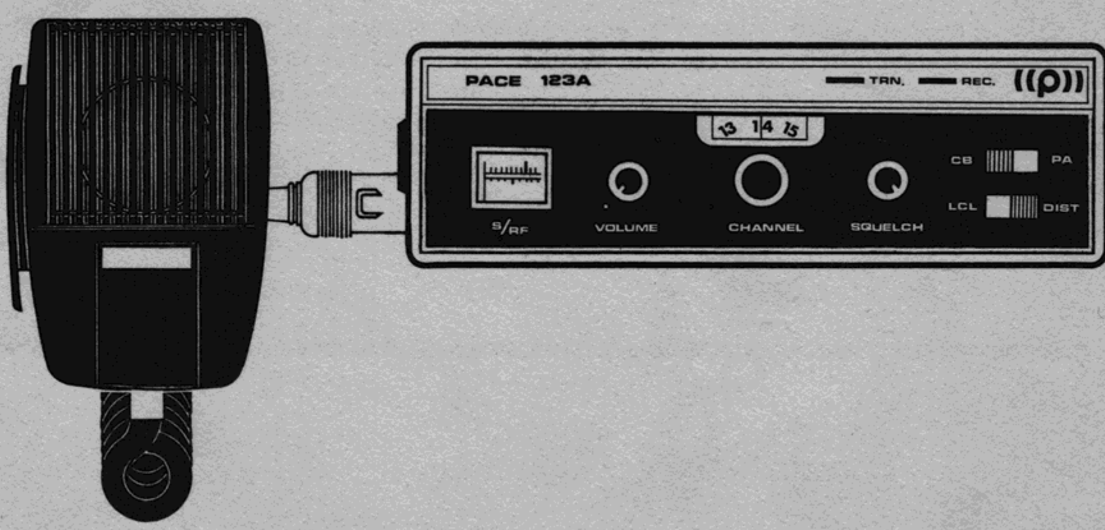
Pace CB123A Service Manual

PRICE $2.50

SERVICE MANUAL

PACE CB 123A
MOBILE TRANSCEIVER



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SECTION 1
GENERAL INFORMATION

1.1 GENERAL DESCRIPTION

This manual contains service and maintenance information for the PACE Model CB 123A Mobile Transceiver manufactured by Pathcom Inc. The Model CB 123A is a 23-band, crystal controlled HF/AM transceiver. It is a fully solid-state device and may be operated from any standard 12 volt DC negative, or positive, ground source. Internal protection is provided to prevent damage in the event that reverse polarity is applied.

Some of the outstanding features of the PACE mobile transceiver are:

* A switchable PA system for direct audio communication.
* Speech compression circuitry.
* LCL/DIST control for optimum use in the country and in city traffic noise.
* An illuminated "S" meter and an RF output meter.

1.2 SPECIFICATIONS

Technical specifications for the PACE Model CB 123A are shown in Table 1-1.

1.3 CRYSTAL INFORMATION

A few crystal manufacturers are still utilizing an obsolete crystal-can with solid metal grounded base. When ordering crystals from other than PACE, be sure to specify the glass filled or insulated base.

When an old style metal base crystal is used, the pins must be insulated from the base for proper operation. This can be accomplished by inserting the crystal pins through a small piece of tape before inserting the crystal in the socket.

The reliability of the crystal manufacturer to actually supply crystals cut to proper frequency is most important to obtain the maximum design performance of your PACE transceiver.

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 1–1
Technical Specifications

GENERAL

Number of channels	23 channels frequency synthesized
Frequency range	27 MHz band
Channel spacing	10 kHz
Frequency control	± 0.005% from −30 °C to +50 °C, crystal controlled
Supply voltage	12.5 V DC nominal, negative or positive ground, reverse polarity protection
Metering	Front panel "S" meter and RF meter
Size (H x W x L)	Approximately 2" by 6-1/2" by 7"
Weight	Approximately 4-1/2 lbs.
Cooling	Conduction/radiation
Mounting position	Any
Type Acceptance	FCC Part 95

TRANSMITTER

Power input	Not to exceed 5 W @ 12.5 V DC
Power output	Typically 3 W @ 12.5 V DC
Impedance	50 ohm
Modulation	85% minimum guaranteed
Harmonic suppression	−65 dB
Microphone	Dynamic type

RECEIVER

Sensitivity	0.6 µV at 10 dB $\frac{S+N}{N}$ ratio
Squelch sensitivity (threshold)	0.35 µV
AGC characteristics	Audio output within 10 dB from 0.4 to 100,000 µV
Spurious rejection	50 dB minimum
Selectivity	6 kHz bandwidth @ 6 dB 30 kHz bandwidth @ 60 dB

Table 1–2
Frequency Synthesizing System

Channel Number	Channel Frequency	1st Local Osc Crystal	RECEIVER		TRANSMITTER	
			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	X13	455 kHz	X7 - X10	27.255 MHz

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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

The Model CB 123A has been certified for Type Acceptance under FCC Part 95. It also meets Canadian DOC type approved regulations RSS136, and EIA Standards for AM 27 MHz transceivers.

SECTION II
PRINCIPLES OF OPERATION

2.1 GENERAL

This section provides a general description of the Model CB 123A Mobile Transceiver circuitry. Refer to 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 Driver, Intermediate Power Amplifier (I.P.A.), and Power Amplifier (P.A.).

The synthesizer comprises two oscillators, Q16 and Q6. Oscillator Q16 operates at approximately 8.0 MHz and Q6 at 35. The difference of the two oscillators is obtained from mixer Q17 and passed through a bandpass-filter/amplifier L4, L5, L6, Q18, and L7. The output *(at L7) is coupled to driver Q19. Driver Q19 operates Class AB so that a small forward bias* exists with no signal and increases with drive power. The I.P.A. (Q20) and P.A. (Q21) are operated Class C, the more drive applied, the more reverse biased their base-emitters become. There is no current flow in Q20 or Q21 without power applied. The transmitter output network is a three-section pi filter for maximum efficiency and harmonic rejection.

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 first mixer (Q2) uses high side injection obtained from oscillator Q6. (Oscillator Q6 works during both transmit and receive operation.) The second mixer (Q3) obtains injection from oscillator Q7. The output of Q3 is at 455 kHz and passes through the filter circuit T3 and ceramic filter LF-B6. The signal is amplified by Q4 and Q5 and detected by D2 and D3.

The low side of the secondary of T2 is connected to the LCL/DIST switch. In the LCL position the DC base current of Q3 is shunted off through R8 to reduce its gain. A drop of approximately 12 dB occurs in this position.

The output of the detector contains the rectified audio, and a DC component proportional to the carrier. The DC component is applied to the base of AGC amplifier Q8 through the filter network R20-C31. This positive voltage turns Q8 on causing its collector to go toward ground. Q1, Q2, Q3, and Q4 receive base bias from the collector of Q8. The negative going voltage reduces the gain of these stages.

2.3.1 Noise Limiter

Noise limiting is accomplished with the network consisting of R21 through R24, C26, and D4. The DC bias from the detector is applied to the cathode of D4 from the junction of divider R21/R22. It is also applied to the anode via R23 and R24 with the audio being bypassed by C26. This forward biases D4 for normal signal amplitudes and the audio is coupled through D4 to the gate of audio pre-amplifier Q9.

Positive signal amplitudes, greater than the bias at the cathode of D4, will cause D4 to be gated off, clipping these levels. Noise pulses are usually equal to three or four times the normal 100% modulated audio level and will gate D4 off. Clipping is fixed at about 65%.

2.3.2 Squelch Amplifier

Squelch sensing voltage is taken from the emitter of RF amplifier Q1. With increasing signal strength, a decreasing positive voltage is applied to the base of squelch sensor Q10, increasing the positive voltage at its collector. This, in turn, causes D7 to be cut off so that full bias is applied to the base of audio pre-driver Q12 decreasing the gain of the audio amplifier. Maximum squelch level is set by trimmer VR4, while front panel squelch control is determined by the setting of VR2.

2.3.3 Audio Amplifier

The audio amplifier uses AC coupling with a common emitter push-pull output stage. The audio from the drain of pre-amplifier Q9 is coupled to pre-driver Q12 via C30, R4, VR1, C44, and RFC1. The signal is amplified in this stage and further amplified in driver Q13. R-C combinations in the emitters of Q12 and Q13 boost low frequencies to compensate for losses (at these frequencies) in the transformers. Thermistor TH1 in the base of Q12 provides thermal stabilization.

Transformer coupling is used at the input and output of the push-pull stage. R58, R59, and D8 provide sufficient bias for Q14 and Q15 to prevent crossover distortion. The upper winding in the secondary of T8 couples the audio signal to the speaker (or jacks) during receiver operation. The lower winding couples audio (for modulation) to Q20 and Q21 during transmitter operation.

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 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, RFC2 and RFC3.

When the P-T-T switch is in the normal (receive) position, the antenna is connected through C1 and C83 to the receiver RF stage. RFC2 and RFC3 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 T8 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 C83 which exhibit very high impedances at audio frequencies.

When the P-T-T switch is depressed, 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 Q16, mixer Q17, filter-amplifier Q18, and driver Q19. In addition, the speaker is disconnected and the antenna is connected to the transmitter.

Note that +12 volts is applied to the I.P.A. and P.A. stages at all times through the lower winding of T8. 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 T8.

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 L3 is coupled to the base of receiver first mixer Q2 via C38, and to the base of transmitter mixer Q17 via C39.

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 collector of Q7 and coupled to the base of the receiver second mixer Q3. This frequency is then mixed with the output from the first mixer (Q2) to obtain the 455 kHz IF. Q7 is activated in the receive mode only.

Oscillator Q16 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 T6 is coupled via C56 to the emitter of transmitter mixer Q17. This frequency, mixed with that from Q6, produces the channel frequency.

SECTION III
MAINTENANCE

3.1 GENERAL

This section contains maintenance instructions for the PACE Model CB 123A Mobile Transceiver. 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 PCBA component location, refer to illustrations and schematics in Section V.

3.2 PREVENTIVE MAINTENANCE

The receiver 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 receiver 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 PCB 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.

3.4 TROUBLESHOOTING

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

Table 3–1
Test Equipment Required

Item	Model or Description
RF Signal Generator	Capable of tuning 45 kHz and 27 MHz CB frequencies
Voltmeter	20, 000 ohm/volt multimeter with AC output function
Oscilloscope	30 MHz bandpass or DC coupled scope with detector
Wattmeter	50 ohm, 5 watts
Power Source	Regulated 12.5 volts DC power supply capable of 2 amperes
Dummy Load	50 ohm type
RF Probe	For use with voltmeter

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 12.5 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%.

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.

Table 3–2
DC Voltage Chart

Transistor	E	B	C
Q1	4.6	5.2	7.8
Q2	1.6	2.2	8.0
Q3	1.0	1.7	4.9
Q4	1.7	2.3	7.7
Q5	1.2	1.8	7.5
Q6	1.4	1.5	11.6
Q7	1.6	2.1	7.7
Q8	0.0	0.2	7.7
Q10 SQ	0.0	0.6	0.0
UNSQ	0.0	0.6	8.0
Q11 SQ	7.3	0.0	8.0
UNSQ	8.0	8.0	0.0
Q12 SQ	7.3	1.7	12.0
UNSQ	1.0	1.6	8.0
Q13	9.0	1.5	11.7
Q14	0.08	0.58	12.0
Q15	0.08	0.58	12.0
Q16*	1.3	1.9	7.6
Q17*	1.5	1.7	7.6
Q18*	0.5	0.6	7.8
Q19*	0.4	−1	11.7
Q20	0.0	0.12	11.3
Q21	0.0	−1	11.3
	S	G	D
Q9	1.8	0.3	3.3

*With P-T-T switch depressed.

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.

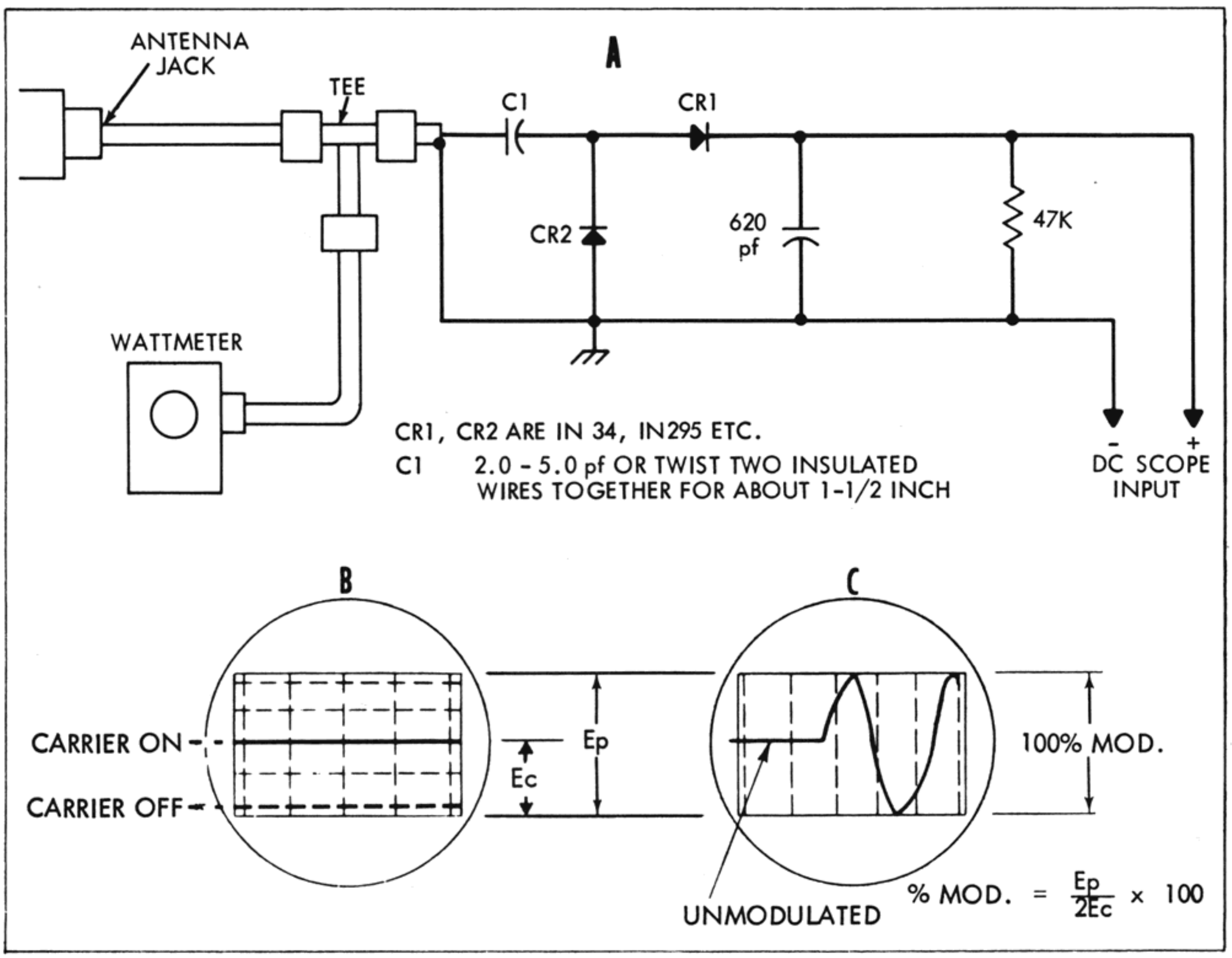


Figure 3–1. Modulation Detector

If a high frequency scope is used, connect the probe to the antenna jack directly 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.

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.

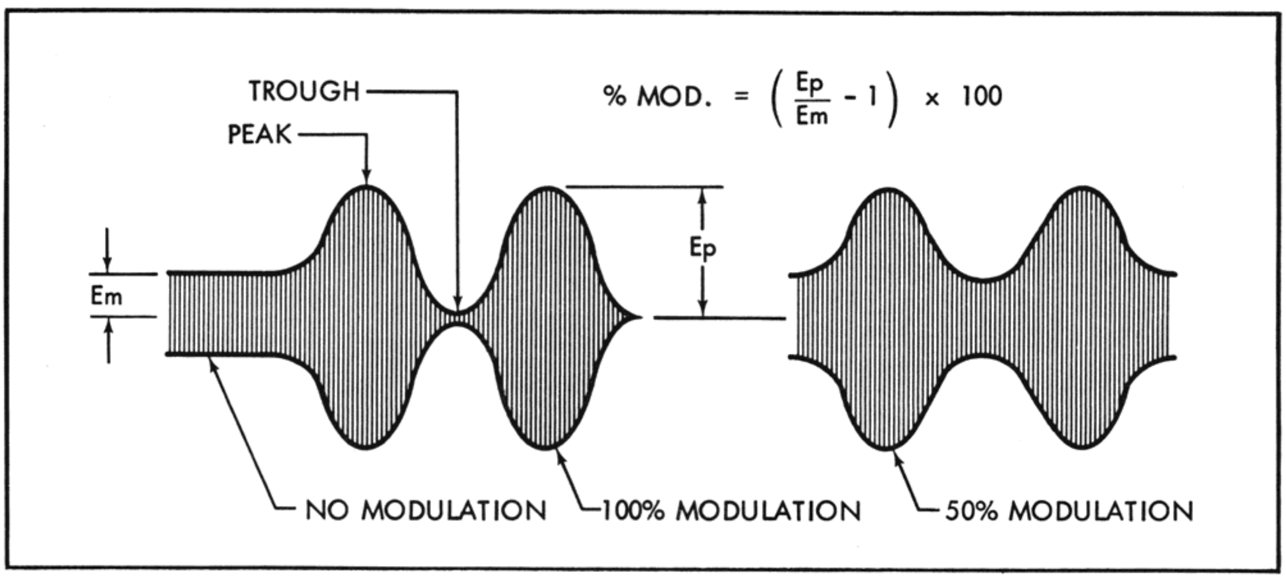


Figure 3–2. Direct Modulation Monitor

SECTION IV
ADJUSTMENT AND ALIGNMENT

4.1 GENERAL

The PACE Model CB 123A Mobile 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 0.6 microvolts for 20 dB quieting.

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 TRANSMITTER ALIGNMENT

Transmitter adjustment should not be attempted unless very low power, instability, or audio distortion is present. Follow the tuning procedure CAREFULLY. Failure to do so may result in excessive dissipation with resultant loss of a driver or output unit. 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.

NOTE

The synthesizer oscillator circuit must be properly aligned (Section 4.5) prior to transmitter alignment.

4.3.1 Preliminary Set-Up

a. Connect a 50 ohm dummy load to the antenna terminals.

b. Connect a wattmeter across the dummy load.

c. Preset the coils as follows:

L8 slug in approximately 1/8 inch from top of coil form.
L9 slug approximately flush with top of coil form.
L10 slug approximately flush with top of coil form.
L11 slug approximately flush with top of coil form.

d. Set selector switch to Channel 12.

4.3.2 Driver Alignment

a. Connect a voltmeter (through an RF probe)* to the base of Q20. Set the meter on the minus 1.5 volt scale.

b. Key the transmitter.

c. Adjust L8 for maximum indication on the voltmeter. This should be approximately minus one volt.

d. Disconnect the voltmeter (VOM).

4.3.3 Intermediate Power Amplifier Alignment

a. Key the transmitter.

b. Adjust L9 to obtain maximum RF output indication on the wattmeter.

4.3.4 Power Amplifier Alignment

a. Key the transmitter.

b. Adjust L10 and L11 for maximum RF output indication on the wattmeter.

c. If maximum output exceeds 3 watts, rotate L9 slug clockwise to reduce power, and repeak L10 and L11 to obtain approximately 2.8 watts output.

L10 and L11 must always be repeaked after adjustment of L9. After obtaining about 2.8 watts, rotate L10 clockwise to reduce power about 100 milliwatts. Then rotate L11 counterclockwise to reduce power an additional 100 milliwatts.

*If no probe is available, one may be fabricated as shown in Figure 4-2.

d. Check modulation (see Section 3.5). Steady tone modulation should be at least 80 percent and speech peaks must "hit" 90 percent or greater. If modulation is inadequate, L13 may be rotated counterclockwise slightly to improve it, but in no case greater than one half turn. At final adjustment, power output shall not be less than 2.4 watts.

4.4 RECEIVER ALIGNMENT

Complete receiver alignment can be accomplished using a single set-up. The transceiver's "S" meter is used as an indicating device.

4.4.1 Preliminary Set-Up

a. Connect an AM signal generator to the antenna terminals.

b. Set the selector switch to Channel 12.

c. Set the signal generator to 27.105 MHz with 40% modulation at 1 kHz.

d. Adjust the generator output for an approximate mid-scale indication (5) on the "S" meter. See Figure 4-1.

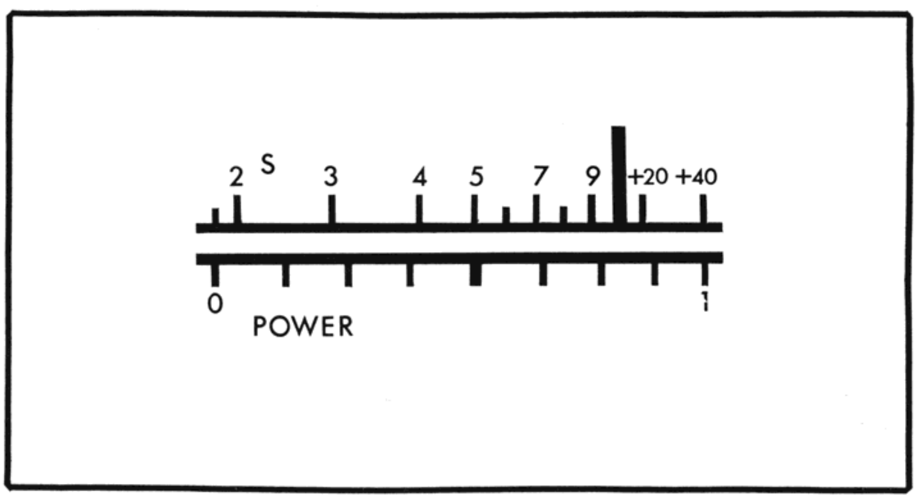


Figure 4—1. Meter Dial

4.4.2 Alignment Procedure

Using the "S" meter (upper scale) as an indicator, adjust L1, L2, T1, T2, T3, T4, and T5 for maximum indication. Reduce the generator output, as necessary, to keep the "S" meter at its approximate mid-scale (5).

4.4.3 Sensitivity Check

a. Set the generator output for 0.5 microvolts.

b. Connect an AC voltmeter with dB scale across the speaker terminals.

c. Adjust the transceiver volume control for one volt across the speaker terminals. Use a convenient meter reference such as zero to +2 dB on the scale.

d. Turn the signal generator modulation off. (Do not disturb RF output.) The output should drop at least 10 dB. If this is not obtained, repeat L1, L2, T1, T2, and T3. Then repeat steps "c" and "d".

4.5 OSCILLATOR ADJUSTMENT

NOTE

All oscillators have been precision set at the factory. They should not be readjusted unless one of the critical tuning components associated with them have been replaced or tampered with.

4.5.1 Q6 Oscillator Adjustment

a. Connect a VOM, through an RF probe to TP1. If no probe is available, one may be fabricated as shown in Figure 4-2.

b. Set the channel selector switch to Channel 12.

c. Adjust L3 for a maximum reading on the voltmeter.

d. Check the voltage readings on Channels 1 and 24. These should be within ± 10% of that obtained in step "c". If not, "tweak" L3 to achieve this.

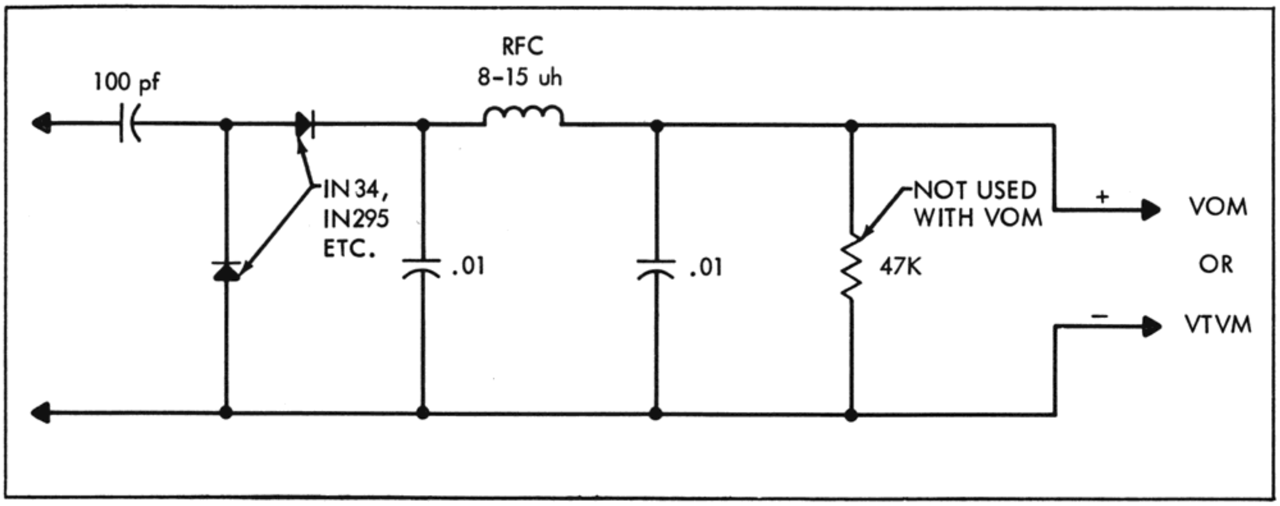


Figure 4—2. RF Probe

4.5.2 Q7 Oscillator Adjustment

a. Connect the VOM, through the RF probe used in Section 4.5.1, to TP2.

b. Set the channel selector switch to Channel 12.

c. Adjust trimmer VC1 for a maximum reading on the voltmeter.

d. Check the voltage readings on Channels 1 and 24. These should be within ± 10% of that obtained in step "c". If not, tweak VC1 to achieve this.

4.5.3 Q16 Oscillator Adjustment

a. Connect the VOM, through the RF probe used in Section 4.5.1, to TP4.

b. Set the channel selector switch to Channel 12.

c. Depress the P-T-T switch and adjust T6 for a maximum reading on the voltmeter.

d. Check the voltage readings on Channels 1 and 24. These should be within ± 10% of that obtained in step "c". If not, tweak T6 to achieve this.

4.6 METER SET ADJUSTMENT

This procedure consists of adjusting VR3 and VR5. Since the meter provides a dual function ("S" meter and RF meter), the setting must satisfy both.

4.6.1 VR3 Adjustment

a. Connect an AM signal generator to the antenna input terminals.

b. Set the selector switch to Channel 12.

c. Set the signal generator to 27.105 MHz, unmodulated.

d. Adjust the generator output to 1 μV.

e. Set VR3 fully counterclockwise (minimum resistance), then rotate clockwise until the meter just starts to give an indication.

f. Disconnect the signal generator.

4.6.2 VR5 Adjustment

a. Connect a wattmeter to the antenna jack.

b. Set the channel selector to Channel 12.

c. Depress the P-T-T button and observe the reading on the wattmeter.

d. With the P-T-T button depressed, adjust VR5 for the same reading on the meter RF scale as on the wattmeter. (Refer to Figure 4-1). Note that the heavy mark in the approximate center of the lower scale is 4 watts.

e. Disconnect the wattmeter.

4.7 SQUELCH ADJUSTMENT

a. Connect an AM signal generator to the antenna input terminals.

b. Set the signal generator to 27.105 MHz with 40% modulation at 1 kHz.

c. Adjust the generator output to 500 μV.

d. Set the transceiver volume control for a comfortable listening level.

e. Adjust VR4 to the point where the 1 kHz tone just starts to break up.

f. Disconnect the signal generator.

SECTION V
ILLUSTRATIONS AND PARTS LIST

5.1 GENERAL

The schematic and parts locator in this section are for the PACE Model CB 123A Mobile Transceiver. Part numbers and descriptions are keyed to schematic reference numbers and are listed for these components.

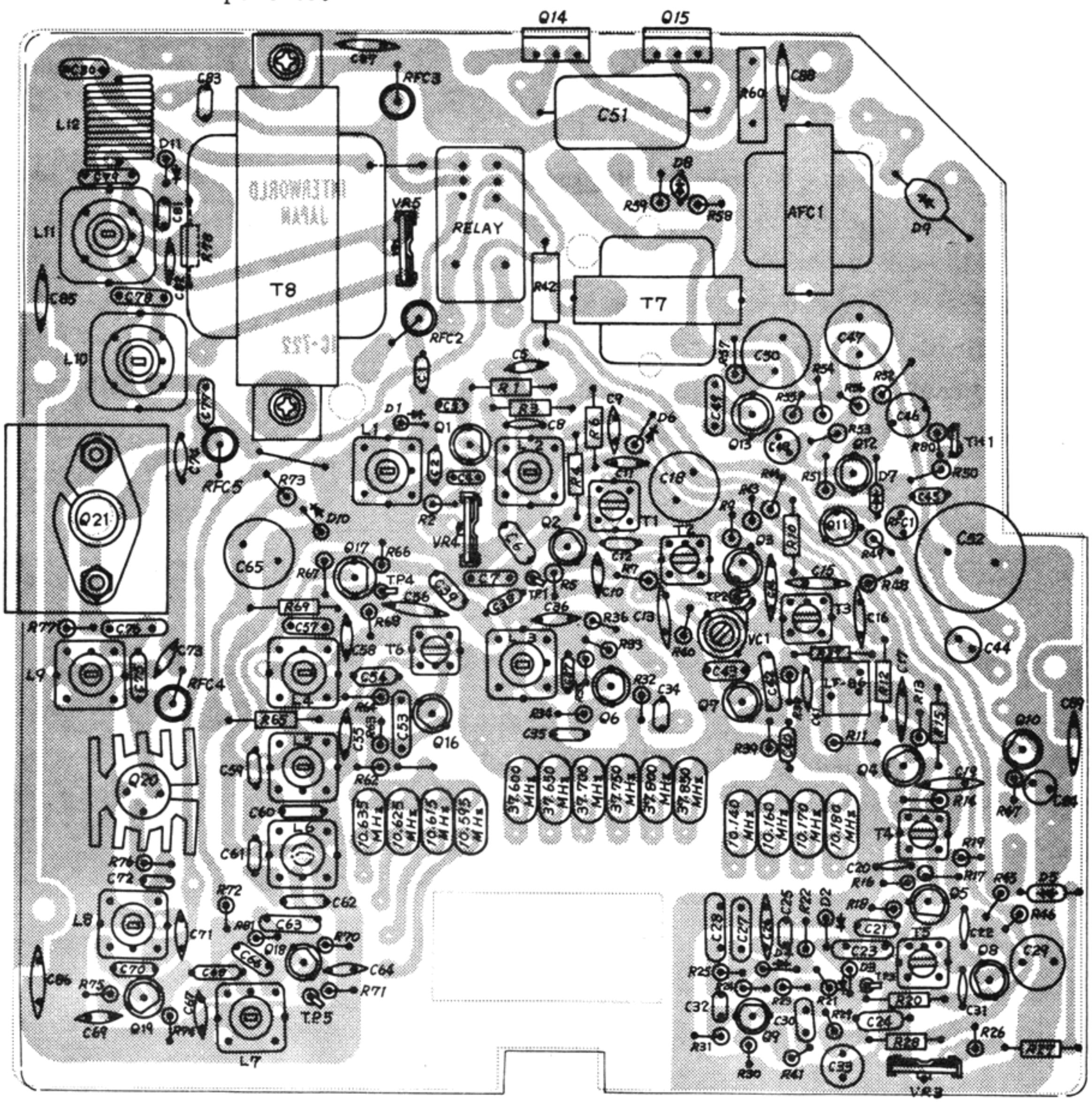


Figure 5–1. Parts Locator (Component Side)

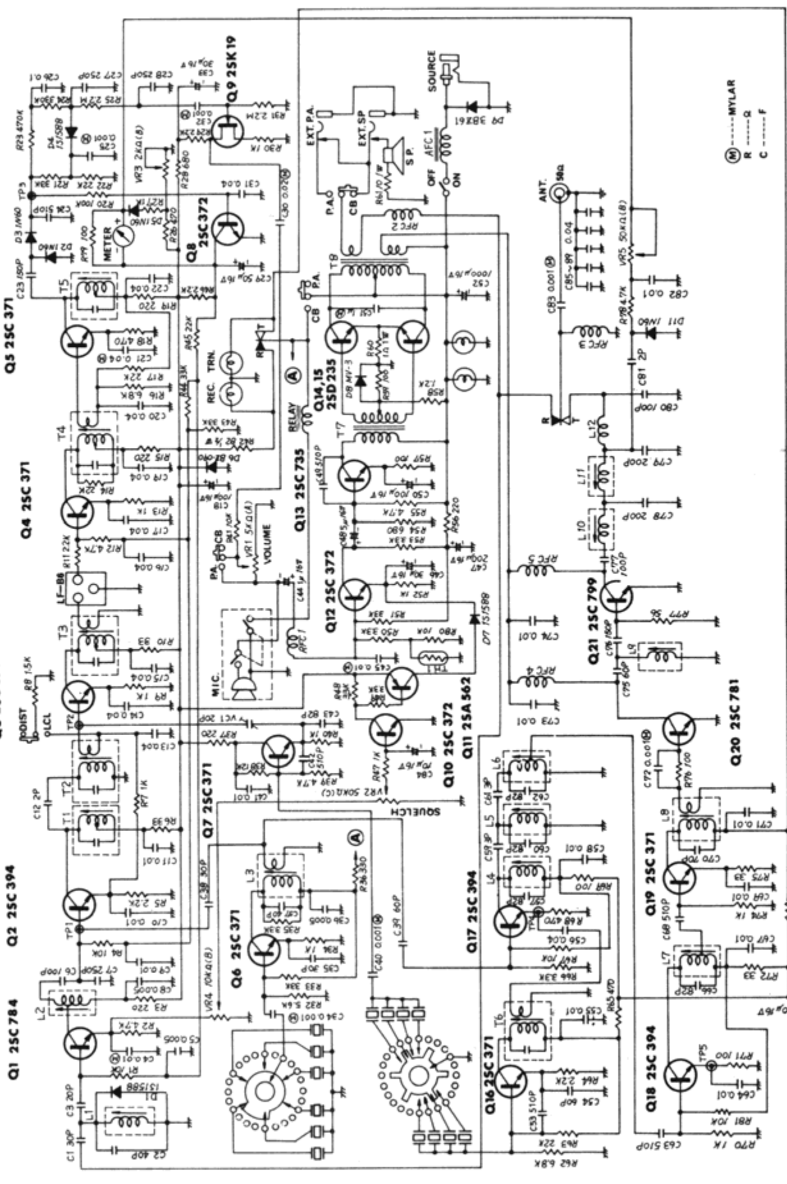


Figure 5–2. Schematic Diagram

Table 5–1
Electrical Parts List

Reference Number	Description	Part Number
CAPACITORS		
C1, 35, 38	30 pF Mica *	
C2, 37	40 pF Mica *	
C3	20 pF Mica *	
C4, C45	0.01µF Mylar	IP 22-0015
C5, 8, 36	0.005µF Ceramic *	
C6, 77, 80	100 pF Mica *	
C7, 27, 28	250 pF Mica *	
C9, 10, 11, 41, 55, 58, 64, 67, 69, 71, 73, 74, 82	0.01µF Ceramic*	
C12, 81	2 pF Mica*	
C13, 14, 15, 16, 17, 19, 20, 22, 31, 56, 85, 86, 87, 88, 89	0.04µF Ceramic*	
C18, 50, 65	100µF/16 V Electrolytic	IP 22-0008
C21	0.04µF Mylar	IP 22-0018
C23, 76	150 pF Mica *	
C24, 42, 49, 53, 63, 68	510 pF Mica *	
C25, 32, 34, 40, 72, 83	0.001µF Ceramic *	
C26	0.1µF Ceramic*	
C29	50µF/16 V Electrolytic	IP 22-0007
C30	0.02µF Mylar	IP 22-0017
C33, 46	30 µF/16 V Electrolytic	IP 22-0005
C39, 54, 75	60 pF Mica *	
C43, 57, 60, 62, 66	82 pF Mica *	
C44	1 µF/16 V Electrolytic	IP 22-0001
C47	200 µF/16 V Electrolytic	IP 22-0009
C48	5 µF/16 V Electrolytic	IP 22-0003
C51	1 µF/63 V Electrolytic NP	IP 22-0012
C52	1000 µF/16 V Electrolytic	IP 22-0011
C59, 61	3 pF Mica *	
C70	70 pF Mica *	
C78, 79	200 pF Mica *	
C84	10 µF/16 V Electrolytic	IP 22-0004
VC1	20 pF Trimmer	IP 22-0020

*Order ceramic and mica capacitors by description and reference numbers.

Table 5–1 (continued)

Reference Number	Description	Part Number
RESISTORS (All 1/4 W 10% Unless Otherwise Noted)		
R1, 4, 41, 67, 80, 81	10 k ohm	14-0009-112
R2, 12, 39, 55, 78	4.7 k ohm	14-0009-104
R3, 15, 19, 37, 56	220 ohm	14-0009-72
R5, 11, 29, 46, 64	2.2 k ohm	14-0009-95
R6, 10, 72, 75	33 ohm	14-0009-52
R7, 9, 13, 27, 30, 34, 40, 47, 52, 70, 74	1 k ohm	14-0009-88
R8	1.5 k ohm	14-0009-92
R14, 17, 22, 45, 63	22 k ohm	14-0009-120
R16, 62	6.8 k ohm	14-0009-108
R18, 26, 65, 68	470 ohm	14-0009-80
R 20	100 k ohm	14-0009-136
R21, 33, 43, 44, 51	33 k ohm	14-0009-124
R23	470 k ohm	14-0009-152
R24	330 k ohm	14-0009-148
R25, 31	2.2 M ohm	14-0009-168
R28, 54	680 ohm	14-0009-84
R32	5.6 k ohm	14-0009-106
R35, 48, 49, 50, 53, 66	3.3 k ohm	14-0009-100
R36	330 ohm	14-0009-76
R38	12 k ohm	14-0009-114
R42	82 ohm 1/2 W	14-0001-62
R57, 59, 69, 71, 76, 79	100 ohm	14-0009-64
R58	1.2 k ohm	14-0009-90
R60	1 ohm 1 W	IP 23-0002
R61	10 ohm 1 W	IP 23-0003
R73	150 ohm	14-0009-68
R77	56 ohm	14-0009-58
TH1	Thermistor	IP 20-0057
VR1	5 k ohm Pot. (Volume)	IP 24-0009
VR2	50 k ohm Pot. (Squelch)	IP 24-0010
VR3	2 k ohm (Trimmer)	IP 24-0011
VR4	10 k ohm (Trimmer)	IP 24-0003
VR5	50 k ohm (Trimmer)	IP 24-0006

Table 5–1 (continued)

Reference Number	Description	Part Number
CHOKES, INDUCTORS, AND TRANSFORMERS		
AFC1	Power Choke	IP 21-0037
L1, L4, L5	Tuneable Inductor	IP 21-0019
L2, L6, L7	Tuneable Inductor	IP 21-0020
L3, L8	Receiver Oscillator Coil	IP 21-0021
L9	Tuneable Inductor	IP 21-0022
L10, L11	Tuneable RF Coil	IP 21-0028
L12	RF Coil	IP 21-0024
RFC1	Micro-Inductor	IP 21-0030
RFC2, RFC3	RF Choke	IP 21-0027
RFC4	RF Choke	IP 21-0023
RFC5	RF Choke	IP 21-0016
T1, T2, T6	Transformer	IP 21-0038
T3	I F Transformer	IP 21-0032
T4	I F Transformer	IP 21-0033
T5	I F Transformer	IP 21-0034
T7	AF Input Transformer	IP 21-0045
T8	AF Output Transformer	IP 21-0046
DIODES AND TRANSISTORS		
D1, D4, D7	Diode, 1S1588	IP 20-0061
D2, D3, D5, D11	Diode, 1N60	IP 20-0060
D6, D10	Diode, Zener, BZ-090	IP 20-0019
D8	Diode, MV-3	IP 20-0055
D9	Diode, Zener, 3BZ61	IP 20-0053
Q1	Transistor, 2SC784	IP 20-0037
Q2, Q17, Q18	Transistor, 2SC394	IP 20-0038
Q3, Q4, Q5, Q6, Q7, Q16, Q19 .	Transistor, 2SC371	IP 20-0040
Q8, Q10, Q12	Transistor, 2SC372	IP 20-0039
Q9	Transistor, FET, 2SK19	IP 20-0035
Q11	Transistor, 2SA562	IP 20-0046
Q13	Transistor, 2SC735	IP 20-0041
Q14, Q15	Transistor, 2SD235	IP 20-0036
Q20	Transistor, 2SC781	IP 20-0043
Q21	Transistor, 2SC799	IP 20-0044

Table 5–1 (continued)

Reference Number	Description	Part Number
MISCELLANEOUS		
	Crystal 37.600 MHz	IP 31-0001
	Crystal 37.650 MHz	IP 31-0002
	Crystal 37.700 MHz	IP 31-0003
	Crystal 37.750 MHz	IP 31-0004
	Crystal 37.800 MHz	IP 31-0005
	Crystal 37.850 MHz	IP 31-0006
	Crystal 10.635 MHz	IP 31-0007
	Crystal 10.625 MHz	IP 31-0008
	Crystal 10.615 MHz	IP 31-0009
	Crystal 10.595 MHz	IP 31-0010
	Crystal 10.180 MHz	IP 31-0011
	Crystal 10.170 MHz	IP 31-0012
	Crystal 10.160 MHz	IP 31-0013
	Crystal 10.140 MHz	IP 31-0014
	Filter, Ceramic, LF-B6	IP 31-0048
	Jack, Antenna	IP 26-0002
	Jack, External Speaker	IP 26-0005
	Jack, Microphone	IP 26-0016
	Jack, Power	IP 26-0007
	Lamp, Pilot	IP 28-0001
	Meter	IP 27-0001
	Microphone Assembly	IP 29-0008
	Relay, R/T	IP 32-0004
	Speaker, Oval	IP 29-0003
	Switch, Channel Selector	IP 25-0006
	Switch, ON-OFF	Part of VR1
	Switch, PA/CB	IP 25-0002

Accessories

P5631
Antenna, mount, cable and connector for motorcycle, snowmobile, or sailboat.

P5632
Antenna, laydown gutter clip with fiberglass whip, cable and connector.

P5647
Antenna, Mobile Trunk Edge Mount, Base loaded, 25-30 MHz range, 48" long, 17' of coax cable with PL-259 connector.

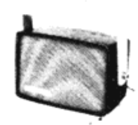
P5646
Antenna, Mobile Gutter Clip, 18" long, with 17' of Coax Cable, 25-30 MHz range, and PL-259 connector.

P5605
Base Antenna, ⅝ wave, end fed, 25-30 MHz range, base load design for 4dB power gain.

P5403A
Watt meter, 10 & 100 watt scale. Also checks VSWR and field strength.

P5430
Multi-purpose test instrument for 2-way radio. Checks RF power up to 500W — VSWR — % of Modulation — Relative Field Strength. Frequency range 25-36 MHz — Amplitude Modulation. Can be used as a 25W "dummy" load. Complete with carrying strap and antenna.

P5503A
All weather 5" Trumpet Speaker—7.5 watts.



P5514
Remote Speaker, 3½" x 5" cycolac housing, with phono plug. (Black).

P5804A
Power supply, Regulated AC to 12 VDC, 4 amp capacity for any 5 watt transceiver, complete line isolation.

P5828
Power Lead Mobile Noise Filter for (+) or (—) ground applications, 3 amps.