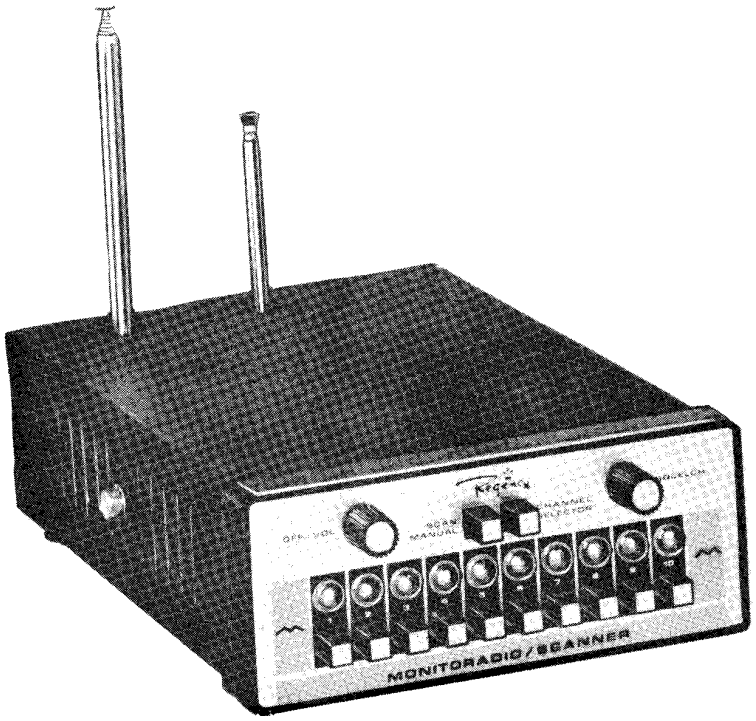
Regency ELECTRONICS INC.

SERVICE MANUAL



MODEL ACT-R10 H/L/U

MONITORADIO RECEIVER

7707 RECORDS STREET
INDIANAPOLIS, INDIANA 46226

PRINTED IN U. S. A
3-75

PRICE $5.00
SM-10-475

MONITORADIO RECEIVER

CONTENTS

SECTION 1 SPECIFICATIONS AND CIRCUIT DESCRIPTION

1-1 SPECIFICATIONS (Subject To Change Without Notice)

RECEIVER -MODEL ACT-R 10 H/L/U

Frequency Range ..... Low Band; 30-50 MHz
High Band; 150-174 MHz
UHF Band; 450-470 MHz
Antenna Impedance ..... 50 Ohms
Channels ..... 10, Crystal Controlled
Sensitivity (At Tune-Up) ..... Low Band; 0.5μv (max.)
High Band; 0.6μv (max.)
UHF Band; 0.7μv (max.)
Frequency Separation
Low Band ..... 6 DB Bandwidth; 33-47 MHz
10 DB Bandwidth; 30-50 MHz
High Band ..... 6 DB Bandwidth; 8 MHz
10 DB Bandwidth; 12 MHz
UHF Band ..... 6 DB Bandwidth; 8 MHz
10 DB Bandwidth; 12 MHz
Selectivity (I.F.) ..... 6 DB Down; ±7 KHz (min.)
50 DB Down; ±18 KHz (max.)
Spurious Rejection (excluding Primary Image) ..... 50 DB
AFC Range (UHF Band Only) ..... Approx. ±5 KHz
Modulation Acceptance ..... ±7 KHz (min.)
Intermediate Frequencies ..... 1st I.F. -10.7 MHz
2nd I.F. -455 KHz
Squelch System ..... "Noise Operated"
Audio Output (3.2 Ω Speaker) ..... 1 Watt @ 10%, or less,
Distortion; 2 Watts, maximum

SCANNER

Scan Rate ..... Approx. 15 Channels per sec.
Scan Delay ..... Approx. 1/2 sec.

POWER

Voltage Requirement ..... 117 VAC (±10%),
60 Hz, 13 Watts Max.
13.8 VDC (±10%)
Current Requirements ..... @ 13.8 VDC
Receiver (Squelched) ..... 180 MA.
Receiver (Max. Audio Output) ..... 600 MA.
Fuse Size ..... 1.5 Amp., 3AG

SEMICONDUCTORS

Integrated Circuits	5
Silicon Transistors	24
Field Effect Transistor	1
Diode (Total)	29
Zener Diodes	2
Rectifier Diodes	2
Varactor Diode	1

GENERAL

Front Panel Size	6 1/2" x 2 5/8"
Depth (including Knobs and Rear Panel Connectors)	9 3/4"
Antenna Connectors	Motorola Type
Speaker Size	2" x 6", 8 Ohm

1-2 CRYSTAL SPECIFICATIONS

Minature plug-in crystals are utilized in the receiver. Because of the high accuracy (close tolerance) required, Shepherd Industries' crystals are recommended. If the crystals are ordered from Regency, it is only necessary to specify Part No. 301-532 for High Band crystals and the desired receive frequency, or Part No. 301-542 for Low Band crystals and the desired receive frequency, or Part No. 301-603 for UHF (450-470 MHz) crystals and the desired receive frequency, or Part No. 302-187 for UHF (470-500 MHz) crystals and the desired receive frequency.

If desired, the crystals may be purchased from other manufacturers. The following specifications must be included in the order:

High Band Crystal:

a. Crystal frequency, determined as follows:

$$\text{Crystal frequency} = \frac{\text{Channel frequency} - 10.7\ \text{MHz}}{3}$$

EXAMPLE:

$$\text{Crystal frequency} = \frac{155.55\ \text{MHz} - 10.7\ \text{MHz}}{3} = \frac{144.85\ \text{MHz}}{3} = 48.2833\ \text{MHz}$$

b. Frequency Tolerance of .001%
c. 3rd Overtone
d. Series resonance minus 450 Hz
e. Maximum equivalent series resistance of 35 ohms
f. Drive Level of 2 MW
g. Holder: HC-25/U

Low Band Crystal:

a. Crystal frequency, determined as follows:
Crystal frequency = Channel frequency +10.7 MHz

EXAMPLE:
Crystal frequency = 39.5 MHz +10.7 MHz = 50.2 MHz

b. Frequency Tolerance of .001%
c. 3rd Overtone
d. Series resonance minus 450 Hz
e. Maximum equivalent series resistance of 35 ohms
f. Drive Level of 2 MW
g. Holder: HC-25/U

UHF Band Crystal (450-470 MHz):

a. Crystal frequency = $\frac{\text{Receive frequency -10.7 MHz}}{9}$

EXAMPLE:
Crystal frequency = $\frac{\text{458.00 MHz -10.700 MHz}}{9}$

Crystal frequency = 49.70000 MHz

b. Frequency Tolerance of .001%
c. 3rd Overtone
d. Parallel resonance - 18 PF load capacity
e. Maximum equivalent series resistance of 35 ohms
f. Drive Level of 2 MW
g. Holder: HC-25/U

UHF Band Crystal (470-500 MHz):

a. Crystal frequency = $\frac{\text{Receive frequency -10.7 MHz}}{10}$

EXAMPLE:
Crystal frequency = $\frac{\text{485.10 MHz -10.7 MHz}}{10}$

Crystal frequency = 47.44000 MHz

b. Frequency Tolerance of .001%
c. 3rd Overtone
d. Parallel resonance - 18 PF load capacity
e. Maximum equivalent series resistance of 35 ohms
f. Drive Level of 2 MW
g. Holder: HC-25/U

1-3 CRYSTAL INSTALLATION AND BAND PROGRAMMING

Prior to installing a crystal, the receiver's cover will have to be removed. To remove the cover, first remove telescopic antennas if they are installed. Second, unscrew the two large bolts located at the sides of the unit. The cover may then be slipped off by sliding it toward the rear of the unit.

Insert the crystal in the proper socket pins as indicated on the Crystal Location Diagram. See diagram 3-7. The number by each pair of sockets matches the channel number on the front panel.

If the crystal inserted is for the Low VHF Band (30-50 MHz), place the proper color-coded wire and socket onto the proper Low Band pin (row of pins nearest front of unit); if the crystal is for the High VHF Band (148-174 MHz), place the proper color-coded wire onto the proper High Band pin (middle row of pins); if the crystal is for the UHF Band (450-470 MHz), place the proper color-coded wire onto the proper UHF Band pin (row of pins near the rear of set). See Crystal Location Diagram 3-7. Be sure that each channel has its color-coded wire programmed properly with respect to crystal installed. Reading from left to right (Channel 1 through 10), the color-coded wires should be in the order of brown, red, orange, yellow, green, blue, purple (or violet), pink, white and black.

NOTE: If a particular channel is not used (in other words, there is no crystal installed for that channel), the band selection wire must still be connected to either a High Band, a Low Band pin or to a UHF Band pin. Thus, for proper scanner operation, all of the band selection wires MUST be connected, even though not all channels are used.

As shipped from the factory, the first three channels are programmed for Low Band, the next four (channels 4 through 7) are programmed for the High Band and the last three (channels 8 through 10) are programmed for the UHF Band. If desired, this arrangement can be changed to any combination of High, Low or UHF Band channels.

After the crystals are installed and any necessary band programming changes are completed, reinstall the cover.

1-4 MAIN BOARD

Q101 is a Low VHF Band RF amplifier with broad-band tuned circuits in its input and output circuitry. The output of the RF amplifier is coupled to the input of the Low VHF Band mixer, Q102.

Q103 is a High VHF Band RF amplifier with broad-band circuits in its input and output circuitry. The output of the RF amplifier is coupled to the input of the High VHF Band mixer, Q104.

Q105 is the UHF Band Field Effect RF transistor used in the common gate configuration. Q105 has broad-band tuned circuits in its input and output circuitry. The output from the RF amplifier is coupled to the input of the UHF Band mixer, Q106.

The first L.O. (local oscillator), Q107, uses third overtone crystals and operates on all channels, whether High, Low or UHF. For Low VHF Band signals, the fundamental frequency of the crystal is taken off the Emitter of Q207 for injection. For High VHF Band signals, the third harmonic of the crystal is coupled off the collector of Q107 for oscillator injection. For UHF Band signals, the third harmonic of the crystal is coupled off the collector circuitry of Q107 and is coupled to the base of Q108. Q108 is a tripler which multiplies the 3rd harmonic of the oscillator by three for use as the ultimate injection frequency. The radio is switched between Low VHF Band, High VHF Band and UHF Band by transistors Q113, Q114 and Q115. When Q113 is conducting, operating bias is applied to Low VHF Band RF amplifier and mixer. When Q114 conducts, operating bias is applied to High VHF Band RF amplifier and mixer. When Q115 conducts, operating bias is applied to the UHF Band oscillator-multiplier, AFC circuitry and mixer. Conduction of Q115, Q114, and Q113 is determined by the Band Programming pins. A pin for each particular channel is connected to either the Low, High or UHF row of pins. When that particular channel is scanned the Low, High or UHF section is turned on depending on the band programming.

A crystal is electrically connected to the oscillator circuit when its associated diode is forward biased. Until the scanner reaches that particular channel, the diode is back biased and prevents the oscillator from operating on the crystal's frequency. When the respective channel is reached, the scanner's output line provides a low resistance path to ground. which turns the diode on (forward biases it) and effectively connects the crystal into the oscillator circuit.

The automatic frequency control circuit (AFC), UHF Band only, consists of Q109, Q110, Q111 and CR111. Q110 and Q111 form a differential amplifier. The voltage at pin 1 of IC102 is determined by the amount the signal is off frequency; this is called an error voltage. The error voltage is amplified by Q109 and applied to CR111. CR110 is a voltage dependent capacitor, or varactor, in the oscillator circuit. When the voltage applied to CR111 changes, the frequency of the oscillator is changed.

The second L.O. frequency is normally 10.245 MHz. In cases where interference is encountered from a signal approximately 910 KHz from the desired frequency, the second L.O. may be changed to 11.155 MHz. If the second L.O. is 10.245 MHz, the error voltage is taken from the collector of Q111. If the second L.O. has been changed to 11.155 MHz, the error voltage is taken from the collector of Q109. The correct combination can be determined by checking the frequency stamped on the second L.O. crystal, (Y111).

The output frequency from the first mixers is 10.7 MHz, the first IF frequency. It is filtered by L122, L123 and L124 before it is fed to an Integrated circuit IC101, which contains the second mixer circuitry and the second L.O. circuitry, normally operating at 10.245 MHz. In some locations where a strong Image signal has been encountered, this oscillator's frequency is moved to 11.155 MHz. (The crystal frequency is stamped on the top of the crystal).

The 455 KHz output of IC101 (terminal 5) is coupled through a tuned circuit to the input of the ceramic filter, CF101. CF101 is a narrow-band filter centered at 455 KHz. The excellent bandpass characteristics of CF101 provode for very good adjacent channel rejection. The output of CF101 is amplified by Q116 and coupled through another tuned circuit to the input of Integrated circuit IC102. IC102 is a series of amplifiers providing approximately 60 DB gain at 455 KHz. Also included in IC102 is the limiting circuitry and a Quadrature Detector circuit. L128, connected between terminals 2 and 12 of IC102, is the adjustable Quadrature coil.

The audio output from IC102 (terminal 1) is coupled to the input of the audio amplifier circuit and to the input of the noise-operated squelch circuit.

Transistor Q117 is an amplifier whose frequency response extends from approximately 5 KHz to 25 KHz. Q117 amplifies the "noise" occuring in this frequency range. The noise is coupled to the base of Q118. Q118 is used as a detector which rectifies the amplified noise and produces a DC voltage at its collector. When the DC voltage at the collector of Q118 is positive and of sufficient value to provide base bias for Q119, Q119 turns off and removes forward bias from diode, CR113 and leaves it back biased. This action prevents audio from reaching the speaker and the receiver is squelched (muted). When a signal (carrier) arrives, the output from the detector Q118 is reduced to the point where the DC voltage at the base of Q119 is no longer sufficient to cause Q119 to conduct.

At this time, CR113 is forward biased and allowed to conduct normally and the audio output of the unit is heard. Audio is applied through the volume control to IC103. IC103 is an Integrated circuit containing a power audio amplifier, gain is internally fixed at 34 DB or 50 times and the output is short circuit proof with internal thermal limiting. The output of IC103 is connected to an 8 ohm internally mount4d speaker. An external speaker can be connected to the unit, no less than a 8 ohm speaker is recommended for optimum performance.

The squelch tail circuit consists of R184, CR112, C170 and R185. This circuit is used to keep the squelch circuit open for a short time after the station signal goes off. The purpose of the squelch tail circuit is to prevent the squelch circuits from chopping very weak signals, especially mobile signals. The timing of the squelch tail can be changed by changing the value of C170. Removing C170 from the circuit will remove the squelch tail completely.

Five basic functional circuits make up the Scanner system. They are: a 4-bit binary counter, a binary coded decimal to one of ten decoder/driver, a lamp detector, a three-speed clock and a clock inhibitor.

The 4-bit binary counter (IC104) has four outputs (pins 8, 9, 11 and 12) and two inputs. One of the inputs (pin 1) accepts clock pulses and the other one (pin 14) accepts pulses from pin 11 of the counter. The counter counts the clock pulses (up to 16) and provides a binary-coded decimal (BCD) output for each input pulse. This is basically accomplished by having four divide-by-two sections (Flip-Flops) interconnected in a series circuit.

There is a specific combination, in a binary form, of these counter outputs for each channel. The Decoder/Driver (IC105) converts the BCD information into decimal configuration (0 through 9) and provides the "Low" output necessary to turn on the channel lamp and diode switch for the crystal. Only one Decoder/Driver output is low at any one time; all other outputs are "high" or near the supply voltage.

The duration for the lamp to be on is dependent upon the position of the channel switch and the Scan/Manual switch. If the channel switch is set to the "OUT" position, the lamp does not light at all and the Lamp Detector (Q120) remains cut off (no collector current). The clock runs at its FAST speed (approximately 1200 Hz) and the receiver's oscillator and squelch circuits can not react quickly enough to stop on that channel even if a RF signal were present.

If the channel switch is in the "IN" position, the channel lamp lights and the Lamp Detector (Q120) conducts, forcing the clock to run at its NORMAL (approximately 15 Hz) scan speed. Thus, the lamp is on long enough to reach normal illumination and the receiver's oscillator and squelch circuits can react quickly enough during this relatively long period of time to an incoming RF signal. It should be noted that the Clock runs at its FAST speed except when scanning through an active channel. In other words, until the Lamp Detector (Q120) determines that a channel lamp is drawing current, the Clock is operating in its FAST mode and it does not slow down to its NORMAL scan speed until it actually is partly into an active (lamp lit) channel.

When an RF signal is present, squelch is "broken" and a positive voltage is fed to the Clock Inhibitor (Q121) which then stops the clock from running. Thus, as long as an RF signal (carrier) is present, the clock is stopped and the Counter is not operative. After the RF signal is gone, a delay to the Clock starting again is provided by capacitor C179. This delay permits a short interval of a "stopped" clock so that another RF signal responding to the first signal (for example a mobile replying to the base station) can come on channel without the scanner going through all of the other channels first.

The Clock (pulse generator) circuitry is primarily a unijunction oscillator. Its basic speed (frequency or period) is determined by R197 and C181, which is the FAST speed. Its NORMAL speed is determined by R197, C180 and C181. When Q122 is turned on (Q121 turned off, Q120 turned on), C180 is effectively added to the timing circuit of the clock, forcing it to run much slower (approximately 15 Hz).

The Clock Inhibitor, Q121, stops the Clock when it is conducting and its collector goes low (near ground). This provides a low voltage path to ground for the Emitter of the unijunction (Q123). When the Emitter of Q123 is below a certain value, the unijunction ceases to oscillate. It can be considered a solid-state version of the relaxation type oscillator.

For normal scanning operating, the Scan/Manual switch connects the carrier delay capacitor (C179) to the Clock Inhibitor's collector circuit. For manual operation,

C179 is connected in parallel with C180. Also, fixed voltage is applied to the base of Q121 which is turned on (conducting), thus stopping the Clock. The when the Step switch is pushed in, it removes this fixed voltage from Q121's base, permitting the Clock to run. However, with C180 and C179 in parallel, the Clock will now run at approximately 2 Hz, which is the SLOW or manual stepping scan rate. Upon release of the Step switch, the Clock Inhibitor (Q121) is again forced to stop the Clock. Pushing in the Scan/Manual switch will automatically let the Clock run again at its proper scan rate.

1-5 470-500 MEGAHERTZ OPERATION

This unit can be retuned to cover an eight Megahertz segment of the 470-500 MHz band. The major difference is that the crystal frequency is determined by taking the channel frequency minus 10.7 MHz and dividing by ten (REFER to Section 1-2, CRYSTAL SPECIFICATIONS). This allows for L119 (injection coil for the High VHF Band) and drive coil for the UHF tripler, (Q108), not to be retuned and therefore, not affecting High VHF Band sensitivity. C139, the UHF Band injection tuning capacitor, is tuned to 10th harmonic of the crystal. Tuning procedure for 470 to 500 MHz operation is the same as in the UHF Section alignment, see Section 2-4 RF Alignment.

SECTION 2 ALIGNMENT AND TUNING PROCEDURE

2-1 EQUIPMENT REQUIRED

2-1-1 FM Signal Generator
2-1-2 Oscilloscope
2-1-3 AC VTVM

NOTE: During all steps of alignment, the squelch control should be in the maximum clockwise position (minimum squelch action).

All receivers should be aligned to the channel nearest the center of the frequency range in the band over which they will operate.

2-2 QUADRATURE DETECTOR

2-2-1 Connect the FM Signal Generator to the H/L antenna input jack. Accurately set the frequency to the center of the channel being used for alignment. Modulate Signal Generator with 1000 Hz, 3 KHz deviation.

2-2-2 Connect the oscilloscope to Junction of C162, C163 and R172.

2-2-3 Adjust Signal Generator's output until all of the noise in the scope pattern just disappears.

2-2-4 Adjust L128 for maximum peak to peak amplitude, while maintaining symmetry of the detected signal. When L128 is properly aligned, signal at above Junction should be approximately 0.2 volts RMS with test signal input as noted in 2-2-1.

2-3 IF ALIGNMENT

2-3-1 Pre-Set the cores of L122, L123 and L124 9 turns in from the outer end of the coil form.

2-3-2 Connect AC voltmeter to the Junction of R167 and the collector of Q116.

2-3-3 Set AC voltmeter to the 300 millivolts scale.

2-3-4 With generator accurately set to the frequency of the center of the channel being used for alignment, increase Signal Generator's output until AC voltmeter reading is mid-range.

2-3-5 Adjust L122, L123 and L124 (in that order) for maximum AC voltmeter reading. Readjust Signal Generator's output to main-

tain voltmeter reading approximately in the mid-range. Repeat adjustment until no further improvements can be made.

2-4 RF ALIGNMENT

LOW BAND SECTION

2-4-1 Pre-Set the cores of L102 and L103 one turn from the outer ends of the coil form. (NOTE: Due to the broadness of the Low Band Section, presetting the above cores will give you optimum performance over the entire band).

HIGH BAND SECTION

2-4-2 Connect AC voltmeter to the Junction of R167 and the collector of Q116.

2-4-3 Set AC voltmeter to the 300 millivolts scale.

2-4-4 Activate High Band channel nearest to center of High Band frequencies being used.

2-4-5 With Signal Generator accurately set to the frequency of the center of the channel being used for alignment and connected to H/L antenna input jack, increase Signal Generator's output until AC voltmeter reading is mid-range.

2-4-6 Adjust L119, L104, L105 and L106 (in that order) for maximum AC voltmeter reading. Readjust Signal Generator's output ot maintain voltmeter reading approximately in the mid-range. Repeat adjustment until no further improvements can be made.

NOTE: Adjustment to L119 of one or more turns may require UHF Section to be realigned.

UHF BAND SECTION

2-4-7 Connect AC voltmeter across the speaker terminals.

2-4-8 With Signal Generator output reduced to zero, adjust the volume control until AC voltmeter reads 1.0 volt of noise.

2-4-9 Activate UHF channel nearest to center of UHF frequencies being used.

2-4-10 Set Signal Generator accurately to the channel being used and adjust output of Signal Generator until AC voltmeter reads .2 volts.

2-4-11 Adjust trimmers C121, C122 and C139 (in that order) for maximum quieting (lowest meter reading). Adjust the Signal Generator output to maintain voltmeter reading between .1 and .2 volts. Repeat adjustments until no further improvements can be made.

NOTE: 1) Use non-metallic screwdriver for trimmer adjustments. 2) L119 is tuned in High Band alignment. If the UHF section sensitivity is down, a readjustment to L119 may be necessary. If more than a turn one way or the other is necessary, repeat High Band alignment.

2-5 AFC ALIGNMENT

NOTE: This adjustment requires an accurate 10.7 MHz ±1 KHz oscillator or 455 KHz ±500 Hz oscillator to be used as a reference signal. If none are available, proceed to Step 2-5-4.

2-5-1 With a coupling loop, inject "Reference" signal (either 10.7 MHz or 455 KHz) to produce good quieting (more than 30 DB quieting). Adjust R147 for reading of 3.8 to 4.0 volts at the collector of Q109.

2-5-2 Remove the "Reference" signal and have the unit squelched and receiving no signal. The voltage on the collector of Q109 shall be between 3.2 and 4.6 volts. If not, note voltage and proceed to Step 2-5-3. If voltage is between 3.2 and 4.6 volts, AFC alignment is complete.

NOTE: Any further adjustments made to L128 and R147 will require AFC to be re-adjusted.

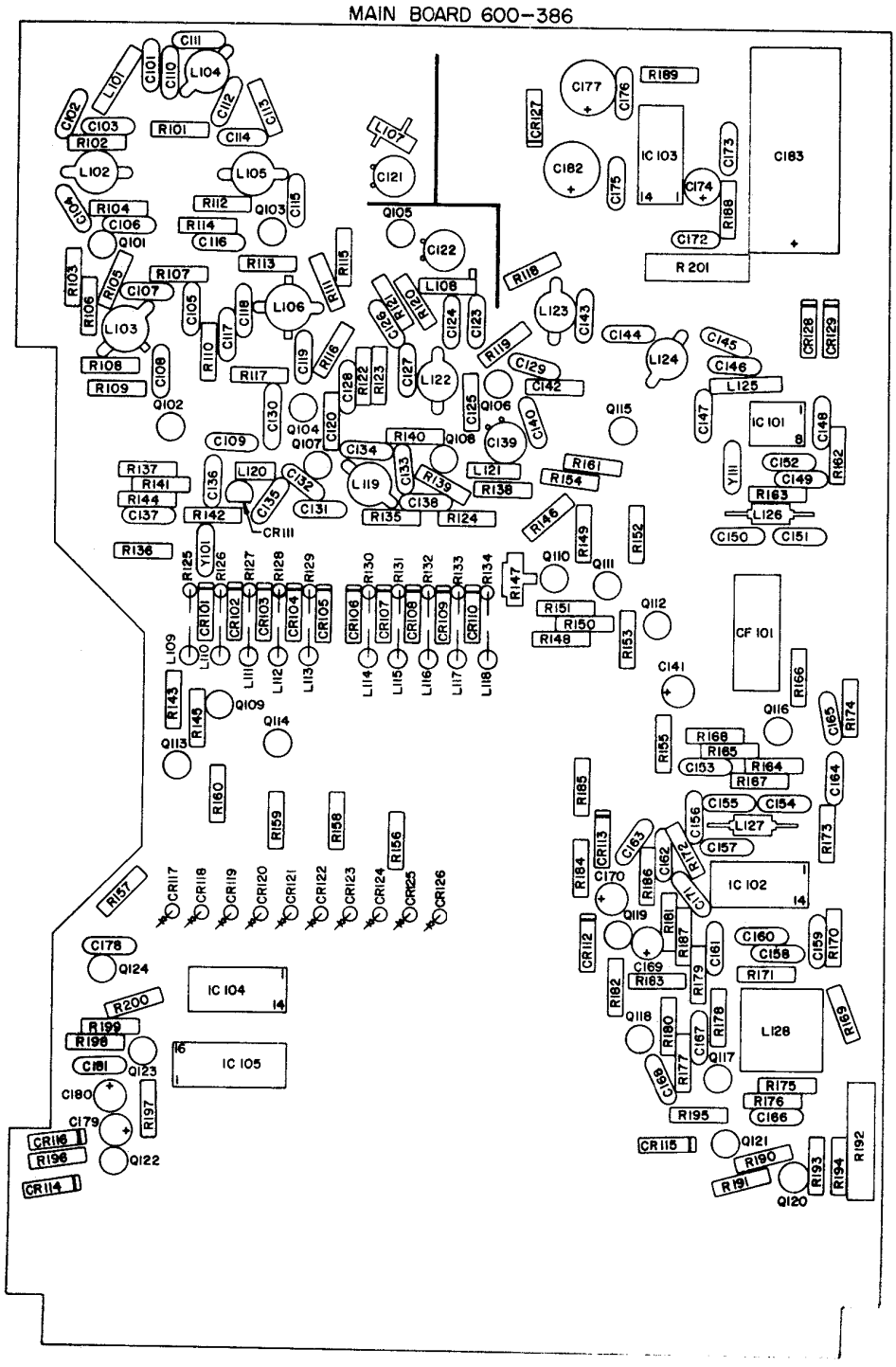
2-5-3 Inject "Reference" signal and monitor voltage on collector of Q109. Adjust L128 for same voltage as noted in Step 3. Readjust R147 for a voltmeter reading of 3.8 to 4.0 volts. Repeat Step 2-5-2.

NOTE: Do not adjust L128 more than 1/4 turn at a time.

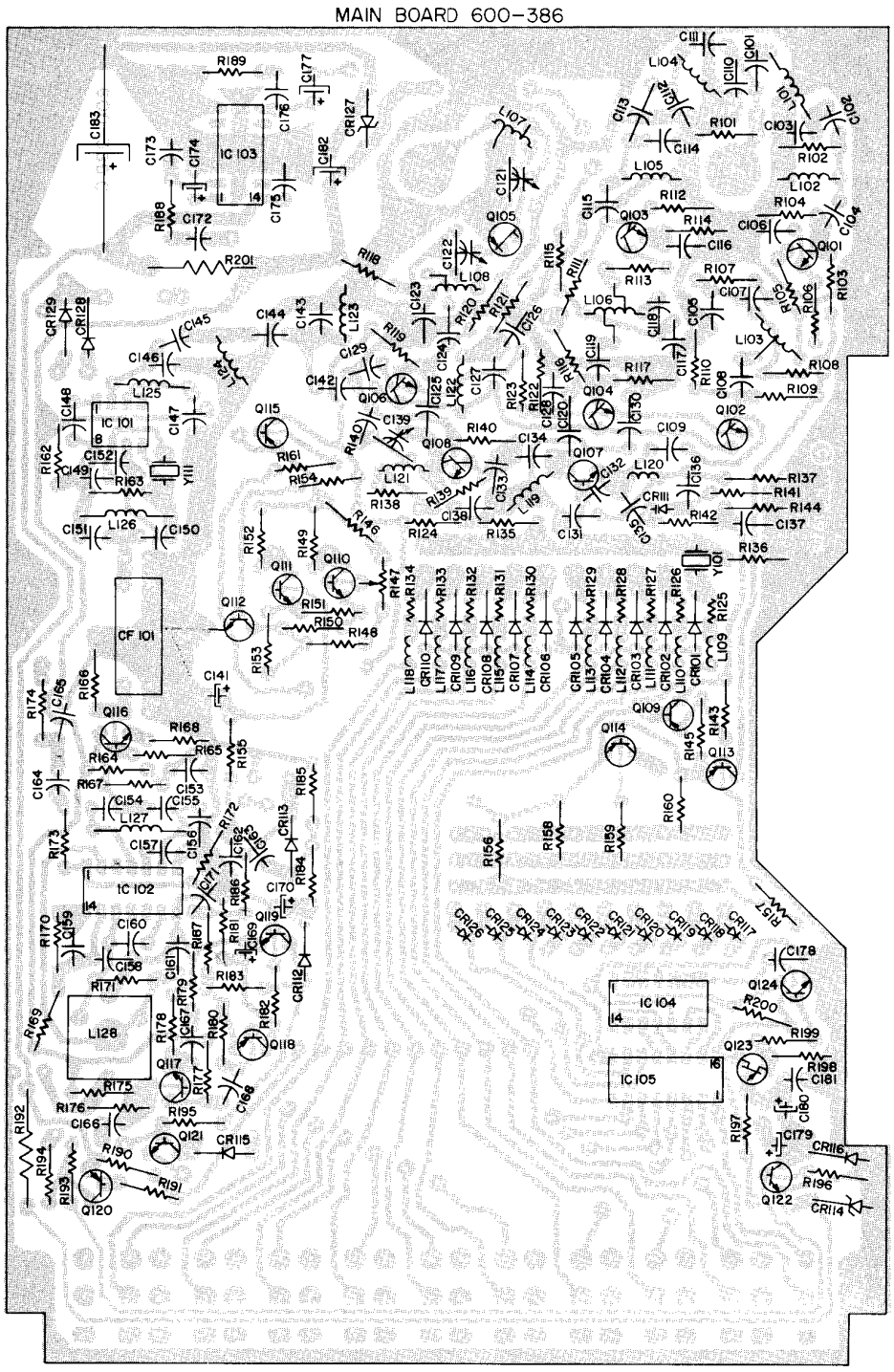
2-5-4 If an accurate I.F. signal source is not available, an approximate AFC alignment can be made by adjusting L128 on a High Band or Low Band crystal as specified in Quadrature Detector Alignment (Section 2-2), and with the unit squelched and receiving no signal, adjust R147 for voltmeter reading of 3.2 to 4.6 on the collector of Q109.

NOTE: Units equiped with a 10.245 MHz crystal have the jumper in the AFC circuit connected between the base of Q109 and collector of Q111. When a 11.155 MHz crystal is used, the jumper is connected between the base of Q109 and the collector of Q110. If the crystal is changed from one frequency to the other, the jumper must be changed.

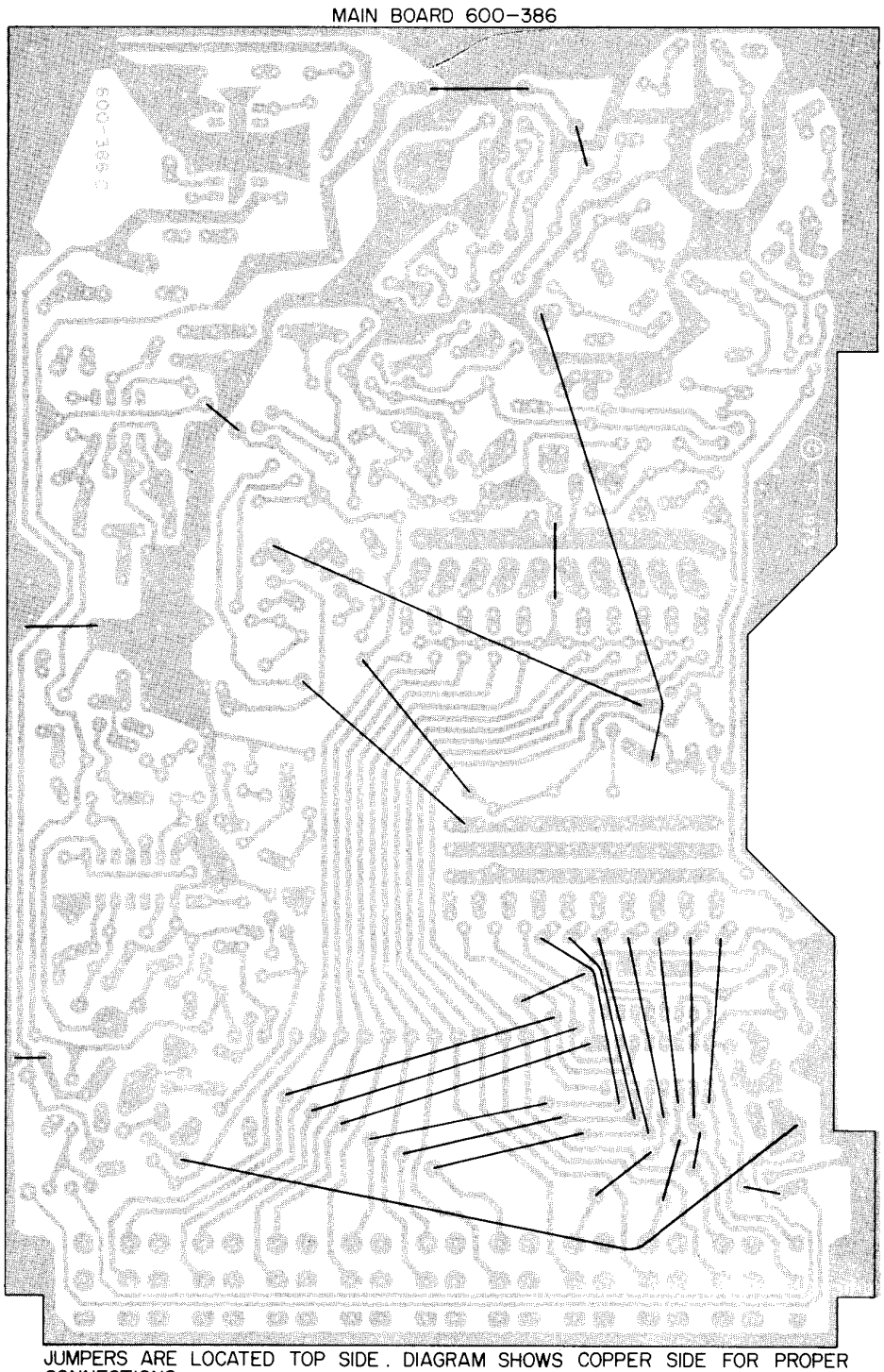
SECTION 3 DIAGRAMS, VOLTAGE DATA AND SCHEMATIC



3-1 MAIN BOARD PARTS PLACEMENT DIAGRAM

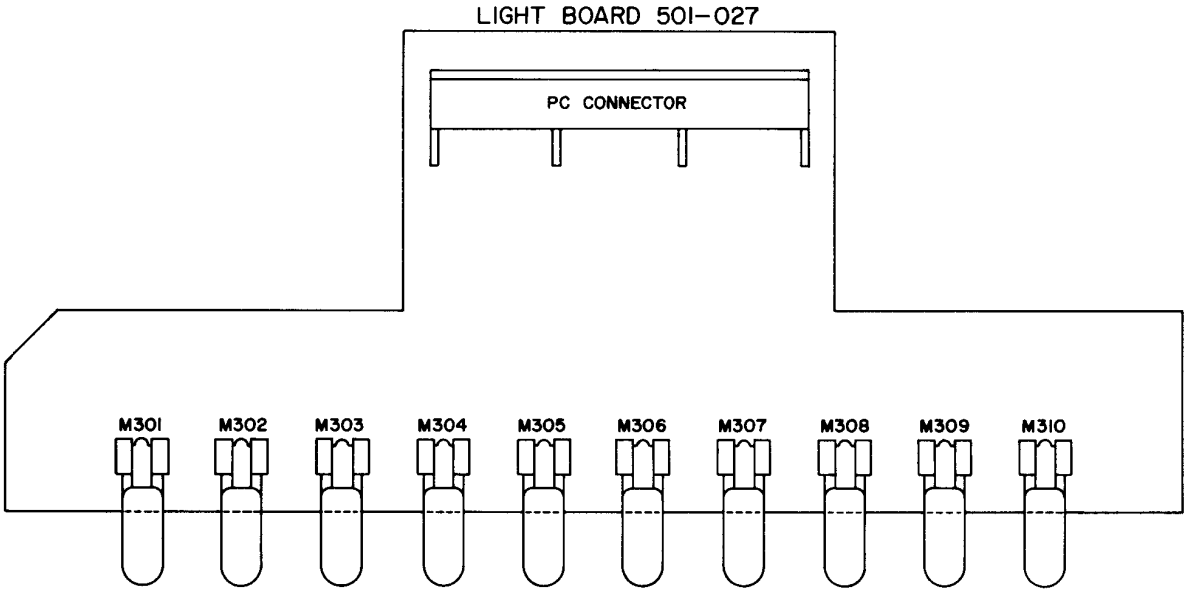


3-2 MAIN BOARD BOTTOM VIEW

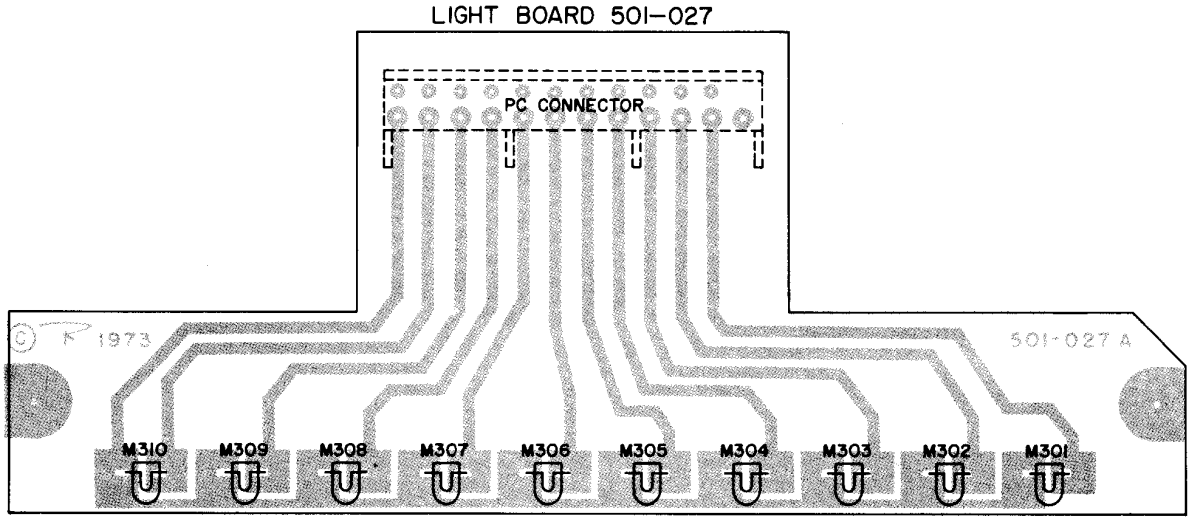


JUMPERS ARE LOCATED TOP SIDE. DIAGRAM SHOWS COPPER SIDE FOR PROPER CONNECTIONS.

3-3 MAIN BOARD JUMPER PLACEMENT (BOTTOM VIEW) DIAGRAM



3-4 LIGHT BOARD PARTS PLACEMENT DIAGRAM



3-5 LIGHT BOARD BOTTOM VIEW

3-6 VOLTAGE DATA

NOTE: All voltages are nominal and are measured with a VTVM. SCAN indicates the unit is scanning. MAN indicates the unit is not scanning and is stopped at channel 1. A "P" beside a voltage indicates that the meter reading is pulsating (fluctuating) because the scanner section of the unit is operating.

VOLTAGE DATA – SEMICONDUCTORS:

TRANSISTOR	EMITTER (Source)	BASE (Gate)	COLLECTOR (Drain)	
Q101	3.1	3.8	7.0	Low Band Activated
	0	0	0	High Band Activated
	0	0	0	UHF Band Activated
Q102	1.6	2.3	7.7	Low Band Activated
	1.6	0	7.7	High Band Activated
	1.4	0	7.7	UHF Band Activated
Q103	0	0	8.2	Low Band Activated
	3.1	3.8	7.9	High Band Activated
	0	0	8.2	UHF Band Activated
Q104	1.6	0	7.7	Low Band Activated
	1.6	2.3	7.7	High Band Activated
	1.4	0	7.7	UHF Band Activated
Q105 (FET)	0	0	6.0	
Q106	1.6	0	7.7	Low Band Activated
	1.6	0	7.7	High Band Activated
	1.6	2.3	7.7	UHF Band Activated
Q107	3.7	4.4	7.4	No Crystal
	3.4	4.0	7.4	With Crystal
Q108	0	0	0	Low High Band Activated
	0	.4	8.1	UHF Band Activated (No Crystal)
	0	.1	4.0	UHF Band Activated (With Crystal)
Q109 (PNP)	8.1	8.1	.8	Low Band Activated
	8.1	8.1	.8	High Band Activated
	7.9	7.2	3-5	UHF Band Activated
Q110	8.2	8.2	8.2	Low Band Activated
	8.2	8.2	8.2	High Band Activated
	2.9	3.6	7.2	UHF Band Activated
Q111	8.2	8.2	4.0	Low Band Activated
	8.2	8.2	4.0	High Band Activated
	2.9	3.6	7.4	UHF Band Activated
Q112	0	0	8.2	Low Band Activated
	0	0	8.2	High Band Activated
	0	.7	.1	UHF Band Activated

VOLTAGE DATA (CONTINUED)

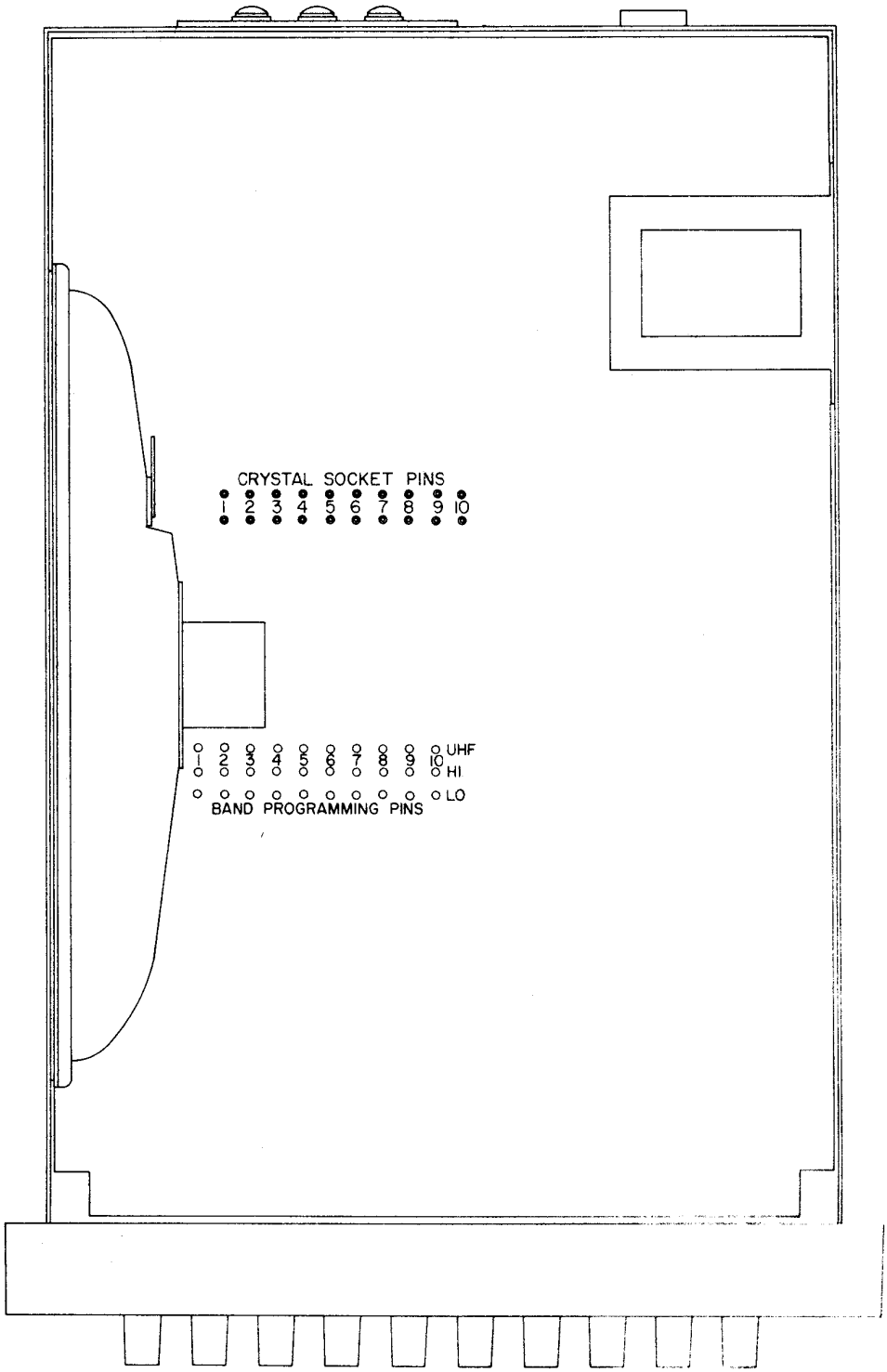
TRANSISTOR	EMITTER (Source)	BASE (Gate)	COLLECTOR (Drain)	
Q113 (PNP)	8.2	7.5	8.1	Low Band Activated
	8.2	8.2	0	High Band Activated
	8.2	8.2	0	UHF Band Activated
Q114 (PNP)	8.2	8.2	0	Low Band Activated
	8.2	7.5	8.1	High Band Activated
	8.2	8.2	0	UHF Band Activated
Q115 (PNP)	8.2	8.2	0	Low Band Activated
	8.2	8.2	0	High Band Activated
	8.2	7.5	8.1	UHF Band Activated
Q116	0.4	1.1	4.5	
Q117	1.0	1.7	5.0	
Q118	8.2	8.2	0	(Unsquelched)
	8.2	8.2	1.0	(Squelched)
	8.2	8.2	1.5	Min. (Tight Squelched)
Q119	0	0	7.2	(Unsquelched)
	0	0.8	0.2	(Squelched)
	0	0.8	0.1	(Tight Squelched)
Q120	13.8	13.1	13.6	(SCAN)
	13.8	13.1	13.6	(MAN)
	13.8	13.8	0	(No Lights)
Q121	0	0	4.0	(SCAN)
	0	0.8	0.1	(MAN)
Q122	0	0.8	0.1	
Q124	0	.2	4.9	(SCAN)
	0	.2	5.1	(MAN)
	BASE 1	**EMITTER**	**BASE 2**	
Q123	0.2	3.8	5.1	(SCAN)
(Unijunction)	0.2	0.5	5.1	(MAN)
	CATHODE	**ANODE**		
CR113	1.8	2.4		(Unsquelched)
	1.0	0		(Squelched)

VOLTAGE DATA (CONTINUED)

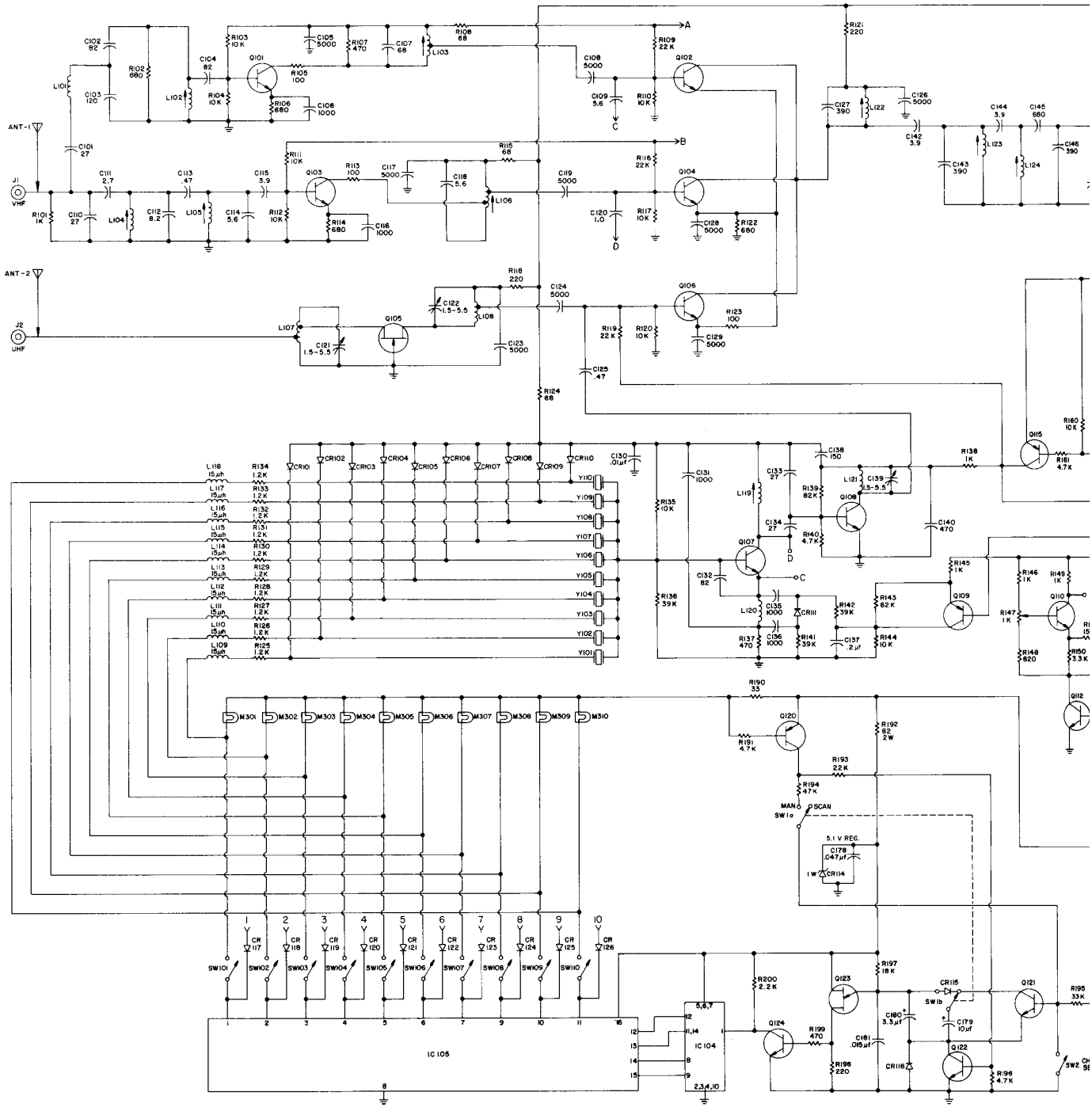
INTEGRATED CIRCUITS

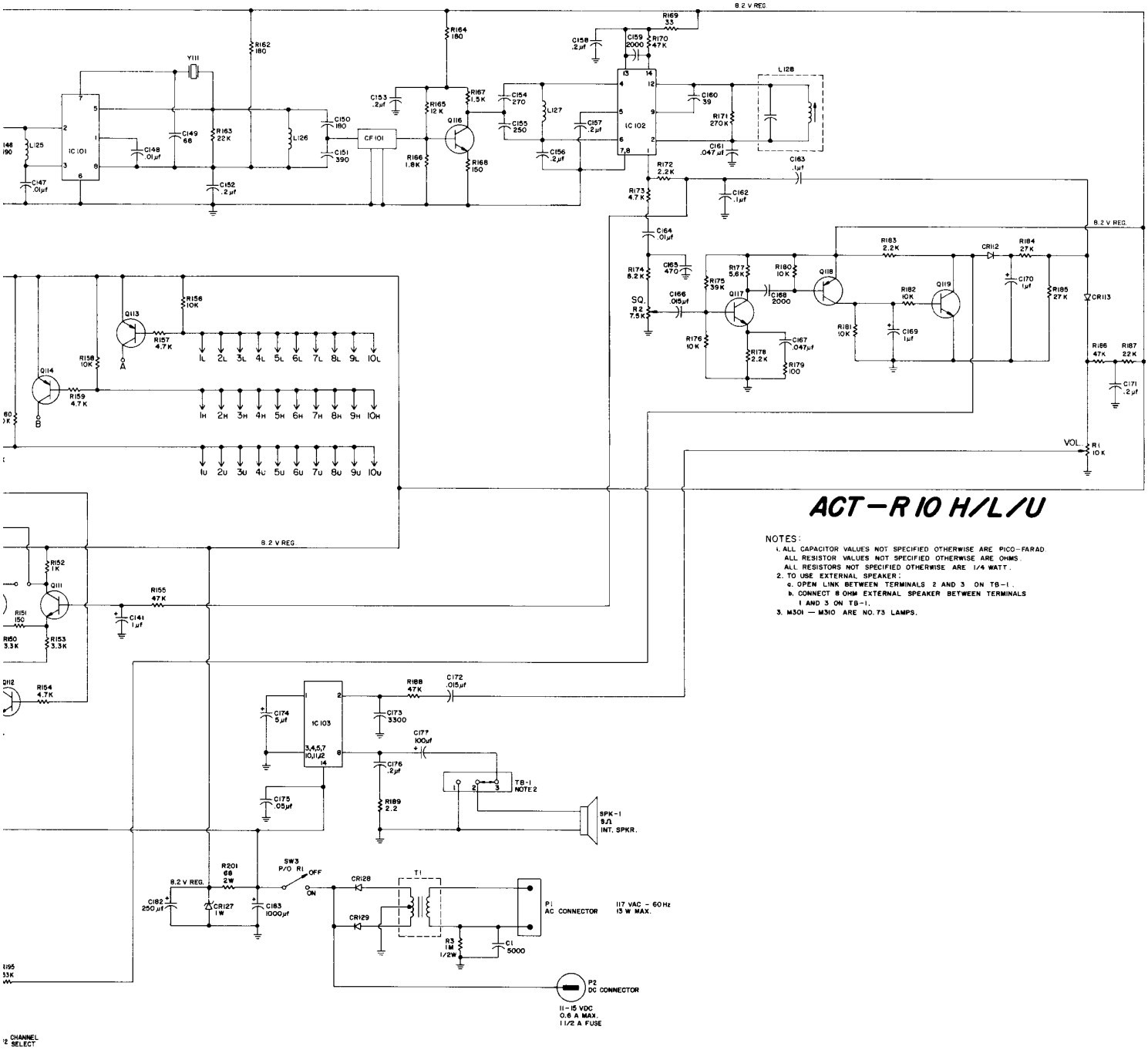
NOTE: A "P" beside a voltage indicates that the meter reading is pulsating (fluctuating) because the scanner section of the unit is operating. MAN indicates the unit is not scanning and is at channel 1 (M301 is lighted).

IC No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
IC 101	4.2	0.7	0.7	4.2	7.8	0	4.2	7.8	–	–	–	–	–	–	–	–	
IC102	4.0	3.5	0	1.3	1.3	1.3	0	0	0.2	1.4	2.9	3.5	7.6	5.0	–	–	
IC103	7.1	.01	0	0	0	.01	0	6.9	0	0	0	0	0	13.8	–	–	
IC104	5.1	0	0	0	5.1	5.1	5.1	.1	.1	0	.1	.1.	0	.1	–	–	Manual
	4.9	0	0	0	5.1	5.1	5.1	1P	2P	0	2P	1P	0	2P	–	–	SCAN
IC105	.5	11.2	11.2	11.2	11.2	11.2	11.2	0	11.2	11.2	11.2	.1	.1	.1	.1	5.1	Manual
	9P	9P	9P	9P	9P	9P	9P	0	9P	9P	9P	1P	2P	1P	2P	5.1	SCAN



3-7 CRYSTAL LOCATION DIAGRAM


ANT-1
J1
VHF
ANT-2
J2
UHF
Q101
Q102
Q103
Q104
Q105
Q106
Q107
Q108
Q109
Q110
Q112
Q115
Q120
Q121
Q122
Q123
Q124
L101
L102
L103
L104
L105
L106
L107
L108
L109
L110
L111
L112
L113
L114
L115
L116
L117
L118
L119
L120
L121
L122
L123
L124
CR110
CR111
CR114
CR115
CR116
CR117
CR118
CR119
CR120
CR121
CR122
CR123
CR124
CR125
CR126
M301
M302
M303
M304
M305
M306
M307
M308
M309
M310
Y101
Y102
Y103
Y104
Y105
Y106
Y107
Y108
Y109
Y110
SW101
SW102
SW103
SW104
SW105
SW106
SW107
SW108
SW109
SW110
SW1a
SW1b
SW2
MAN
SCAN
5.1 V REG.
IC 104
IC 105
A
B
C
D



3-8 SCHEMATIC

SECTION 4 PARTS LIST

4-1 MAIN BOARD 600-386

Item	Description	Part No.
	RESISTORS	
All Resistors are † 10%, ¼W, unless otherwise noted		
R101	1K	
R102	680 ohm	
R103	10K	
R104	10K	
R105	100 ohm	
R106	680 ohm	
R107	470 ohm	
R108	68 ohm	
R109	22K	
R110	10K	
R111	10K	
R112	10K	
R113	100 ohm	
R114	680 ohm	
R115	68 ohm	
R116	22K	
R117	10K	
R118	220 ohm	
R119	22K	
R120	10K	
R121	220 ohm	
R122	680 ohm	
R123	100 ohm	
R124	68 ohm	
R125	1.2K	
R126	1.2K	
R127	1.2K	
R128	1.2K	
R129	1.2K	
R130	1.2K	
R131	1.2K	
R132	1.2K	
R133	1.2K	
R134	1.2K	
R135	10K	
R136	39K	
R137	470 ohm	
R138	1K	
R139	82K	
R140	4.7K	
R141	39K	
R142	39K	
R143	82K	
R144	10K	
R145	1K	
R146	1K	
R147	1K, Trimmer	4751-0102-005
R148	820 ohm	
R149	1K	
R150	3.3K	
R151	150 ohm	

Item	Description	Part No.
R151	150 ohm	
R152	1K	
R153	3.3K	
R154	4.7K	
R155	47K	
R156	10K	
R157	4.7K	
R158	10K	
R159	4.7K	
R160	10K	
R161	4.7K	
R162	180 ohm	
R163	22K	
R164	180 ohm	
R165	12K	
R166	1.8K	
R167	1.5K	
R168	150 ohm	
R169	33 ohm	
R170	47K	
R171	270K	
R172	2.2K	
R173	4.7K	
R174	8.2K	
R175	39K	
R176	10K	
R177	5.6K	
R178	2.2K	
R179	100 ohm	
R180	10K	
R181	10K	
R182	10K	
R183	2.2K	
R184	27K	
R185	27K	
R186	47K	
R187	22K	
R188	47K	
R189	2.2 ohm	
R190	33 ohm	
R191	4.7K	
R192	82 ohm, 2W, 5%	4707-0820-031
R193	22K	
R194	47K	
R195	33K	
R196	4.7K	
R197	18K	
R198	220 ohm	
R199	470 ohm	
R200	2.2K	
R201	68 ohm, 2W, 5%	4707-0680-031

Item	Description	Part No.
	CAPACITORS	
C101	27pf 10%, 50V NPO (Disc.)	1500-0270-650
C102	82pf 5%, 50V NPO (Disc.)	1524-0820-002
C103	120pf 5%, 50V (Mica)	1506-0121-550
C104	82pf 5%, 50V NPO (Disc.)	1524-0820-002
C105	.005mf +80%-20% 500V, Z5U (Disc.)	1503-0502-002
C106	.001mf +80%-20% 500V, Z5U (Disc.)	1503-0102-001
C107	68pf 5%, 50V NPO (Disc.)	1524-0680-002
C108	.005mf +80%-20% 500V, Z5U (Disc.)	1503-0502-002
C109	5.6pf 10%, 500V NPO (Disc.)	1500-0569-905
C110	27pf 10%, 50V NPO (Disc.)	1500-0270-650
C111	2.7pf 10%, 500V NPO (Disc.)	1500-0279-905
C112	8.2pf 10%, 500V NPO (Disc.)	1500-0829-905
C113	.47pf 10% (Composition)	1510-0478-900
C114	5.6pf 10%, 500V NPO (Disc.)	1500-0569-905
C115	3.9pf 10%, 500V NPO (Disc.)	1500-0399-905
C116	.001mf +80%-20% 500V, Z5U (Disc.)	1503-0102-001
C117	.005mf +80%-20% 500V, Z5U (Disc.)	1503-0502-002
C118	5.6pf 10% 500V NPO (Disc.)	1500-0569-905
C119	.005mf +80%-20% 500V, Z5U (Disc.)	1502-0502-002
C120	1.0pf 10% (Composition)	1510-0010-900
C121	1.5-5.5pf, Trimmer	1517-0000-011
C122	1.5-5.5pf, Trimmer	1517-0000-011
C123	.005mf +80%-20% 500V, Z5U (Disc.)	1503-0502-002
C124	.005mf +80%-20% 500V, Z5U (Disc.)	1503-0502-002
C125	.47pf 10% (Composition)	1510-0478-900
C126	.005mf +80%-20% 500V, Z5U (Disc.)	1503-0502-002
C127	390pf 5% 50V (Mica)	1506-0391-550
C128	.005mf +80%-20% 500V, Z5U (Disc.)	1503-0502-002
C129	.005mf +80%-20% 500V, Z5U (Disc.)	1503-0502-002
C130	.01mf +80%-20% 500V, Z5U (Disc.)	1503-0103-001
C131	.001mf +80%-20% 500V, Z5U (Disc.)	1503-0102-001
C132	82pf 5% 50V NPO (Disc.)	1524-0820-002
C133	27pf 10% 50V NPO (Disc.)	1500-0270-650
C134	27pf 10% 50V NPO (Disc.)	1500-0270-650
C135	.001mf +80%-20% 500V, Z5U (Disc.)	1503-0102-001
C136	.001mf +80%-20% 500V, Z5U (Disc.)	1503-0102-001
C137	.2mf +80%-20% 12V (Disc.)	1502-0204-006
C138	150pf 20% 50V, Z5F (Disc.)	1523-0151-002
C139	1.5-5.5pf Trimmer	1517-0000-011
C140	470pf 20% 50V, Z5F (Disc.)	1523-0471-002
C141	1mf 85° 16V (Electrolytic)	1513-0010-002
C142	3.9pf 10% (Composition)	1510-0399-900
C143	390pf 5% 50V (Mica)	1506-0391-550
C144	3.9pf 10% 500V NPO (Disc.)	1500-0399-905
C145	680pf 5% 50V (Mica)	1506-0681-550
C146	390pf 5% 50V (Mica)	1506-0391-550
C147	.01mf +80%-20% 25V (Disc.)	1502-0103-004
C148	.01mf +80%-20% 25V (Disc.)	1502-0103-004
C149	68pf 5% 50V NPO (Disc.)	1524-0680-002
C150	180pf 5% 50V (Mica)	1506-0181-550
C151	390pf 5% 50V (Mica)	1506-0391-550
C152	.2mf +80%-20% 12V (Disc.)	1502-0204-006
C153	.2mf +80%-20% 12V (Disc.)	1502-0204-006
C154	270pf 5% 50V (Mica)	1506-0271-550
C155	250pf 5% 50V (Mica)	1506-0251-550
C156	.2mf +80%-20% 12V (Disc.)	1502-0204-006
C157	.2mf +80%-20% 12V (Disc.)	1502-0204-006
C158	.2mf +80%-20% 12V (Disc.)	1502-0204-006
C159	.002pf 20% 50V, Z5F (Disc.)	1523-0202-002
C160	39pf 10% 50V NPO (Disc.)	1500-0390-650
C161	.047mf 10% 100V (Mylar film)	1508-0473-610
C162	.1mf 20% 12V (Disc.)	1502-0104-005
C163	.1mf 20% 12V (Disc.)	1502-0104-005
C164	.01mf 10% 100V (Mylar film)	1508-0103-610
C165	470pf 20% 50V, Z5F (Disc.)	1523-0471-002
C166	.015mf 10% 100V (Mylar film)	1508-0153-610
C167	.047mf 10% 100V (Mylar Film)	1508-0473-610
C168	.002pf 20% 50V, Z5F (Disc.)	1523-0202-002
C169	1mf 85° C 16V (Electrolytic)	1513-0010-002
C170	1mf 85° C 16V (Electrolytic)	1513-0010-002
C171	.2mf +80%-20% 12V (Disc.)	1502-0204-006
C172	.015mf 10% 100V (Mylar film)	1508-0153-610
C173	.0033mf 10% 100V (Mylar film)	1508-0332-610
C174	5mf 85° C 10V (Electrolytic)	1513-0050-001
C175	.05mf +80%-20% 25V (Disc.)	1502-0503-004
C176	.2mf +80%-20% 12V (Disc.)	1502-0204-006
C177	100mf 85° C 16V (Electrolytic)	1513-0101-002
C178	.047mf 10% 100V (Mular film)	1508-0473-610
C179	10mf 85° C 10V (Electrolytic)	1513-0100-001
C180	3.3mf 20% 85° C 10V (Electrolytic)	1513-0339-005
C181	.015mf 10% 100V (Mylar film)	1508-0153-610
C182	250mf 85° C 10V (Electrolytic)	1513-0251-001
C183	100mf 16V (Electrolytic)	1511-0102-002
	COILS	
L101	Choke .68 UHY	1802-0688-003
L102	Coil, RF input (Green)	1800-3152-005
L103	Coil, RF (Yellow)	1800-3152-004
L104	Coil, RF input (Red)	1800-3152-002
L105	Coil, RF input (Red)	1800-3152-002
L106	Coil, RF (Orange)	1800-3152-003
L107	Coil, RF 450 MHZ	1800-3160-001
L108	Coil, RF AMP out	1800-3160-002
L109	Choke 15 MHY	1802-0152-004
L110	Choke 15 MHY	1802-0152-004
L111	Choke 15 MHY	1802-0152-004
L112	Choke 15 MHY	1802-0152-004
L113	Choke 15 MHY	1802-0152-004
L114	Choke 15 MHY	1802-0152-004
L115	Choke 15 MHY	1802-0152-004
L116	Choke 15MHY	1802-0152-004
L117	Choke 15MHY	1802-0152-004
L118	Choke 15MHY	1802-0152-004
L119	Coil, RF Inj. (White)	1800-3152-009
L120	Coil, OSC.	1801-1236-900
L121	Coil OSC. 450 MHZ	1800-3160-003
L122	Coil RF (White)	1800-3191-401
L123	Coil RF (White)	1800-3191-401
L124	Coil RF (Yellow)	1800-3191-402
L125	Choke 6.8 uh 10%	1802-0689-003
L126	Choke	1802-0000-002

Item	Description	Part No.
	COILS (Cont'd.)	
L127	Choke	1802-0000-002
L128	Coil, Quadrature	1800-3151-700
	INTEGRATED CIRCUITS	
IC101	IC, 10.7 IF	3130-3167-901
IC102	IC, 455 KHZ Detector	3130-3157-603
IC103	IC, Audio Amplifier	3130-3157-614
IC104	IC, Counter	3130-3157-608
IC105	IC, Decoder Driver	3130-3193-501
	TRANSISTORS	
Q101	Silicon NPN (RT)	4801-0000-035
Q102	Silicon NPN (RT)	4801-0000-035
Q103	Silicon NPN (RT)	4801-0000-035
Q104	Silicon NPN (RT)	4801-0000-035
Q105	Junct. FET	4811-0000-015
Q106	Silicon NPN (RT)	4801-0000-035
Q107	Silicon NPN, MPS5172	4801-0000-100
Q108	Silicon NPN (RT)	4801-0000-035
Q109	Silicon PNP (WT)	4801-0000-060
Q110	Silicon NPN, MPS5172	4801-0000-010
Q111	Silicon NPN, MPS5172	4801-0000-010
Q112	Silicon NPN, MPS 5172	4801-0000-010
Q113	Silicon PNP (W T)	4801-0000-060
Q114	Silicon PNP (WT)	4801-0000-060
Q115	Silicon PNP (WT)	4801-0000-060
Q116	Silicon NPN, MPS 5172	4801-0000-060
Q117	Silicon NPN, MPS 5172	4801-0000-010
Q118	Silicon PNP (WT)	4801-0000-060
Q119	Silicon NPN, MPS 5172	4801-0000-010
Q120	Silicon PNP (WT)	4801-0000-060
Q121	Silicon NPN, MPS 5172	4801-0000-010
Q122	Silicon NPN, MPS 5172	4801-0000-010
Q123	PN Silicon, Unijunction	4813-0000-001
Q124	Silicon NPN, MPS 5172	4801-0000-010
	(WT) = White Top (RT) = Red Top	
	DIODES	
CR101	Germanium-junction, signal	4807-1233-900
CR102	Germanium-junction, signal	4807-1233-900
CR103	Germanium-junction, signal	4807-1233-900
CR104	Germanium-junction, signal	4807-1233-900
CR105	Germanium-junction, signal	4807-1233-900
CR106	Germanium-junction, signal	4807-1233-900
CR107	Germanium-junction, signal	4807-1233-900
CR108	Germanium-junction, signal	4807-1233-900
CR109	Germanium-junction, signal	4807-1233-900
CR110	Germanium-junction, signal	4807-1233-900
CR111	VARICAP	4809-0000-001
CR112	Silicon, IN4148	4805-1241-200
CR113	Silicon, IN4148	4805-1241-200
CR114	Zener 5% 5.1V	4808-0000-007
CR115	Silicon, IN4148	4805-1241-200
CR116	Silicon, IN4148	4805-1241-200
CR117	Silicon, IN4148	4805-1241-200

Item	Description	Part No.
CR118	Silicon, IN4148	4805-1241-200
CR119	Silicon, IN4148	4805-1241-200
CR120	Silicon, IN4148	4805-1241-200
CR121	Silicon, IN4148	4805-1241-200
CR122	Silicon, IN4148	4805-1241-200
CR123	Silicon, IN4148	4805-1241-200
CR124	Silicon, IN4148	4805-1241-200
CR125	Silicon, IN4148	4805-1241-200
CR126	Silicon, IN4148	4805-1241-200
CR127	Zener 8.2V	4808-0000-009
CR128	Silicon Rectifier	4806-0000-004
CR129	Silicon Rectifier	4806-0000-004
	FILTER	
CF101	Ceramic	2700-0000-007
	CRYSTAL	
Y111	10.245 MHZ	2301-3151-601
	MISCELLANEOUS	
SW101-	Switch (10POS)	5112-5038-401
SW110	Shield Assembly (301-602	2508-1256-300
		2508-1256-400

4-2 LIGHT BOARD 501-027

Item	Description	Part No.
	LAMPS	
M301-M310	Lamp, incandescent, 14.4V, 80MA (WB # 73)	3901-0000-007
	MECHANICAL	
	Bulb Cup	2830-1276-900
	Connector (12PIN)	2105-0000-012

4-3 CHASSIS ASSEMBLY

Item	Description	Part No.
	ELECTRICAL COMPONENTS	
R1	Res. Var. 10K/SW	4750-3212-101
R2	Res. Var. 7.5K	4750-3212-102
R3	Res. Comp. 1MEG., 10%, ½W	4701-0105-044
C1	.005MF, +80-20%, 1.4KV Z5U (Disc.)	1501-0502-002
SPK-1	Speaker 2 x 6 in. 8 ohm	1301-5101-000
ANT-1	Antenna, H/L Telescoping	1201-0000-002
ANT-2	Antenna, UHF Telescoping	1201-0000-003
T1	Power Transformer	5604-5100-600
J1, J2	Antenna Connector	2105-0000-005
P1	AC Connector	2105-1279-100
P2	DC Connector	2105-1277-900
Y100	Crystal, Receive (Low Band)	2303-0000-000
Y100	Crystal, Receive (Highband)	2302-0000-000
Y100	Crystal, Receive (450-470MHZ)	2304-0000-000
Y100	Crystal, Receive (470-500MHZ)	2320-0000-000
MA-16	AC Power Cord	6041-3215-900
MA-17	DC Power Cord Assembly	7011-1047-800
SW1-2	Switch	5112-6035-820
	MECHANICAL COMPONENTS	
	AC Shield	2508-3215-800
	Speaker, MTG. Speed Nut	2853-0000-003
TB-1	Terminal Board (3Lug)	2103-3007-907
	Front Panel (Bezel)	1405-6034-302
	Face Plate	2403-3212-600
	Knob, Volume & Squelch	2402-1276-202
	Lens, 10 Station	3900-5100-800
	Cabinet/Wrap Assembly	1408-6038-500
	Bushing, Mounting Bolt	2501-3214-000
	Bushing, UHF Antenna	2501-0000-006
	Bushing, H/L Antenna	2501-0000-007
	Feet, Rubber	1402-0000-001
	Mounting Bolt (¼-20 x 5/8	2806-0625-002
	Bracket, Mobile, Mounting	1400-3214-200
	Manual, Owner's Instruciton	7001-1047-500
	Manual, Service ($5.00 Prepaid)	

ADDENDUM – IC AND TRANSISTOR TYPES

REF	REGENCY NUMBER	PART MARKING	TYPE
IC101	3130-3167-901	SC5282P	MC1550P
IC102	3130-3157-603	301-576-3	MC1357P
IC103	3130-3157-614		LM380N
IC104	3130-3157-608	301-576-8	SN7493AN
IC105	3130-3193-501		SN7445N
	4801-0000-035	RED TOP	2N5222
	4801-0000-060	WHITE TOP	2N5227
	4801-0000-100		2N5130 (LOW BETA)
	4801-0000-010	SPS952	MPS5172
	4813-0000-001		2N4871
	4811-0000-015		2N5245