

# Service Manual

for

## **RCA CB Co-Pilot**



Model 14T300



Model 14T301

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

RCA CB Co-Pilot Citizen's Band Transceivers Models 14T300 and 14T301 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 (13.8 V Nominal) with either positive or negative ground, fused in the input power cable. Operation on all 23 CB channels is provided through use of three built-in crystals operating in a PLL (phase lock loop) design. All receiver and transmitter frequencies are synthesized in the highly stable PLL circuitry.

Both units feature switchable ANL circuitry for automatic noise limiting and built-in RF gain controls to optimize receiver sensitivity. Model 14T301 also

features Delta-Tune circuitry for improved reception of off-frequency signals, a Noise Blanker to minimize pulse type noise effects and a built-in RF/CAL/SWR meter for adjusting antenna SWR ratio. Both models incorporate detachable dynamic push-to-talk microphones and LED indicators. Model 14T301 also includes a LOCAL/DISTANT switch, and front panel ALC and Noise Blanker switches.

Front panel illuminated "S" meters monitor receiver input signals and transmitter output levels. Adjustable squelch is featured on both models, along with a switchable CB/PA function to permit use of the units as public address amplifiers. Separate PA and external speaker jacks are provided on the unit rear panels.

## Typical Specifications

### General

Frequency range	26.965 – 27.255 MHz
Channel	23 (PLL synthesized)
Frequency tolerance	0.005%
Operating temperature range	–30°C to +50°C (–22°F to +112°F)
Power source	12 to 15v dc (13.8v nominal)*
	Positive or negative ground
Emission	6A3

\*All measurements referenced to 13.8V operation.

### Transmitter

Power output	4W (FCC maximum)
Modulation	AM – Collector modulated
Attenuation of Spurious and Harmonic Radiation	50 dB (Min.)
Antenna Input Impedance	50 Ohms

### Receiver

Sensitivity	0.7 micro-volts for 10 dB $\frac{S+N}{N}$
Selectivity	
2.4 KHz	–6 dB
10 KHz	–55 dB
Adjacent channel rejection	> 55 dB

Image rejection (1st IF)	> 60 dB
Spurious rejection (Except images)	1/2 x 2nd IF > 35 dB 2 x 2nd IF > 35 dB
Intermodulation rejection ratio	> 40 dB
IF frequencies	
1st IF	10.695 MHz
2nd IF	455 KHz
ACC figure of merit	75 dB (RF input change for less than 10 dB change in audio output)
Squelch sensitivity (CH13)	1.5 uv – 100 uv
Audio output	3W min.
Current drain (Nominal)	Transmit: 1.5A Receive : Full audio 1.2A Squelch 240mA

### Mechanical

#### 14T300

Dimensions	6–3/8in. x 2–1/4in. x 7–7/8in. (162mm x 57mm x 200mm)
Weight	3 lbs, 8.2 oz. (1.45 kg)

#### 14T301

Dimensions	7in. x 8–1/4in. x 2–5/16in. (178mm x 209mm x 59mm)
Weight	3 lbs, 13.6 oz. (1.6 kg)

# Circuit Description

## General

Models 14T300 and 14T301 make use of the Phase Locked Loop (PLL) system of frequency synthesization to produce the crystal controlled channel and IF signals used in the operation of the transmitter and receiver sections of the transceivers. The basic PLL system is comprised of a free running voltage controlled oscillator (VCO – Q101) a phase detector, a reference crystal oscillator (Q105) and a programmable divider (IC101), refer to block diagram figure 1.

The VCO is designed to operate in a frequency range of 37.66 MHz to 37.95 MHz, which is 10.695 MHz above the channel 1 to channel 23 frequency range of 26.965 to 27.255 MHz (note that 10.695 MHz is also the receiver first mixer IF frequency). The VCO signal is mixed with the output (third harmonic) of reference oscillator Q105, producing a difference frequency range of 2.24 MHz to 2.53 MHz. Simul-

taneously a second crystal controlled oscillator Q117, feeds a 10.24 MHz signal to the programmable divider in IC 101 and is divided down in 10 kHz steps in the 224 to 253 MHz range being controlled by an "N" code signal originated by the channel selector. (See Frequency Table on Page 18. The phase detector within IC 101 produces a DC output voltage derived from the phase difference in the two signals fed to it, i.e. – signal from Osc. Q117 and the 2.24 to 2.53 MHz signal from Mixer Q102 via buffer Q103. This DC output is applied to VCO Q101 through the LPF, forming the phase loop. Application of the DC voltage to the VCO causes it to shift frequency until it locks up with the count-down frequency of the divider, at which point no DC output is produced from IC 101 and the VCO remains locked on frequency. When a new channel is selected a new "N" code is sent to the programmable divider. The VCO is no longer locked and again shifts in frequency and locks up, corresponding to the new channel selected.

In summary, it will be seen that a range of stable frequency outputs from the VCO will be produced over the band 37.66 to 37.95 MHz, each specific

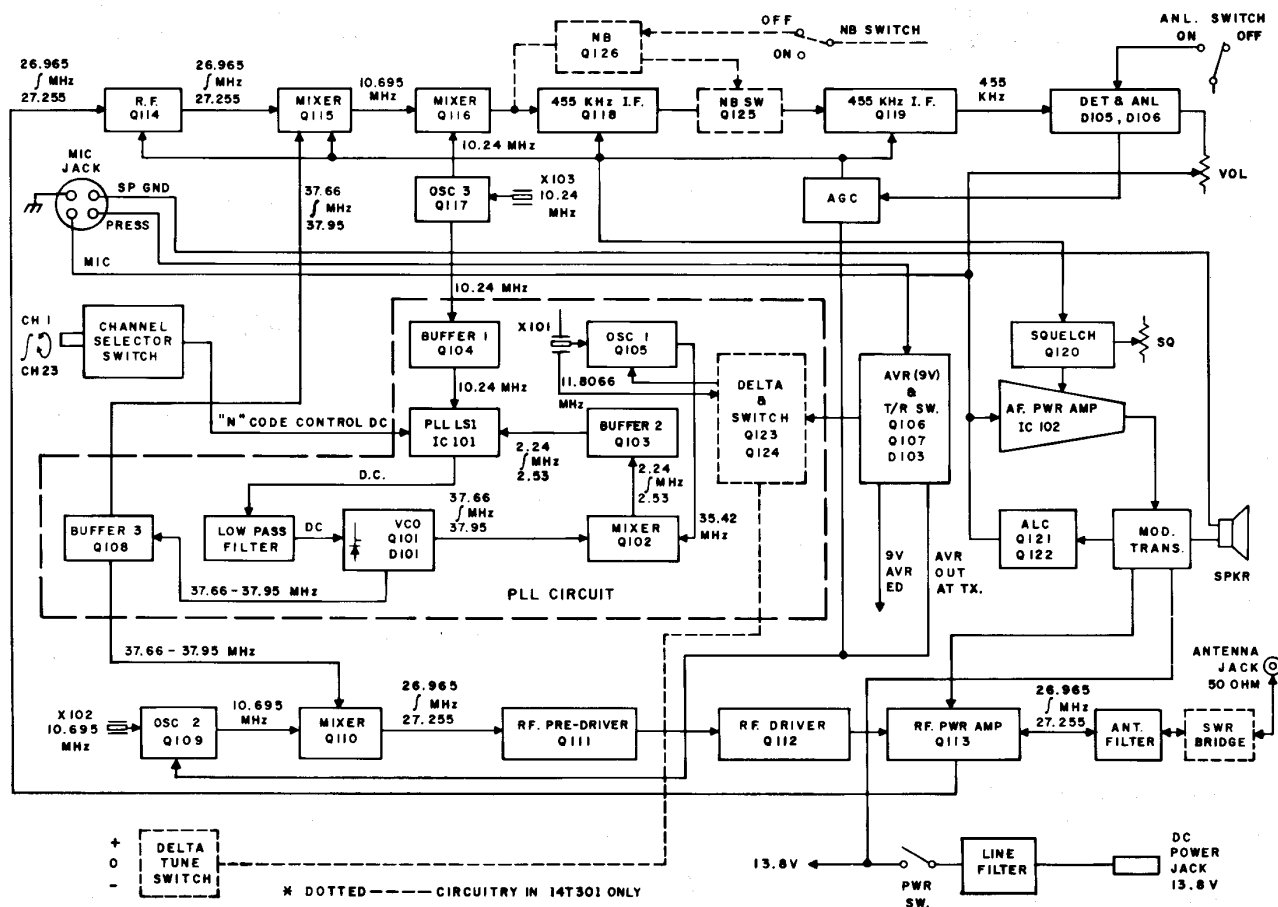


Figure 1 – Block Diagram

frequency being determined by the "N" code from the channel selector. The VCO output is used in both the transmitter and receiver sections of the transceiver as described in the separate sections which follow.

## Transmitter

The transmitter oscillator Q109, oscillator # 2, is a Pierce type oscillator circuit operating at a frequency of 10.695 MHz. The oscillator output is coupled to the transmitter mixer Q110. The mixer is also fed a signal in the 37 MHz range from the VCO Q101. 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. See Channel Frequency Chart on page 18.

The 27 MHz mixer output is coupled to RF predriver transistor Q111 through high pass filter L103/L104/T102 and C139/C140. The predriver serves to isolate the oscillator and mixer stages from the output, and at the same time provide a certain amount of power gain. Q111 output is applied to the base input of Q112, the RF Driver stage and in turn to Q113 the RF output stage of the transmitter. These stages amplify the 27 MHz RF signal resulting in an output at L110 of 4 watts.

In the transmit mode, the microphone feeds audio through IC102 to the output transformer T110 and to the collectors of Q112 and Q113 which serve as the modulator for the transmitter. This modulating audio is applied to both the driver and output stages to provide carrier modulation up to 100%. An ALC voltage derived from this modulating signal at L110 is fed back to Q122 to control the output of IC102 and prevent over modulation. Factory adjustment of 90% modulation is achieved by adjustment of RV102.

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 Q113.

## Receiver

The rf signal, at a frequency between 26.965 and 27.255 MHz, feeds from the antenna through L110 and L109 to the 27 MHz Neutralized RF Amp Q114. Then the amplified output signal from Q114 is coupled through T105 to Mixer Q115, where it is beat with an injection signal from VCO Q101 via buffer Q108. (This oscillator serves as a master in the PLL crystal synthesization of the required

receiver and transmitter signals). The frequency of the injection signal depends on the channel being received, as a signal in the 37 MHz range is programmed by channel selector switch SW101. The output of Mixer Q115 is therefore 10.695 MHz, the result of the RF input and mixing of VCO signals. (see Frequency Chart on Page 18).

This 10.6-MHz range IF signal is then fed to Q116, the second mixer. Also fed to the 2nd Mixer is a second signal from Q117, Oscillator No. 3. This oscillator signal is at 10.24 MHz. Mixing of these two signals results in a signal in the T107 circuit from the 2nd Mixer of 455 kHz, the second IF frequency.

The 455 kHz second IF signal passes through the ceramic bandpass filter CF101, and feeds the 455 kHz signal to IF amplifiers Q118 and Q119 which include IF transformers T108 and T109. The output of Q119 is applied to D110 the diode detector.

The rectified audio signal from the detector is passed through the volume control VR1 to the input of the audio circuit IC102. The audio output is transformer coupled to the internal speaker, and to an external speaker if used.

Q120 is the squelch amplifier transistor. At low or no signal levels Q120 conducts heavily and its output, connected to pin 7 of IC102 results in no signal output from the audio section. As the incoming RF signal increases it results in a decreasing output from Q120. This results in opening up the AF amplifier and output is achieved. The point at which Q120 cuts off is determined by setting the SQUELCH control VR2.

## Delta Tune (14T301 only)

Delta tune circuitry is employed in the oscillator #1 Q105 crystal stage. The "Delta-Tune" switch on the front panel acts to connect SW2 (Q124) or SW1 (Q123) in the Q105 oscillator. Depending upon whether the + position of switch or - 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.

## Public Address

Switching provision is made in the audio input circuit of the transceiver to provide a PA function by switching the microphone output. The audio output is also switched to an external PA speaker jack. This switch-

ing occurs when the CB/PA switch is set to the PA position.

In the PA mode, the transceiver serves as a public address amplifier providing 3 watts output to an external PA speaker. The other functions of the transceiver are deactivated in the PA mode per FCC Rules & Regulations).

## Servicing

### General

RCA 14T300 and 14T301 Co—Pilot Citizen's Band Transceivers performance 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 16, 17, 22 & 23 should be employed.

Illustrations to aid in servicing and adjustment; such as top and bottom views, exploded views and super-imposed printed board views, are provided to assist in proper and competent servicing. A block diagram is shown in Figure 1. The schematic diagrams are shown in Figures 16 and 17.

Figure 10 of the printed circuit board incorporate map grid coordinates 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 10 are shown in views Figures 8 and 9. 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 four Phillips screws at each side of the transceiver case permits removal of both halves of the case.

Servicing the two models is fundamentally the same due to the similarity of the two units.

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 3B for view and information on dummy plug.

*Note — Crystals appear to be plug-in units. What appear to be sockets are spacers for thermal isolation, crystals are soldered to board.*

## Test Equipment

The following test equipment is required and recommended for servicing the 14T300 and/or 14T301 Transceiver.

1. A 50 ohm resistive antenna load with a power capability 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 plug to activate transmitter without using microphone, see Figure 3A.
7. Dummy mike plug for receiver servicing, with jumper between pins 2 and 3 as seen in Figure 3B.
8. An 8 ohm 5 watt resistive dummy speaker load.
9. An Audio Signal Generator.
10. An RF Voltmeter. (WV-500B with WG-301A Probe)
11. A regulated bench DC power supply capable of supplying 0 — 20 v DC @ at least 2 amperes.
12. DC Ammeter with 0 — 2 amp. scale.

## Tune Up and Alignment

Before performing any adjustments, check visually all jacks, plugs and solder joints for good connection. Shown in the schematics are nominal test voltage values for the transceiver transistors. In addition, certain other pertinent voltages are shown on the schematics. For tune-up and servicing identical procedures may be employed for both Model 14T300 and 14T301.

### Transmitter Alignment

Connect test equipment to the transceiver as shown

in the block diagram below, Figure 2. To activate the transmitter without using the microphone, use

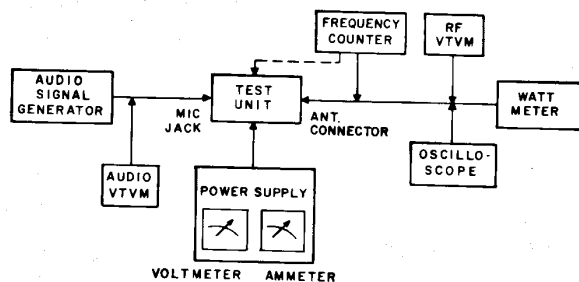


Figure 2 – Test Equipment Hook-Up

the dummy microphone plug wired as shown in Figure 3A. This plug is also used to introduce a modulating audio signal to the microphone input circuit as described in the following procedure.

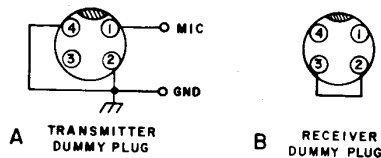


Figure 3 – Dummy Microphone Plugs

#### A. PLL CIRCUIT ALIGNMENT

Before proceeding with the PLL Alignment check the operating frequencies at points a, b and c on the frequency counter. (Use a 1000 pf capacitor in series with counter probe). See a,b,c below.

- A signal frequency of  $10.239\ 200\ \text{MHz} \pm 0.13\ \text{MHz}$  should be read at the collector of Q104 the 10.24 MHz Buffer # 1. (Point a)
- A signal frequency of  $37.6592\ \text{MHz} \pm 0.38\ \text{MHz}$  should be read at the base of Q101 the VCO. (Point b)
- A signal frequency of  $10.694200\ \text{MHz} \pm 0.12\ \text{MHz}$  should be read at the emitter of Q109 the 10.695 MHz Osc # 2. (Point c)

#### d. Delta Tune Adjustment (14T301 only)

Set "Delta Tune" switch to "0" position. Connect counter to base of Buffer Q108. A reading of  $37.659200\ \text{MHz}$  should be read with channel selector in the channel 1 position. If necessary, adjust CT101 to obtain this reading on the counter.

#### e. VCO Alignment

To more readily follow the frequencies involved

during the alignment, refer to partial block diagram, Figure 4.

- Set channel selector to channel 1.
- Connect DC Voltmeter, set to 5 V range, between ground and R114 high side at TP8, see Figure 8. (Meter input impedance should be  $20\text{k}\ \text{ohm/volt}$  or higher).
- Adjust T101 core clockwise to obtain  $1.5\ \text{volts} \pm 0.1\ \text{volt}$  on meter.
- Set channel selector to open position between channels 1 and 23. A reading between 5.1 and 5.4 volts should be obtained. Then set selector to channel 23, a reading of  $2.7 \pm 0.6\ \text{volts}$  should be obtained.

#### B. ALIGNMENT OF MIXER Q110, PREDRIVER Q111 AND DRIVER Q112

- Set channel selector in channel 13 position.
- Adjust power supply for a supply voltage at 8.0 volts.
- Connect oscilloscope to base side of T102, between C141 and ground.
- Adjust L103, L104 and T102 for maximum amplitude on the scope ( $27.115\ \text{MHz}$  – channel 13 output)

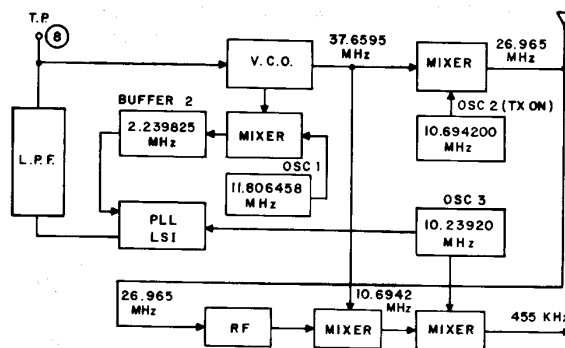


Figure 4 – Partial Block Diagram

- Move oscilloscope to the base of Q112, RF driver, and readjust T102, then T103 for maximum amplitude.

#### C. ALIGNMENT OF RF POWER AMPLIFIER

- Set channel selector to channel 13.
- Adjust L106 for maximum reading on the RF wattmeter. See Figure 2.



- c. Adjust L109 for maximum RF output.
- d. Adjust L110 for maximum RF output.
- e. Readjust L109 for maximum.
- f. Turn L106 clockwise for an output of 4.4 watts on the meter.
- g. Turn L110 counter-clockwise to obtain a reading of 3.8 watts on the meter.
- h. Connect the DC ammeter in series with the power input and check the current reading. A reading of 900 milliamperes or less should be obtained. (Unmodulated)  
(Note: — May be read on bench supply ammeter if used, see Figure 2)

#### D. TRANSMITTER FREQUENCY CHECK

- a. Connect the frequency counter to the ANT connector and check the frequency on each channel with no modulation. The frequency should be within  $\pm 800$  Hz of the center frequency for each channel. Refer to the frequency table on page 18.

#### E. MODULATION SENSITIVITY ALIGNMENT

- a. Connect the transmit dummy plug to the microphone jack.
- b. Apply a 1 kHz, 20 MV signal to the microphone input circuit, between pin 1 and ground.
- c. Adjust RV-102 to obtain 90% modulation, as observed on the scope, see Figure 2.
- d. Decrease the signal input to 6 mV and observe that modulation ratio is maintained at 80% or higher.

#### F. RF METER ADJUSTMENT

- a. Adjust RV104 so that the meter pointer is in the center of the red zone on meter scale. (This will indicate 3.8 watts output, the same as the wattmeter in step C.g.)

#### G. SWR BRIDGE ADJUSTMENT (14T301 ONLY)

- a. Connect 100 ohm non-inductive resistor across antenna jack. Set RF/CAL/SWR switch to "CAL". Adjust VR4 to put meter pointer exactly on "SET" mark.
- b. Set RF/CAL/SWR switch to "SWR". Adjust RV502 so that meter pointer reads "2" on meter scale.

### Receiver Alignment

Connect test equipment to the transceiver as shown in Figure 5. Unless noted otherwise, keep Delta

Tune switch at "0" and ANL switch to "ON" positions for Model 14T301.

#### A. RECEIVER SENSITIVITY ALIGNMENT

To activate the receiver without using the microphone, connect the dummy microphone plug shown in Figure 3B in place of the microphone (jumper on plug between pins 2 and 3). VOLUME control fully clockwise.

- a. Set the signal generator output to 27.115 MHz with 1 kHz 30% modulation.
- b. Set the transceiver on channel 13.
- c. Refer to Figure 8 and adjust T111 (Buffer 3, Q108 output) and T104, T105, L112, T106, T108 and T109, in this order, for maximum audio output across the 8 ohm dummy speaker load. Keep reducing the generator input signal as adjustment is made to avoid inaccuracy due to AGC action. Make final adjustments at low input level. Repeat adjustment to achieve maximum alignment accuracy at low level, signal level at 1 uV or less.

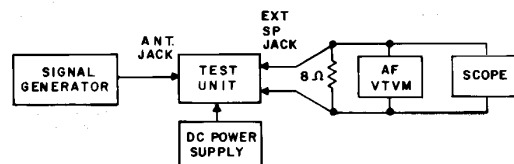


Figure 5 — Receiver Alignment Test Set-Up

#### B. SQUELCH CIRCUIT ADJUSTMENT

- a. With signal generator and transceiver set to channel 13, 27.115 MHz, feed a 100 mV, 1 kHz signal modulated 30% into the RF input jack.
- b. Rotate the SQUELCH control fully clockwise.
- c. Adjust RV-101, see Figure 8, for maximum audio output on VTVM and scope connected across 8 ohm dummy speaker load. Note the output level. Slowly turn RV101 to decrease the output level by 60 dB, this will be indicated by a rapid cut-off of the audio output signal.

#### C. S-METER ADJUSTMENT

- a. Set signal generator to produce a 100 uV signal to the RF input. (Set RF/CAL/SWR switch to "RF." — 14T301)
- b. Adjust RV103, see Figure 8, so that RF meter pointer reads "9" on the meter.

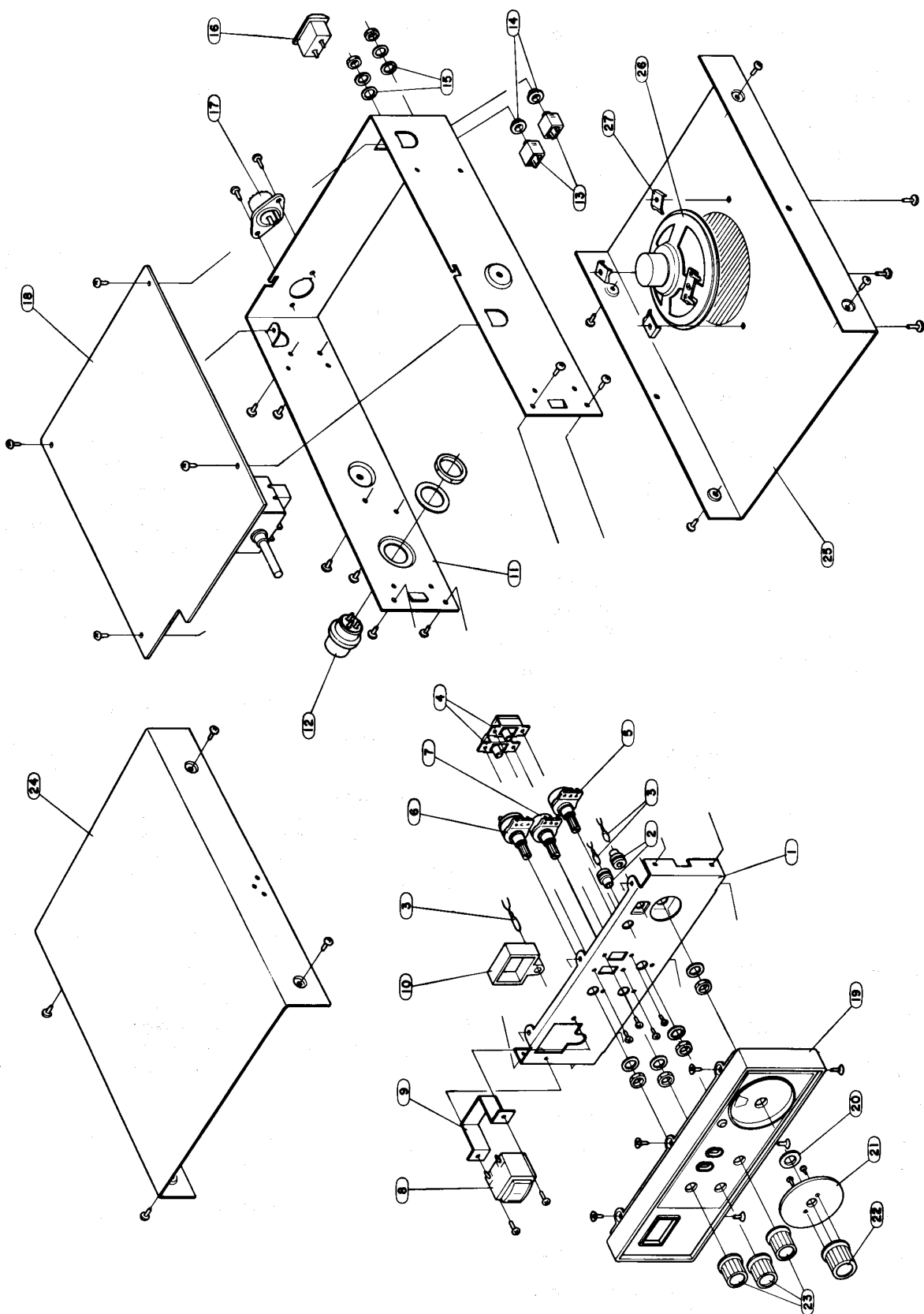


Figure 6 — Exploded View of Model 14T300

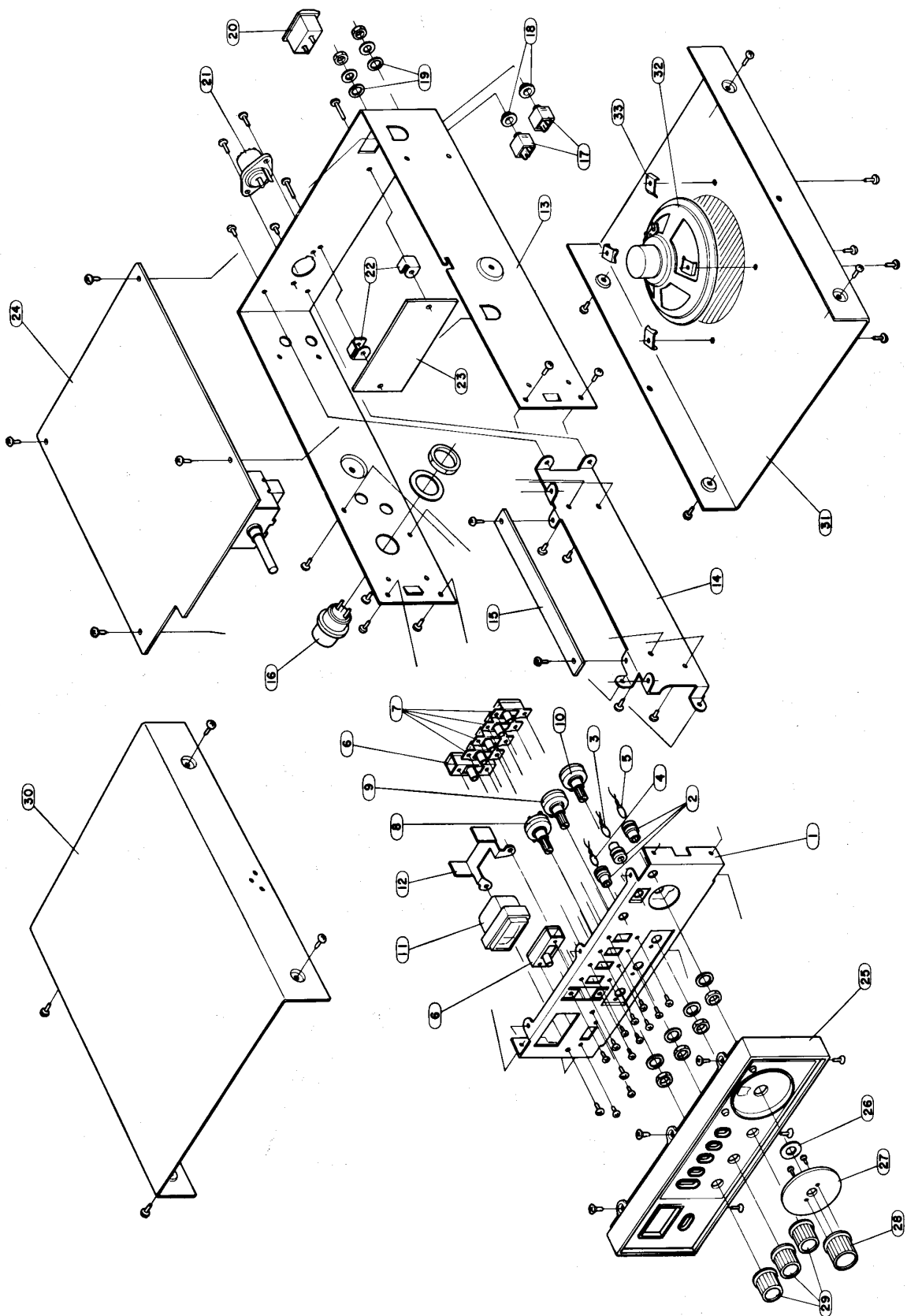


Figure 7 — Exploded View of Model 14T301

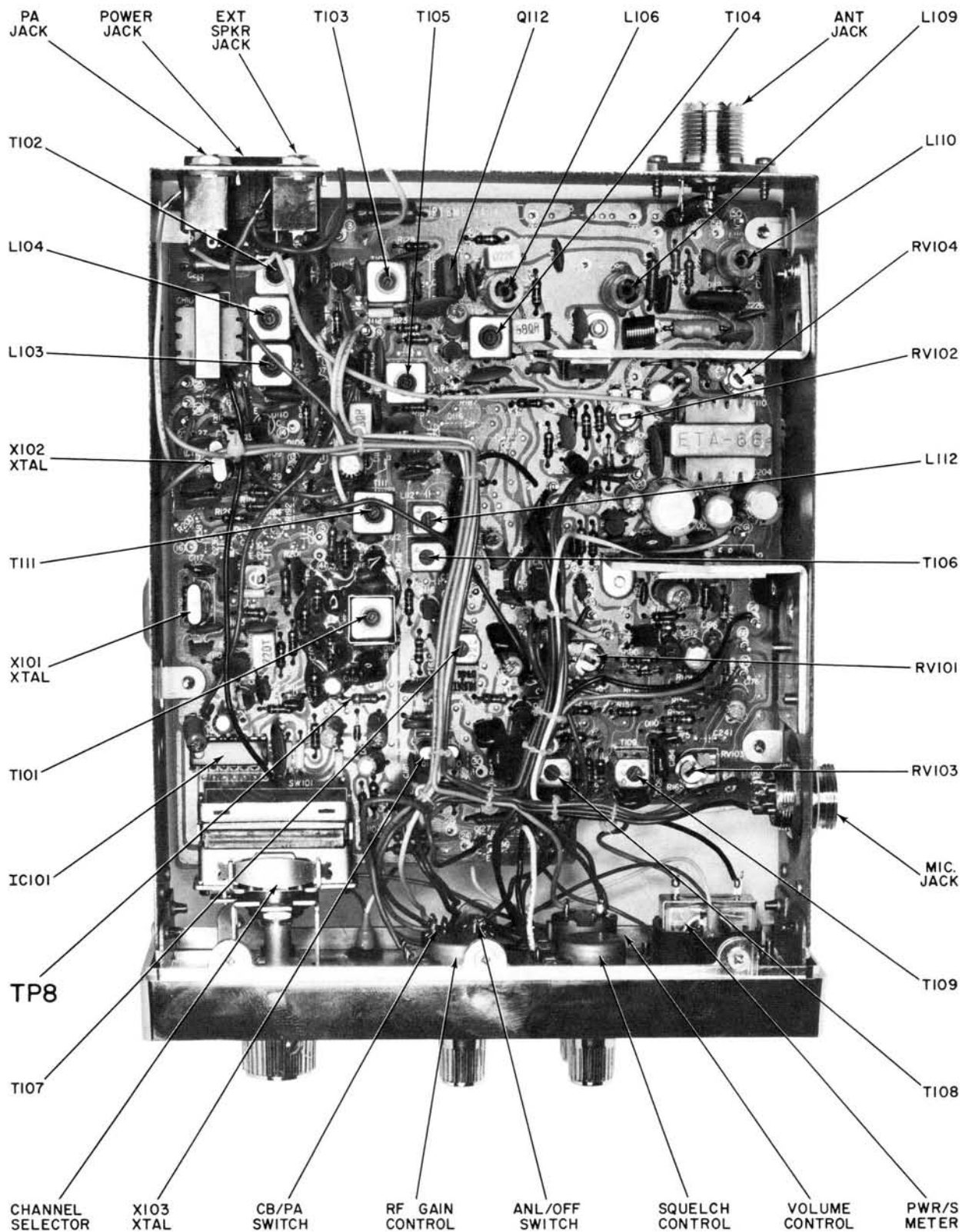


Figure 8 — Bottom (Component) View of Model 14T300

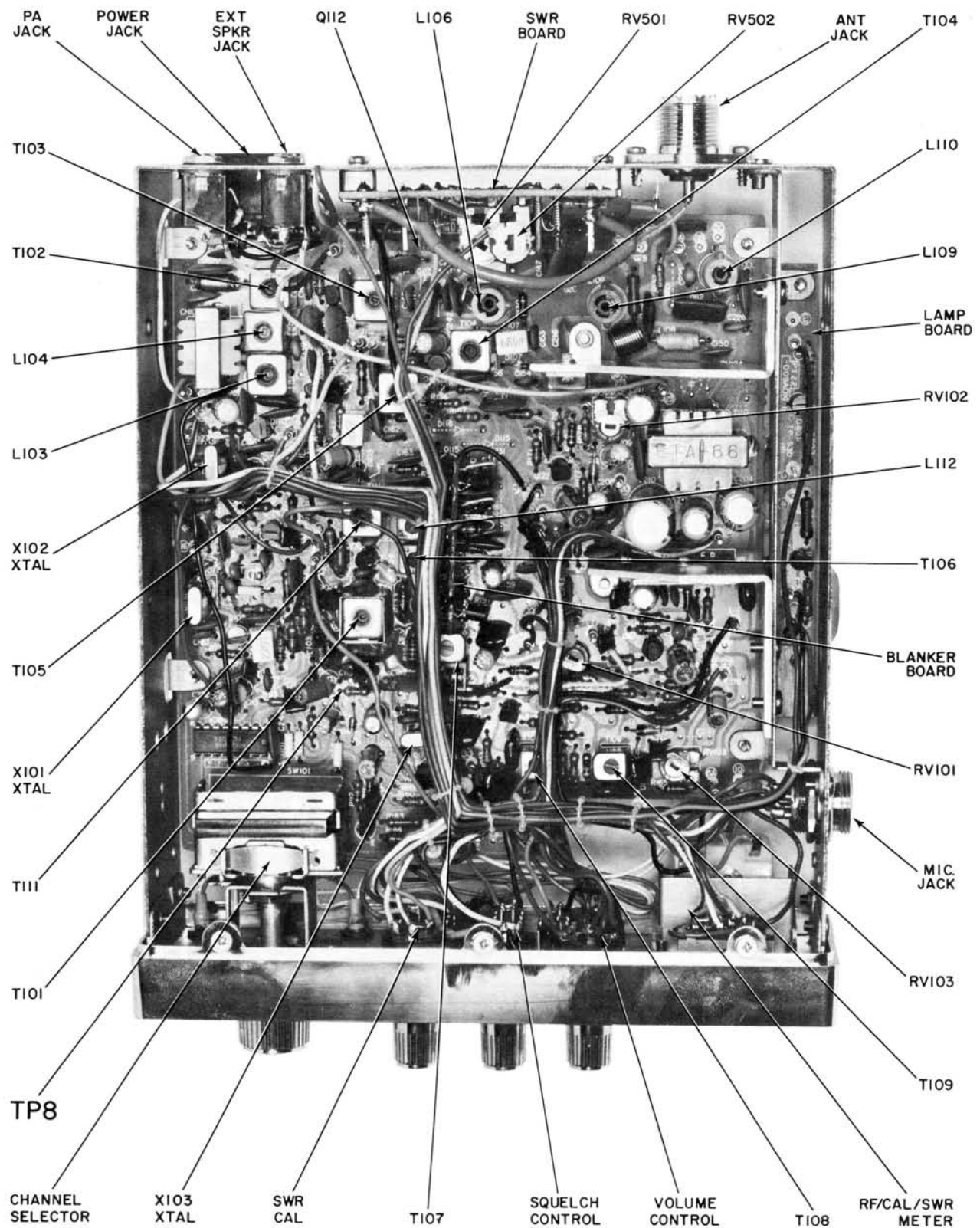


Figure 9 – Bottom (Component) View of Model 14T301

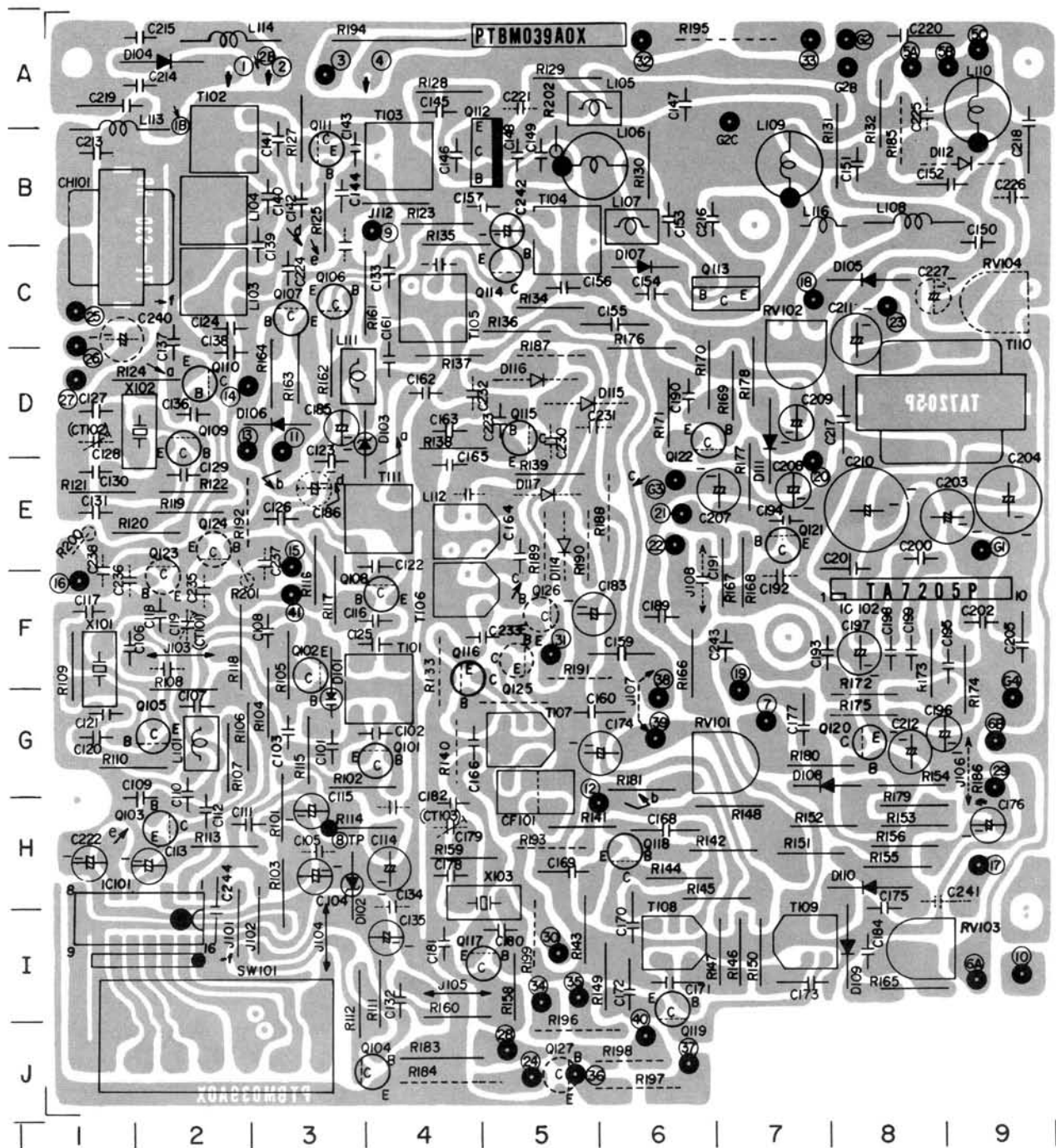


Figure 10 – Main Printed Circuit Board – 14T300 & 14T301

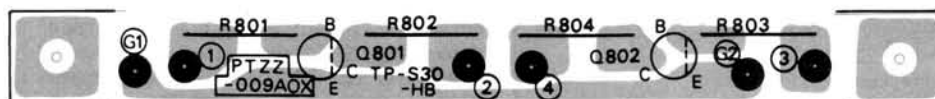


Figure 11 — Lamp Printed Circuit Board — 14T301

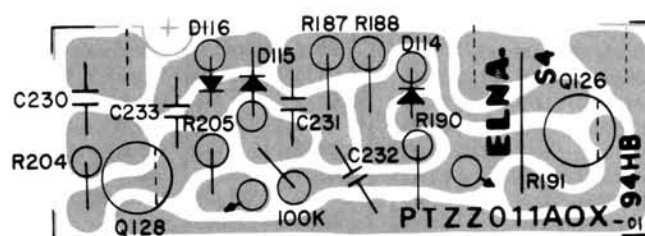


Figure 12 — Noise Blanker Printed Circuit Board — 14T301

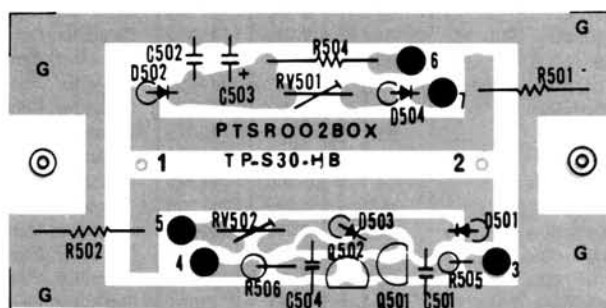


Figure 13 — SWR Printed Circuit Board — 14T301

# Replacement Parts

NOTE:—Location column is for grid coordinates shown on printed circuit board in Figure 10.

SYMB. NO.	STOCK NO.	DESCRIPTION	LOCATION	SYMB. NO.	STOCK NO.	DESCRIPTION	LOCATION
C1	742086	Capacitor, Mica - 220 pf, 500 v (14T300 only)	RP	C156	742070	Capacitor, Ceramic - .01 uF, 50 v	C5
C1	742088	Capacitor, Mica - 180 pf, 500 v (14T301 only)	RP	C157	742070	Capacitor, Ceramic - .01 uF, 50 v	B4
C2	742087	Capacitor, Ceramic - .01 uF, 50 v (14T300 only)	—	C158	741776	Capacitor, Mica - 270 pf, 500 v	—
C2	741779	Capacitor, Ceramic - .047 uF, 50 v (14T301 only)	—	C159	741779	Capacitor, Ceramic - .047 pf, 50 v	F6
C3	742087	Capacitor, Ceramic - .01 uF, 50 v (14T300 only)	—	C160	741780	Capacitor, Mylar - .047 pf, 50 v	G6
C3	742070	Capacitor, Ceramic - .01 uF, 50 v (14T301 only)	—	C161	742070	Capacitor, Ceramic - .01 uF, 50 v	D4
C4	742070	Capacitor, Ceramic - .01 uF, 50 v	—	C162	741781	Capacitor, Ceramic - 33 pf, 50 v	D4
C101	741747	Capacitor, Ceramic - 18 pf, 50 v	G3	C163	742070	Capacitor, Ceramic - .01 uF, 50 v	D4
C102	741748	Capacitor, Ceramic - 22 pf, 50 v	G4	C164	741771	Capacitor, Ceramic - 2 pf, 50 v	E5
C103	741749	Capacitor, Ceramic - 1 pf, 50 v	G3	C165	742070	Capacitor, Ceramic - .01 uF, 50 v	E4
C104	742068	Capacitor, Electrolytic - 10 uF, 16 v	H3	C166	742007	Capacitor, Ceramic - 47 pf, 50 v	G5
C106	742069	Capacitor, Ceramic - 10 pf, 50 v	—	C168	741782	Capacitor, Ceramic - 2.2 pf, 500 v	H6
C107	742070	Capacitor, Ceramic - .01 uF, 50 v	G2	C169	741780	Capacitor, Mylar - .047 uF, 50 v	H4
C108	742071	Capacitor, Ceramic - 330 pf, 50 v	F3	C170	741780	Capacitor, Mylar - .047 uF, 50 v	I6
C109	742071	Capacitor, Ceramic - 330 pf, 50 v	H2	C171	741780	Capacitor, Mylar - .047 uF, 50 v	I6
C110	741754	Capacitor, Mylar - .001 uF, 50 v	G2	C172	741780	Capacitor, Mylar - .047 uF, 50 v	I6
C111	741755	Capacitor, Mylar - .01 uF, 50 v	H2	C173	741780	Capacitor, Mylar - .047 uF, 50 v	I7
C112	741756	Capacitor, Ceramic - 39 pf, 50 v	H2	C174	742074	Capacitor, Electrolytic - 3.3 uF, 25 v	G6
C113	741757	Capacitor, Electrolytic - .22 uF, 50 v	H2	C175	742075	Capacitor, Mylar - .0047 uF, 50 v	H8
C114	742072	Capacitor, Electrolytic - 10 uF, 16 v	H3	C176	742076	Capacitor, Electrolytic - 1 uF, 50 v	H9
C115	741759	Capacitor, Electrolytic - .1 uF, 50 v	H3	C177	741786	Capacitor, Mylar - .0022 uF, 50 v	G7
C116	741760	Capacitor, Ceramic - 15 pf, 50 v	F4	C178	741786	Capacitor, Ceramic - 39 pf, 50 v	H3
C117	741755	Capacitor, Mylar - .01 uF, 50 v	F1	C180	741762	Capacitor, Ceramic - 560 pf, 50 v	I5
C118	741761	Capacitor, Ceramic - 39 pf, 50 v (14T300 only)	F2	C181	741787	Capacitor, Ceramic - 100 pf, 50 v	I4
C118	741807	Capacitor, Ceramic - 22 pf, 50 v (14T301 only)	F2	C182	741788	Capacitor, Ceramic - 68 pf, 50 v	H3
C120	741762	Capacitor, Ceramic - 560 pf, 50 v	G1	C183	742068	Capacitor, Electrolytic - 10 uF, 16 v	F6
C121	741763	Capacitor, Ceramic - 100 pf, 50 v	G1	C184	741789	Capacitor, Mylar - .022 uF, 50 v	I8
C122	741760	Capacitor, Ceramic - 15 pf, 50 v	E4	C185	742077	Capacitor, Electrolytic - 47 uF, 10 v	D3
C123	742070	Capacitor, Ceramic - .01 uF, 50 v	E3	C189	742078	Capacitor, Ceramic - .0022 uF, 50 v	F6
C124	742073	Capacitor, Mica - 100 pf, 500 v	C2	C190	742070	Capacitor, Ceramic - .01 uF, 16 v	D6
C125	741765	Capacitor, Ceramic - 33 pf, 50 v	F4	C191	741789	Capacitor, Mylar - .022 uF, 50 v	F7
C126	741766	Capacitor, Ceramic - 12 pf, 50 v	E3	C192	741775	Capacitor, Ceramic - 220 pf, 50 v	F7
C127	741767	Capacitor, Ceramic - 56 pf, 50 v	D1	C193	741755	Capacitor, Mylar - .01 uF, 50 v	F8
C129	741762	Capacitor, Ceramic - 560 pf, 50 v	E2	C194	742070	Capacitor, Ceramic - .01 uF, 50 v	E7
C130	741768	Capacitor, Ceramic - 82 pf, 50 v	E1	C195	741792	Capacitor, Ceramic - .0022 uF, 50 v	F9
C132	741769	Capacitor, Mylar - 560 pf, 50 v	I4	C196	741793	Capacitor, Tantalum - 3.9 uF, 25 v	G9
C133	742070	Capacitor, Ceramic - .01 uF, 50 v	C4	C197	741794	Capacitor, Electrolytic - 33 uF, 6.3 v	F8
C135	742068	Capacitor, Electrolytic - 10 uF, 16 v	I4	C198	741772	Capacitor, Ceramic - 68 pf, 50 v	F8
C136	741770	Capacitor, Ceramic - 270 pf, 50 v	D2	C199	741772	Capacitor, Ceramic - 68 pf, 50 v	F8
C137	742070	Capacitor, Ceramic - .01 uF, 50 v	C2	C200	741787	Capacitor, Ceramic - 100 pf, 50 v	E8
C138	742070	Capacitor, Ceramic - .01 uF, 50 v	C2	C201	741795	Capacitor, Mylar - .068 uF, 50 v	E8
C139	741771	Capacitor, Ceramic - 2 pf, 50 v	C3	C202	741787	Capacitor, Ceramic - 100 pf, 500 v	F9
C140	741771	Capacitor, Ceramic - 2 pf, 50 v	B3	C203	742079	Capacitor, Electrolytic - 47 uF, 16 v	E8
C141	741772	Capacitor, Ceramic - 68 pf, 50 v	B3	C204	741797	Capacitor, Electrolytic - 220 uF, 16 v	E9
C142	742070	Capacitor, Ceramic - .01 uF, 50 v	B3	C205	741795	Capacitor, Mylar - .068 uF, 50 v	F9
C143	741763	Capacitor, Ceramic - 100 pf, 50 v	B3	C207	741794	Capacitor, Electrolytic - 33 uF, 6.3 v	E6
C144	742070	Capacitor, Ceramic - .01 uF, 50 v	B3	C208	742068	Capacitor, Electrolytic - 10 uF, 16 v	E7
C145	742070	Capacitor, Ceramic - .01 uF, 50 v	A4	C209	742076	Capacitor, Electrolytic - 1 uF, 50 v	D7
C146	741773	Capacitor, Ceramic - 470 pf, 50 v	B4	C210	742080	Capacitor, Electrolytic - 1000 uF, 16 v	E8
C147	742070	Capacitor, Ceramic - .01 uF, 50 v	A6	C211	742081	Capacitor, Electrolytic - 47 uF, 25 v	C8
C148	741774	Capacitor, Ceramic - 120 pf, 50 v	B5	C212	741794	Capacitor, Electrolytic - 33 uF, 6.3 v	G8
C149	741775	Capacitor, Ceramic - 220 pf, 50 v	B5	C213	742070	Capacitor, Ceramic - .01 uF, 50 v	B1
C150	742070	Capacitor, Ceramic - .01 uF, 50 v	C9	C214	742070	Capacitor, Ceramic - .01 uF, 50 v	A2
C151	742073	Capacitor, Mica - 100 pf, 500 v	B8	C215	742070	Capacitor, Ceramic - .01 uF, 50 v	A2
C152	741776	Capacitor, Mica - 270 pf, 500 v	B8	C216	742070	Capacitor, Ceramic - .01 uF, 50 v	B6
C153	741777	Capacitor, Ceramic - 82 pf, 50 v	B6	C217	741779	Capacitor, Ceramic - .047 uF, 50 v	D8
C154	741778	Capacitor, Ceramic - 27 pf, 50 v	C6	C218	741779	Capacitor, Ceramic - .047 uF, 50 v	B9
C155	741779	Capacitor, Ceramic - .047 uF, 50 v	C6	C219	741779	Capacitor, Ceramic - .047 uF, 50 v	A1
				C220	741779	Capacitor, Ceramic - .047 uF, 50 v	A8
				C222	742082	Capacitor, Electrolytic - 4.7 uF, 25 v	H1
				C223	741756	Capacitor, Ceramic - 29 pf, 50 v	D5
				C224	742070	Capacitor, Ceramic - .01 uF, 50 v	C3
				C225	742083	Capacitor, Ceramic - 3 pf, 500 v	A8
				C226	742084	Capacitor, Ceramic - .0047 uF, 50 v	B9

Continued on Page 17



SYMB. NO.	STOCK NO.	DESCRIPTION	LOCA- TION	SYMB. NO.	STOCK NO.	DESCRIPTION	LOCA- TION
C230	742016	Capacitor, Ceramic - 4 pf, 50 v (14T301 only)	D5	L116	741703	Coil, RF	B7
C231	742070	Capacitor, Ceramic - .01 uF, 50 v	D5	M	741846	Meter (14T300 only)	FP
C232	742017	Capacitor, Mylar - 3300 pf, 50 v (14T301 only)	D4	M	741831	Meter (14T301 only - Incl. Lamp PL3)	FP
C233	741775	Capacitor, Ceramic - 220 pf, 50 v	F5	PL1	741818	Lamp, CH	FP
C235	741810	Capacitor, Ceramic - 15 pf, 50 v (14T301 only)	F2	PL2	741818	Lamp, Meter (14T300 only)	FP
C236	741761	Capacitor, Ceramic - 29 pf, 50 v	—	PL3	741818	Lamp, TX (14T300 only)	FP
C237	741786	Capacitor, Mylar - .0022 uF, 50 v	E3	PL3	—	Part of Meter M (14T301 only)	FP
C238	741786	Capacitor, Mylar - .0022 uF, 50 v	F1	PL4	741833	Lamp, Mod	FP
C240	742085	Capacitor, Electrolytic - 33 uF, 16 v	C1	Q101	741726	Transistor, 2SC710D	G4
C242	742076	Capacitor, Electrolytic - 1 uF, 50 v	B5	Q102	741726	Transistor, 2SC710D	F3
C243	741787	Capacitor, Ceramic - 100 pf, 50 v	F7	Q103	741727	Transistor, 2SC829D	H2
C245	741778	Capacitor, Ceramic - 27 pf, 50 v	—	Q104	741726	Transistor, 2SC710D	J4
C501	741840	Capacitor, Ceramic - .01 uF, 50 v (14T301 only)	*	Q105	741726	Transistor, 2SC710D	G2
C502	741840	Capacitor, Ceramic - .01 uF, 50 v (14T301 only)	*	Q106	741728	Transistor, 2SC1318Q	C3
C503	742089	Capacitor, Electrolytic - 1 uF, 50 v (14T301 only)	*	Q107	741729	Transistor, 2SA719Q	C3
				Q108	741730	Transistor, 2SC1359B	F4
				Q109	741726	Transistor, 2SC710D	D2
				Q110	741726	Transistor, 2SC710D	D2
				Q111	741731	Transistor, 2SC1687	B3
CF101	741812	Capacitor, Ceramic	G5	Q112	741688	Transistor, 2SC1760-3	B4
CH101	741691	Coil, Choke	B1	Q113	741732	Transistor, 2SC1306	C7
CT101	741721	Capacitor, Trimmer 20 pf	F2	Q114	741733	Transistor, 2SC1047B	C5
				Q115	741730	Transistor, 2SC1359B	D5
D101	741689	Diode - 1T-410	G3	Q116	166906	Transistor, 2SC829C	F4
D102	741738	Diode - MZ205	H3	Q117	741726	Transistor, 2SC710D	I4
D103	741739	Diode - RD9.1E	D3	Q118	166906	Transistor, 2SC829C	H6
D104	741740	Diode - 1S1885	A2	Q119	166906	Transistor, 2SC829C	I6
D105	166593	Diode - V06C	C8	Q120	741735	Transistor, 2SC372Y	G8
D106	741741	Diode - 1S1555	D3	Q121	741736	Transistor, 2SC828P.Q	E7
D107	741741	Diode - 1S1555	C6	Q122	741737	Transistor, 2SC828P	D6
D108	741741	Diode - 1S1555	G8	Q123	741805	Transistor, 2SC839F (14T301 only)	F2
D109	226344	Diode - 1N60	I8				
D110	226344	Diode - 1N60	H8	Q124	741805	Transistor, 2SC839F (14T301 only)	E2
D111	226344	Diode - 1N60	D7				
D114	741741	Diode - 1S1555	E5	Q125	741806	Transistor, 2SC900U (14T301 only)	F5
D115	226344	Diode - 1N60	D5				
D116	226344	Diode - 1N60	D5	Q126	741008	Transistor, 2SA733P.Q (14T301 only)	F5
D501	226344	Diode - 1N60	*				
D502	226344	Diode - 1N60	*	Q128	166906	Transistor, 2SC829B,C (14T301 only)	NB
D503	226344	Diode - 1N60	*	Q801	741724	Transistor, 2SC945 (14T301 only)	LB
IC101	741686	Circuit, Integrated PLL02A	I1,2				
IC102	741687	Circuit, Integrated TA7205P	F8,9	Q802	741724	Transistor, 2SC945 (14T301 only)	LB
J1	741814	Jack, Antenna	RP			<i>All Resistors fixed carbon 1/4 watt unless otherwise noted</i>	
J2	741815	Jack, Microphone	SP				
J3	741816	Jack, PA/Ext. CB	RP				
J4	741816	Jack, Ext. Spkr.	RP	R1	223769	Resistor - 100k ohms	FP
J5	741819	Jack, DC (Power)	RP	R2	223769	Resistor - 100k ohms	FP
L101	741692	Coil, RF, 22UH	G2	R101	108861	Resistor - 100 ohms	H3
L103	741693	Coil, RF, 27 MHz	C2	R102	223769	Resistor - 100k ohms	G3
L104	741694	Coil, RF, 27 MHz	B2	R103	219459	Resistor - 1.5k ohms	H3
L105	741695	Coil, RF, 2.2 uH	A5	R104	219459	Resistor - 1.5k ohms	G3
L106	741696	Coil, RF	B5	R105	227755	Resistor - 220k ohms	F3
L107	741697	Coil, RF, 68 uH	B5	R106	219459	Resistor - 1.5k ohms	G2
L108	741698	Coil, RF	B8	R107	223769	Resistor - 100k ohms	G2
L109	741699	Coil, RF	B7	R108	219459	Resistor - 1.5k ohms	—
L110	741700	Coil, RF	A9	R109	223769	Resistor - 100k ohms	—
L111	741697	Coil, RF 68 uH	D3	R110	108866	Resistor - 2.2k ohms	G1
L112	741701	Coil, RF	E4	R111	108865	Resistor - 1k ohms	I4
L113	741702	Coil, RF	A1	R112	223769	Resistor - 100k ohms	I3
L114	741702	Coil, RF	A2				
Continued on Page 22							

\*On SWR P.C. BOARD  
(FP) Front Panel

(LB) Lamp Board  
(NB) Noise Blanking Board

(RP) Rear Panel  
(SP) Side Panel

CHANNEL NO.	CHANNEL FREQUENCY MHZ	"N" CODE	V.C.O. FREQUENCY MHZ	IC101 PIN NO.				
				11	12	13	14	15
1	26.965	224	36.66	0	0	0	0	0
2	26.975	225	37.67	0	0	0	0	1
3	26.985	226	37.68	0	0	0	1	0
4	27.005	228	37.70	0	0	1	0	0
5	27.015	229	37.71	0	0	1	0	1
6	27.025	230	37.72	0	0	1	1	0
7	27.035	231	37.73	0	0	1	1	1
8	27.055	233	37.75	0	1	0	0	1
9	27.065	234	37.76	0	1	0	1	0
10	27.075	235	37.77	0	1	0	1	1
11	27.085	236	37.78	0	1	1	0	0
12	27.105	238	37.80	0	1	1	1	0
13	27.115	239	37.81	0	1	1	1	1
14	27.125	240	37.82	1	0	0	0	0
15	27.132	241	37.83	1	0	0	0	1
16	27.155	243	37.85	1	0	0	1	1
17	27.165	244	37.86	1	0	1	0	0
18	27.175	245	37.87	1	0	1	0	1
19	27.185	246	37.88	1	0	1	1	0
20	27.205	248	37.90	1	1	0	0	0
21	27.215	249	37.91	1	1	0	0	1
22	27.225	250	37.92	1	1	0	1	1
23	27.255	253	37.95	1	1	1	0	1

1 = H Level (4.5V – 5.5V Circuit Tester DC V/20K )

0 = L Level (0.05V – 0.4V Circuit Tester DC V/20K )

Figure 14 – Channel Frequency Chart

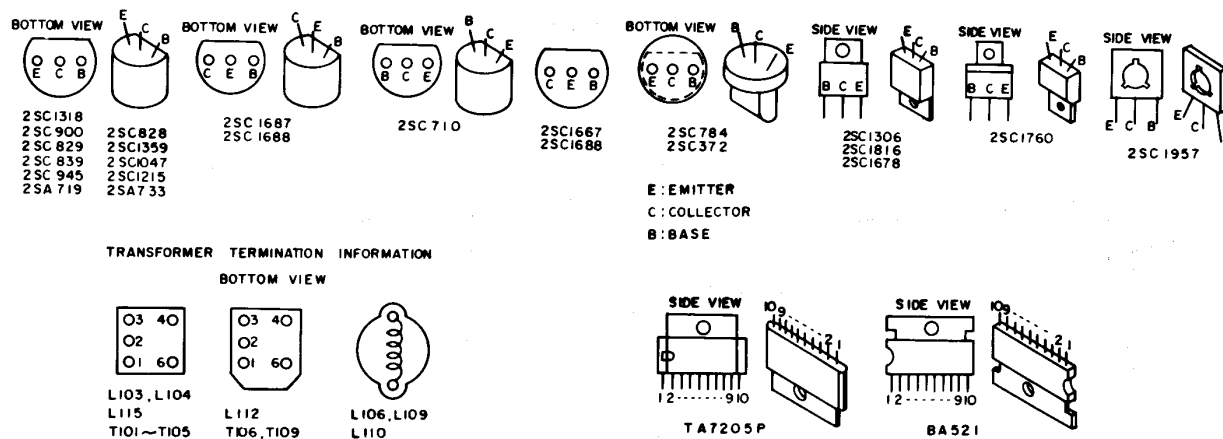


Figure 15 – Semiconductor Terminal Connections

SYMB. NO.	STOCK NO.	DESCRIPTION	LOCA- TION	SYMB. NO.	STOCK NO.	DESCRIPTION	LOCA- TION
R113	107972	Resistor - 3.3k ohms	H2	R179	426112	Resistor - 22k ohms	H8
R114	108864	Resistor - 470 ohms	H3	R180	219460	Resistor - 1.8k ohms	G8
R115	426112	Resistor - 22k ohms	G3	R181	108870	Resistor - 18k ohms	G6
R116	108864	Resistor - 470 ohms	E3	R183	133646	Resistor, Metal Oxide - 270 ohms, 1/2 w	J4
R117	426219	Resistor - 33k ohms	F3	R184	742015	Resistor, Metal Oxide - 150 ohms, 1 w (14T301 only)	J4
R118	427333	Resistor, Metal Oxide - 100 ohms 1/2 w	F2	R186	218499	Resistor - 10k ohms	G9
R119	219459	Resistor, Metal Oxide - 1.5k ohms	E2	R187	227741	Resistor - 560k ohms (14T301 only)	BB
R120	223769	Resistor - 100k ohms	E2	R188	243304	Resistor - 820k ohms (14T301 only)	E6
R121	108865	Resistor - 1k ohms	E1	R189	223769	Resistor - 100k ohms	E5
R122	108865	Resistor - 1k ohms	E2	R190	426213	Resistor - 4.7k ohms	E5
R123	430297	Resistor - 82k ohms	B4	R191	426112	Resistor - 22k ohms	F5
R124	108863	Resistor - 270 ohms	D2	R192	218499	Resistor - 10k ohms	E2
R125	218499	Resistor - 10k ohms	B3	R193	218499	Resistor - 10k ohms	H4
R127	426216	Resistor - 68 ohms	B3	R194	832015	Resistor, Metal Oxide - 15 ohms, 2 w	A3
R128	108861	Resistor - 100 ohms	A4	R199	107972	Resistor - 3.3k ohms	I5
R129	218758	Resistor - 220 ohms	A5	R202	249438	Resistor, Metal Oxide - 560 ohms, 1/4 w	A5
R130	108860	Resistor - 47 ohms	B6	R204	223769	Resistor - 100k ohms	BB
R131	426743	Resistor, Metal Oxide - 10 ohms, 1/2 w	B7	R205	108865	Resistor - 1k ohms	BB
R132	108871	Resistor - 47k ohms	H8	R501	228878	Resistor - 56 ohms	*
R133	108863	Resistor - 270 ohms	F4	R502	228878	Resistor - 56 ohms	*
R134	426215	Resistor - 680 ohms	C5	R504	108864	Resistor - 470 ohms	*
R135	219459	Resistor - 1.5k ohms	C4	R801	218499	Resistor - 10k ohms	LB
R136	108861	Resistor - 100 ohms	C5	R802	133646	Resistor, Metal Oxide - 270 ohms, 1/2 w	LB
R137	108870	Resistor - 18k ohms	D4	R803	108869	Resistor - 15k ohms (14T301 only)	LB
R138	108865	Resistor - 1k ohms	D4	R804	741725	Resistor, Metal Oxide - 330 ohms, 1/2 w (14T301 only)	LB
R139	108864	Resistor - 470 ohms	E5	RV101	741707	Potentiometer - 10k ohms	G7
R140	232389	Resistor - 470k ohms	G4	RV102	741708	Potentiometer - 2k ohms	C7
R141	108865	Resistor - 1k ohms	H4	RV103	741709	Potentiometer - 20k ohms	I8
R142	426213	Resistor - 4.7k ohms	H7	RV501	741722	Potentiometer - 5k ohms (14T301 only)	*
R143	108864	Resistor - 470 ohms	I5	RV502	741723	Potentiometer - 2k ohms (14T301 only)	*
R144	108871	Resistor - 47k ohms	H6	S1	—	Part of VR1	—
R145	218758	Resistor - 220 ohms	H6	S2	741817	Switch, Slide - "CB/PA" (14T300 only)	FP
R146	219458	Resistor - 330 ohms	I7	S2	741834	Switch, Slide - "DELTA TUNE" (14T301 only)	FP
R148	219467	Resistor - 27 ohms	H7	S3	741817	Switch, Slide - "ANL/OFF" (14T300 only)	FP
R149	218758	Resistor - 220 ohms	I6	S3	741817	Switch, Slide - "ANL/OFF" (14T301 only)	FP
R150	108860	Resistor - 47 ohms	I7	S4	741817	Switch, Slide - "CB/PA"	FP
R151	426112	Resistor - 22k ohms	H7	S5	741817	Switch, Slide - "NB/OFF"	FP
R152	232687	Resistor - 270k ohms	H7	S6	741834	Switch, Slide - "RF/CAL/SWR"	FP
R153	108871	Resistor - 47k ohms	H8	S7	741817	Switch, Slide - "LO/DX"	FP
R154	427566	Resistor - 68k ohms	G9	SP	741845	Speaker (14T300 only)	—
R155	426219	Resistor - 33k ohms	H8	SP	741830	Speaker (14T301 only)	—
R156	108871	Resistor - 47k ohms	H8	SW101	741710	Switch, Rotary - "CHAN"	I2,3
R158	223769	Resistor - 100k ohms	I5	T101	741711	Coil, RF	G4
R159	219459	Resistor - 1.5k ohms	—	T102	741712	Coil, RF	B2
R160	219459	Resistor - 1.5k ohms	I4	T103	741713	Coil, RF	B4
R161	239443	Resistor, Metal Oxide - 22 ohms, 1/2 w	—	T104	741714	Coil, RF	C5
R162	108865	Resistor, Metal Oxide - 1k ohms	D3	T105	741715	Coil, RF	C4
R163	108865	Resistor, Metal Oxide - 1k ohms	D3	T106	741701	Coil, RF	F4
R164	218499	Resistor, Metal Oxide - 10k ohms	D3	T107	741717	Transformer, IF - 455k Hz	G5
R165	426234	Resistor, Metal Oxide - 820 ohms	I8				
R166	219464	Resistor, Metal Oxide - 5.6k ohms	F7				
R167	219467	Resistor, Metal Oxide - 27 ohms	F7				
R168	107972	Resistor, Metal Oxide - 3.3k ohms	F7				
R169	227755	Resistor - 220k ohms	D7				
R170	426112	Resistor - 22k ohms	D6				
R171	227744	Resistor - 150 ohms	D6				
R172	108866	Resistor - 2.2k ohms	G8				
R173	426234	Resistor - 820 ohms	F9				
R174	108860	Resistor - 47 ohms	F9				
R175	218499	Resistor - 10k ohms	G8				
R176	227959	Resistor - 82 ohms	C6				
R177	108863	Resistor - 270 ohms	E7				
R178	426215	Resistor - 680 ohms	D7				

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\*On SWR P.C. BOARD  
(BB) Blanking Board

(FP) Front Panel  
(LB) Lamp Board

SYMB. NO.	STOCK NO.	DESCRIPTION	LOCA- TION	SYMB. NO.	STOCK NO.	DESCRIPTION	LOCA- TION
T108	741718	Transformer, IF - 455k Hz	I6	22	741822	Knob Assembly, Channel	
T109	741719	Transformer, IF - 455k Hz	I7	23	741823	Knob, VR	
T110	741690	Transformer, Audio Output	D8	26	741845	Speaker (SP)	
T111	741720	Transformer, IF	E4	27	742013	Bracket, Speaker mtg.	
					742009	Bracket, mobile mtg.	
X101	741704	Crystal - 11.8066 MHz	F1		741827	Cord Assembly, DC	
X102	741705	Crystal - 10.695 MHz	D2		741825	Holder, microphone	
X103	741706	Crystal - 10.240 MHz	H3		741826	Microphone	
					741745	Sheet, mylar (for IC102)	
VR1	741842	Control, "Volume" - 50k ohms (Incl. S1) (14T300 only)	FP		741813	Spacer, crystal	
VR1	741828	Control, "Volume" - 50k ohms (Incl. S1) (14T301 only)	FP				
VR2	741843	Control, "Squelch" - 10k ohms (14T300 only)	FP				
VR2	741829	Control, "Squelch" - 10k ohms (14T301 only)	FP				
VR3	741844	Control, "RF Gain" - 10k ohms (14T300 only)	FP				
VR3	741829	Control, "CAL/SWR" - 10k ohms (14T301 only)	FP				
		MECHANICAL PARTS - 14T300 (Refer to exploded view Figure 6 Page 10)					
2	741824	Holder, lamp		2	741824	Holder, lamp	
3	741818	Lamp (PL1, 2, 3)		3	741818	Lamp (PL1)	
4	741819	Switch, Slide (S2, S3)		4	741833	Lamp (PL4)	
5	741844	Control (VR3 - RF Gain)		5	741832	Lamp (PL2)	
6	741842	Control (VR1 - Volume)		6	741834	Switch, slide (S2, S6)	
7	741843	Control (VR2 - Squelch)		7	741817	Switch, slide (S3, S4, S5, S7)	
8	741846	Meter		8	741828	Control (VR1 - Volume, Incl. S1)	
9	742012	Bracket, meter mtg.		9	741829	Control (VR2 - Squelch)	
10	741851	Holder, meter lamp		10	741829	Control (VR3 - S, CAL, SWR/PRF)	
12	741815	Jack, Microphone - 4 Prong (J2)		11	741831	Meter (M - Incl. lamp PL3)	
13	741816	Jack, PA + Ext. Spkr - 3 Prong (J3, J4)		12	742014	Bracket, meter mtg.	
16	741819	Jack, DC		16	741815	Jack, microphone (J2)	
17	741814	Jack, Antenna (J1)		17	741816	Jack, PA/EXT. CB, EXT SP. (J3, J4)	
19	741849	Escutcheon Assembly		20	741819	Jack, DC	
20	742011	Plate, Buffer, CH		21	741814	Jack, Antenna (J1)	
21	742010	Plate, Channel Indicating		25	741838	Escutcheon Assembly	
				26	742011	Plate, Buffer, CH	
				27	742010	Plate, Channel Indicating	
				28	741822	Knob Assembly, Channel	
				29	741823	Knob, VR	
				32	741831	Speaker (SP)	
				33	742013	Bracket, speaker mtg.	
					742018	Bracket, mobile mtg.	
					741827	Cord Assembly, DC	
					741825	Holder, microphone	
					741826	Microphone	
					741745	Sheet, mylar (for IC102)	
					741813	Spacer, crystal	

(FP) Front Panel