL CORPORATION

MAMARONECK, N.Y. OTTAWA, CANADA

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IN-3010A *Issue Date:* 1 MAY 1965

NOTICE

FOREWORD

The Receiver Converter modules, Models TTRR-1, TTRR-2, TTRR-3, and TTRR-4, are physically and functionally similar. Since the operating principles for each module are the same (varying mainly in frequency range), only Model TTRR-1 is explained in this manual. The differences between the modules are appropriately noted in the text and tables.

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

IN-3010A
Issue Date: 1 May 1965

RECORD OF CORRECTIONS MADE

Change No.	Date of Change	Date Entered	Entered By
1	3/15/66	Incorporated in manual	5/66

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Figure 1-1. Receiver Converter, TTRR

SECTION 1

GENERAL INFORMATION

1-1. FUNCTIONAL DESCRIPTION.

Receiver Converter, Model TTRR (figure 1-1), is a transistorized, fixed-tuned, plug-in r-f module that is used with several types of single-sideband receivers. Four modules (Model TTRR-1, TTRR-2, TTRR-3, and TTRR-4) cover the frequency range from 2- to 32-megacycles. Limitations on the mode of operation are dependent upon the receiver in which the TTRR is used. The modules may be used for the reception of practically any type of signal, the only limitation being an r-f bandpass of approximately 0.5% of frequency to which the r-f amplifiers are tuned.

The TTRR contains three high-gain r-f amplifiers, a mixer, and a crystal-controlled local oscillator. The gain of the r-f amplifiers is controlled by an AGC (automatic gain control) voltage supplied by the associated receiver. The local oscillator has two operating frequencies selected by a front-panel switch that permit reception of either of two signal frequencies (F1 or F2) within the r-f bandpass of the TTRR, without necessitating realignment. A RECEIVER CLARIFIER control (located on front panel) provides fine-tuning of the oscillator. 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). The nominal r-f output of the TTRR is 1.75 mc.

1-2. PHYSICAL DESCRIPTION.

a. EXTERNAL. - The front panel of the TTRR is provided with a knob to facilitate handling the unit when inserting or removing it from the associated receiver. The F1/F2 frequency selector switch (screwdriver type switch) and the RECEIVER CLARIFIER control are located on the front panel; a plate above the F1/F2 switch identifies the input carrier frequencies associated with the two crystals in the TTRR. The plug-in interchangeability feature of TTRR is provided by an etched connector at the rear of the module; two slide latches on the front panel hold the TTRR in place after it has been plugged into the associated receiver. Side covers provide electrostatic shielding and protect TTRR components when the module is removed from the receiver. Each TTRR module weighs 1 1/2 pounds, and is 1 1/2 inches wide, 5 3/8 inches high, and 8 inches long.

b. INTERNAL. - Most of the smaller components in the TTRR 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 TTRR. (Also refer to the schematic diagrams, figures 7-1 through 7-4.) Each r-f section of the TTRR is shielded by removable metal dividers in order to minimize interaction between stages.

1-3. EQUIPMENT SUPPLIED.

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

TABLE 1-1. SEMICONDUCTOR COMPLEMENT

REFERENCE DESIGNATION	TYPE	FUNCTION
Q101	2N2495 *	1st r-f amplifier
Q102	2N2084	2nd r-f amplifier
Q103	2N2084	3rd r-f amplifier
Q104	2N2084	Mixer

* In TTRR-4: Q401, Q402, and Q403 are Type 2N22495

TABLE 1-1. SEMICONDUCTOR COMPLEMENT (CONT)

REFERENCE DESIGNATION	TYPE	FUNCTION
Q105 **	2N2084	Buffer Amplifier
Q106	2N2084	Local Oscillator
** In TTRR-4: Q405 Functions as a Frequency Doubler		

TABLE 1-2. EQUIPMENT SUPPLIED
(These items supplied in accordance with individual order.)

NOMENCLATURE		DESIGNATION	
Formal	Common	TMC/PN	SYMBOL
Crystal Oven, TCO-1	12 VDC Crystal oven	OC100-1	
Crystal Oven, TCO-2	24 VDC Crystal oven	OC100-2	Z101 Z201 Z301 Z401
Crystal Oven, TCO-3	115 VAC Crystal oven	OC100-3	
Crystal Oven, TCO-4	32 VDC Crystal oven	OC100-4	
	F1 Crystal	CR110-1-FREQ.* (For use without oven)	Y101 Y201
	F1 Crystal	CR110-3-FREQ.* (For use with oven)	Y301 Y401
	F2 Crystal	Same as F1 Crystal	Y102 Y202 Y302 Y402
NOTE: * Crystal frequency determined in accordance with information provided in Section 5.			

1-4. TECHNICAL SPECIFICATIONS.

Technical specifications for the TTRR are as follows:

Frequency range:

TTRR-1	2- to 4-mc
TTRR-2	4- to 8-mc
TTRR-3	8- to 16-mc
TTRR-4	16- to 32-mc

Tuning: Fixed-tuned.

Frequency control: Crystal-controlled oscillator, with selector switch and provision for two crystals.

Frequency stability: 1 part in 10^5 per day (without oven).
1 part in 10^6 per day (with optional crystal oven).

1-4. TECHNICAL SPECIFICATIONS (CONT).

R-F bandpass:	Approximately 0.5% of frequency to which module is tuned.
Noise figure:	15 db, or better.
Input impedance:	50 ohms (nominal), unbalanced.
Output:	1.75 mc i-f.
Power requirement:	Provided by associated receiver.

SECTION 2

INSTALLATION

2-1. INITIAL INSPECTION.

Each TTRR 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 content 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 of 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 TTRR is a plug-in module and can be installed in the associated receiver by inserting it into its respective position, no specific installation procedures are given in this manual. Initial installation and test procedures for the TTRR are, therefore, given in the associated receiver manual.

NOTE

Each TTRR module (refer to figure 1-1) is provided with a front panel knob to facilitate handling the unit when inserting or removing it from the receiver.

SECTION 3

OPERATOR'S SECTION

3-1. GENERAL.

Before attempting to operate the TTRR, 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 receiver manual for specific operating instructions.

TABLE 3-1. OPERATOR'S CONTROLS

ITEM	FUNCTION
F1/F2 switch	A two-position, screw driver-controlled switch that selects appropriate oscillator frequency for

TABLE 3-1. OPERATOR'S CONTROLS (CONT)

ITEM	FUNCTION
F1/F2 switch (cont)	reception on either F1 frequency or F2 frequency.
RECEIVER CLARIFIER	A trimmer capacitor for fine-tuning the local oscillator.

3-2. WARM-UP PERIOD.

When a crystal oven is used in the TTRR, a 30-minute warm-up period is required to attain proper frequency stability. When the TTRR is used without a crystal oven, no warm-up is required.

3-3. OPERATOR'S MAINTENANCE.

Operator's maintenance is not required on TTRR modules. Detailed maintenance, troubleshooting, repair, and alignment procedures are given in Section 5 of this manual.

SECTION 4

PRINCIPLES OF OPERATION

4-1. GENERAL.

With one exception (refer to the NOTE below), the operating principles for each TTRR module (TTRR-1, TTRR-2, TTRR-3, and TTRR-4) are similar, and therefore only TTRR-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 TTRR-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 TTRR-1, will apply equally as well to TTRR-2 through TTRR-4 (refer to figure 4-1 through figure 4-4).

Refer to figure 7-1. The r-f signal applied to the TTRR is amplified by three common-emitter, tuned-collector, class A amplifiers (Q101, Q102, and Q103). Each of these amplifiers is fixed-tuned and will select only one particular signal.

The gain of each r-f amplifier is controlled by an externally generated AGC (automatic gain control) signal. The AGC input, a positive voltage, is supplied through the module connector to the emitters of the three amplifiers to forward bias the transistors. The AGC input to each of the three r-f amplifiers controls the individual stage gains so that the r-f input to mixer Q104 is constant regardless of signal strength.

When the r-f signal level is low, the AGC signal is at its minimum value and the transistors are biased to operate on the linear portion of their transfer curves. As the r-f signal level and the AGC signal level increases, the operating points of the amplifiers are shifted up the transfer curves into the non-linear region. As the transistors approach saturation, the gain decreases keeping the input to mixer Q104 relatively constant. If the AGC input is not connected to the TTRR, the gain of the r-f amplifiers is fixed by resistor R116 (refer to figures 7-2 through 7-4 for resistor designations for TTRR-2, TTRR-3, and TTRR-4).

The output of the third r-f amplifier is applied to mixer Q104; the mixer is also supplied with the output of local oscillator Q106 through buffer amplifier Q105, which ensures maximum stability of local oscillator.

In TTRR-1, TTRR-2, and TTRR-3 the oscillator operates 1.75 mc above the incoming r-f signal. In TTRR-4 the oscillator operates 1.75 mc above the incoming r-f signal. In TTRR-4 the oscillator operates between 8.875 and 16.875 mc; doubler Q405 multiplies the oscillator output to the range of 17.75 to 33.75 mc. Crystal Y101 or Y102 may be selected with the F1/F2 switch, permitting reception on one of two frequencies without removing and replacing crystal. RECEIVER CLARIFIER capacitor control is used to fine-tune the local oscillator.

The mixer produces the beat frequency of the r-f and local oscillator frequencies; the output circuit of mixer Q104 is tuned to 1.75 mc.

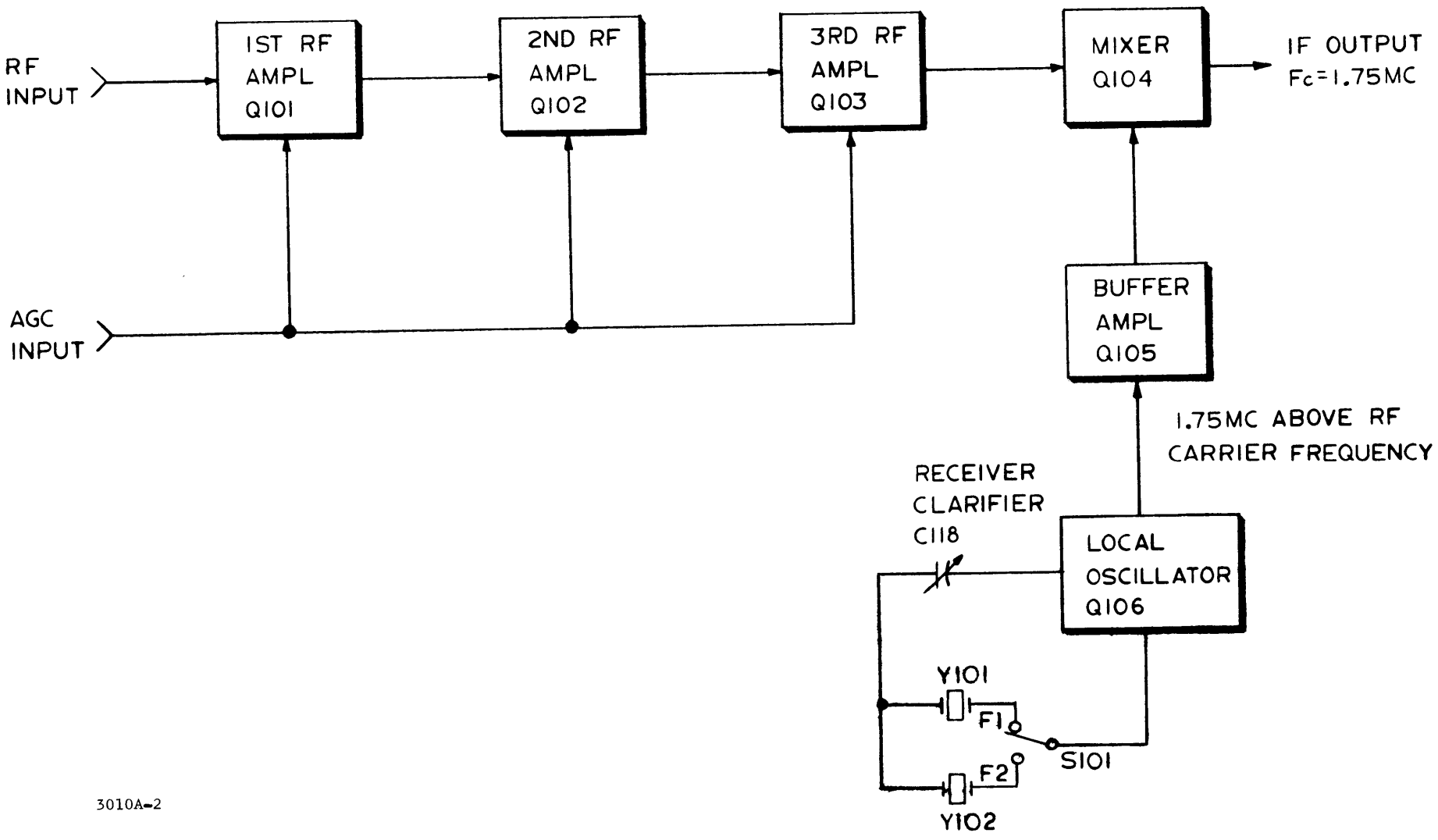

Figure 4-1. Simplified Block Diagram, TTRR-1

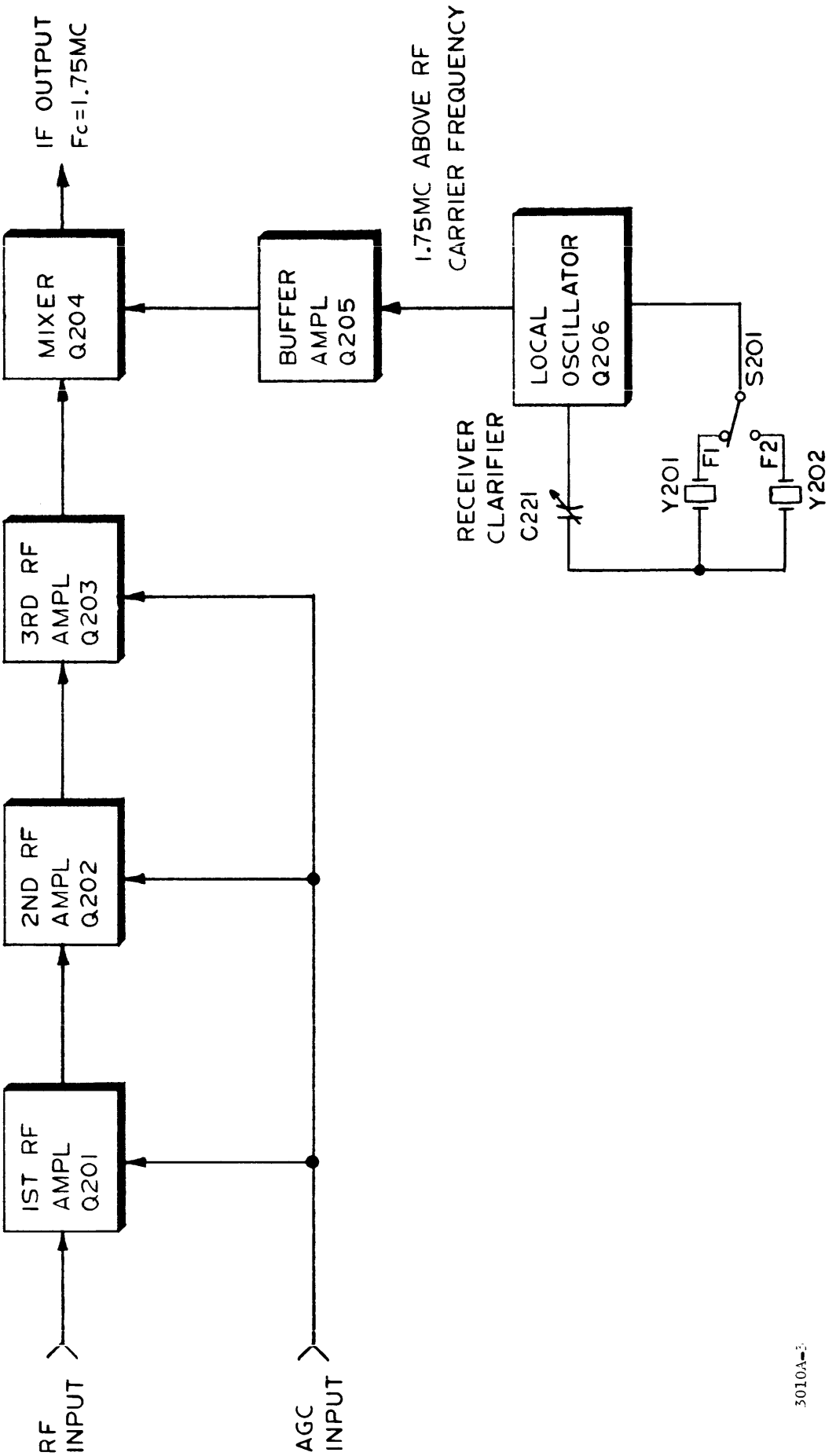

Figure 4-2. Simplified Block Diagram, TTRR-2

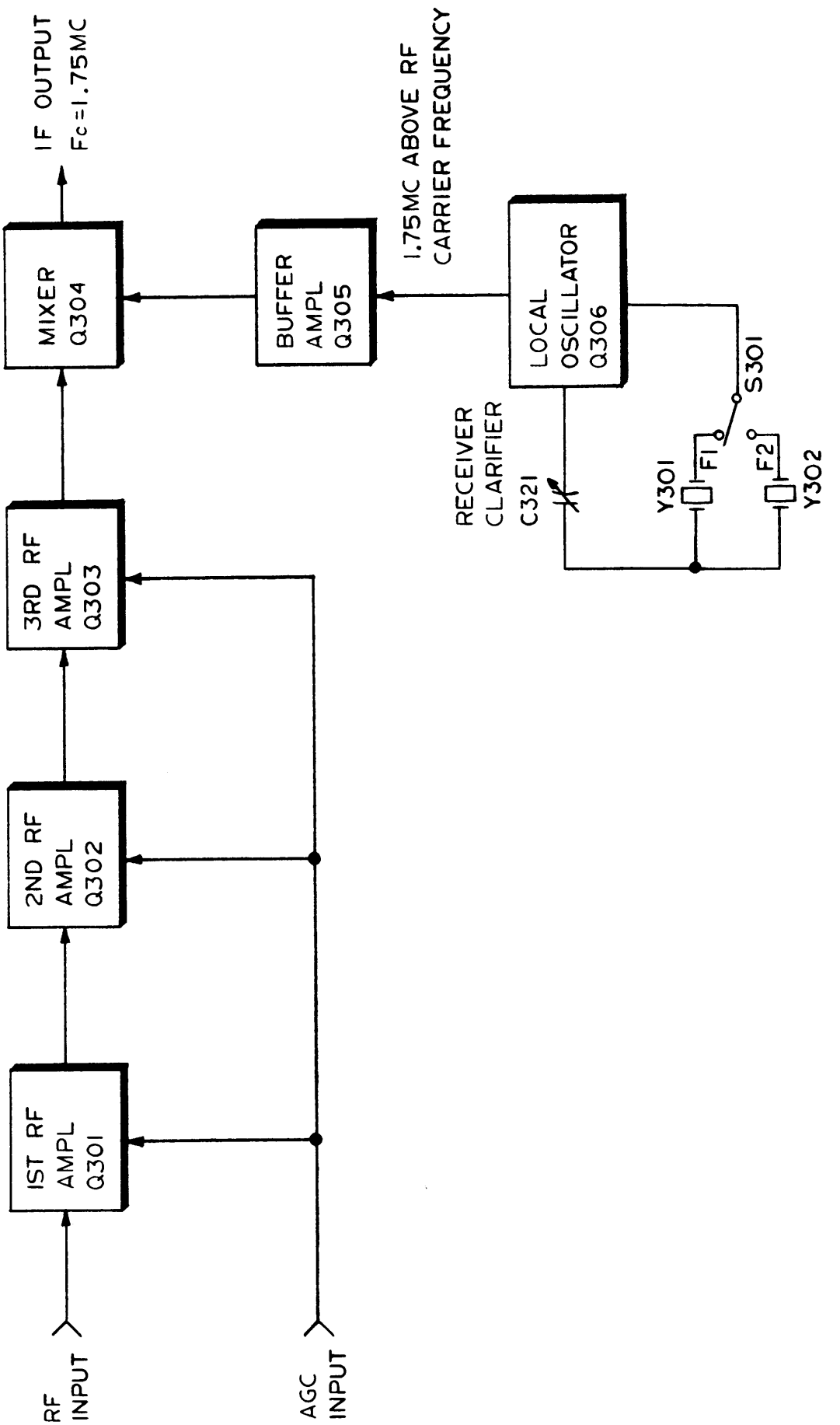

Figure 4-3. Simplified Block Diagram, TTRR-3

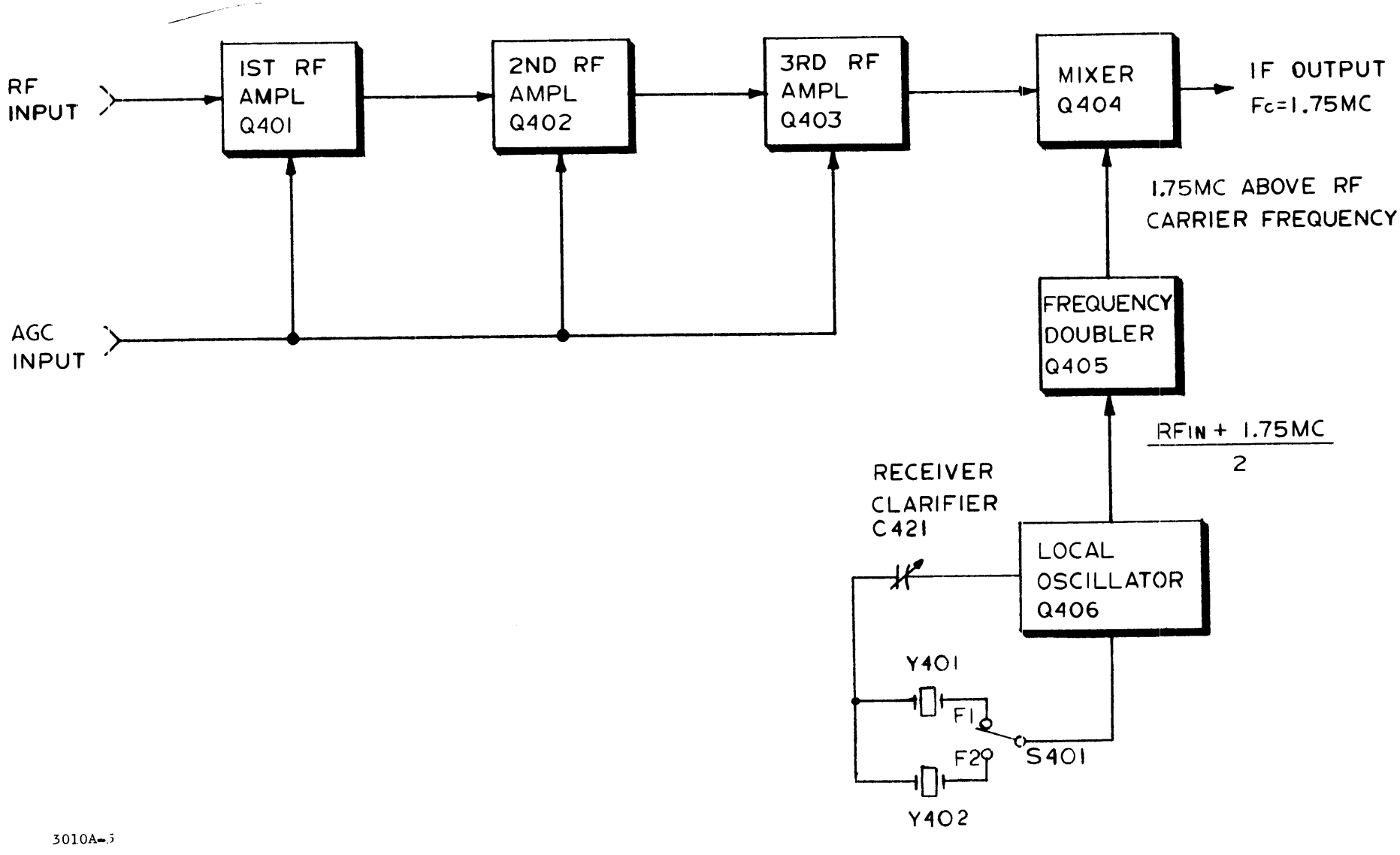

Figure 4-4. Simplified Block Diagram, TTRR-4

SECTION 5

MAINTENANCE

5-1. GENERAL.

With the exception of frequency doubling circuitry contained in the TTRR-4, all TTRR modules are physically and functionally similar. Therefore, only the TTRR-1 is described and illustrated in this section; differences between the TTRR-4 and other modules are appropriately noted in text.

NOTE

Reference symbols for TTRR components are assigned according to the particular module. For example, transistors in TTRR-1 are Q101 through Q106; transistors in TTRR-2 are Q201 through Q206. etc. (refer to figure 5-1 and the appropriate schematic diagram).

5-2. PREVENTIVE MAINTENANCE.

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

5-3. TROUBLESHOOTING.

When a TTRR module is suspected of malfunction, the source of trouble may be located by the following procedures (required test equipment is listed in table 5-1):

TABLE 5-1. TEST EQUIPMENT

ITEM	FUNCTION
Frequency Counter (Hewlett Packard, Model 524C, or equiv.)	Used during troubleshooting and alignment procedures.
R-F Signal Generator (Hewlett Packard, Model 606A, or equiv.)	Same.
Oscilloscope (Tektronix, Model 545, or equiv.)	Same.
Volt-ohm-milli-ammeter (Simpson, Model 260, or equiv.)	Same.

a. Remove right-side cover of TTRR, and check +12 vdc and -12 vdc inputs at pins 1 and 8, respectively, of connector at rear of the module. (If necessary, use module extender supplied with the receiver.) If +12 vdc or -12 vdc are not present, check power supply circuitry in associated receiver.

b. Using an oscilloscope, measure signal level at TP2; level should be approximately 0.3 volts peak-to-peak.

c. Using a frequency counter, check frequency of signal at TP2; signal should be approximately 1.75 mc above operating frequency of TTRR (F1 or F2, dependent upon setting of F1/F2 switch.) If this signal is not obtained, check circuitry of local oscillator and buffer/doubler.

d. Remove local oscillator crystal Y101 and Y102 (refer to the schematic diagrams). Connect r-f signal generator to ANTENNA jack of receiver; adjust generator to deliver TTRR operating frequency (F1 or F2) at 100μv.

e. Measure signal level at TP1; level should be between 100 and 200 mv peak-to-peak. If this signal is not obtained, check circuitry of the three r-f amplifiers.

f. Replace local oscillator crystal removed in step d. Measure signal level at TP3; signal level should be approximately 500 mv peak-to-peak. If this signal is not obtained, check circuitry of the mixer stage.

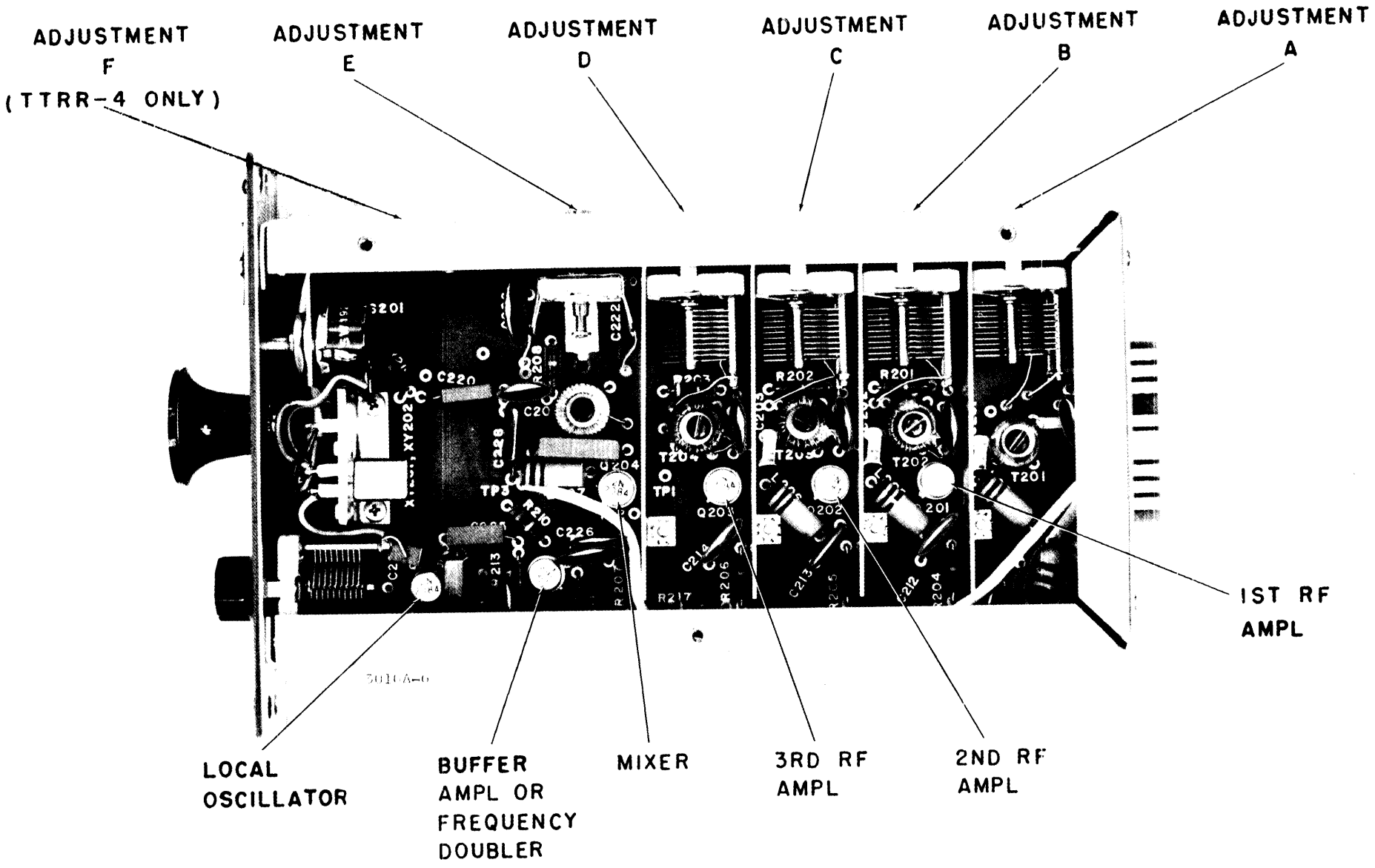

Figure 5-1. Right-Side Cover Removed, Module TTRR

5-4. REPAIR.

Repair of TTRR modules consists of component replacement and resoldering wire connections. The following precautions should be observed:

a. Use replacement components identical to defective component (same part number), and position the replacement component in exact place on the board.

NOTE

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

b. Use long-nosed pliers or alligator clips when soldering wire leads in order to transfer heat from the junction and thus prevent damage to the component.

NOTE

Use 50-watt soldering iron for soldering all wire leads and connections. Use suitable flux remover to clean soldered joints.

CAUTION

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

5-5. ALIGNMENT.

After repairing or replacing components in the TTRR, the unit must be checked for alignment. Also, when the operating frequency (F1, F2) of the module is to be changed, the alignment procedure given is to be followed. (Refer to paragraph 5-6 to determine local oscillator crystal frequency).

To align the r-f and i-f amplifier stages, proceed as follows:

a. Disconnect antenna from receiver, and connect r-f signal generator to antenna input. (If necessary, use module extender supplied with receiver).

b. Remove left-side cover of TTRR and local oscillator crystals (or crystal oven, if used).

NOTE

If only "peaking up" of amplifier is required, omit steps c through h.

c. Adjust generator to deliver desired operating frequency (mean frequency of F1, F2). Connect oscilloscope to stator of adjustment A capacitor (refer to table 5-2).

d. Adjust screw A on TTRR for maximum amplitude on oscilloscope.

e. Connect oscilloscope to stator of adjustment B capacitor (refer to table 5-2). Adjust screw A for maximum amplitude on oscilloscope, then adjust screw B for maximum amplitude.

f. Connect oscilloscope to stator of adjustment C capacitor (refer to table 5-2). Adjust screw A for maximum amplitude on oscilloscope; readjust screw B for maximum amplitude, then adjust screw C for maximum amplitude on oscilloscope.

g. Connect oscilloscope to stator of adjustment D capacitor (refer to table 5-2). Readjust screws A, B, and C (in that order) for maximum amplitude on oscilloscope. Adjust screw D for maximum amplitude on oscilloscope.

h. Connect oscilloscope to TP1 (mixer input), and set generator output at 1 microvolt.

i. Readjust screws A through D (in that order) for maximum amplitude on oscilloscope.

j. Insert local oscillator crystal (or crystal oven), and allow 30 minutes for crystal to warm up.

NOTE

For TTRR-4 alignment only: Connect oscilloscope to TP2; adjust screw F for maximum amplitude on scope. Check frequency with counter; frequency of signal TP2 should be approximately 1.75 mc above module operating frequency.

k. Connect oscilloscope to TP3, then adjust screw E for maximum amplitude on oscilloscope.

l. Replace right-side cover of TTRR.

m. Connect oscilloscope to i-f output (terminal 3 on receiver receptacle) and readjust screws A through E (in that order) for maximum amplitude on oscilloscope.

n. Disconnect test equipment, and install TTRR in receiver.

TABLE 5-2. TUNING CAPACITOR DESIGNATIONS

ADJUSTMENT	TTRR-1	TTRR-2	TTRR-3	TTRR-4
A	C114	C216	C316	C416
B	C115	C217	C317	C417
C	C116	C218	C318	C418
D	C117	C219	C319	C419

5-6. DETERMINATION OF LOCAL OSCILLATOR CRYSTAL FREQUENCY.

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

EXAMPLE: If a TTRR-2 module has been aligned at 4020 kc, appropriate crystals may be inserted for reception of any two signals between 4010 and 4030 kc.

NOTE

The desired sidebands of the signals to be received must also fall within the 0.5% r-f bandpass limits.

a. TTRR-1, TTRR-2, AND TTRR-3 CRYSTAL FREQUENCIES. - In Receiver Converter, Models TTRR-1, TTRR-2, and TTRR-3, the local oscillator operates approximately 1750 kilocycles above the signal to be received.

fx = fo + 1750 kc where:
fx = local oscillator crystal frequency in kilocycles.
fo = frequency of signal to be received in kilocycles.

b. TTRR-4 CRYSTAL FREQUENCIES. - Receiver Converter, Model TTRR-4, has a frequency doubler stage between its local oscillator and mixer; therefore, the formula is modified.

$$fx = \frac{fo + 1750 \text{ kc}}{2}$$

c. CRYSTAL FREQUENCIES FOR CW, FSK, AND FAX. - The receivers in which the TTRR modules are used may not be capable of detecting an i-f signal whose frequency is exactly 1750 kc. For CW, FSK, or FAX reception, the TTRR local oscillator frequency must be displaced slightly. For CW reception, the formula becomes:

fx = fo + 1750.5 kc
or
fx = fo + 1749.5 kc.

For FSK reception, the formula must be modified so as to place the audio output of the receiver in the designed center-frequency of the audio frequency shift converter.

EXAMPLE: If the audio frequency shift converter is designed to accept signals centered at 2550 cps, the formula becomes:

fx = fo + 1752.22 kc
or
fx = fo + 1747.45 kc.

For FAX reception, the formula becomes:

fx = fo + 1751.9 kc
or
fx = fo + 1748.1 kc.

SECTION 6
PARTS LIST

6-1. INTRODUCTION

The parts list presented in this section is a cross-reference list of parts identified by a reference designation and TMC part number. In most cases, parts appearing on schematic diagrams are assigned reference designations in accordance with MIL-STD-16. Wherever practicable, the reference designation is marked on the equipment, close to the part it identifies. In most cases, mechanical and electro-mechanical parts have TMC part numbers stamped on them.

To expedite delivery when ordering any part, specify the following:

a. Generic name.

b. Reference designation.

c. TMC part number.

d. Model and serial numbers of the equipment containing the part being replaced; this can be obtained from the equipment nameplate.

For replacement parts not covered by warranty (refer to warranty sheet in front of manual), address all purchase orders to:

The Technical Materiel Corporation
Attention: Sales Department
700 Fenimore Road
Mamaroneck, New York

RECEIVER CONVERTER MODULE, 2-4 MC
SYMBOL SERIES 100

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C101	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 2.2 uuf, ±0.25 uuf; 500 WVDC; char. CK.	CC20CK2R2C
C102	NOT USED	
C103	Same as C101.	
C104	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10,000 uuf, GMV; 500 WVDC.	CC100-16
C105 thru C107	Same as C104.	
C108	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 200,000 uuf, +80% -20%; 25 WVDC.	CC100-33
C109 thru C112	Same as C108.	
C113	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 5,000 uuf, GMV; 500 WVDC.	CC100-15
C114	CAPACITOR, VARIABLE, AIR DIELECTRIC: 3.9-75 uuf; 29 plates.	CT103-2
C115	CAPACITOR, VARIABLE, AIR DIELECTRIC: 3.2-50 uuf; 19 plates.	CT103-1
C116 thru C118	Same as C115.	
C119	CAPACITOR, VARIABLE, MICA DIELECTRIC: 6 plates; 80-480 uuf; 1 section; 175 WVDC.	CV113-10
C120	Same as C104.	
C121	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 25,000 uuf, +80% -20%; 500 WVDC.	CC100-25
C122	Same as C121.	
C123	CAPACITOR, FIXED, MICA DIELECTRIC: 270 uuf, ±5%; 500 WVDC; char. F.	CM15F271J03
C124	CAPACITOR, FIXED, MICA DIELECTRIC: 5 uuf, ±5%; 500 WVDC; char. C.	CM15C050J03YY

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C125	CAPACITOR, FIXED, MICA DIELECTRIC: 2,000 uuf, ±2%; 500 WVDC; char. F.	CM100-14
C126	CAPACITOR, FIXED, MICA DIELECTRIC: 110 uuf, ±5%; 500 WVDC; char. F.	CM15F111J03
C127	CAPACITOR, FIXED, MICA DIELECTRIC: 680 uuf, ±2%; 500 WVDC; char. F.	CM20F681G03
C128	Same as C121.	
C129	Same as C104.	
C130	CAPACITOR, FIXED, MICA DIELECTRIC: 2,200 uuf, ±10%; 300 WVDC; straight wire leads.	CM112F202K3S
C131	Same as C104.	
L101	COIL, RADIO FREQUENCY: fixed; 0.047 mh, ±10%; 100 ma.	CL140-7
L102 thru L106	Same as L101.	
L107	COIL, RADIO FREQUENCY: fixed; 100 mh, ±10%; 2.8 ohms DC resistance; molded case.	CL240-100
Q101	TRANSISTOR: germanium; PNP; JEDEC type 2N2084 transistor with a controlled hfe limit of 100-150; JEDEC type TO33 case.	TX113
Q102 thru Q106	Same as Q101.	
R101	RESISTOR, FIXED, COMPOSITION: 4,700 ohms, ±5%; 1/2 watt.	RC20GF472J
R102	Same as R101.	
R103	RESISTOR, FIXED, COMPOSITION: 3,900 ohms, ±5%; 1/2 watt.	RC20GF392J
R104	RESISTOR, FIXED, COMPOSITION: 1,200 ohms, ±5%; 1/2 watt.	RC20GF122J
R105	Same as R104.	
R106	Same as R104.	

RECEIVER CONVERTER MODULE, 2-4 MC
SYMBOL SERIES 100

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R107	RESISTOR, FIXED, COMPOSITION: 12,000 ohms, ±5%; 1/2 watt.	RC20GF123J
R108	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, ±5%; 1/2 watt.	RC20GF102J
R109	RESISTOR, FIXED, COMPOSITION: 470 ohms, ±10%; 1/2 watt.	RC20GF471K
R110	RESISTOR, FIXED, COMPOSITION: 68 ohms, ±10%; 1/2 watt.	RC20GF680K
R111	Same as R103.	
R112	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, ±5%; 1/2 watt.	RC20GF222J
R113	RESISTOR, FIXED, COMPOSITION: 47 ohms, ±10%; 1/2 watt.	RC20GF470K
R114	Same as R103.	
R115	Same as R112.	
R116	Same as R101.	
S101	SWITCH, ROTARY: miniature; 1 deck, 2 positions, non-shorting type; rated to break at 1 amp, 115 VAC non-inductive; 5 amps, 115 VAC.	SW192-12NSJ
T101	TRANSFORMER, RADIO FREQUENCY: primary inductance 108 uh, ±10%.	TZ128
T102	TRANSFORMER, RADIO FREQUENCY: primary inductance 117 uh, ±10%.	TZ129
T103	Same as T102.	
T104	TRANSFORMER, RADIO FREQUENCY: primary inductance 117 uh, ±10%.	TZ130
T105	TRANSFORMER, RADIO FREQUENCY: primary inductance 4.5 uh, ±10%.	TZ127
W101	CABLE ASSEMBLY, SHIELDED: 2 conductor cable.	CA808-1
W102	CABLE ASSEMBLY: RF; RG188/U type cable; no ferrules.	CA418-8

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
XY101	BRACKET, CRYSTAL SOCKET: 6 sub-miniature jack tips and swage nuts.	LD1342/MS3414
XY102	Same as XY101.	
XZ101	Same as XY101.	
Y101	CRYSTAL UNIT, QUARTZ, OVEN (SEE NOTE 1)	CR110-1-FREQ
Y101	CRYSTAL UNIT, QUARTZ, AMBIENT (SEE NOTE 2)	CR110-3-FREQ
Y102	Same as Y101. (SEE NOTE 1)	
Y102	Same as Y101. (SEE NOTE 2)	
Z101	OVEN, CRYSTAL: 12 VDC (SEE NOTE 1)	OC100-1
Z101	OVEN, CRYSTAL: 24 VDC (SEE NOTE 1)	OC100-2
Z101	OVEN, CRYSTAL: 115 VAC (SEE NOTE 1)	OC100-3
Z101	OVEN, CRYSTAL: 32 VDC (SEE NOTE 1)	OC100-4

NOTES

1. Used when crystal ovens are required by customer.
2. Used when no crystal ovens are required by customer.

RECEIVER CONVERTER MODULE, 4-8 MC
SYMBOL SERIES 200

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C201	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 2.2 uuf, ±0.25 uuf; 500 WVDC; char. CK.	CC20CK2R2C
C202	Same as C201.	
C203	Same as C201.	
C204	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10,000 uuf, GMV; 500 WVDC.	CC100-16
C205 thru C207	Same as C204.	
C208	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 25,000 uuf, +80% -20%; 500 WVDC.	CC100-25
C209	Same as C208.	
C210	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 200,000 uuf, +80% -20%; 25 WVDC.	CC100-33
C211 thru C214	Same as C210.	
C215	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 5,000 uuf, GMV; 500 WVDC.	CC100-15
C216	CAPACITOR, VARIABLE, AIR DIELECTRIC: 3.2-50 uuf; 19 plates.	CT103-1
C217 thru C219	Same as C216.	
C220	CAPACITOR, FIXED, MICA DIELECTRIC: 110 uuf, ±5%; 500 WVDC; char. F.	CM15F111J03
C221	Same as C216.	
C222	CAPACITOR, VARIABLE, MICA DIELECTRIC: 6 plates; 80-480 uuf; 1 section; 175 WVDC.	CV113-10
C223	CAPACITOR, FIXED, MICA DIELECTRIC: 2,000 uuf, ±2%; 500 WVDC; char. F.	CM100-14
C224	Same as C208.	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C225	CAPACITOR, FIXED, MICA DIELECTRIC: 180 uuf, ±1%; 500 WVDC; char. B.	CM15B181F03YY
C226	Same as C204.	
C227	CAPACITOR, FIXED, MICA DIELECTRIC: 5 uuf, ±5%; 500 WVDC; char. C.	CM15C050J03YY
C228	CAPACITOR, FIXED, MICA DIELECTRIC: 2,000 uuf, ±10%; 300 WVDC; straight wire leads.	CM112F202K3S
C229	CAPACITOR, FIXED, MICA DIELECTRIC: 680 uuf, ±2%; 500 WVDC; char. F.	CM20F681G03
C230	Same as C204.	
C231	Same as C204.	
L201	COIL, RADIO FREQUENCY: fixed; 0.270 mh, ±10%; 200 ma.	CL140-3
L202	Same as L201.	
L203	Same as L201.	
L204	COIL, RADIO FREQUENCY: fixed; 100 mh, ±10%; 2.8 ohms DC resistance; molded case.	CL240-100
L205 thru L207	Same as L204.	
Q201	TRANSISTOR: germanium; PNP; JEDEC type 2N2495 transistor with a controlled hfe limit of 95-150; JEDEC type TO72 case.	TX109
Q202	TRANSISTOR: germanium; PNP; JEDEC type 2N2084 transistor with a controlled hfe limit of 100-150; JEDEC type TO33 case.	TX113
Q203 thru Q206	Same as Q202.	
R201	RESISTOR, FIXED, COMPOSITION: 6,800 ohms, ±5%; 1/2 watt.	RC20GF682J
R202	RESISTOR, FIXED, COMPOSITION: 5,600 ohms, ±5%; 1/2 watt.	RC20GF562J

RECEIVER CONVERTER MODULE, 4-8 MC
SYMBOL SERIES 200

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R203	RESISTOR, FIXED, COMPOSITION: 4,700 ohms, ±5%; 1/2 watt.	RC20GF472J
R204	RESISTOR, FIXED, COMPOSITION: 1,200 ohms, ±5%; 1/2 watt.	RC20GF122J
R205	Same as R204.	
R206	Same as R204.	
R207	RESISTOR, FIXED, COMPOSITION: 12,000 ohms, ±5%; 1/2 watt.	RC20GF123J
R208	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, ±5%; 1/2 watt.	RC20GF102J
R209	RESISTOR, FIXED, COMPOSITION: 470 ohms, ±10%; 1/2 watt.	RC20GF471K
R210	RESISTOR, FIXED, COMPOSITION: 68 ohms, ±10%; 1/2 watt.	RC20GF680K
R211	RESISTOR, FIXED, COMPOSITION: 3,900 ohms, ±5%; 1/2 watt.	RC20GF392J
R212	Same as R211.	
R213	RESISTOR, FIXED, COMPOSITION: 47 ohms, ±10%; 1/2 watt.	RC20GF470K
R214	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, ±5%; 1/2 watt.	RC20GF222J
R215	Same as R208.	
R216	NOT USED	
R217	Same as R203.	
S201	SWITCH, ROTARY: miniature; 1 deck, 2 positions, non-shorting type; rated to break at 1 amp, 115 VAC non-inductive; 5 amps, 115 VAC.	SW192-12NSJ
T201	TRANSFORMER, RADIO FREQUENCY: primary inductance 31 uh, ±10%.	TZ131
T202	TRANSFORMER, RADIO FREQUENCY: primary inductance 30 uh, ±10%.	TZ132

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
T203	Same as T202.	
T204	TRANSFORMER, RADIO FREQUENCY: primary inductance 30 uh, ±10%.	TZ133
T205	TRANSFORMER, RADIO FREQUENCY: primary inductance 4.5 uh, ±10%.	TZ127
W201	CABLE ASSEMBLY, SHIELDED: 2 conductor cable.	CA808-1
W202	CABLE ASSEMBLY: RF; RG188/U type cable; no ferrules.	CA418-8
XY201	BRACKET, CRYSTAL SOCKET: 6 sub-miniature jack tips and swage nuts.	LD1342/MS3414
XY202	Same as XY201.	
XZ201	Same as XY201.	
Y201	CRYSTAL UNIT, QUARTZ, OVEN (SEE NOTE 1)	CR110-1-FREQ
Y201	CRYSTAL UNIT, QUARTZ, AMBIENT (SEE NOTE 2)	CR110-3-FREQ
Y202	Same as Y201. (SEE NOTE 1)	
Y202	Same as Y201. (SEE NOTE 2)	
Z201	OVEN, CRYSTAL: 12 VDC (SEE NOTE 1)	OC100-1
Z201	OVEN, CRYSTAL: 24 VDC (SEE NOTE 1)	OC100-2
Z201	OVEN, CRYSTAL: 115 VAC (SEE NOTE 1)	OC100-3
Z201	OVEN, CRYSTAL: 32 VDC (SEE NOTE 1)	OC100-4
	NOTES 1. Used when crystal ovens are required by customer. 2. Used when no crystal ovens are required by customer.	

RECEIVER CONVERTER MODULE, 8-16 MC
SYMBOL SERIES 300

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C301	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 2.2 uuf, ±0.25 uuf; 500 WVDC; char. CK.	CC20CK2R2C
C302	Same as C301.	
C303	Same as C301.	
C304	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10,000 uuf, GMV; 500 WVDC.	CC100-16
C305 thru C309	Same as C304.	
C310	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 200,000 uuf, +80% -20%; 25 WVDC.	CC100-33
C311 thru C314	Same as C310.	
C315	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 5,000 uuf, GMV; 500 WVDC.	CC100-15
C316	CAPACITOR, VARIABLE, AIR DIELECTRIC: 3.2-50 uuf; 19 plates.	CT103-1
C317 thru C319	Same as C316.	
C320	CAPACITOR, FIXED, MICA DIELECTRIC: 110 uuf, ±5%; 500 WVDC; char. F.	CM15F111J03
C321	Same as C316.	
C322	CAPACITOR, VARIABLE, MICA DIELECTRIC: 6 plates; 80-480 uuf; 1 section; 175 WVDC.	CV113-10
C323	CAPACITOR, FIXED, MICA DIELECTRIC: 1,500 uuf, ±2%; 500 WVDC; char. F.	CM100-10
C324	Same as C304.	
C325	CAPACITOR, FIXED, MICA DIELECTRIC: 100 uuf, ±5%; 500 WVDC; char. F.	CM15F101J03
C326	Same as C304.	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C327	CAPACITOR, FIXED, MICA DIELECTRIC: 5 uuf, ±5%; 500 WVDC; char. C.	CM15C050J03YY
C328	CAPACITOR, FIXED, MICA DIELECTRIC: 240 uuf, ±5%; 500 WVDC; char. F.	CM15F241J03
C329	Same as C304.	
C330	CAPACITOR, FIXED, MICA DIELECTRIC: 330 uuf, ±5%; 500 WVDC; char. F.	CM15F331J03
C331	CAPACITOR, FIXED, MICA DIELECTRIC: 2,000 uuf, ±10%; 300 WVDC; straight wire leads.	CM112F202K3S
C332	Same as C304.	
L301	COIL, RADIO FREQUENCY: fixed; 0.270 mh, ±10%; 200 ma.	CL140-3
L302	Same as L301.	
L303	Same as L301.	
L304	COIL, RADIO FREQUENCY: fixed; 47 mh, ±10%; 2.3 ohms DC resistance; molded case.	CL240-47
L305	Same as L304.	
L306	Same as L304.	
Q301	TRANSISTOR: germanium; PNP; JEDEC type 2N2495 transistor with a controlled hfe limit of 95-150; JEDEC type TO72 case.	TX109
Q302 thru Q306	Same as Q301.	
R301	RESISTOR, FIXED, COMPOSITION: 3,900 ohms, ±5%; 1/2 watt.	RC20GF392J
R302	RESISTOR, FIXED, COMPOSITION: 3,300 ohms, ±5%; 1/2	RC20GF332J
R303	RESISTOR, FIXED, COMPOSITION: 2,700 ohms, ±5%; 1/2 watt.	RC20GF272J
R304	RESISTOR, FIXED, COMPOSITION: 1,200 ohms, ±5%; 1/2 watt.	RC20GF122J
R305	Same as R304.	

RECEIVER CONVERTER MODULE, 8-16 MC
SYMBOL SERIES 300

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R306	Same as R304.	
R307	RESISTOR, FIXED, COMPOSITION: 12,000 ohms, ±5%; 1/2 watt.	RC20GF123J
R308	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, ±5%; 1/2 watt.	RC20GF102J
R309	RESISTOR, FIXED, COMPOSITION: 470 ohms, ±10%; 1/2 watt.	RC20GF471K
R310	RESISTOR, FIXED, COMPOSITION: 68 ohms, ±10%; 1/2 watt.	RC20GF680K
R311	Same as R301.	
R312	Same as R301.	
R313	RESISTOR, FIXED, COMPOSITION: 47 ohms, ±10%; 1/2 watt.	RC20GF470K
R314	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, ±5%; 1/2 watt.	RC20GF222J
R315	Same as R308.	
R316	NOT USED	
R317	RESISTOR, FIXED, COMPOSITION: 4,700 ohms, ±5%; 1/2 watt.	RC20GF472J
S301	SWITCH, ROTARY: miniature; 1 deck, 2 positions, non-shorting type, rated to break at 1 amp, 115 VAC non-inductive; 5 amps, 115 VAC.	SW192-12NSJ
T301	TRANSFORMER, RADIO FREQUENCY: primary inductance 8 uh, ±10%.	TZ134
T302	TRANSFORMER, RADIO FREQUENCY: primary inductance 8.7 uh, ±10%.	TZ135
T303	Same as T302.	
T304	TRANSFORMER, RADIO FREQUENCY: primary inductance 8.5 uh, ±10%.	TZ136
T305	TRANSFORMER, RADIO FREQUENCY: primary inductance 4.5 uh, ±10%.	TZ127

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
W301	CABLE ASSEMBLY, SHIELDED: 2 conductor cable.	CA808-1
W302	CABLE ASSEMBLY: RF; RG188/U type cable; no ferrules.	CA418-8
XY301	BRACKET, CRYSTAL SOCKET: 6 sub-miniature jack tips and swage nuts.	LD1342/MS3414
XY301	Same as XY301.	
XZ301	Same as XY301.	
Y301	CRYSTAL UNIT, QUARTZ, OVEN (SEE NOTE 1)	CR110-1-FREQ
Y301	CRYSTAL UNIT, QUARTZ, AMBIENT (SEE NOTE 2)	CR110-3-FREQ
Y302	Same as Y301. (SEE NOTE 1)	
Y302	Same as Y301. (SEE NOTE 2)	
Z301	OVEN, CRYSTAL: 12 VDC (SEE NOTE 1)	OC100-1
Z301	OVEN, CRYSTAL: 24 VDC (SEE NOTE 1)	OC100-2
Z301	OVEN, CRYSTAL: 115 VAC (SEE NOTE 1)	OC100-3
Z301	OVEN, CRYSTAL: 32 VDC (SEE NOTE 1)	OC100-4

NOTES

1. Used when crystal ovens are required by customer.
2. Used when no crystal ovens are required by customer.

RECEIVER CONVERTER MODULE, 16-32 MC
SYMBOL SERIES 400

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C401	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 5 uuf, ±0.25 uuf; 500 WVDC; char. CH.	CC20CH050C
C402	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 2.2 uuf, ±0.25 uuf; 500 WVDC; char. CK.	CC20CK2R2C
C403	Same as C402.	
C404	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10,000 uuf, GMV; 500 WVDC.	CC100-16
C405 thru C409	Same as C404.	
C410	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 200,000 uuf, +80% -20%; 25 WVDC.	CC100-33
C411 thru C414	Same as C410.	
C415	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 5,000 uuf, GMV; 500 WVDC.	CC100-15
C416	CAPACITOR, VARIABLE, AIR DIELECTRIC: 3.2-50 uuf; 19 plates.	CT103-1
C417 thru C419	Same as C416.	
C420	CAPACITOR, VARIABLE, MICA DIELECTRIC: 2 plates; 5-80 uuf; 1 section; 175 WVDC.	CV113-11
C421	Same as C416.	
C422	CAPACITOR, VARIABLE, MICA DIELECTRIC: 6 plates; 80-480 uuf; 1 section; 175 WVDC.	CV113-10
C423	CAPACITOR, FIXED, MICA DIELECTRIC: 1,500 uuf, ±2%; 500 WVDC; char. F.	CM100-10
C424	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 25,000 uuf, +80% -20%; 500 WVDC.	CC100-25
C425	CAPACITOR, FIXED, MICA DIELECTRIC: 100 uuf, ±5%; 500 WVDC; char. F.	CM15F101J03

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C426	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 33 uuf, ±1 uuf; 500 WVDC.	CC107UL330F
C427	CAPACITOR, FIXED, MICA DIELECTRIC: 5 uuf, ±5%; 500 WVDC; char. C.	CM15C050J03YY
C428	CAPACITOR, FIXED, MICA DIELECTRIC: 330 uuf, ±5%; 500 WVDC; char. F.	CM15F331J03
C429	CAPACITOR, FIXED, MICA DIELECTRIC: 2,000 uuf, ±10%; 300 WVDC; straight wire leads.	CM112F202K3S
C430	Same as C404.	
C431	CAPACITOR, FIXED, MICA DIELECTRIC: 240 uuf, ±5%; 500 WVDC; char. F.	CM15F241J03
C432	CAPACITOR, FIXED, MICA DIELECTRIC: 110 uuf, ±5%; 500 WVDC; char. F.	CM15F111J03
C433	Same as C404.	
L401	COIL, RADIO FREQUENCY: fixed; 100 mh, ±10%; 2.8 ohms DC resistance; molded case.	CL240-100
L402	Same as L401.	
L403	Same as L401.	
L404	COIL, RADIO FREQUENCY: fixed; 22 uh, ±10%; 0.9 ohms DC resistance; molded case.	CL240-22
L405	Same as L404.	
L406	Same as L404.	
L407	COIL, RADIO FREQUENCY: fixed; 0.68 uh, ±20%; approx. resonant frequency 290 Mc; max. DC resistance 0.08 ohms; phenolic coil form.	CL270-0.68
Q401	TRANSISTOR: germanium; PNP; JEDEC type 2N2495 transistor with a controlled hfe limit of 95-150; JEDEC type TO72 case.	TX109
Q402 thru Q406	Same as Q401.	
R401	RESISTOR, FIXED, COMPOSITION: 4,700 ohms, ±5%; 1/2 watt.	RC20GF472J

RECEIVER CONVERTER MODULE, 16-32 MC
SYMBOL SERIES 400

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R402	RESISTOR, FIXED, COMPOSITION: 3,300 ohms, ±5%; 1/2 watt.	RC20GF332J
R403	Same as R402.	
R404	RESISTOR, FIXED, COMPOSITION: 1,200 ohms, ±5%; 1/2 watt.	RC20GF122J
R405	Same as R404.	
R406	Same as R404.	
R407	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, ±5%; 1/2 watt.	RC20GF103J
R408	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, ±5%; 1/2 watt.	RC20GF102J
R409	RESISTOR, FIXED, COMPOSITION: 470 ohms, ±10%; 1/2 watt.	RC20GF471K
R410	Same as R408.	
R411	RESISTOR, FIXED, COMPOSITION: 3,900 ohms, ±5%; 1/2 watt.	RC20GF392J
R412	Same as R411.	
R413	RESISTOR, FIXED, COMPOSITION: 47 ohms, ±10%; 1/2 watt.	RC20GF470K
R414	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, ±5%; 1/2 watt.	RC20GF222J
R415	Same as R401.	
S401	SWITCH, ROTARY: miniature; 1 deck, 2 positions, non-shorting type; rated to break at 1 amp, 115 VAC non-inductive; 5 amps, 115 VAC.	SW192-12NSJ
T401	TRANSFORMER, RADIO FREQUENCY: primary inductance 2.7 uh, ±10%.	TZ137
T402	TRANSFORMER, RADIO FREQUENCY: primary inductance 2.7 uh, ±10%.	TZ138
T403	Same as T402.	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
T404	TRANSFORMER, RADIO FREQUENCY: primary inductance 2.7 uh, ±10%.	TZ139
T405	TRANSFORMER, RADIO FREQUENCY: primary inductance 4.5 uh, ±10%.	TZ127
W401	CABLE ASSEMBLY, SHIELDED: 2 conductor cable.	CA808-1
W402	CABLE ASSEMBLY: RF; RG188/U type cable; no ferrules.	CA418-8
XY401	BRACKET, CRYSTAL SOCKET: 6 sub-miniature jack tips and swage nuts.	LD1342/MS3414
XY402	Same as XY401.	
XZ401	Same as XY401.	
Y401	CRYSTAL UNIT, QUARTZ, OVEN (SEE NOTE 1)	CR110-1-FREQ
Y401	CRYSTAL UNIT, QUARTZ, AMBIENT (SEE NOTE 2)	CR110-3-FREQ
Y402	Same as Y401. (SEE NOTE 1)	
Y402	Same as Y401. (SEE NOTE 2)	
Z401	OVEN, CRYSTAL: 12 VDC (SEE NOTE 1)	OC100-1
Z401	OVEN, CRYSTAL: 24 VDC (SEE NOTE 1)	OC100-2
Z401	OVEN, CRYSTAL: 115 VAC (SEE NOTE 1)	OC100-3
Z401	OVEN, CRYSTAL: 32 VDC (SEE NOTE 1)	OC100-4

NOTES

1. Used when crystal ovens are required by customer.
2. Used when no crystal ovens are required by customer.

SECTION 7

SCHEMATIC DIAGRAMS

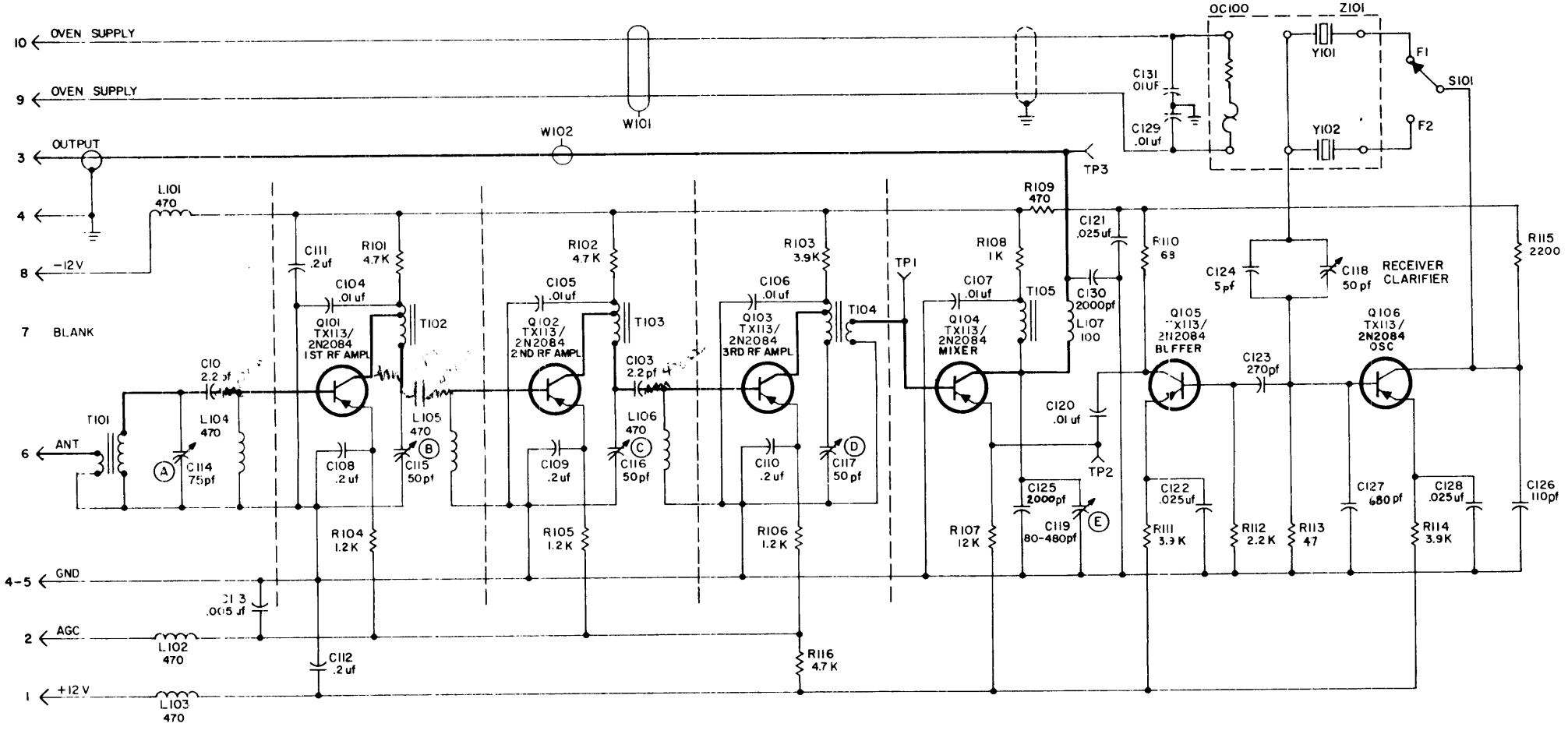

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Figure 7-1. Schematic Diagram, Receiver Converter, Model TTRR-1

1036630l0A

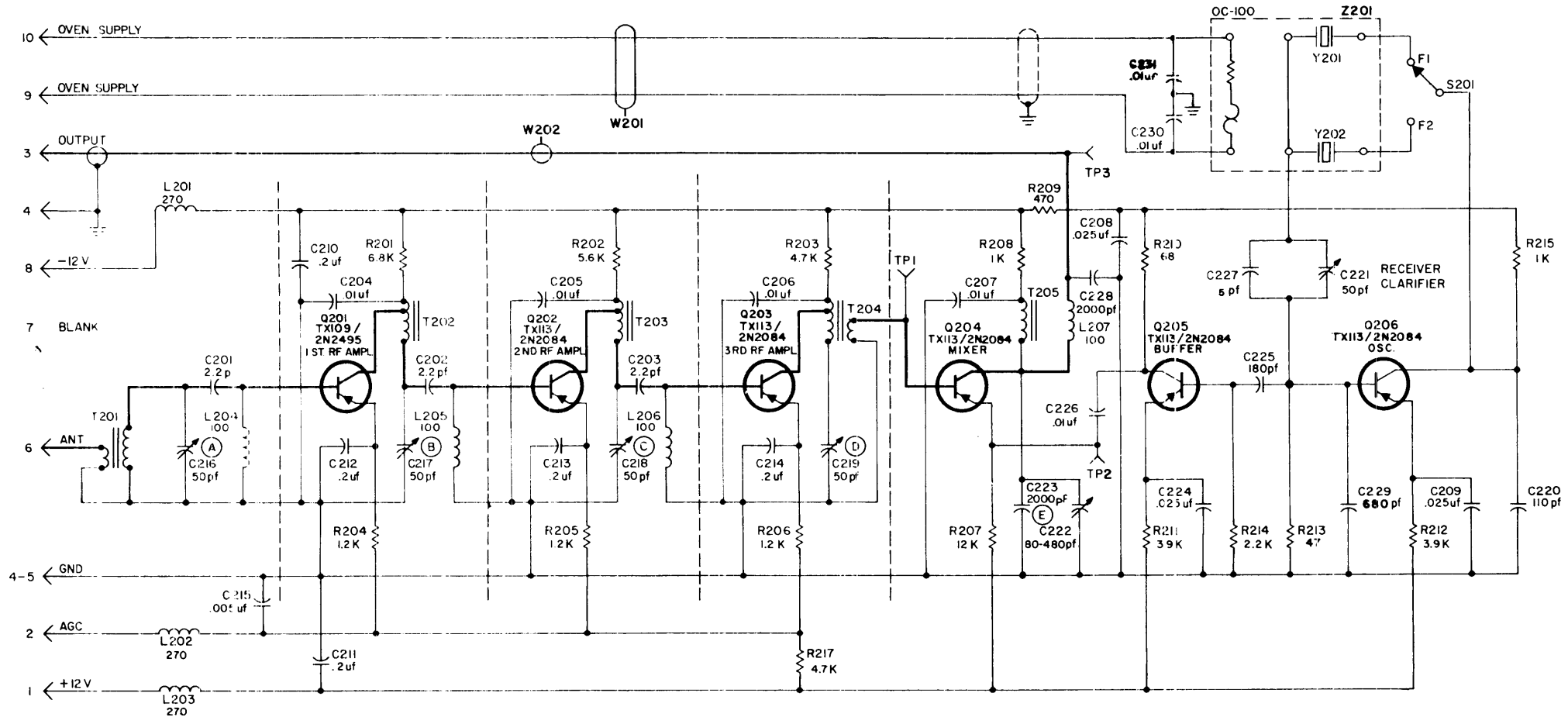

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Figure 7-2. Schematic Diagram, Receiver Converter, Model TTRR-2

103663010A

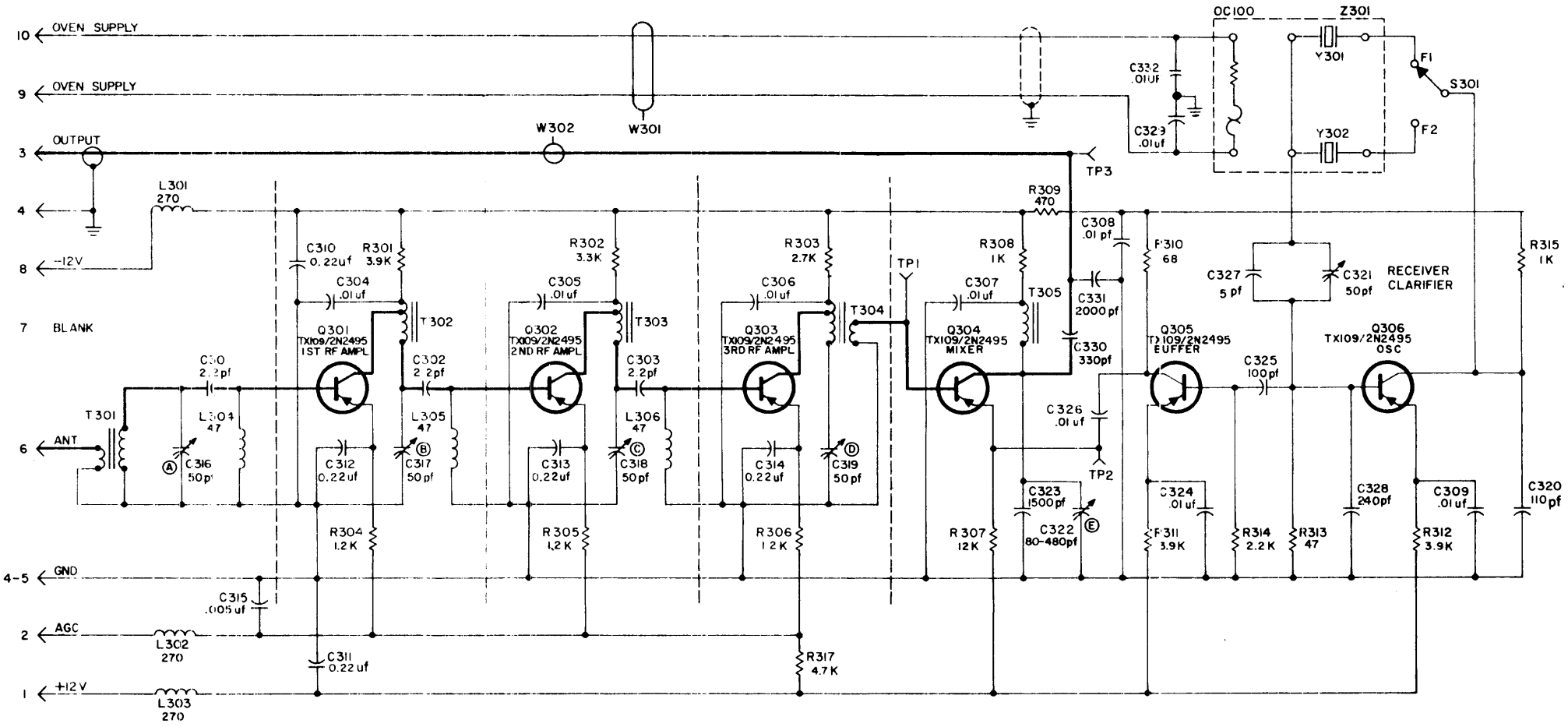

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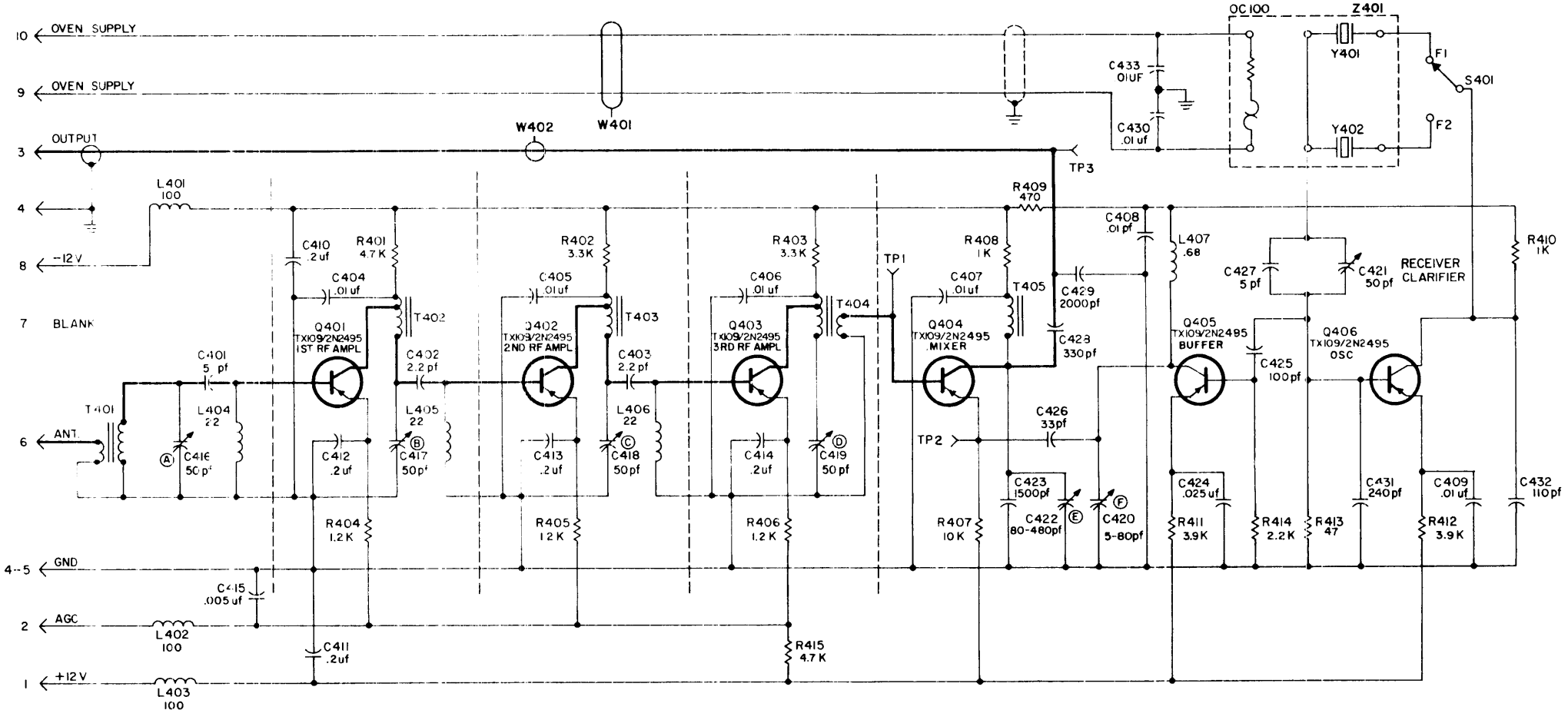
Figure 7-3. Schematic Diagram
Receiver Converter,
Model TTRR-3



CK-686F

Figure 7-4. Schematic Diagram Receiver Converter, Model TTRR-4