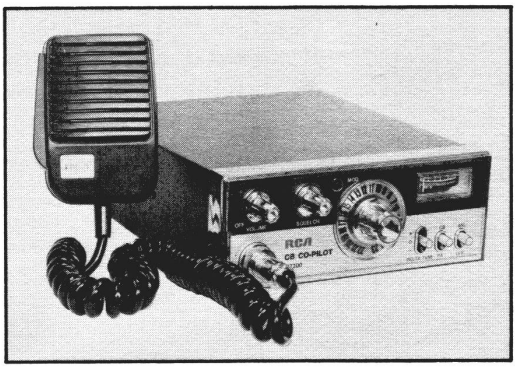
Service Manual

for **RCA CB Co-Pilot**

Model 14T100



Model 14T200

23 Channel Citizen's Band Transceivers

IMPORTANT NOTICE

The transmitter section of this transceiver may only be serviced by, or under the direct supervision of a qualified technician having a valid First or Second Class FCC Radiotelephone license. This includes internal adjustments or replacement of crystals, transistors, or any other components which can affect the performance of the transmitter. Servicing should only be done by a licensed, capable technician using suitable equipment and having complete knowledge of proper CB servicing techniques.

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General Description

The RCA CB Co - Pilot Citizen's Band Transceivers Models 14T100 and 14T200, are fully transistorized 23 channel CB units designed for mobile two-way AM radio communication in the 26.965 to 27.255 MhZ Class D citizen's band. They operate on 12-15 volts DC (13.8v nominal) with positive or negative ground, and are fused in the input power cable. Operation on all 23 CB channels is provided through use of 14 built-in crystals, which produce stabilized crystal synthesized signals for transmission and reception on all channels. A 24 position rotary channel selector switch provides for rapid selection of any of the 23 channels, and the PA function on Model 14T100.

The transmitter produces an output power of 4 watts, and is designed to prevent spurious radiations, instability and harmonic distortion in conformance with FCC Regulations. An automatic level control (ALC) circuit prevents over-modulation of the transmitter. An LED modulation indicator on 14T200, (a transmit indicator light on 14T100) and an RF output meter located on the front panel are incorporated to monitor the transmitter output. The dynamic-type push-to-talk microphone connects to a jack on the face of the transceiver unit. Removal of the microphone disables the transceiver, preventing unauthorized use when the equipment is unattended.

Receiver circuits include a dual conversion system, automatic noise limiter (ANL) active at all times on 14T100, controllable on 14T200 by a front panel switch, and a public address (PA) function using the microphone and audio circuits as a PA system, with a jack provided for use of an external PA speaker. On Model 14T100, the PA function is selected by the channel switch (between Channel 22 and 23). On Model 14T200 a separate toggle switch on the front panel selects the PA function. An external CB spaker jack is also provided for use of a speaker away from the transceiver unit.

An illuminated signal strength ("S") meter monitors receiver input signals giving relative signal strength of the received signals. Model 14T200 incorporates a Delta-Tune circuit, with a front panel switch provided to select optimum reception of a signal which is slightly off-frequency. Selectable Automatic Noise Limiting is also provided on Model 14T200 by a front panel switch. Adjustable squelch on both models is controlled by operation of a front panel control.

Typical Specifications

General

Frequency range	26.965 to 27.255 MHz (FCC Rule Part 95.41)
Channels	23
Channel composition	Crystal synthesizer type
Frequency tolerance	+ 0.005%
Polarity of power supply	Negative or positive ground DC (13.8 V nominal)

Transmitter

RF power output	4W
Modulation capability	100%
Output impedance	50 ohms
Spurious and Harmonics Attenuation	–50 dB

Receiver

Sensitivity	0.7 μV for 10 dB S+N/N
Selectivity	–6 dB Bandwidth 6 KHz –50dB Bandwidth 20KHz
Adjacent channel Rejection	50 dB
Image rejection	at least 60 dB (S.F. +2 X 10.7 MHz)
Spurious response (Except images)	–50 dB
IF frequency	1st IF 10.595 to 10.635 MHz 2nd IF 455 KHz
Squelch Sensitivity	0.5 μV to 100μV
AGC figure of merit	more than 75 dB
Audio output	3 Watts minimum
Current Drain (Nominal)	Transmit: 1.4A Receive: Full audio - 1.1A Squelch - 240 mA

Mechanical

Dimensions	6.5 in. x 2.4 in. x 7.75 in. (165 mm x 61 mm x 197 mm)
Weight	3 lbs, 5 oz. (1.5 kg)

Circuit Description

Transmit/Receive Switching

Transmit/Receive Switching in the CB Co–Pilot transceivers is achieved with the "push-to-talk" microphone switch.

Receive

When the microphone switch is not actuated ("receive" position), a ground return for the secondary of audio transformer T2 is provided through the microphone switch, activating the internal speaker. The microphone switch in the "receiver" position also produces an open circuit from the microphone. It also biases off the transmitter.

Transmit

Activating the microphone switch to the "transmit" position, removes the ground return for the audio speaker circuit, cutting off receiver output. Simultaneously the switch connects the microphone to the input of TR41, the microphone preamplifier transistor. The receiver is biased off when the transceiver is in transmit mode.

Receiver

The rf signal, at a frequency between 26.965 and 27.255 MHz, feeds from the antenna through L111 to the 27 MHz Neutralized RF Amp TR11 to the double diode input protection circuit D111/D113 then the amplified output signal from TR11 is coupled through L112 to 1st Mixer TR12, where it is beat with an injection signal from Oscillator No. 1, TR31. (This oscillator serves as a master for the crystal synthesization of the required receiver and transmitter signals). The frequency of the injection signal depends on the channel being received, as one of six crystals of oscillator No. 1 in the 37 MHz range is selected by channel selector switch S1. The output of 1st Mixer TR12 is therefore one of four frequencies – i.e., 10.635 MHz, 10.625 MHz, 10.615 MHz or 10.595 MHz, the result of the RF input and mixing of 1st oscillator signals. (see Crystal Frequency Chart on Page 12).

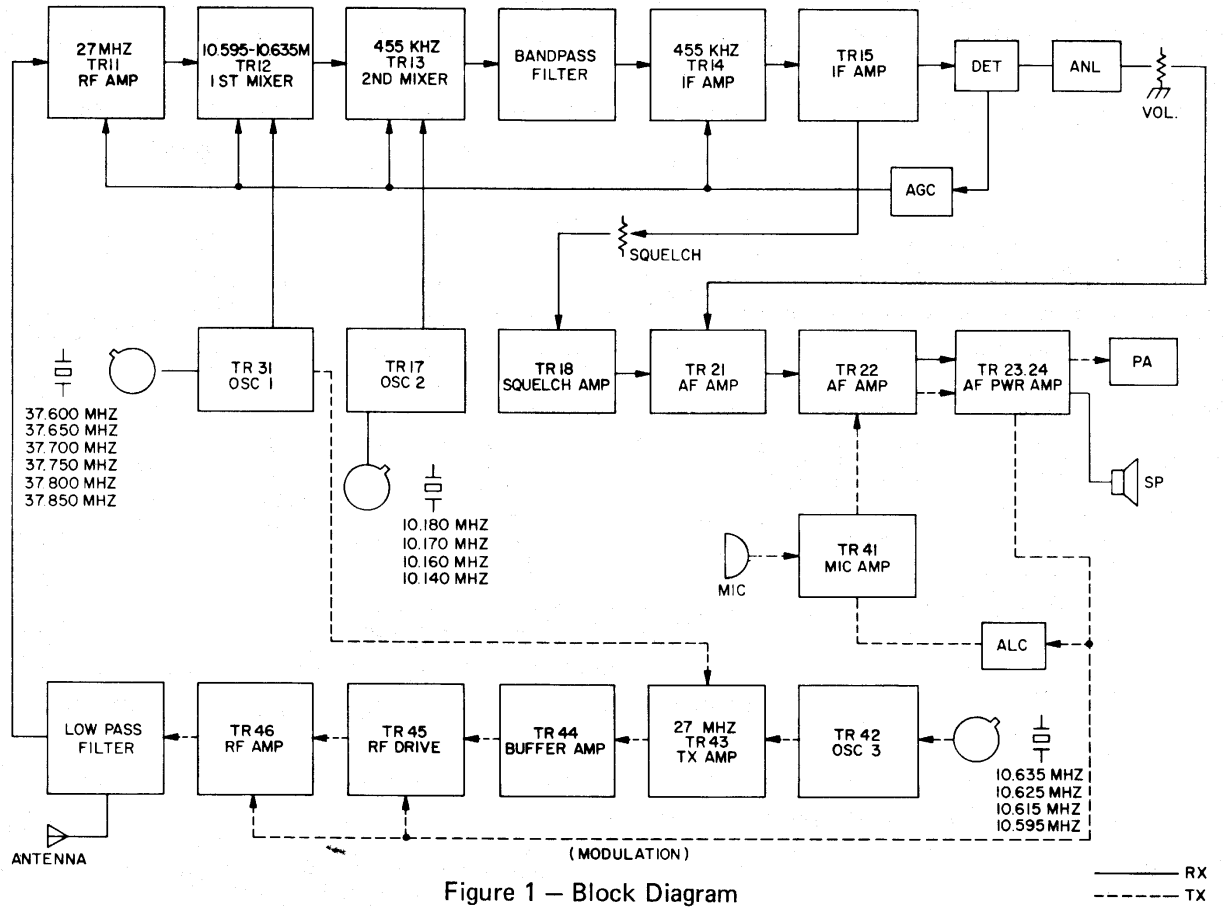

Figure 1 – Block Diagram

This 10.6-MHz range IF signal is then fed to TR13, the second mixer. Also fed to the 2nd Mixer is a second signal from TR17, Oscillator No. 2. This oscillator signal is at one of four frequencies, depending, as in the case of the 1st Mixer, on the particular channel selected, and is determined by switch S1B. Mixing of these two signals results in a signal in the L121/L122 circuit from the 2nd Mixer of 455 MHz, the second IF frequency.

The 455 kHz second IF signal passes through the ceramic bandpass filter F131, and feeds the 455 kHz signal to IF amplifiers TR14 and TR15 which include L141 and L151. The output of TR15 is applied to D151/D152 a voltage doubler type detector.

The output of the detector provides a DC component across C157 proportional to the received signal. This DC AGC signal is used to establish the base bias on transistors TR11, TR12, TR13, and TR14, causing a reduction in bias with an increase in input signal strength.

Diode D153 circuit is a series noise limiter, which limits ignition and other man-made noise induced into the receiver and is in the circuit at all times except that in model 14T200, the noise limiter may be shunted by the ANL switch S4, provided on the front panel. enabling reception of weaker signals.

The rectified audio signal from the detector is passed through the volume control VR153 to the base of the 1st audio amplifier TR21, then through 2nd audio amplifier TR22 to the push-pull audio power amplifiers TR23/TR24. The audio output is transformer coupled to the internal speaker, and to an external speaker if used.

TR18 is the squelch amplifier transistor. At low or no signal levels TR18 conducts heavily and its output, connected to the base of AF amplifier TR22, cuts off TR22 resulting in no signal output from the audio section. As the Incoming RF signal increases it results in a decreasing output from TR18, until TR18 is cut-off. This results in opening up the AF amplifier TR22 and output is achieved. The point at which TR18 cuts off is determined by the setting of SQUELCH control VR182.

Delta Tune

Model 14T200 employes a delta tune circuit in the oscillator # 2 crystal stage. The "Delta-Tune" switch on the front panel acts to connect an inductance L171 or capacitance C171 in series with the oscillator # 2 crystal. Depending upon whether the inductance (+ position of switch) or capacitance (– position of switch) is chosen the crystal frequency is "pulled" slightly above or below its normal operating frequency. By being able to control this slight change in crystal frequency, clearer reception of an incoming signal may be achieved, when the received signal is slightly above or below the nominal frequency of the channel crystal frequency.

Transmitter

The transmitter oscillator TR41, oscillator # 3, is a Pierce type oscillator circuit using one of four 10 MHz range crystals – i.e., 10.635, 10.625, 10.615 or 10.595 MHz. Depending on the channel of operation, one of the above four frequencies is selected by channel selector switch S1C. (See Channel Frequency Chart on page 12).

The oscillator output is capacitively coupled to the transmitter mixer TR43. The mixer is also fed a signal in the 37 MHz range from oscillator # 1. One of six frequencies is selected by channel switch S1A, depending on the channel selected. (See Channel Frequency Chart on page 12). These two signals beat in the mixer and result in a 27 MHz output difference frequency which is the channel frequency of the channel chosen.

The 27 MHz mixer output is coupled to buffer amplifier transistor TR44 through high pass filter L431/L432/L433/C433 and C434. The buffer serves to isolate the oscillator and mixer stages from the output, and at the same time provide a small amount of power gain. TR44 output is applied to the base input of TR45, the RF Driver stage and in turn to TR46 the RF output stage of the transmitter. These stages amplify the 27 MHz RF signal resulting in an output from TR46 of 4 watts.

In the transmit mode, the microphone feeds audio through TR41 and TR22 to the push-pull audio output TR23/TR24 which serves as the modulator for the transmitter. This modulating audio is applied to both the driver and output stages TR45 and TR46, to provide carrier modulation up to 100%. An ALC voltage derived from this modulating signal is fed back to TR23/TR24

via the microphone amplifier TR41 to control its output and prevent over modulation. Factory adjustment of 100% modulation is achieved by adjustment of VR481.

The low pass filter between the antenna and receiver and transmitter inputs serves to pass the 27 MHz signals, attenuating higher frequency signals. It also serves to match the antenna impedance to the output impedance of the transmitter output transistor stage TR46.

Public Address

Switching provision is made in the audio output circuit of the transceiver to provide a PA function by switching the audio output to an external PA speaker jack. On Model 14T100 this switching occurs when the channel selector S1 is set between channels 22 and 23. On Model 14T200 a separate front panel toggle switch is provided for PA function selection.

In the PA mode, the microphone, the microphone amplifier TR41, AF amplifier TR22 and Audio power Amplifiers TR23 and TR24 serve as a public address amplifier providing 5 watts output to an external PA speaker.

Servicing

General

Performance of the RCA 14T100 and 14T200 Co–Pilot Citizen's Band Transceivers depends upon the high quality of components employed and proper servicing techniques performed by licensed fully qualified technical personnel. Only use of replacement parts as outlined in the parts list on pages 18, 22, 23 should be employed.

Illustrations to aid in servicing and adjustment; such as top and bottom views, exploded views and a superimposed printed board view, are provided to assist in proper and competent servicing. A block diagram is shown in Figure 1. The schematic diagram Figure 9 is combined for the both models with the small differences for the 14T200 shown in dotted lines on the schematic, plus a small section at the extreme right which shows the difference in the audio output circuitry for the 14T200.

Figure 6 of the printed circuit board incorporates a map grid coordinate scale at the sides of the illustration. These coordinates are keyed to corresponding key numbers in the replacement parts list, for instant location of smaller parts. Major components, not shown in Figure 6 are shown in chassis views Figures 2 and 3. Exploded views identify all mechanical parts by means of balloon callouts. These balloons key to corresponding balloons shown in the mechanical parts list section.

Simple removal of the two Phillips screws at the rear of the transceiver case permits the entire unit to slide out of the case. Loosening the two screws on the slotted speaker bracket permits the speaker and bracket to be rotated 90° to an upright position revealing all components on both top and bottom of the unit.

Servicing the two models is fundamentally the same due to the similarity of the two units. As mentioned earlier, the only variations between the units are readily discerned from the few dotted lines on the schematic diagram and the slightly different circuitry in the audio output circuit of Model 14T200.

Electronic switching is used in both units making them inoperable when the microphone is disconnected from the front of the unit. In order to activate the set only for receiver service, a dummy plug must be used in place of the microphone plug. Use of this plug is HIGHLY RECOMMENDED TO ACTIVATE THE RECEIVER WHEN PERFORMING SERVICE. IF THE MICROPHONE IS USED, ACCIDENTAL DEPRESSION OF THE TRANSMIT BUTTON COULD RESULT IN DAMAGE TO VALUABLE TEST EQUIPMENT. See Figure 8 for view and information on dummy plug.

Test Equipment

The following test equipment is required and recommended for servicing the 14T100 and/or 14T200 Transceiver.

1. A 50 ohm resistive antenna load with a power capa-

bility of 5 watts or more, such as Bird Model 43 "thru line" wattmeter with a 5A Element and a Model 8053 RF Coaxial Load Resistor, or equivalent.

2. A frequency counter operable in the required CB range, such as Hewlett-Packard Model HP 5283A or suitable equivalent.

3. A HF Signal Generator which operates in the 50 kHz to 65 MHz frequency range with + 1% accuracy, such as Hewlett-Packard HP-606B, Wavetek Model 3000 or equivalent.

4. An oscilloscope capable of accurate monitoring of 27 MHz range AM signals.

5. High Input impedance Electronic Voltmeter such as a WV-500B or equivalent.

6. Dummy mike plug for receiver servicing, with jumper between pins 2 and 3 as seen in photo in Figure 8.

7. An 8 ohm 5 watt resistive dummy speaker load.

8. An Audio Signal Generator.

9. An RF Voltmeter. (WV-500B with WG-301A Probe)

10. A bench DC power supply capable of supplying 13.8 V DC @ at least 2 amperes.

11. A VHF radio receiver capable of tuning in the 54.3 MHz range, or a TV set if available (for adjustment of the TV interference trap L465).

Tune Up and Alignment

Shown in the table on Page 10 are nominal test voltage values for the transceiver transistors. In addition, certain other pertinent voltages are shown on the schematic Figure 9. For tune-up and servicing identical procedures may be employed for both Model 14T100 and 14T200.

A. Audio Frequency Adjustment

Unless otherwise specified, the input signal level is adjusted for an audio output of 1 watt across 8 ohms with volume control at maximum. Connect the dummy microphone plug to activate the receiver.

1. Connect an 8 ohm resistive dummy load across the EXT SPKR jack.

2. Connect an AC voltmeter across the load.

3. Connect the Audio Oscillator Output to the center lead (arm) of VR153 volume control. Set VR153 maximum clockwise.

4. The amplitude gain from VR153 to the dummy load should be approximately .5 volts RMS with 1 watt output at the load.

5. Check resistor voltages, table 1, if condition in step 4 is not obtained.

NOTE:

Iron core adjusting slugs are secured in place at the factory to prevent movement from excessive vibration as may be encountered in mobile service. Before attempting to readjust these cores, carefully soften the wax by inserting a pencil tipped iron in the coil form. After the wax is softened the core may be easily adjusted.

B. Oscillator #1 (TR31) Adjustment (37 MHz)

1. Connect the RF voltmeter between TP31 (top of L311 in TR31 output see Figures 2 and 3) and ground. Set channel selector to channel 21 or 23. Turn L311 fully clockwise.

2. Turn L311 counterclockwise slowly for a peak reading on the meter. Then turn clockwise approximately 1/4 turn (90%). This will result in setting the oscillator to a stable oscillation point.

3. Refer to the crystal frequency table and check the six oscillator 37 MHz output frequencies on the frequency counter. When adjustment is proper voltages should be approximate to TR31 voltages in table 1.

C. Oscillator #2 Check (TR17 10.1 MHz RX Oscillator)

1. Connect the RF voltmeter between the emitter of TR17 and ground.

2. A reading of approx. .52 volts should be obtained.

3. Refer to the crystal frequency table on Page 12 and check the four oscillator output frequencies on the frequency counter.

4. Check oscillator # 2 DC voltages. Should approximate those in table 1.

Voltage Table

Transistor	Function	Emitter	Base	Collector
TR11	RF AMP	0.47v	1.18v	3.6v
TR12	1ST MIXER	0.54v	1.2v	7.8v
TR13	2ND MIXER	0.5v	1.2v	7.4v
TR14	IF AMP	0.55v	1.2v	8.0v
TR15	IF AMP	0.17v	.82v	8.0v
TR17	OSC #2	0.68v	1.2v	4.6v
TR18	SQ. AMP	*0 **(0.v)	*0.45v **(0.6-0.65v)	*4.0v **(0v)
TR21	AF AMP	*0.2v **(0v)	*0.8v **(0v)	*9.5v **(11.5v)
TR22	AF AMP	1.3v	2.0v	11.0v
TR23	AF OUTPUT	0.05	0.64	13.6v
TR24	AF OUTPUT	0.05v	0.64v	13.6v
TR31	OSC #1	†1.7v ††1.7v	†1.5v ††1.5v	†12.5v ††12.5v
TR41	MIC AMP	†4.5v ††1.0v	†1.7v ††1.7v	†11.6v ††7.6v
TR43	27 MHZ AMP	†4.6v †† .38v	†0.5v ††0v	†13.8v ††13.8v
TR44	BUFFER AMP	†3.2v ††1.7v	†3.7v ††2.1v	†13.8v ††13.8v
TR45	RF DRIVER	†.015v ††.06v	†0v ††–.9v	†13.6v ††13.6v
TR46	RF OUTPUT	†0v ††0v	†0v ††–.62v	†13.8v ††12.0v

* Indicates unsequelched condition.
** Indicates squelched condition.
† Receive condition.
†† Transmit condition.

All voltages measured with RCA Volt Ohmyst WV-98C and may vary ±20% – Voltages marked †† may vary ± 40%.

D. Oscillator #3 Check (TR42 10.6 MHz TX Oscillator)

1. Open up the jumper between "a" and "b" of TP47 (Located next to L463 and L462 in TR46 output) See Figures 2 and 3.

2. Connect the RF voltmeter between the emitter of TR42 Oscillator # 3 and ground.

3. An oscillator voltage of approx. 1.8 volts should be read on the meter.

4. Refer to the crystal frequency table on Page 12 and check the four oscillator output frequencies on the frequency counter. Reconnect TP47 jumper.

5. Voltages measured on Oscillator #3 should approximate TR42 voltages in table 1.

E. Receiver Adjustment

1. Connect 8 ohm dummy load across EXT. SPKR jack. Connect Output Meter across load. On 14T200 set ANL switch to OFF.

2. Set the Signal Generator to 455 kHz and connect between the base of TR13 2nd IF Amplifier and ground.

NOTE:

Iron core adjusting slugs are secured in place at the factory to prevent movement from excessive vibration as may be encountered in mobile service. Before attempting to readjust these cores, carefully soften the wax by inserting a pencil tipped iron in the coil form. After the wax is softened the core may be easily adjusted.

3. Adjust L151, L141 and L131 (in this order) for maximum output on the meter at the EXT SPKR load. Gradually decrease input from generator to obtain maximum adjustment sensitivity when making adjustments.

4. Move the signal generator output to the "Antenna" jack and set the receiver to channel 13 or 14.

5. Set generator to only a high enough output to obtain a reading on audio output meter.

6. Tune L121, L122, L112 and L111 in RF and mixer stages for maximum output meter reading. Keep decreasing generator output so that final adjustment is made at low level for maximum sensitivity.

7. Check on channel 1 and channel 23. The sensitivity should be within −3dB. If not, readjust L111 and L112 to obtain this condition between the two frequency extremes.

8. Input signal generator levels to obtain 1 watt audio output should read as follows with volume fully clockwise:

   *TR11 base: .7 uV (27 MHz)

   *TR12 base: 5.5 uV (27 MHz)

   *TR13 base: 40 uV (10.6 MHz)

   *TR14 base: 250 uV (455 kHz)

   *TR15 base: 9000 uv (455 kHz)

F. Squelch Control Circuit Adjustment

1. Use same test equipment as in section E, signal generator connected to "ANTENNA".

2. Set signal generator input for 100 uV level.

3. Set "SQUELCH" control fully clockwise.

4. Adjust VR181 in TR18 input for an output of

5. The voltages on the squelch amplifier should be close to VR18 readings shown in table, page 10, in the squelched and unsquelched conditions.

G. Receiver "S" Meter Adjustment

1. Set VR151 for a reading of S9 with a signal generator input level of 100 uV. (See 2, section F)

2. Remove all test equipment.

H. Transmitter Adjustment

Remove power from unit

1. Open up jumper between "a" and "b" at TP47 (see step 1 under "D").

2. Connect the RF Voltmeter between TR45 base and ground.

3. Remove dummy microphone plug, and connect the microphone to the transceiver. Reconnect power to unit.

4. Depress microphone switch and adjust L431, L432, L433 and L441 for maximum meter reading.

5. Connect a DC Ammeter across "a" and "b" of TP47, see step 1.

6. Connect the in-line wattmeter and 50 ohm dummy load to the Antenna.

7. Adjust L451, L463 and L464 for maximum reading on wattmeter.

8. Adjust the output power to 4 watts, readjusting L463 to achieve correct output.

9. Whistle or speak into microphone. Modulation "TX" indicator light should increase in intensity indicating upward modulation.

I. ALC Adjustment

1. Connect the oscilloscope to the antenna – Loosely couple with a 10 pf capacitor.

2. In the transmitter mode, provide a 1000 Hz audio signal from the Audio Oscillator to produce a 50% modulation indication on the oscilloscope. Adjust oscilloscope for 1" deflection.

3. Increase the audio signal by 16 dB, and while observing the oscilloscope, set VR481 for 100% modulation.

J. Transmitter RF Power Meter Adjustment

1. Four watts output from the transmitter is represented by a point on the "S" meter of +10 dB. This corresponds to a point just below the red line on the lower RF-P scale.

2. With full four watt output adjust the meter trim pot VR491 to achieve this reading.

K. Transmitter Frequency Check

1. Loosely couple the frequency counter to the antenna.

2. Check the transmitter output frequency of all channels 1 through 23. They should fall within + .005% of the FCC assigned channel frequency (see table below).

3. If outside this tolerance, touch-up slightly, L311 in the output of TR31 Oscillator # 1 until this tolerance is achieved. No more the +45° rotation should be required to do so.

L. TV Interference Trap

1. Loosely couple the transmitter output to the 54 MHz receiver or a TV receiver.

2. Adjust receiver to 54.23 MHz, or set the TV receiver to channel 2.

3. Adjust L465 trap for minimum signal output on receiver, or minimum interference pattern on TV receiver.

Crystal Frequency Chart

	RECEIVER					TRANSMITTER		
CHAN	CHAN FREQ	OSC # 1 XTAL FREQ	1ST MIXER FREQ	OSC # 2 XTAL FREQ	2ND MIXER OUTPUT FREQ	OSC # 1 XTAL FREQ	OSC # 3 XTAL FREQ	TX AMP (CHAN) FREQ
1	26.965	37.600	10.635	10.180	455 kHz	37.600	10.635	(1) 26.965
2	26.975	"	10.625	10.170	455 kHz	"	10.625	(2) 26.975
3	26.985	"	10.615	10.160	455 kHz	"	10.615	(3) 26.985
4	27.005	"	10.595	10.140	455 kHz	"	10.595	(4) 27.005
5	27.015	37.650	10.635	10.180	455 kHz	37.650	10.635	(5) 27.015
6	27.025	"	10.625	10.170	455 kHz	"	10.625	(6) 27.025
7	27.035	"	10.615	10.160	455 kHz	"	10.615	(7) 27.035
8	27.055	"	10.595	10.140	455 kHz	"	10.595	(8) 27.055
9	27.065	37.700	10.635	10.180	455 kHz	37.700	10.635	(9) 27.065
10	27.075	"	10.625	10.170	455 kHz	"	10.625	(10) 27.075
11	27.085	"	10.615	10.160	455 kHz	"	10.615	(11) 27.085
12	27.105	"	10.595	10.140	455 kHz	"	10.595	(12) 27.105
13	27.115	37.750	10.635	10.180	455 kHz	37.750	10.635	(13) 27.115
14	27.125	"	10.625	10.170	455 kHz	"	10.625	(14) 27.125
15	27.135	"	10.615	10.160	455 kHz	"	10.615	(15) 27.135
16	27.155	"	10.595	10.140	455 kHz	"	10.595	(16) 27.155
17	27.165	37.800	10.635	10.180	455 kHz	37.800	10.635	(17) 27.165
18	27.175	"	10.625	10.170	455 kHz	"	10.625	(18) 27.175
19	27.185	"	10.615	10.160	455 kHz	"	10.615	(19) 27.185
20	27.205	"	10.595	10.140	455 kHz	"	10.595	(20) 27.205
21	27.215	37.850	10.635	10.180	455 kHz	37.850	10.635	(21) 27.215
22	27.225	"	10.625	10.160	455 kHz	"	10.625	(22) 27.225
23	27.255	"	10.595	10.140	455 kHz	"	10.595	(23) 27.255

All frequencies in MHz except 2nd Mixer Output.

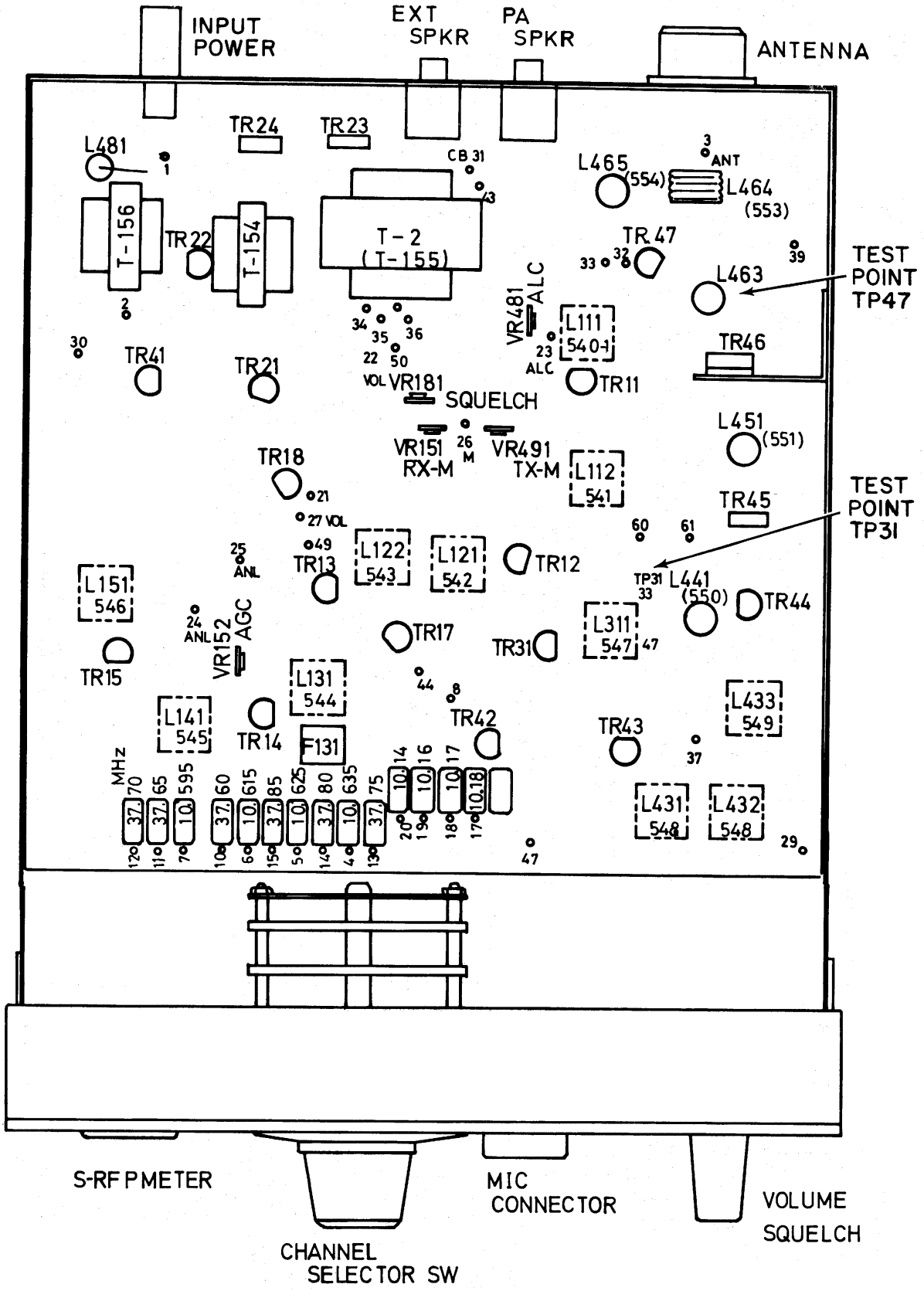

Figure 2 — Top View of 14T100

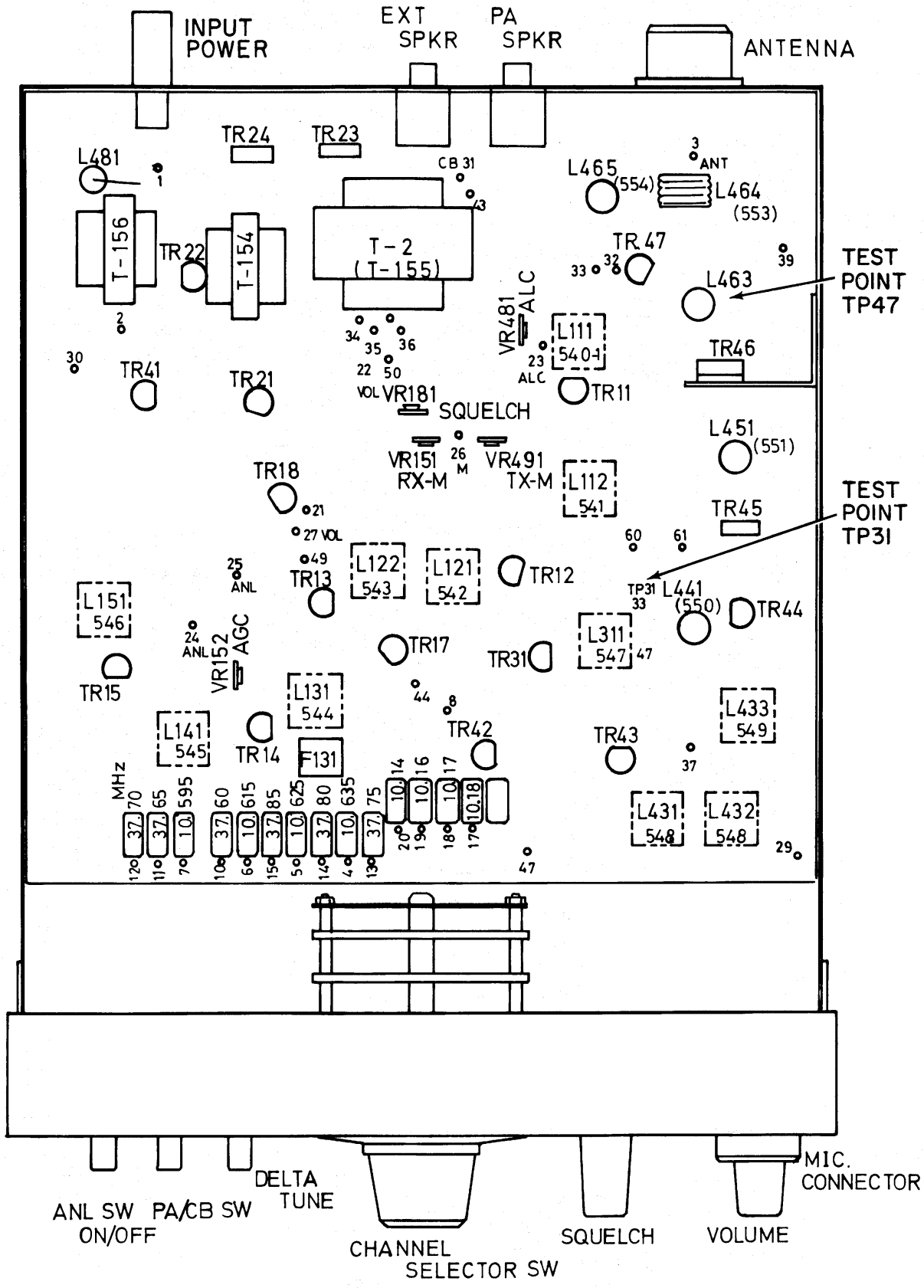

Figure 3 – Top View of 14T200

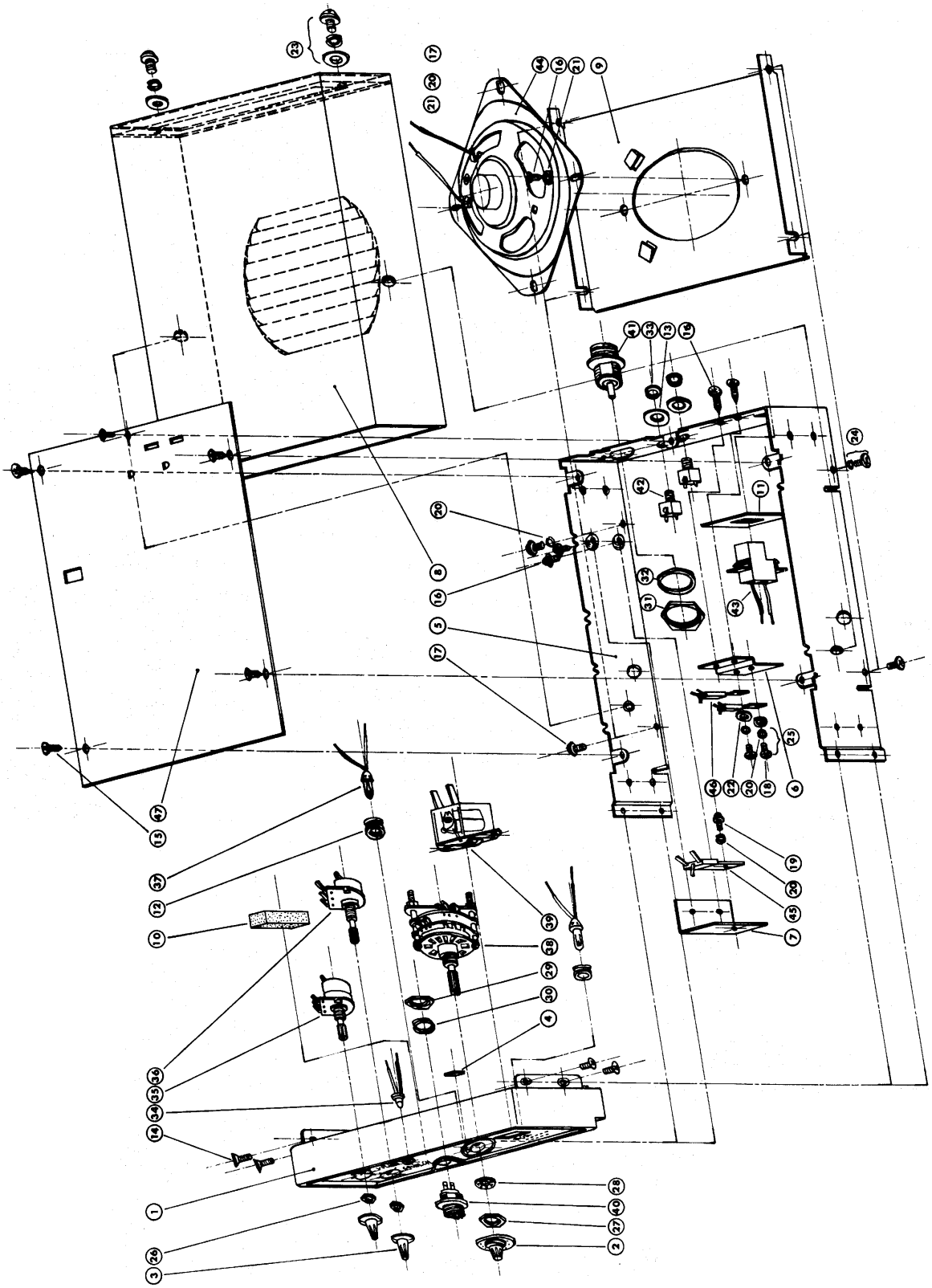

Figure 4 – Exploded View of 14T100

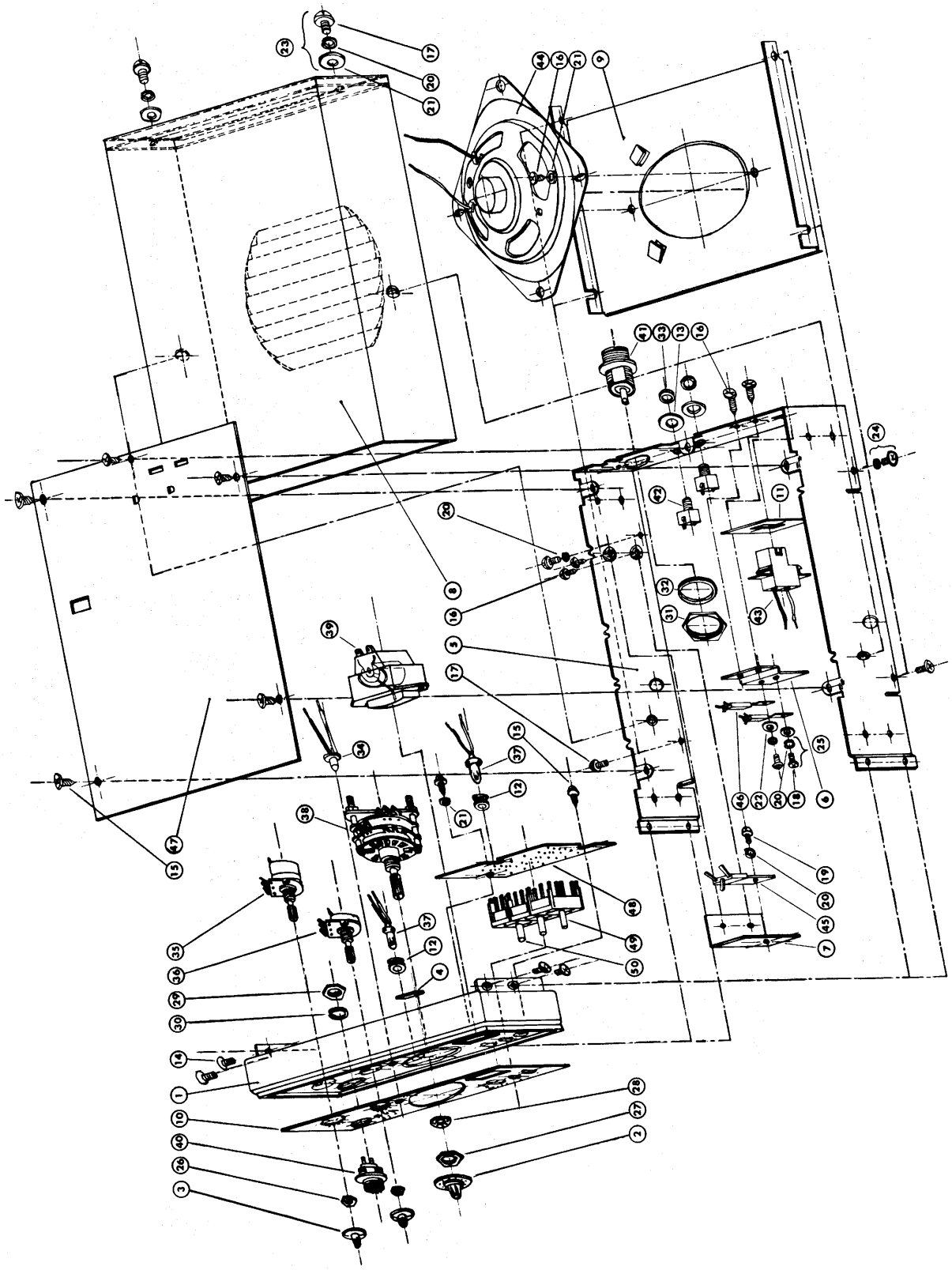

Figure 5 – Exploded View of 14T200

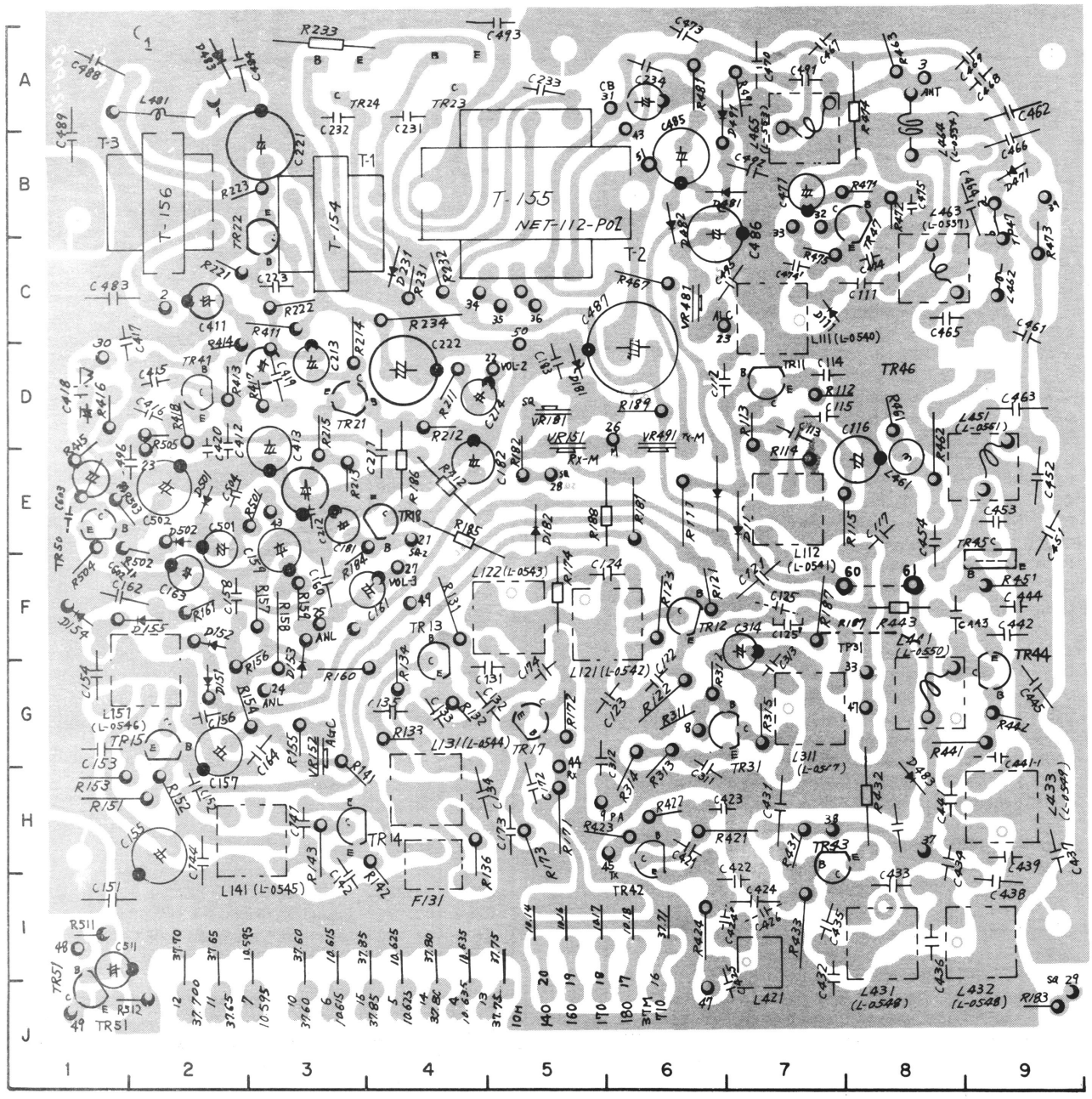

Figure 6 — Printed Circuit Board

Replacement Parts

Order parts by RCA stock numbers through your local RCA Distributor.

NOTE: – Location column is for use with the grid coordinates shown on the printed circuit board illustration in Figure 6 on Page 17.

SYMB. NO.	STOCK NO.	DESCRIPTION	LOCATION
C111	425838	Capacitor, Ceramic - 82 pf, 50 v	C8
C112	249943	Capacitor, Ceramic - .01 uF, 50 v	D7
C113	741369	Capacitor, Ceramic - 2 pf, 50 v	D7
C114	249943	Capacitor, Ceramic - .01 uF, 50 v	D8
C115	249943	Capacitor, Ceramic - .01 uF, 50 v	D7
C116	427593	Capacitor, Electrolytic - 4.7 uF, 16 v	E8
C117	249943	Capacitor, Ceramic - .01 uF, 50 v	E8
C121	249943	Capacitor, Ceramic- .01 uF, 50 v	F7
C122	249943	Capacitor, Ceramic - .01 uF, 50 v	G6
C123	741280	Capacitor, Ceramic - .04 uF, 50 v	G6
C124	248409	Capacitor, Ceramic - 1 pf, 50 v	F6
C125	248409	Capacitor, Ceramic - 1 pf, 50 v	F7
C131	249943	Capacitor, Ceramic - .01 uF, 50 v	G5
C132	741370	Capacitor, Ceramic - 7 pf, 50 F	G5
C133	249943	Capacitor, Ceramic - .01 uF, 50 v	G4
C134	741280	Capacitor, Ceramic - .04 uF, 50 v	H5
C135	436630	Capacitor, Ceramic - 500 pf, 50 v	G4
C141	741369	Capacitor, Ceramic - 2 pf, 50 v	H3
C142	740614	Capacitor, Film - .04 uF, 50 v	I3
C144	741280	Capacitor, Ceramic - .04 uF, 50 v	H2
C151	249943	Capacitor, Ceramic - .01 uF, 50 v	I1
C152	249943	Capacitor, Ceramic - .01 uF, 50 v	H2
C153	740614	Capacitor, Film - .04 uF, 50 v	G1
C154	248646	Capacitor, Ceramic - 180 pf, 50 v	G1
C155	137872	Capacitor, Electrolytic - 33 uF, 16 v	H2
C156	741280	Capacitor, Ceramic - .04 uF, 50 v	G2
C157	124095	Capacitor, Elecgrolytic - 10 uF, 16 v	G2
C158	249943	Capacitor, Ceramic - .01 uF, 50 v	C3
C159	427593	Capacitor, Electrolytic - 4.7 uF, 16 v	F3
C160	425041	Capacitor, Ceramic - .005 uF, 50 v	F3
C161	741607	Capacitor, Electrolytic - .47 uF, 50 v	F4
C162	245853	Capacitor, Ceramic - 220 pf, 50 v	F2
C163	124095	Capacitor, Electrolytic - 10 uF, 16 v	F2
C164	249943	Capacitor, Ceramic - .01 uF, 50 v	G3
C171	425836	Capacitor, Ceramic - 33 pf, 50 v (14T200 only)	††
C172	436630	Capacitor, Ceramic - 500 pf, 50 v	H5
C173	427831	Capacitor, Ceramic - 150 pf, 50 v	H5
C174	249943	Capacitor, Ceramic - .01 uF, 50 v	G5
C181	435876	Capacitor, Electrolytic - 1 uF, 16 v	E3
C182	427593	Capacitor, Electrolytic - 4.7 uF, 16 v	E4
C183	741280	Capacitor, Ceramic - .04 uF, 50 v	D5
C211	249943	Capacitor, Ceramic - .01 uF, 50 v	E4
C213	741607	Capacitor, Electrolytic - .47 uF, 50 v	D3
C214	435876	Capacitor, Electrolytic - 1 uF, 16 v	D4
C221	741089	Capacitor, Electrolytic - 100 uF, 10 v	B3
C222	226976	Capacitor, Electrolytic - 100 uF, 16 v	D4
C223	425322	Capacitor, Ceramic - 270 pf, 50 v	C3
C231	741280	Capacitor, Ceramic - .04 uF, 50 v	A4 †
C232	232752	Capacitor, Ceramic - .02 uF, 50 v	A3
C233	130214	Capacitor, Ceramic - .1 uF, 50 v	A5
C311	741353	Capacitor, Ceramic - 100 uF, 50 v	H6
C313	124095	Capacitor, Electrolytic - 10 uF, 16 v	G7
C314	249943	Capacitor, Ceramic - 10 uF, 16 v	F7
C411	124095	Capacitor, Electrolytic - 10 uF, 16 v	C2
C412	249943	Capacitor, Ceramic - .01 uF, 50 v	E2
C413	740847	Capacitor, Electrolytic - 33 uF, 10 v	E3
C415	741278	Capacitor, Ceramic - .003 uF, 50 v	D2
C416	170467	Capacitor, Ceramic - .005 uF, 50 v	D2
C417	249943	Capacitor, Ceramic - .01 uF, 50 v	D2
C418	426729	Capacitor, Film - .1 uF, 50 v	D1
C419	426729	Capacitor, Film - .1 uF, 50 v	D3
C420	249943	Capacitor, Ceramic - .01 uF, 50 v	E2
C421	436630	Capacitor, Ceramic - 500 pf, 50 v	H6
C422	427831	Capacitor, Ceramic - 150 pf, 50 v	H7
C423	249943	Capacitor, Ceramic - .01 uF, 50 v	H7
C424	425835	Capacitor, Ceramic - 22 pf, 50 v	I7
C431	422015	Capacitor, Ceramic - 15 pf, 50 v	H7
C432	249943	Capacitor, Ceramic - .01 uF, 50 v	I7
C433	134756	Capacitor, Ceramic - 3 pf, 50 v	H8
C434	134756	Capacitor, Ceramic - 3 pf, 50 v	H8
C435	741609	Capacitor, Mica - 100 pf, 50 v	I7
C436	741610	Capacitor, Mica - 150 pf, 50 v	I8
C437	741280	Capacitor, Ceramic - .04 uF, 50 v	H9
C438	741280	Capacitor, Ceramic - .04 uF, 50 v	H9
C439	741609	Capacitor, Mica - 100 pf, 50 v	H9
C441	425836	Capacitor, Ceramic - 33 pf, 50 v	H8
C442	249943	Capacitor, Ceramic - .01 uF, 50 v	F9
C443	426475	Capacitor, Ceramic - 120 pf, 50 v	F8
C444	741353	Capacitor, Ceramic - 100 pf, 50 v	F9
C445	741280	Capacitor, Ceramic - .04 uF, 50 v	G9
C451	741280	Capacitor, Ceramic - .04 uF, 50 v	E9
C452	741280	Capacitor, Ceramic - .04 uF, 50 v	E9
C453	741353	Capacitor, Ceramic - 100 pf, 50 v	E9
C454	425332	Capacitor, Ceramic - 270 pf, 50 v	E8
C461	425835	Capacitor, Ceramic - 22 pf, 50 v	D9
C462	741280	Capacitor, Ceramic - .04 uF, 50 v	A9
C463	741280	Capacitor, Ceramic - .04 uF, 50 v	D9
C464	741280	Capacitor, Ceramic - .04 uF, 50 v	B9
C465	249943	Capacitor, Ceramic - .01 uF, 50 v	D9
C466	741611	Capacitor, Mica - 270 pf, 50 v	B9
C467	245245	Capacitor, Ceramic - 47 pf, 50 v	A7
C468	741353	Capacitor, Ceramic - 100 pf, 50 v	A9
C469	425836	Capacitor, Ceramic - 33 pf, 50 v	A9
C470	741280	Capacitor, Ceramic - .04 uF, 50 v	A7
C471	435876	Capacitor, Electrolytic - 1 uF, 16 v (14T200 only)	B7
C473	249943	Capacitor, Ceramic - .01 uF, 50 v (14T200 only)	A6
C474	170467	Capacitor, Ceramic - .005 uF, 50 v (14T200 only)	C7
C481	741277	Capacitor, Ceramic - .002 uF, 50 v	**
C482	436630	Capacitor, Ceramic - 500 pf, 50 v	**
C483	426202	Capacitor, Film - .22 uF, 50 v	C1
C484	741280	Capacitor, Ceramic - 104 uF, 50 v	A2
C485	435873	Capacitor, Electrolytic - 33 uF, 50 v	B6
C486	124095	Capacitor, Electrolytic - 10 uF, 50 v	C6
C487	741090	Capacitor, Electrolytic - 470 uF, 16 v	D6
C488	426202	Capacitor, Film - .22 uF, 50 v	A1
C489	249943	Capacitor, Ceramic - .01 uF, 50 v	B1
C491	741608	Capacitor, Ceramic - 5 pf, 50 v	A7
C492	130214	Capacitor, Ceramic - .1 uF, 50 v	B7
C493	249943	Capacitor, Ceramic - .01 uF, 50 v	A5
C494	249943	Capacitor, Ceramic - .01 uF, 50 v	D6
C495	249943	Capacitor, Ceramic - .01 uF, 50 v	C7

Continued on Page 22

†Mounted on foil side of P.C. board

††Mounted on S3 board

**Mounted on microphone jack

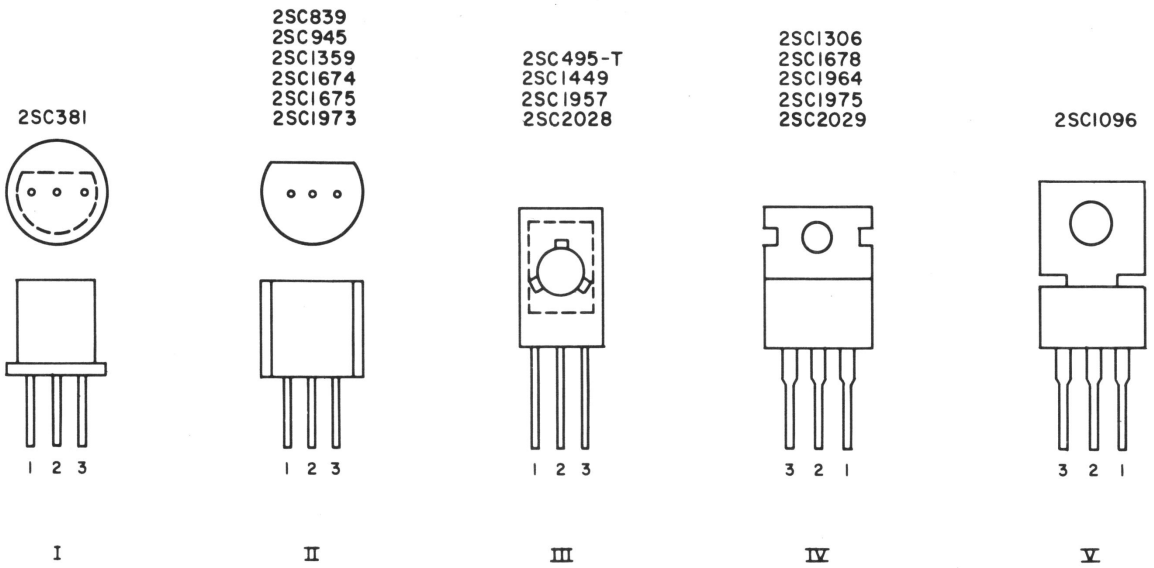

Figure 7 — Transistor Identification

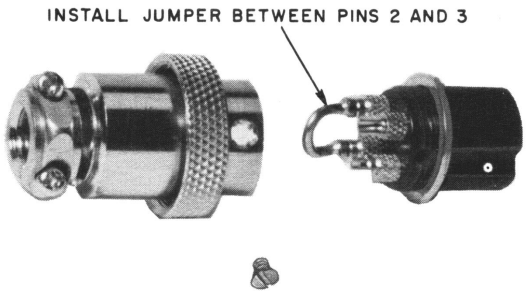

Figure 8 — Dummy Microphone Plug

SYMB. NO.	STOCK NO.	DESCRIPTION	LOCATION
C496	238831	Capacitor, Ceramic - .001 uF, 50 v	E2
C497	741280	Capacitor, Ceramic - .04 uF, 50 v	A7
D111	226344	Diode - 1N60	C7
D112	741051	Diode - 1S1588	E7
D113	741051	Diode - 1S1588	C7†
D151	741051	Diode - 1S1588	G2
D152	226344	Diode - 1N60	F2
D153	741051	Diode - 1S1588	G3
D154	226344	Diode - 1N60	F1
D155	226344	Diode - 1N60	F2
D181	741541	Diode - Zener, MZ209	D5
D182	741051	Diode - 1S1588	E5
D231	741542	Varistor - KB162	C4
D471	741543	Diode - SR1K-2	B9
D472	741544	Diode - Light Emitting SR103	(FP)
D481	226344	Diode - 1N60	B7
D482	226344	Diode - 1N60	B6
D483	741545	Diode - U05B	A2
D491	741051	Diode - 1S1588	A7
F1	132488	Fuse, 2A	—
F131	741575	Filter - Ceramic	H4
J1	741570	Jack - P.A. Speaker	(RP)
J2	741570	Jack - External Speaker	(RP)
J3	741571	Jack - Power Source	(RP)
J4	741569	Jack - Microphone	(FP)
J5	741572	Connector - Antenna	(RP)
L111	741546	Coil - 27 MHz	C7
L112	741547	Coil - 27 MHz	E7
L121	741548	Coil - 10.6 MHz	F6
L122	741549	Coil - 10.6 MHz	F5
L131	741550	Coil - 455 kHz	H4
L141	741551	Coil - 455 kHz	H3
L151	741552	Coil - 455 kHz	G2
L171	741602	Coil - Tuning (14T200 only)	††
L311	741553	Coil - Tank	G7
L431	741554	Coil - Tank	I8
L432	741554	Coil - Tank	I9
L433	741555	Coil - Tank	H9
L441	741556	Coil - Tank	G8
L451	741557	Coil - Tank	E9
L461	741558	Micro-Inductor (2.2 uF)	E8
L462	741559	Coil - Choke	C9
L463	741560	Coil - Tank, 27 MHz	C8
L464	741561	Coil - Tank, 27 MHz	A8
L465	741562	Coil - TV Interference	A7
L481	741563	Coil - Choke	A2
M1	741599	Meter - 14T100	(FP)
M1	741604	Meter - 14T200	(FP)
MIC1	741616	Microphone	—
P1	741618	Plug - Microphone	(FP)
P3		Part of 741617 Power Cord Assembly	—
PL1	741573	Lamp - Pilot	(FP)
PL2	741573	Lamp - Pilot	(FP)

SYMB. NO.	STOCK NO.	DESCRIPTION	LOCATION
		All Resistors fixed carbon 1/4 watt unless otherwise noted	
R111	426635	Resistor - 2.2 k ohms	E6
R112	431971	Resistor - 220 ohms	D7
R113	428561	Resistor - 47 ohms	D7
R114	239954	Resistor - 5.6 K ohms	E7
R115	432572	Resistor - 150 ohms	E7
R121	239954	Resistor - 5.6 K ohms	F6
R122	436469	Resistor - 680 ohms	G6
R123	432572	Resistor - 150 ohms	F6
R131	428882	Resistor - 6.8 K ohms	F4
R132	249554	Resistor - 1 K ohm	G4
R133	239466	Resistor - 82 K ohms	G4
R134	249554	Resistor - 1 K ohm	G4
R136	249554	Resistor - 1 K ohm	H4
R141	428116	Resistor - 4.7 K ohms	H3
R142	249554	Resistor - 1 K ohm	I4
R143	239466	Resistor - 82 K ohms	H3
R151	239954	Resistor - 516 K ohms	H1
R152	428113	Resistor - 47 K ohms	H2
R153	428115	Resistor - 330 ohms	H1
R154	428382	Resistor - 6.8 K ohms	G3
R155	249261	Resistor - 18 K ohms	G3
R156	249555	Resistor - 10 K ohms	G3
R157	237916	Resistor - 8.2 K ohms	F3
R158	422463	Resistor - 56 K ohms	F3
R159	422463	Resistor - 56 K ohms	F3
R160	418962	Resistor - 27 K ohms	G3
R161	239954	Resistor - 5.6 K ohms	F2
R171	239954	Resistor - 5.6 K ohms	H5
R172	436144	Resistor - 15 K ohms	G5
R173	422460	Resistor - 470 ohms	I5
R174	431971	Resistor - 22 ohms	F5
R181	428115	Resistor - 330 ohms	E6
R182	428882	Resistor - 6.8 K ohms	E5
R183	239954	Resistor - 5.6 K ohms	J9
R184	426910	Resistor - 3.3 K ohms	F3
R185	428116	Resistor - 4.7 K ohms	E4
R186	249262	Resistor - 22 K ohms	E4
R187	431971	Resistor - 220 ohms	F7
R188	249554	Resistor - 1 K ohm	E6
R189	431971	Resistor - 220 ohms	D6
R211	428882	Resistor - 6.8 K ohms	D4
R212	239954	Resistor - 5.6 K ohms	D4
R213	422096	Resistor - 270 ohms	E3
R214	428596	Resistor - 2.7 K ohms	C3
R221	239954	Resistor - 5.6 K ohms	C2
R222	249262	Resistor - 22 K ohms	C3
R223	249553	Resistor - 100 ohms	B3
R231	248106	Resistor - 68 ohms	C4
R232	436439	Resistor - 680 ohms	C4
R233	741612	Resistor - .47 ohms, metal oxide, 1/2 w	A3
R234	227744	Resistor - 150 ohms	C4
R235	420946	Resistor - 8.2 ohms, metal oxide, 2 w	††
R311	239954	Resistor - 5.6 K ohms	G6
R312	249531	Resistor - 33 K ohms	G6
R313	428115	Resistor - 330 ohms	H6
R315	239954	Resistor - 5.6 K ohms	G7
R411	431971	Resistor - 220 ohms	C3
R412	249554	Resistor - 1 K ohm	E4
R413	428116	Resistor - 4.7 K ohms	D2

Continued on Page 23

†Mounted on foil side of P.C. board
(RP) Mounted on rear panel
(FP) Mounted on front panel

†† Mounted on S3 Board

SYMB. NO.	STOCK NO.	DESCRIPTION	LOCATION
R414	249531	Resistor - 33 K ohms	D2
R415	239954	Resistor - 5.6 K ohms	E1
R416	431971	Resistor - 220 ohms	D1
R417	249438	Resistor - 560 ohms	D3
R418	249553	Resistor - 100 ohms	D2
R421	428115	Resistor - 330 ohms	H7
R422	436114	Resistor - 15 K ohms	H6
R423	239954	Resistor - 5.6 K ohms	H6
R424	431971	Resistor - 220 ohms	I6
R431	428109	Resistor - 220 K ohms	H7
R432	428561	Resistor - 47 ohms	H8
R433	428881	Resistor - 1.8 K ohms	I7
R441	245961	Resistor - 39 K ohms	H9
R442	249555	Resistor - 10 K ohms	G9
R443	249553	Resistor - 100 ohms	F8
R444	436469	Resistor - 680 ohms	G8
R451	422096	Resistor - 270 ohms	F9
R461	741613	Resistor - 39 ohms	D8
R462	433312	Resistor - 2.2 ohms	E8
R463	433780	Resistor - 1 K ohm, fixed, 1/2 w	A8
R464	432572	Resistor - 15 ohms	D8
R471	427563	Resistor - 3.9 K ohms (14T200 only)	B8
R472	108865	Resistor - 1 K ohm (14T200 only)	B8
R473	249553	Resistor - 100 ohms	C9
R474	219459	Resistor - 1.5 K ohms (14T200 only)	B8
R475	426233	Resistor - 22 ohms (14T200 only)	C7
R491	432572	Resistor - 150 ohms	A7
R505	232661	Resistor - 4.7 K ohms	D2
S1	741567	Switch - Rotary, channel selector	FP
S2	741600	Switch - Lever, CB/PA - 14T200 only	FP
S3	741605	Switch - Lever, "Delta Tune" - 14T200 only	FP
S4	741600	Switch - Lever, ANL - 14T200 only	FP
S5	—	Power (Part of VR153)	—
SP	741568	Speaker - 8 ohms	—
T1	741564	Transformer - Driver	B3
T2	741565	Transformer - Modulation	B5
T3	741566	Coil - Choke	B2
TR11	741534	Transistor - 2SC381-O	D7
TR11	741536	Transistor - 2SC1359-B	D7
TR11	741538	Transistor - 2SC1675-L	D7
TR12	741538	Transistor - 2SC1675-L	F6
TR12	741536	Transistor - 2SC1359-B	F6
*TR13	741538	Transistor - 2SC1675-L	G4
*TR14	741538	Transistor - 2SC1675-L	H3
*TR15	741538	Transistor - 2SC1675-L	G2
*TR17	741538	Transistor - 2SC1675-L	G5
TR18	741539	Transistor - 2SC945-R	E4
TR22	741539	Transistor - 2SC945-R	C3
TR23	741540	Transistor - 2SC1096	A4
TR23	741537	Transistor - 2SC1226-Q	A4
TR24	741540	Transistor - 2SC1096	A4
TR24	741537	Transistor - 2SC1226-Q	A4
*TR31	741534	Transistor - 2SC381-O	G7
TR31	741538	Transistor - 2SC1675-L	G7
TR41	741539	Transistor - 2SC945-R	D2
*TR42	741538	Transistor - 2SC1675-L	H6
*TR43	741534	Transistor - 2SC381-O	I7

SYMB. NO.	STOCK NO.	DESCRIPTION	LOCATION
TR43	741538	Transistor - 2SC1675-L	I7
TR43	741536	Transistor - 2SC1359-B	I7
*TR44	741538	Transistor - 2SC1675-L	G9
TR44	741536	Transistor - 2SC1359-B	G9
*TR45	741535	Transistor - 2SC495-T	F9
*TR46	741606	Transistor - 2SC1678	D8
TR47	741539	Transistor - 2SC945R	B8
VR151	741590	Resistor - Variable, 10 K ohms	D5
VR152	741591	Resistor - Variable, 30 K ohms	G3
VR153	741592	Resistor - Variable, 10 K ohms, "Volume" (Includes S5)	FP
VR181	741593	Resistor - Variable, 50 K ohms	D5
VR182	741594	Resistor - Variable, 50 K ohms "Squelch"	FP
VR481	741593	Resistor - Variable, 50 K ohms	C6
VR491	741590	Resistor - Variable, 10 K ohms	D6
X171	741576	Crystal - 10.180 MHz	I6
X172	741577	Crystal - 10.170 MHz	I5
X173	741578	Crystal - 10.160 MHz	I5
X174	741579	Crystal - 10.140 MHz	I5
X311	741580	Crystal - 37.600 MHz	I3
X312	741581	Crystal - 37.650 MHz	I2
X313	741582	Crystal - 37.700 MHz	I2
X314	741583	Crystal - 37.750 MHz	I5
X315	741584	Crystal - 37.800 MHz	I4
X316	741585	Crystal - 37.850 MHz	I4
X421	741586	Crystal - 10.635 MHz	I4
X422	741587	Crystal - 10.625 MHz	I4
X423	741588	Crystal - 10.615 MHz	I3
X424	741589	Crystal - 10.595 MHz	I3

MECHANICAL PARTS
(Refer to exploded views Figures 4 and 5 on pages 15 and 16 for parts identification)

1	741595	Front Panel - 14T100
1	741619	Front Panel - 14T200
2	741596	Knob, Channel - 14T100
2	741601	Knob, Channel - 14T200
3	741597	Knob, Switch
4	741598	Plate, Illumination
10	741647	Plate, front (14T200 only)
34	741544	Diode, Light Emitting
35	741592	Control, "Volume", VR153
36	741594	Control, "Squelch", VR182
37	741573	Lamp, Pilot
38	741567	Switch, Rotary, Channel Selector
39	741599	Meter - 14T100
39	741604	Meter - 14T200
40	741569	Connector, Microphone
41	741572	Connector, Antenna
42	741570	Jack, Speaker (J1, J2)
43	741571	Jack, Power Source (J3)
44	741568	Speaker (SP)

*Use transistors marked with (*) asterisk for replacement purposes for all types encountered in units

(FP) Mounted on front panel