TECHNICAL MANUAL
FOR
MULTI-CHANNEL TRANSMITTER-RECEIVER MODEL MTR-100A

8100

THE TECHNICAL MATERIEL CORPORATION
MAMARONECK, N.Y. OTTAWA, CANADA

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TMC (Canada) LIMITED

TELECOMMUNICATIONS ENGINEERS

MAILING ADDRESS: R.R. No. 5, Ottawa, Ontario

A Subsidiary of The Technical Materiel Corporation, Mamaroneck, N.Y.

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* Electron tubes also include semi-conductor devices.

TECHNICAL MANUAL CHANGE NOTICE

Manual affected: MTR-100A

Number: 1N1033A

Date: 11 January, 1971

SECTION V - MAINTENANCE

Page 5-25, Para 5-3-3-a-(i)

Delete +15V at Pin 10

Add +30V at Pin 10

Page 5-25, Para 5-3-3-b-(ii)

Delete +15V at the wiper of .....

Add +30V at the wiper of .....

SECTION VII - SCHEMATIC DIAGRAMS

Page 7-2, Fig. 7-1

Top end of L116 should be shown connected to junction of C142 and Pin 3 of J110, and not to junction of C142 and Pin 1 of J110.

RECORD OF CORRECTIONS MADE

Change No.	Date of Change	Date Entered	Entered By

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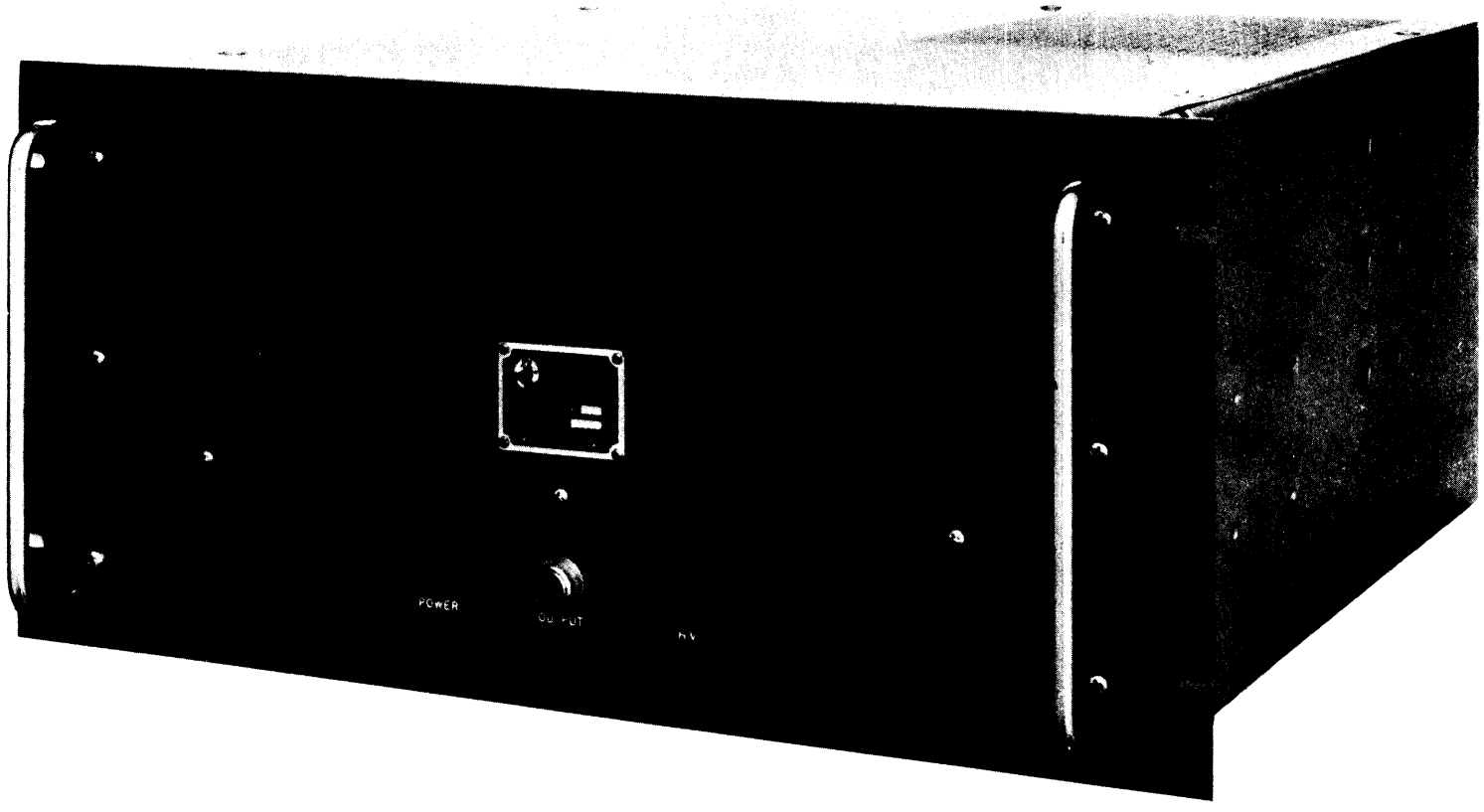


FIGURE 1-1. MULTI-CHANNEL TRANSMITTER-RECEIVER, MODEL MTR-100A

SECTION 1

GENERAL DESCRIPTION

1-1 FUNCTIONAL DESCRIPTION

The Multi-Channel Transmitter-Receiver, Model MTR-100A, is an eight channel transmitter-receiver covering a frequency range of 1.6 to 12 MHz and delivering 100 watts PEP output power. The MTR consists of a fully transistorized superheterodyne receiver, a fully transistorized exciter coupled to a high power vacuum tube linear amplifier, and a power supply.

Included with the MTR is a Desk Control Set, Model DCS-1, to provide operating controls, a handset and loudspeaker audio output.

The receiver section of the MTR is a single conversion superheterodyne with an IF centre frequency of 455 kHz. Its audio output is connected to the handset and speaker of the DCS.

The exciter section of the MTR converts the audio from the microphone in the DCS handset to the desired radio frequency and mode of transmission at a level suitable for driving the RF linear amplifier. The linear amplifier section of the MTR provides a 100 watt PEP output which is tuned to the operating frequency by an adjustable pi network.

The MTR is capable of operating on any one of eight preset channels within its frequency range. Operating frequencies for both receiver and transmitter sections are determined by tuned RF assemblies and oven-stabilized, crystal-controlled HF oscillator assemblies. Eleven receive RF assemblies and nine transmit RF assemblies are available to cover the total frequency range. The appropriate RF assemblies and associated crystals are provided for up to eight receive frequencies (channels) and eight transmit frequencies as required. Tables 1-1 and 1-2 specify the frequency range for each RF assembly.

The MTR normally provides for both AM and SSB operation, however it may be ordered for SSB operation only. In addition, if specified at the time of order, 2.7 kHz SSB filters will be provided in place of the standard 2.1 kHz filters.

RECEIVE RF ASSEMBLY	FREQUENCY RANGE MHz
A10871-5	1.6- 2.0
A10871-6	2.0- 2.5
A10871-7	2.5- 3.0
A10871-8	3.0- 3.5
A10871-9	3.5- 4.0
A10871-10	4.0- 5.0
A10871-11	5.0- 6.0
A10871-12	6.0- 7.0
A10871-13	7.0- 8.0
A10871-14	8.0- 10.0
A10871-15	10.0- 12.0

Table 1-1. Frequency Ranges for the Receive RF Assemblies

TRANSMIT RF ASSEMBLY	FREQUENCY RANGE MHz
A10795-5	1.6- 2.0
A10795-6	2.0- 2.5
A10795-7	2.5- 3.0
A10795-8	3.0- 4.0
A10795-9	4.0- 5.0
A10795-10	5.0- 6.0
A10795-11	6.0- 8.0
A10795-12	8.0- 10.0
A10795-13	10.0- 12.0

Table 1-2. Frequency Ranges for the Transmit RF Assemblies

1-2 PHYSICAL DESCRIPTION

The MTR is designed for track-slide mounting in a standard 19 inch rack. The controls for operating the MTR are located on the desk set DCS-1. Power indicator lamps are located on the front panel of the MTR and the external connectors are located on the rear panel. Tubes and semiconductor devices used in the MTR are specified in table 1-3.

REFERENCE DESIGNATION	TYPE	FUNCTION
CR101	1N3006	Regulator, + 300 volt dc supply
CR102	1N3006R	Regulator, + 300 volt dc supply
CR103	1N3006	Regulator, + 300 volt dc supply
CR104	1N2988A/R	Regulator, -20 and -27 volt dc supplies
CR105	1N538	Arc suppressor in ledex switch S103
CR106	1N2986	Regulator, +30 volt dc supply
CR107	1N2979B	Regulator, +15 volt dc supply
CR108	1N2982B	Regulator, +15 volt dc supply
CR109	1N914	Clarifier voltage regulator
CR110	1N538	Arc suppressor in ledex switch S104
V101	8121	RF amplifier
Z101, Z102	MDA962-1	Bridge rectifiers
CR301 through CR304	1N34A	Ring modulator
CR305, CR306	1N34A	Part of second converter
Q301	2N3906	Audio amplifier
Q302	2N5361	Local oscillator
Q303	MPF104	Carrier switch
Q304	3N142	IF amplifier
Q305	2N5361	IF amplifier
Q306	2N5361	Part of second converter
CR401, CR402	1N914	DC block
Q401, Q402	3N142	RF amplifiers
Q403	2N4427	RF amplifier
CR501	1N456A	Thermal compensation and bias
Q501, Q502	2N5160	RF amplifiers
Q503	2N3866	RF amplifier

REFERENCE DESIGNATION	TYPE	FUNCTION
Q605	2N3904	Receive audio amplifier (handset)
Q606	2N3904	Transmit audio amplifier
Q607	2N3904	Receive audio amplifier (speaker)
Q608	2N3906	Receive audio amplifier (speaker)
Q609	2N3055	Receive audio amplifier (speaker)
Q610	2N350A	Receive audio amplifier (speaker)
CR801 through CR804	1N4007	Regulators, high voltage supplies
CR806	1N914	Gate
CR807	1N746	Regulator
CR901, CR902	1N34A	Rectifier
Q901	2N3904	Trigger circuit
Q902	2N3906	Trigger circuit
Q903	2N3904	Trigger circuit
CR110	1N914	DC blocking
Q1101	3N141	RF amplifier
Q1102	3N142	RF amplifier
A1201, A1202	MC1550G	IF amplifiers
CR1201, CR1202	1N34A	Gates
CR1203, CR1204	1N34A	Voltage doubler and rectifier
CR1205, CR1206	1N34A	Voltage doubler and rectifier
CR1207	1N34A	Transient suppressor
CR1208	1N34A	Isolator
CR1209, CR1210	1N914	DC blocking
Q1201	2N5459	SSB buffer amplifier
Q1202	2N5459	AM buffer amplifier
Q1203	2N5459	IF buffer amplifier
Q1204	2N5361	Mixer
Q1205	MFE4010	Audio amplifier
Q1206	2N3904	HFO buffer amplifier
Q1207	3N141	Mixer
Q1208	2N3904	AGC amplifier
Q1209	2N5361	Local oscillator
Q1210	2N3906	SSB switch
Q1211	2N3906	AM switch
CR1401	1N914	DC block
CR1402	1N914	Transient suppressor
CR1403, CR1404	1N914	RF overload protection
Q1401	2N5361	Switch
Q1402	2N3906	Switch
Q1403	2N3904	Relay switch
Q2011 through Q2081	2N3904	HF oscillators
CR2101	1N914	DC block
CR2103	1N961B	Regulator
Q2101, Q2102	2N3904	Buffers
CR3101, CR3102	1N4002	Biasing
Q3101, Q3102	2N2219A	Driver
Q3103	TX10002	Heater
CR4011 through CR4081	1N5139	HF oscillator tuning
Q4011 through Q4081	2N3904	HF oscillators
CR4103	1N961B	Regulator
Q4101, Q4102	2N3904	Buffers

Table 1-3. Tube and Semiconductor Complement

1-3 TECHNICAL SPECIFICATIONS

Frequency range	1.6 to 12 MHz
Number of channels	Eight
Number of bands	Eight
Tuning	Each RF assembly can be tuned for any frequency within its range
Frequency control	Crystal controlled oscillators are used throughout
Modes of operation	USB: either pilot carrier (carrier - 26dB) or carrier suppressed (carrier - 40 dB) AM: AME
IF	455 kHz centre frequency on all bands
Primary power	115 volts ac, 50-60 Hz, single phase
Power consumption	350 watts, approximately
Dimensions	Height: 8-3/4 inches Depth: 18 inches Width: 19 inches
Weight	40 pounds approximately

Receiver section

Sensitivity:	SSB	1.5 uvolts across 50 ohms or an equivalent input power
	AM	3.0 uvolts across 50 ohms or an equivalent input power
Frequency stability		± 10 Hz at ambient of 25°C
Intermodulation		Intermodulation products at least 20 dB below audio output signal
Spurious output signals		Not exceeding 200 uvolts at any frequency measured at the receiver antenna input

Transmitter section

Power output		100 watts PEP
Carrier level:		
	SSB	16 ±2 dB below rated PEP for pilot carrier mode At least 40 dB below power transmitted in USB for suppressed carrier mode
	AM	6 dB below rated PEP
LSB suppression		At least 40 dB below power transmitted in USB
Frequency stability		±10 Hz at ambient of 25°C
Transmit audio input		-20 dBm
Spurious and harmonic output suppression		At least 40 dB below mean power, not exceeding 50 mwatts
Residual noise level		At least 40 dB below test modulation
Occupied bandwidth		4.2 kHz, maximum (5.4 kHz, maximum with optional filters - see paragraph 1-1)

1-4 EQUIPMENT SUPPLIED

NAME	DESIGNATION	FUNCTION	QTY
Multi-Channel Transmitter-Receiver	MTR-100A	Transmitter-receiver	1
Desk Control Set	DCS-1	Control unit for MTR-100A	1
Technical Manual	IN1033A	Operating and maintenance instructions	1
Service Extension Module	A10869-5	Aid in maintenance	1
Power cable assembly	CA884-7-72	Mating connector for J101	1
Connector	MS3106A-20-27P	Mating connector for J106	1
	UG88CU	Mating connector for J105	1
Clamp	MS3057-12	For MS3106A-20-27P	1

Table 1-4. Equipment Supplied

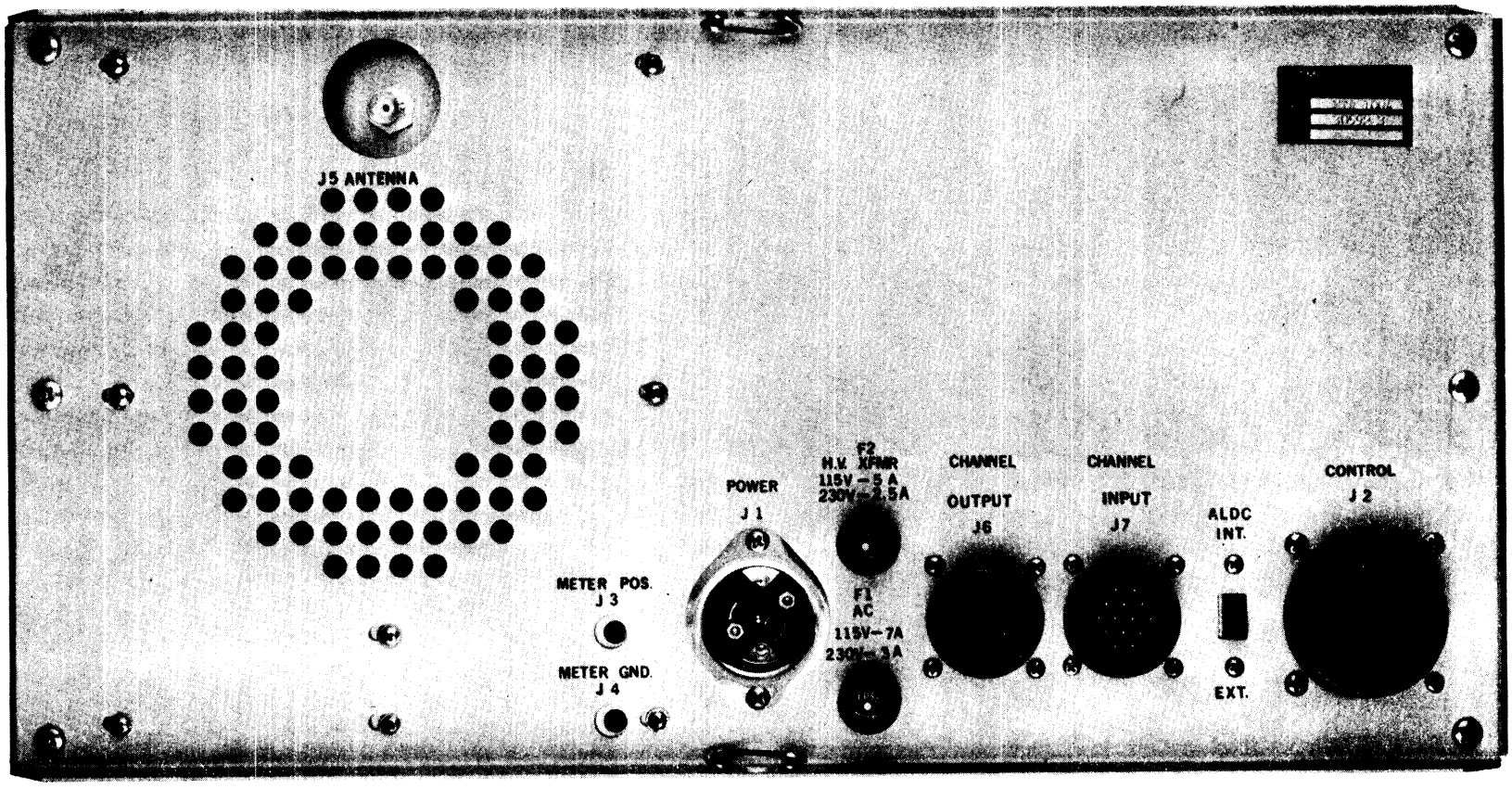


FIGURE 2-1. MULTI-CHANNEL TRANSMITTER-RECEIVER, MODEL MTR-100A, REAR VIEW

SECTION 2

INSTALLATION

2-1. INITIAL INSPECTION

When the MTR is unpacked, visually inspect for possible damage: check all front panel controls for ease of operation; remove all covers and check the inside of the unit for damaged components; and check that the tube is properly seated in its tube socket. Replace all covers. Check for equipment supplied as loose items with the MTR (table 1-4).

With respect to equipment damage for which the carrier is liable, TMC (Canada) Limited will assist in describing methods of repair and the furnishing of replacement parts.

NOTE The MTR is normally supplied wired for 115 volt ac operation.

2-2 ELECTRICAL CONNECTIONS

Once the MTR has been properly mounted in its operating location, electrical connections can be made to the unit at the connectors listed in table 2-1. To check that electrical connections have been properly made, note that the PWR lamp on the MTR comes on.

CONNECTOR	FUNCTION
J101	Primary power input
J102	Audio, mode select and clarifier connections to DCS
J103 and J104	Plate current output
J105	Antenna connection
J106	Channel selection output and external ALDC and PTT inputs
J107	Channel selection input from DCS

Table 2-1. MTR External Connector Functions

SECTION 3

OPERATOR'S SECTION

3-1 CONTROLS AND INDICATORS

Before attempting to operate the MTR, the operator should become familiar with the controls on the DCS and indicators on the front panel of the MTR. Table 3-1 gives the designation and a brief description of the function of each control and indicator.

DESIGNATION	FUNCTION
PWR lamp (DS102)	Lights when dc supply is being provided by the power supply section of the MTR
OUTPUT lamp (DS103)	Lights when the MTR is delivering RF output
HV lamp (DS101)	Lights when the high voltage is being provided by the power supply section of the MTR

Table 3-1. Indicators on the MTR

DESIGNATION	FUNCTION
POWER ON/OFF switch (S203)	Controls ac power to MTR
CHANNEL switch (S202)	Selects one of the eight preset operating frequencies
MODE switch (S201)	Selects either SSB or AM mode of operation
CLARIFIER control (R202)	Adjusts clarity of DCS speaker and handset outputs
VOLUME control (R205)	Adjusts level of the DCS speaker output
Push-to-talk switch (handset)	Switches MTR to transmit

Table 3-2. Controls on the DCS

3-2 PROTECTIVE DEVICES

The MTR contains protective devices listed in table 3-3. If a failure should occur in the MTR, check the protective devices to determine the source of the failure. If a fuse burns out immediately after replacement, do not replace it a second time until the cause of failure has been corrected.

DESIGNATION	FUNCTION
Interlock switch S106	Switches off high voltage when top cover of MTR is removed
Interlock switch S107	Switches off high voltage when bottom cover of MTR is removed
F101	Protects primary ac input
F102	Protects the primary ac input to the high voltage section of the MTR power supply

Table 3-3. Protective Devices

3-3 OPERATING PROCEDURES

(1) Turn the DCS POWER ON/OFF switch to the ON position. The PWR lamp on the MTR will light. Allow 2 minutes for warmup before transmitting.

(2) Set the DCS CHANNEL switch for the desired operating frequency.

(3) Set the DCS MODE switch to either the SSB or AM position.

(4) Adjust the DCS CLARIFIER and VOLUME controls for clear reception.

(5) To transmit, hold down the push-to-talk switch on the DCS handset.

SECTION 4

PRINCIPLES OF OPERATION

4-1 INTRODUCTION

The principles of operation for the MTR are described under four headings; the power supply, channel selection, receiver section and transmitter section. The transmitter section covers the exciter, the RF amplifier, the pi tuning network and the ALDC circuitry. The DCS is described in paragraph 4-6. Block diagrams are shown in figures 4-1 and 4-2.

4-2 MTR POWER SUPPLY

The primary ac input at J101 is connected through the DCS POWER ON/OFF switch S203 to transformers in both the low voltage section and high voltage section of the MTR power supply. In addition, it is used to drive the blower BL101. F101 is located in the live side of the primary input.

(1) LOW VOLTAGE SECTION

Transformer T101 converts the primary ac input to a 12 volt supply for the filament of the RF amplifier tube V101, and to a 30 volt supply which is rectified by a bridge rectifier, Z102. The +30 volt dc, +28 volt dc and +24 volt dc supplies derived from it are connected to various points in the MTR. The +28 volt supply is provided to the DCS through pin P of J102. PWR lamp DS102 is connected at the output of rectifier Z102 and indicates operation of the low voltage supply.

(2) HIGH VOLTAGE SECTION

The ac input to T102 is connected through fuse F102 and contacts of relay K101 which is energized when:

(a) the push-to-talk switch on the DCS handset is held down, providing a ground connection to pin C of J102

(b) the top and bottom cover interlock switches S106 and S107 are closed.

Relay K102 is connected in parallel with K101. Transformer T102 has two secondary windings, across one of which is connected the HV lamp DS102 which indicates when high voltage is present in the MTR. Across this winding is also connected bridge rectifier Z101 and regulator CR104 to provide -27 volt dc and -20 volt dc supplies. The latter provides bias to the RF amplifier tube V101 and may be adjusted by R108 to obtain the desired level (refer to alignment procedure, section 5). The second output winding of T102 is connected to rectifiers and a voltage doubler network to provide the +300 volt dc screen grid bias and +1300 volt dc plate voltage for V101.

4-3 CHANNEL SELECTION

A ledex switch S104 is used for selection of one of the eight operating frequencies. It is positioned by the CHANNEL switch on the DCS and in turn sets the position of switches S102 and S105.

When a dc voltage is applied from the DCS to S104 at any one of the eight switch positions, S104 will rotate until the wiper loses contact with the dc voltage. It will then be set for the selected channel as will all wafers of S102 and S105 which are controlled by it. The MTR provides an output of +30 volts dc to the DCS at pin J of J107. The channel selector on the DCS switches this voltage to the selected channel and returns it to the MTR(J107).

The functions of the various wafers of S102 and S105 are as follows:

(1) Wafers A and B of S102 are used in the pi network to connect the appropriate preset loading capacitors (C122 to C129 and C133 to C140).

(2) Wafer A of S105 is used to provide channel selection information to any remote equipment.

(3) Wafer B of S105 connects the +24 volt dc supply to the transmit RF assembly (A10795) for the selected channel when the MTR is keyed for transmission (K101 energized).

(4) Wafer D of S105 is used to provide channel selection information to the program board A10890 which in turn positions bandswitch S103 (see paragraph 4-5-4).

(5) Wafer C of S105 connects +15 volts dc to the receive RF assemblies (A10871) when the MTR is receiving (K101 deenergized). Wafer C also connects the antenna input from J105 to the receiver RF assemblies.

4-4 MTR RECEIVER SECTION

The receiver section includes one receive IF assembly, A10856, up to eight receive RF assemblies, A10871, and one antenna attenuator assembly A10868. Wafer C of switch S105 controls the +15 volt dc supply to the RF assemblies so that only one assembly, for the selected channel, is operating. It also connects the antenna input to the selected RF assembly through antenna attenuator assembly A10868. When the MTR is transmitting, K101 is energized and the antenna and dc supply are disconnected from the receiver section.

(1) ANTENNA ATTENUATOR

This assembly switches attenuating resistors into the RF input to the receiver section of the MTR whenever the AGC from the receive IF assembly exceeds a preset level. Normally the AGC is zero, hence transistor Q1401 is biased to conduct, and subsequently Q1402 and Q1403 conduct, connecting ground to one side of relays K1401 and K1402. Since +24 volts is connected to the other side of these relays, they are normally energized, connecting the RF input from the antenna directly to the receive RF assemblies.

As the level of the RF input increases, the AGC line goes negative and when it reaches approximately -1.8 volts Q1401 becomes reverse biased and cuts off. As a result, Q1402 and Q1403 do not conduct and ground is no longer connected to relays K1401 and K1402. When these relays are deenergized, resistors R1409, R1410 and R1411 are inserted into the RF line to provide 30 dB attenuation. This in turn causes the AGC level to drop to -1.5 volts; however, this level is not sufficient to overcome the positive feedback voltage applied through R1407 to the source of Q1401. The AGC level at which Q1401 will become forward biased is set by R1403 to approximately -1 volt.

(2) RECEIVE RF ASSEMBLIES

The RF input and the +15 volt dc supply are connected to pin 1 of the selected receive RF assembly. The RF signal is amplified by RF amplifiers, Q1101 and Q1102. The frequency range covered by the assembly depends on the values of the tuned circuit components (T1101, T1102, T1103, and T1104 when provided; C1103, C1107, C1109, and C1113). The transformer secondary circuits are adjusted to tune the assembly for the desired operating frequency within the range covered by the assembly. An AGC input from the receive IF assembly is connected to each amplifier.

(3) RECEIVE IF ASSEMBLY

The amplified RF signal from the selected receive RF assembly and the HFO input from A010005 are fed to mixer Q1207. The output from the mixer is connected to two filters, SSB filter FL1201 and AM filter FL1202. The outputs from the filters are connected through buffer amplifier Q1201 (SSB) or Q1202 (AM), and buffer amplifier Q1203 to the IF amplifiers, A1201 and A1202. A mode selection input from the control unit is used to select the output from the appropriate filter.

When the SSB mode is selected at the DCS, a ground signal is provided through the DCS MODE switch S201 and pin M of J102 to pin 6 of the receive IF assembly. This causes Q1211 to conduct, providing +15 volts dc to switch on SSB buffer Q1201 (and local oscillator Q1209), and hence connecting the IF signal from SSB filter FL1201 to the IF amplifiers. At the same time, since CR1210 conducts and CR1209 does not conduct, Q1210 will not conduct, ensuring that the AM output is not connected to the IF amplifiers. When the AM mode is selected at the DCS, no input is present at pin 6. Q1211 and CR1210 are biased off, whilst Q1210 conducts as a result of base-bias through R1253 and R1254. +15 volts dc is therefore provided to AM buffer Q1202, connecting the IF output from filter FL1202 to the IF amplifiers. Since Q1211 does not conduct, no dc voltage is supplied to the SSB buffer Q1201.

The AGC signal is derived from the first IF amplifier, A1201. This signal is amplified by Q1208 and fed back to the receive RF assemblies through pin 2, and also to IF buffer amplifiers Q1201 and Q1202.

IF to AM conversion is achieved in the following manner. The amplified IF output from A1202 is fed to Q1204. For SSB signals, a re-inserted carrier input from local oscillator Q1209 is also fed to Q1204. Q1204 acts as a mixer and product detector, and the resulting audio signal is amplified by Q1205. For AME signals, since carrier is already present, no input is required from local oscillator Q1209.

The mode selection input from the DCS is used to control carrier insertion. When SSB mode is selected at the DCS, a ground signal provided at pin 6 of the receive IF assembly switches on Q1210 as previously described. This in turn switches on local oscillator Q1209 which provides a 456.350 kHz input (or 456.750 kHz optional) to mixer Q1204. When the AM mode is selected at the DCS, no input is present at pin 6. Q1210 is biased off, thereby removing dc supply to local oscillator Q1209.

The audio output from the receive IF assembly is provided through pin 9 to transformer T1302 on audio distribution board A10866.

(4) HIGH FREQUENCY OSCILLATOR

The receive section, A10893, of HFO assembly A010005, includes eight crystal-controlled oscillator circuits, one for each channel. The crystal frequencies are selected in accordance with the following equation:

$$f_x = f_R + f_I$$

where f_x=crystal frequency

f_R=frequency of RF signal

f_I=456.350 kHz(456.750 kHz optional)

Only the circuit for the selected channel is switched on at any one time. The switching signal is provided from switch S105C through the RF assembly for the selected channel. A dc clarifier input from the DCS, through J102G, provides variable bias to varicap diodes CR4011 through CR4081 for fine tuning of the selected oscillator output. For frequencies above 8 MHz, it is required that a minimum clarifier voltage of +3 volts is maintained. This voltage is provided through R804, CR806 and CR807 on component board A10891. The output from the selected oscillator is connected through buffers Q1401 and Q1402 to the IF assembly.

The receive HFO assembly includes a temperature-compensated heater assembly, A10767, consisting of thermistor RVT3101, driver Q1301-Q3102 and heater Q3103.

4-5 MTR TRANSMITTER SECTION

The transmitter section is comprised of the exciter, the RF amplifier, the pi tuning network and the ALDC circuitry. The exciter consists of one transmit IF assembly, A10797, and up to eight transmit RF assemblies, A10795. Wafer B of switch S105 controls the +24 volt dc supply to the RF assemblies so that only one assembly, for the selected channel, is operating.

(1) TRANSMIT IF ASSEMBLY

The balanced 600 ohm line audio input from the DCS is connected to pin 2 on the transmit IF assembly through pins D and E of J102, and through transformer T1301 and input adjust resistor R1301 on audio line distribution assembly A10866. The input level may also be adjusted using R301 on the transmit IF assembly.

The audio signal is amplified by Q301 and converted to an audio modulated IF signal by ring modulator CR301-CR304. Crystal-controlled local oscillator Q302 provides a 456.350 kHz input(456.750 kHz optional) to the modulator. The bandwidth of the IF signal is determined by filter FL301 which has a centre frequency of 455 kHz and a 2.1 kHz bandpass (2.7 kHz optional).

For operation in the SSB pilot carrier or AM mode, it is necessary to re-insert carrier from local oscillator Q302 into the IF signal. The amount of carrier reinserted is controlled by variable attenuator Q303 and resistors R316 and R317. For AM mode a ground connection is provided to the transmit IF assembly on pin 5 to control Q303. R316 is set to control the voltage applied to Q303 which in turn determines the amount of carrier re-inserted. Similarly, for SSB mode, ground is provided at pin 6 to control Q303 and R317 sets the amount of carrier re-inserted if required. When no carrier is required (SSB suppressed carrier mode) Q303 will remain biased off.

The IF signal and required amount of carrier are amplified by Q304 and Q305 and fed to second converter Q306-T301-CR505-CR506 from which is derived the RF output. The required HFO input to the second converter is provided from A010005 (paragraph 4-5-3).

An ALDC input to pin 4 on the transmit IF assembly is connected to first IF amplifier Q304, which limits the level of the RF output from Q304 to prevent overloading the RF amplifier tube (paragraph 4-5-4).

(2) TRANSMIT RF ASSEMBLY

The RF signal from the transmit IF assembly is fed to pin 9 on all eight transmit RF assemblies. Only one assembly, for the selected channel, is provided at any one time with the +24 volt dc supply required for operation. The RF signal is amplified by Q401, Q402 and Q403. The frequency range covered by each transmit RF assembly depends on the values of the tuned circuit components (T401, T402, T403, T404, C402, C404, C409 and C415). The transformer resonant circuits are adjusted to tune the assembly for the desired operating frequency within the range covered by the RF assembly.

(3) HIGH FREQUENCY OSCILLATOR

The transmit section, A10892, of HFO assembly A010005, includes eight crystal-controlled oscillator circuits, one for each channel. The crystal frequencies are selected in accordance with the following equation:

$$f_x = f_R + f_I$$

where f_x=crystal frequency

f_R=frequency of RF signal

f_I=456.350 kHz (456.750 kHz optional)

Only the circuit for the selected channel is switched on at any one time. The switching signal is provided from switch S105B through the RF assembly for the selected channel. The output from the selected oscillator is connected through buffer Q2101-Q2102 to the IF assembly.

The transmit HFO assembly includes a temperature-compensated heater assembly, A10767 consisting of thermistor RVT3101, driver Q3101-Q3102 and heater Q3103.

(4) RF AMPLIFIER

The RF output from the exciter is connected through preamplifier assembly A10898 to RF amplifier tube V101. Bias voltages for V101 are provided by the power supply section of the MTR (paragraph 4-2). Connections to V101 are as follows:

(a) pins 5 and 6: filament voltage, 12.5 volts

(b) pins 3, 8 and 11: RF input and control grid bias, -20 volts dc

(c) pins 2 and 7: screen grid bias, +300 volts dc

(d) pin 10: ground

(e) pins 1, 4 and 9: cathode self-bias and I_p output to J103

(f) plate, top cap: bias +1300 volts dc

A parasitic suppressor, A101, is incorporated into the plate circuit to reduce undesirable oscillations produced by the tube.

(5) TUNING

The MTR employs an adjustable pi network to match the plate signal from the RF amplifier to the antenna at all operating frequencies. This involves selection of the band containing the desired frequency, and selecting and adjusting components in the pi network for resonance at that frequency.

(a) BAND SELECTION

Band selection is controlled by band switch S103 which is positioned by program board A10890. Since the eight operating frequencies may be located anywhere in the 1.6 to 16 MHz range, the program board provides the means of locating the eight channels in the proper frequency bands. The channels may be all in one band or in any combination of bands.

+28 volts dc is provided to the wiper of wafer D of channel switch S105. The contacts of wafer D are connected to the appropriate channel terminals on program board A10890. Jumpers connect these channel terminals to the appropriate band terminals on A10890, which are in turn connected to the band switch S103. The dc voltage from wafer D causes S103 to rotate to the position of the band containing the selected channel. This in turn positions S101 in the pi network for the selected band.

(b) PI NETWORK SETTING

Tuning is achieved by connecting the required section of tank coil L105 into the pi network. Wafer A of switch S101 switches in the required section of the tank coil and wafer B adds padding capacitors. In addition, wafers A and B of switch S102 connect preset variable capacitors (C122 to C129 and C133 to C140 respectively) into the pi network. S102 is controlled by S104 and hence is positioned for the selected channel.

(6) ALDC AND MONITOR CIRCUITS

The ALDC signal for the MTR may be provided from an external source through pin L of J106, or may be set internally by potentiometer R906 on the ALDC and monitor board A10945. The ALDC switch S108 is set to either the EXT or INT position to connect the desired ALDC signal to the transmit IF assembly A10797. The ALDC signal from the wiper of R905 is connected to reverse-biased diode CR901. A monitor of the RF output from the pi network provided at pin 2 is also connected to CR901. When the RF signal level exceeds the level set by R905, CR901 conducts and a rectified ALDC signal is provided through a filter network to pin 4 from where it is connected to the INT position of ALDC switch S108.

The RF monitor signal at pin 2 is also used to switch on the RF OUTPUT indicator lamp DS103 when the RF output is above the required level. The monitor signal is connected to variable resistor R906 through rectifier CR902. The wiper of R906 is connected to a trigger circuit Q901, Q902, Q903. The output from this circuit is provided through pin 2 to DS103. Hence when the RF signal exceeds the required level, the trigger circuit is biased on, and DS103 lights.

4-6 DCS AUDIO

(1) RECEIVE AUDIO

The receive audio input from the MTR receive section is connected to the DCS at pin 14 of the DCS terminal board (TB201). This audio signal is provided to the receive side of the handset through amplifier Q605 on A10915 (pins 2 and 4), and also to the DCS loudspeaker through VOLUME control R205 and three-stage amplifier Q607, Q608, Q609-Q610 on A10915 (pins 13 and 11).

(2) TRANSMIT AUDIO

The transmit audio from the transmit side of the handset is connected through pin 3 to amplifier Q606 on A10915. The output from Q606 is transformed (Q601) to a balanced 600 ohm audio line output that is connected to the transmit section of the MTR through pins 13 and 15 of TB201.

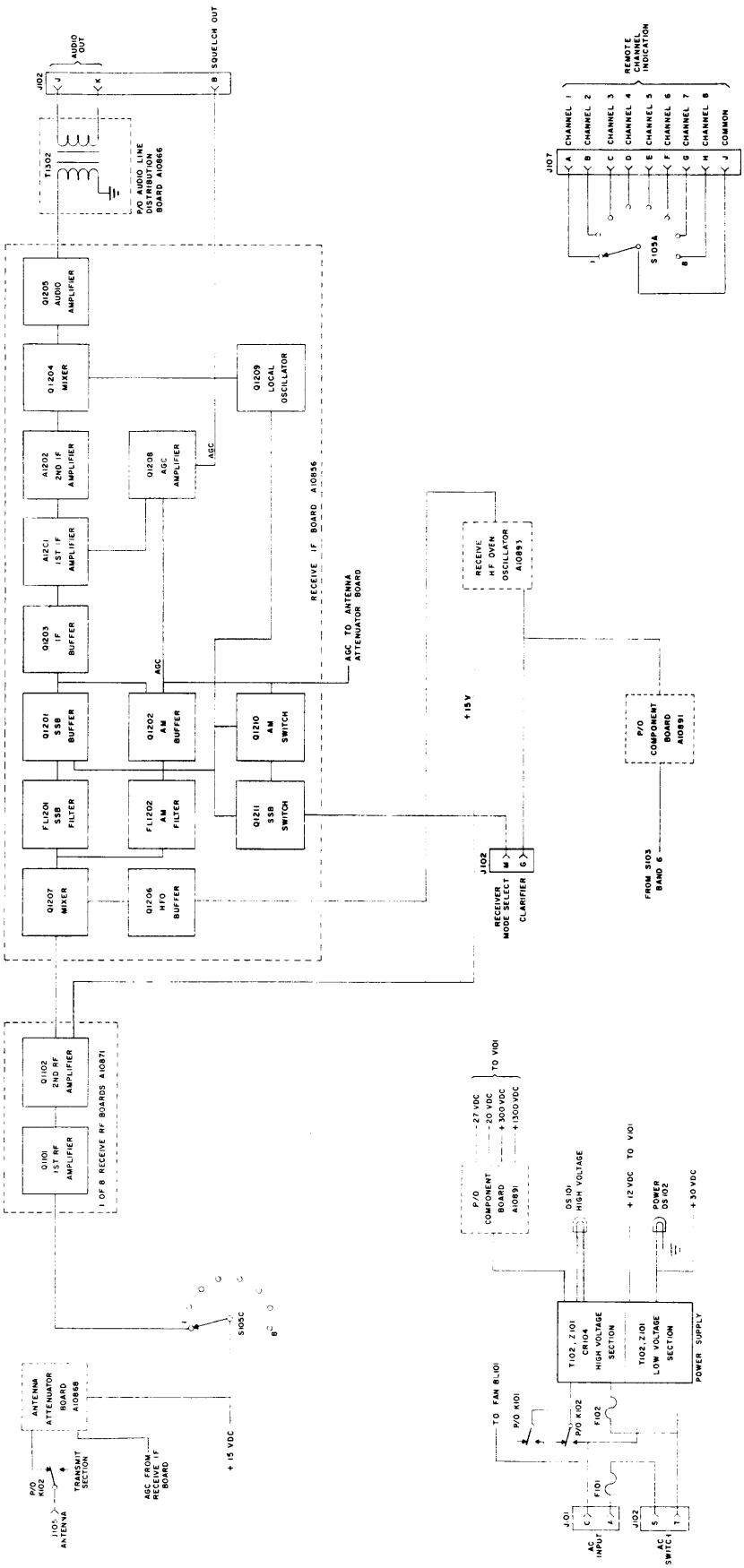


FIGURE 4-1. BLOCK DIAGRAM, RECEIVE SECTION, MTR-100A

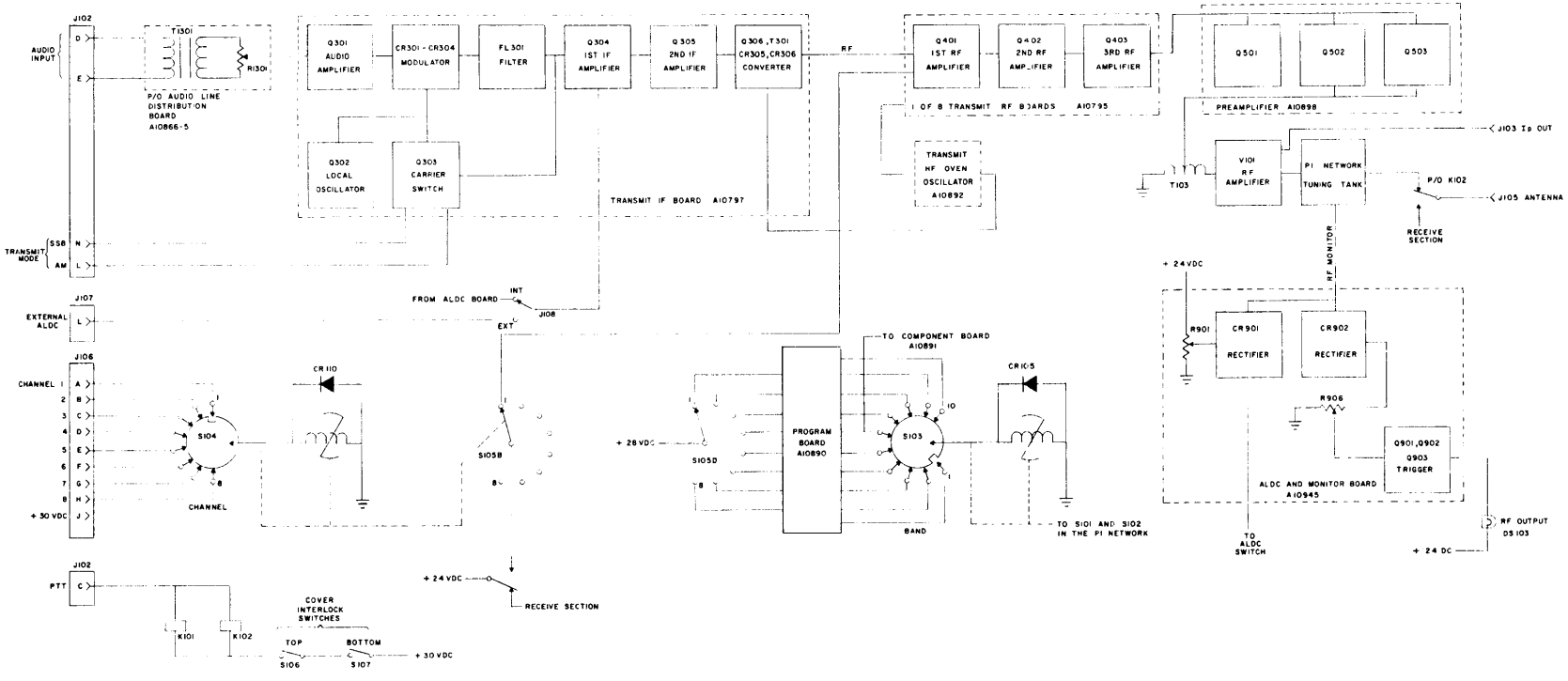


FIGURE 4-2. BLOCK DIAGRAM, TRANSMIT SECTION, MTR-100A

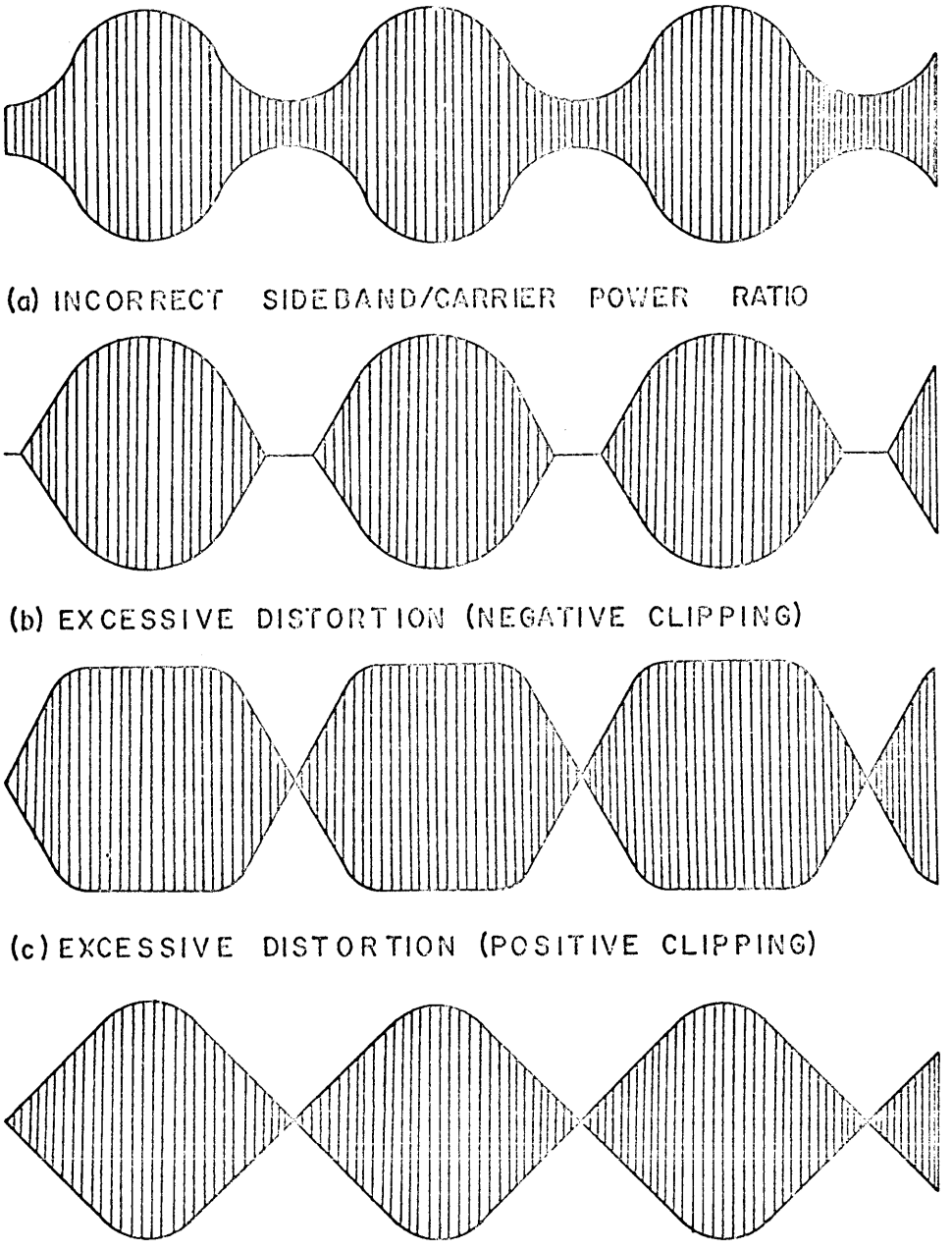


Figure 5-1. Modulation Envelopes

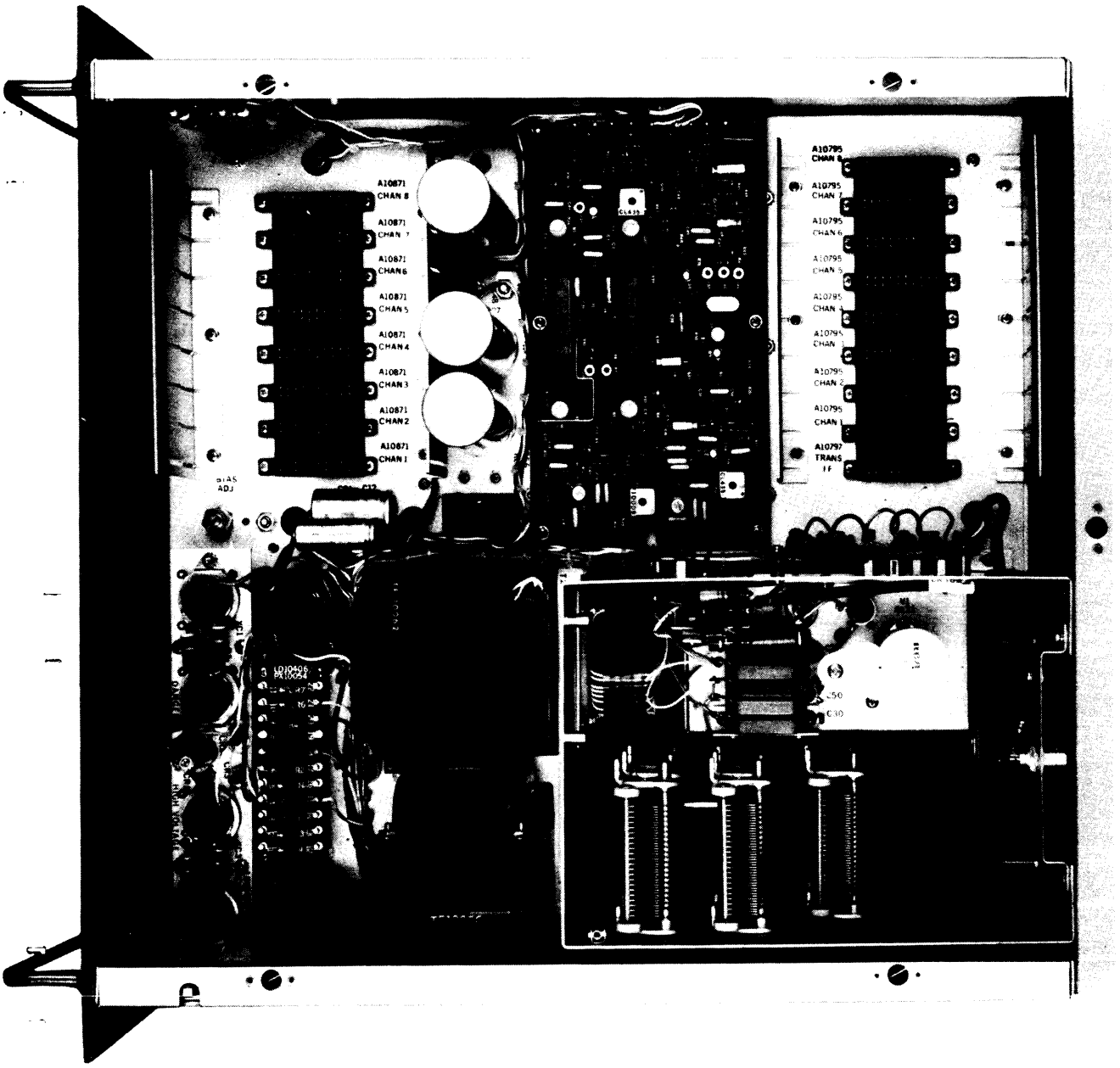


FIGURE 5-2. MULTI-CHANNEL TRANSMITTER-RECEIVER, MODEL MTR-100A, TOP VIEW, COVER REMOVED

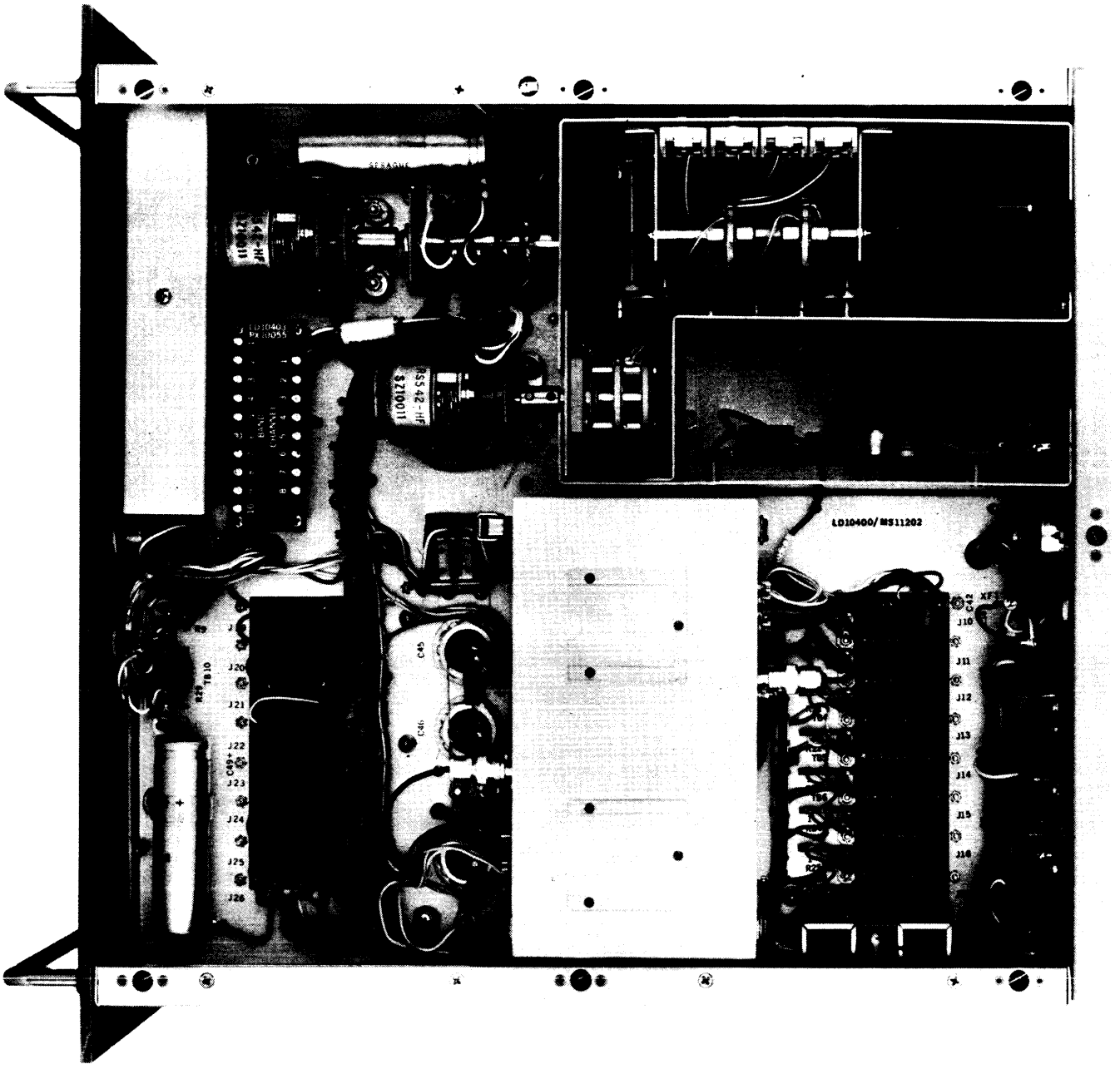


FIGURE 5-3. MULTI-CHANNEL TRANSMITTER-RECEIVER, MODEL MTR-100A, BOTTOM VIEW, COVER REMOVED

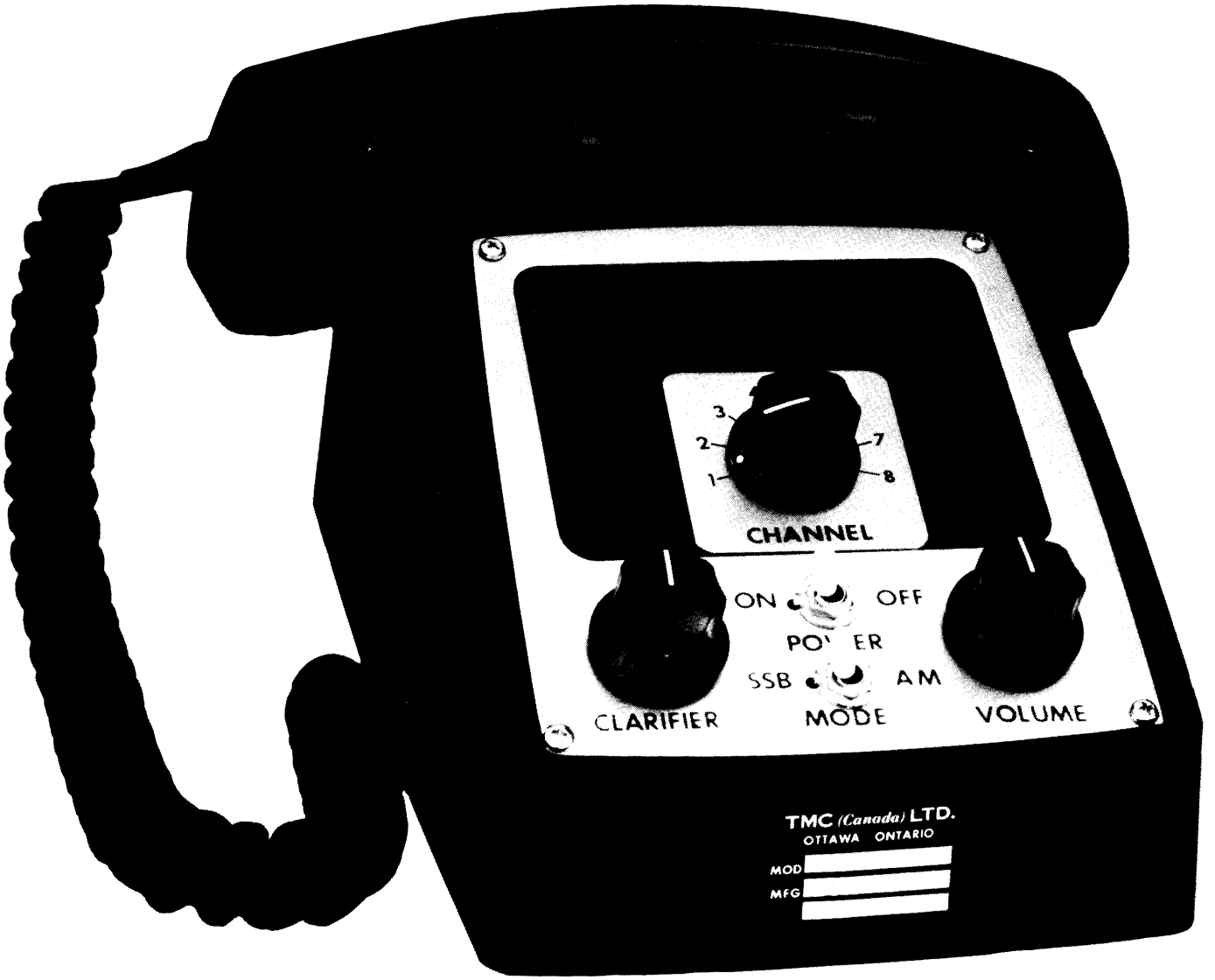


FIGURE 5-4. DESK CONTROL SET, MODEL DCS-1C

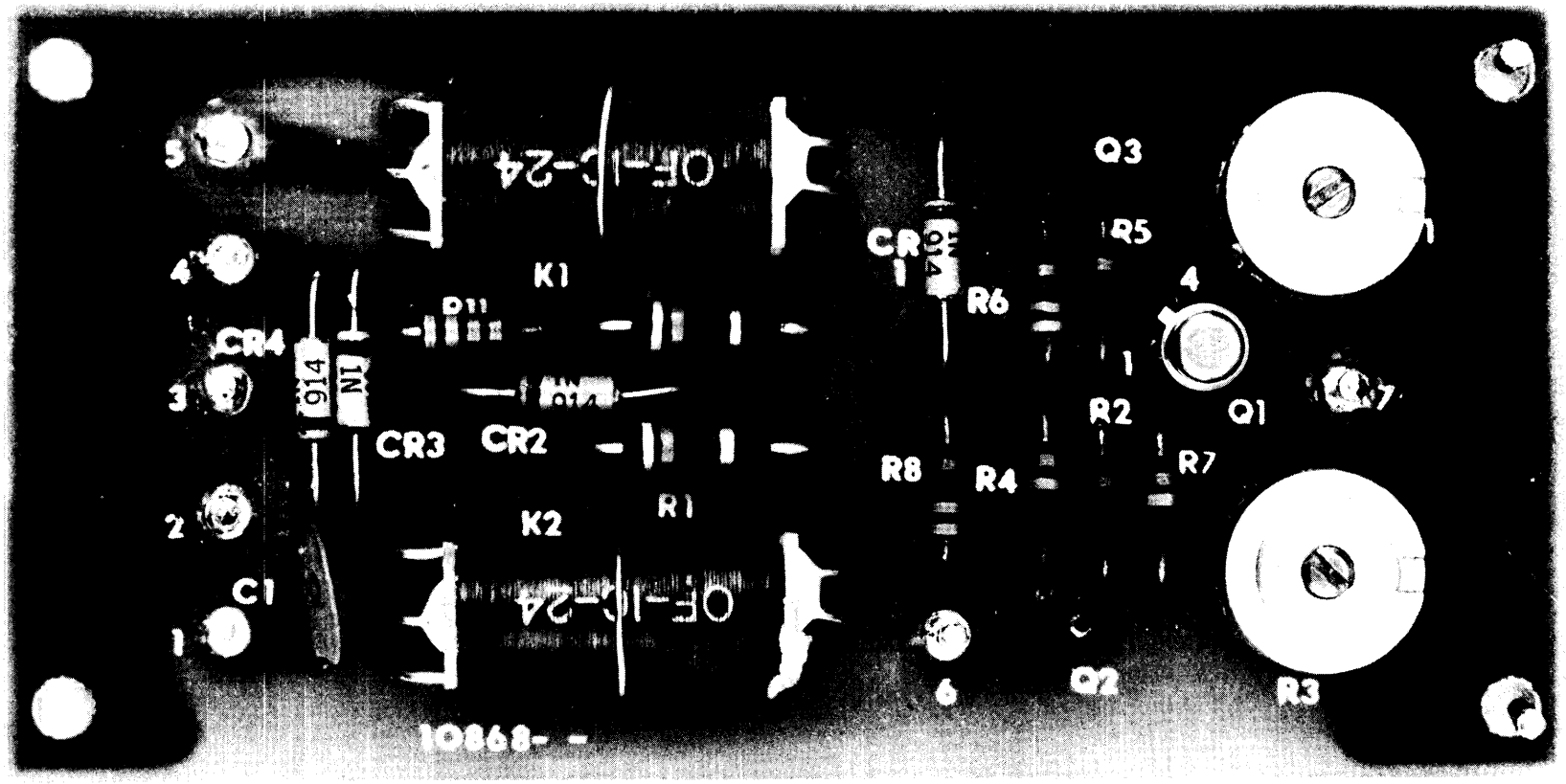


FIGURE 5-5. ANTENNA ATTENUATOR ASSEMBLY, A10868, MTR-100A

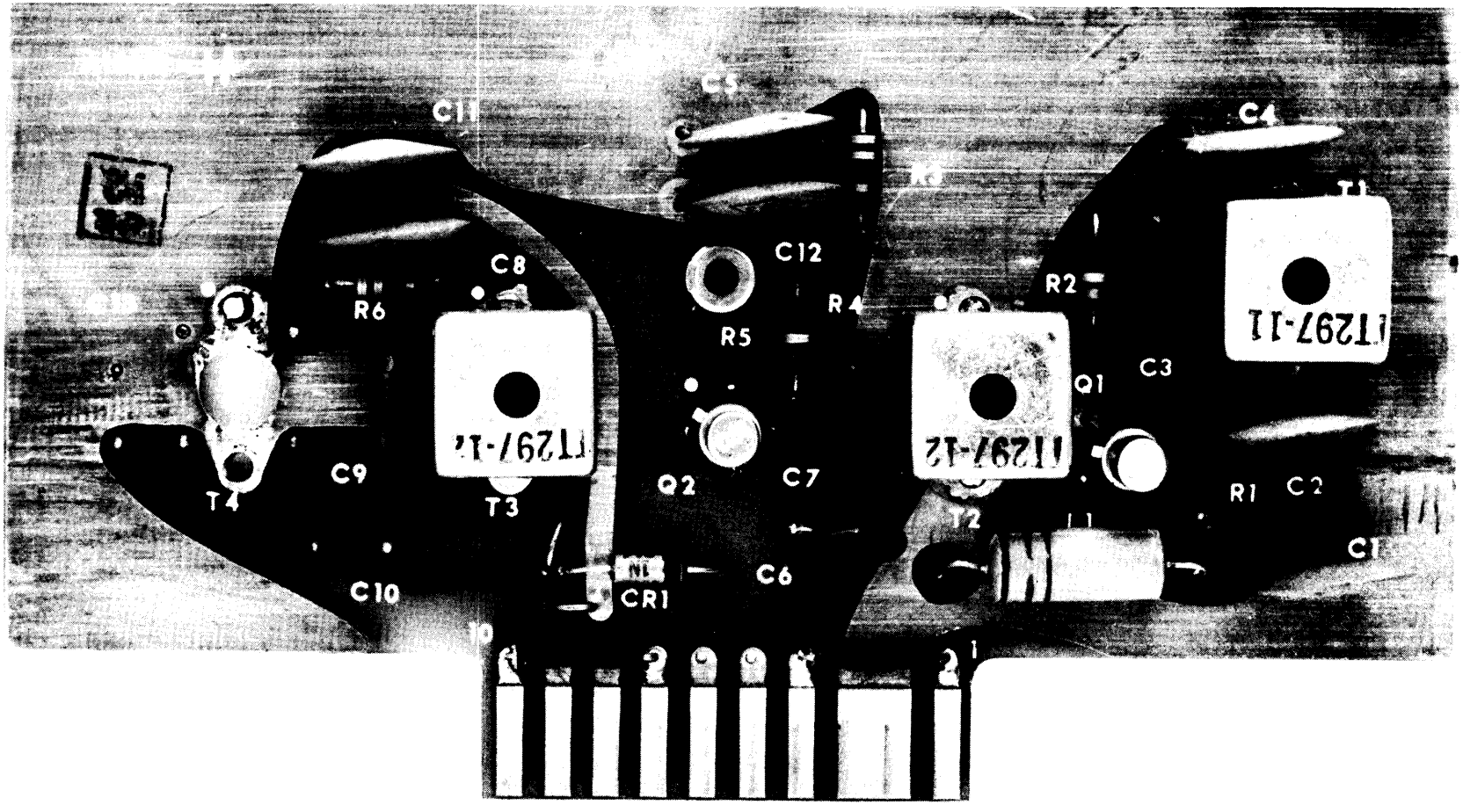


FIGURE 5-6. RECEIVE RF ASSEMBLY, A10871-5 THROUGH -13, MTR-100A

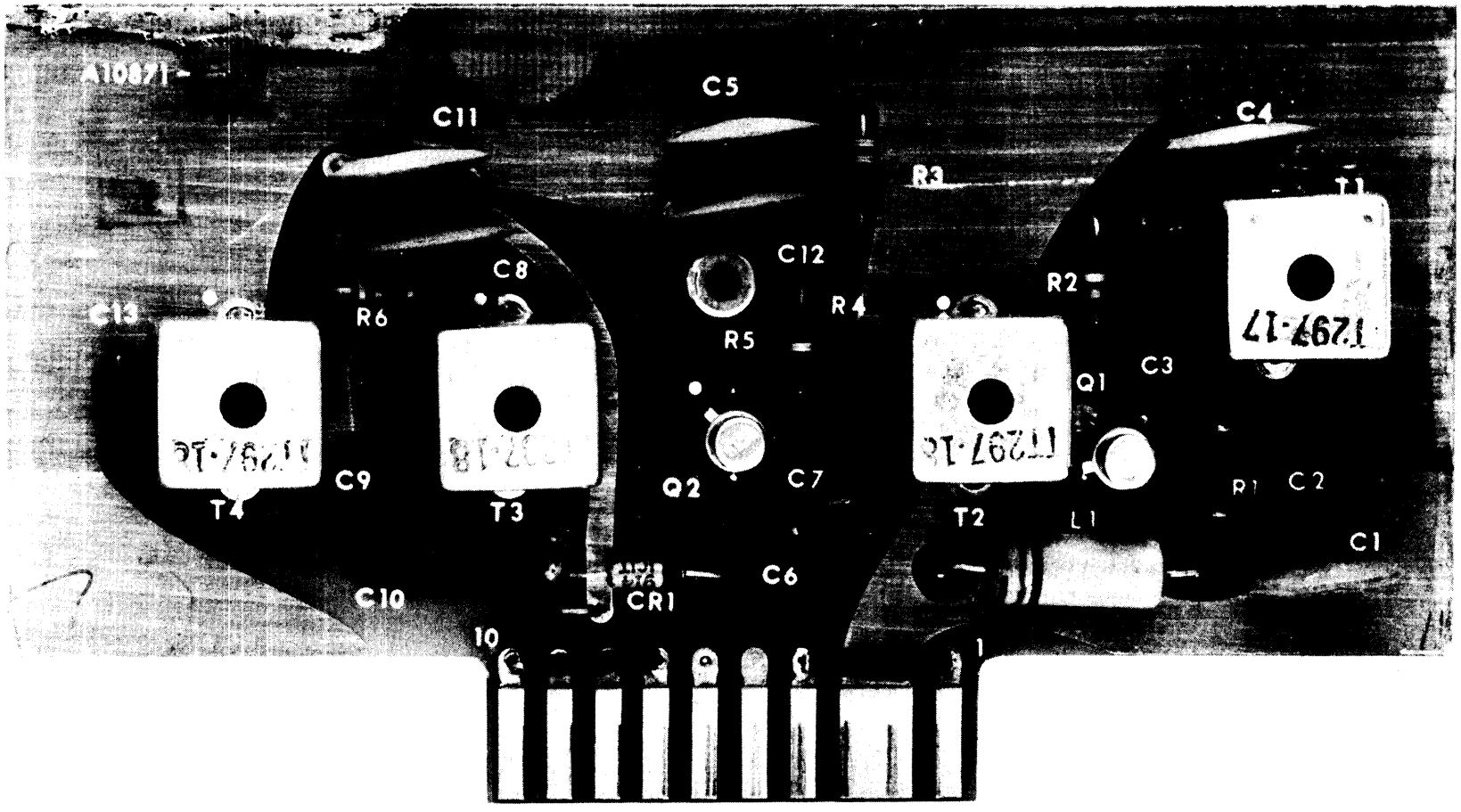


FIGURE 5-7. RECEIVE RF ASSEMBLY, A10871-14 AND -15, MTR-100A

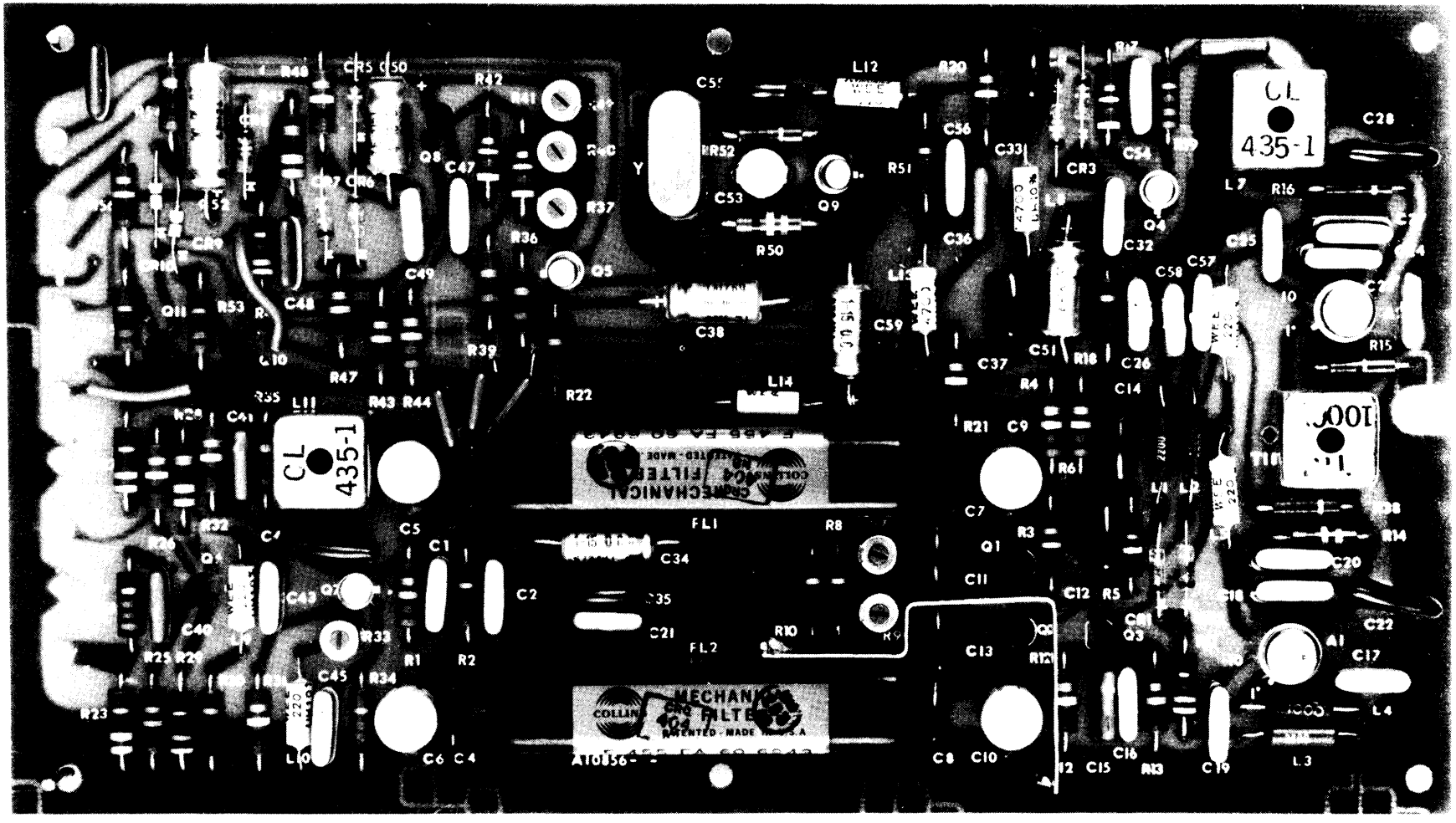


FIGURE 5-8. RECEIVE IF ASSEMBLY, A10856, MTR-100A

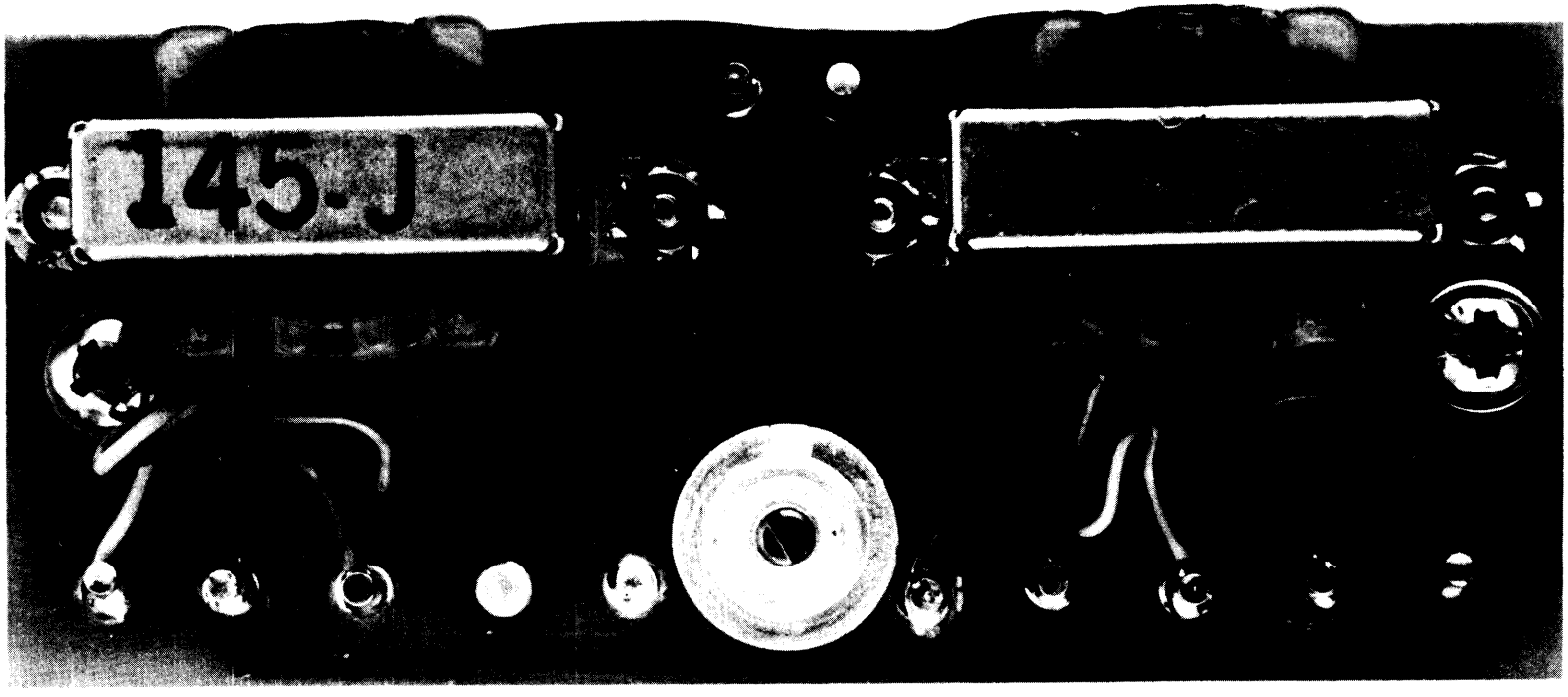


FIGURE 5-9. AUDIO LINE DIST BOARD, A10866, MTR-100A

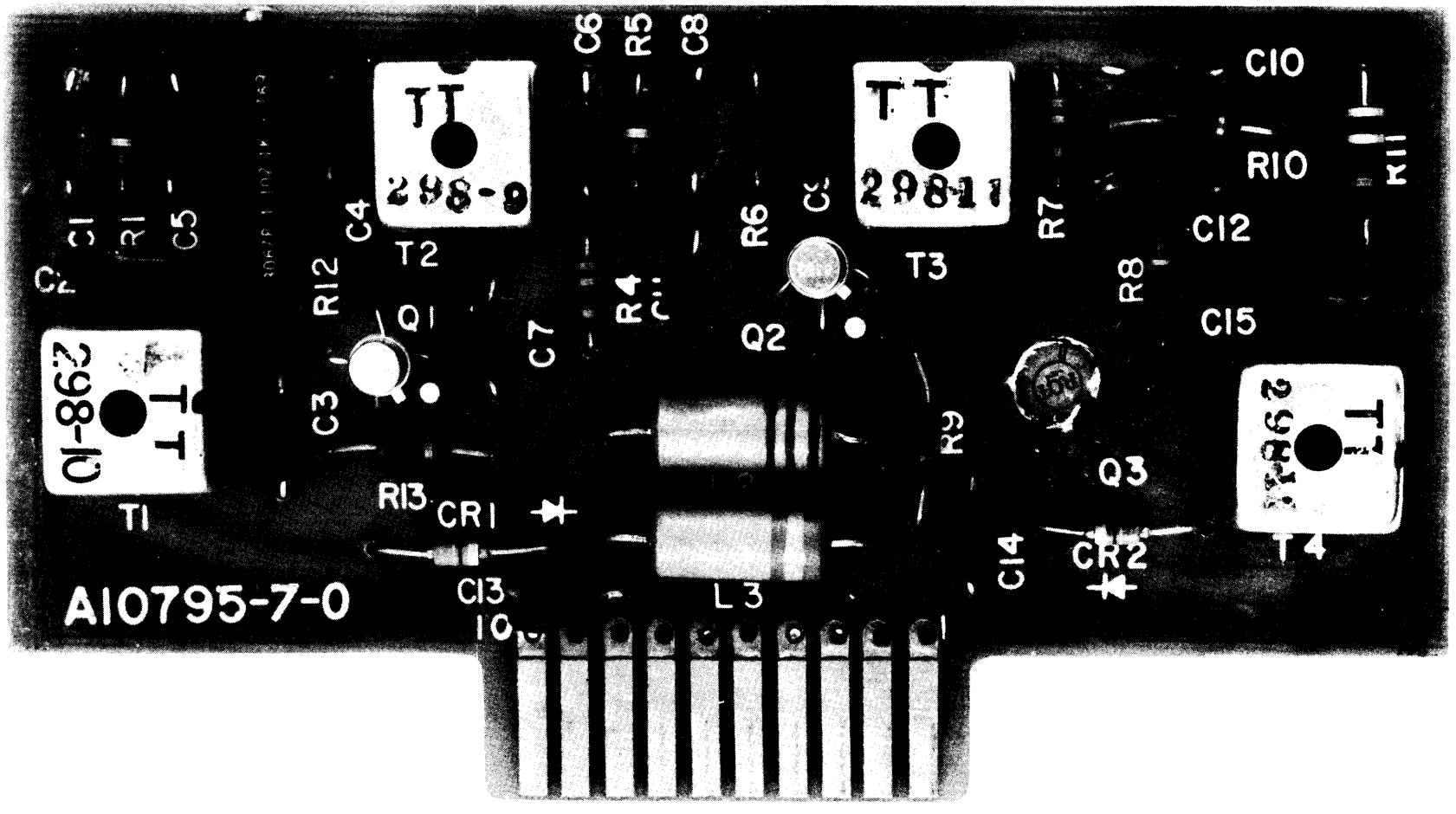


FIGURE 5-10. TRANSMIT RF ASSEMBLY, A10795-5 THROUGH -13, MTR-100A

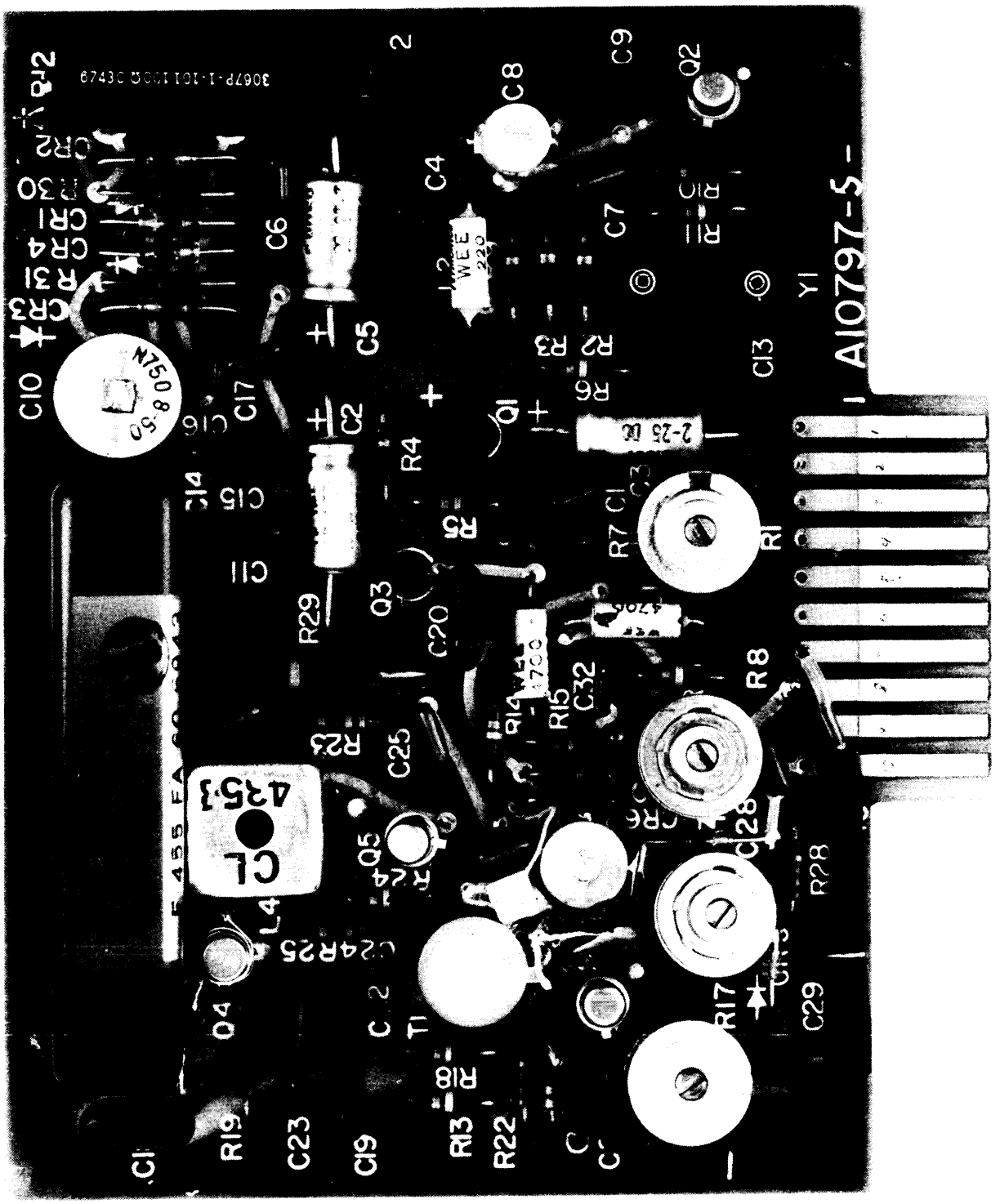


FIGURE 5-11. TRANSMIT IF ASSEMBLY, A10797, MTR-100A

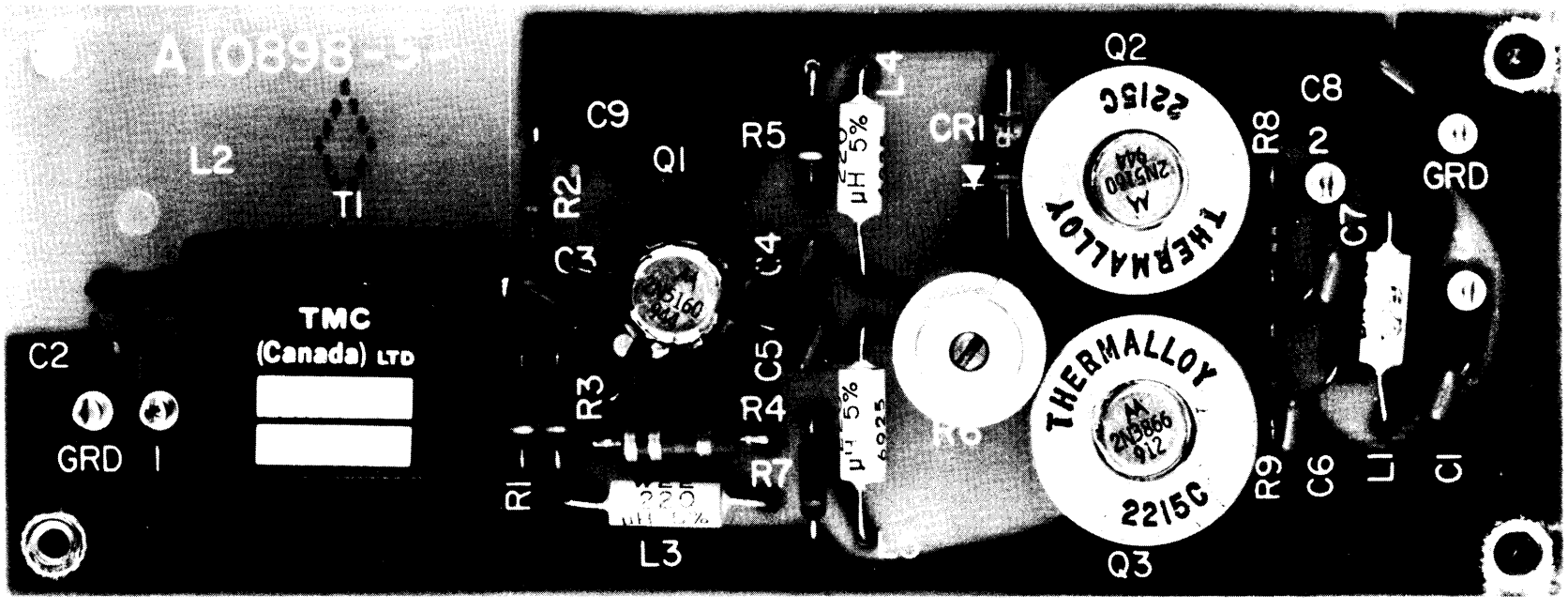


FIGURE 5-12. RF PRE-AMPLIFIER ASSEMBLY, A10898, MTR-100A

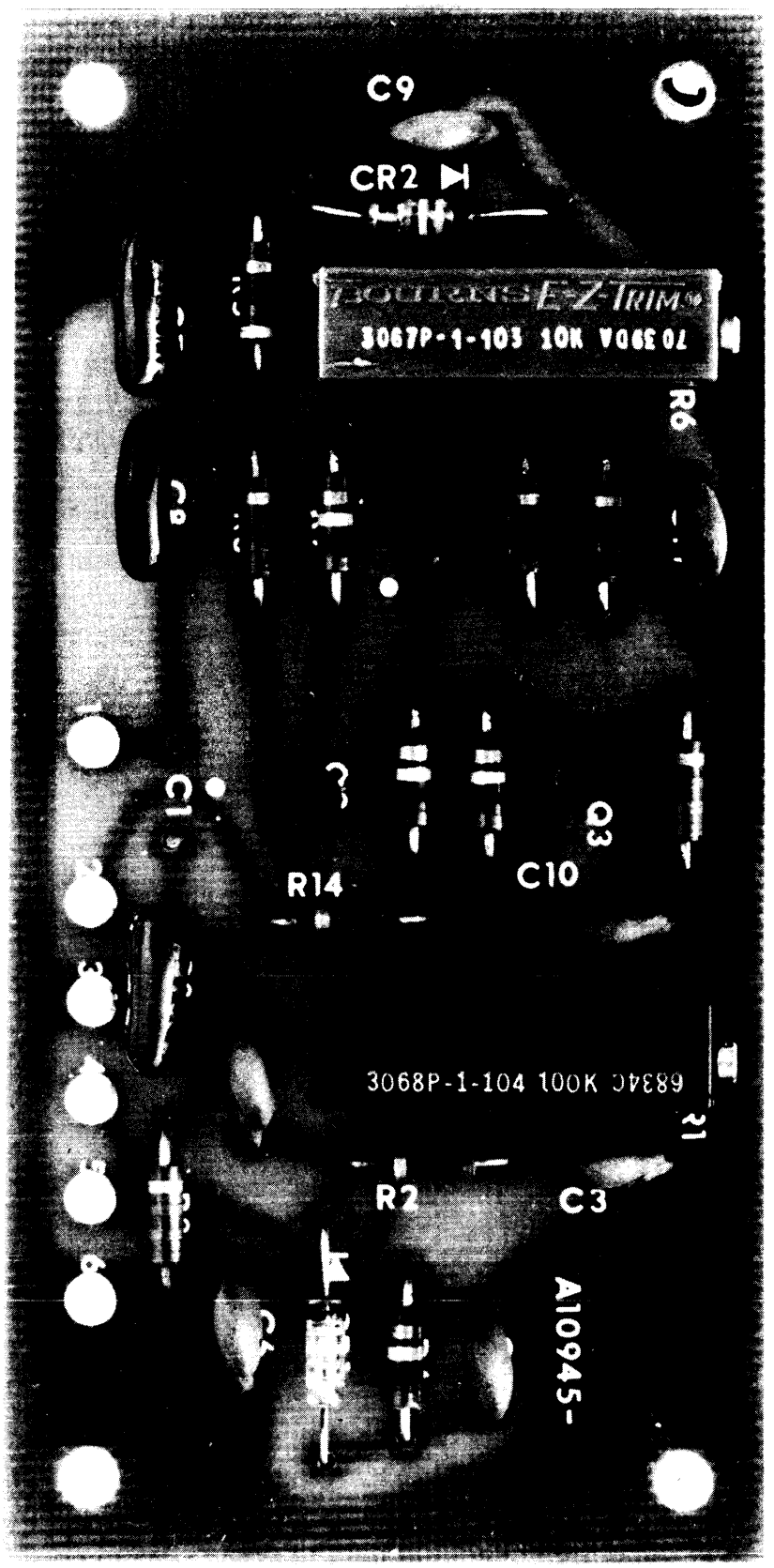


FIGURE 5-13 A1DC & MONITOR ASSEMBLY, A10945, MTR-100A

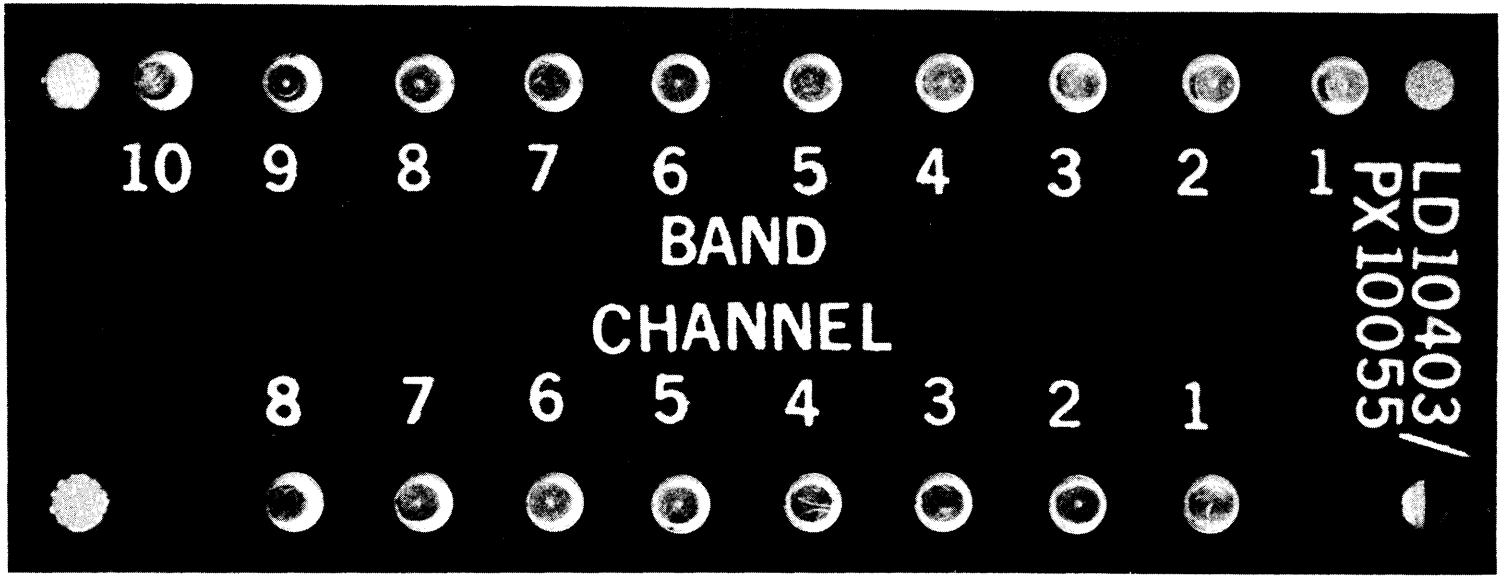


FIGURE 5-14. PROGRAM BOARD, A10890, MTR-100A

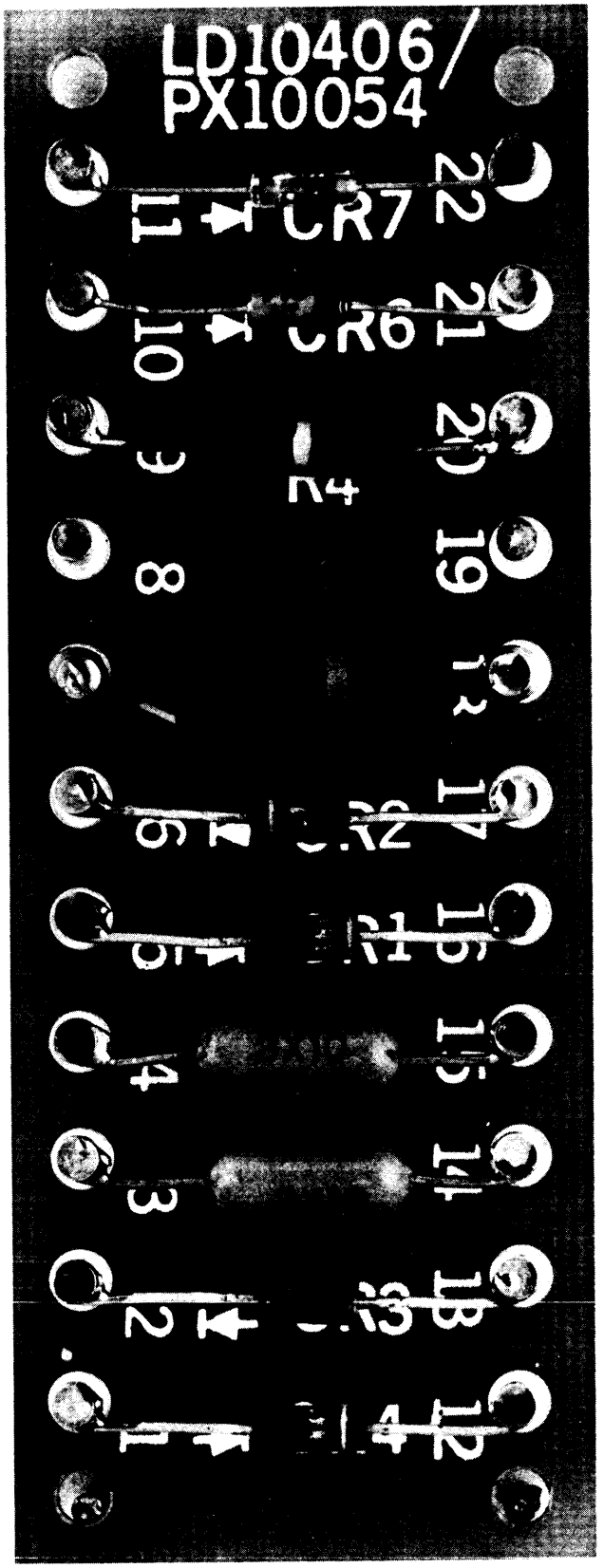


FIGURE 5-15. HV COMPONENT BOARD, A10891, MTR-100A

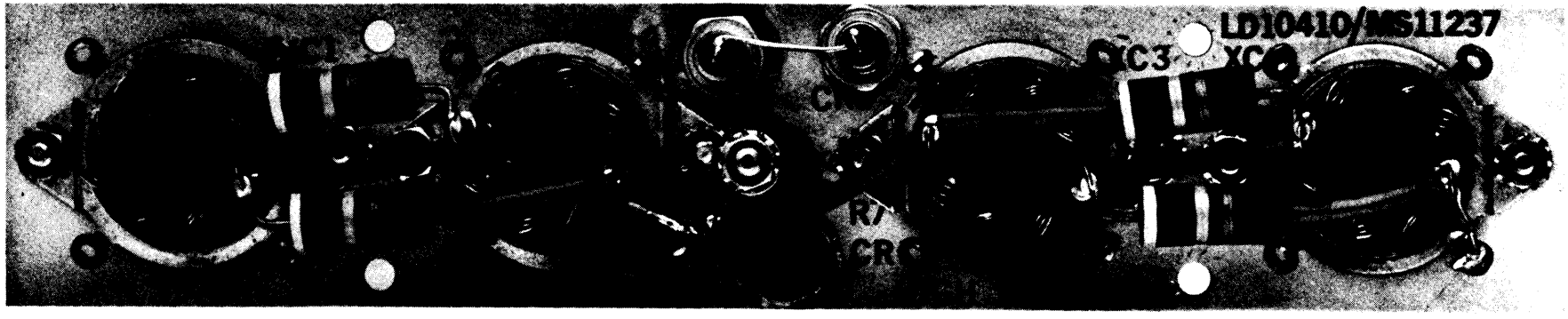


FIGURE 5-16. HV CAPACITOR ASSEMBLY, A10911, MTR-100A

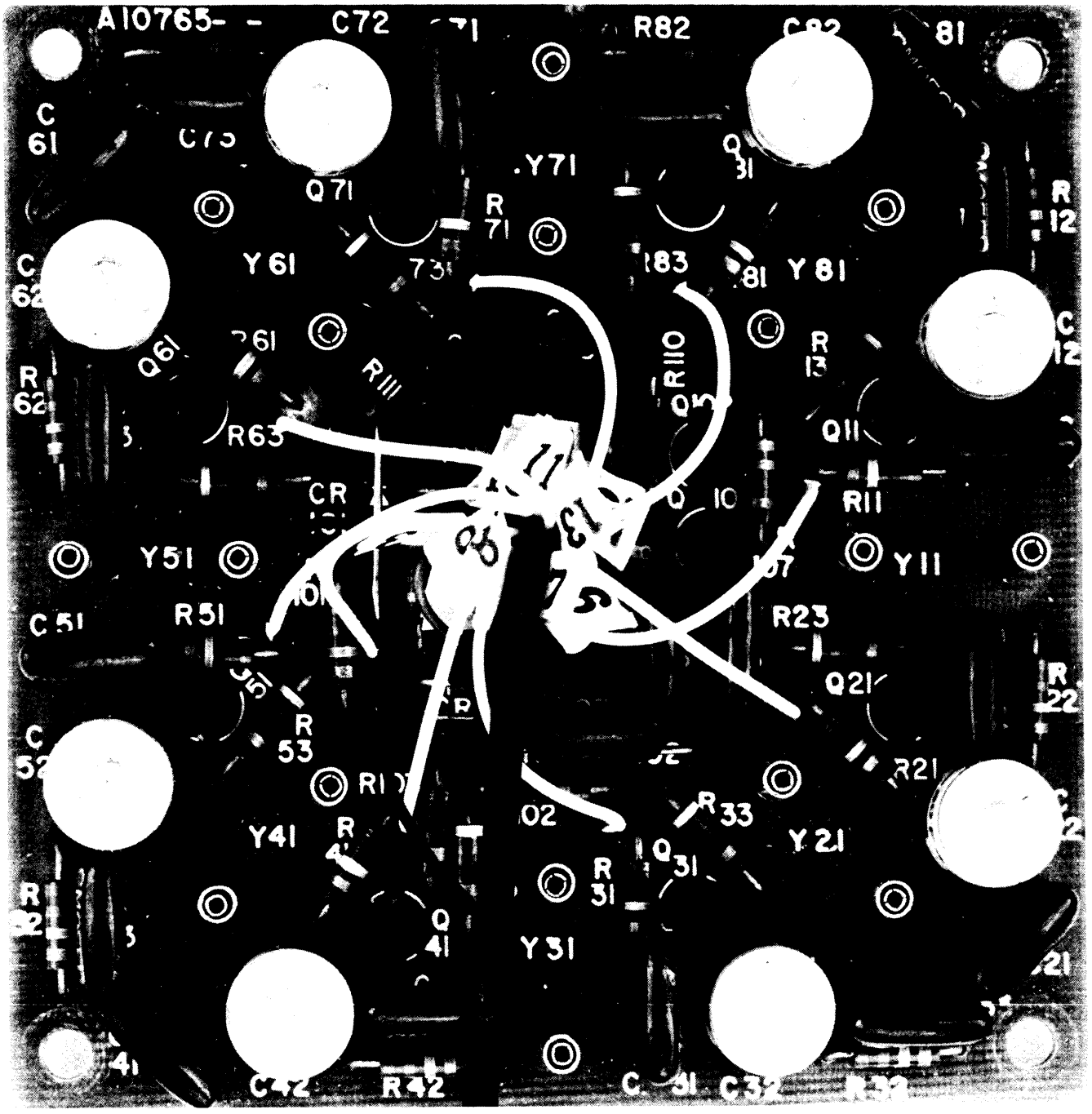


FIGURE 5-17. RECEIVE HF OVEN OSC. ASSEMBLY, A10765-6, MTR-100A

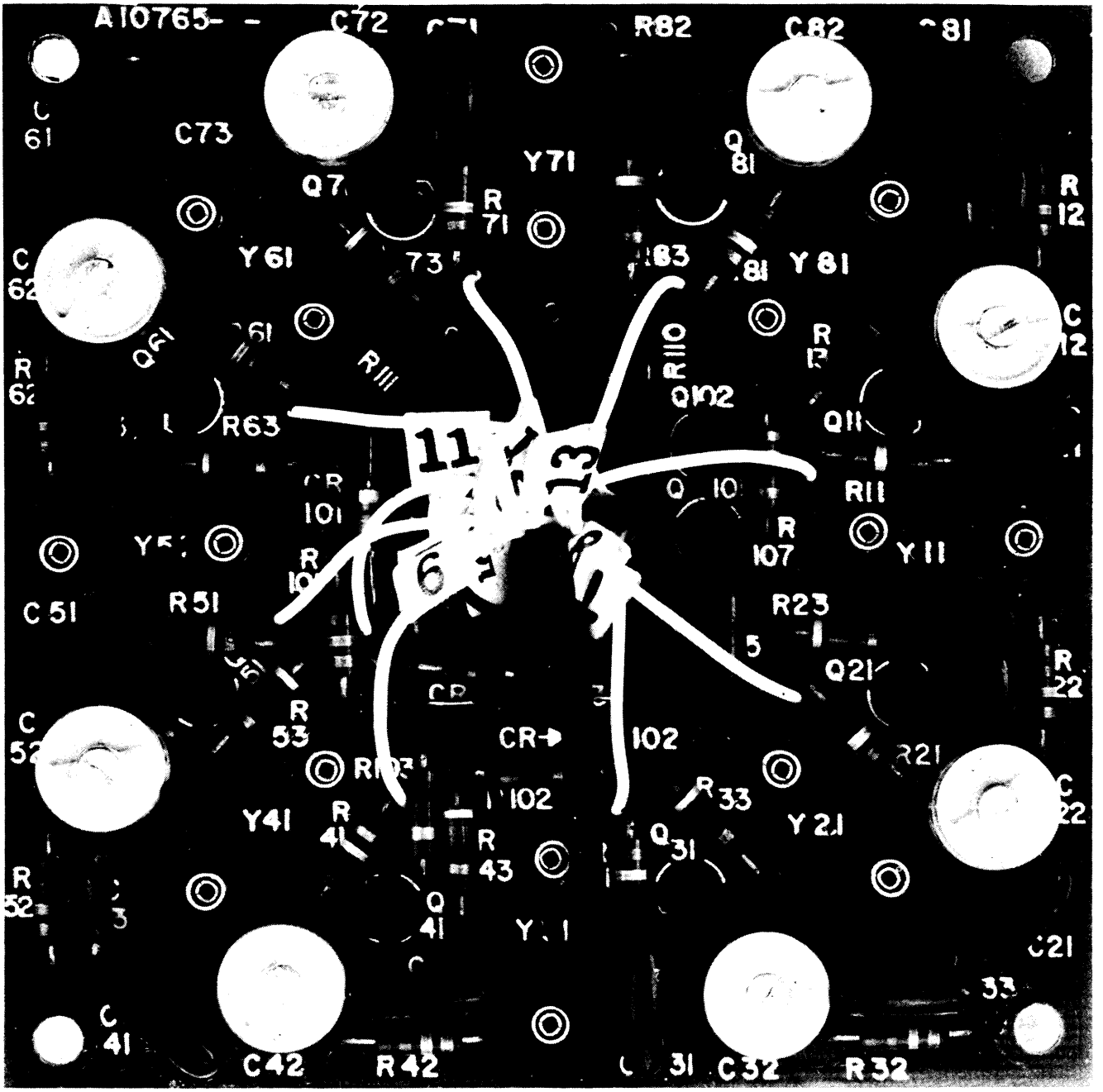


FIGURE 5-18. TRANSMIT HF OVEN OSC. ASSEMBLY, A10765-5, MTR-100A

FIGURE 5-19. HF OVEN OSC. CONTROL ASSEMBLY, A10767, MTR-100A

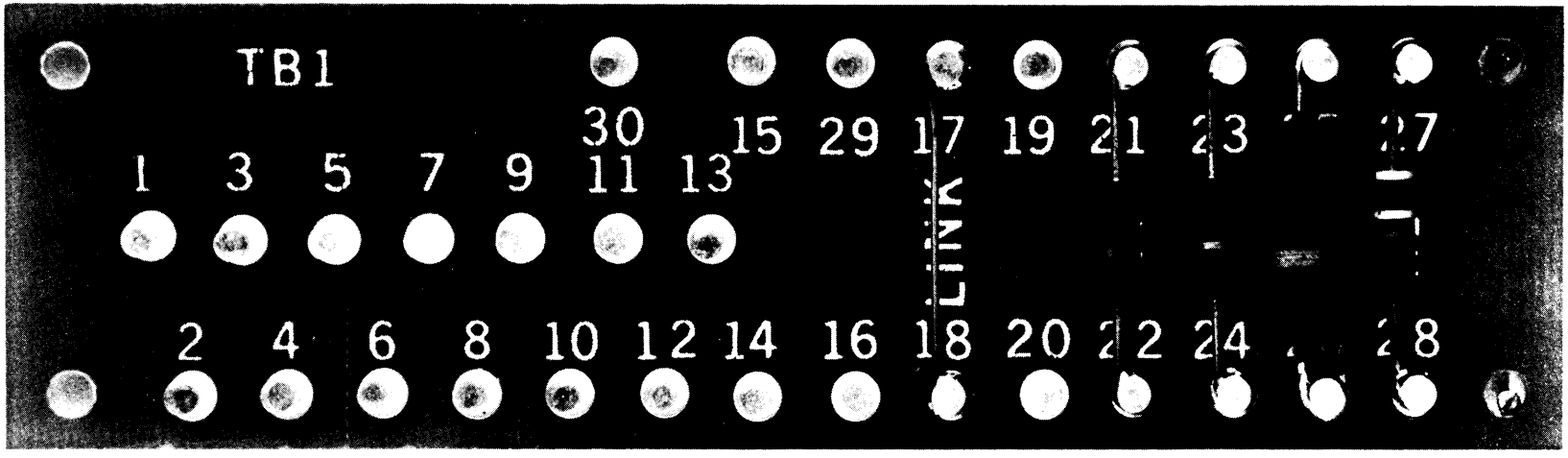


FIGURE 5-20. COMPONENT & TERMINAL BOARD, A10919, DCS-1C

SECTION 5

MAINTENANCE

5-1 GENERAL

The MTR has been designed to provide long-term, trouble-free operation. It is recommended that any necessary maintenance be done by a competent maintenance technician familiar with troubleshooting techniques. Table 5-1 specifies the test equipment required for maintenance.

WARNING

The voltages used in the MTR are sufficiently high to endanger life. All personnel are advised to be thoroughly familiar with the MTR before troubleshooting with the high voltage supplied. Insulated tools should be used wherever possible.

5-2 PREVENTIVE MAINTENANCE

In order to prevent failure of the equipment due to corrosion, tube failure, dust, or other destructive elements, it is suggested that a schedule of preventive maintenance be set up and adhered to. At least every six months the equipment should be taken from the rack and all accessible covers removed for cleaning and inspection.

Remove any accumulated dust with a soft brush or a vacuum cleaner. Remove the blower screen and clean thoroughly. Clean dirt or grease from electrical parts with trichlorethylene, and from metalwork with any good dry cleaning fluid.

WARNING

When using trichlorethylene, make certain that adequate ventilation exists. Avoid prolonged contact with skin.

Table 5-2 suggests items which should be inspected during preventive maintenance.

EQUIPMENT	SPECIFICATIONS
Extender board	TMC Part Number A10869
Frequency counter	Hewlett Packard Model 5245L, or equivalent
Signal generator	Hewlett Packard Model 606A, or equivalent
Multimeter	Simpson Model 260, or equivalent
Audio two-tone generator	TMC Model TTG-2, or equivalent
Oscilloscope	Tektronic Model 545, or equivalent
Spectrum analyzer	TMC Model PTE-3, or equivalent (0.01 uf capacitor also required)
AC vacuum tube voltmeter	Hewlett Packard Model 410B, or equivalent
Antenna dummy load	50 ohm, 100 watt resistor
RF preamplifier dummy load	50 ohm, 1 watt resistor

Table 5-1. Test Equipment Required

WHAT TO INSPECT	DEFECTS TO LOOK FOR
All electrical connectors	Loose pins, dirt, frayed cables
Screws and connectors	Loose or missing hardware
Wiring	Loose connections or frayed wires
Resistors	Cracks, chipping, blistering, discolouration, and other signs of over-heating
Capacitors	Leaks, bulges, discolouration and dirt
Tube	Poor seating
Ledex switches	Dirty interrupter contacts, stiffness of rotary solenoid plate

Table 5-2. Preventive Maintenance Inspection

5-3 TROUBLESHOOTING

The troubleshooting procedure is intended as an aid in locating, diagnosing and correcting equipment trouble and maladjustments in the MTR.

CAUTION

Although removal of the top or bottom cover will prevent the high voltage from being applied, it must be remembered that the primary ac power is still supplied to the blower and the low voltage section of the MTR power supply assembly.

(1) POWER SUPPLY

(a) When the 115 volt ac primary power is supplied to the MTR (through the DCS-1) the blower should be energized and the PWR lamp should come on. If the blower does not energize, check fuse F101. If F101 is intact, check the blower itself. If the blower energizes but the lamp does not light, check lamp DS102, diode bridge Z102 and transformer T101.

(b) Check for +28 volts dc at pin P of J102.

(c) Check for +24 volts dc at

(i) pin 4 on ALDC board A10945
(ii) pin 3 on antenna attenuator board A10868-6.

(d) Check for +15 volts dc at

(i) pin 6 on antenna attenuator board A10868-6
(ii) pin 5 on receive IF board A10856
(iii) cathode of diode CR107.

(e) Operate the push-to-talk from the DCS-1 or ground pin C of J102, ensuring first that the top and bottom covers are in place, the antenna is connected to the MTR, and the mode switch on the DCS is in the SSB position. If the HV lamp does not light check

(i) interlock switches S106 and S107
(ii) relays K101 and K102
(iii) fuse F102
(iv) lamp DS101 and transformer T102.

(f) Remove transmit IF card A10797-5. With a dc VTVM connected between J103 and J104 a reading of 0.11 volts should be observed. If not, adjust BIAS ADJ potentiometer R108 until this reading is observed. If this is not achieved check

(i) +1300 volts dc at the plate of RF amplifier tube V101. If not, check the voltage doubler network in the high voltage section of the power supply and rectifiers CR801, CR802, CR803 and CR804 on component board A10891.

(ii) +300 volts dc at C105. If not check regulators CR101, CR102, CR103.

(iii) approximately -20 volts dc at C111. If not, check rectifier Z101, regulator CR104 and associated circuitry.

(iv) RF amplifier tube V101.

(g) Check for -27 volts dc at pin 3 of preamplifier A10898.

(h) Replace transmit IF card A10797-5.

(2) RECEIVER SECTION

With primary power supplied to the MTR, and SSB mode and channel 1 selected at the DCS, disconnect the antenna lead at J105 and in its place connect the RF signal generator. Adjust the generator to deliver 1.5 uvolts CW at the channel 1 operating frequency. With a meter connected across the audio output line at J102, pins J and K, a minimum reading of 0.1 volts ac should be observed. Select channels 2 through 8 (if all are used) and for each channel adjust the RF signal generator to the correct channel frequency, and for 1.5 uvolts output. Observe that the audio output for each channel is 0.1 volts ac minimum. For each channel, adjust the CLARIFIER control for maximum audio output. If any of the above tests fail to yield the results expected, the problem must first be resolved to be either a problem contained in one or some channels, or a problem contained in all channels.

(a) If the problem appears to be in one channel only, set the CHANNEL switch on the DCS to that channel, and check

(i) +15 volts at pin 1 of the receive RF card for the channel affected
(ii) HFO input is present at pin 3 of receive IF board A10856. This input should be 1 volt peak-to-peak, minimum, at the correct HFO frequency for the channel affected. If this input is not present, check the HFO assembly for that channel.
(iii) The alignment of the receive RF card for the channel affected (see paragraph 5-6-2).

(b) If the problem appears to be in all channels, check

(i) The RF path through antenna attenuator assembly A10868-6
(ii) +15 volts at the wiper of wafer C of channel switch S105
(iii) Presence of HFO signal at pin 3 of receive IF board A10856. This signal should be 1 volt peak-to-peak, minimum, at the correct HFO frequency for the channel selected. If this input is not present, check the two buffer stages Q4101 and Q4102 on the HFO board A10765-6.
(iv) Correct operation of carrier re-insert oscillator Q1209, on receive IF board A10856. This oscillator is switched on by a ground provided at pin 6.
(v) Alignment of receive IF board (see paragraph 5-6-3).
(vi) Correct operation of receive IF board A10856. To isolate a faulty component, check for the presence of an RF signal at the following points

Pin 1 of A1201
Pin 1 of A1202
Pins 2 and 3 of Q1204.

Check for the presence of an audio signal at pins 2 and 1 of Q1205.

(3) TRANSMITTER SECTION - EXCITER

Disconnect the primary power to the MTR. Remove the connection to pin 2 of preamplifier A10898 and connect a 50 ohm, 1 watt resistor from pin 2 to ground. Reconnect primary power and select the SSB mode and channel 1 at the DCS.

Connect the audio generator to the audio line input at J102 and adjust it to deliver 78 mvolts. Connect the multimeter to pin 2 of J110 and adjust R1301 on the audio line distribution assembly A10866 to obtain a meter reading of 78 mvolts ac. (Check T1301 if this level cannot be obtained.) At pin 9 on J110 connect the spectrum analyzer (through a 0.1 uf capacitor) and the oscilloscope. Adjust the spectrum analyzer for the channel 1 frequency. Close the push-to-talk switch on the DCS. A waveform such as that shown in figure 5-1(d) should be observed on the oscilloscope. Its amplitude should be between 2.5 and 4 volts peak-to-peak. Repeat the procedure for channels 2 to 8 (where supplied) and for each channel observe the correct RF output and waveform across the 50 ohm resistor at the output of RF peamplifier A10898.

If any of the above tests fail to yield the results expected, the problem must first be resolved to be either a problem contained in one or some channels, or a problem contained in all channels.

(a) If there appears to be a problem in an individual channel, set the CHANNEL switch on the DCS to that channel, operate the push-to-talk switch, and check

(i) +15 volts at pin 10 of the transmit RF card for the channel affected
(ii) HFO input is present at pin 7 of the transmit IF assembly A10797. This input should be between 2 and 6 volts peak-to-peak, at the correct HFO frequency for the channel affected. If this input is not present, check the HFO assembly for that channel.
(iii) The alignment of the transmit RF card for the channel affected.

(b) If the problem appears to be in all channels, check

(i) The audio input to pin 2 of transmit IF assembly A10797 through [illegible] on radio line distribution board A10866
(ii) 4.5 volts at the wiper of wafer B of channel switch S105
(iii) 27 volts at pin 3 of RF preamplifier A10898
(iv) Presence of HFO signal at pin 7 of transmit IF assembly A10797. This signal should be 2 volts, peak-to-peak, minimum, at the correct HFO frequency for the channel selected. If this input is not present, check the two buffer stages Q2101 and Q2102 on the HFO board A10765-5.
(v) Correct operation of local oscillator Q302 on transmit IF assembly A10797, and also its associated switching circuit, Q303.
(vi) Alignment of the transmit IF assembly (see paragraph 5-6-5).
(vii) Correct operation of the transmit assembly A10797. To isolate a faulty component, check for the presence of a signal at the following points:-

Approximately 50 mvolts of audio at base of Q301
Approximately 20 mvolts of IF at junction of C318 and C333
Approximately 400 mvolts of IF at junction of C323 and C324
Approximately 80 mvolts of IF at junction of R325 and C325
Approximately 2 to 4 volts peak-to-peak at HFO input (pin 7)
Approximately 20 mvolts of RF at output pin 9.

(viii) Correct operation of RF preamplifier A10898.

(4) TRANSMITTER SECTION - FINAL STAGES

Remove primary power from the MTR. With the test equipment connected as for troubleshooting the exciter (paragraph 5-3-3), disconnect the 50 ohm, 1 watt dummy load and reconnect pin 2 on A10898 to T103. Disconnect the antenna input to J105 and connect a 50 ohm, 100 watt resistor. Connect the ac vacuum tube voltmeter across this resistor.

Connect primary power to the MTR and select the SSB mode and channel 1 at the DCS. The push-to-talk switch on the handset must be closed to key the transmitter. With the 3 volt RF ac, peak-to-peak, input at pin 1 on preamplifier A10898, check for voltage levels given in steps (a) to (c). Repeat for channels 2 to 8 and disconnect all test equipment.

(a) At pin 2 on A10898, check for 10 volts RF ac, peak-to-peak. If not present, check Q501, Q502 and Q503 on A10898.

(b) At pin 8 of the RF amplifier tube V101, check for 30 volts RF ac, peak-to-peak. If not present check RF transformer T103.

(c) The vacuum tube voltmeter across the dummy load should read 70 volts RF ac. If it does not, check

(i) tuning of the pi network (see paragraph 5-5)
(ii) channel 1 tuning capacitor C122
(iii) tank coil L105
(iv) channel 1 loading capacitor C133
(v) padding capacitors C120, C121 and C130
(vi) program board A10890.

5-4 REPAIR

Repair work generally consists of the replacement of an electrical component, and the following precautions should be observed.

(1) Always replace a component with its exact duplicate.

NOTE

When replacing insulated gate field effect transistors follow the manufacturer's installation instructions.

(2) Place any new component in the same position as the one it replaces. It is not good practice to alter the existing layout. This applies to the layout of wiring as well as discrete components.

(3) Never use a soldering iron having a power rating of more than 100 watts on printed circuit boards or delicate components. Use a pair of long-nose pliers as a heat sink while soldering.

(4) Extreme caution must be taken when replacing components on a printed circuit board as excess heat applied to the board may cause the printed wiring to lift off.

(5) Double check all solder joints made, as cold or loose solder connections can cause trouble at a later date.

5-5 TUNING PROCEDURE FOR CHANGING OPERATING FREQUENCIES

(1) Switch off power to the MTR and disconnect the RF output from J105 and connect a 50 ohm, 100 watt dummy load.

(2) Determine the frequencies of the new crystals required in the HFO assemblies using the formula

$$f_x = f_R + f_I$$

where f_x=crystal frequency
f_R=frequency of operation
f_I=IF frequency used.

Replace the crystals for all channels whose frequencies are being changed in both the receive and transmit oscillator assemblies.

(3) Replace the transmit and receive RF cards for all channels whose new operating frequency is not covered by the old RF cards. See tables 1-1 and 1-2 for this information.

(4) Connect ac power to the MTR, and switch on power at the DCS. Allow 1 hour for the new crystals to warm up.

(5) Realign the oscillator assemblies in which new crystals have been installed, following the procedure in paragraph 5-6-9.

(6) Realign the receive and transmit RF assemblies for all channels being changed, following the procedures in paragraphs 5-6-2 and 5-6-6.

(7) Switch OFF power and reconnect program board A10890 as follows.

(a) Disconnect the jumper cables for all channels being changed, from the band terminal strips on A10890.

(b) For each channel being changed, connect the jumper cable to the band terminal strip for the band containing the new operating frequency (see table on Figure 7.2.) More than one cable may be connected to a band terminal strip when required.

(8) Tune the MTR as follows, repeating the procedure for each channel affected.

(a) With the DCS in SSB mode, provide a single tone audio input of 1000Hz and approximately 40 mvolt amplitude to the audio input of the MTR (Note: This may be avoided if the unit supplied has an AM mode capability, by switching to AM mode and ensuring there is no audio input to the MTR.)

(b) Operate the push-to-talk switch on the handset of the DCS, or ground pin C of J102.

(c) With a VTVM and the 50 ohm, 100 watt dummy load connected to the output of the MTR, adjust the tune and load capacitors (accessible on the right hand side plate of the unit) for maximum RF output.

(d) Reduce or increase the RF gain control (R12) on the transmit RF card for the channel being tuned, until the RF output indicated on the VTVM is 35 volts RMS. Re-peak the tune and load capacitors for that channel each time the RF gain control is adjusted.

5-6 ALIGNMENT

The MTR is aligned at the factory and should not normally need adjustment. In the event that alignment is required, the following procedures should be used.

(1) POWER SUPPLY

Potentiometer R108 sets the bias voltage for the control grid of amplifier tube V101 and should only be adjusted if the tube is changed. This is accomplished as follows:-

(a) Connect a multimeter across J103 and J104. Switch on power at the DCS.

(b) Select the SSB mode on the DCS.

(c) With no audio input at J102 of the MTR, close the push-to-talk switch on the DCS.

(d) Adjust potentiometer R108 until the meter reads 0.11 volts.

(2) RECEIVE RF ASSEMBLIES

(a) Supply power to the MTR, select the AM mode, channel 1, and remove the BNC coaxial connector from the receive HFO assembly.

(b) Rotate potentiometer R1105 fully clockwise.

(c) Disconnect the antenna input at J105 and connect the RF signal generator. Adjust the signal generator to deliver a signal at the channel 1 frequency, at a level of 1 mvolt.

(d) Connect the oscilloscope at pin 6 of J119 on the main chassis.

(e) Peak transformers T1101, T1102, T1103, (and T1104 when provided) for maximum indication on the oscilloscope. The output signal should be between 20 and 30 mvolts RF ac. If this level is exceeded, reduce R1105 as required.

(f) Repeat steps (a) to (e) for channels 2 to 8.

(g) Disconnect the test equipment, connect the antenna input to J105, and reconnect the HFO BNC connector.

(3) RECEIVE IF ASSEMBLY, A10856

(a) Supply power to the MTR and select the SSB mode on the DCS.

(b) Disconnect the antenna input at J105. Connect the frequency counter at pin 2 of Q1204.

(c) Adjust C1253 on A10856 until the counter indicates a frequency of 456.350 kHz ± 1 Hz. (456.750 optional.)

(d) Connect ground to pin 2 (AGC) on A10856. Select the AM mode.

(e) Connect the RF signal generator at pin 4 of A10856. Set the output frequency to 455 ± .1 kHz and adjust the amplitude to 1 mvolt. Set the modulation for 30% at 1 kHz.

(f) Connect the multimeter and oscilloscope across pins J and K on J102. Adjust C1206 and C1210 for maximum output on the multimeter, reducing the signal level on the RF signal generator as required to keep the output below 0.1 volt.

(g) Maximize the output as in step (f), adjusting L1211, T1201 and L1207.

(h) Select the SSB mode. Adjust the frequency of the output from the RF signal generator to give a reading of 1000 ±50 Hz on the oscilloscope. Adjust C1205 and C1209 for maximum reading on the multimeter.

(i) Disconnect signal generator from pin 4 of A10856, and connect to antenna input J105.

(j) Select the AM mode. Set the signal generator for a 3 uvolt output at the channel 1 frequency. Set the modulation for 30% at 1 kHz.

(k) Adjust R1233 for +1.0 volt dc at pin 4 of Q1207.

(l) Set R1209 for an audio output of 0.2 volts at pins J and K of J104.

(m) Remove the ground connection from pin 2 of the IF assembly. Adjust R1240 for an audio output of 0.1 volts.

(n) Reconnect pin 2 to ground. Select the SSB mode, and adjust RF signal generator output to 1.5 uvolt.

(o) Remove the modulation from the RF signal generator output. Adjust R1207 for an audio output of 0.2 volts.

(p) Remove the ground connection to pin 2 and adjust R1237 for an audio output of 0.1 volts.

(4) ANTENNA ATTENUATOR ASSEMBLY

(a) Supply power to the MTR and select the SSB mode.

(b) Disconnect the antenna input at J105 and connect the RF signal generator.

(c) Turn R1401 fully counterclockwise and set R1403 to the mid-point of its range.

(d) With a dc VTVM at pin 2 of receive IF assembly A10856, adjust the signal generator input to obtain an AGC level of -1.8 volts. Slowly turn R1401 clockwise until relays K1401 and K1402 are deenergized, thereby switching 30 dB attenuation into the RF signal path.

(e) Reduce the signal generator input to obtain an AGC level of -1 volt. Adjust R1403 until relays K1401 and K1402 are energized.

(f) Re-check levels set in (d) and (e) and readjust if necessary.

(g) Disconnect the test equipment and connect the antenna input to J105.

(5) TRANSMIT IF ASSEMBLY A10797

(a) With no power supplied to the MTR, disconnect wire from pin 2 on preamplifier A10898 and connect a 50 ohm, 1 watt resistor from pin 2 to ground.

(b) Supply power to the MTR and select the SSB mode.

(c) Connect the audio signal generator to the line audio input at J102, and adjust to deliver two audio tones at 78 mvolts.

(d) Key the transmitter section by closing the push-to-talk switch on the DCS.

(e) Rotate input adjust potentiometer R301 on A10797 fully counter clockwise.

(f) At pin 9 of J110 connect the spectrum analyzer (through the 0.1 uf capacitor), and the oscilloscope.

(g) Select the channel with the highest operating frequency at the DCS and adjust the spectrum analyzer to monitor the output frequency.

NOTE

$f_R = f_X - f_I$

where f_R= output frequency
f_X= HFO crystal frequency
f_I= 456.35 kHz (456.75 kHz optional)

Adjust R326 and C331 for minimum HFO amplitude.

(h) Peak L304 for maximum output.

(i) Adjust R301 until 25 mvolts is indicated on the oscilloscope.

(j) Reduce the two tone audio input to zero. Adjust R312 and C310 for minimum carrier as indicated on the spectrum analyzer.

(k) Connect the frequency counter at the junction of C316 and the wiper of R312. Adjust C308 until the counter indicates 456.350 kHz ±1 Hz. Disconnect the counter.

(l) Adjust the audio signal generator to deliver a two tone input at 78 mvolts RF ac.

(m) Select AM mode. Adjust R316 until the carrier level as indicated on the spectrum analyzer is the same level as the two input tones.

(n) Remove power from the MTR, disconnect the test equipment and reconnect pin 2 on the preamplifier.

(6) TRANSMIT RF ASSEMBLIES, A10795

(a) With no power supplied to the MTR, disconnect wire from pin 2 on preamplifier A10898 and connect a 50 ohm, 1 watt resistor from pin 2 to ground.

(b) Supply power to the MTR and select the SSB mode.

(c) Connect the audio generator to the audio line input at J102 and adjust it to deliver two audio tones at 78 mvolts RF ac.

(d) Key the transmitter section by closing the push-to-talk switch on the DCS.

(e) Connect the oscilloscope at pin 3 of ~~J110~~ 2.

(f) Turn R412 fully counterclockwise and peak transformers T401, T402, T403 and T404 for maximum indication on the oscilloscope. Care must be taken when adjusting T401, T402 and T403 to ensure tuning to the desired frequency. This may be best accomplished by rotating the cores fully counterclockwise (looking from the component side of the board) and tuning to the first peak encountered when turning the cores in a clockwise direction.

(g) Turn R412 clockwise until the oscilloscope indicates 3 volts RF ac, peak-to-peak.

(h) Remove power from the MTR, disconnect all test equipment and reconnect pin 2 on the preamplifier.

(7) RF PREAMPLIFIER A10898

(a) With no power to the MTR and no RF input to the preamplifier, disconnect the lead to pin 3 of the preamplifier and connect it to one side of the multimeter. Connect the other side of the multimeter to pin 3.

(b) Supply power to the MTR, select the SSB mode and close the push-to-talk switch on the DCS.

(c) Adjust R506 (shown as R6 on the printed circuit board) until the multimeter indicates 35 ma.

(d) Remove power from the MTR and disconnect the test equipment.

(8) ALDC AND MONITOR ASSEMBLY, A10945

(i) ALDC ADJUSTMENT

(a) Connect the 50 ohm, 100 watt load and a RF VTVM to the antenna output of the MTR, and supply the audio input at J102 with approximately 78 mvolts from the two-tone generator.

(b) Supply power to the MTR, select SSB mode and channel 1, and close the push-to-talk switch on the DCS handset.

(c) Turn ALDC potentiometer R901 fully clockwise.

(d) Adjust the two-tone audio input level to the MTR until the RF output from the transmitter is 70 volts RMS.

(e) Adjust ALDC potentiometer R901 until the RF output level drops to 68 volts RMS.

(f) Remove power from the MTR, and disconnect the test equipment.

(ii) MONITOR LAMP ADJUSTMENT

R906 is factory set to provide an on-air indication when the RF output of the transmitter exceeds 35 volts RMS. It may however be set to provide an indication of from 20 volts RMS RF (by turning R906 counterclockwise), to 70 volts RMS RF (by turning R906 clockwise).

(9) HFO ASSEMBLIES A10765-5 and A10765-6

(a) Supply power to the MTR. Connect the frequency counter to the output jack for the HFO assembly (J109 for the receive oscillator assembly, or J108 for the transmit oscillator assembly). Ensure that the necessary operating supplies are provided to the assembly being aligned.

(b) Remove the cover from the HFO assembly, and ajust the variable capacitor in the selected channel to obtain the required operating frequency as indicated on the frequency counter. An access hole is provided for this purpose. Replace the cover and allow 1 hour for the unit to stabilize. Readjust if necessary.

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 parts 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 Y2011 is designated XY2011. To expedite delivery, when ordering replacement parts, specify the TMC part number and the model number of the equipment.

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
A101	PARASITIC SUPPRESSOR	AX319
BL101	FAN	BL106-5
C101 through C104	CAPACITOR: fixed, electrolytic; 80 uf, 450 WVDC	CE51C800R
C105	CAPACITOR: fixed, ceramic; 2000 pf ± 20%	CK70A202M
C106	Same as C105	
C107	CAPACITOR: fixed, ceramic; 0.01 uf GMV, 500 WVDC	CC100-16
C108	CAPACITOR: fixed, ceramic; 1000 pf ± 20%, 5000 WVDC	CC109-38
C109	Same as C108	
C110	CAPACITOR: fixed, ceramic; 0.1 uf +80% -20%, 100 WVDC	CC100-28
C111	Same as C105	
C112	CAPACITOR: fixed, electrolytic; 500 uf, 50 WVDC	CE10007
C113	Same as C105	
C114	CAPACITOR: fixed, electrolytic; 2300 uf, 50 WVDC	CE119-2300-50
C115	Same as C107	
C116	Same as C107	
C117 through C119	CAPACITOR: fixed, ceramic; 0.02 uf +80% -20%, 25 WVDC	CC100-40
C120	CAPACITOR: fixed, mica; 220 pf ±10%, 2500 WVDC	CM45B221K
C121	CAPACITOR: fixed, mica; 560 pf ±10%, 2500 WVDC	CM45B561K

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
C122 through C129	CAPACITOR: variable, air, tuning; 13.5 to 320 pf	CB10008
C130	CAPACITOR: fixed, mica; 1000 pf ±10%, 2500 WVDC	CM45B102K
C133 through C140	CAPACITOR: variable, mica; 275 to 970 pf	CV100-306
C142	CAPACITOR: fixed, ceramic; 0.02 uf +80% -20%, 25 WVDC	CC100-40
C143	CAPACITOR: fixed, ceramic; 2200 uf GMV, 500 WVDC	CC100-11
C144	Same as C143	
C145 through C147	CAPACITOR: fixed, electrolytic; 2200 pf, 50 WVDC	CE44C222G
C148	Same as C143	
C149	Same as C114	
C150	Same as C130	
C152	Same as C105	
C153	Same as C105	
C161	CAPACITOR: fixed, electrolytic; 100 uf	CE10010
C162 through C169	CAPACITOR: fixed, ceramic; 0.01 uf ±20%, 50 WVDC	CC100-42
CR101	DIODE	1N3006
CR102	DIODE	1N3006R
CR103	Same as CR101	
CR104	DIODE	1N2988A/R
CR105	DIODE	1N538
CR106	DIODE	1N2986
CR107	DIODE	1N2979B
CR108	DIODE	1N2982B

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
CR109	DIODE	1N914
CR110	Same as CR105	
DS101	LAMP	BI110-9
DS102	Same as DS101	
DS103	LAMP	BI101-1819
F101	FUSE: slow-blow; 7A (at 115 Vac) 3A (at 220 Vac)	FU102-7.0 FU102-3.0
F102	FUSE: slow-blow; 5A (at 115 Vac) 2.5A (at 220 Vac)	FU102-5.0 FU102-2.5
J101	CONNECTOR: power	JJ175
J102	CONNECTOR: receptacle	MS3102A-28-16S
J103	CONNECTOR: jack	JJ219-1-0
J104	CONNECTOR: jack	JJ219-1-2
J105	CONNECTOR: BNC	UG625/U
J106	CONNECTOR: receptacle	MS3102A-20-27P
J107	CONNECTOR: receptacle	MS3102A-20-27S
J108	CONNECTOR	PL224
J109	Same as J108	
J110 through J126	CONNECTOR	JJ10010-10-01
K101	RELAY	RL116DC4C024
K102	Same as K101	
L101	COIL: RF, fixed; 220 uH ±10%	CL140-6
L102	COIL: 185 uH ±10%	CL178
L103	COIL: RF, fixed; 124 uH ±10%	CL361
L105	COIL: Tank, (tapped)	CL10046
L106	COIL: RF, fixed; 2.5 uH ±10%	CL140-1

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
L107 through L114	COIL: RF, fixed; 270 uH ±10%	CL275-271
L115	COIL: RF, fixed; 120 uH ±10%	CL240-120
L116	Same as L106	
R101	RESISTOR: fixed, wirewound: 3.3 ohms, 5W	RW107-4
R102 through R105	RESISTOR: fixed, composition: 47 kohms ±5% 2W	RC42GF473J
R106	RESISTOR: fixed, wirewound; 20 kohms, 10W	RW109-37
R107	Same as R102	
R108	RESISTOR: variable, composition; 5 kohms ±10%	RV4LAYSA502A
R109	RESISTOR: fixed, composition; 4.7 kohms ±5%, 1W	RC32GF472J
R110	RESISTOR: fixed, composition; 47 ohms ±5%, 1W	RC32GF470J
R111	RESISTOR: fixed, composition; 150 ohms ±5%, ¼W	RC07GF151J
R112	Same as R101	
R113 through R115	RESISTOR: fixed, composition; 3.3 ohms ±5%, 1W	RC32GF3R3J
R116	RESISTOR: fixed, composition; value selected on test ±5%, ¼W	RC07GF270J or RC07GF330J or RC07GF390J
R117	RESISTOR: fixed, composition; 22 ohms ±5%, 2W	RC42GF220J
R118	Same as R117	
R119 through R126	RESISTOR: fixed, composition; 68 kohms ±5%, ½W	RC20GF683J
R127	RESISTOR: fixed, composition; 100 ohms ±5%, 2W	RC42GF101J

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
R128	RESISTOR: fixed, composition; 150 ohms ±5%, 2W	RC42GF151J
R129	Same as R101	
R130	RESISTOR: fixed, composition; 22 kohms ±5%, ¼W	RC07GF223J
R132	RESISTOR: fixed, composition; 10 kohms ±5%, ¼W	RC07GF103J
R133	RESISTOR: fixed, composition; 820 ohms ±5%, ¼W	RC07GF821J
S101	SWITCH: rotary	SW10053
S102	Same as S101	
S103	SWITCH: rotary, solenoid	SZ10011
S104	Same as S103	
S105	SWITCH: rotary	SW10056
S106	SWITCH: interlock	SW10055
S107	Same as S106	
S108	SWITCH	SW163
T101	TRANSFORMER	TF10056
T102	TRANSFORMER	TF10062
T103	AUTO TRANSFORMER	TR10008
TB101 through TB108	TERMINAL STRIP	TM117-13
TB109	TERMINAL STRIP	TM117-31
TB110	Same as TB109	
TB111	TERMINAL STRIP	TM117-23
V101	TUBE	8121
Z101	DIODE BRIDGE	MDA962-1
Z102	Same as Z101	

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
LS201	LOUDSPEAKER	LS10003
R201	RESISTOR: fixed, composition; 470 kohms ±5%, ½W	RC20GF474J
R202	RESISTOR: variable, composition; 500 kohms	RV4NAYSD504D
R205	RESISTOR: variable, composition; 5 kohms	RV4NAYSD502D
R206	RESISTOR: fixed, composition; 1 kohm ±5%, 2W	RC42GF102J
S201	SWITCH: toggle, double-pole, double-throw	SW10062
S202	SWITCH: rotary	SW10061
S203	Same as S101	

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
C301	CAPACITOR: fixed, ceramic; 0.1 uf, ±20%, 100 WVDC	CC10015-X5V-104M
C302	CAPACITOR: fixed, electrolytic; 10 uf, -10% +150%, 16WVDC	CE105-10-16
C303	CAPACITOR: fixed, electrolytic; 2 uf, -10% + 150%, 25 WVDC	CE105-2-25
C305	Same as C303	
C306	CAPACITOR: fixed, ceramic; 0.01 uf ± 20%, 100 WVDC	CC10017-X5V-103M
C307	Same as C301	
C308	CAPACITOR: variable 3.5-13 pf	CV10001
C309	CAPACITOR: fixed, mica; 390 pf ±5%, 500 WVDC	CM111E391J5S
C310	CAPACITOR: variable 8-50 pf	CV109-9
C311	CAPACITOR: fixed, mica; 27 pf ±5%, 500 WVDC	CM111E270J5S
C312	CAPACITOR: fixed, mica; 820 pf ±5%, 500 WVDC	CM111E821J5S
C314	CAPACITOR: fixed, mica; 270 pf ±2%, 500 WVDC	CM111E271G5S
C315	Same as C314	
C316	Same as C306	
C317	Same as C301	
C318	CAPACITOR: fixed, mica; 1000 pf ±5%, 500 WVDC	CM111E102J5S
C319	CAPACITOR: fixed, mica; 180 pf ±5%, 500 WVDC	CM111E181J5S
C320	Same as C319	
C321	CAPACITOR: fixed, ceramic; 2.2 uf, 50 WVDC	CC10018

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
C322	Same as C306	
C323	Same as C312	
C324	Same as C306	
C325	Same as C301	
C326	Same as C301	
C327	Same as C306	
C328	Same as C301	
C329	CAPACITOR: fixed, mica; 220 pf ±5%, 500 WVDC	CM111E221J5S
C330	Same as C319	
C331	CAPACITOR: variable 9-35 pf	CV112-9
C332	Same as C306	
C333	Same as C306	
CR301 through CR306	DIODE	1N34A
FL301	FILTER: for A10797-5, 2.7 kHz bandwidth (available as option) for A10797-6, 2.1 kHz bandwidth (supplied as standard)	FX10032 FX290
L301	COIL: fixed, RF; 4700 uH ±10%	CL275-472
L302	COIL: fixed, RF; 220 uH ±10%	CL275-221
L303	Same as L301	
L304	COIL: variable; 150 uH	CL435-1
Q301	TRANSISTOR	2N3906
Q302	TRANSISTOR	2N5361
Q303	TRANSISTOR	MPF104
Q304	TRANSISTOR	3N142
Q305	Same as Q302	

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
Q306	Same as Q302	
R301	RESISTOR: variable; 5 Kohms ±10%	RV111U502A
R302	RESISTOR: fixed, composition; 1 Kohm ±5%, ¼W	RC07GF102J
R303	Same as R302	
R304	RESISTOR: fixed, composition; 820 ohms ±5%, ¼W	RC07GF821J
R305	RESISTOR: fixed, composition; 22 Kohms ±5%, ¼W	RC07GF223J
R306	RESISTOR: fixed, composition; 100 Kohms ±5%, ¼W	RC07GF104J
R307	RESISTOR: fixed, composition; 680 ohms ±5%, ¼W	RC07GF681J
R308	Same as R306	
R309	RESISTOR: fixed, composition; 100 ohms ±5%, ¼W	RC07GF101J
R310	Same as R309	
R311	RESISTOR: fixed, composition; 220 Kohms ±5%, ¼W	RC07GF224J
R312	RESISTOR: variable, wirewound; 100 ohms	RV10005-1P
R313	Same as R306	
R314	Same as R311	
R315	RESISTOR: fixed, composition; 15 Kohms ±5%, ¼W	RC07GF153J
R316	RESISTOR: variable; 10 Kohms ±10%	RV111U103A
R317	Same as R316	
R318	Same as R311	
R319	Same as R307	
R320	Same as R302	

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
R321	RESISTOR: fixed, composition; 3.3 Kohms ±5%, ¼W	RC07GF332J
R322	Same as R307	
R323	RESISTOR: fixed, composition; 330 ohms ±5%, ¼W	RC07GF331J
R324	Same as R306	
R325	Same as R323	
R326	RESISTOR: variable, 500 ohms ±10%	RV111U501A
R327	RESISTOR: fixed, composition; 18 Kohms ±5%, ¼W	RC07GF183J
R328	RESISTOR: fixed, composition; 180 ohms ±5%, ¼W	RC07GF181J
R329	RESISTOR: fixed, composition; 1.5 Kohms ±5%, 1 W	RC32GF152J
R330	RESISTOR: fixed, composition; 270 ohms ±5% ¼W	RC07GF271J
R331	Same as R330	
T301	TRANSFORMER	TZ10003
Y301	CRYSTAL; QUARTZ: for A10797-5 (available as option) for A10796-6 (supplied as standard)	CR46A/U456.750 CR46A/U456.350

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
C401	CAPACITOR: fixed, ceramic; 0.02 uf, +80%-20%, 25 WVDC	CC100-40
C402	CAPACITOR: fixed, mica; ±5%, 50 WVDC	
	A10795- 5; 200 pf	CM111E201J5S
	A10795- 6; 200 pf	CM111E201J5S
	A10795- 7; 200 pf	CM111E201J5S
	A10795- 8; 180 pf	CM111E181J5S
	A10795- 9; 150 pf	CM111E151J5S
	A10795-10; 150 pf	CM111E151J5S
	A10795-11; 150 pf	CM111E151J5S
	A10795-12; 150 pf	CM111E151J5S
	A10795-13; 91 pf	CM111E910J5S
C403	Same as C401	
C404	Same as C402	
C405 through C408	Same as C401	
C409	Same as C402	
C410 through C414	Same as C401	
C415	Same as C402	
CR401	DIODE	1N914
CR402	Same as CR401	
L401	COIL: fixed, RF; 330 uH ±10%	CL275-330
L402	COIL: fixed, RF; 120 uH ±10%	CL240-120
L403	COIL: fixed, RF; 33 uH ±10%	CL240-33
Q401	TRANSISTOR	3N142
Q402	Same as Q401	
Q403	TRANSISTOR	2N4427
R401	RESISTOR: fixed, composition; 100 Kohms ±5%, ¼W	RC07GF104J
R404	RESISTOR: fixed, composition; 330 ohms ±5%, ¼W	RC07GF331J
R405	Same as R401	

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
R406	RESISTOR: fixed, composition; 680 ohms ±5%, ¼W	RC07GF681J
R407	Same as R404	
R408	RESISTOR: fixed, composition; 47 ohms ±5%, ¼W	RC07GF470J
R409	RESISTOR: fixed, composition; 1.5 Kohms ±5%, ¼W	RC07GF152J
R410	RESISTOR: fixed, composition; 120 ohms ±5%, ¼W	RC07GF121J
R411	RESISTOR: fixed, composition; 30 ohms ±5%, ½W	RC20GF300J
R412	RESISTOR: variable, 1000 ohms, ±10%	RV10005-4P
R413	RESISTOR: fixed, composition; 8.2 Kohms ±5%, ¼W	RC07GF822J
T401	TRANSFORMER: variable	
	A10795-5	TT298-2
	A10795-6	TT298-6
	A10795-7	TT298-10
	A10795-8	TT298-14
	A10795-9	TT298-18
	A10795-10	TT298-22
	A10795-11	TT298-26
	A10795-12	TT298-30
	A10795-13	TT298-34
T402	TRANSFORMER: variable	
	A10795-5	TT298-1
	A10795-6	TT298-5
	A10795-7	TT298-9
	A10795-8	TT298-13
	A10795-9	TT298-17
	A10795-10	TT298-21
	A10795-11	TT298-25
	A10795-12	TT298-29
	A10795-13	TT298-33

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
T403	TRANSFORMER: variable	
	A10795-5	TT298-3
	A10795-6	TT298-7
	A10795-7	TT298-11
	A10795-8	TT298-15
	A10795-9	TT298-19
	A10795-10	TT298-23
	A10795-11	TT298-27
	A10795-12	TT298-31
	A10795-13	TT298-35
T404	TRANSFORMER: variable	
	A10795-5	TT298-4
	A10795-6	TT298-8
	A10795-7	TT298-12
	A10795-8	TT298-16
	A10795-9	TT298-20
	A10795-10	TT298-24
	A10795-11	TT298-28
	A10795-12	TT298-32
	A10795-13	TT298-36

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
C501	CAPACITOR: fixed, ceramic; 0.01 uf, ±20%, 100 WVDC	CC10015-X5V-104M
C502	CAPACITOR: fixed, ceramic; 0.02 uf +80% -20%, 25 WVDC	CC100-40
C503 through C505	CAPACITOR: fixed, ceramic; 0.1 uf, ±20%, 100 WVDC	CC10017-X5V-103M
C506	Same as C501	
C507	Same as C501	
C508	Same as C503	
CR501	DIODE	1N456A
L501	COIL: fixed, RF;33 uH ±10%	CL275-330
L503 through L505	COIL: fixed, RF; 220 uH ±10%	CL275-221
Q501	TRANSISTOR	2N5160
Q502	Same as Q501	
Q503	TRANSISTOR	2N3866
R501	RESISTOR: fixed, film; 1.8 Kohms ±2%, ¼W	RL07S182G
R502	RESISTOR: fixed, film; 8.2 Kohms ±2%, ¼W	RL07S822G
R503	RESISTOR: fixed, film; 3 Kohms ±2%, ¼W	RL07S302G
R504	RESISTOR: fixed, comp; 330 ohms ±5%, ½W	RC20GF331J
R505	RESISTOR: fixed, film; 2 Kohms ±2%, ¼W	RL07S202G
R506	RESISTOR: variable; 500 ohms	RV111U501A
R507	Same as R505	
R508	RESISTOR: fixed, comp; 7.5 ohms ±5%, ¼W	RC07GF7R5J
R509	Same as R508	
T501	TRANSFORMER: RF	TR10007

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
C601	CAPACITOR: flat, foil; 0.1 uf ±5%, 250 WVDC	CC10011-8
C602	CAPACITOR: flat, foil; 0.01 uf ± 5%, 250 WVDC	CC10011-1
C603	Same as C601	
C604	CAPACITOR: flat, foil; 0.015 uf ±5%, 250 WVDC	CC10011-2
C605	Same as C602	
C606	Same as C601	
C607	CAPACITOR: fixed; 2.2 uf	CC10018-X5V-225M
C608	Same as C607	
C609	CAPACITOR: fixed, electrolytic; 100 uf, 25 WVDC	CE105-100-25
C610	CAPACITOR: fixed, electrolytic; 10 uf, 15 WVDC	CE105-10-15
C611	CAPACITOR: fixed, electrolytic; 50 uf, 25 WVDC	CE105-50-25
C612	Same as C607	
Q605 through Q607	TRANSISTOR	2N3904
Q608	TRANSISTOR	2N3906
Q609	TRANSISTOR	2N3055
Q610	TRANSISTOR	2N350A
R601	RESISTOR: variable, composition; 10 Kohms	RV111U103A
R602	RESISTOR: fixed, composition; 220 Kohms ±5%, ½W	RC20GF224J
R603	RESISTOR: fixed, composition; 22 Kohms ±5%, ½W	RC20GF223J
R604	RESISTOR: fixed, composition; 1.5 Kohms ±5%, ½W	RC20GF152J

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
R605	RESISTOR: fixed, composition; 1.2 Kohms ±5%, ½W	RC20GF122J
R606	RESISTOR: fixed, composition; 330 ohms	RC20GF331J
R609	Same as R601	
R610	RESISTOR: fixed, composition; 2.2 Kohms ±5%, ½W	RC20GF222J
R611	RESISTOR: fixed, composition; 680 Kohms ±5%, ½W	RC20GF684J
R612	RESISTOR: fixed, composition; 100 Kohms ±5%, ½W	RC20GF104J
R613	RESISTOR: fixed, composition; 82 ohms ±5%, ½W	RC20GF820J
R614	RESISTOR: fixed, composition 6.8 Kohms ±5%, ½W	RC20GF682J
R615	RESISTOR: fixed, composition; 1.5 Mohms ±5%, ½W	RC20GF155J
R616	Same as R612	
R617	RESISTOR: fixed, composition; 22 ohms ±5%, ½W	RC20GF220J
R618	Same as R610	
R619	Same as R613	
R620	RESISTOR: fixed, composition; 680 ohms ±5%, ½W	RC20GF681J
R621	Same as R605	
R622	Same as R605	
R624	RESISTOR: fixed, composition; 4.7 ohms ±5%, ½W	RC20GF4R7J
T601	TRANSFORMER: line	TF267-3

COMPONENT BOARD
A10891

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
CR801 through CR804	DIODE	1N4007
CR806	DIODE	1N914
CR807	DIODE	1N746
R801	RESISTOR: fixed, wirewound; 10 ohms ±5%	RW123-100J
R802	Same as R801	
R803	RESISTOR: fixed, composition; 27 ohms ±5%, 2 W	RC42GF270J
R804	RESISTOR: fixed, composition; 15 Kohms ±5%, ½W	RC20GF153J

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
C901	CAPACITOR: fixed, ceramic; 10pf ±5%, 100 WVDC	CM111C100J1S
C902	CAPACITOR: fixed ceramic; 100 pf ±5%, 100 WVDC	CM111E101J1S
C903 through C906	CAPACITOR: fixed, ceramic; 0.01 uf ±80% -20%, 25 WVDC	CC100-41
C907	CAPACITOR: fixed, ceramic; 33 pf ±5%, 100 WVDC	CM111C330J1S
C908	CAPACITOR: fixed, ceramic; 5 pf ±5%, 100 WVDC	CM111C050J1S
C909 through C911	Same as C903	
CR901	DIODE	1N34A
CR902	Same as CR901	
Q901	TRANSISTOR	2N3904
Q902	TRANSISTOR	2N3906
Q903	Same as Q901	
R901	RESISTOR: variable; 100 Kohms	RV10006-3P
R902	RESISTOR: fixed, composition; 1 Kohm ±5%, ¼W	RC07GF102J
R903	RESISTOR: fixed, composition; 2.7 Kohms ±5%, ¼W	RC07GF272J
R904	RESISTOR: fixed, composition; 10 Kohms ±5%, ¼W	RC07GF103J
R905	RESISTOR: fixed, composition; 4.7 Kohms ±5%, ¼W	RC07GF472J
R906	RESISTOR: variable; 10 Kohms	RV10005-7P
R907	Same as R903	
R908	RESISTOR: fixed, composition; 2.7 Kohms ±5%, ¼W	RC07GF272J
R909	Same as R904	

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
R910	Same as R902	
R911	RESISTOR: fixed, composition; 22 Kohms ±5%, ¼W	RC07GF223J
R912	Same as R904	
R913	Same as R903	
R914	RESISTOR: fixed, composition; 100 ohms ±5%, ¼W	RC07GF101J

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
C1101	CAPACITOR: fixed, ceramic; 0.02 uf, 50 WVDC	CC10024
C1102	CAPACITOR: fixed, mica	
	A10871- 5; 100 pf ±5%, 500 WVDC	CM111E101J5S
	A10871- 6; 100 pf ±5%, 500 WVDC	CM111E101J5S
	A10871- 7; 56 pf ±5%, 500 WVDC	CM111E560J5S
	A10871- 8; 100 pf ±5%, 500 WVDC	CM111E101J5S
	A10871- 9; 100 pf ±5%, 500 WVDC	CM111E101J5S
	A10871-10; 0.02 uf, 50 WVDC	CC10024
	A10871-11; 0.02 uf, 50 WVDC	CC10024
	A10871-12; 0.02 uf, 50 WVDC	CC10024
	A10871-13; 0.02 uf, 50 WVDC	CC10024
	A10871-14; 100 pf ±5%, 500 WVDC	CM111E101J5S
	A10871-15; 100 pf ±5%, 500 WVDC	CM111E101J5S
C1103	CAPACITOR: fixed, mica	
	A10871-5; 200 pf ±2%, 500 WVDC	CM111E201K5S
	A10871-6; 150 pf ±5%, 500 WVDC	CM111E151J5S
	A10871-7; 200 pf ±5%, 500 WVDC	CM111E201J5S
	A10871-8; 180 pf ±5%, 500 WVDC	CM111E181J5S
	A10871-9; 150 pf ±5%, 500 WVDC	CM111E151J5S
	A10871-10; 150 pf ±5%, 500 WVDC	CM111E151J5S
	A10871-11; 150 pf ±5%, 500 WVDC	CM111E151J5S
	A10871-12; 150 pf ±5%, 500 WVDC	CM111E151J5S
	A10871-13; 130 pf ±5%, 500 WVDC	CM111E131J5S
	A10871-14; 110 pf ±5%, 500 WVDC	CM111E111J5S
	A10871-15; 910 pf ±5%, 500 WVDC	CM111E910J5S
C1104	Same as C1101	
C1105	Same as C1101	
C1106	Same as C1102 except:	
	A10871-7; 56 pf ±5%, 50 WVDC	CM111E560J5S
	A10871-10; Not used	
	A10871-11; Not used	
	A10871-12; Not used	
	A10871-13; Not used	
C1107	Same as C1103	
C1108	Same as C1101	
C1109	Same as C1103	

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
C1110	A10871-14 and -15 only CAPACITOR: fixed, ceramic; 1 pf ±5%, 500 WVDC	CM111E010J5S
C1111	Same as C1101	
C1112	Same as C1101	
C1113	A10871-14 and -15 only Same as C1103	
CR1101	DIODE	1N914
L1101	COIL: fixed, RF; 120 uH ±10%	CL240-120
Q1101	TRANSISTOR	3N141
Q1102	TRANSISTOR	3N142
R1101	RESISTOR: fixed, composition; 68 ohms ±5%, ¼W, A10871-5,-6,-7 and -15 only	RC07GF680J
R1102	RESISTOR: fixed, composition: 10 kohms ±5%, ¼W	RC07GF103J
R1103	RESISTOR: fixed, composition; 330 ohms ±5%, ¼W	RC07GF331J
R1104	RESISTOR: fixed, composition; 100 kohms ±5%, ¼W	RC07GF104J
R1105	RESISTOR: variable; 1000 ohms ±30%	RV10007-7-P
R1106	Same as R1103	
T1101	TRANSFORMER: A10871-5	TT297-1
	A10871-6	TT297-3
	A10871-7	TT297-5
	A10871-8	TT297-7
	A10871-9	TT297-7
	A10871-10	TT297-9
	A10871-11	TT297-11
	A10871-12	TT297-13
	A10871-13	TT297-15
	A10871-14	TT297-17
	A10871-15	TT297-19

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
T1102	TRANSFORMER: A10871-5	TT297-2
	A10871-6	TT297-4
	A10871-7	TT297-6
	A10871-8	TT297-8
	A10871-9	TT297-8
	A10871-10	TT297-10
	A10871-11	TT297-12
	A10871-12	TT297-14
	A10871-13	TT297-16
	A10871-14	TT297-18
	A10871-15	TT297-20
T1103	Same as T1102	
T1104	Same as T1102: A10871-14 and -15 only	

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
A1201	INTEGRATED CIRCUIT	MC1550G
A1202	Same as A1201	
C1201	CAPACITOR: flat, foil; 0.047 uf ±5%, 250 WVDC	CC10011-5
C1202	Same as C1201	
C1203	CAPACITOR: fixed, mica; 91 pf ±5%, 500 WVDC	CM111E910J5S
C1204	Same as C1203	
C1205	CAPACITOR: variable; 15-60 pf	CV112-5
C1206	Same as C1205	
C1207	Same as C1203	
C1208	Same as C1203	
C1209	Same as C1205	
C1210	Same as C1205	
C1211	CAPACITOR: fixed, mica; 220 pf ±5%, 500 WVDC	CM111E221J5S
C1212	CAPACITOR: fixed, mica; 1000 pf ±5%, 100 WVDC	CM111C102J1S
C1213	Same as C1211	
C1214	Same as C1212	
C1215	CAPACITOR: flat, foil; 0.01 uf ±5%, 250 WVDC	CC10011-1
C1216 through C1221	Same as C1201	
C1222	CAPACITOR: fixed, mica; 820 pf ±5%, 300 WVDC	CM111E821J3S
C1223 through C1227	Same as C1201	
C1228	Same as C1222	
C1231	Same as C1215	

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
C1232	Same as C1201	
C1233	Same as C1212	
C1234	CAPACITOR: electrolytic; 1 uf, 15 WVDC	CE105-1-15
C1235	Same as C1212	
C1236	Same as C1215	
C1237	Same as C1212	
C1238	CAPACITOR: electrolytic; 10 uf, 15 WVDC	CE105-10-15
C1239	CAPACITOR: flat, foil; 0.022 uf ±5%, 250 WVDC	CC10011-3
C1240	Same as C1215	
C1241	Same as C1215	
C1243	Same as C1201	
C1245	Same as C1201	
C1246	Same as C1222	
C1247	Same as C1201	
C1248	Same as C1239	
C1249	Same as C1201	
C1250	CAPACITOR: electrolytic; 4 uf, 15 WVDC	CE105-4-15
C1251	Same as C1250	
C1252	CAPACITOR: electrolytic; 20 uf, 15 WVDC	CE105-20-15
C1253	CAPACITOR: variable; 3.5-9 pf	CV10001
C1254	Same as C1201	
C1255	CAPACITOR: fixed, mica; 390 pf ±5%, 500 WVDC	CM111E391J5S
C1256 through C1258	Same as C1201	
C1259	Same as C1234	

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
C1260 through C1262	CAPACITOR: fixed, ceramic; 2.2 uf ±20%, 100 WVDC	CC10018
C1263	CAPACITOR: fixed, foil, 0.68 pf ±5%, 250 WVDC	CC10011-13
CR1201 through CR1208	DIODE	1N34A
CR1209	DIODE	1N914
CR1210	Same as CR1209	
FL1201	FILTER: A10856-5 and -6 only A10856-7 and -8 only	FX10032 FX290
FL1202	FILTER: A10856-5 and -7 only	FX10033
L1201 through L1203	COIL: RF; 2200 uH ±10%	CL275-222
L1204	COIL: RF; 1000 uH ±10%	CL275-102
L1205	COIL: RF; 220 uH ±10%	CL275-221
L1206	Same as L1205	
L1207	COIL: RF; variable, 150 uH	CL435-1
L1208	COIL: RF; 4700 uH ±10%	CL275-472
L1209	Same as L1205	
L1210	Same as L1205	
L1211	Same as L1207	
L1212	Same as L1205	
L1213	Same as L1208	
L1214	Same as L1208	
Q1201 through Q1203	TRANSISTOR	2N5459
Q1204	TRANSISTOR	2N5361
Q1205	TRANSISTOR	MFE4010
Q1206	TRANSISTOR	2N3904

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
Q1207	TRANSISTOR	3N141
Q1208	Same as Q1206	
Q1209	Same as Q1204	
Q1210	TRANSISTOR	2N3906
Q1211	Same as Q1210	
R1201	RESISTOR: fixed, composition; 68 kohms ±5%, ½W	RC20GF683J
R1202	RESISTOR: fixed, composition; 1 kohm ±5%, ½W	RC20GF102J
R1203	RESISTOR: fixed, composition; 22 kohms ±5%, ½W	RC20GF223J
R1204	Same as R1201	
R1205	Same as R1203	
R1206	Same as R1201	
R1207	RESISTOR: variable; 5 kohms	RV124-1-502
R1208	Same as R1202	
R1209	Same as R1207	
R1210	Same as R1202	
R1211	RESISTOR: fixed, composition; 4.7 kohms ±5%, ½W	RC20GF472J
R1212	RESISTOR: fixed, composition; 100 kohms ±5%, ½W	RC20GF104J
R1213	RESISTOR: fixed, composition; 10 kohms ±5%, ½W	RC20GF103J
R1214	Same as R1213	
R1215	RESISTOR: fixed, composition; 150 ohms ±5%, ½W	RC20GF151J
R1216	RESISTOR: fixed, composition; 220 ohms ±5%, ½W	RC20GF221J

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
R1217	RESISTOR: fixed, composition; 47 kohms ±5%, ½W	RC20GF473J
R1218	RESISTOR: fixed, composition; 2.2 kohms ±5%, ½W	RC20GF222J
R1219	RESISTOR: fixed, composition; 680 ohms ±5%, ½W	RC20GF681J
R1220	Same as R1212	
R1221	Same as R1212	
R1222	RESISTOR: fixed, composition; 68 ohms ±5%, ½W	RC20GF680J
R1223	RESISTOR: fixed, composition; 3.3 kohms ±5%, ½W	RC20GF332J
R1224	RESISTOR: fixed, composition; 1.5 kohms ±5%, ½W	RC20GF152J
R1225	RESISTOR: fixed, composition; 12 kohms ±5%, ½W	RC20GF123J
R1226	Same as R1212	
R1227	Same as R1223	
R1228	Same as R1223	
R1229	RESISTOR: fixed, composition; 470 ohms ±5%, ½W	RC20GF471J
R1230	Same as R1218	
R1231	Same as R1212	
R1232	Same as R1212	
R1233	Same as R1207	
R1234	RESISTOR: fixed, composition; 270 ohms ±5%, ½W	RC20GF271J
R1235	Same as R1224	
R1236	RESISTOR: fixed, composition; 5.6 kohms ±5%, ½W	RC20GF562J

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
R1237	Same as R1207	
R1238	Same as R1218	
R1239	Same as R1236	
R1240	Same as R1207	
R1241	Same as R1217	
R1242	Same as R1217	
R1243	Same as R1213	
R1244	Same as R1201	
R1245	Same as R1223	
R1246	Same as R1211	
R1247	Same as R1213	
R1248	Same as R1212	
R1249	Same as R1207	
R1250	Same as R1212	
R1251	RESISTOR: fixed, composition; 100 ohms ±5%, ½W	RC20GF101J
R1252	Same as R1251	
R1253	RESISTOR: fixed composition; 1.8 kohms ±5%, ½W	RC20GF182J
R1254	RESISTOR: fixed, composition; 8.2 kohms ±5%, ½W	RC20GF822J
R1255	Same as R1253	
R1256	Same as R1213	
T1201	TRANSFORMER: RF	TR10009
Y1201	Crystal: A10856-5 and -6 only A10856-7 and -8 only	CR46A/U456.750 CR46A/U456.350

AUDIO LINE DISTRIBUTION BOARD
A10866

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
R1301	RESISTOR: variable, composition; 5 kohms ±20%	RV111U502B
T1301	TRANSFORMER	TF10050
T1302	Same as T1301	

ANTENNA ATTENUATOR ASSEMBLY
A10868-6

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
C1401	CAPACITOR: fixed, ceramic; 0.01 uf ±20%, 100 WVDC	CC100-43
CR1401 through CR1404	DIODE	1N914
K1401	RELAY: RF, reed, single-pole change over	RL10038
K1402	Same as K1401	
Q1401	TRANSISTOR	2N5359
Q1402	TRANSISTOR	2N3906
Q1403	TRANSISTOR	2N3904
R1401	RESISTOR: variable; 250 kohms ±10%	RV111U254A
R1402	RESISTOR: fixed, composition; 1.2 kohms ±5%, ¼W	RC07GF122J
R1403	RESISTOR: variable; 1 kohm ±10%	RV111U102A
R1404	RESISTOR: fixed, composition; 10 kohms ±5%, ¼W	RC07GF103J
R1405	RESISTOR: fixed, composition; 2.2 kohms ±5%, ¼W	RC07GF222J
R1406	RESISTOR: fixed, composition; 330 ohms ±5%, ¼W	RC07GF331J

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
R1407	RESISTOR: fixed, composition; ±5%, ¼W	
	To be selected on test from 4.7 k,	RC07GF472J
	6.8 k,	RC20GF682J
	10 k,	RC07GF103J
	15 k, or	RC07GF153J
	22 kohms	RC07GF223J
R1408	RESISTOR: fixed, composition; 3.3 kohms ±5%, ¼W	RC07GF332J
R1409	RESISTOR: fixed, composition; 47 ohms ±5%, 2W	RC42GF470J
R1410	Same as R1409	
R1411	RESISTOR: fixed, composition; 3.3 ohms ±5%, ¼W	RC07GF3R3J

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
C2011	CAPACITOR: fixed, mica; 18 pf ±5%, 100 WVDC	CM111E180J1S
C2012	CAPACITOR: variable; 15-60 pf, 100 WVDC	CV112-9
C2013	CAPACITOR: fixed, mica; 110 pf ±5%, 100 WVDC	CM111E111J1S
C2014	CAPACITOR: fixed, mica; 5 pf ±5%, 100 WVDC	CM111C050J1S
C2021	Same as C2011	
C2022	Same as C2012	
C2023	Same as C2013	
C2024	Same as C2014	
C2031	Same as C2011	
C2032	Same as C2012	
C2033	Same as C2013	
C2034	Same as C2014	
C2041	Same as C2011	
C2042	Same as C2012	
C2043	Same as C2013	
C2044	Same as C2014	
C2051	Same as C2011	
C2052	Same as C2012	
C2053	Same as C2013	
C2054	Same as C2014	
C2061	Same as C2011	
C2062	Same as C2012	
C2063	Same as C2013	

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
C2064	Same as C2014	
C2071	Same as C2011	
C2072	Same as C2012	
C2073	Same as C2013	
C2074	Same as C2014	
C2081	Same as C2011	
C2082	Same as C2012	
C2083	Same as C2013	
C2084	Same as C2014	
C2103	CAPACITOR: fixed, ceramic; 0.01 uf, +80% -20%, 25 WVDC	CC100-41
C2104	Same as C2103	
C2105	Same as C2013	
C2106	Same as C2013	
C2107	Same as C2103	
C2108	Same as C2103	
C2109	CAPACITOR: fixed, mica; 33 pf ±5%, 500 WVDC	CM111E330J5S
CR2101	DIODE	1N914
CR2103	DIODE	1N961B
Q2011	TRANSISTOR	TX10003
Q2021	Same as Q2011	
Q2031	Same as Q2011	
Q2041	Same as Q2011	
Q2051	Same as Q2011	

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
Q2061	Same as Q2011	
Q2071	Same as Q2011	
Q2081	Same as Q2011	
Q2101	Same as Q2011	
Q2102	Same as Q2011	
R2011	RESISTOR: fixed, composition; 150 kohms ±5%, ¼W	RC07GF154J
R2012	RESISTOR: fixed, composition; 18 kohms ±5%, ¼W	RC07GF183J
R2013	RESISTOR: fixed, composition; 47 ohms ±5%, ¼W	RC07GF470J
R2021	Same as R2011	
R2022	Same as R2012	
R2023	Same as R2013	
R2031	Same as R2011	
R2032	Same as R2012	
R2033	Same as R2013	
R2041	Same as R2011	
R2042	Same as R2012	
R2043	Same as R2013	
R2051	Same as R2011	
R2052	Same as R2012	
R2053	Same as R2013	
R2061	Same as R2011	
R2062	Same as R2012	
R2063	Same as R2013	

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
R2071	Same as R2011	
R2072	Same as R2012	
R2073	Same as R2013	
R2081	Same as R2011	
R2082	Same as R2012	
R2083	Same as R2013	
R2102	RESISTOR: fixed, composition; 1 Mohm ±5%, ¼W	RC07GF105J
R2103	RESISTOR: fixed, composition; 1 kohm ±5%, ¼W	RC07GF102J
R2104	RESISTOR: fixed, composition; 5.6 kohms ±5%, ¼W	RC07GF562J
R2105	Same as R2103	
R2106	RESISTOR: fixed, composition; 560 ohms ±5%, ¼W	RC07GF561J
R2107	RESISTOR: fixed, composition; 3.3 kohms ±5%, ¼W	RC07GF332J
R2108	Same as R2103	
R2109	RESISTOR: fixed, composition; 120 ohms ±5%, ¼W	RC07GF121J
R2110	Same as R2109	
R2111	Same as R2103	
Y2011	CRYSTAL: for desired frequency	CR
Y2021	CRYSTAL: for desired frequency	CR
Y2031	CRYSTAL: for desired frequency	CR
Y2041	CRYSTAL: for desired frequency	CR
Y2051	CRYSTAL: for desired frequency	CR
Y2061	CRYSTAL: for desired frequency	CR

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
C4101	CAPACITOR: fixed, ceramic; 0.01 uf, +80% -20%, 25 WVDC	CC100-41
C4103	Same as C2101	
C4104	Same as C2101	
C4105	Same as C2013	
C4106	Same as C2013	
C4107	Same as C2101	
C4108	Same as C2101	
C4109	CAPACITOR: fixed, ceramic; 33 pf ±5% 100 WVDC	CM111E330J1S
CR4011	DIODE: varicap	1N5139
CR4021	Same as CR4011	
CR4031	Same as CR4011	
CR4041	Same as CR4011	
CR4051	Same as CR4011	
CR4061	Same as CR4011	
CR4071	Same as CR4011	
CR4081	Same as CR4011	
CR4103	DIODE	1N961B
Q4011	TRANSISTOR	TX10003
Q4021	Same as Q2011	
Q4031	Same as Q2011	
Q4041	Same as Q2011	
Q4051	Same as Q2011	
Q4061	Same as Q2011	
Q4071	Same as Q2011	

HF OVEN OSCILLATOR A010005
TRANSMIT OSCILLATOR ASSEMBLY
A10765-5

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
Y2071	CRYSTAL: for desired frequency	CR
Y2081	CRYSTAL: for desired frequency	CR

HF OVEN OSCILLATOR A010005
CONTROL ASSEMBLY
A10767-5

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
CR3101	DIODE	1N4002
CR3102	Same as CR3101	
Q3101	TRANSISTOR	2N2219A
Q3102	Same as Q3101	
Q3103	TRANSISTOR	TX10002
R3101	Resistor: fixed, composition; 620 ohms ±5%, ¼W	RC07GF621J
R3101A	RESISTOR: fixed, composition; value to be determined in test, will be one of; 12 Kohms ±5% 2.2 Kohms ±5% 6.8 Kohms ±5%	 RC07GF123J RC07GF222J RC07GF682J
R3102	RESISTOR: fixed, composition; 2.2 Kohms ±5%, ¼W	RC07GF222J
R3103	RESISTOR: fixed, composition; 3.9 Kohms ±5%, ¼W	RC07GF392J
R3104	Same as R3102	
R3105	RESISTOR: fixed, composition; 1.8 Kohms ±5%, ¼W	RC07GF182J
R3106	Same as R3102	
R3107	RESISTOR: fixed, composition; 150 Kohms ±5%, ¼W	RC07GF154J
RVT3101	THERMISTOR	RR10005

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
C4011	CAPACITOR: fixed, mica; 18 pf ±5%, 100 WVDC	CM111E180J1S
C4012	CAPACITOR: variable; 15-60 pf, 100 WVDC	CV112-9
C4013	CAPACITOR: fixed, mica; 110 pf ±5%, 100 WVDC	CM111E111J1S
C4021	Same as C4011	
C4022	Same as C4012	
C4023	Same as C4013	
C4031	Same as C4011	
C4032	Same as C4012	
C4033	Same as C4013	
C4041	Same as C4011	
C4042	Same as C4012	
C4043	Same as C4013	
C4051	Same as C4011	
C4052	Same as C4012	
C4053	Same as C4013	
C4061	Same as C4011	
C4062	Same as C4012	
C4063	Same as C4013	
C4071	Same as C4011	
C4072	Same as C4012	
C4073	Same as C4013	
C4081	Same as C4011	
C4082	Same as C4012	
C4083	Same as C4013	

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
Q4081	Same as Q4011	
Q4101	Same as Q4011	
Q4102	Same as Q4011	
R4011	RESISTOR: fixed, composition; 150 Kohms ±5%, ¼W	RC07GF154J
R4012	RESISTOR: fixed, composition; 18 Kohms ±5%, ¼W	RC07GF183J
R4013	RESISTOR: fixed, composition; 47 ohms ±5%, ¼W	RC07GF470J
R4014	RESISTOR: fixed, composition; 100 Kohms ±5%, ¼W	RC07GF104J
R4021	Same as R4011	
R4022	Same as R4012	
R4023	Same as R4013	
R4024	Same as R4014	
R4031	Same as R4011	
R4032	Same as R4012	
R4033	Same as R4013	
R4034	Same as R4014	
R4041	Same as R4011	
R4042	Same as R4012	
R4043	Same as R4013	
R4044	Same as R4014	
R4051	Same as R4011	
R4052	Same as R4012	
R4053	Same as R4013	
R4054	Same as R4014	

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
R4061	Same as R4011	
R4062	Same as R4012	
R4063	Same as R4013	
R4064	Same as R4014	
R4071	Same as R4011	
R4072	Same as R4012	
R4073	Same as R4013	
R4074	Same as R4014	
R4081	Same as R4011	
R4082	Same as R4012	
R4083	Same as R4013	
R4084	Same as R4014	
R4101	Same as R4012	
R4102	RESISTOR: fixed, composition; 1 Mohm ±5%, ¼W	RC07GF105J
R4103	RESISTOR: fixed, composition; 1 Kohm ±5%, ¼W	RC07GF102J
R4104	RESISTOR: fixed, composition; 5.6 Kohms ±5%, ¼W	RC07GF562J
R4105	Same as R4103	
R4106	RESISTOR: fixed, composition; 560 ohms ±5%, ¼W	RC07GF561J
R4107	RESISTOR: fixed, composition; 3.3 Kohms ±5%, ¼W	RC07GF332J
R4108	Same as R4107	
R4109	RESISTOR: fixed, composition; 120 ohms ±5%, ¼W	RC07GF121J
R4110	Same as R4109	

REFERENCE DESIGNATION	DESCRIPTION	TMC PART NUMBER
R4111	Same as R4103	
Y4011	CRYSTAL: for desired frequency	CR
Y4021	CRYSTAL: for desired frequency	CR
Y4031	CRYSTAL: for desired frequency	CR
Y4041	CRYSTAL: for desired frequency	CR
Y4051	CRYSTAL: for desired frequency	CR
Y4061	CRYSTAL: for desired frequency	CR
Y4071	CRYSTAL: for desired frequency	CR
Y4081	CRYSTAL: for desired frequency	CR

SECTION 7

SCHEMATIC DIAGRAMS

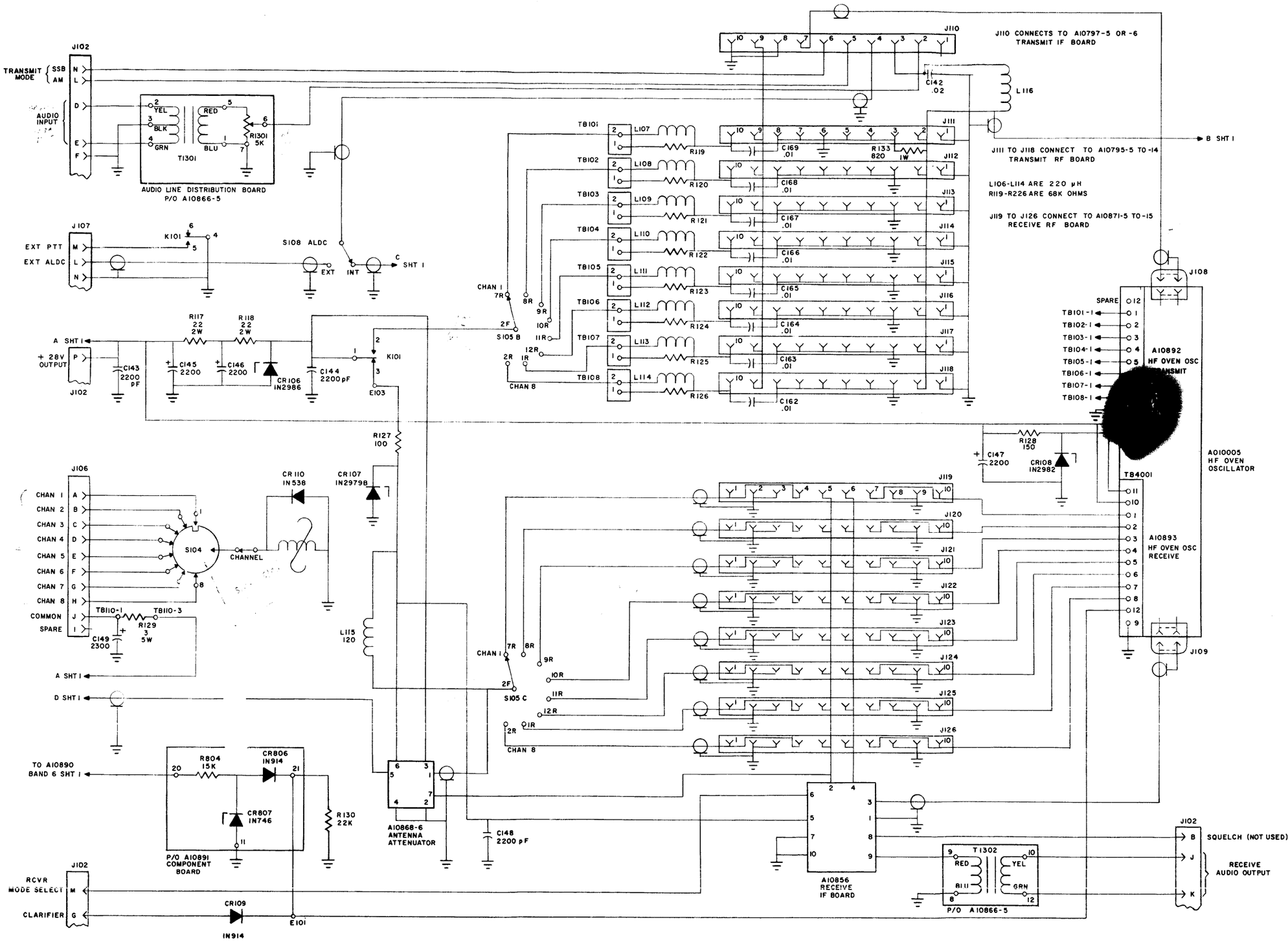
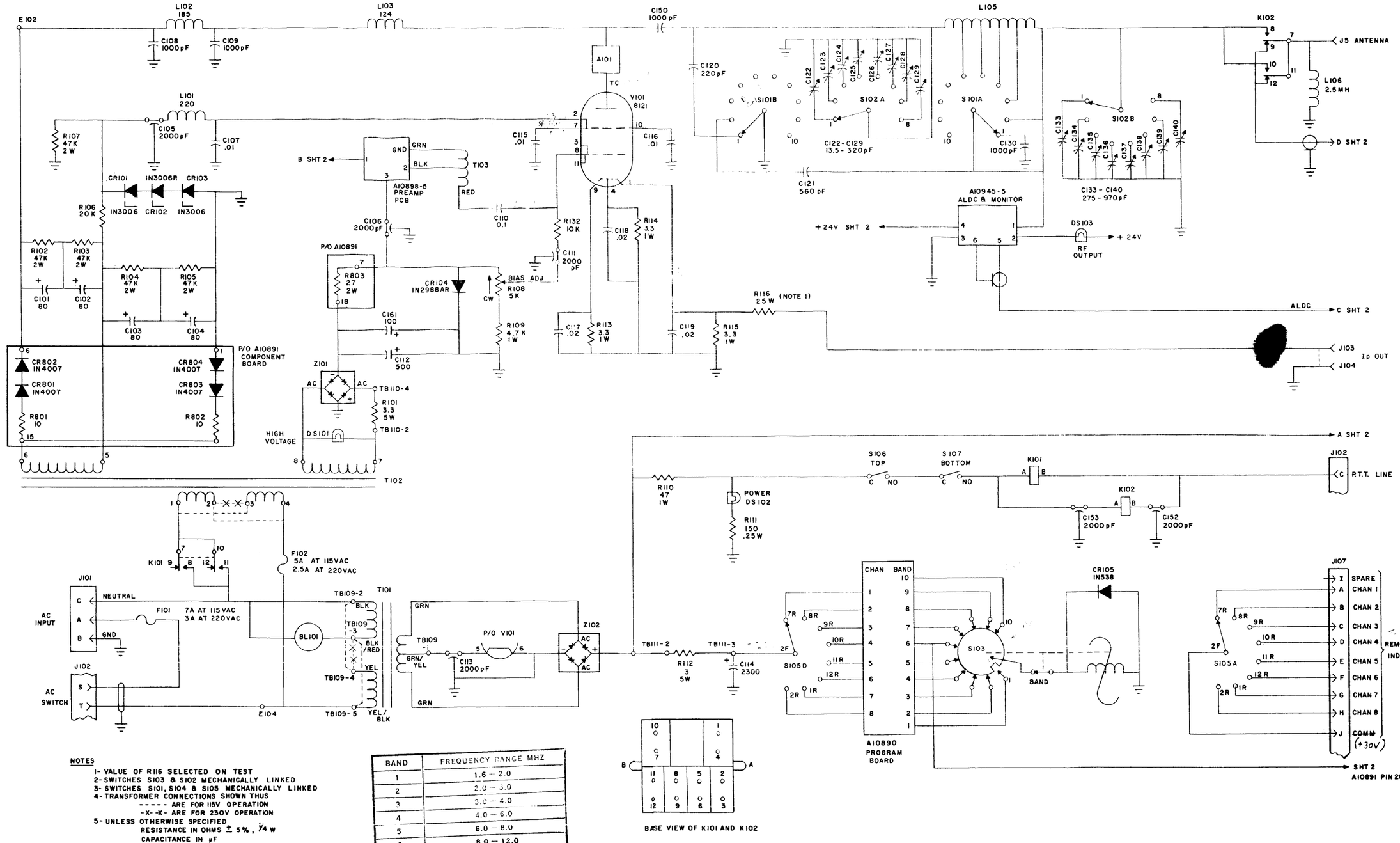


FIGURE 7-1. MAIN SCHEMATIC, MTR-100A, Sheet 1 of 2

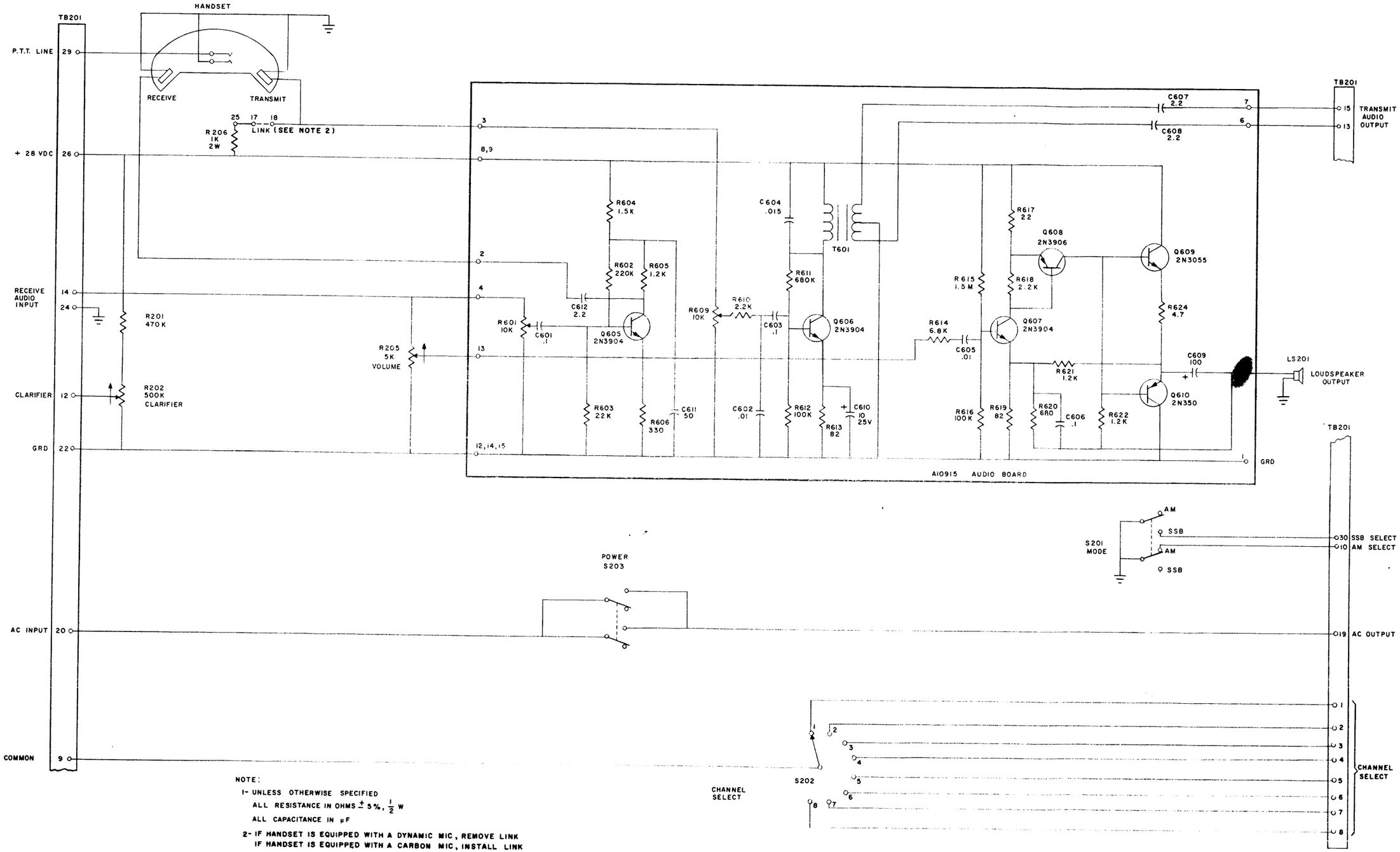


NOTES

1- VALUE OF R116 SELECTED ON TEST
2- SWITCHES S103 & S102 MECHANICALLY LINKED
3- SWITCHES S101, S104 & S105 MECHANICALLY LINKED
4- TRANSFORMER CONNECTIONS SHOWN THUS
----- ARE FOR 115V OPERATION
-X--X- ARE FOR 230V OPERATION
5- UNLESS OTHERWISE SPECIFIED
RESISTANCE IN OHMS ± 5%, ¼ W
CAPACITANCE IN μF
INDUCTANCE IN μH

BAND	FREQUENCY RANGE MHZ
1	1.6 – 2.0
2	2.0 – 3.0
3	3.0 – 4.0
4	4.0 – 6.0
5	6.0 – 8.0
6	8.0 – 12.0

FIGURE 7-2. MAIN SCHEMATIC, MTR-100A, Sheet 2 of 2



NOTE:

1- UNLESS OTHERWISE SPECIFIED
ALL RESISTANCE IN OHMS ± 5%, ½ W
ALL CAPACITANCE IN µF

2- IF HANDSET IS EQUIPPED WITH A DYNAMIC MIC, REMOVE LINK
IF HANDSET IS EQUIPPED WITH A CARBON MIC, INSTALL LINK

FIGURE 7-3. MAIN SCHEMATIC, DCS-1

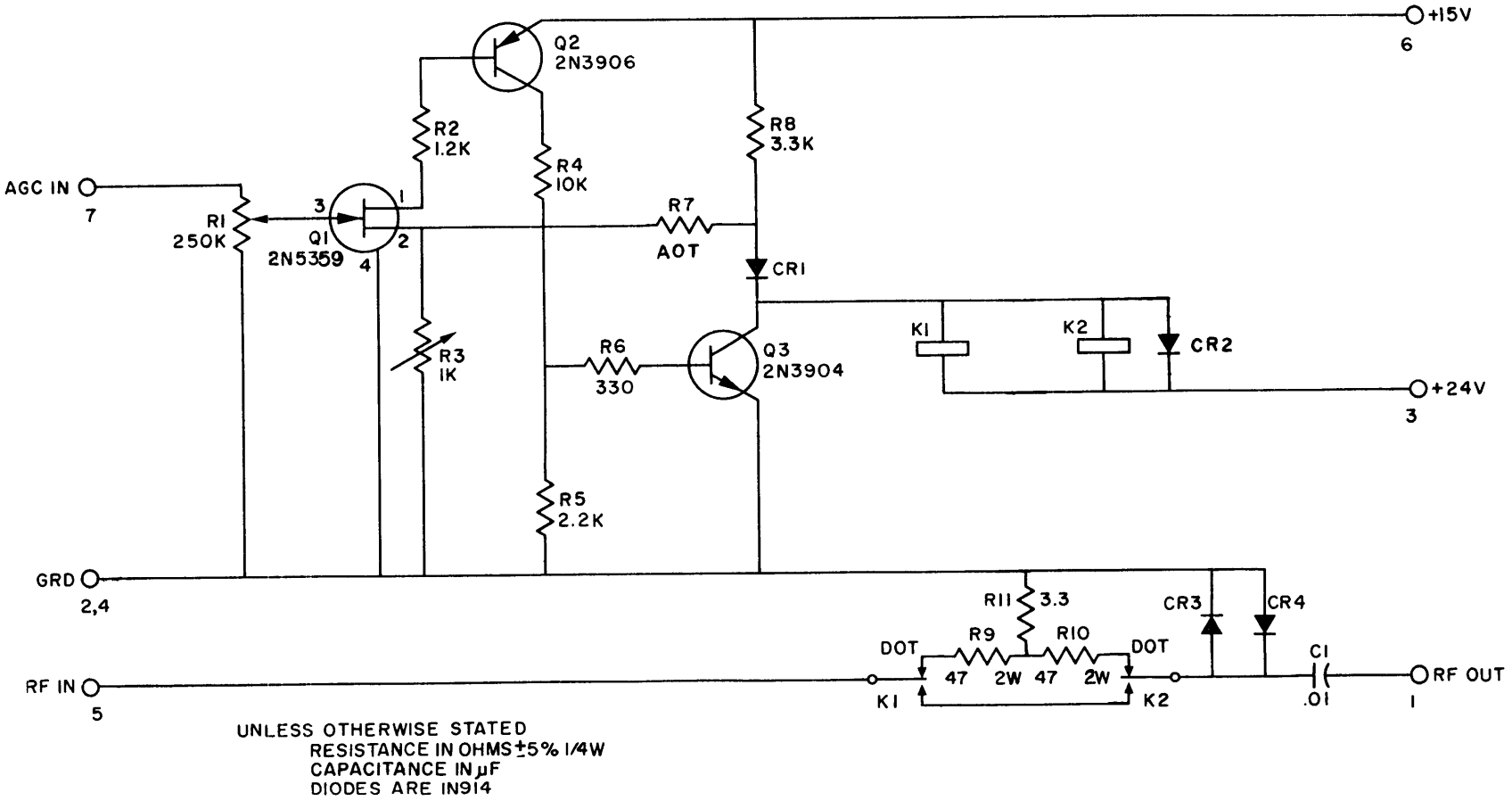
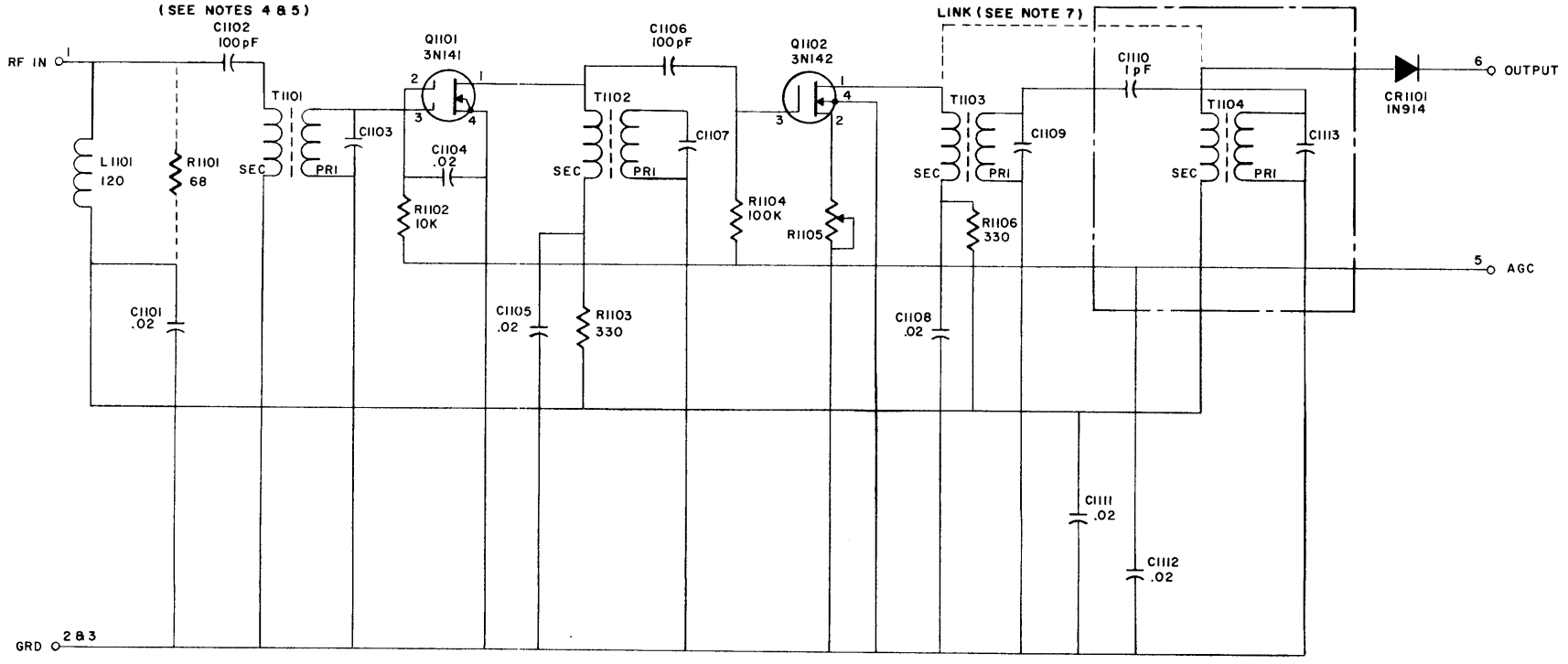


FIGURE 7-4. ANTENNA ATTENUATOR ASSEMBLY, A10868-6



NOTES:

1- UNLESS OTHERWISE STATED
ALL RESISTANCE VALUES IN OHMS
ALL CAPACITANCE VALUES IN MICRO FARADS
ALL INDUCTANCE VALUES IN MICRO HENRIES

2- VALUES OF C1103, C1107, C1109 & C1113 ARE DEPENDENT ON FREQUENCY BAND

3- CONNECT RESISTOR R1101 IN POSITION SHOWN DOTTED

4- VALUE OF C1102 TO BE 56 pF

5- VALUE OF C1102 TO BE .02 μF

6- COMPONENTS WITHIN AREA INDICATED ——— - ——— - ——— APPLICABLE TO -14 & -15 ONLY.

7- INSTALL LINK ON ALL BOARDS EXCEPT -14 & -15

A10871-8-9 (-14 -15)	AS SHOWN
A10871-5-6	SEE NOTE 3
A10871-7	SEE NOTE 3 & 4
A10871-10-11-12-13	SEE NOTE 5

FIGURE 7-5. RECEIVE RF AMPLIFIER ASSEMBLY, A10871

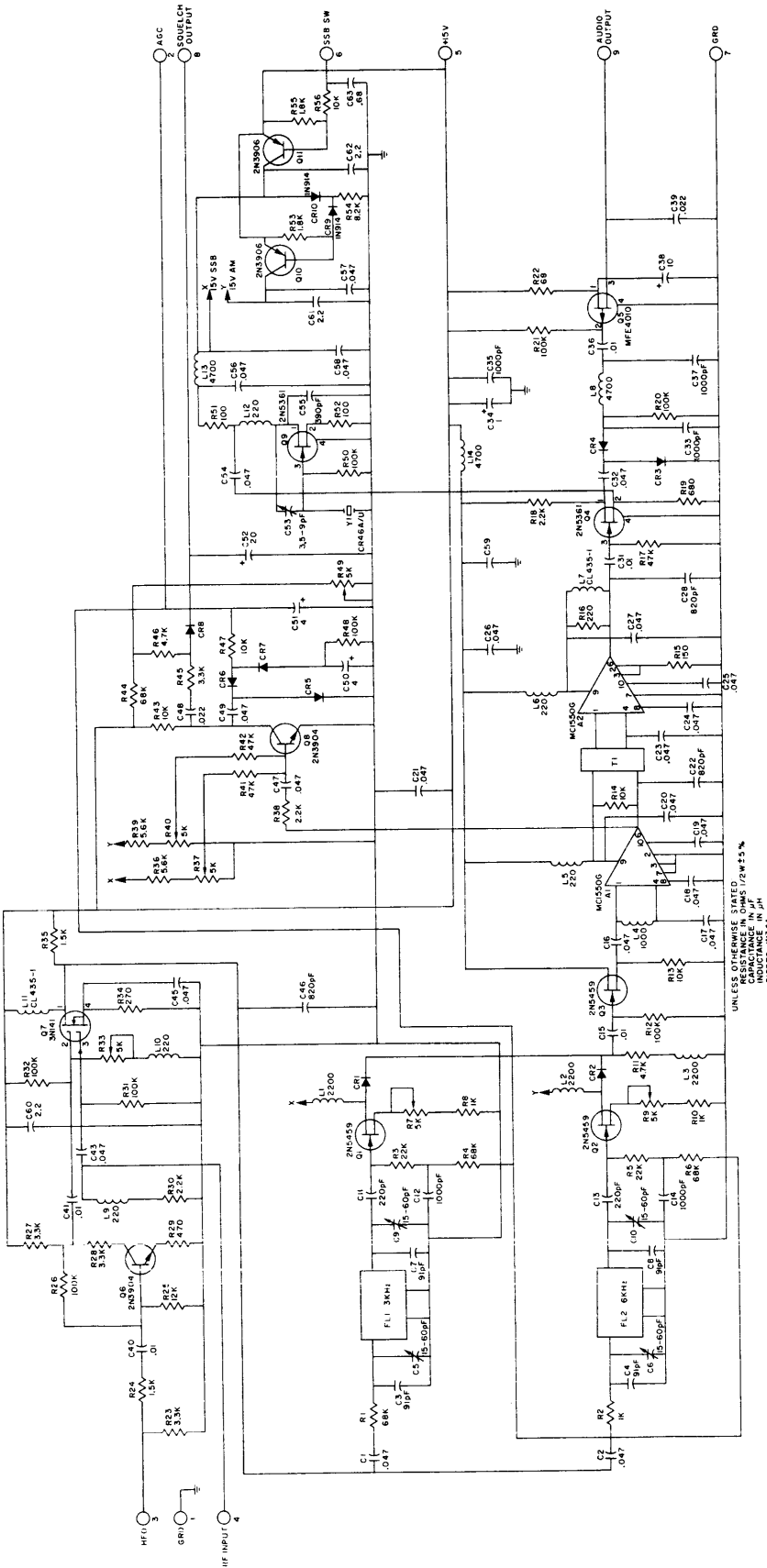


FIGURE 7-6. RECEIVE IF ASSEMBLY, A10856

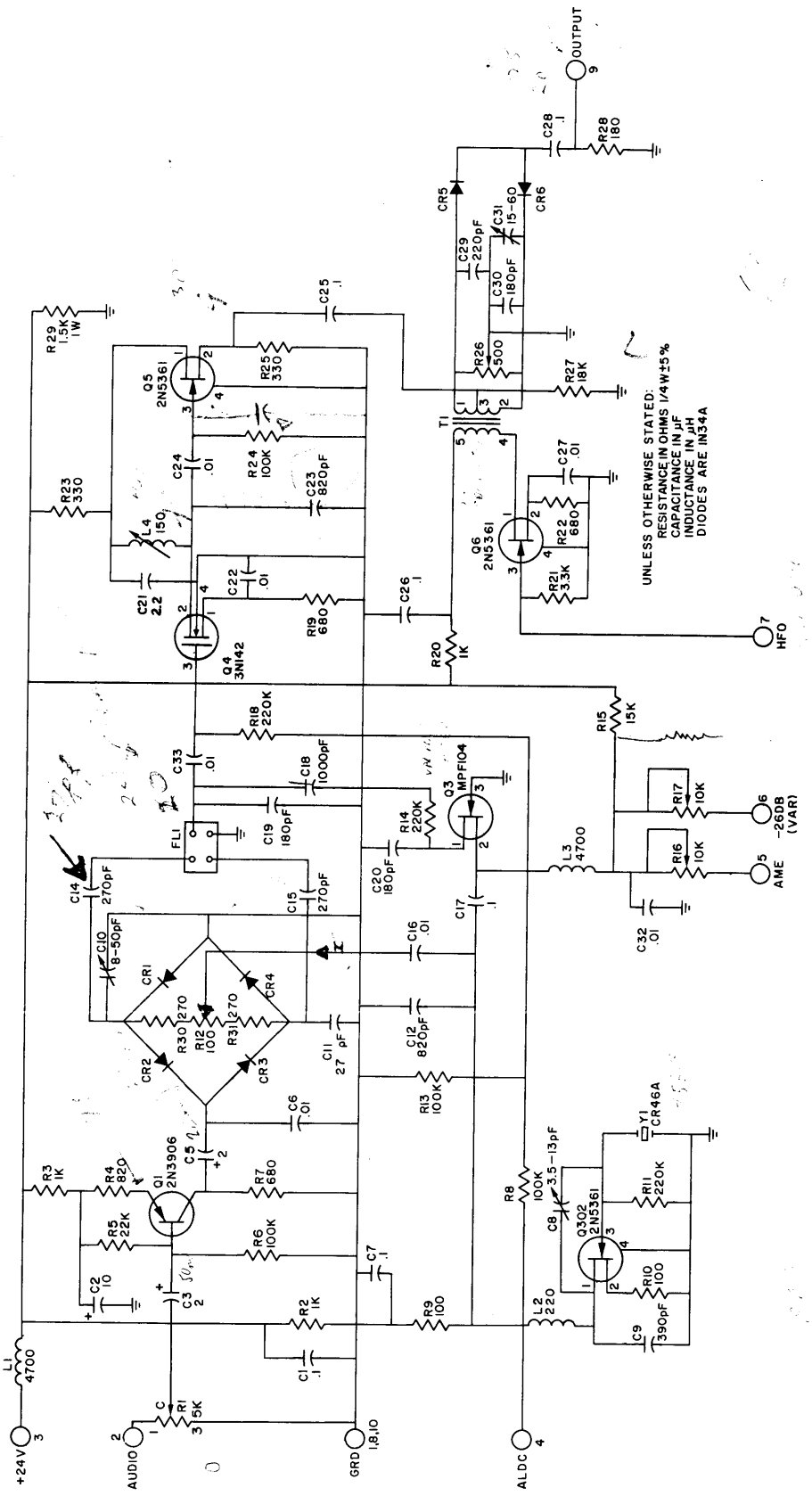


FIGURE 7-7. TRANSMIT IF ASSEMBLY, A10797

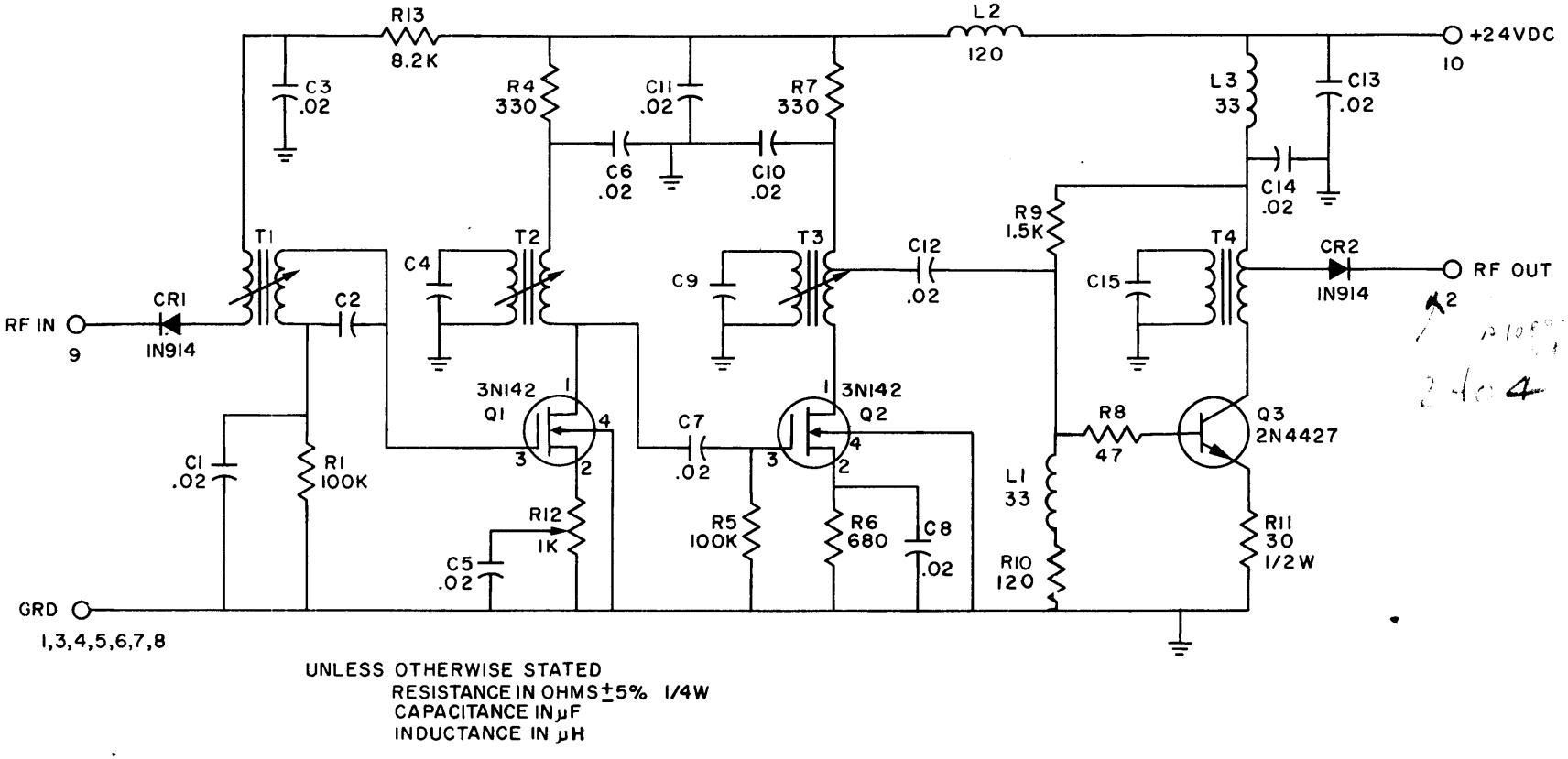


FIGURE 7-8. TRANSMIT RF ASSEMBLY, A10795

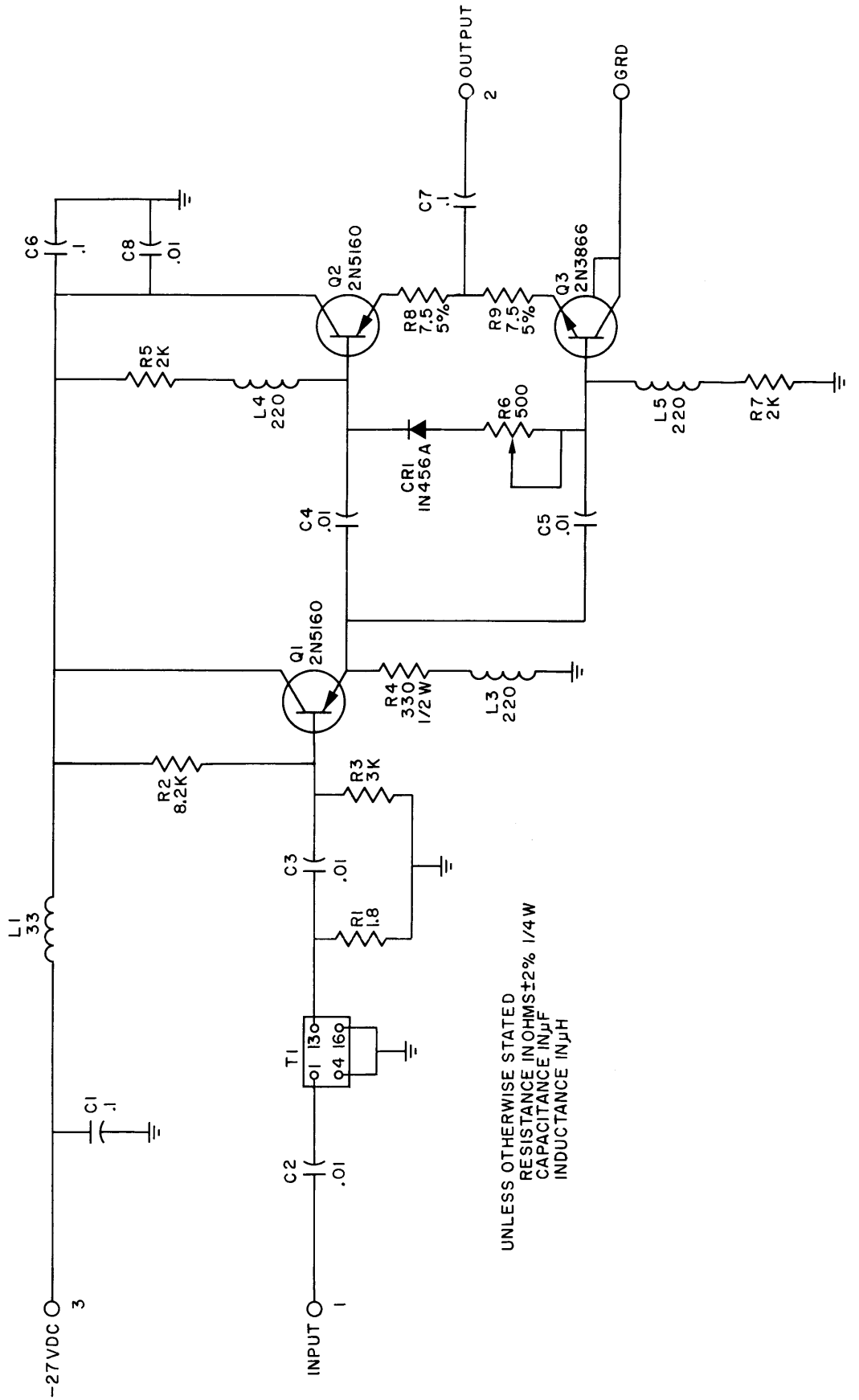
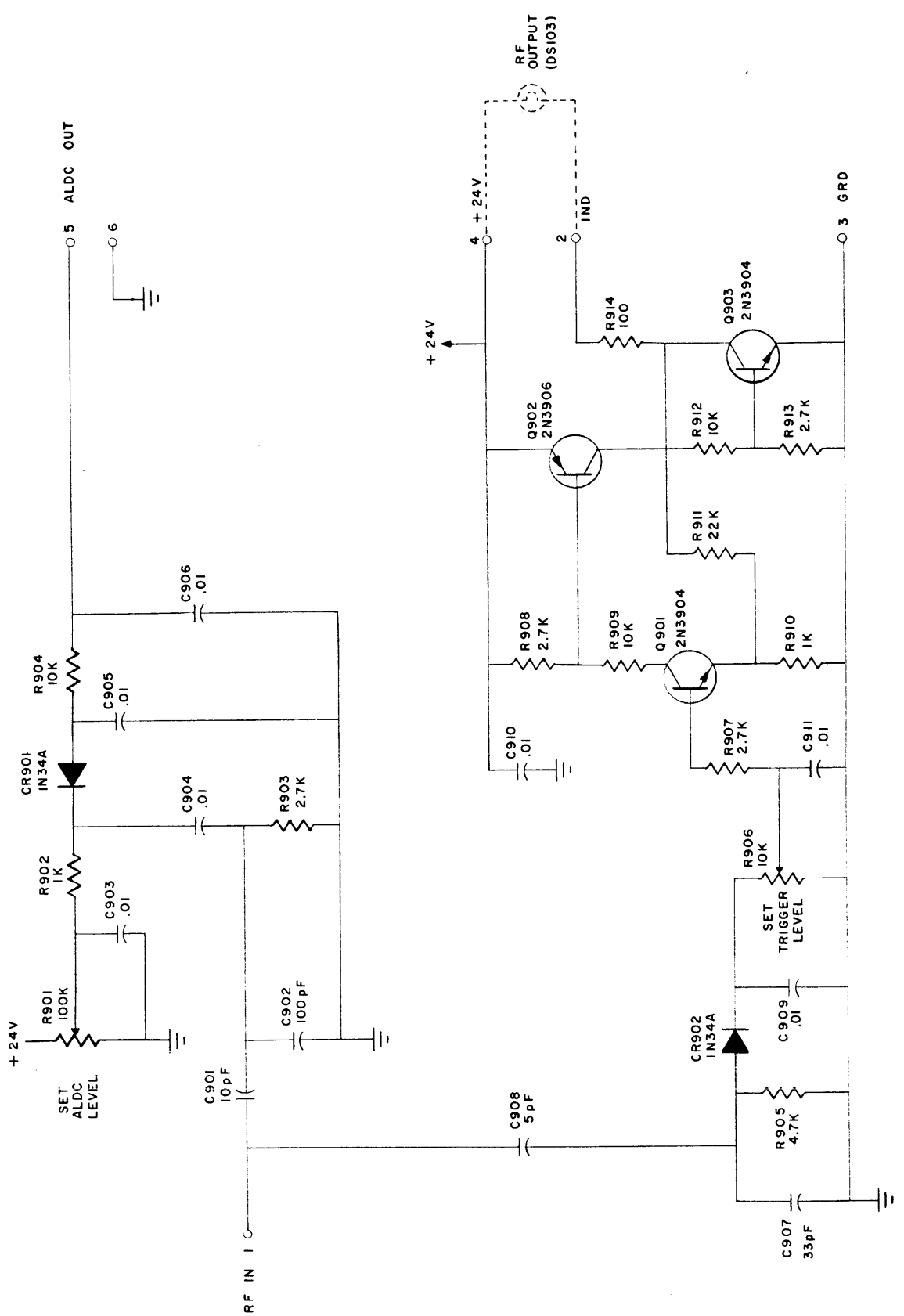


FIGURE 7-9. TRANSMIT RF PRE-AMPLIFIER ASSEMBLY, A10898



NOTES:
UNLESS OTHERWISE SPECIFIED
1-RESISTANCE IN OHMS
2-CAPACITANCE IN MICROFARADS

FIGURE 7-10. ALDC AND MONITOR ASSEMBLY, A10945

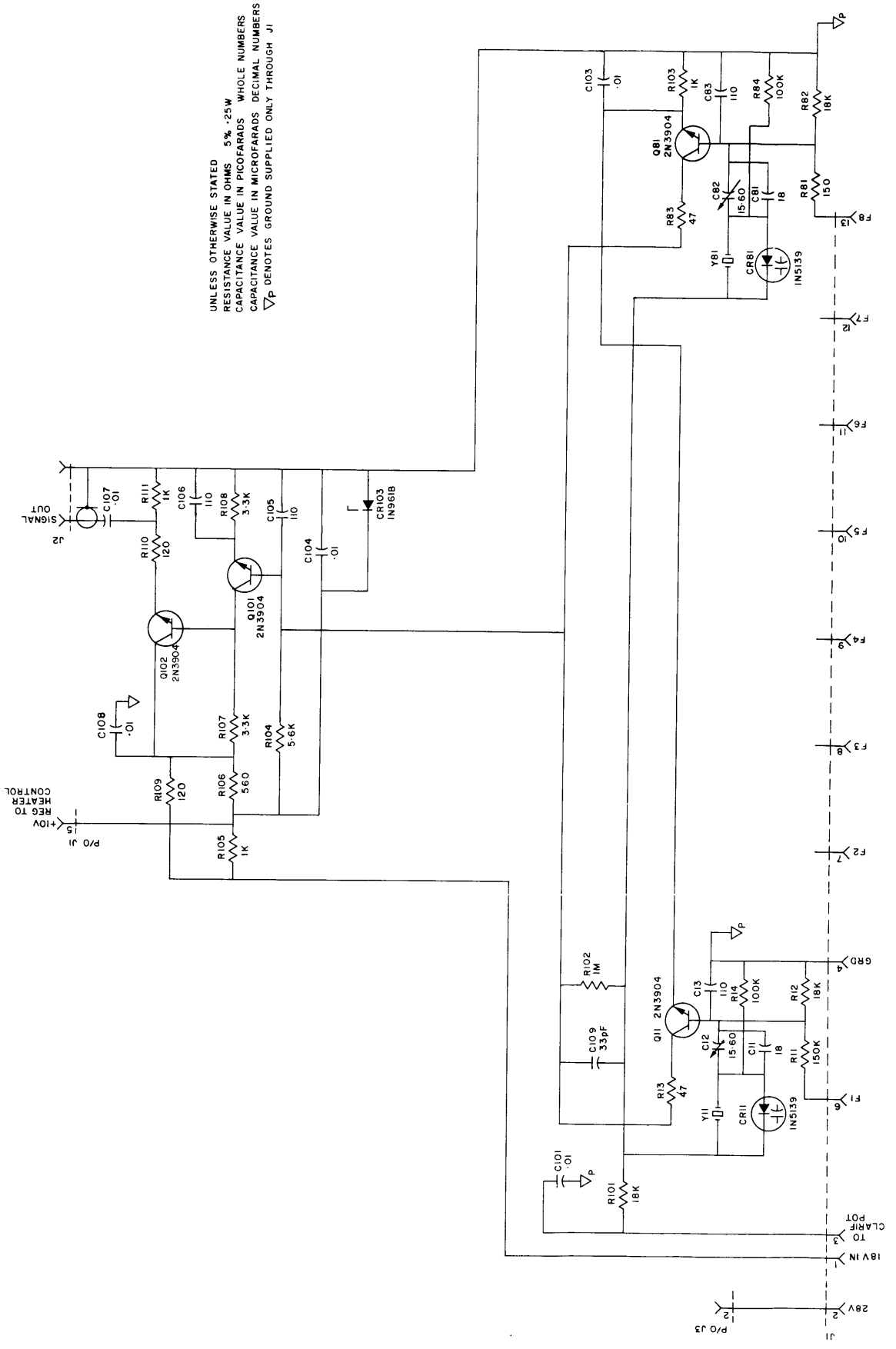


FIGURE 7-11. RECEIVE HFO ASSEMBLY, A10765-6

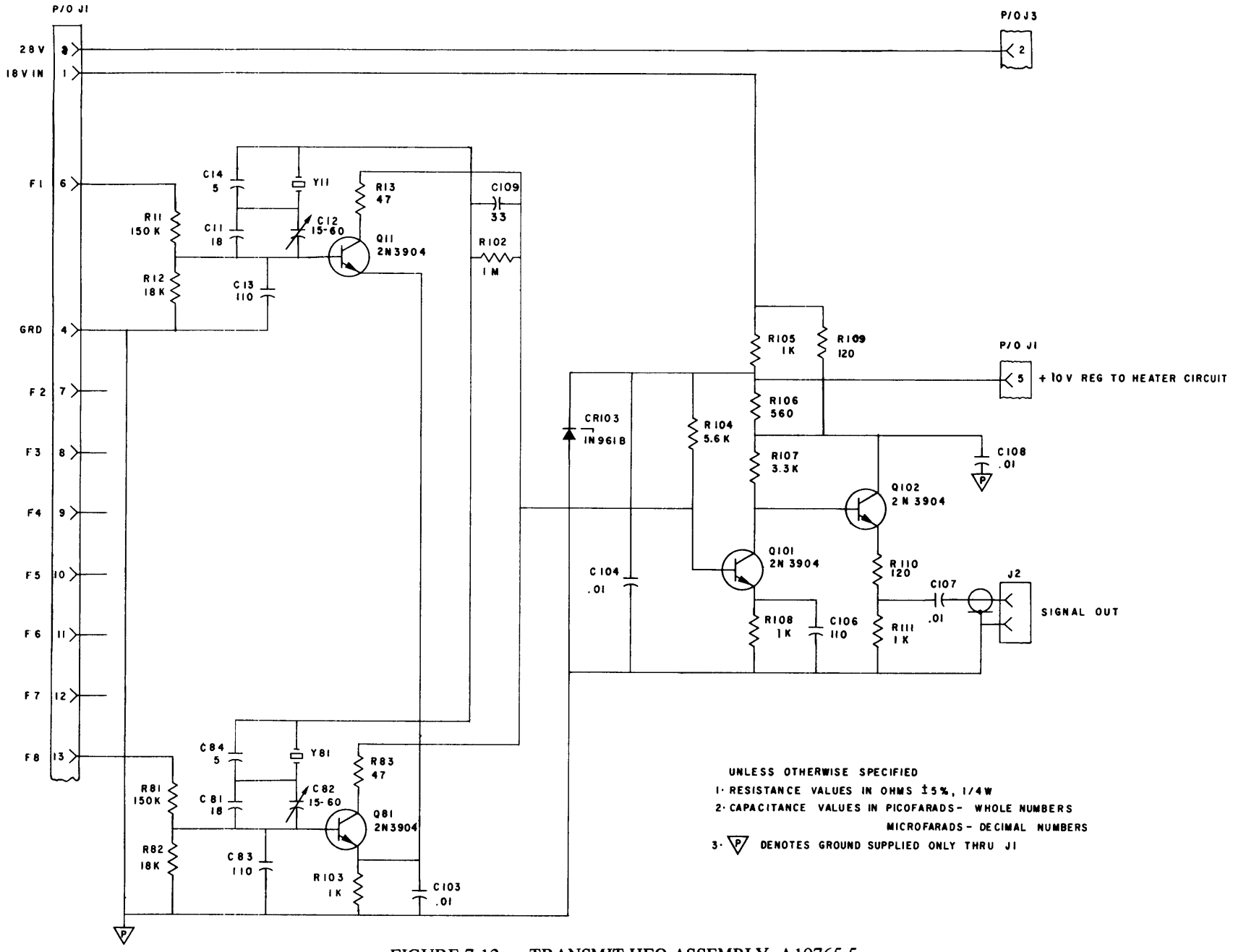
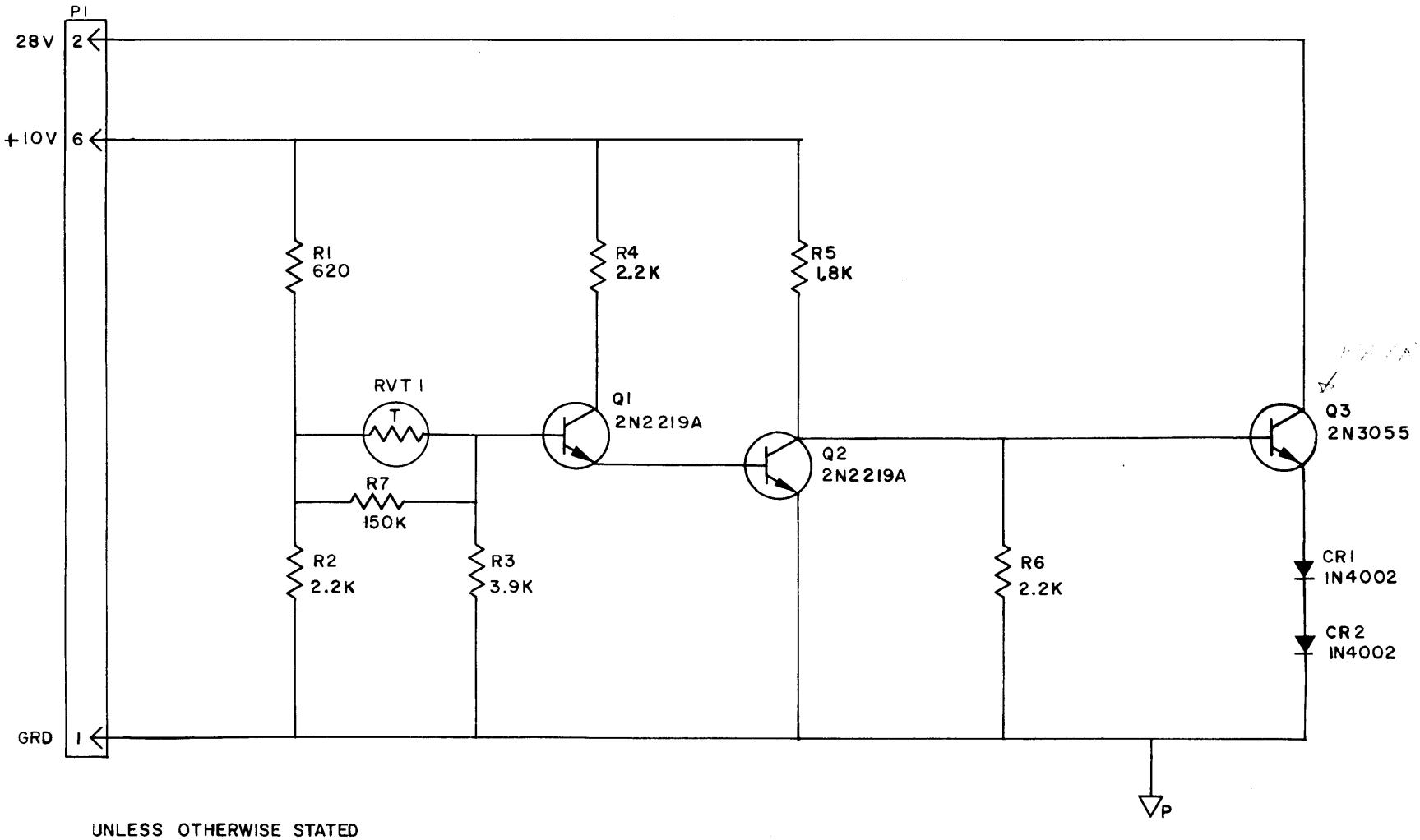


FIGURE 7-12. TRANSMIT HFO ASSEMBLY, A10765-5



UNLESS OTHERWISE STATED
RESISTANCE VALUE IN OHMS ±5%, .25 WATT

▽P DENOTES POWER GROUND, SUPPLIED ONLY THROUGH P1

FIGURE 7-13. HFO CONTROL BOARD, A10767-5