PRICE $2.50

SERVICE MANUAL

PACE MODELS
CB133 AND 143
MOBILE TRANSCEIVERS
27 MHz CITIZENS BAND

PATHCOM INC.
PACE TWO-WAY RADIO PRODUCTS
24049 S. Frampton Ave., Harbor City, California 90710

L2085-476

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SECTION I
GENERAL INFORMATION

1.1 GENERAL DESCRIPTION

This manual contains service and maintenance information for the CB 133 and CB 143 mobile transceivers. Circuitry for all units is identical with the following exceptions.

1. The CB 143 transceiver contains an "S"/RF meter, which is not included in the CB 133.
2. The CB 143 has P.A. facilities included (with optional P.A. speaker connected), which is not included in the CB 133.

1.2 SPECIFICATIONS

Technical specifications for the PACE Models CB 133 and CB 143 are shown in Table 1-1.

Table 1-1
Technical Specifications for CB 133 and CB 143

GENERAL	
Number of Channels	23 channels frequency synthesized
Frequency Range	26.965 to 27.255 MHz
Channel Spacing	10 kHz
Frequency Control	$\pm$ 0.005% from −30 °C to +50 °C, crystal controlled
Supply Voltage	13.8 V DC, $\pm$ ground (12 V nominal)
Size (H x W x L)	Approximately 1-5/8" x 5" x 7-1/4"
Weight	Approximately 3 lbs. (with accessories)
TRANSMITTER	
Compliance	FCC Type Number PACE 133, Part 95
Power Output	4 W (maximum legal power)
Impedance	50 Ω
Modulation	85% minimum guaranteed sine wave (typically 95%)
Harmonic Suppression (TV Interference)	−65 dB
Microphone	Dynamic, with plug-in connector
RECEIVER	
Sensitivity	0.5 μV at 10 dB $\frac{S+N}{N}$ ratio
Squelch Sensitivity	0.35 μV minimum
Spurious Rejection (Major Image)	50 dB minimum
Selectivity	$\pm$ 5.5 kHz at −6 dB
Audio Output	5 W
Speaker	2-1/2" oval dynamic, 8 Ω

Specifications subject to change without notice.

1.3 CRYSTAL INFORMATION

All crystals supplied for use in PACE Models CB 133 and CB 143 have been individually checked for activity, proper frequency, and freedom from spurious and parasitic oscillations. Use of any crystal not supplied by PACE cannot be insured against off-frequency operation, spurious radiation, substandard performance, or temperature drift; nor will defects, which in our opinion, were caused by use of such crystals be corrected under the warranty.

CAUTION

The Federal Communications Commission expressly prohibits the substitution or addition of any transmitter oscillator crystal unless the crystal manufacturer or PACE has determined that the crystal will provide the transmitter with the capability of operating within the specified frequency tolerance of 0.005%.

Frequency synthesized circuitry is used to obtain all 23 of the Class D Citizens Band channels. Crystal combinations to obtain synthesis are shown for the transmitter and receiver in Table 1-2. The frequency of each crystal is shown in Table 1-3.

Table 1-2
Frequency Synthesizing System

		RECEIVER			TRANSMITTER	
Channel Number	Channel Frequency	1st Local Osc Crystal	2nd Local Osc Crystal	2nd IF Frequency	Crystal Combination	Synthesized Frequency
1	26.965 MHz	X1	X11	455 kHz	X1 – X7	26.965 MHz
2	26.975 MHz	X1	X12	455 kHz	X1 – X8	26.975 MHz
3	26.985 MHz	X1	X13	455 kHz	X1 – X9	26.985 MHz
4	27.005 MHz	X1	X14	455 kHz	X1 – X10	27.005 MHz
5	27.015 MHz	X2	X11	455 kHz	X2 – X7	27.015 MHz
6	27.025 MHz	X2	X12	455 kHz	X2 – X8	27.025 MHz
7	27.035 MHz	X2	X13	455 kHz	X2 – X9	27.035 MHz
8	27.055 MHz	X2	X14	455 kHz	X2 – X10	27.055 MHz
9	27.065 MHz	X3	X11	455 kHz	X3 – X7	27.065 MHz
10	27.075 MHz	X3	X12	455 kHz	X3 – X8	27.075 MHz
11	27.085 MHz	X3	X13	455 kHz	X3 – X9	27.085 MHz
12	27.105 MHz	X3	X14	455 kHz	X3 – X10	27.105 MHz
13	27.115 MHz	X4	X11	455 kHz	X4 – X7	27.115 MHz
14	27.125 MHz	X4	X12	455 kHz	X4 – X8	27.125 MHz
15	27.135 MHz	X4	X13	455 kHz	X4 – X9	27.135 MHz
16	27.155 MHz	X4	X14	455 kHz	X4 – X10	27.155 MHz
17	27.165 MHz	X5	X11	455 kHz	X5 – X7	27.165 MHz
18	27.175 MHz	X5	X12	455 kHz	X5 – X8	27.175 MHz
19	27.185 MHz	X5	X13	455 kHz	X5 – X9	27.185 MHz
20	27.205 MHz	X5	X14	455 kHz	X5 – X10	27.205 MHz
21	27.215 MHz	X6	X11	455 kHz	X6 – X7	27.215 MHz
22	27.225 MHz	X6	X12	455 kHz	X6 – X8	27.225 MHz
23	27.255 MHz	X6	X14	455 kHz	X6 – X10	27.255 MHz

Table 1-3
Crystal Frequency Chart

Crystal Number	Osc Frequency	Channel in Which Used					
X1	37.600 MHz	1	2	3	4		
X2	37.650 MHz	5	6	7	8		
X3	37.700 MHz	9	10	11	12		
X4	37.750 MHz	13	14	15	16		
X5	37.800 MHz	17	18	19	20		
X6	37.850 MHz	21	22	23			
X7	10.635 MHz	1	5	9	13	17	21
X8	10.625 MHz	2	6	10	14	18	22
X9	10.615 MHz	3	7	11	15	19	
X10	10.595 MHz	4	8	12	16	20	23
X11	10.180 MHz	1	5	9	13	17	21
X12	10.170 MHz	2	6	10	14	18	22
X13	10.160 MHz	3	7	11	15	19	
X14	10.140 MHz	4	8	12	16	20	23

1.4 OTHER PERTINENT INFORMATION

Models CB 133 and CB 143 have been certified for Type Acceptance under FCC Part 95. They also meet Canadian DOC Type Approved Regulations RSS136, and EIA Standards for AM 27 MHz transceivers.

NOTES

SECTION II
PRINCIPLES OF OPERATION

2.1 GENERAL

This section provides a general description of Models CB 133 and CB 143 mobile transceivers. Since all circuits are virtually identical, only that of the CB 143 will be described. Refer to the block diagram of Figure 2-1 and the schematic in Section V.

2.2 TRANSMITTER DESCRIPTION

The transmitter is comprised of two basic sections: (a) the low level frequency generation section (synthesizer) and (b) the Buffer, Driver, and Power Amplifier. See Figure 2-1.

The synthesizer comprises two oscillators, Q6 and Q14. Oscillator Q6 operates at approximately 37.7 MHz and Q14 at 10.6 MHz. The difference of the two oscillators is obtained from mixer Q15 and passed through a bandpass-filter buffer T5, T6, Q16, and T7. The output (at T7) is coupled to driver Q17. Driver Q17 and power amplifier Q18 are operated Class C. The more drive applied, the more reverse biased their base-emitters become. There is no current flow in Q17 or Q18 without power applied. The transmitter output network is a three-section pi filter for maximum efficiency and harmonic rejection.

2.2.1 Modulation Section

Audio signals from the microphone are fed to amplifier Q10, and then to AF driver Q11. They are further amplified in push-pull AF power amplifiers Q12 and Q13. For maximum drive under high-level modulation, this modulation audio is applied to the collectors of driver Q17 and power output stage Q18.

2.3 RECEIVER DESCRIPTION

The receiver is a double conversion superheterodyne. Both oscillators are crystal controlled and both are changed in frequency steps to obtain 23 channel operation. The 1st mixer (Q2) uses high side injection obtained from oscillator Q6. (Oscillator Q6 works during both transmit and receive operation.) The 2nd mixer (Q3) obtains injection from oscillator Q7. The output of Q3 is at 455 kHz and passes through the filter circuit T103 and ceramic filter FL1. The signal is amplified by Q4 and Q5 and detected by D1 and D2. Automatic noise limiting is accomplished by diode D3 and associated circuitry. After detection, the audio signal is coupled through C45 to the volume control.

2.3.1 Noise Limiter

Noise limiting is accomplished with the network consisting of R21 through R24, C27 and D3. DC bias from the detector is applied to the cathode of D3 from the junction of divider R22/R21. It is also applied to the anode via R23 and R24. This forward biases D3 for normal signal amplitudes and the audio is coupled through D3 to the base of Q10 via C45, R47, and the volume control.

When noise pulses are present in the signal, a higher negative bias is applied to the cathode of D3. However, the bias to the anode is not increased because of the time constant presented by R23 and C27. This reverse biases D3 so that the noise pulses are clipped off.

2.3.2 Audio Amplifier

The audio amplifier uses AC coupling with a common emitter push-pull output stage. Audio from the volume control is coupled to pre-driver Q10 via C39 and L101. The signal is amplified in this stage and further amplifier in driver Q11. R-C combinations in the emitters of Q10 and Q11 boost low frequencies to compensate for losses (at these frequencies) in the transformers. Thermistor RT1 in the base of Q10 provides thermal stabilization.

Transformer coupling is used at the input and output of the push-pull stage. R49, R50, and CR1 provide sufficient bias for Q12 and Q13 to prevent crossover distortion. The upper winding in the secondary of T202 couples the audio signal to the speaker (or jacks) during receiver operation. The lower winding couples audio (for modulation) to Q17 and Q18 during transmitter operation.

2.3.3 Squelch

Squelch sensing voltage is taken from the AGC (Automatic Gain Control) line. With increasing signal strength, a decreasing positive voltage is applied to the base of squelch sensor Q8, increasing the positive voltage at its collector. This increases the bias applied to the base of audio pre-driver Q10 decreasing the gain of the audio amplifier. Maximum squelch level is set by trimmer R401, while front panel squelch control is determined by the setting of R302.

2.3.4 AGC

A portion of the 2nd-IF signal is taken from the secondary winding of T105. It is rectified by diode D4 and then filtered to produce a negative voltage that responds to the input level of the incoming RF signal. This negative AGC voltage is applied to Q1, Q2, and Q4. When a stronger signal is received at the antenna, a more negative bias is applied to Q1, Q2, and Q4, thus preventing saturation in these stages.

2.4 TRANSMIT–RECEIVE SWITCHING SYSTEM

The transmit-receive switching system is relay controlled. The antenna and speaker circuits are switched by one set of contacts on the relay which is energized when the push-to-talk (P-T-T) microphone switch is depressed. Another set of contacts on the relay switch B+ from the receiver circuits to those in the transmitter. The audio amplifier is constantly powered so that it may be used as a microphone amplifier during transmit and P.A. operation. The antenna circuit is switched by relay contacts in the conventional manner; the speaker is also switched with the antenna relay contacts. Shunting of the RF circuit to ground is prevented by a pair of isolation chokes, L102 and L103.

When the P-T-T switch is in the normal (receive) position, the antenna is connected through C1 and C73 to the receiver RF stage. L102 and L103 present a high RF impedance so that no antenna currents will flow into the audio circuits. The speaker is connected across the upper winding of T202 secondary because the RF chokes are essentially zero impedance at audio frequencies. Loss of audio through the antenna or RF stage is prevented by C1 and C73 which exhibit very high impedances at audio frequencies.

When the P-T-T switch is pressed, B+ is removed from the receiver circuits, thereby disabling the receiver. The relay is energized by grounding the low side of the coil which, in turn, connects B+ to oscillator Q14, mixer Q15, and buffer Q16. In addition, the speaker is disconnected and the antenna is connected to the transmitter.

Note that +13.8 volts is applied to the driver and power amplifier stages at all times through the lower winding of T202. This is possible because these stages draw no current when drive is removed. Receiver audio also appears on the collectors of these stages but, since they are drawing no current, they appear as a small capacity shunting T202.

2.5 OSCILLATOR DESCRIPTION

Three separate oscillators are used with a total of 14 crystals. The crystals are combined in a synthesis circuit to obtain all 23 CB channels. Refer to Section 1.3 for crystal information.

Oscillator Q6 is a tuned-collector crystal oscillator. Six crystals coupled to the base of this transistor are in the frequency range of 37.600 to 37.850 MHz. A different crystal is selected for each channel as shown in Table 1-2. This oscillator is active in both the transmit and receive modes of operation. The output, taken from the secondary winding of T3 is coupled to the base of receiver 1st mixer Q2 via C9, and to the base of transmitter mixer Q15 via C47.

Oscillator Q7 is a crystal controlled Colpitts oscillator. Four crystals, coupled to the base of this transistor, are in the frequency range of 10.140 to 10.180 MHz. A different crystal is selected for each channel as shown in Table 1-2. The output is taken from the emitter of Q7 and coupled to the base of the receiver 2nd mixer Q3. This frequency is then mixed with the output from the 1st mixer (Q2) to obtain the 455 kHz IF. Q7 is activated in the receive mode only.

Oscillator Q14 is a tuned-collector crystal oscillator. Four crystals, coupled to the base of this transistor, are in the frequency range of 10.595 to 10.635 MHz. A different crystal is selected for each channel as shown in Table 1-2. This oscillator is only active in the transmit mode. The output taken from the secondary winding of T4 is coupled via C51 to the emitter of transmitter mixer Q15. This frequency, mixed with that from Q6, produces the channel frequency.

2.6 METER CIRCUITRY (CB 143 ONLY)

The "S"/RF meter provides relative indications of both incoming signal strength and transmitted power.

In receive mode, IF signals from the secondary of T105 are detected by D4 and filtered by C85. This negative DC voltage is then applied to the meter via limiting potentiometer VR4.

In transmit mode, power output signals are coupled through C84 to CR9, which provides negative rectification. This negative DC voltage is then applied to the meter via limiting potentiometer VR5.

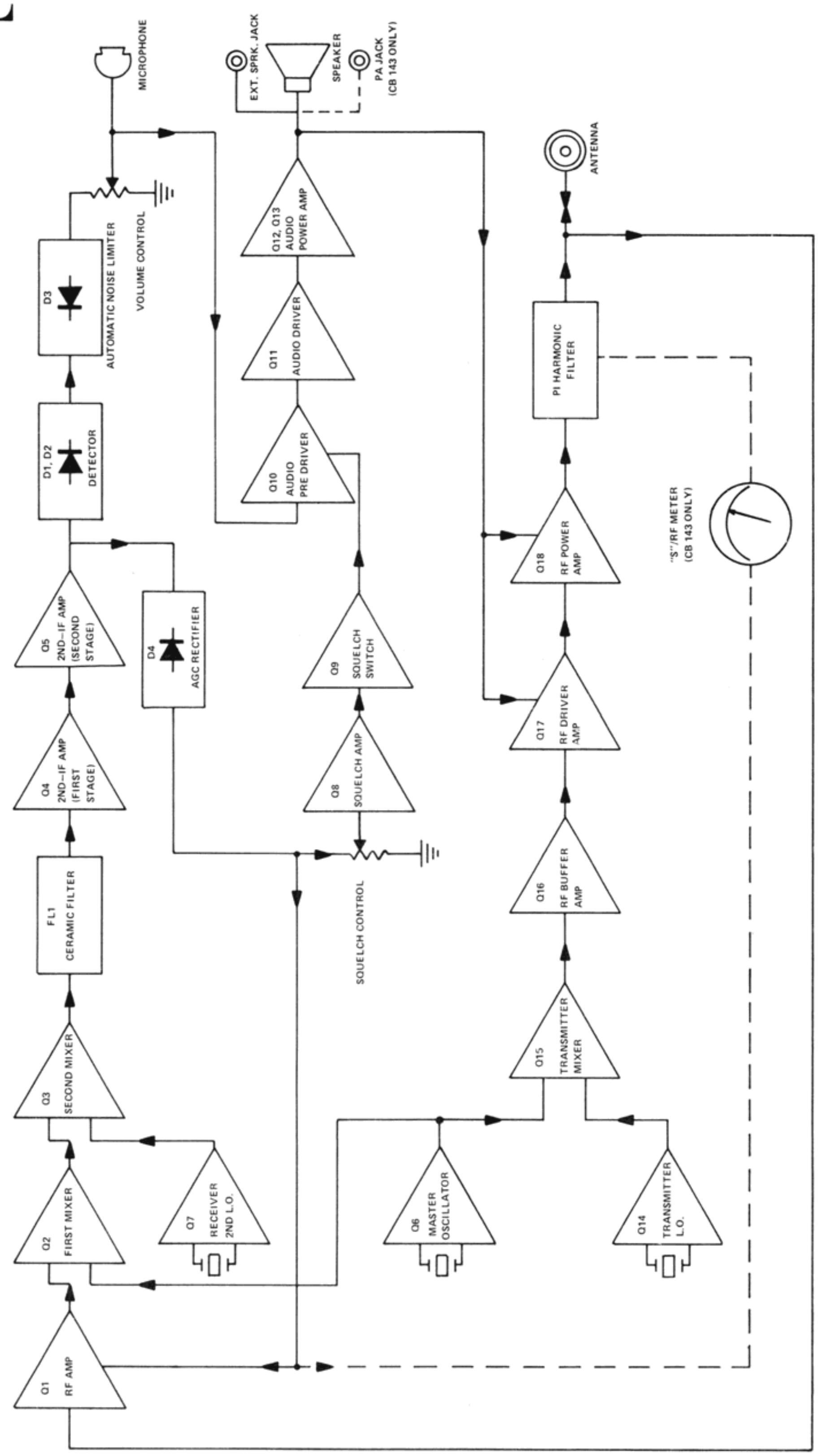

Figure 2-1 CB 143 Block Diagram

NOTES

SECTION III
MAINTENANCE

3.1 GENERAL

This section contains maintenance instructions for the PACE Models CB 133 and CB 143 transceivers. The procedures given in this section assume a general knowledge of AM type communications receivers and a familiarization with transistors and integrated circuits.

3.1.1 Tools and Techniques

A list of recommended tools and test equipment required for maintenance operations is presented in Table 3-1. Aside from the items listed, hand tools and equipment commonly used in the maintenance of electronic equipment are sufficient for maintenance operations.

It is recommended that maintenance adjustments and repairs be performed only by experienced personnel familiar with the equipment. In some cases, minor changes in voltage levels may be corrected by adjusting potentiometers located in the affected circuits. Standard practices in the electronic industry should be observed in checking and/or replacing system components.

3.1.2 Parts Identification

For printed circuit (PC) board component location, refer to illustrations and schematics in Section V.

3.2 PREVENTIVE MAINTENANCE

The transceiver requires minimal maintenance due to the nonmechanical nature of the equipment. However, a preventive maintenance program consisting of electrical checks is recommended as an aid in obtaining maximum operating efficiency from the system.

3.3 CORRECTIVE MAINTENANCE

Corrective maintenance operations entail transceiver checks and adjustments which are not part of preventive maintenance procedures. Operational malfunctions which require corrective maintenance may usually be corrected by an adjustment or PC board replacement. If necessary to make repairs at the component level, such repairs should be made by maintenance technicians who are familiar with the equipment and electronic repair techniques. Refer to Section IV for alignment and adjustment procedures.

Table 3-1
Test Equipment Required

Item	Model or Description
Power Source	Regulated 13.8 V DC Power Supply (Hewlett-Packard Model 624B or Equivalent)
Wattmeter	50 Ω, 10 W (Bird Electronics Model 43 or Equivalent)
Audio Generator	Frequency Range: 200 Hz to 5 kHz Minimum
Frequency Counter	DC to 30 MHz Minimum (Hewlett-Packard Model 4245L or Equivalent)
Oscilloscope	30 MHz Bandpass or DC Coupled Scope with Detector (Tektronix Model 545B or Equivalent)
Vacuum Tube Voltmeter	1 mV to 50 V AC or More (Hewlett-Packard Model 410B or Equivalent)
RF Signal Generator	Capable of Tuning 455 kHz, 7.8 MHz, and 27 MHz CB Frequencies (Hewlett-Packard Model 606B or Equivalent)
DC Voltmeter (Multimeter). . . .	High Impedance Input (RCA Model WV-98C or Equivalent)
RF Probe.	For Use with Multimeter

3.4 TROUBLESHOOTING

It is recommended that a functional analysis approach be used to locate the cause of the transceiver malfunction. Troubleshooting can be simplified by reference to the schematic diagrams in Section V.

Standard troubleshooting procedures, such as signal injection and signal tracing, should be used in locating faulty circuits. Once the trouble has been isolated to a particular circuit, the defective component can be localized by voltage and resistance measurements. Refer to voltage charts in Table 3-2.

Before proceeding with the troubleshooting procedures, the entire installation should be checked for defective antenna connections and loose or broken supply cables and plugs.

Voltages were measured with an ohmmeter having a 20,000 ohm/volt sensitivity, with 13.8 volts ± 5% DC input. Measurements were made in manual mode unless otherwise indicated. All voltages are positive unless otherwise indicated, and have a tolerance of ± 20%.

NOTE

Voltage may vary between the different models, and/or with various meters used.

Table 3-2
DC Voltage Chart

Transistor	E	B	C
Q1	1.2	1.75	9.0
Q2	1.25	1.75	9.0
Q3	0.6	1.2	7.0
Q4	1.15	1.75	8.8
Q5	1.95	1.35	8.4
Q6	0.95	1.55	12.4
Q7	1.15	1.55	8.8
Q8 SQ	0	0.65	5
UNSQ	0	0	9
Q9 SQ	9.1	8.4	9.1
UNSQ	9.1	9.0	0.33
Q10	0.33	0.92	11.8
Q11	0.86	1.45	13.5
Q12	0.02	0.6	13.8
Q13	0.02	0.6	13.8
Q14	1.34	1.85	8.2
Q15	1.9	2.1	8.4
Q16	1.22	1.45	13.5
Q17*	0	0	13.8
Q18*	0	0	13.8

*With no modulation applied.

3.5 MODULATION CHECK

There are three satisfactory methods of checking modulation:

1. A high frequency (30 MHz) oscilloscope, which can be directly coupled by a small capacitor to the antenna jack.
2. A low frequency scope with provisions for direct connection to the deflection plates. A twisted pair, with a 1 1/2 turn link on the end, should be used for coupling. Connect the open end to the deflection plates and then orient the link near the power amplifier coils in the transceiver to obtain a deflection on the screen.
3. A linear detector and a DC oscilloscope would probably be the easiest method to use, and the most accurate, unless a high frequency oscilloscope is available. A suitable detector is shown in Figure 3-1A.

Inexpensive modulation indicators of the meter type have been found to be of irregular accuracy and of no value in checking for parasitics, etc., and therefore, should not be relied upon.

If a high frequency scope is used, connect the probe directly to the antenna jack through a 20-50 pF capacitor. While transmitting a carrier only, adjust the gain to produce a pattern on the scope of about one-half the usable screen area. See Figure 3-2.

Apply modulation and observe the maximum height of the modulated waveform. For 100% modulation, EP = 2 EM, etc. It is more important that the peak (positive) going portion be analyzed since the "trough" or negative going portion will always perform correctly when the peaks are present.

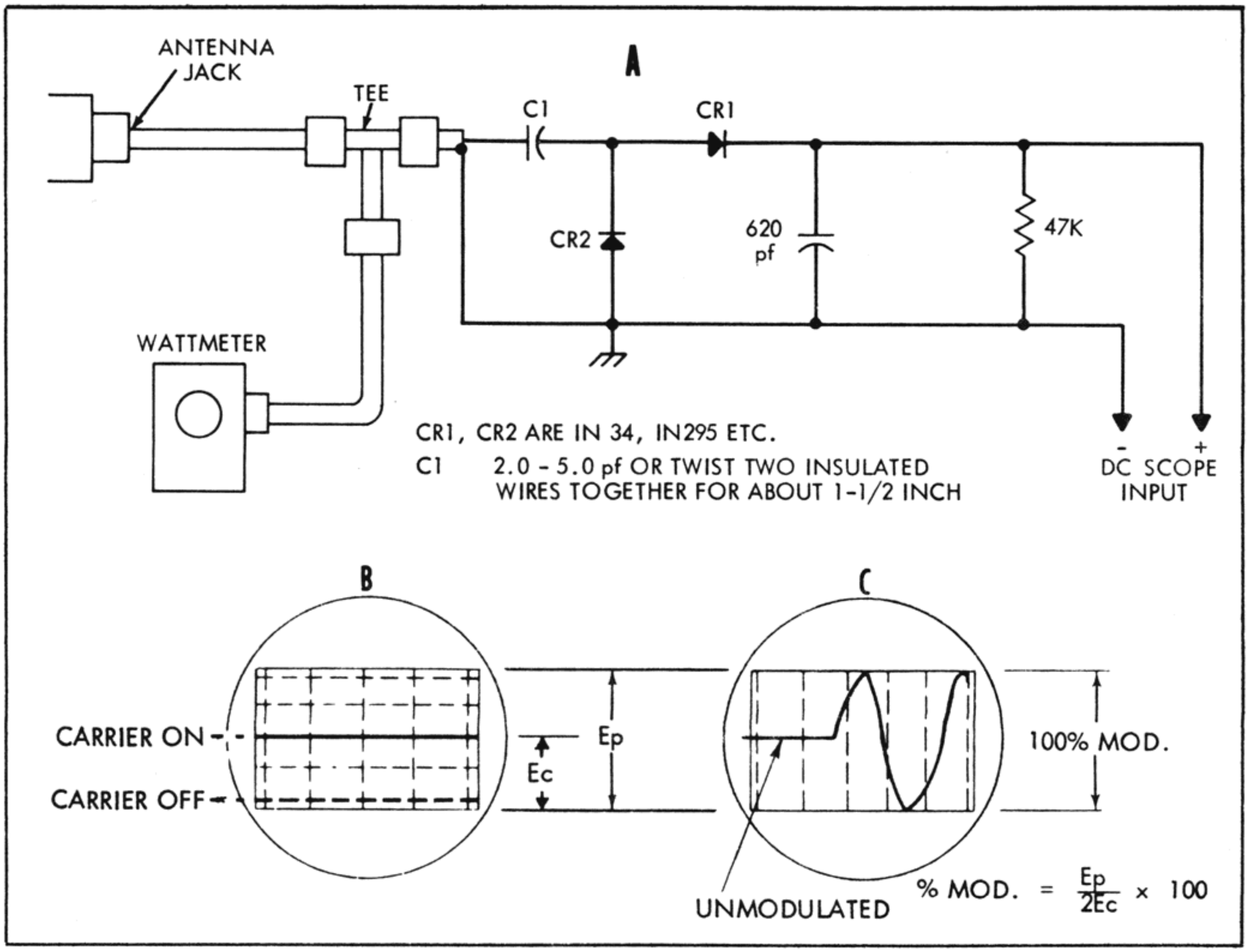

Figure 3-1 Modulation Detector

If a low frequency scope using a direct connection to the plates is employed, the same adjustment procedures apply.

To use the DC scope and detector of Figure 3-1A, adjust the position control with the carrier off to place the trace on a reference line near the bottom of the scope face. See Figure 3-1B. Then feed the unmodulated carrier to the detector and adjust the gain to place the trace in the center of the scope face. It may be necessary to switch the transmitter off and on several times to adjust the trace properly, since on most scopes the position and gain controls will interact.

A 100% modulated transmitter will produce a peak-to-peak envelope equal to twice the shift between the carrier and no carrier traces. See Figure 3-1C. When checking modulation, do not over-drive. Whistle into the microphone with increasing loudness so that maximum modulation is reached without clipping.

Talking into the microphone in a normal manner should produce continuous peaks of 80-95% modulation.

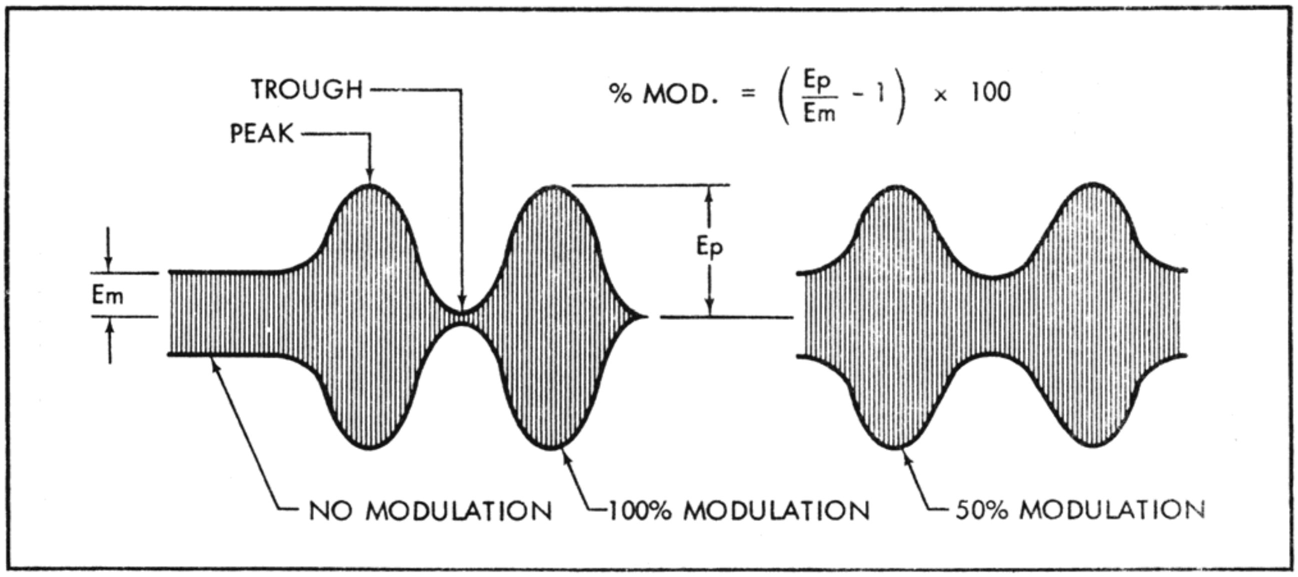

Figure 3-2 Direct Modulation Monitor

SECTION IV
ADJUSTMENT AND ALIGNMENT

4.1 GENERAL

Transceiver circuitry is identical for the CB 133 and CB 143, therefore, the alignment procedure is the same for all models with exceptions noted.

The PACE Model CB 143 transceiver was factory aligned to provide optimum performance. It will not normally require realignment unless major components have been replaced or if the receiver sensitivity has dropped below the specified 0.5 microvolts for 20 dB quieting, or if there is a malfunction of the transmitter.

NOTE

Transmitter tuning adjustments must be made by a technician holding an appropriate FCC license and the results entered in the station radio log.

It is recommended that the transceiver be returned to the factory for realignment. However, correct alignment procedures are given in the following paragraphs where this is not feasible.

4.2 TEST EQUIPMENT

Every effort has been made to keep the required instruments necessary to align and service as simple as possible. It must be realized that the degree of accuracy attained in measurement is directly related to the quality of instruments used. Where a lower quality instrument than the one suggested is used, allowance must be made for possible error in readings. Refer to Table 3-1 for a list of recommended test equipment.

4.3 PRELIMINARY SETUP

1. Set the front panel controls as follows:

CONTROL	SETTING
Volume ON/OFF	Maximum CCW (Power Off)
Squelch	Maximum CCW
CB/PA Switch	CB Position

2. Connect a regulated DC voltage source of 13.8 volts to the DC power cord (plus to red wire).
3. Connect a 50-ohm dummy load to the antenna jack.
4. Connect a wattmeter across the dummy load.

4.4 TRANSMITTER ALIGNMENT

Transmitter adjustment should not be attempted unless the unit exhibits very low power, instability, or audio distortion. Follow the tuning procedure carefully. Failure to do so may result in excessive dissipation with resultant loss of a driver or output transistor. Remember that when a battery or battery eliminator is used, the current supply is nearly unlimited, and it is therefore inadvisable to operate the transceiver without the fused power cord.

Refer to Figure 4-1 for transmitter adjustment and test point locations.

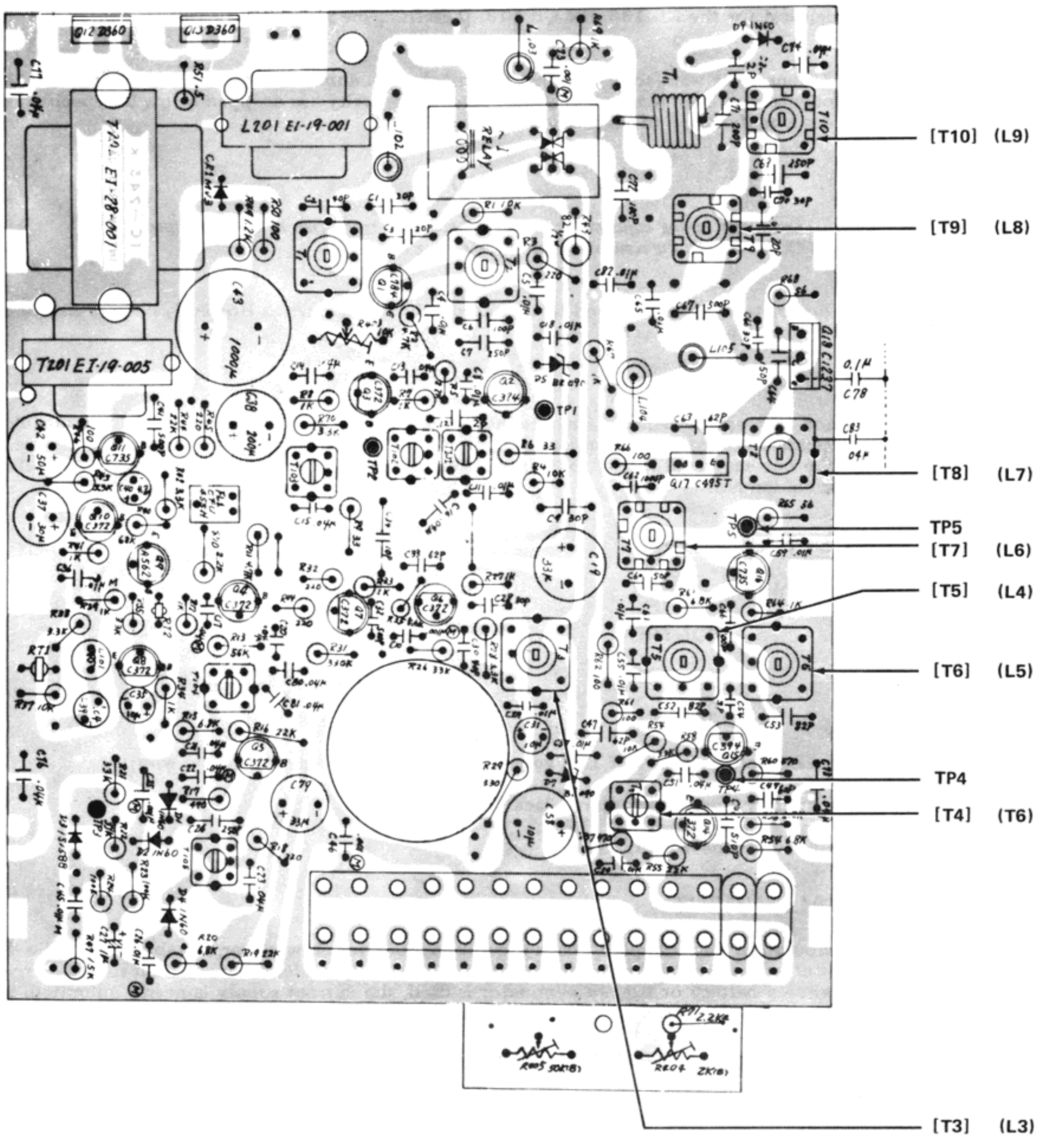

Figure 4-1 Test Point and Adjustment Locations for Transmitter Alignment

4.4.1 Synthesizer Alignment

1. Connect a frequency counter to TP4.
2. Connect a multimeter through an RF probe to TP4. If no probe is available, one may be constructed as shown in Figure 4-2.
3. Set the channel selector switch to the vacant channel between Channels 22 and 23.

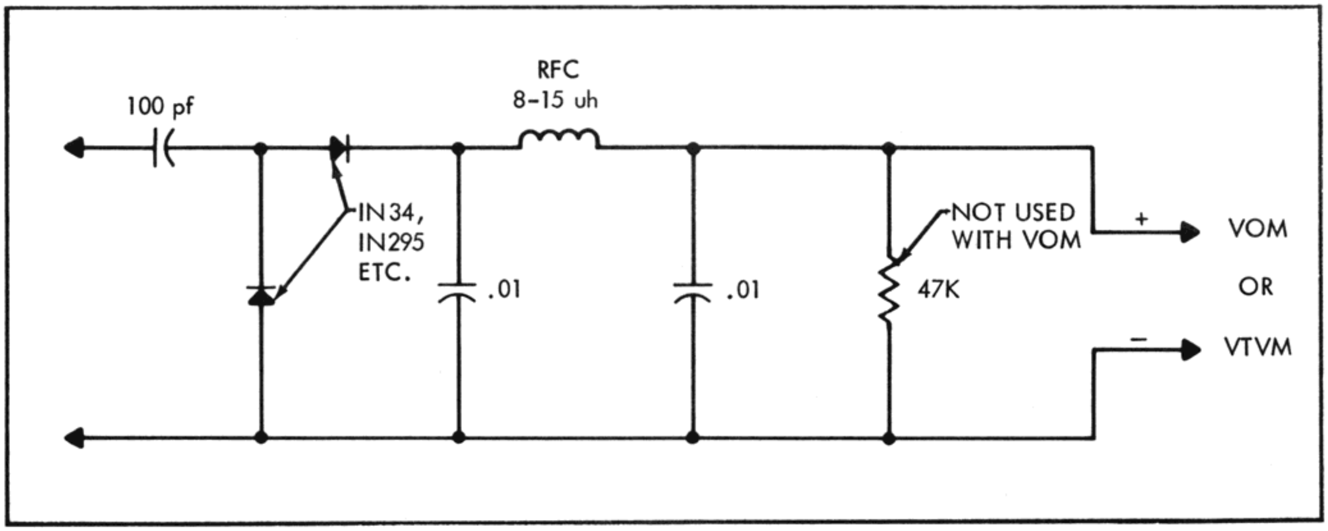

Figure 4-2 RF Probe

4. Turn the power switch on.

CAUTION

Make sure the dummy load is connected to the antenna output jack.

5. Key the transmitter and adjust T4 for a maximum indication on the multimeter. (Use the most sensitive scale.) Check the reading on the frequency counter. This should be in the vicinity of the 10 MHz band.
6. Release the P-T-T switch. Remove the RF probe and frequency counter from TP4.
7. Connect a DC voltmeter (on a minimum 3 volt scale) to TP4.
8. Set the channel selector to Channel 13.
9. Adjust T3 for a maximum reading on the voltmeter, then turn the slug counterclockwise approximately one-eighth of a turn.
10. Move the voltmeter to TP5.
11. Key the transmitter and adjust T5 and T6 for a maximum indication on the meter.
12. Disconnect the meter.

4.4.2 Buffer, Driver, and Power Amplifier Alignment

1. Key the transmitter and adjust T7, T8, T9, and T10 for a maximum reading on the wattmeter.
2. Repeat step 1, two to three times.

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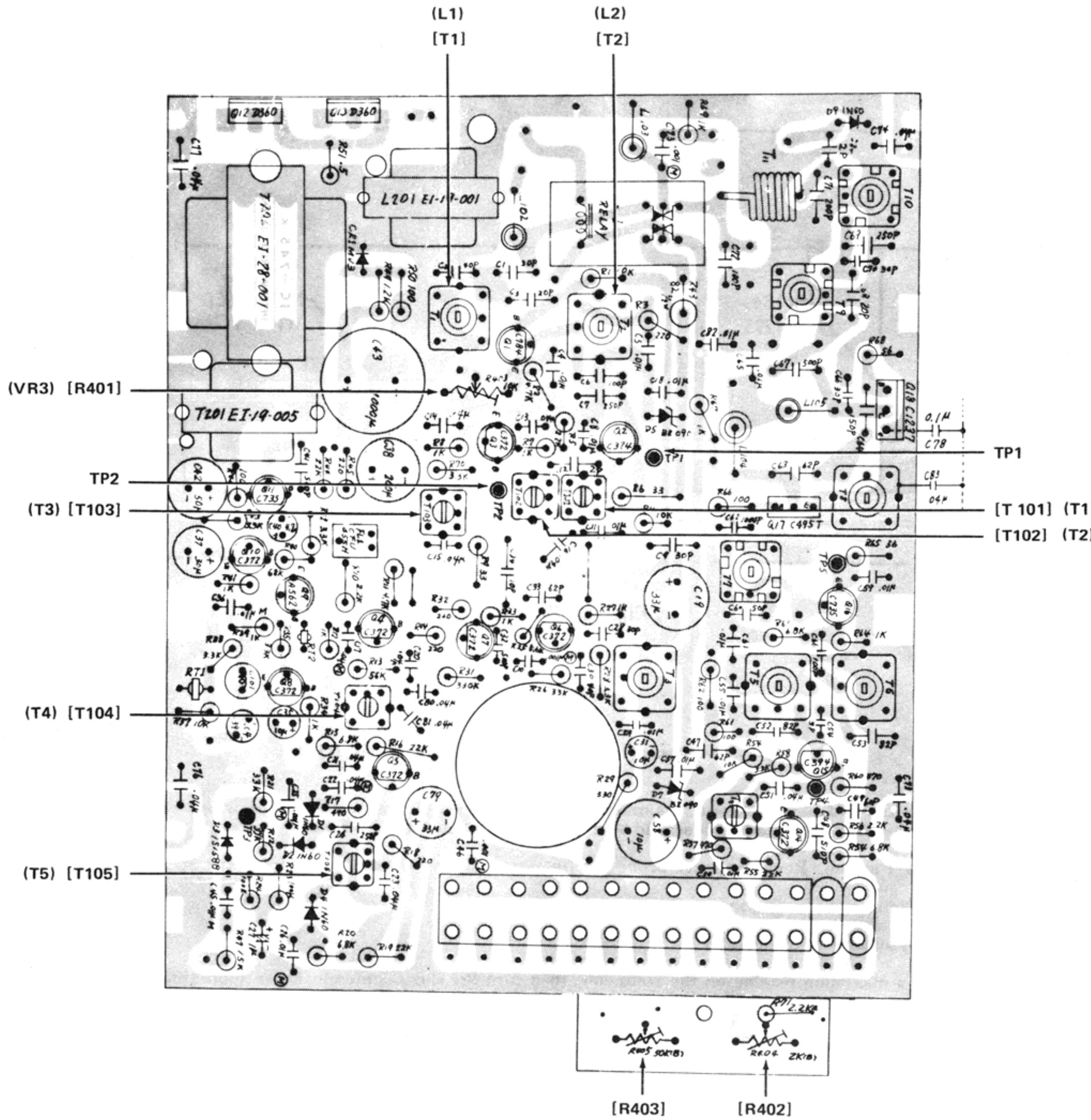

Figure 4-3 Test Point and Adjustment Locations for Receiver Alignment

3. Set the power output to the specified level by making a final adjustment on T8.

NOTE

This should not exceed 4 watts.

4. Connect the frequency counter (through an appropriate attenuator) across the dummy antenna load.
5. Check the frequencies on all channels. These should be as shown in Table 1-2, within 0.005%.
6. Disconnect the counter.

4.5 RECEIVER ALIGNMENT

Refer to Figure 4-3 for adjustment and test point locations.

1. Connect an external speaker or 8-ohm dummy load to the external speaker jack on the unit.
2. Connect a VTVM across the speaker (or dummy load).
3. Connect an AM signal generator (0.047 μF capacitor in series with high side) to TP2.
4. Set the signal generator to 455 kHz with 30% modulation at 1 kHz.
5. Adjust the generator output for an approximate mid-scale indication (5) on the "S" meter. See Figure 4-4.
6. Adjust T103, T104, and T105 for a maximum indication on the "S" meter.

NOTE

For this, and subsequent steps, adjust the generator output to retain an approximate mid-scale indication on the "S" meter.

7. Move the signal generator output lead to TP1.
8. Set the signal generator to 10.7 MHz with 30% modulation at 1 kHz.
9. Adjust T101 and T102 for a maximum indication on the "S" meter.
10. Move the signal generator output lead to the antenna input jack.
11. Set the signal generator to 27.115 MHz with 30% modulation at 1 kHz.
12. Set the channel selector switch to Channel 13.
13. Adjust T1 and T2 for a maximum reading on the "S" meter.
14. Set the output level of the signal generator to 0.5 μV and repeat step 13.
15. Readjust T1, T2, T101 through T105 for a maximum indication on the "S" meter.
16. Disconnect all test equipment.

4.6 METER SET ADJUSTMENT

This procedure consists of adjusting R402 and R403. Since the meter provides a dual function ("S" meter and RF meter), the setting must satisfy both. See Figure 4-3 for trimmer locations.

4.6.1 R402 Adjustment

1. Connect an AM signal generator to the antenna input terminals.
2. Set the selector switch to Channel 12.
3. Set the signal generator to 27.105 MHz, unmodulated.

4. Adjust the generator output to 100 μV.
5. Set R402 for a reading of S9 on the "S" meter,. See Figure 4-4.
6. Disconnect the signal generator.

4.6.2 R403 Adjustment

1. Connect a wattmeter to the antenna jack.
2. Set the channel selector to Channel 12.
3. Depress the P-T-T button and observe the reading on the wattmeter.
4. With the P-T-T button depressed, adjust R403 for the same reading on the meter RF scale as on the wattmeter. Refer to Figure 4-4. Note that the heavy mark in the approximate center of the lower scale is 4 watts.
5. Disconnect the wattmeter.

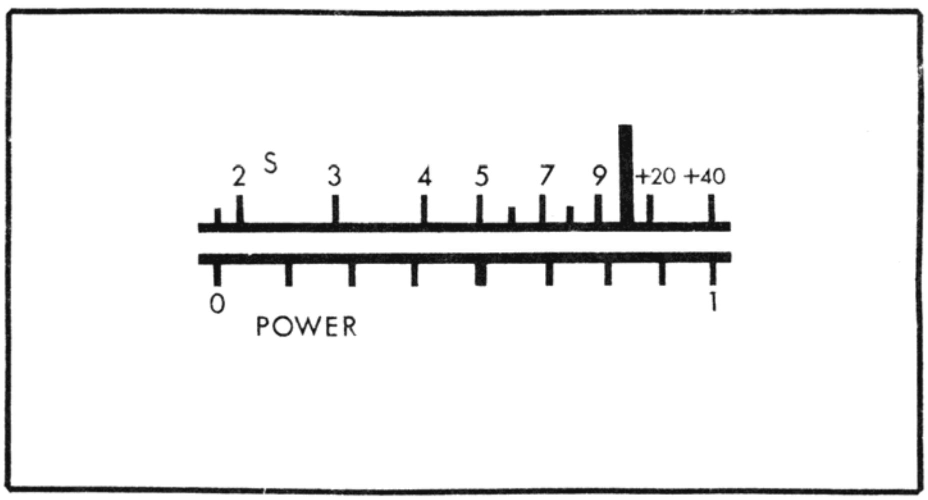

Figure 4-4 Meter Dial

4.7 SQUELCH ADJUSTMENT

1. Connect an AM signal generator to the antenna input terminals.
2. Set the signal generator to 27.105 MHz with 40% modulation at 1 kHz.
3. Adjust the generator output to 1000 μV.
4. Set the transceiver volume control for a comfortable listening level.
5. Adjust R401 to the point where the 1 kHz tone just starts to break up. See Figure 4-3.
6. Disconnect the signal generator.

SECTION V
ILLUSTRATIONS AND PARTS LIST

5.1 GENERAL

The schematics and parts locators in this section are for the PACE Models CB 133 and CB 143 mobile transceivers. Part numbers and descriptions are keyed to schematic reference numbers and are listed for these components. The parts list includes components that are identical for both models. Where a part is listed for one model only, it is so designated.

Standard value resistors and capacitors may be purchased from any electronic parts distributor, and are not listed. If desired, these parts may be ordered from PATHCOM by specifying the schematic reference number and its full description. When ordering parts from PATHCOM, please specify the model and serial number of the transceiver.

Table 5-1
CB 133 and CB 143 Parts List*

Reference Number	Description	Part Number
CAPACITORS		
C10, 25, 46, 73	Mylar, 0.001 μF	IP 22-0014
C17, 22	Mylar, 0.04 μF	IP 22-0018
(C19), (58)	Electrolytic, 100 μF 16V	IP 22-0008
[C19], 37, 79	Electrolytic, 33 μF 16V	IP 22-0005
C26, 36, 45	Mylar, 0.01 μF	IP 22-0015
C27	Electrolytic, 1 μF 25V	IP 22-0001
C31, 35, [58, 87]	Electrolytic, 10 μF 16V	IP 22-0004
C38	Electrolytic, 220 μF 16V	IP 22-0009
C40	Electrolytic, 4.7 μF 16V	IP 22-0003
C42, [85]	Electrolytic, 47 μF 16V	IP 22-0006
C43	Electrolytic, 1000 μF 16V	IP 22-0011
C44	Electrolytic, 1 μF 63V (Bipolar)	IP 22-0031
RESISTORS		
(R51)	0.5 Ω 1W	IP 23-0001
[R51]	0.5 Ω 1/2W	IP 23-0008
R52	10 Ω 1W	IP 23-0003
R53	4.7 Ω 1W	IP 23-0006
[R301], (VR1)	Potentiometer w/switch, 5k Ω(A)	IP 24-0009
[R302]	Potentiometer w/switch, 50k Ω(C)	IP 24-0037
[R401], (VR3)	Trimmer, 10k Ω(B)	IP 24-0003
[R402]	Trimmer, 2k Ω(B)	IP 24-0011
[R403]	Trimmer, 50k Ω(B)	IP 24-0006
[RT1, 2], (TH1)	Thermistor, 33D26	IP 20-0057
(VR2)	Potentiometer, 50k Ω(C)	IP 24-0010

* Order all unlisted components by description and reference number.
Reference numbers within (curved brackets) are for CB 133, numbers within [squared brackets] are for CB 143. Unbracketed reference numbers are for both models.

Table 5-1
(Continued)

Reference Number	Description	Part Number
DIODES AND TRANSISTORS		
[CR1], (D6)	Diode, MV3	IP 20-0055
D1, 2, (3), 4, [9]	Diode, 1N60P	IP 20-0016
[D3]	Diode, 1S1588	IP 20-0061
D5, 7	Diode, Zener, BZ090	IP 20-0019
D8	L.E.D., GL 31AR	IP 28-0005
Q1	Transistor, 2SC784 (O)	IP 20-0037
Q2, 15	Transistor, 2SC394 (O)	IP 20-0038
Q3 thru 8, 10, 14	Transistor, 2SC372 (O)	IP 20-0039
Q9	Transistor, 2SA562 (O)	IP 20-0046
Q11, 16	Transistor, 2SC735 (O)	IP 20-0163
Q12, 13	Transistor, 2SD360	IP 20-0083
Q17	Transistor, 2SC495T	IP 20-0103
Q18	Transistor, 2SC1237	IP 10-0104
	or Transistor, 2SC1678	IP 20-0135
CHOKES, INDUCTORS AND TRANSFORMERS		
(AFC1), [L201]	Choke, Power, EI-19-001	IP 21-0031
(L1, 4), [T1, 5]	Inductor, RF, TKXN34386HM	IP 21-0019
(L2, 5), [T2, 6]	Inductor, RF, TKXN34387Y	IP 21-0020
(L3), [T3]	Transformer, RF, TKXN34384BM	IP 21-0021
(L6), [T7]	Transformer, RF, HL-128	IP 21-0117
(L7), [T8]	Inductor, RC, TKXN34385HM	IP 21-0022
(L8,9), [T9, 10]	Inductor, RF, HL-129	IP 21-0118
(L10), [T11]	Inductor, RF, HL-130	IP 21-0119
[L101]	Micro-Inductor, 10μH	IP 21-0073
[L102, 103], (RFC2, 3)	Choke, RF, HL-109	IP 21-0027
[L104], (RFC4)	Choke, RF, HL-111	IP 21-0023
[L105], (RFC5)	Choke, RF, HL-110	IP 21-0016
(T1, 2, 6), [T4, 101, 102]	Transformer, IF, 85AC2531	IP 21-0038
(T3), [T103]	Transformer, IF, LMC3054	IP 21-0032
(T4), [T104]	Transformer, IF, LPC4201A	IP 21-0033
(T5), [T105]	Transformer, IF, LMC4202A	IP 21-0034
(T7), [T201]	Transformer, AF, EI-19-005	IP 21-0047
(T8) [T202]	Transformer, AF, EI-28-001	IP 21-0036

Table 5-1
(Continued)

Reference Number	Description	Part Number
MISCELLANEOUS		
[DS1, 2]	Lamp, 100mA 15V	IP 28-0002
(PL1)	Lamp, 30mA 15V	IP 28-0001
FL1	Filter, FL-A6/CYF-455	IP 31-0049
K1	Relay, MTS-2	IP 32-0004
[LS1]	Speaker, 8 Ω	IP 29-0003
[M]	Meter	IP 27-0008
(SP)	Speaker, 8 Ω	IP 29-0002
	Bezel (CB 133)	IP 30-0062
	Bezel [CB 143]	IP 30-0131
	Bracket, Mounting	IP 30-0059
	Cabinet, Lower	IP 30-0064
	Cabinet, Upper	IP 30-0063
	Dial, Channel	IP 30-0065
	Hanger, Microphone	IP 30-0061
	Jack, Antenna	IP 26-0002
	Jack, Earphone	IP 26-0005
	Jack, Microphone (6P)	IP 26-0016
	Knob, VOL and SQ	IP 30-0006
	Microphone, IC900	IP 29-0009
	Plug, Microphone	IP 26-0004
	Screw, Bracket Mounting	IP 30-0016
	Socket, 1-Crystal	IP 34-0001
	Socket, 12-Crystal	IP 34-0009
	Switch, Rotary	IP 25-0010

TOP VIEW

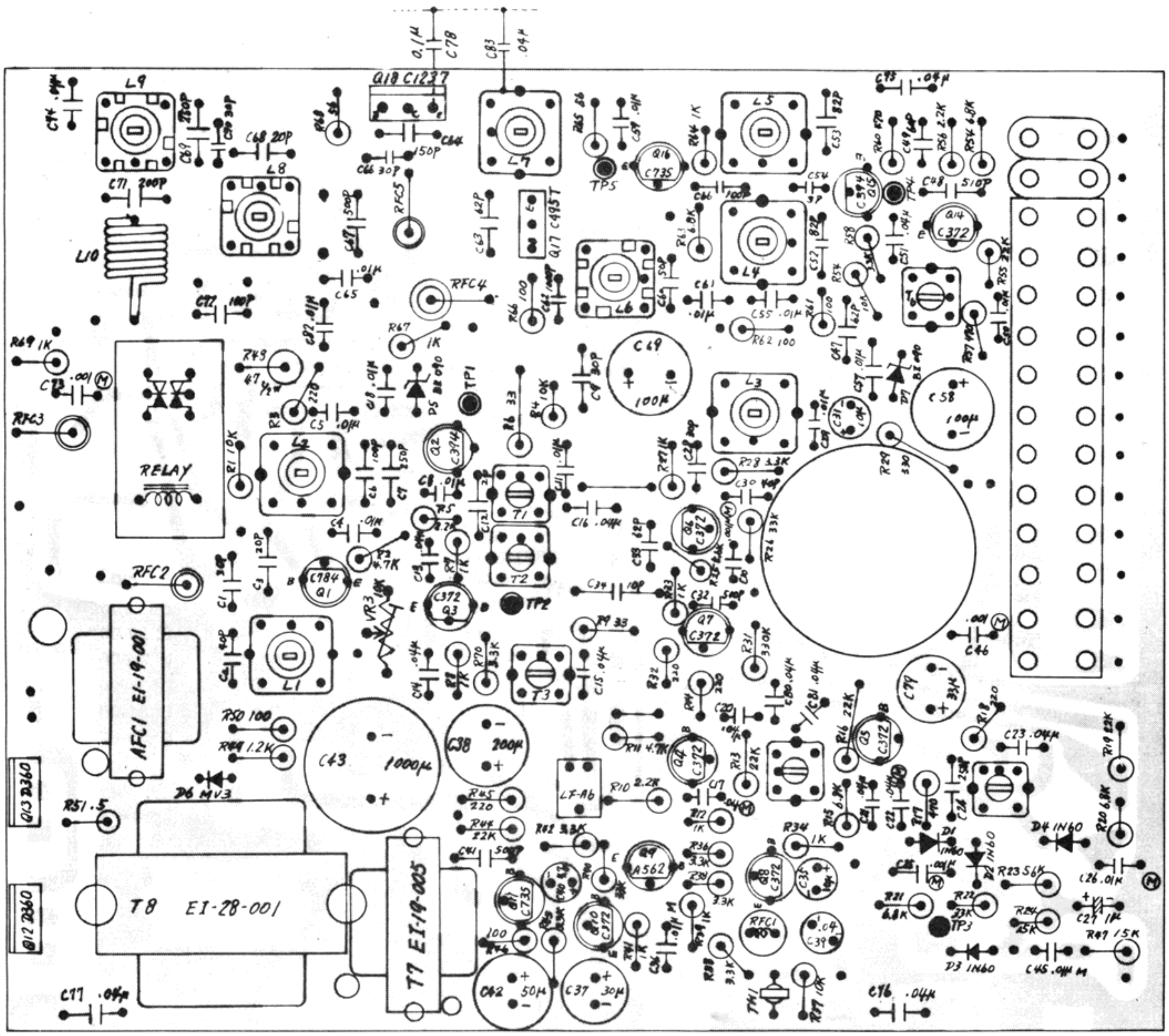

Figure 5-1 CB 133 Parts Locator

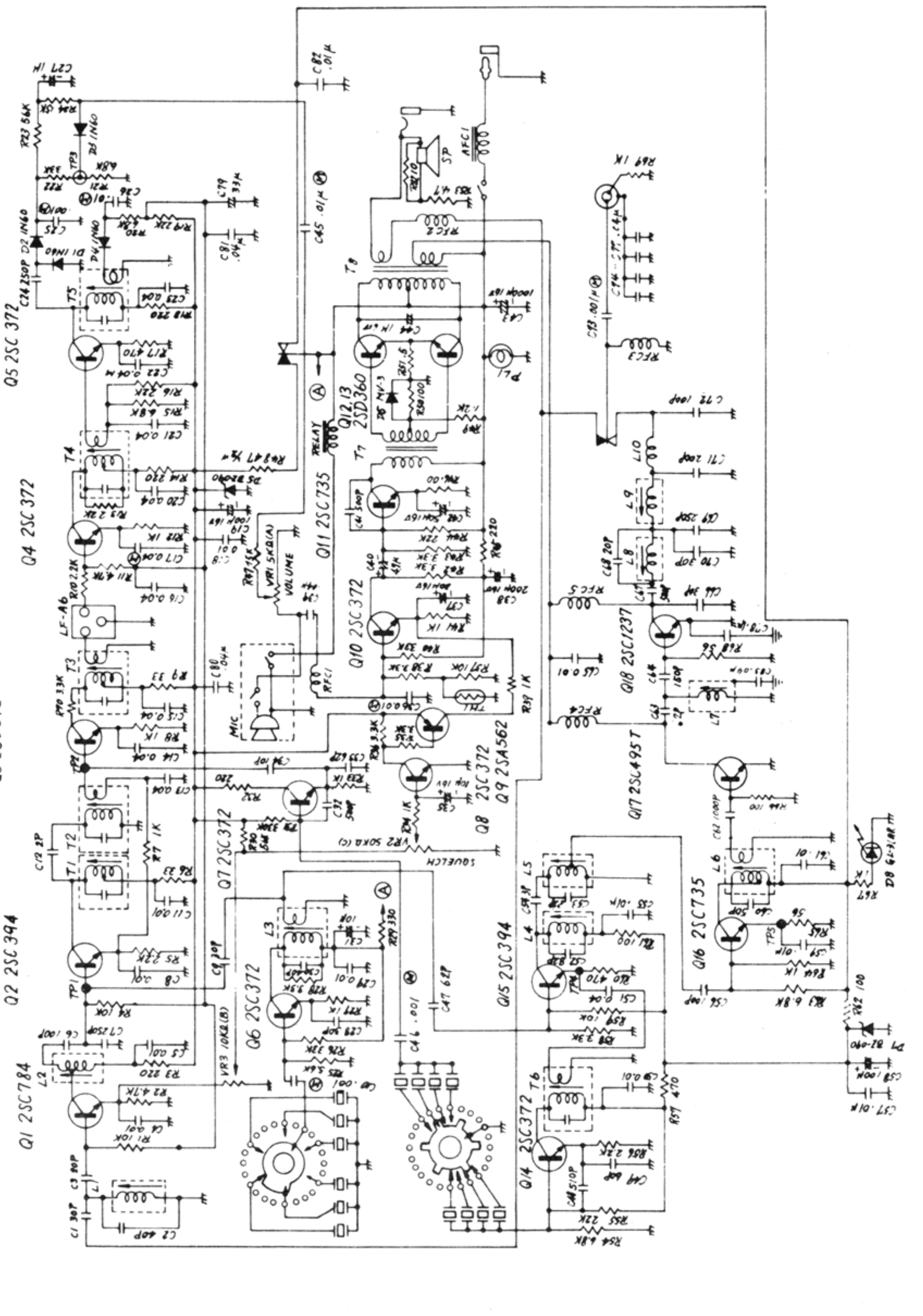

Figure 5-2 CB 133 Schematic

TOP VIEW

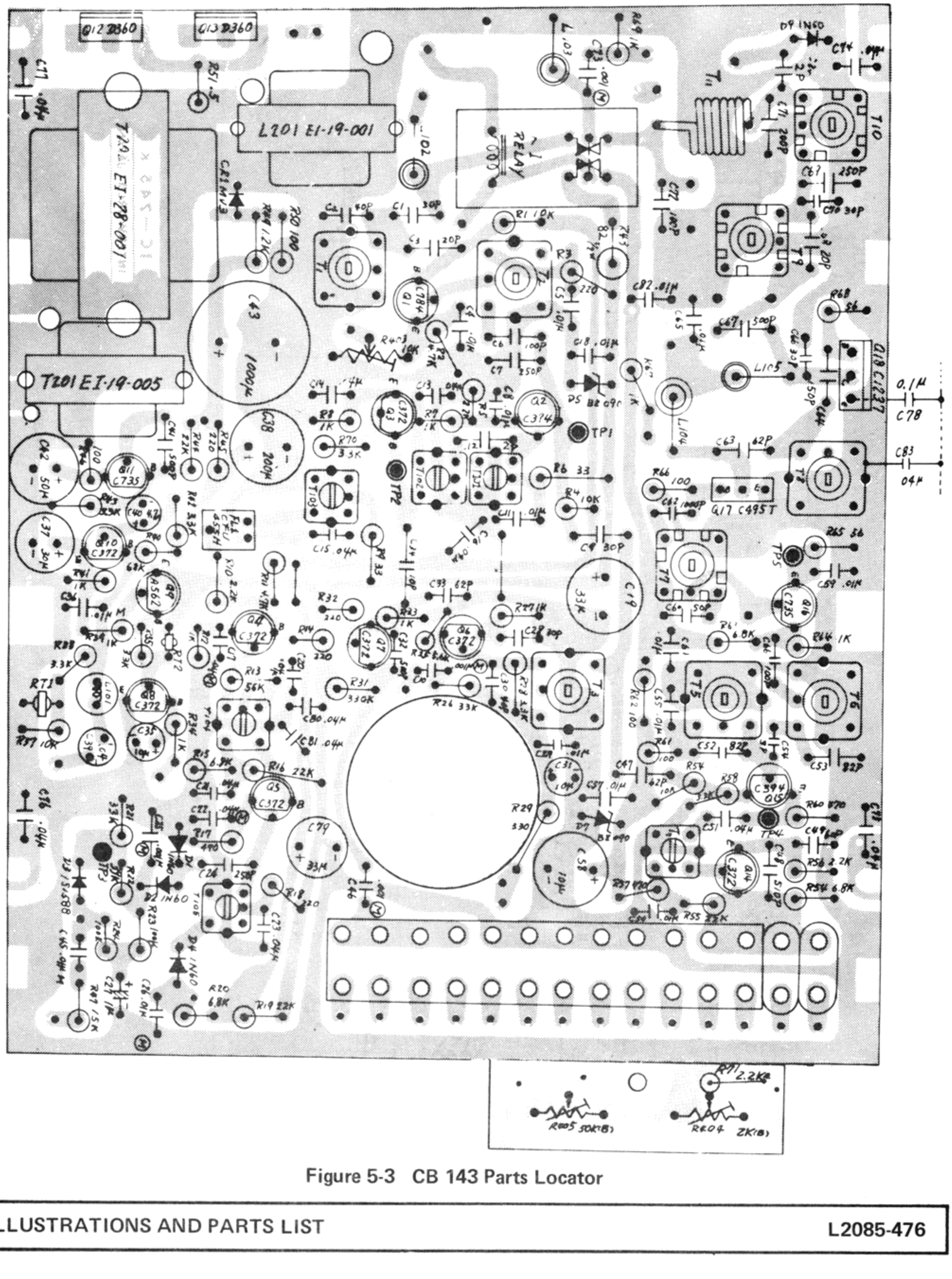

Figure 5-3 CB 143 Parts Locator

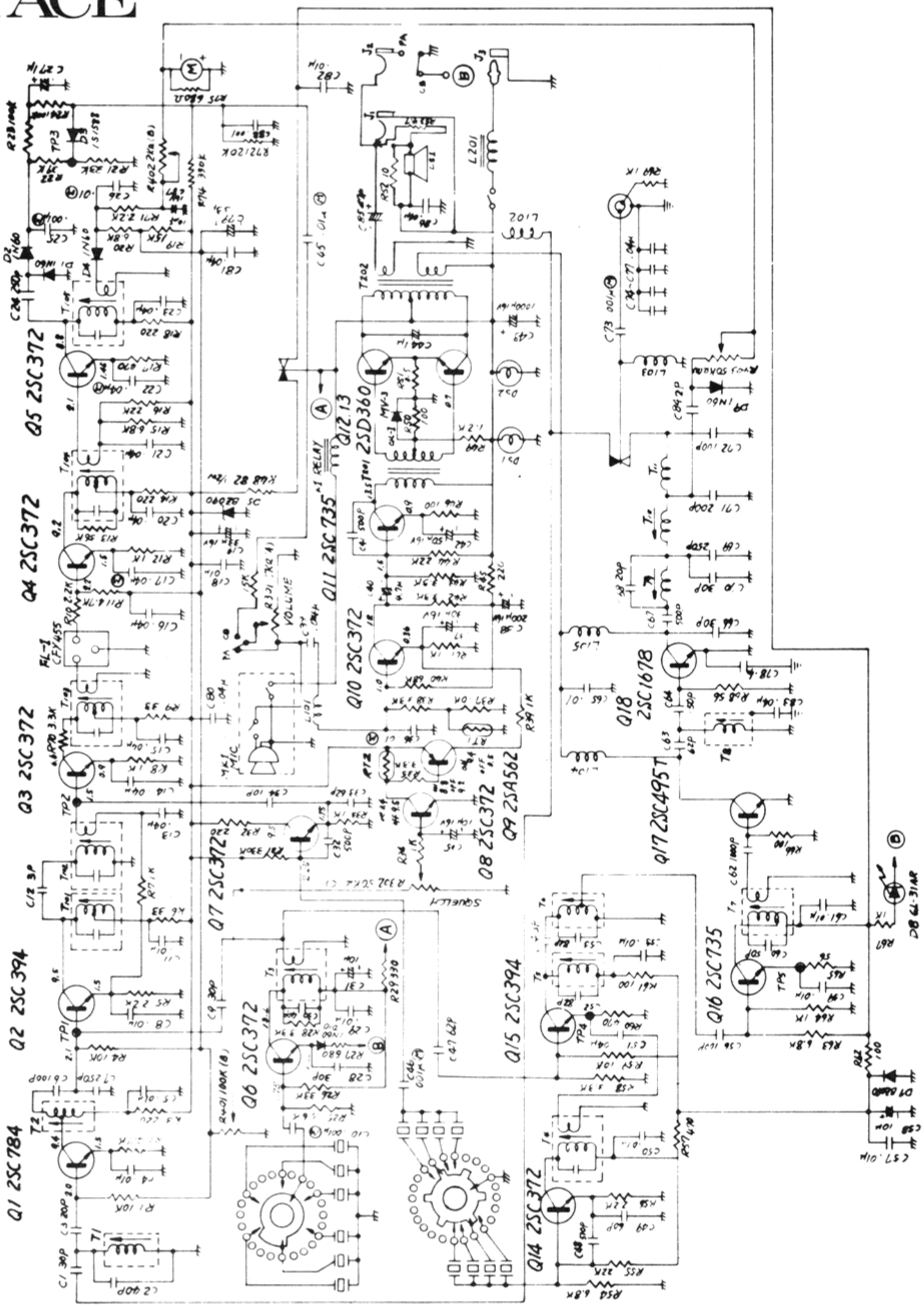

Figure 5-4 CB 143 Schematic

NOTES