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Pace Scan 10-4 Service Manual

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PRICE \$2.50

SERVICE MANUAL

PACE SCAN 10-4 SERIES
FM—VHF/UHF
SCANNING MONITOR
RECEIVERS
30-50 MHz
140-174 MHz
450-470 MHz



PACE COMMUNICATIONS

DIVISION OF PATHCOM INC.

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SECTION I GENERAL INFORMATION

1.1 GENERAL DESCRIPTION

This manual contains the necessary information to perform a detailed troubleshooting analysis and complete alignment on the PACE Model SCAN 10-4 Series Scanning Monitor Receivers.

Each of the scan models is designed to cover a principle band of Public Safety and Land Mobile operation for two-way radios. Unless factory ordered for specific frequencies, or retuned in the field, these monitors are tuned to meet specifications in the following ranges:

10-4H	Center tuned to 155 MHz (covers 151 through 163 MHz without retuning).
10-4L	Center tuned to 43 MHz (covers 37 through 47 MHz without retuning).
10-4U	Center tuned to 460 MHz (covers 455 through 465 MHz without retuning).

1.2 SPECIFICATIONS

Technical specifications for the PACE 10-4 Series Scanning Monitors are shown in Table 1-1.

1.3 CRYSTAL INFORMATION

Precision PACE crystals may be obtained from any authorized PACE Dealer. These PACE crystals will also provide better performance in many other brands of receivers utilizing 10.7 MHz IF. Check the local PACE Dealer for interchangeability information. When ordering crystals from other than the PACE Factory, be sure to specify the crystal formulas as shown in Table 1-2.

1.4 OTHER PERTINENT INFORMATION

This Scanning Monitor Receiver is certified to comply with the necessary government requirements for receiver radiation. FCC Certified in compliance with Part 15. Each country and state has varying regulations concerning the application and use of monitor receivers in the Public Safety Service or other services. The user is required to be cognizant of these regulations for his area of operation.



TABLE I-1
TECHNICAL SPECIFICATIONS

Frequency range:	
10-4H High Band	VHF 146-174 MHz Any 12 MHz bandwidth channel tuned for 151-163 MHz unless specified
10-4L Low Band	VHF 25-50 MHz Any 10 MHz bandwidth channel tuned for 37-47 MHz unless specified
10-4U UHF Band	UHF 450-570 MHz Any 10 MHz bandwidth channel tuned for 455-465 MHz unless specified
Sensitivity6 μ V or better for 20 dB quieting
Squelch sensitivity (threshold)4 μ V
Selectivity	60 dB @ \pm 20 kHz
Spurious rejection	45 dB
Modulation acceptance	\pm 7 kHz
IF frequency	1st IF 10.7 MHz, 2nd IF 455 kHz
Scanning rate	4 channels per half/second typical
Power	105-130 V AC, 60 cps. 8 W maximum 10-16 V DC (negative ground) 6.5 W maximum
Current drain	Approximately 120 mA @ 13.6 V DC
Local/Distant switch	18 dB \pm 3 dB sensitivity variation

**TABLE I-2
 CRYSTAL SPECIFICATIONS**

Crystal frequency:	
10-4H High Band	= $\frac{\text{Channel frequency} - 10.7 \text{ MHz}}{3}$
10-4L Low Band	= Channel frequency + 10.7 MHz
10-4U UHF Band	= $\frac{\text{Channel frequency} - 10.7 \text{ MHz}}{9}$
Frequency tolerance	$\pm .001\%$ @ 25 °C $\pm .005\%$ @ -55 °C to +105 °C
Mode	Series resonance -450 Hz 3rd overtone
Impedance	35 Ω maximum
Holder	HC-25/U

SECTION II INSTALLATION

2.1 MOUNTING SUGGESTIONS

The Model 10-4 Scanning Monitor can be mounted in any position without affecting its performance. The desired method and location of mounting should be determined before attempting the installation.

When selecting the mounting position, keep the following in mind:

1. The controls must be convenient and visible.
2. The location should not interfere with the operator's normal functions.
3. The monitor should not be mounted in the way of heater ducts, air-conditioning outlets, or direct blast air inlets.

2.2 CRYSTAL INSTALLATION

Up to 4 crystals may be installed at one time. When installing crystals note the socket for Channel 4 is nearest the front of the receiver and Channel 1 is to the rear of the receiver.

A frequency trimming adjustment is provided for each channel adjacent to the crystal socket and should be adjusted for best reception on the desired channel frequency.

Crystals used in these scan monitors within the specified frequency range may simply be plugged into the appropriate sockets and monitored. Any crystals used other than these ranges should be installed by qualified licensed technicians so that appropriate retuning can be accomplished for best performances. Insert the crystals in their proper sockets by aligning them directly over the pins and pushing straight in. Attempting to insert them at an angle may distort the socket and cause it to lose its holding power.

NOTE

All crystals supplied for use in PACE 10-4 Scan Monitors have been individually checked for activity, proper frequency, and freedom from spurious and parasitic oscillations. Use of any crystals not supplied by PACE does not insure against off frequency operation, spurious radiations, substandard performance, or temperature drift, nor will defects which in our opinion were caused by use of such crystals be corrected under warranty.

2.3 ANTENNA INSTALLATION

The antenna supplied with this unit plugs into the antenna jack on the side of the case. For mobile application or receiving weak signals, an external type antenna should be plugged into the antenna jack.

For best base station reception, we recommend an external antenna. This antenna should be mounted on a pole or pipe at the highest possible elevation. RG-58/U cable with a PL-259 plug should be ordered.

2.4 INSTALLATION FOR AC OPERATION

Merely plug the two pin receptacle into the pronged pins on the rear panel, and plug in the AC power cord into any 110 volt AC 60 cycle socket. The Scan Monitor needs very little ventilation. However, it is recommended not to place the Scan Monitor in extremely warm areas such as near radiators or heating vents.

Insert the antenna as referred to in the ANTENNA section.

If a remote speaker is required, merely plug into the external speaker jack in back of the set.

If using the receiver in a building containing heavy electrical machinery or many fluorescent lights, it is recommended to run a grounding wire from the case or rear panel to a metal pipe or structure to minimize interference from electrical power line noises.

2.5 INSTALLATION FOR MOBILE OPERATION

The Scan Monitor may be operated in any truck or car with the use of a mobile antenna.

There are many types of mobile antennas available depending upon the type of vehicle and the location in which mounting is desired. The radio can be mounted by using the mobile mounting bracket supplied.

SECTION III PRINCIPLES OF OPERATION

3.1 GENERAL

This section contains a general description of the SCAN 10-4 Series operating principles. Major circuit functions and system operation are discussed. Circuits in all scanning receivers are similar except for the front ends, so that only the 10-4L will be discussed.

3.2 CIRCUIT DESCRIPTION

3.2.1 Receiver Circuit (Figure 3-1)

The receiver is a double conversion superheterodyne using crystal controlled oscillators. The first mixer (Q102) uses high-side injection from oscillator Q3. This results in a first IF frequency of 10.7 MHz. The second mixer (Q1) obtains injection from the 10.245 MHz oscillator Q4 which results in the second IF frequency of 455 kHz. The output of Q1 passes through ceramic filter CF1 to the FM IF amplifier/limiter/detector IC2.

Audio output, from the limiter, is coupled to the audio pre-amplifier via C43. The transistor of this stage is contained within the multifunction chip IC3. Interconnection between stages is made externally. Thus, the output from the pre-amplifier is coupled to the driver via C25, VR2, and C26. Finally, audio from the power amplifier is coupled to the speaker via C30.

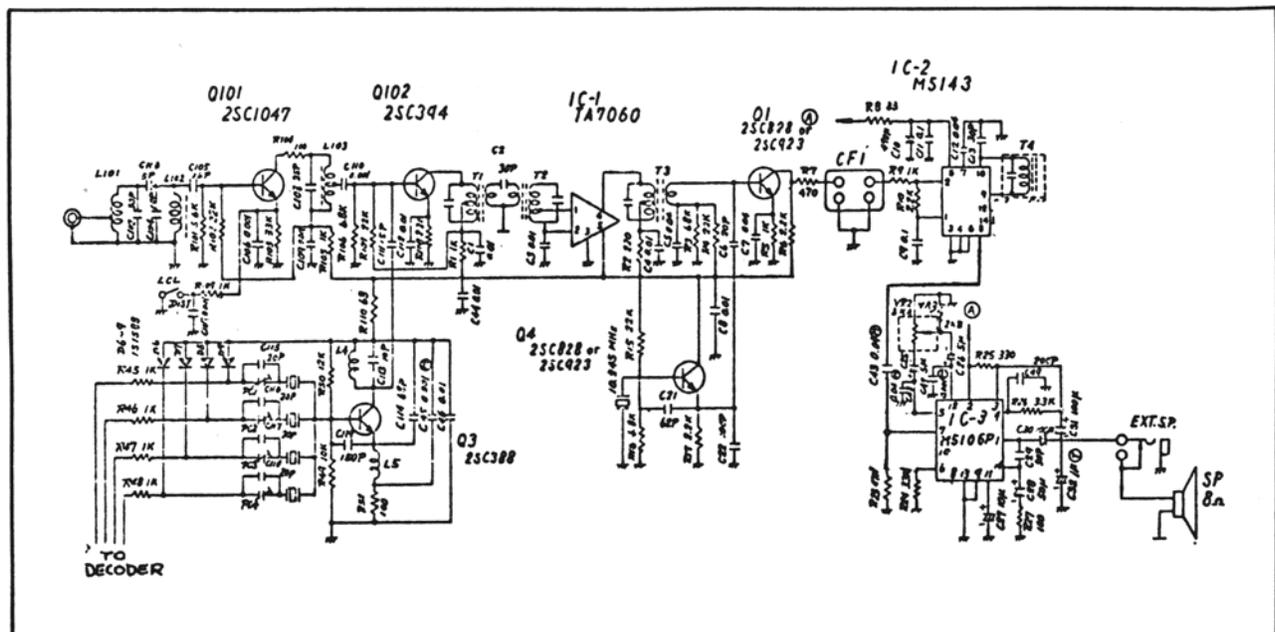


Figure 3-1 Receiver Circuit

3.2.2 Squelch Circuit (Figure 3-2)

A second output from the detector is taken from pin 12 of IC2 where it passes through a high-pass filter (C15, L6, and C16) to the base of noise amplifier Q2. This high-frequency noise is rectified in D1, D2, and C20, and coupled via squelch control VR1 to the squelch detector contained within IC3. With increased noise, gain of the audio pre-amplifier is decreased.

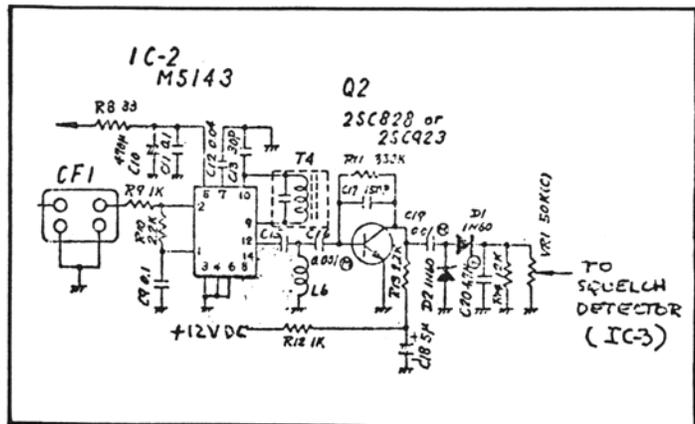


Figure 3.2 Squelch Circuit

3.2.3 Scan Circuit (Figure 3-3)

With no signal present, positive voltage is fed to the base of Q5, via R18 and D3. This permits scan trigger oscillator (Q6 and Q7) to oscillate and supply pulses to the first of two flip-flops contained in IC4 and associated circuitry. The output from the first flip-flop, in turn, triggers the second flip-flop as shown in the scan logic circuit of Figure 3-4.

When a signal is present, the anode of D3 is shunted to ground through the squelch detector in IC3. This cuts off Q5, which turns off the scan trigger oscillator and the scanner locks in on that channel.

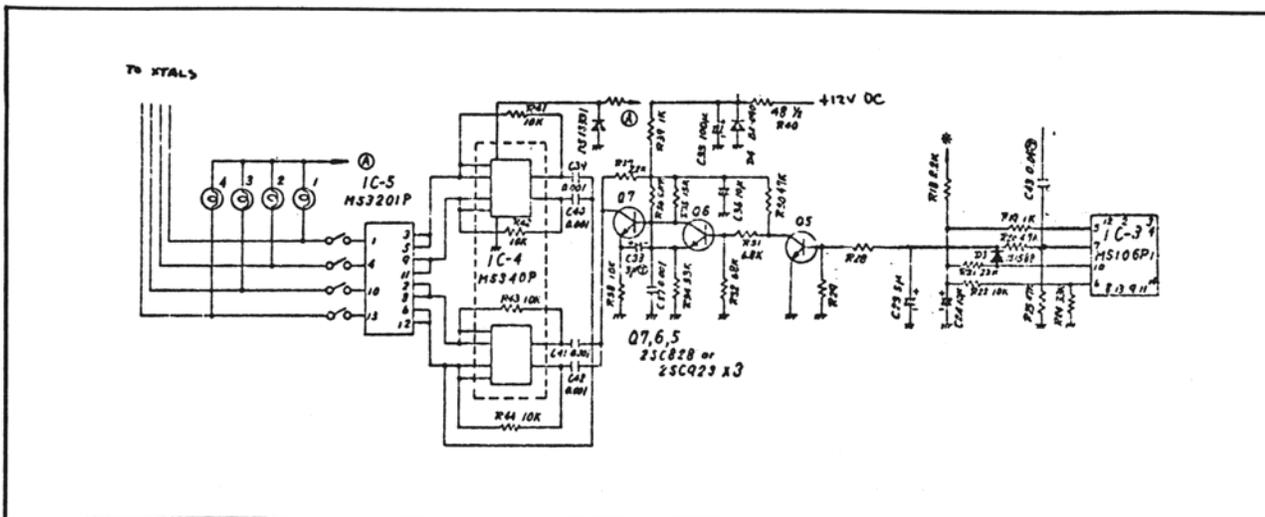


Figure 3-3 Scan Circuit

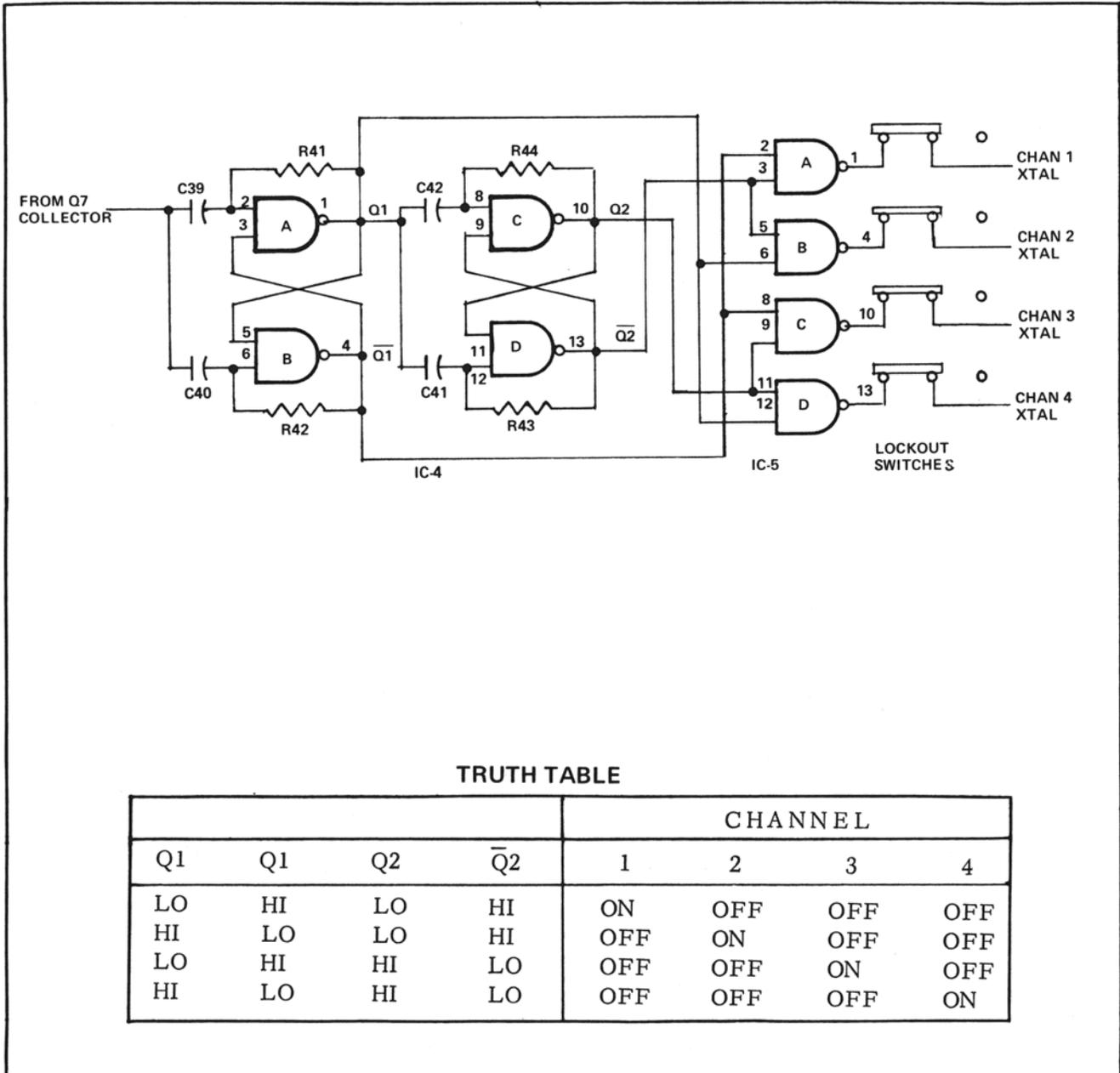


Figure 3-4 Scan Logic and Truth Table

**SECTION IV
MAINTENANCE**

4.1 GENERAL

This section contains maintenance instructions for the PACE Model SCAN 10-4 Series Monitors. The procedures given in this section assume a general knowledge of communications—FM type receivers and a familiarization with transistors and IC's.

4.1.1 Tools and Techniques

A list of recommended tools and test equipment required for maintenance operations is presented in Table 4-1. 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 trim potentiometers located in the affected circuits. Standard practices in the electronic industry should be observed in checking and/or replacing system components.

4.1.2 Parts Identification

For Printed Circuit Board Assembly (PCBA) component location, refer to illustrations and schematics in Section VI.

4.2 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.

**TABLE 4-1
TEST EQUIPMENT REQUIRED**

Item	Model or Description
VOM	Simpson 260 or equivalent.
AC VTVM	Simpson 715 or equivalent.
RF Voltmeter	Boonton 91H or equivalent.
Signal Generator	Singer-Gertsch FM-10 or equivalent.
RF Probe for VOM	If none available for instrument, one may be fabricated as shown in Figure 4-1.

4.2.1 Voltage Check

DC power supply output voltages should be checked periodically to verify that the voltages are within specified limits. Output voltage levels should be as noted in Table 4-2. These voltages are based upon an input voltage of 13.8 volts DC \pm 5%.

4.2.2 Maintenance Check

The purpose of this maintenance check is to verify the general operational status of the receiver. In addition to including the DC power supply voltage check described in Section 4.2.1, it includes a visual inspection of the unit and a general cleaning of all potentiometers, switches, plugs, and jacks. To conduct the semi-annual maintenance check, proceed as follows:

1. Visually inspect each printed circuit board (PCB) for evidence of overheated components, excessive dirt, or foreign material, or other physical damage. Inspect all connectors for dust corrosion or foreign material.

NOTE

Replacement or repair of the PCB is recommended if any of the components show evidence of overheating, thus preventing possible failure during system operation.

2. Blow out all dust from chassis and PCB components.
3. Clean and lubricate all potentiometer switches, plugs and jacks.
4. Upon completion of the visual inspection and cleaning procedure, energize the unit and check power supply output voltage levels, as described in Section 4.2.1.

**TABLE 4-2
POWER SUPPLY VOLTAGE CHECKS**

Test Point	DC Voltage
Point A	+12 V
Cathode of D4	+9 V
Cathode of D5	+4.5 V

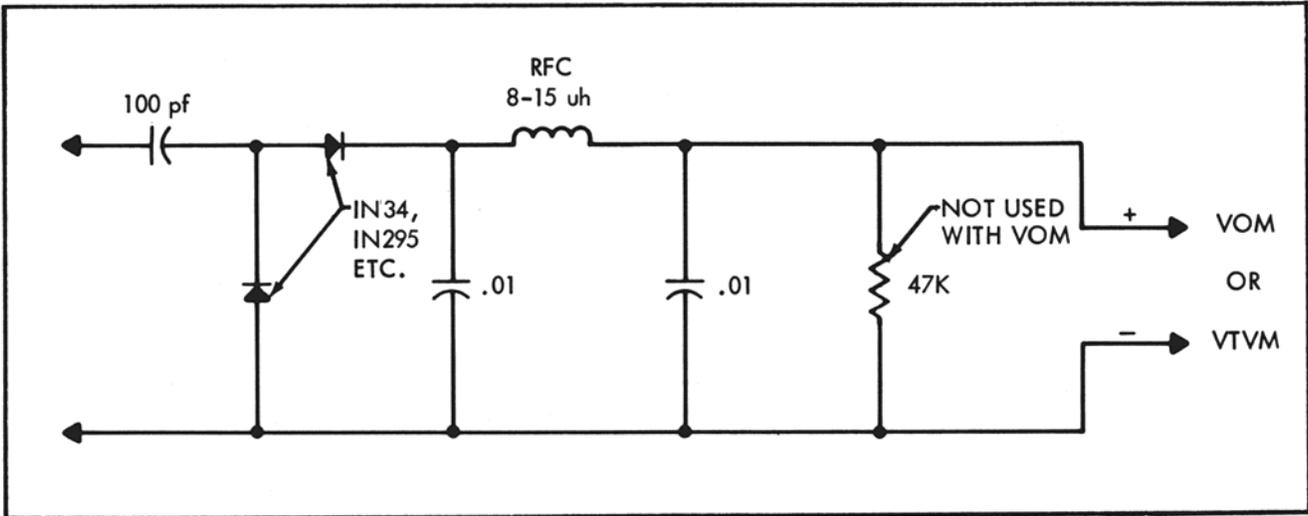


Figure 4-1 RF Probe

4.3 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 V for alignment and adjustment procedures.

4.4 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 VI.

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 DC voltage and resistance measurements. Refer to voltage charts in Tables 4-3 through 4-5.

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 \pm 5% DC input and no crystals installed. Measurements were made in manual mode unless otherwise indicated. All voltages are positive and have a tolerance of \pm 10%.

TABLE 4-3
IF AND AUDIO CIRCUIT DC VOLTAGE CHART

TRANSISTORS				
10-4U	10-4H & L	E	B	C
Q5	Q1	1.4	2.0	5.5
Q6	Q2	0	0.5	3.0
INTEGRATED CIRCUITS				
Pin No.	IC1	IC2	IC3	
1	1.4	1.5	6.0	
2	1.4	1.5	12.5	
3	0	0	12.0	
4	6.5	0	7.5	
5	7.0	11.0	{ SQ 7.0 UNSQ 6.0	
6	-	0	{ SQ 1.5 UNSQ 2.5	
7	-	6.5	{ SQ 0 UNSQ 3.5	
8	-	5.5	{ SQ 0.6 UNSQ 0	
9	-	4.0	0	
10	-	4.0	{ SQ 0 UNSQ 4.0	
11	-	-	6.0	
12	-	5.0	6.0	
13	-	-	0	
14	-	1.5	6.0	

TABLE 4-4
OSCILLATOR CIRCUIT DC VOLTAGE CHART

TRANSISTORS				
10-4U	10-4H & L	E	B	C
Q3*	Q3*	0.9	1.5	6.5
Q7	Q4	2.6	2.0	9.0

* Measured with all channels locked out.

**TABLE 4-5
SCANNING LOGIC CIRCUITS DC VOLTAGE CHART**

TRANSISTORS								
10-4U		10-4H & L		E	B	C		
Q8		Q5		SQ	0	0	4.0	
				UNSQ	0	0.6	0	
Q9		Q6		SQ	4.5*	4.0	6.0*	
				UNSQ	1.0	0	7.0	
Q10		Q7		SQ	5.8*	6.0*	7.0*	
				UNSQ	7.0	7.0	6.7	

INTEGRATED CIRCUITS								
Pin Number	IC4 CHANNEL ON				IC5 CHANNEL ON			
	1	2	3	4	1	2	3	4
1	0.3	4.5	0.3	4.5	0.5	12	12	12
2	1.5	4.5	1.5	4.5	4.5	0.3	4.5	0.3
3	4.5	0.3	4.5	0.3	4.5	4.5	0.3	0.3
4	4.5	0.3	4.5	0.3	12	0.5	12	12
5	0.3	4.5	0.3	4.5	4.5	4.5	0.3	0.3
6	4.5	1.5	4.5	1.5	0.3	4.5	0.3	4.5
8	1.5	1.5	4.5	4.5	4.5	0.3	4.5	0.3
9	4.5	4.5	0.3	0.3	0.3	0.3	4.5	4.5
10	0.3	0.3	4.5	4.5	12	12	0.5	12
11	0.3	0.3	4.5	4.5	0.3	0.3	4.5	4.5
12	4.5	4.5	1.5	1.5	0.3	4.5	0.3	4.5
13	4.5	4.5	0.3	0.3	12	12	12	0.5

*Pulsating DC.



4.5 NOISE SUPPRESSION

When installed in a vehicle whose ignition system proves to be unusually noisy, local measures can be taken on the vehicle to reduce such noise. Usually simple suppression of spark plugs may suffice. However, more difficult cases may require special techniques. Sometimes generator and voltage regulator "hash" may be troublesome. Special capacitors and/or complete kits are available depending upon requirements.

Little can be done to reduce noise interference from other mobile sources. The PACE SCAN 10-4 has the finest noise suppression circuitry available today regardless of cost. Only special and expensive noise blankers can improve upon its noise rejection. "Outboard" noise suppressors available from \$20 to \$50 on the market cannot improve PACE as noise is already suppressed beyond the capability of such devices. If noise is experienced in base station operation from fluorescent lamps, motors, etc., suppression devices are available from radio distributors specifically designed for radio noise suppression of these appliances.

SECTION V ADJUSTMENTS AND ALIGNMENT

5.1 GENERAL

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 4-1 for a list of recommended test equipment.

5.2 ALIGNMENT PROCEDURE

5.2.1 IF Alignment

1. Connect a DC voltmeter, through an RF probe (Figure 4-1) to terminal 2 of IC2.
2. Connect an FM signal generator to the antenna jack. Set the frequency to the RF carrier frequency of the crystal installed in Channel 1 position. Check to see that the Channel 1 indicator lamp remains lit.
3. With no modulation of the signal, adjust the generator output control for an indication on the meter of approximately 0.5 volts.
4. Tune T1, T2, and T3 for maximum indication on the meter. Reduce the signal generator level to maintain approximately 0.5 volts on the meter. This procedure is common to all models. Refer to Figure 5-1.

5.2.2 RF Amplifier Alignment

NOTE

Adjustable components in this circuit have been precisely set at the factory. They should not be readjusted unless one of the critical tuning components associated with them has been replaced or the seals on the coils broken.

A. Models 10-4H and 10-4L (Figure 5-1)

1. Repeat steps 1 through 3 of Section 5.2.1.
2. Tune L101 through L103 for maximum indication on the meter. Reduce the signal generator level to maintain approximately 0.5 volts on the meter.

B. Model 10-4U (Figure 5-2)

1. Repeat steps 1 through 3 of Section 5.2.1.
2. Adjust PC1 and PC2 for maximum indication on the meter. Reduce the signal generator level to maintain approximately 0.5 volts on the meter.

5.2.3 Oscillator Alignment

NOTE

Adjustable components in this circuit have been precision set at the factory. Only the trimmer capacitors associated with the crystals should need adjustment when a new crystal is installed. All other adjustable components should not be readjusted unless one of the critical tuning components associated with them have been replaced, or the seals on the coils broken.

A. Models 10-4H and 10-4L (Figure 5-1)

1. Repeat steps 1 through 3 of Section 5.2.1.
2. Tune L4 for maximum indication on the meter. Reduce the signal generator level to maintain approximately 0.5 volts on the meter.
3. Adjust PC1 for maximum indication on the meter.
4. Set the signal generator frequency to that of the RF carrier frequency of the crystal installed in the Channel 2 position. Check to see that the Channel 2 indicator lamp remains lit.
5. Adjust PC2 for maximum indication on the meter.
6. Repeat steps 4 and 5 for crystals in Channels 3 and 4, adjusting PC3 and PC4.

B. Model 10-4U (Figure 5-2)

1. Repeat steps 1 through 3 of Section 5.2.1.
2. Tune L3 and PC3 for maximum indication on the meter. Reduce the signal generator level to maintain approximately 0.5 volts on the meter.
3. Adjust PC7 for maximum indication on the meter.
4. Repeat steps 4 through 6 of part A, adjusting PC6 for Channel 2, PC5 for Channel 3, and PC4 for Channel 4.

5.2.4 FM Detector Coil Alignment (Figure 5-1)

1. Connect an AC VTVM, on its 3 volt scale across the speaker terminals.
2. Connect an FM signal generator to the antenna jack. Set the frequency to the RF carrier frequency of the crystal installed in the Channel 1 position. Frequency modulate the signal at 1 kHz with 3 to 5 kHz deviation.
3. Tune T4 for maximum indication on the voltmeter.

5.3 VOLUME LIMIT POTENTIOMETER ADJUSTMENT (Figure 5-1)

1. Repeat steps 1 and 2 of Section 5.2.3.
2. Set the volume control to its maximum clockwise position.
3. Adjust trimming potentiometer, VR3, for 2.9 volts on the meter.

NOTE

In some units, this potentiometer is wired to the volume control.

5.4 QUIETING SENSITIVITY CHECK

After the receiver has been completely aligned, check the quieting sensitivity as follows:

1. Lock the scanner in on one of the channels.
2. Connect an AC VTVM, on its 3 volt scale across the speaker terminals.
3. Turn the receiver squelch control fully counterclockwise (squelch off).
4. Adjust the volume control for a zero dB reference level on the AC VTVM.

5. Connect an unmodulated FM signal generator to the antenna jack. The generator frequency should be set to the frequency of the locked-in channel.
6. Adjust the generator output level for a -20 dB indication on the AC VTVM. The level should be 0.6 microvolts or less. If greater than 0.6 microvolts, repeat Section 5.2.2.

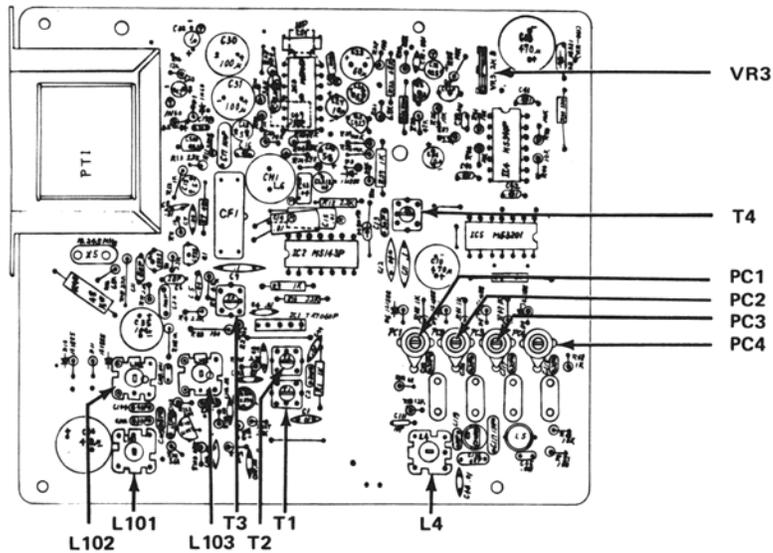


Figure 5-1 Adjustment Locations for SCAN 10-4H and 10-4L

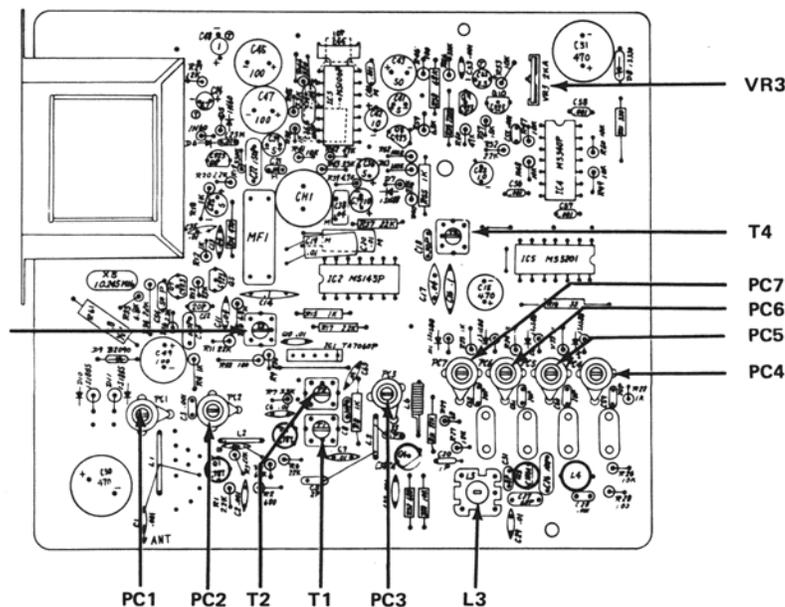


Figure 5-2 Adjustment Locations for SCAN 10-4U

**SECTION VI
ILLUSTRATIONS AND PARTS LIST**

6.1 GENERAL

The schematics and parts locators in this section are for the PACE Model SCAN 10-4 Series Scanning Receivers. Part numbers and descriptions are keyed to the schematic reference numbers and are listed for these components.

**TABLE 6-1
PARTS LIST**

Reference Number	Description	Part Number
CAPACITORS*		
Models 10-4H and 10-4L		
C2(H)**, 16, 37, 39, 40, 41, 42, 45, 47, 110	Mylar, 0.001 μ F	IP 22-0014
C10, 33, 34	Electrolytic, 470 μ F 16 V	IP 22-0010
C14, 15, 19	Mylar, 0.01 μ F	IP 22-0015
C18, 20, 23, 25, 26	Electrolytic, 4.7 μ F 16 V	IP 22-0003
C24, 27, 36	Electrolytic, 10 μ F 16 V	IP 22-0004
C28	Electrolytic, 47 μ F 16 V	IP 22-0006
C30, 31, 35	Electrolytic, 100 μ F 16 V	IP 22-0008
C32	Tantalum, 1 μ F 16 V	IP 22-0001
C38	Tantalum, 3.3 μ F 16 V	IP 22-0002
C43, 48	Mylar, 0.04 μ F	IP 22-0018
PC1 thru PC4	Ceramic, Trimmer, 30 pF	IP 22-0021
Model 10-4U		
C15, 50, 51	Electrolytic 470 μ F 16 V	IP 22-0010
C19, 20, 23	Mylar, 0.01 μ F	IP 22-0015
C21, 40	Mylar, 0.001 μ F	IP 22-0014
C24, 25, 36, 39, 41	Electrolytic, 4.7 μ F 16 V	IP 22-0003
C37, 42, 52	Electrolytic, 10 μ F 16 V	IP 22-0004
C38, 64	Mylar, 0.04 μ F	IP 22-0018
C43	Electrolytic, 47 μ F 16 V	IP 22-0006
C45, 47, 49	Electrolytic, 100 μ F 16 V	IP 22-0008
C48	Tantalum, 1 F 16 V	IP 22-0001
C65	Tantalum, 3.3 μ F 16 V	IP 22-0002
PC1, 2, 3	Trimmer, Ceramic, 10 pF	IP 22-0019
PC4, 5, 6, 7	Trimmer, Ceramic, 30 pF	IP 22-0021

Table 6-1
(Continued)

RESISTORS*

All Models

VR1	Potentiometer, SQUELCH 50 k Ω .	IP 24-0010
VR2	Potentiometer w/SW, VOLUME, 5 k Ω	IP 24-0009
VR3	Trimmer, 2 k Ω	IP 24-0011

CHOKES, INDUCTORS AND TRANSFORMERS

Models 10-4H and 10-4L

L4	Coil, HF, HL-121	IP 21-0106
L5	Coil, HF, HL-125	IP 21-0107
L6	Inductor, 473J	IP 21-0108
L101	Coil, HF, HL-131	IP 21-0109
L102	Coil, HF, HL-132	IP 21-0110
L103	Coil, HF, HL-133	IP 21-0111
PT1	Transformer, Power, AC	IP 21-0115
T1, 2, 3	Coil, IF, 85AC2531	IP 21-0038
T4	Coil, IF, LPC4201	IP 21-0033

Model 10-4U

CH1	Inductor, 4735	IP 21-0108
L1, 2, 5	Coil, HF, HL-126	IP 21-0113
L3	Coil, HF, HL-121	IP 21-0106
L4	Coil, HF, HL-125	IP 21-0107
L6	Coil, HF, HL-127	IP 21-0114
PT1	Transformer, Power, AC	IP 21-0115
T1, 2, 3	Coil, IF, 85AC2531	IP 21-0038
T4	Coil, IF, LPC4201	IP 21-0033

DIODES, TRANSISTORS AND INTEGRATED CIRCUITS

Models 10-4H and 10-4L

D1, 2	Diode, 1N60	IP 20-0060
D3, 6, 7, 8, 9	Diode, 1S1588	IP 20-0061
D4	Diode, BZ090	IP 20-0019
D5	Diode, 1S331 or WZ-061	IP 20-0062
Q1, 2, 4 thru 7	Transistor, 2SC828	IP 20-0091
Q3	Transistor, 2SC388A	IP 20-0088
Q101, 102(H)**	Transistor, 2SC1014	IP 20-0033
Q102 (L)**	Transistor, 2SC394	IP 20-0038

Table 6-1
(Continued)

Model 10-4U

D1, 2, 3, 4, 7	Diode, 1S1588	IP 20-0061
D5, 6	Diode, 1N60	IP 20-0060
D8	Diode, 1S330	IP 20-0086
D9	Diode, BZ090	IP 20-0019
Q1, 2	Transistor, 2SC787	IP 20-0087
Q3	Transistor, 2SC388A	IP 20-0088
Q4	Transistor, 2SC387A	IP 20-0089
Q5 thru 10	Transistor, 2SC923	IP 20-0090

All Models

D10, 11	Diode, 1S1885	IP 20-0054
IC1	Integrated Circuit, TA7060P	IP 20-0093
IC2	Integrated Circuit, M5143P	IP 20-0094
IC3	Integrated Circuit, M5106P	IP 20-0095
IC4	Integrated Circuit, M5340P	IP 20-0096
IC5	Integrated Circuit, M53201P	IP 20-0097

MISCELLANEOUS

All Models

CF1	Filter, Ceramic	
	For 10-4L	IP 31-0052
	For 10-4H & U	IP 31-0045
	Cord, Power, DC	IP 35-0001
	Crystal, 10.245 MHz*	
	Fuse, 1A*	
	Jack, Antenna	IP 26-0002
	Jack, Power, AC	IP 26-0001
	Jack, Power, DC	IP 26-0007
	Jack, Speaker, External	IP 26-0005
	Lamp, Pilot, 15 V/40 mA	IP 28-0009
	Socket, Crystal	IP 34-0001
	Speaker, 8 Ω , 0.3 W	IP 29-0002
	Switch, Slide	IP 25-0001

* Order all unlisted components by description and reference number.

** (H) in 10-4H only, (L) in 10-4L only.

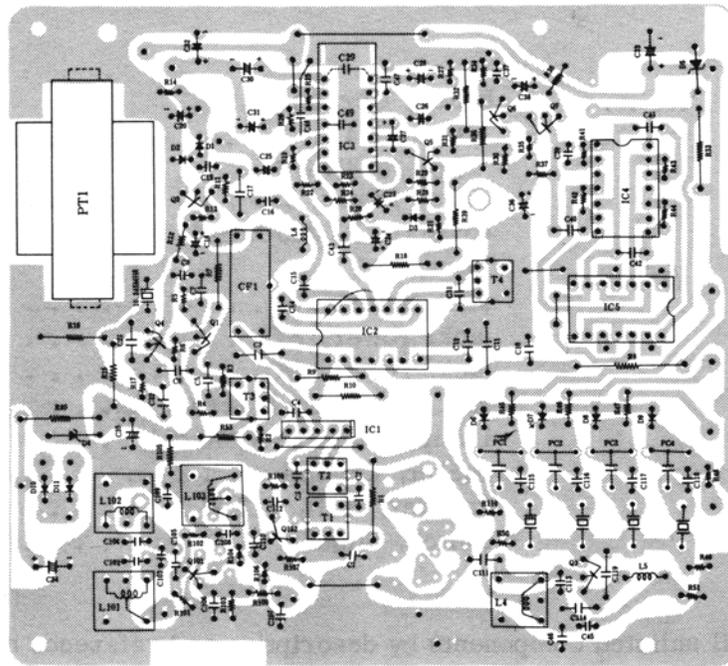
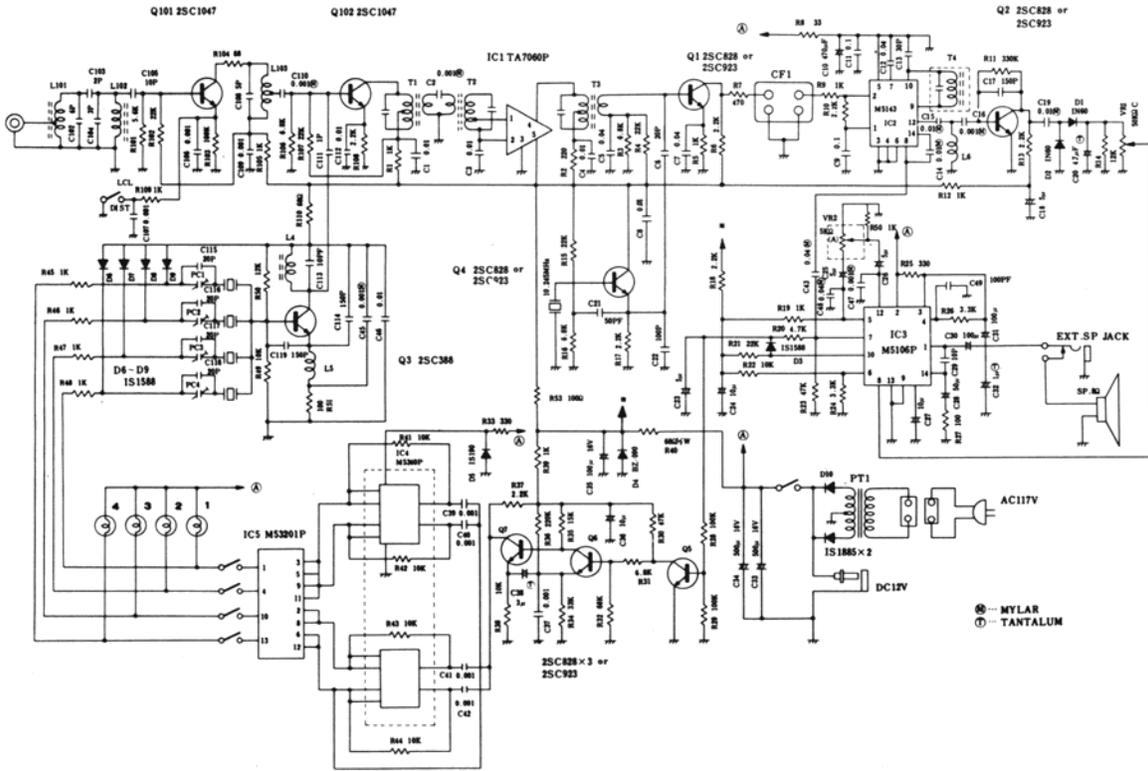


Figure 6-1 10-4H Schematic and Parts Locator (Top View)

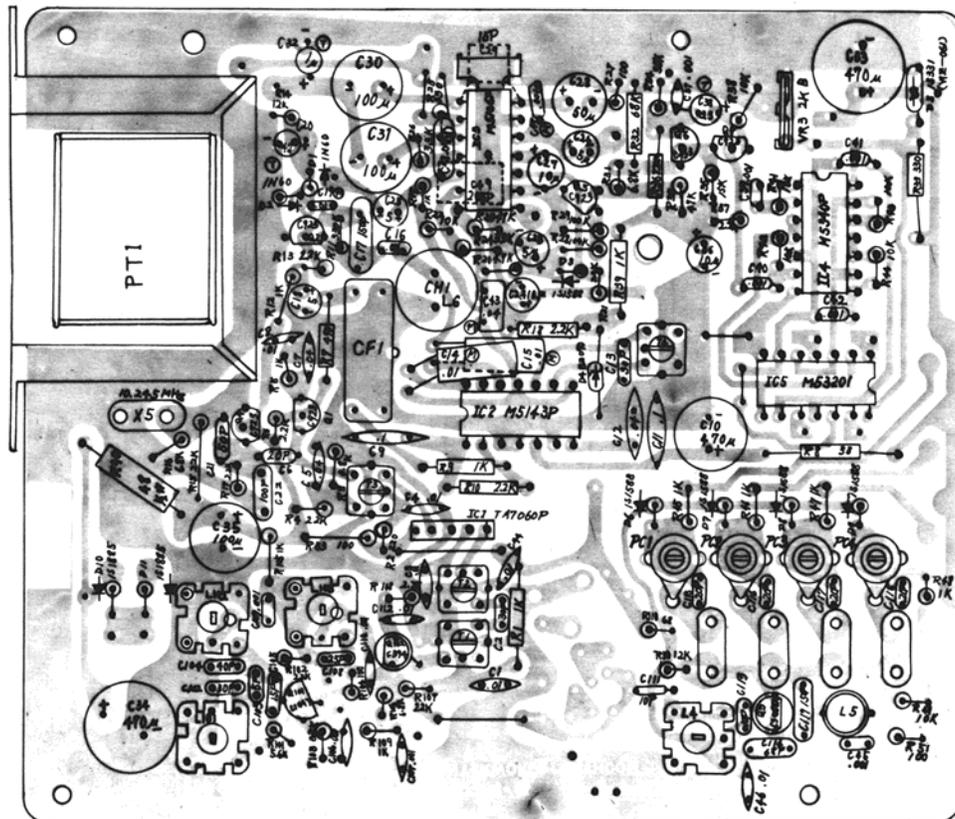
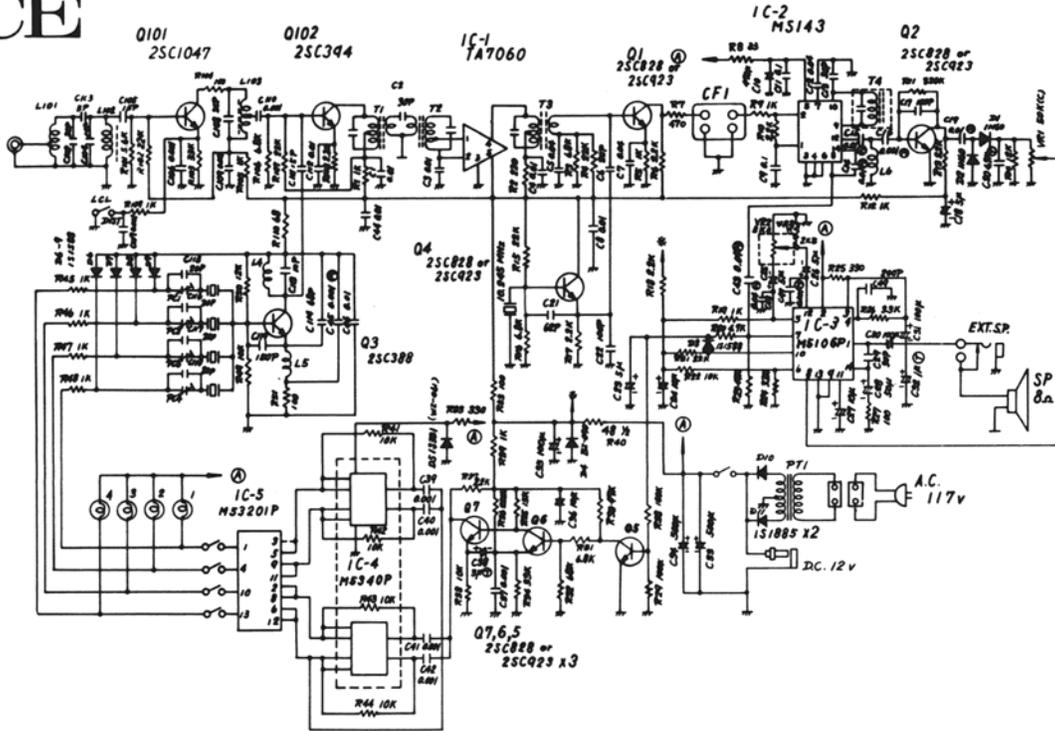


Figure 6-2 10-4L Schematic and Parts Locator (Top View)

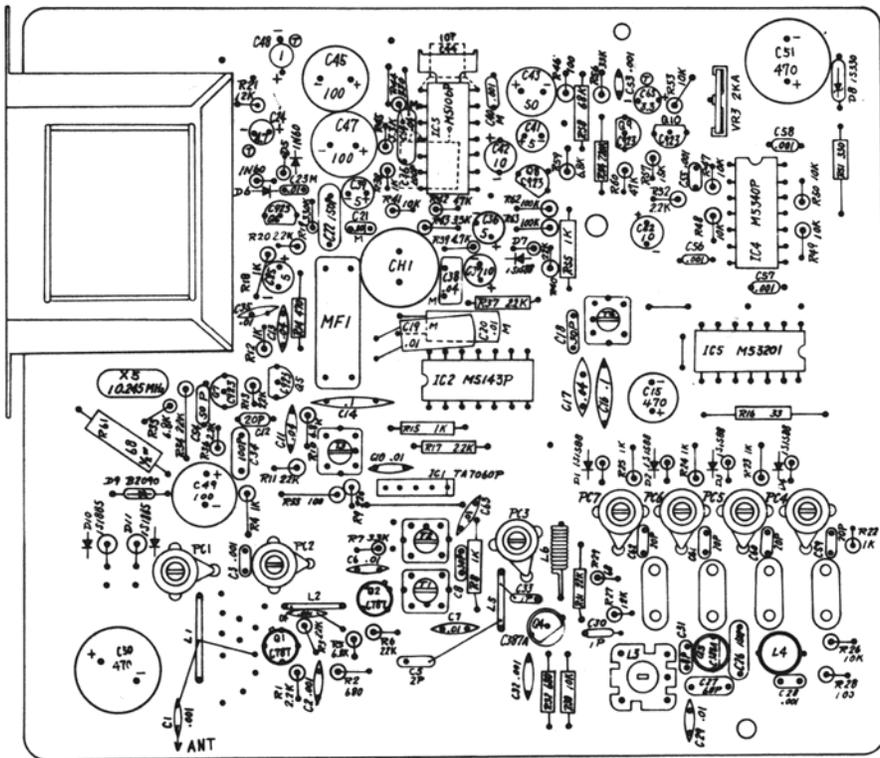
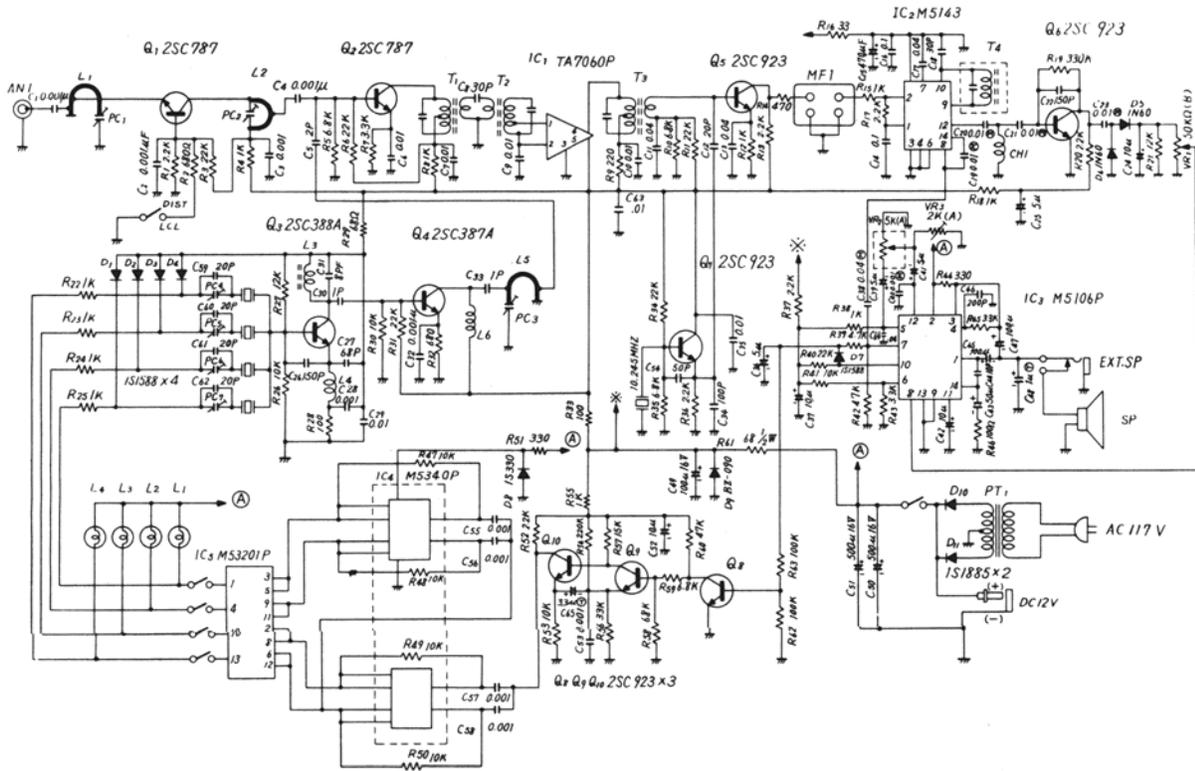


Figure 6-3 10-4U Schematic and Parts Locator (Top View)