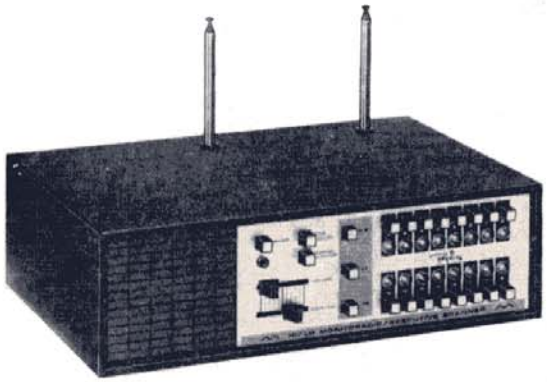
Regency® ELECTRONICS INC.

SERVICE MANUAL



MODEL ACT-E16H/L
ACT-E16H/L/U

MONITORADIO RECEIVER

7707 RECORDS STREET
INDIANAPOLIS, INDIANA 46226

PRINTED IN U.S.A.

PRICE $5.00
SM–10–470–1

CONTENTS

SECTION 1 SPECIFICATIONS AND CIRCUIT DESCRIPTION

1-1 Specifications
1-2 Crystal Specifications
1-3 Crystal Installation and Band Programming
1-4 RF Board
1-5 IF-Audio Board
1-6 Scanner Board

SECTION 2 ALIGNMENT AND TUNING PROCEDURE

2-1 Equipment Required
2-2 Quadrature Detector
2-3 IF Alignment
2-4 RF Alignment ("200" Series Board)
2-5 RF Alignment ("300" Series Board ACT-E 16 H/L)
2-6 RF Alignment ("300" Series Board ACT-E 16 H/L/U)
2-7 AFC Alignment (ACT-E 16 H/L/U)
2-8 Noise Balance Adjustment

SECTION 3 DIAGRAMS, VOLTAGE DATA AND SCHEMATICS

3-1 RF Board Parts Placement Diagram (H/L Board)
3-2 RF Board Bottom View (H/L Board)
3-3 RF Board Parts Placement Diagram (UHF Board)
3-4 RF Board Bottom View (UHF Board)
3-5 IF-Audio Board Parts Placement Diagram
3-6 IF-Audio Board Bottom View
3-7 Scanner Board Parts Placement Diagram
3-8 Scanner Board Bottom View
3-9 Scanner Board (Secondary) Parts Placement Diagram
3-10 Scanner Board (Secondary) Bottom View
3-11 Voltage Data
3-12 Crystal Location Diagrams
3-13 Band Programming Diagram
3-14 Schematic (ACT-E 16 H/L)
3-15 Schematic (ACT-E 16 H/L/U)

SECTION 4 PARTS LIST

4-1 RF Board (H/L)
4-2 RF Board (UHF)
4-3 IF-Audio Board
4-4 Scanner Board (Primary Board)
4-5 Scanner Board (Secondary Board)
4-6 Chassis Assembly

SECTION 1 SPECIFICATIONS AND CIRCUIT DESCRIPTION

1-1 SPECIFICATIONS (SUBJECT TO CHANGE WITHOUT NOTICE)

RECEIVER-MODEL ACT-E 16 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 ..... 16, Crystal Controlled
Sensitivity (At Tune-Up) ..... Low Band; 0.5 μv (max.)
High Band; 0.6 μv (max.)
UHF Band; 0.7 μv (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 Board Only) ..... Approx. ±6 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) ..... 3 Watts @ 10%, or less,
Distortion; 5 Watts, Maximum

RECEIVER-MODEL ACT-E 16 H/L

Frequency Range ..... Low Band 30-50 MHz
High Band; 150-174 MHz
Antenna Impedance ..... 50 Ohms
Channels ..... 16, Crystal Controlled
Sensitivity (At Tune-Up) ..... Low Band; 0.5 μv (max.)
High Band; 0.6 μv (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
Selectivity (I.F.) ..... 6 DB Down; ±7 KHz (min.)
50 DB Down; ±20 KHz (max.)

Spurious Rejection (Excluding Primary Image)..... 50 DB
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)..... 3 Watts @ 10%, or less,
Distortion; 5 Watts, Maximum

SCANNER

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

POWER

Voltage Requirement..... 117 VAC (±10%),
60 Hz., 17 Watts Max.
13.8 VDC (±10%)
Current Requirements..... @ 13.8 VDC
Receiver (Squelched)..... 180 MA.
Receiver (Max. Audio Output)..... 800 MA.
Fuse Size.....1.5 Amp., 3AG

SEMICONDUCTORS

Receiver Section
Integrated Circuits..... 2
Silicon Transistors..... 24
Field Effect Transistors..... Model ACT-E 16 H/L/U only; 1
Diode (Total)..... Model ACT-E 16 H/L; 20
Model ACT-E 16 H/L/U; 21
Zener Diodes..... 1
Rectifier Diodes..... 2
Varactor Diode..... Model ACT-E 16 H/L/U only; 1
Scanner Section
Integrated Circuits..... 3
Silicon Transistors..... 6
Diodes (Total)..... Model ACT-E 16 H/L/U; 12
Model ACT-E 16 H/L; 20
Zener Diode..... 1

GENERAL

Front Panel Size..... 3 7/8" x 13"
Depth (Including Knobs and Rear Panel Connectors)..... 9 1/2"
Antenna Connector..... Motorola Type
Power Connector..... 4-pin, polarized
Speaker Size..... 3 1/2 inch, square

1-2 CRYSTAL SPECIFICATIONS

Miniature plug-in crystals are utilized in the receiver. Because of the high accuracy (close tolerances) 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 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:
Crystal frequency = $\frac{\text{Channel frequency} - 10.7 \text{ MHz}}{3}$

EXAMPLE:
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:

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

EXAMPLE:
Crystal frequency = $\frac{458.000 \text{ MHz} - 10.700 \text{ MHz}}{9}$

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

1-3 CRYSTAL INSTALLATION AND BAND PROGRAMMING

Prior to installing a crystal, the receiver will have to be partially pulled out of its cabinet. First, remove the telescopic antennas if they are installed. Second, remove the two knobs (volume and squelch). Third, remove the rear panel (cover) by removing the four mounting screws. Fourth, remove the four rubber feet by unscrewing each one. The receiver may then be slid rearward from the cabinet until the crystal socket pins are accessible.

Insert the crystal in the proper socket pins as indicated on the Crystal Location Diagram 3-12. The sockets are numbered, in pairs, corresponding to the channel number on the front panel.

For high and low band crystals inserted into the 301-978 High/Low RF Board, band programming will have to be performed. If the crystal inserted is for the High Band (148-174 MHz), place the proper color-coded wire and socket onto the proper High Band pin; if the crystal is for the Low Band (30-50 MHz), place the proper wire and socket onto the proper Low Band pin. Pictorial C shows an example of a partially programmed board. See Diagram 3-13.

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

After the crystals are installed and any necessary band programming changes are completed, carefully slide the unit back into the cabinet. Screw the four feet back into place and replace the rear panel. Push the volume and squelch knobs back on their shafts and the unit is again ready for operation.

1-4 RF BOARD

Q201 is a Low 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 Band mixer, Q203.

Q202 is a High 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 Band mixer, Q204.

The first L.O. (local oscillator), Q207, uses third overtone crystals and operates on all channels, whether high or low. For Low Band signals, the fundamental frequency of the crystal is taken off the emitter of Q207 for injection. For High Band signals, the third harmonic of the crystal is coupled off the collector of Q207 for oscillator injection. The radio is switched between high and low band by transistors Q205 and Q206. When Q205 conducts, operating bias is applied to the Low Band RF amplifier and mixer. When Q206 conducts, operating bias is applied to the High Band RF amplifier and mixer. Each channel then becomes either High Band or Low Band depending on which RF amplifier and mixer are switched on by Q205 or Q206. Conduction of Q205 and Q206 are determined by the program board. If the lead for a particular channel is connected to a High Band pin, the High Band RF amplifier and mixer are turned on, if the lead is connected to a Low Band pin, the Low Band RF amplifier and mixer are turned on when the radio scans that particular channel.

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 output frequency from either mixer, Q203 or Q204, is tuned to 10.7 MHz by T201. The output is linked-coupled to T101, the IF input tuned circuit

On Model ACT-E 16 H/L, the "300" series RF board is identical to the previous description, except for one being "200" series board and the other a "300" series board.

For the "300" series RF board for Model ACT-E 16 H/L/U, Q301 is a Field Effect RF transistor used in the common gate configuration. Q301 has broad band tuned circuits in its input and output circuitry. The output from the RF amplifier is coupled to the mixer transistor Q302.

The first L.O. (local oscillator), Q303, uses third overtone crystals. The output frequency from the oscillator, (3 times the crystal frequency), is coupled to the base of Q307. Q307 is a tripler which multiplies the oscillator output by 3 for use as the ultimate injection frequency (9 times the crystal frequency). The output of Q307 is coupled to the mixer transistor, Q302.

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 biased it) and effectively connects the crystal into the oscillator circuit.

The automatic frequency control circuit (AFC) consists of Q304, Q305, Q306 and CR309. Q305 and Q306 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 Q304 and applied to CR309. CR309 is a voltage dependent capacitor, or varactor, in the oscillator circuit. When the voltage applied to CR309 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 Q306. If the second L.O. has been changed to 11.155 MHz, the error voltage is taken from the collector of Q305. The correct combination can be determined by checking the frequency stamped on the second L.O. crystal, (Y101).

1-5 IF–AUDIO BOARD

The IF input circuitry consists of T101 and Q101, used as an IF amplifier. The output of this amplifier 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, CF-1. CF-1 is a narrow-band filter centered at 455 KHz. The excellent band-pass characteristics of CF-1 provide for very good adjacent channel rejection. The output of CF-1 is 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. L103, connected between terminals 2 and 12 of IC102, is 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 Q102 is an amplifier whose frequency response extends from approximately 5 KHz to 25 KHz. Q102 amplifies the "noise" occuring in this frequency range. The noise is coupled to the base of Q103. Q103 is used as a detector which rectifies the amplified noise and produces DC voltage at its collector. When the DC voltage at the collector of Q103 is positive and of sufficient value to provide base bias for Q104, Q104 turns on and provides a short circuit to the squelch tail circuitry which provides bias to Q105. This action turns off Q105 and the audio output from the receiver is squelched (muted). When a signal (carrier) arrives, the output from the detector (Q103) is reduced to the point where the DC voltage at the base of Q104 is no longer sufficient to cause Q104 to conduct.

At this time, Q105 is allowed to conduct normally and the audio output of the unit is heard. With the audio pre-amplifier (Q105) operating normally, audio is applied through the volume control to the base of the audio amplifier, Q106. Q106 supplies a signal to the audio driver transistors, Q107 and Q108. The output transistors, Q109 and Q110, form a quasi-complementary transformerless stage capable of delivering 5 watts to the speaker.

1-6 SCANNER BOARD

The squelch tail circuit consists of R413, CR404, C405 and R412. 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 C405. Removing C405 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 (IC401) 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/Drivers (IC402 and IC403) convert the BCD information into a decimal configuration. Q406 is an inverter stage, in which the complement of the fourth binary bit of IC402 is applied to IC403. 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 (Q401) 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 (Q401) 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 (Q401) 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 (Q402) 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 C402. 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 R408 and C404, which is the FAST speed. Its NORMAL speed is determined by R408, C403 and C404. When Q403 is turned on (Q402 turned off, Q401 turned on), C403 is effectively added to the timing circuit of the clock, forcing it to run much slower (approximately 15 Hz).

The Clock Inhibitor, Q402, 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 (Q404). When the emitter of Q404 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 operation, the Scan/Manual switch connects the carrier delay capacitor (C402) to the Clock Inhibitor's collector circuit. For manual operation, C402 is connected in parallel with C403. Also, a fixed voltage is applied to the base of Q402 which is turned on (conducting), thus stopping the Clock. Then when the Step switch is pushed in, it removes this fixed voltage from Q402's base, permitting the Clock to run. However, with C403 and C402 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 (Q402) 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.

The three push buttons labeled 1-8, ALL and 9-16 in Model ACT-E 16 H/L, or the five push buttons labeled Hi, Lo, Hi/Lo, UHF and ALL in Model ACT-E 16 H/L/U, select which group of programming buttons is connected to the register's activate output line. For example, when the 9-16 button is pushed in, only the programming buttons 9 through 16 are connected to the lamp detector (Q401), so that these channels can be activated. Thus, even though channels 1 and 5 (for example) may be programmed for operation, the group of buttons 1 through 8 are actually connected so as to be in the "OUT" position regardless whether or not they are pushed in or out. In essence, the group Selector buttons overide the channel programming buttons in regards to activation of a particular channel.

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
2-1-4 Noise Generator (To Be Used In 2-8 Only)

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.

Diagrams 3-1, 3-3 and 3-5 show the location of all coils to be adjusted.

Diagram 3-12 shows location of RF boards.

2-2 QUADRATURE DETECTOR ALIGNMENT

NOTE: Omit this section for Model ACT-E 16 H/L/U.

2-2-1 Connect the FM Signal Generator to the antenna input jack. Accurately set 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 test point A, (Junction of C126, C128, R113). See diagram 3-6.

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

2-2-4 Adjust L103 for maximum peak to peak amplitude, while maintaining symmetry of the detected signal. When L103 is properly aligned, signal should be approximately 0.2 volts RMS with test signal input as noted in 2-2-1.

2-3 IF ALIGNMENT

2-3-1 Disconnect RF Signal Generator from the antenna input.

2-3-2 Connect AC voltmeter across speaker terminals.

2-3-3 Adjust volume control for 0.5 volt reading on AC voltmeter.

2-3-4 Peak T102 (bottom core and top core, in that order) for maximum noise (maximum meter reading on AC voltmeter). If circuit is not badly misaligned, the correct point should be within 2 turns of the slugs present position.

NOTE: Coils will have two peaks; adjust core to peak away from the center of the form.

2-3-5 Pre-align Quadrature Detector by tuning L103 for maximum noise (AC voltmeter). Model ACT-E 16 H/L/U only.

2-3-6 Adjust volume control for 1 volt noise reading on AC voltmeter.

2-3-7 Connect the R.F. Signal Generator to the antenna input jack of "200" series board. Turn modulation off. Set the generator to the High Band crystal frequency that will be used for High Band section alignment.

2-3-8 Adjust the Signal Generator output until the voltmeter reads 0.2 volts.

2-3-9 Adjust T101 and T201 (in that order) for maximum quieting (lowest meter reading). Adjust Signal Generator to maintain reading on AC voltmeter between 0.1 and 0.2 volts.

NOTE: Coils will have two peaks; adjust core to peak away from center of the coil form.

2-3-10 Set the generator frequency to the secondary Image frequency. This is 910 KHz below the channel frequency. NOTE: Some receivers have the second oscillator at 11.155 MHz, in this case, the Image frequency is 910 above the channel frequency. Check the frequency marked on top of the crystal.

2-3-11 Adjust the Signal Generator output until voltmeter reads .2 volts.

2-3-12 Adjust T102 (bottom core), T102 (top core), T101 and T201 (in that order) for maximum quieting degradation (highest meter reading). Adjust Signal Generator output to maintain voltmeter reading between 0.1 and 0.2 volts. The correct position for the cores should be within two turns of the position in step No. 4 and 9.

2-4 RF ALIGNMENT ("200" SERIES BOARD)

2-4-1 Preset the cores L204, L206, L207 and L208 four turns from the outer ends of the coil form.

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

2-4-3 With nothing connected to the antenna input, adjust the volume control until AC voltmeter reads 1.0 volt of noise.

HIGH BAND SECTION

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

2-4-5 Connect Signal Generator to antenna input jack of "200" series R.F. board. Set generator accurately to the frequency of the channel being used. Turn modulation off.

2-4-6 Adjust output Signal Generator until AC voltmeter reads .2 volts.

2-4-7 Adjust L206, L207, L208 and L204, in that order, for maximum quieting (lowest meter reading). Adjust Signal Generator to maintain reading on AC voltmeter between .1 and .2 volts. Repeat adjustment until no further improvements can be made.

LOW BAND SECTION

2-4-8 Preset the cores of L202 and L203 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).

2-5 RF ALIGNMENT ("300" SERIES BOARD) ACT–E 16 H/L

2-5-1 Preset the cores L304, L306, L307 and L308 four turns from the outer ends of the coil form.

2-5-2 Connect AC voltmeter across speaker terminals.

2-5-3 With nothing connected to the antenna input, adjust the volume control until AC voltmeter reads 1.0 volt of noise.

HIGH BAND SECTION

2-5-4 Activate High Band channel nearest to center of High Band frequencies being used.

2-5-5 Connect Signal Generator to antenna input jack of "300" series R.F. board. Set generator accurately to the frequency of the channel being used. Turn modulation off.

2-5-6 Adjust output Signal Generator until AC voltmeter reads .2 volts.

2-5-7 Adjust T301 for maximum quieting (lowest meter reading). Adjust Signal Generator output to maintain voltmeter reading between .1 and .2 volts of "300" series R.F. board.

2-5-8 Adjust L306, L307, L308 and L304, in that order, for maximum quieting (lowest meter reading). Adjust Signal Generator to maintain reading on AC voltmeter between .1 and .2 volts. Repeat adjustment until no further improvements can be made.

LOW BAND SECTION

2-5-9 Preset the cores of L302 and L303 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).

2-6 RF ALIGNMENT ("300" SERIES BOARD) ACT–E 16 H/L/U

2-6-1 Connect the R.F. Signal Generator to the antenna input jack of the "300" series board. Set the generator to the operating crystal frequency.

2-6-2 Adjust output of Signal Generator until AC voltmeter reads 0.2 volts.

2-6-3 Pre-Adjust Trimmer Capacitor (C317) so that the silvered half-moon section is nearest to the rear of the receiver.

2-6-4 Adjust T301 for maximum quieting (lowest meter reading). Adjust Signal Generator output to maintain voltmeter reading between .1 and .2 volts.

2-6-5 Adjust C301 and C302 (trimmer capacitors), in that order, for maximum quieting (lowest meter reading). Adjust Signal Generator output to maintain voltmeter reading between .1 and .2 volts. Repeat adjustments until no further improvements can be made.

NOTE: Use non-metallic screwdriver for trimmer adjustments.

Peaks are very sharp, tune with care. Two peaks can be observed, tune to peak with silver moon section away from I.F. board.

2-6-6 Adjust the core of L303 for maximum quieting (lowest meter reading). Adjust Signal Generator to maintain reading on AC voltmeter between .1 and .2 volts.

NOTE: To properly adjust L303, C317 must be pre-adjusted as in step 2-6-3.

2-6-7 Adjust C317 counter clockwise with non-metallic screwdriver for maximum quieting (lowest meter reading). Adjust Signal Generator to maintain reading on AC voltmeter between .1 and .2 volts. Do NOT re-adjust L303 after C317 is adjusted.

2-6-8 Re-adjust C301, C302 and C317 (only) for maximum quieting (lowest meter reading). Adjust Signal Generator output to maintain .1 and .2 volts. Repeat adjustments until no further improvements can be made.

2-7 AFC ALIGNMENT (ACT–E 16 H/L/U ONLY)

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 2-7-5.

2-7-1 Pre-align Quadrature Detector by tuning L103 for maximum noise (AC voltmeter reading) at the speaker terminals.

2-7-2 With a coupling loop, inject "reference" signal (either 10.7 MHz or 455 KHz) to produce good quieting (more than 30 DB quieting). Adjust R326 for reading of 3.8 to 4.0 volts at the collector of Q304.

2-7-3 Remove the "reference" signal and have the unit squelched and receiving no signal. The voltage on the collector of Q304 shall be between 3.2 and 4.6 volts. If not, note voltage and proceed to step 2-7-4. If voltage is between 3.2 and 4.6 volts, AFC alignment is complete.

NOTE: Any further adjustments made to L103 and R326 will require AFC to be re-adjusted.

2-7-4 Inject "reference" signal and monitor voltage on collector of Q304, adjust L103 for same voltage as noted in step 3. Re-adjust R326 for a voltmeter reading of 3.8 to 4.0 volts. Repeat step 2-4-3.

NOTE: DO NOT adjust L103 more than 1/4 turn at a time.

2-7-5 If an accurate I.F. signal source is not available, an approximate AFC alignment can be made by adjusting L103 for maximum noise (AC voltmeter reading) at the speaker terminals, and with unit squelched and receiving no signal, adjust R326 for a voltmeter reading of 3.2 to 4.6 on the collector of Q304.

NOTE: Units equiped with a 10.245 MHz crystal have the jumper in the AFC circuit connected between the base of Q304 and collector of Q306. When a 11.155 MHz crystal is used, the jumper is connected between the base of Q304 and the collector of Q305. If crystal is changed from one frequency to the other, the jumper must be changed.

2-8 NOISE BALANCE ADJUSTMENT (ACT–E 16 H/L ONLY)

NOTE: This adjustment may be required only if excessive "ignition noise" is encountered. Usually, the "noise" problem is caused by improper or inadequate noise suppression of the vehicle's ignition system. In Models containing UHF RF Board (ACT-E 16 H/L/U), noise balance is achieved through AFC Alignment.

2-8-1 Using a "T" connector, connect the FM Signal Generator and the Noise Generator to the antenna input jack. If a "T" connector is not available, connect the FM generator to the antenna jack and feed in the noise signal by means of a 3 or 4 turn loop coupled to the input coil, L306.

2-8-2 Connect the oscilloscope to the junction of Q109's emitter and Q110's collector, or to the speaker terminals.

2-8-3 Apply a 3 to 10 microvolt signal, as accurately as can be set to the exact channel frequency (carrier only, no modulation), and adjust the output of the Noise Generator until spikes are clearly seen in the audio output as viewed on the oscilloscope. The noise spikes will be either mostly positive or negative, if an unbalanced condition exists.

2-8-4 Tune L103 (Quadrature Detector coil) until the noise spikes are equally positive and negative in their amplitude. The overall amplitude of these spikes should be much less as a balance is achieved. Usually, only a 1/4 turn, or less, is needed to obtain the proper adjustment for best noise balance. If a proper balance can not be achieved, repeat the IF and RF alignments and then try the noise balance adjustment again.

SECTION 3 DIAGRAMS, VOLTAGE DATA AND SCHEMATICS

3-1 RF BOARD PARTS PLACEMENT DIAGRAM (H/L BOARD)

3-2 RF BOARD BOTTOM VIEW (H/L BOARD)

3-3 RF BOARD PARTS PLACEMENT DIAGRAM (UHF BOARD)

3-4 RF BOARD BOTTOM VIEW (UHF BOARD)

3-5 IF - AUDIO BOARD PARTS PLACEMENT DIAGRAM

3-6 IF - AUDIO BOARD BOTTOM VIEW

3-7 SCANNER BOARD PARTS PLACEMENT DIAGRAM

3-8 SCANNER BOARD BOTTOM VIEW

3-9 SCANNER BOARD (SECONDARY) PARTS PLACEMENT DIAGRAM

3-10 SCANNER BOARD (SECONDARY) BOTTOM VIEW

3-11 VOLTAGE DATA

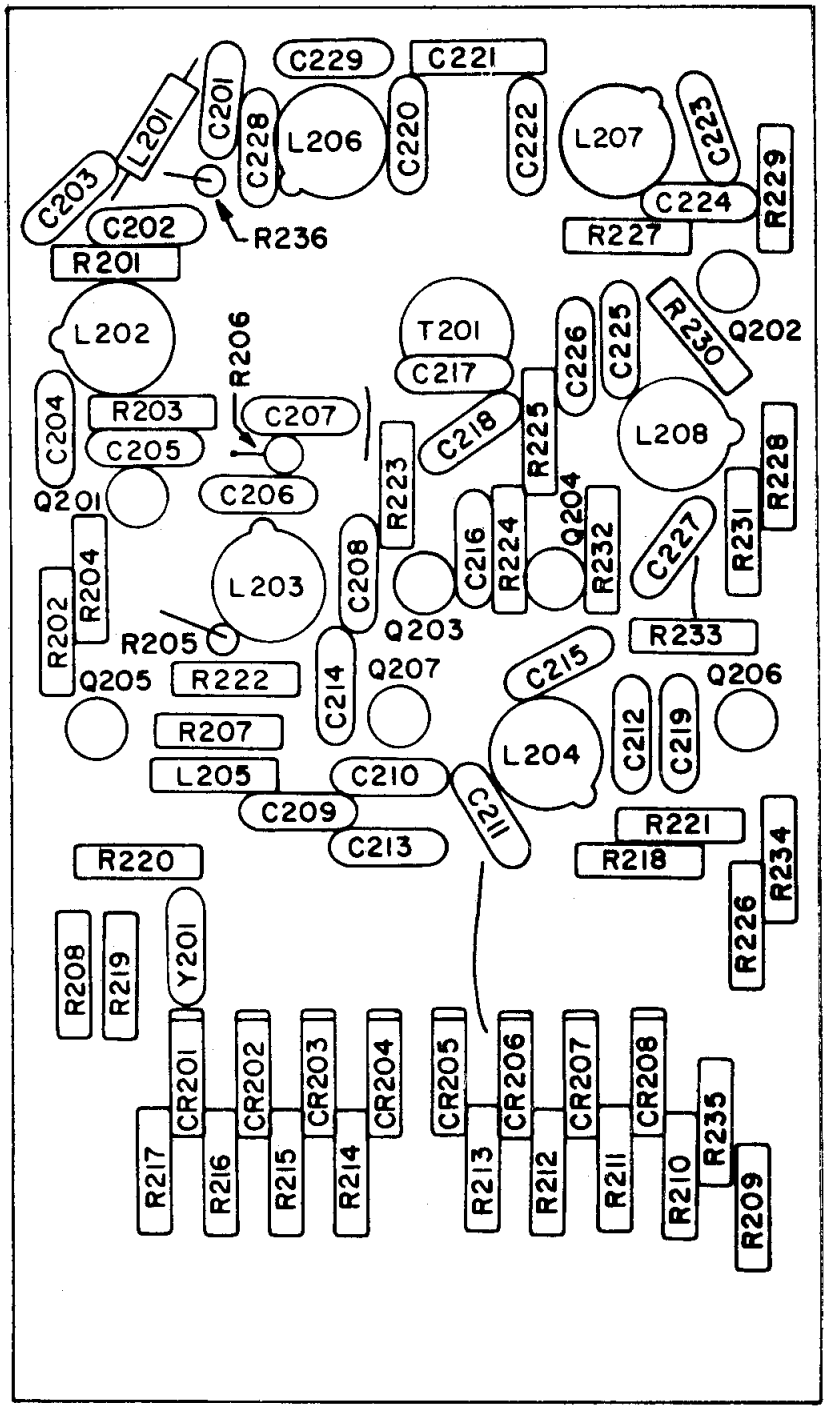
3-12 CRYSTAL LOCATION DIAGRAM

3-13 BAND PROGRAMMING DIAGRAM

3-14 SCHEMATIC (ACT–E 16 H/L)

3-15 SCHEMATIC (ACT–E 16 H/L/U)

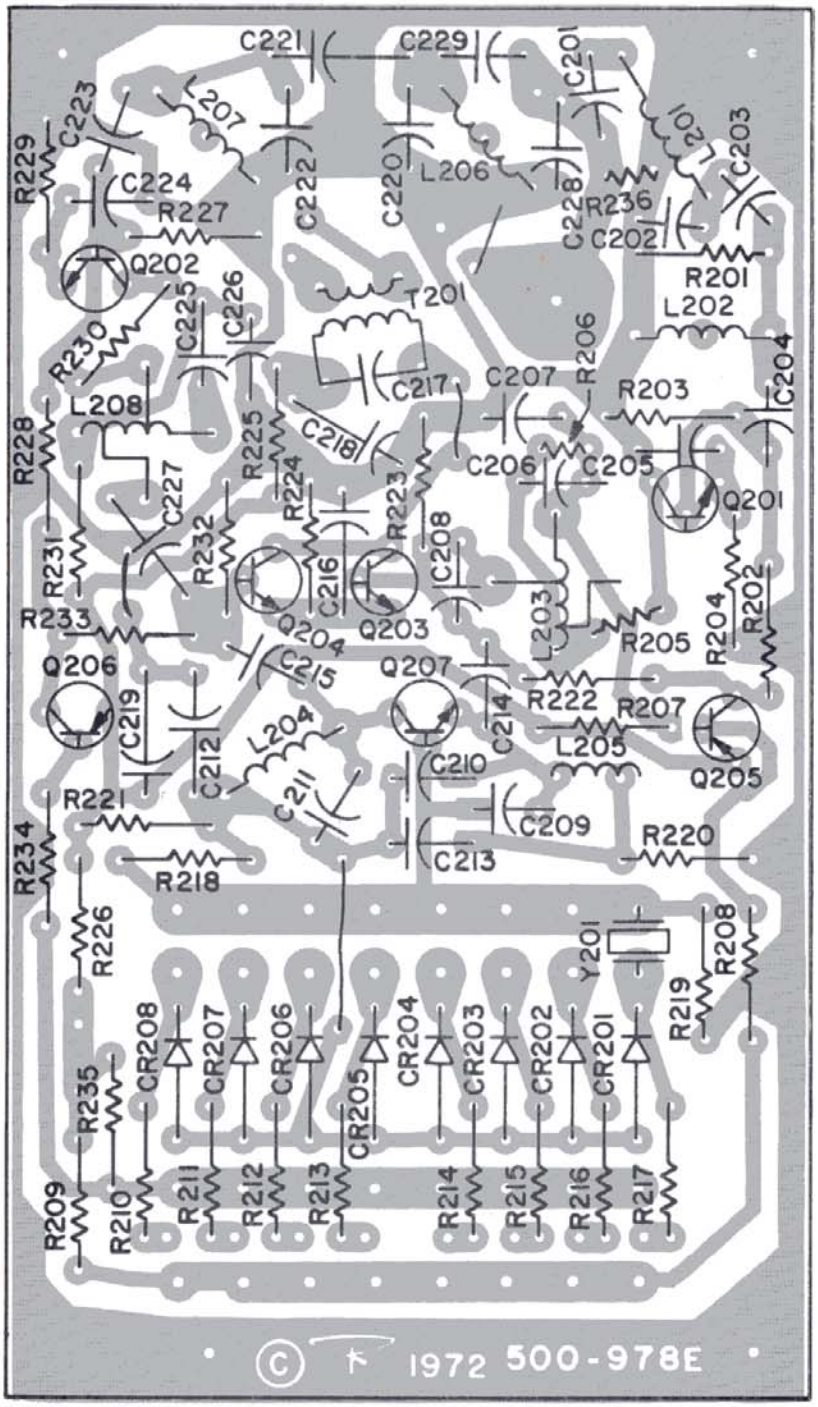
RF BOARD 500-978



MODEL ACT-E16H/L : BOTH RF BOARDS ARE IDENTICAL EXCEPT FOR ONE BEING A "200" SERIES BOARD AND THE OTHER A "300" SERIES BOARD.

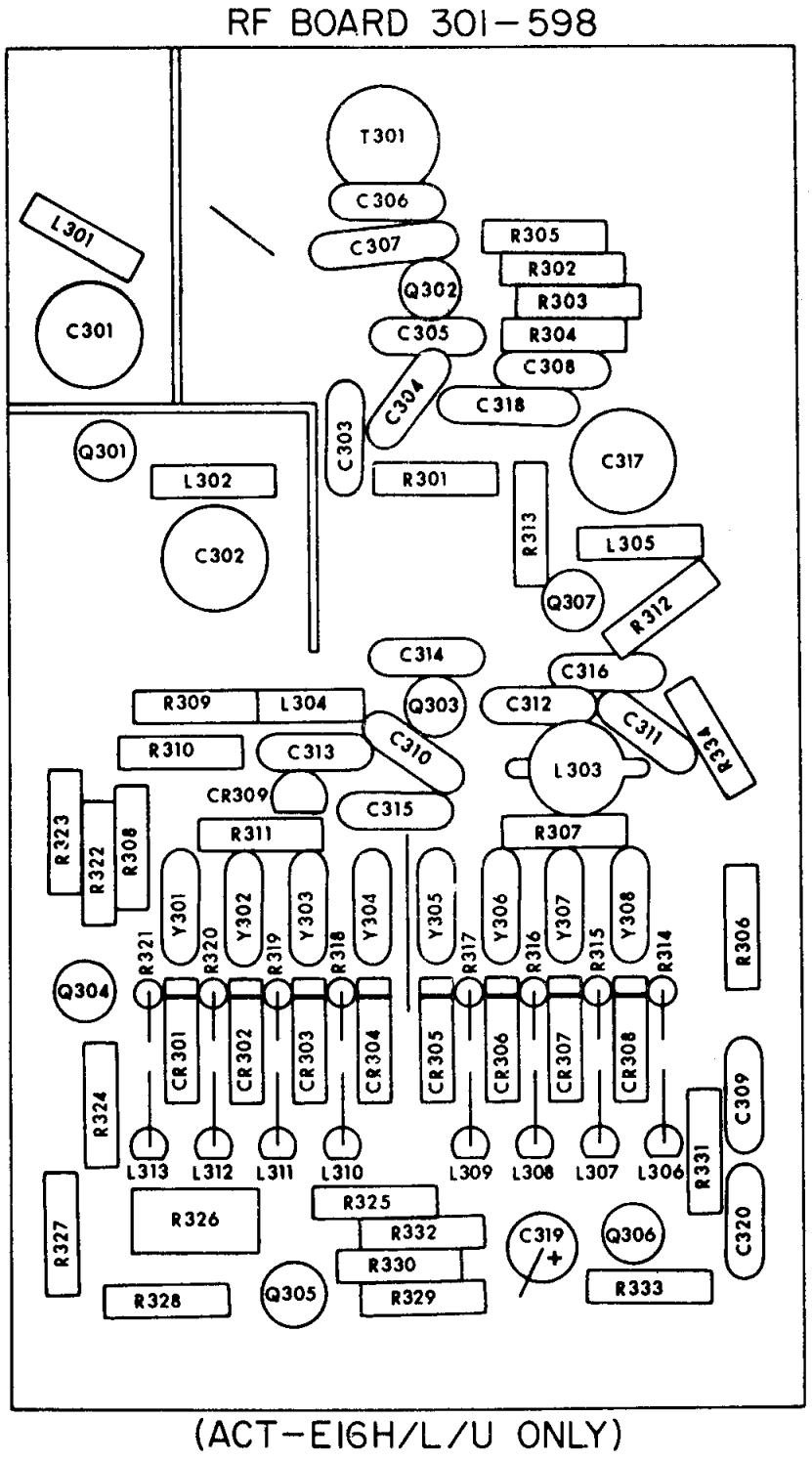
3-1 RF BOARD PARTS PLACEMENT DIAGRAM (H/L BOARD)

RF BOARD 500-978



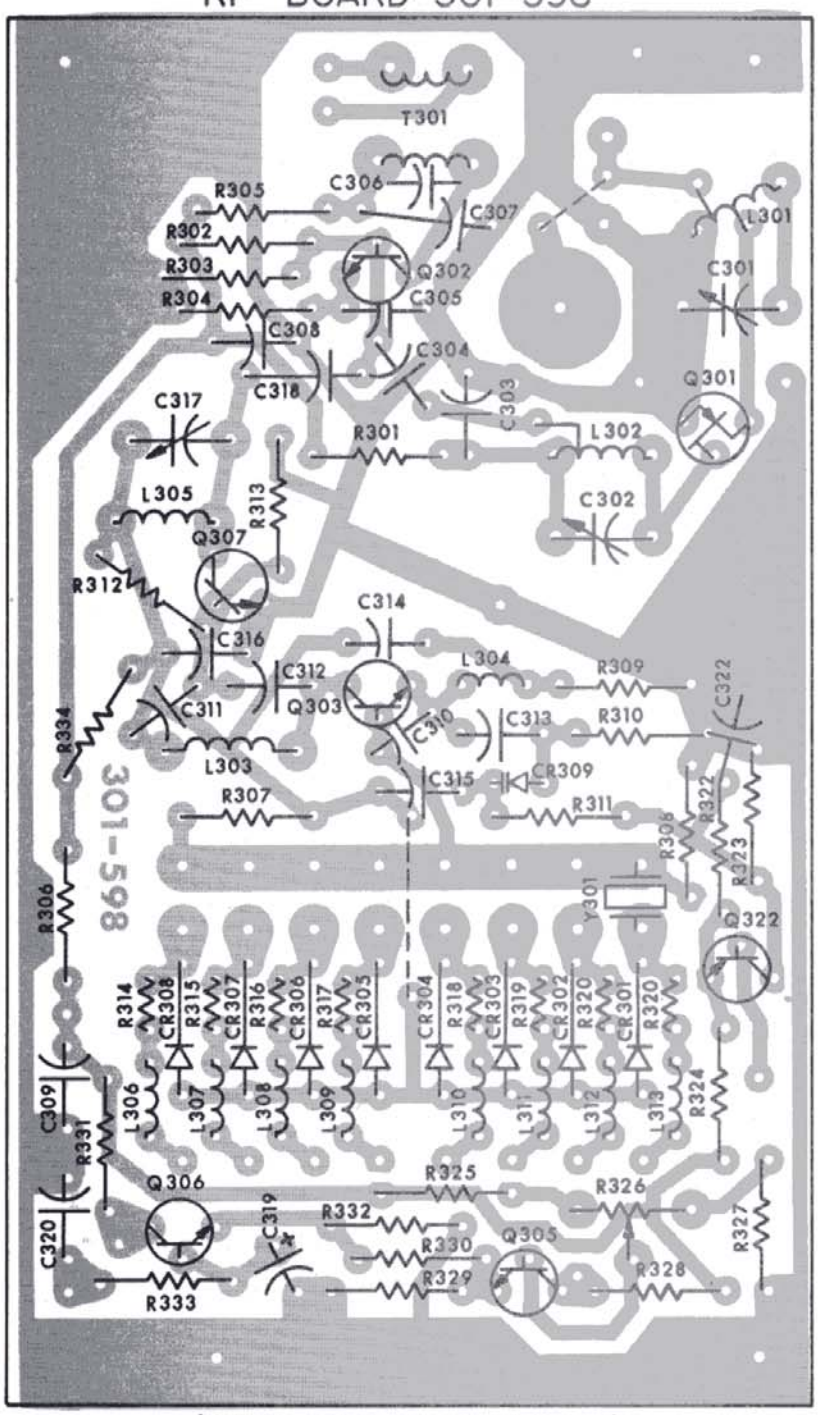
MODEL ACT-E16H/L: BOTH RF BOARDS ARE IDENTICAL EXCEPT FOR ONE BEING A "200" SERIES BOARD AND THE OTHER A "300" SERIES BOARD.

3-2 RF BOARD BOTTOM VIEW (H/L BOARD)



3-3 RF BOARD PARTS PLACEMENT DIAGRAM (UHF BOARD)

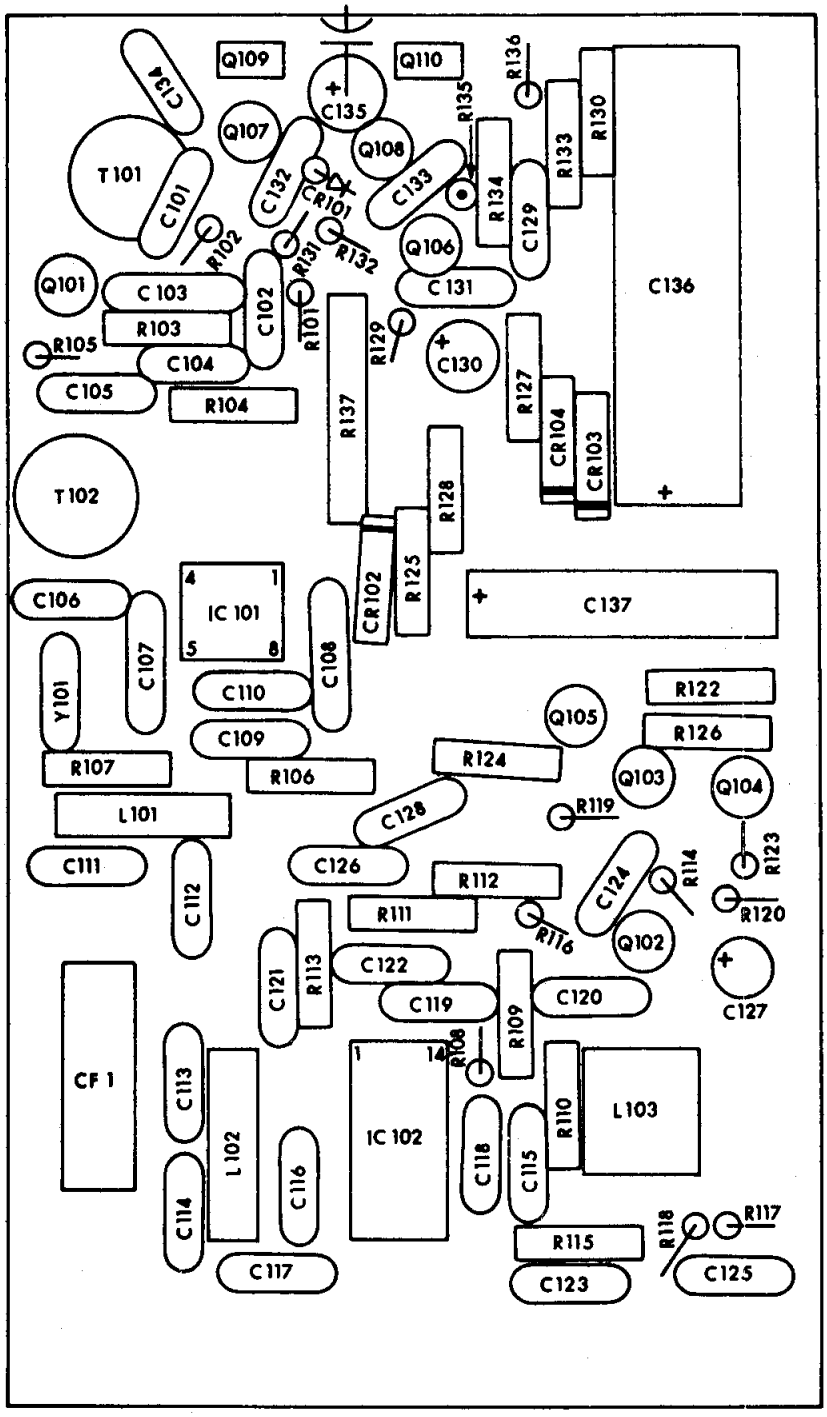
RF BOARD 301-598



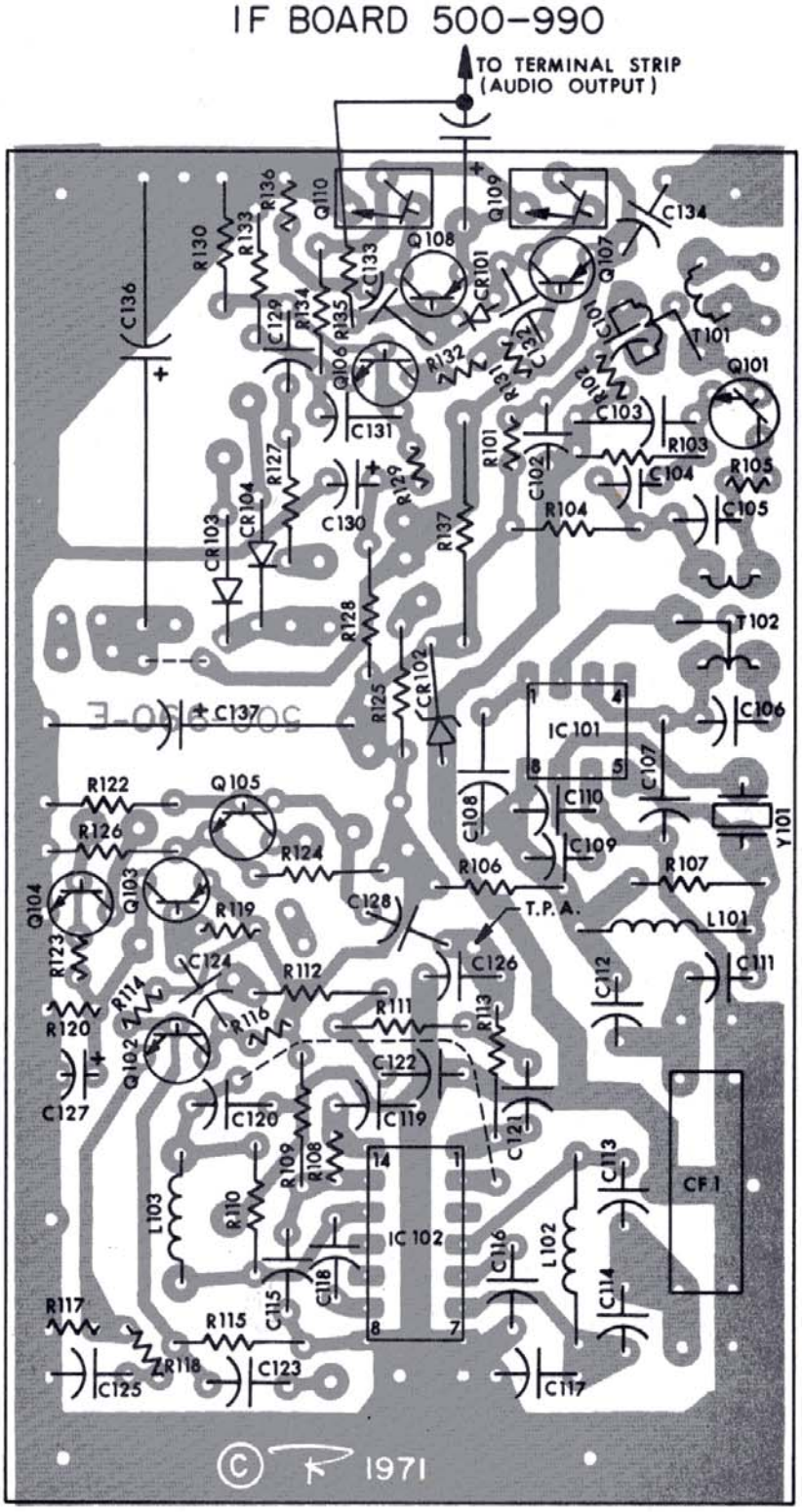
(ACT-E16H/L/U ONLY)

3-4 RF BOARD BOTTOM VIEW (UHF BOARD)

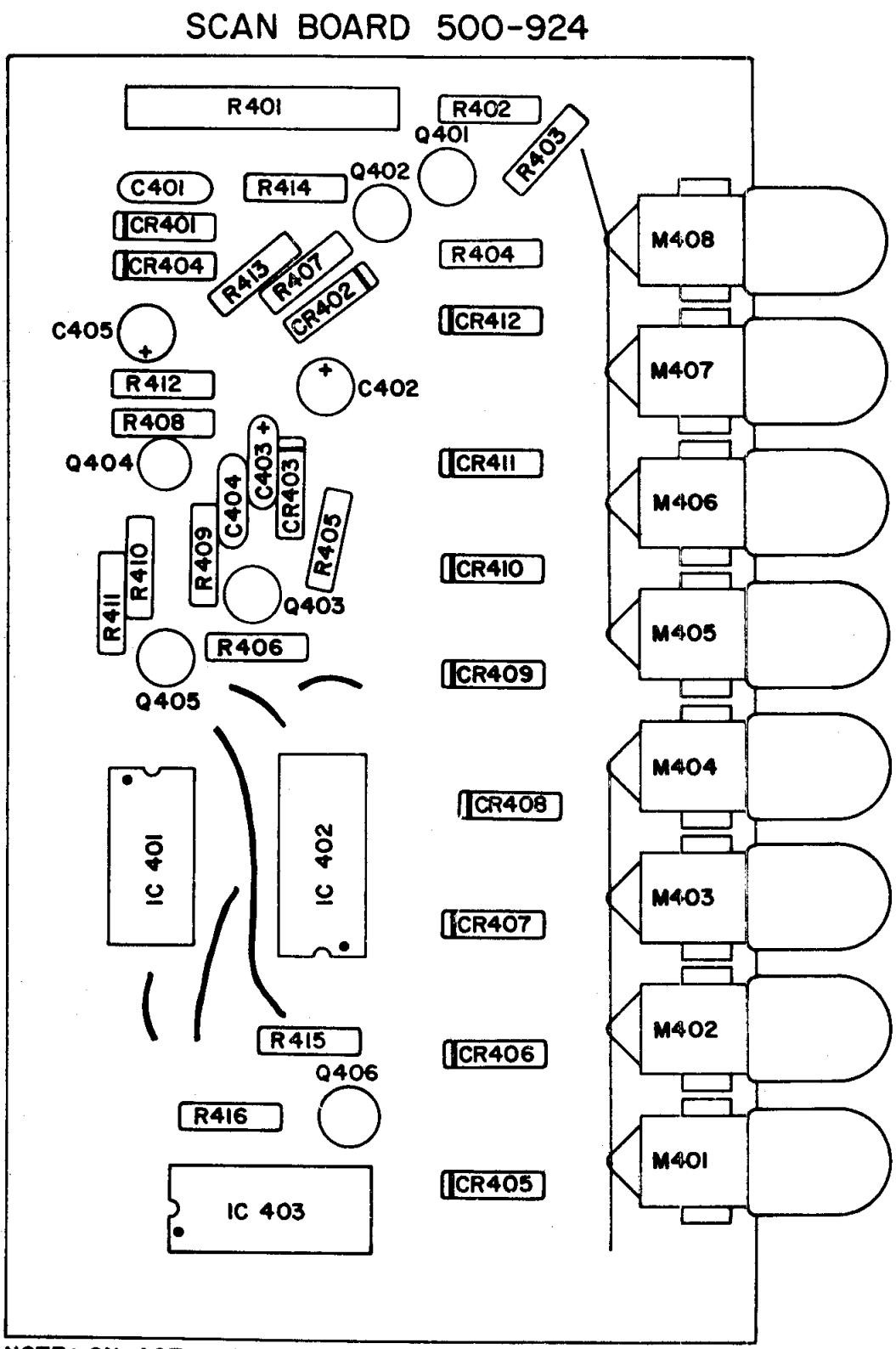
IF BOARD 500-990



3-5 IF - AUDIO BOARD PARTS PLACEMENT DIAGRAM

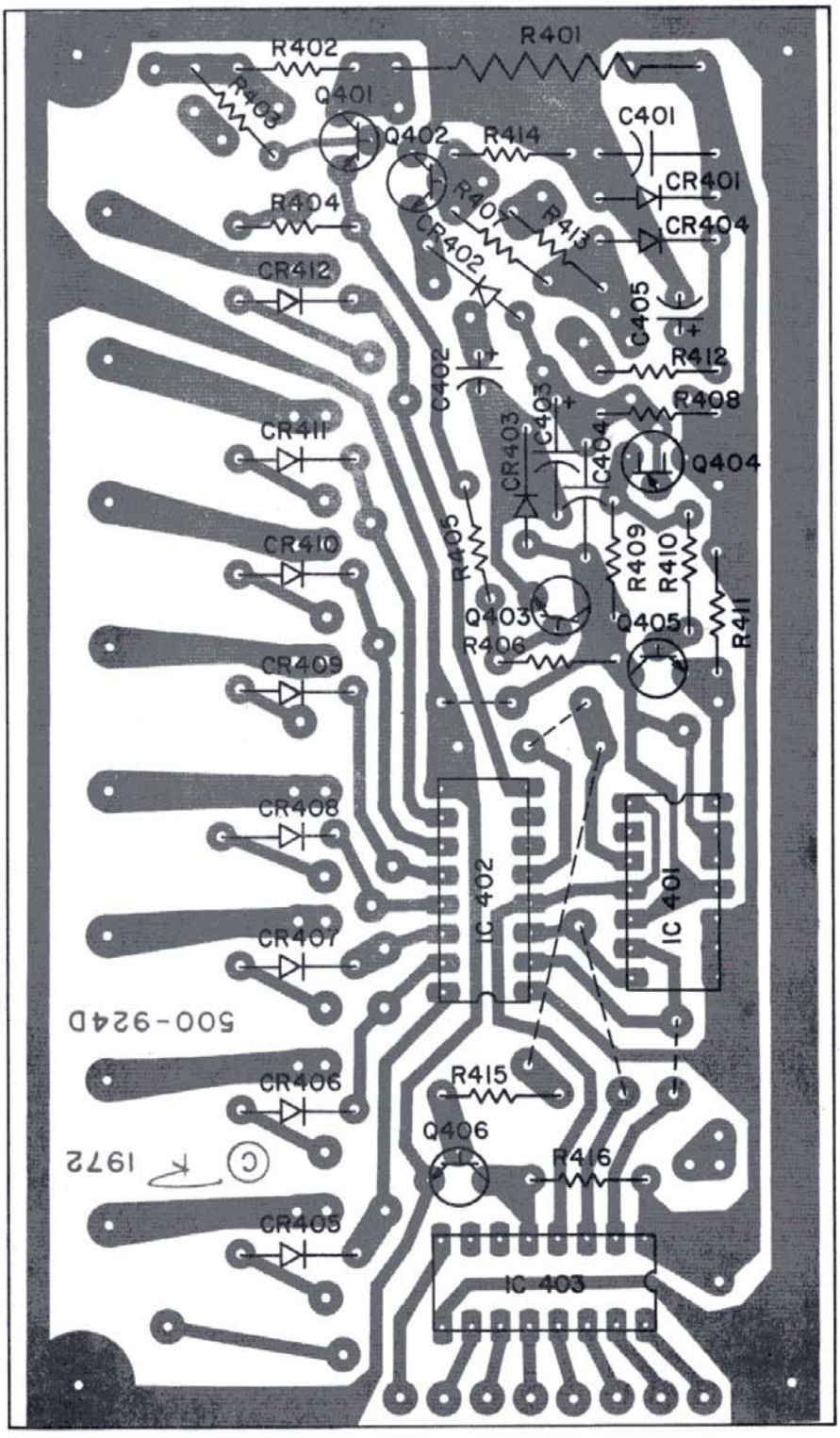


3-6 IF - AUDIO BOARD BOTTOM VIEW

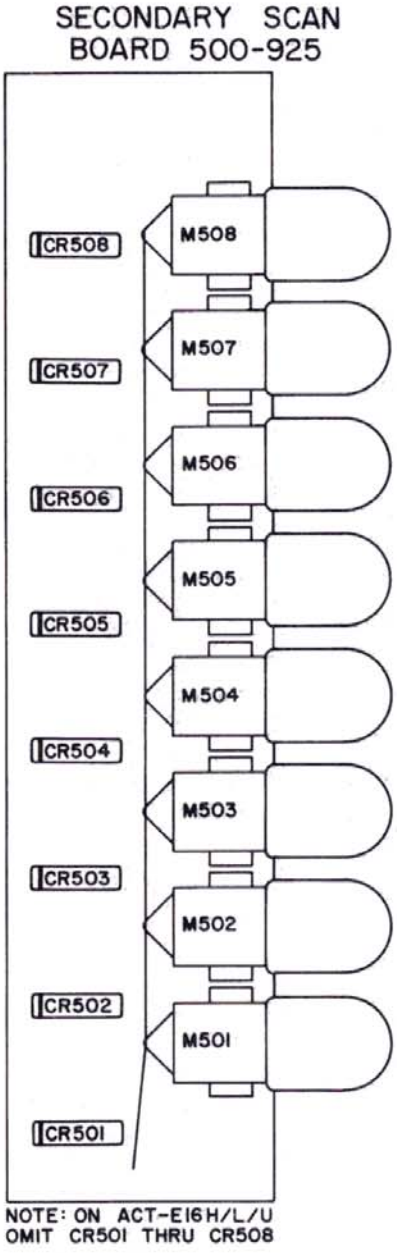


3-7 SCANNER BOARD PARTS PLACEMENT DIAGRAM

SCAN BOARD 500-924

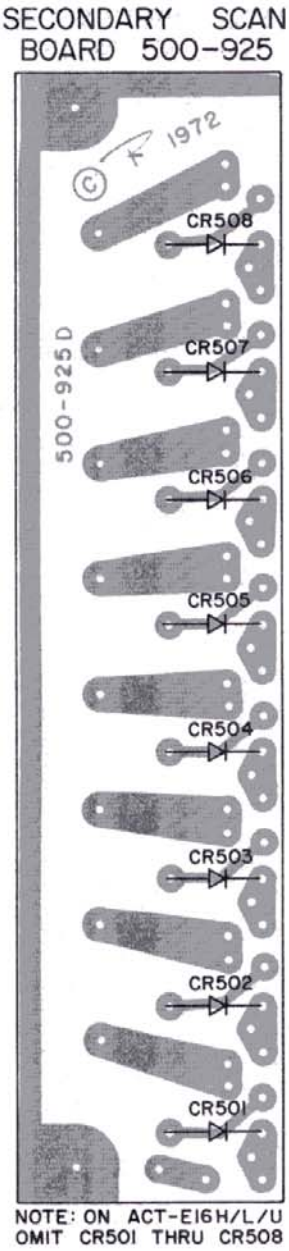


3-8 SCANNER BOARD BOTTOM VIEW



3-9 SCANNER BOARD (SECONDARY)

PARTS PLACEMENT DIAGRAM



3-10 SCANNER BOARD (SECONDARY)

BOTTOM VIEW

3-11 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 – TRANSISTORS:

	TRANSISTOR	EMITTER (Source)	BASE (Gate)	COLLECTOR (Drain)	
RF Board					
No. 301-563	Q201	3.1	3.8	7.0	Low Band Activated
		0	0	7.6	High Band Activated
Note: Model	Q202	0	0	7.6	Low Band Activated
ACT-E 16H/L		3.1	3.8	7.0	High Band Activated
has "300"	Q203	1.6	2.3	7.1	Low Band Activated
Series RF Board		1.6	0	7.1	High Band Activated
voltages identical	Q204	1.6	0	7.1	Low Band Activated
to "200" Series		1.6	2.3	7.1	High Band Activated
RF Board voltages	Q205	7.8	7.4	7.6	Low Band Activated
		7.8	11.0	0V	High Band Activated
	Q206	7.8	11.0	0	Low Band Activated
		7.8	7.0	7.6	High Band Activated
	Q207	3.4	4.1	7.0	
RF Board					
No. 301-598	Q301(FET)	0	0	5.5	
	Q302	1.5	2.2	6.8	
NOTE: Model	Q303	.25	3.1	6.8	
ACT-E 16H/L/U	Q304	7.8	7.2	3.0-5.0	
only.	Q305	2.9	3.6	7.4	
	Q306	2.9	3.6	7.2	
	Q307	0	.2	6.8	
IF Board					
No. 500-858	Q101	2.3	3.0	5.8	
	Q102	1.0	1.7	4.8	
	Q103 (PNP)	8.2	8.2	0	(unsquelched)
		8.2	8.2	1.0	(squelched)
		8.2	8.2	1.5	Min. (tight squelch)
	Q104	0	0	7.2	(unsquelched)
		0	.80	.30	(squelched)
		0	.80	.10	(tight squelch)
	Q105	1.4	1.9	5.1	(unsquelched)
		1.1	.10	8.2	(tight squelch)
	Q106	0.7	1.3	12.4	
	Q107 (PNP)	13.8	13.1	7.2	
	Q108 (PNP)	6.9	6.6	.10	
	Q109	6.9	7.2	13.8	
	Q110	0	.10	6.9	
Scan Board	Q401(PNP)	13.8	13.1	13.6	(SCAN)
No. 500-924	Q402	0	0	4.2	(SCAN)
		0	.70	.10	(MAN)

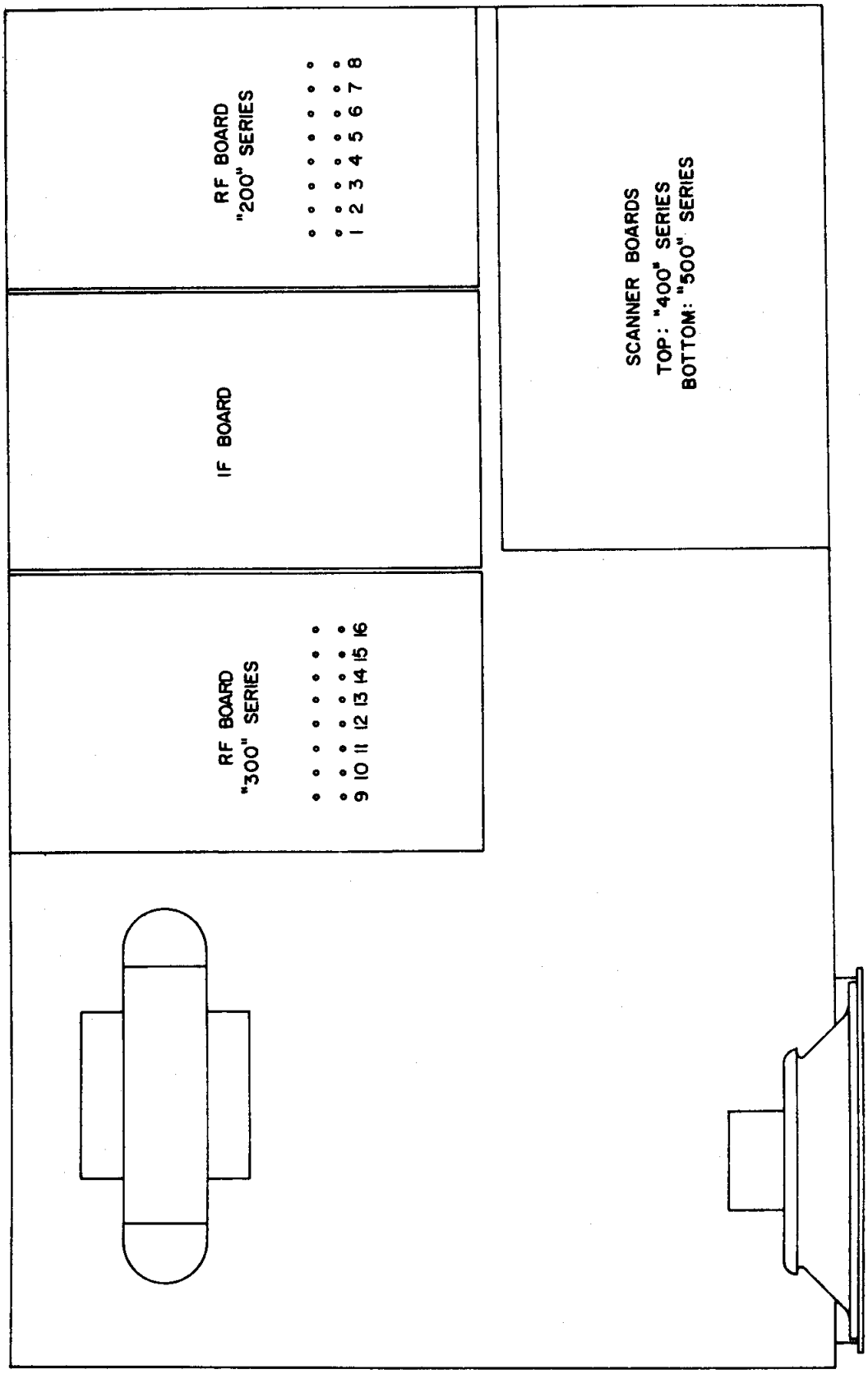
3-11 VOLTAGE DATA (CONTINUED)

TRANSISTOR	EMITTER (Source)	BASE (Gate)	COLLECTOR (Drain)
Q403	0	.70	0.1
Q405	0	.20	4.9 (SCAN)
	0	.20	5.1 (MAN)
Q406	0	.4P	2.5P (SCAN)
	0	.10	5.1 (MAN)
	Base 1	**Emitter**	**Base 2**
Q404	.20	3.8	5.1 (SCAN)
(Unijunction)	.20	0.7	5.1 (MAN)

3-11 VOLTAGE DATA (CONTINUED)

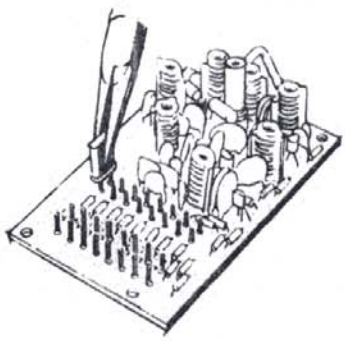
NOTE: A "P" beside a voltage indicates that the meter reading is pulsating (fluctuating) because the scanner section of the unit is operating. MAN indicates the unit is not scanning and is at channel 1 (M401 is lighted).

	IC No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
IF Board 500-858	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			
Scan Board 500-850	IC No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
	IC 401	5.1	0	0	0	5.1	5.1	5.1	.1	.1	0	.1	.1	0	.1	–	–	(MAN)
		4.9	0	0	0	5.1	5.1	5.1	2P	2P	0	2P	2P	0	2P	–	–	(SCAN)
	IC 402	.5	11.2	11.2	11.2	11.2	11.2	11.2	0	11.2	-	-	.1	.1	.1	.1	5.1	(MAN)
		9P	9P	9P	9P	9P	9P	9P	0	9P	0	0	2P	2P	2P	2P	5.1	(SCAN)
	IC 403	11.2	11.2	11.2	11.2	11.2	11.2	11.2	0	11.2	0	0	5.1	.1	.1	.1	5.1	(MAN)
		9P	9P	9P	9P	9P	9P	9P	0	9P	0	0	3P	2P	2P	2P	5.1	(SCAN)



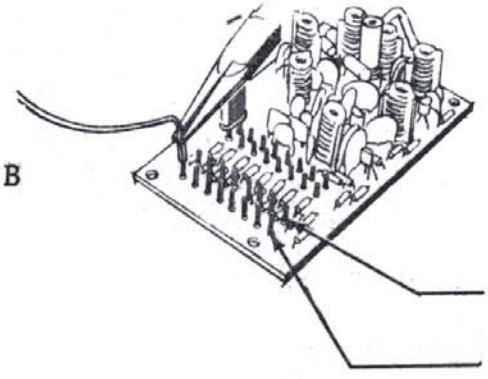
3-12 CRYSTAL LOCATION DIAGRAM

PICTORIAL A



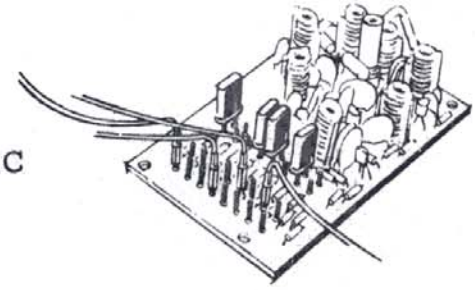
Insert crystal for high or low band frequency of your choice

PICTORIAL B



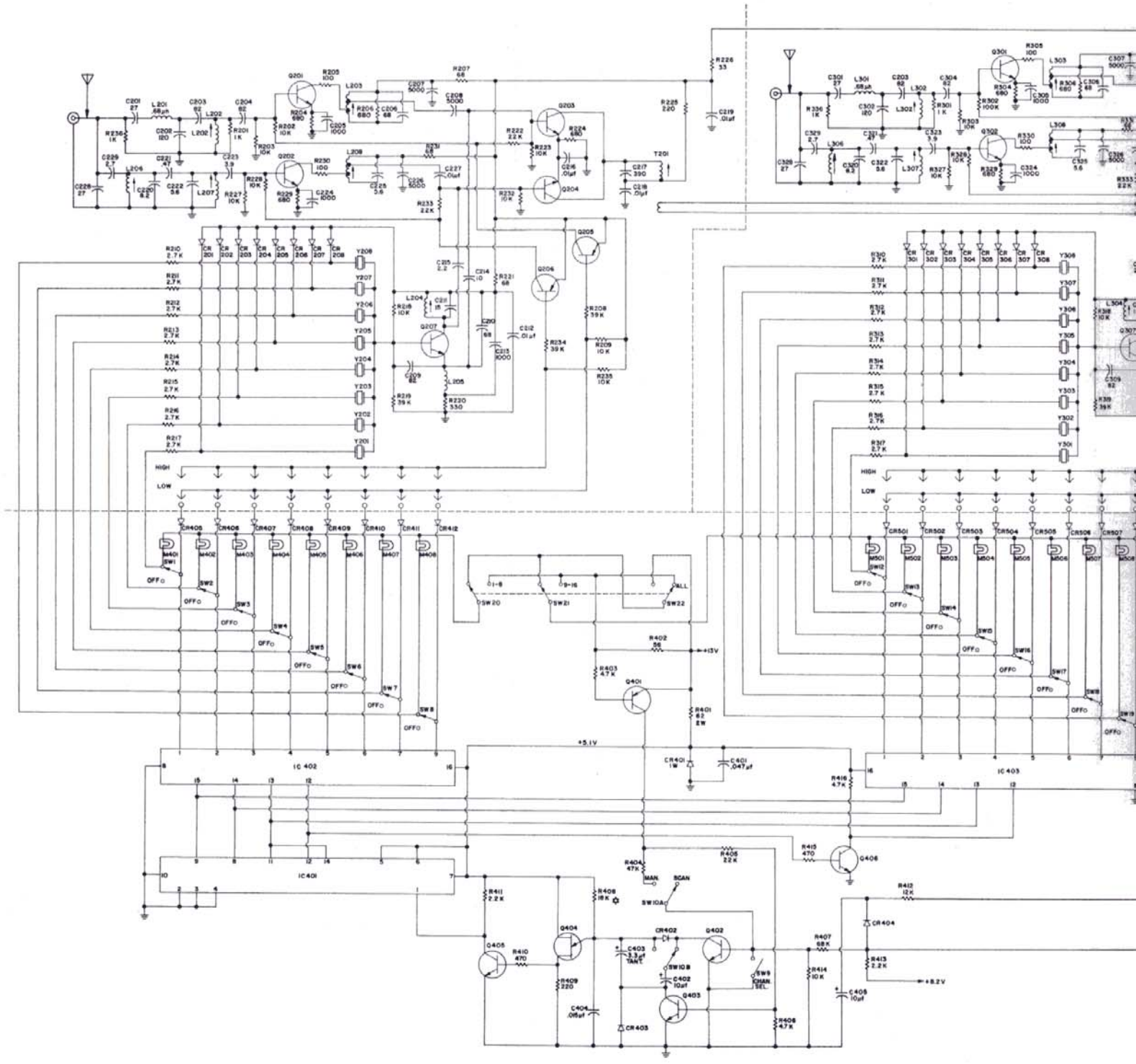
Connect lead to corresponding high or low band terminal programmer

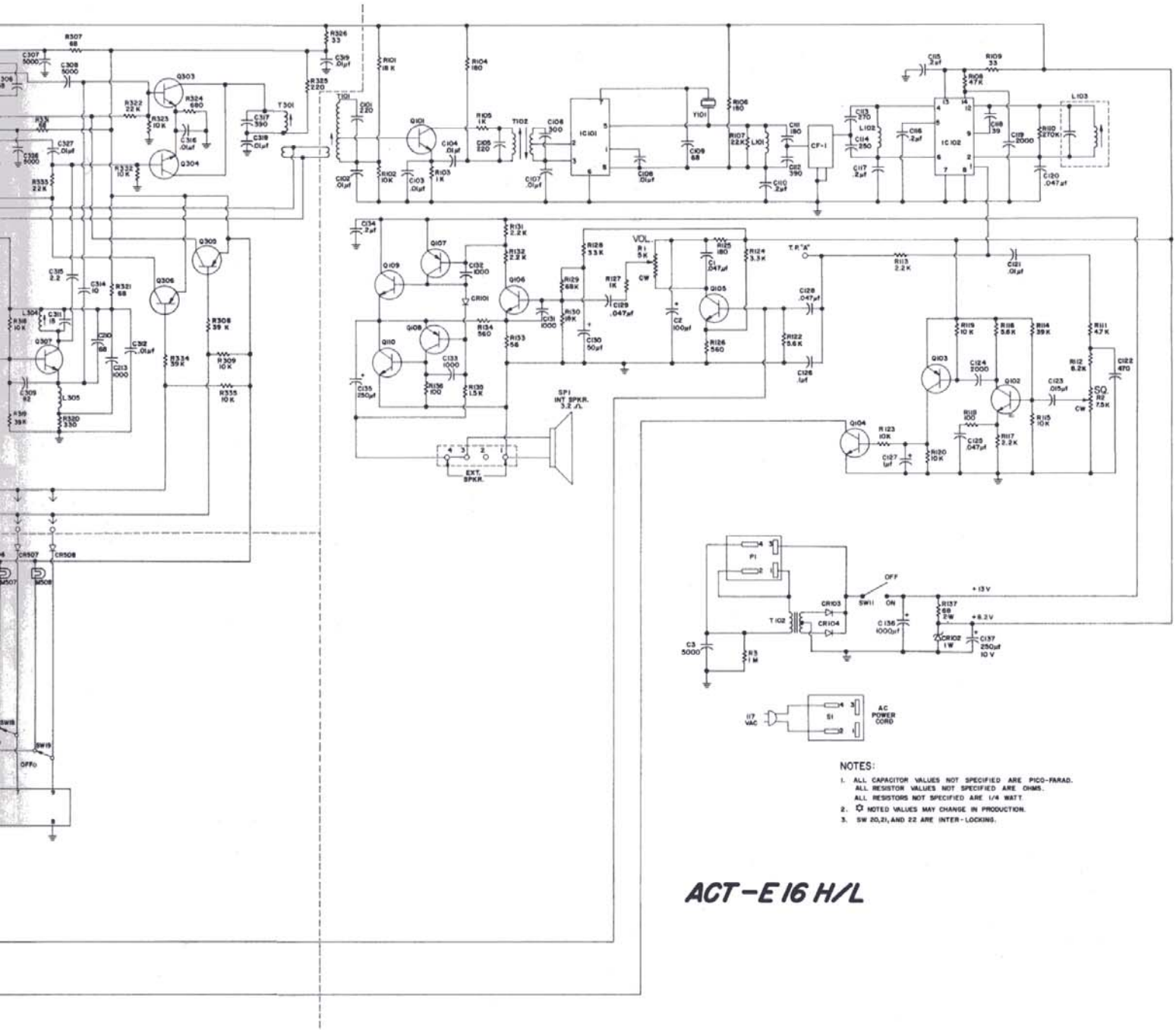
PICTORIAL C



Repeat procedure for each channel in sequence of your choice

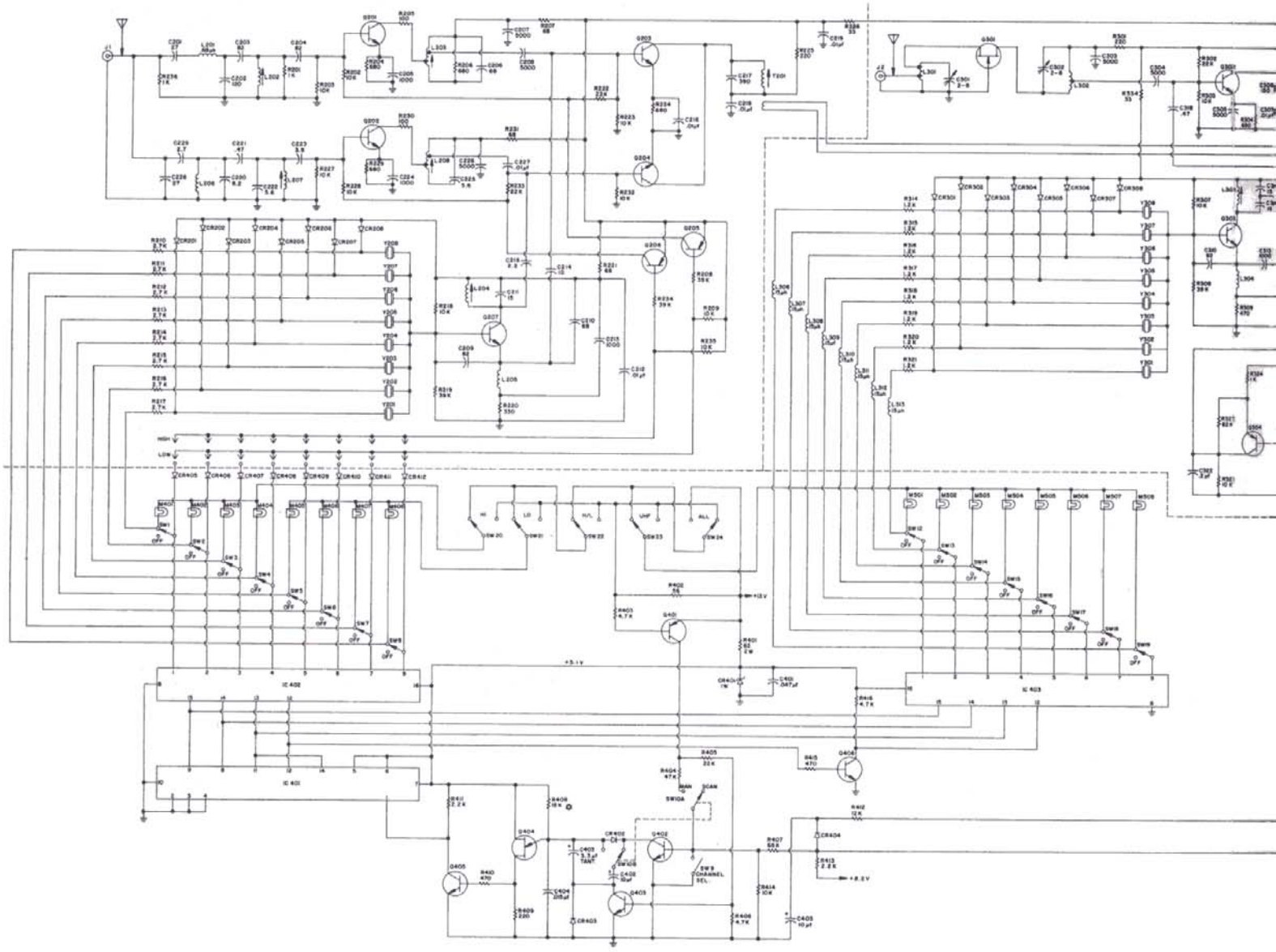
3-13 BAND PROGRAMMING DIAGRAM

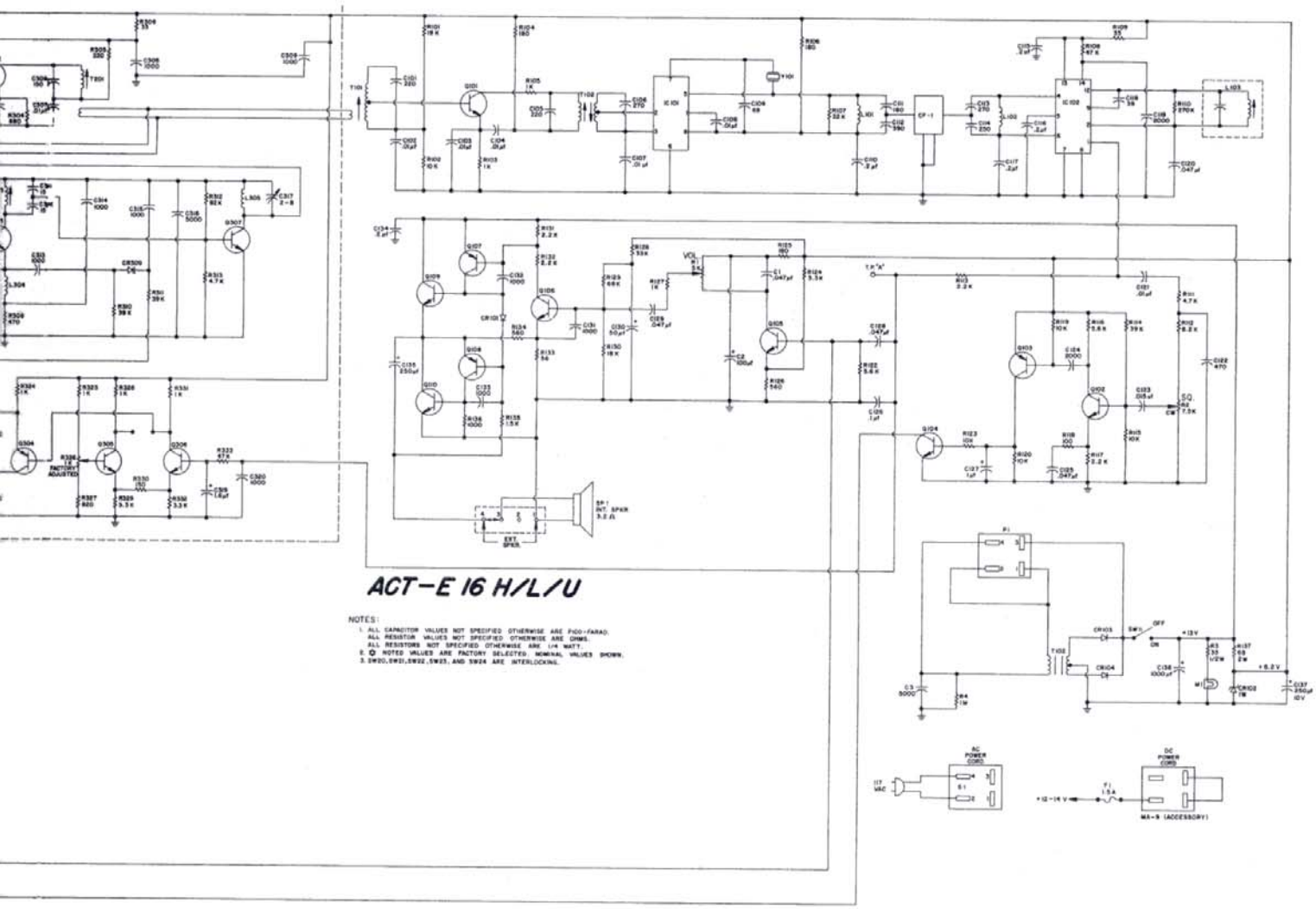




ACT-E16 H/L

3-14 SCHEMATIC (ACT–E 16 H/L)





3-15 SCHEMATIC (ACT–E 16 H/L/U)

SECTION 4 PARTS LIST

4-1 RF BOARD (H/L) 500-978

NOTE: In Model ACT-E 16 H/L, both RF boards are identical except for one being a "200" series board and the other a "300" series board.

Item No.	Description	Part No.
	RESISTORS	
R201	1K, 10%, ¼W	
R202	10K, 10%, ¼W	
R203	10K, 10%, ¼W	
R204	680 ohm, 10%, ¼W	
R205	100 ohm, 10%, ¼W	
R206	680, 10%, ¼W	
R207	68 ohm, 10%, ¼W	
R208	39K, 10%, ¼W	
R209	10K, 10%, ¼W	
R210	2.7K, 10%, ¼W	
R211	2.7K, 10%, ¼W	
R212	2.7K, 10%, ¼W	
R213	2.7K, 10%, ¼W	
R214	2.7K, 10%, ¼W	
R215	2.7K, 10%, ¼W	
R216	2.7K, 10%, ¼W	
R217	2.7K, 10%, ¼W	
R218	10K, 10%, ¼W	
R219	39K, 10%, ¼W	
R220	330 ohm, 10%, ¼W	
R221	68 ohm, 10%, ¼W	
R222	22K, 10%, ¼W	
R223	10K, 10%, ¼W	
R224	680 ohm, 10%, ¼W	
R225	220 ohm, 10%, ¼W	
R226	33 ohm, 10%, ¼W	
R227	10K, 10%, ¼W	
R228	10K, 10%, ¼W	
R229	680 ohm, 10%, ¼W	
R230	100 ohm, 10%, ¼W	
R231	68 ohm, 10%, ¼W	
R232	10K, 10%, ¼W	
R233	22K, 10%, ¼W	
R234	39K, 10%, ¼W	
R235	10K, 10%, ¼W	
R236	1K, 10%, ¼W	
	CAPACITORS	
C201	27, 10%, NPO (DISC)	1500-0270-605
C202	120pf, 50% 50V (MICA)	1506-0121-550
C203	82pf, 5% 50V (MICA)	1506-0820-550
C204	82pf, 5% 50V (MICA)	1506-0820-550
C205	.001mf, +80%-20% 500VZ5U (DISC)	1503-0102-001
C206	68pf, 5% 50V (MICA)	1506-0680-550
C207	.005mf, +80%-20%, 500VZ5U (DISC)	1503-0502-002
C208	.005mf, +80%-20%, 500VZ5U (DISC)	1503-0502-002
C209	82pf, 5%, 50V (MICA)	1506-0820-550
C210	68pf, 5% 50V (MICA)	1506-0680-550
C211	15pf, 10% NPO (DISC)	1500-0150-605
C212	.01mf, +80%-20%, 500VZ5U (DISC)	1503-0103-001
C213	.001mf, +80%-20%, 500V (DISC)	1503-0102-001
C214	10pf, 10% NPO (DISC)	1500-0100-905
C215	2.2pf, +.25pf NPO (DISC)	1500-0229-205
C216	.01mf, +80%-20%, 500VZ5U (DISC)	1503-0103-001
C217	390pf, 5% 50V (MICA)	1506-0391-550
C218	01.mf, +80%-20%, 500VZ5U (DISC)	1503-0103-001
C219	.01mf, +80%-20%, 500VZ5U (DISC)	1503-0103-001
C220	8.2pf, 10% NPO (DISC)	1500-0829-905
C221	.47pf, 10% (composition)	1510-0478-900
C222	5.6pf, 10% NPO (DISC)	1500-0569-905
C223	3.9pf, 10% NPO (DISC)	1500-0399-905
C224	.001, +80%-20%, 500VZ5U (DISC)	1503-0102-001
C225	5.6pf, 10% NPO (DISC)	1500-0569-905
C226	.005mf, +80%-20%, 500VZ5U (DISC)	1503-0502-002
C227	.01mf, +80%-20%, 500VZ5U (DISC)	1503-0103-001
C228	27pf, +10%, NPO (DISC)	1500-0270-605
C229	2.7pf, +.25pf, NPO (DISC)	1500-0279-205
	COILS	
L201	Choke .68 uhy	1802-0688-003
L202	Coil, RF Input (GRN)	1800-3152-005
L203	Coil, RF Output (YEL)	1800-3152-004
L204	Coil, RF Inj. (WHT)	1800-3152-009
L205	Coil, Osc.	1801-1236-900
L206	Coil, RF Input (RED)	1800-3152-002
L207	Coil RF Input (RED)	1800-3152-002
L208	Coil RF Output (ORG)	1800-3152-003
T201	Coil Mixer Output	1800-1240-500
	TRANSISTORS	
Q201	Silicon NPN, 2N5222 (RT)	4801-0000-035
Q202	Silicon NPN, 2N5222 (RT)	4801-0000-035
Q203	Silicon NPN, 2N5222 (RT)	4801-0000-035
Q204	Silicon NPN, 2N5222 (RT)	4801-0000-035
Q205	Silicon PNP, 2N5227 (WT)	4801-0000-060
Q206	Silicon PNP, 2N5227 (WT)	4801-0000-060
Q207	Silicon NPN, 2N5230 (Low Beta)	4801-0000-100

Note: RT=red top, WT=white top

Item	Description	Part No.
	DIODES	
CR201	Germanium-Junction Signal	4807-1233-900
CR202	Germanium-Junction Signal	4807-1233-900
CR203	Germanium-Junction Signal	4807-1233-900
CR204	Germanium-Junction Signal	4807-1233-900
CR205	Germanium-Junction Signal	4807-1233-900
CR206	Germanium-Junction Signal	4807-1233-900
CR207	Germanium-Junction Signal	4807-1233-900
CR208	Germanium-Junction Signal	4807-1233-900

4-2 RF BOARD (UHF) 301-598 ACT–E 16 H/L/U ONLY

Item No.	Description	Part No.
	RESISTORS	
R301	220 ohm, 10%, ¼W	
R203	22K, 10%, ¼W	
R303	10', 10%, ¼W	
R304	680 ohm, 10%, ¼W	
R305	220 ohm, 10%, ¼W	
R306	33 ohm, 10%, ¼W	
R307	10K, 10%, ¼W	
R308	39K, 10%, ¼W	
R309	470 ohm, 10%, ¼W	
R310	39K, 10%, ¼W	
R311	39K, 10%, ¼W	
R312	82K, 10%, ¼W	
R313	4.7K, 10%, ¼W	
R314	1.2K, 10%, ¼W	
R315	1.2K, 10%, ¼W	
R316	1.2K, 10%, ¼W	
R317	1.2K, 10%, ¼W	
R318	1.2K, 10%, ¼W	
R319	1.2K, 10%, ¼W	
R320	1.2K, 10%, ¼W	
R321	1.2K, 10%, ¼W	
R322	82K, 10%, ¼W	
R323	10K, 10%, ¼W	
R324	1K, 10%, ¼W	
R325	1K, 10%, ¼W	
R326	Trimmer 1K, 30% (Stand UP)	4751-0102-020
R327	820 ohm, 10%, ¼W	
R328	1K, 10%, ¼W	
R329	3.3K, 10%, ¼W	
R330	150 ohm, 10%, ¼W	
R331	1K, 10%, ¼W	
R332	3.3K, 10%, ¼W	
R333	47K, 10%, ¼W	
R334	33 ohm, 10%, ¼W	
	CAPACITORS	
C301	2-8pf, NPO, Trimmer	1517-0000-010
C302	2-8pf, NPO, Trimmer	1517-0000-010
C303	.005mf, +80%-20% 500VZ5U (DISC)	1503-0502-002
C304	.005mf, +80%-20% 500VZ5U (DISC)	1503-0502-002
C305	.005mf, +80%-20% 500VZ5U (DISC)	1503-0502-002
C306	150pf, 5% 50V (MICA)	1503-0151-550
C307	.01mf, +80%-20% 500VZ5U (DISC)	1503-0103-001
C308	.005mf, +80%-20% 500VZ5U (DISC)	1503-0502-002
C309	.001mf, +80%-20% 500VZ5U (DISC)	1503-0102-001
C310	82pf, 5% 50V (MICA)	1506-0820-550
C311	15pf, 10%, NPO (DISC)	1500-0150-605
C312	15pf, 10% NPO (DISC)	1500-0150-605
C313	.001mf, +80%-20% 500VZ5U (DISC)	1503-0102-001
C314	.001mf, +80%-20% 500VZ5U (DISC)	1503-0102-001
C315	.001mf, +80%-20% 500VZ5U (DISC)	1503-0102-001
C316	.005mf, +80%-20% 500VZ5U (DISC)	1503-0502-002

Item	Description	Part No.
C317	2-8pf, NPO, Trimmer	1517-0000-010
C318	.47pf, 10% (Composition)	1510-0478-900
C319	1.0mf 85°C 50V (Electrolytic)	1513-0010-004
C320	.001mf, +80%-20% 500VZ5U (DISC)	1503-0102-001
C321	5.6pf, 10%, NPO (DISC)	1500-0569-905
C322	.2mf, +80%-20% 12V (DISC)	1502-0102-001
	COILS	
L301	Coil, RF Input	1800-3160-001
L302	Coil, RF Output	1800-3160-002
L303	Coil, RF (Red)	1800-3152-002
L304	Coil, RF Osc.	1800-1236-900
L305	Coil, RF Osc.	1800-3160-003
L306	Choke, 15uh	1802-0152-004
L307	Choke, 15uh	1802-0152-004
L308	Choke, 15 uh	1802-0152-004
L309	Choke, 15uh	1802-0152-004
L310	Choke, 15 uh	1802-0152-004
L311	Choke, 15 uh	1802-0152-004
L312	Choke 15uh	1802-0152-004
L313	Choke, 15 uh	1802-0152-004
T301	Coil, Mixer	1800-3161-900
	TRANSISTOR	
Q301	Silicon, N-Channel FET	4811-0000-015
Q302	Silicon NPN, 2N5222 (RT)	4801-0000-035
Q303	Silicon NPN (Low Beta) 2N5130	4801-0000-100
Q304	Silicon PNP, 2N 5227 (WT)	4801-0000-060
Q305	Silicon NPN	4801-0000-010
Q306	Silicon NPN	4801-0000-010
Q307	Silicon NPN, 2N5222 (RT)	4801-0000-035

NOTE: RT = Red Top, WT = White Top

	DIODES	
CR301	Germanium-Junction, Signal	4807-1233-900
CR302	Germanium-Junction, Signal	4807-1233-900
CR303	Germanium-Junction, Signal	4807-1233-900
CR304	Germanium-Junction, Signal	4807-1233-900
CR305	Germanium-Junction, Signal	4807-1233-900
CR307	Germanium-Junction, Signal	4807-1233-900
CR308	Germanium-Junction, Signal	4807-1233-900
CR309	Silicon, Varicap	4809-0000-001
	MISCELLANEOUS	
	Shield Assembly	301-602

4-3 IF–AUDIO BOARD 500-990

Item No.	Description	Part No.
	RESISTORS	
R101	18K, 10%, ¼W	
R102	10K, 10%, ¼W	
R103	1K, 10%, ¼W	
R104	180 ohm, 10%, ¼W	
R105	1K, 10%, ¼W	
R106	180 ohm, 10%, ¼W	
R107	22K, 10%, ¼W	
R108	47K, 10%, ¼W	
R109	33 ohm, 10%, ¼W	
R110	270K, 10%, ¼W	
R111	4.7K, 10%, ¼W	
R112	8.2K, 10%, ¼W	
R113	2.2K, 10%, ¼W	
R114	39K, 10%, ¼W	
R115	10K, 10%, ¼W	
R116	5.6, 10%, ¼W	
R117	2.2K, 10%, ¼W	
R118	100 ohm, 10%, ¼W	
R119	10K, 10%, ¼W	
R120	10K, 10%, ¼W	
R122	5.6K, 10%, ¼W	
R123	10K, 10%, ¼W	
R124	3.3K, 10%, ¼W	
R125	180 ohm, 10%, ¼W	
R126	560 ohm, 10%, ¼W	
R127	1K, 10%, ¼W	
R128	33K, 10%, ¼W	
R129	68K, 10%, ¼W	
R130	18K, 10%, ¼W	
R131	2.2K, 10%, ¼W	
R132	2.2K, 10%, ¼W	
R133	56 ohm, 10%, ¼W	
R134	560 ohm, 10%, ¼W	
R135	1.5K, 10%, ¼W	
R136	100 ohm, 10%, ¼W	
R137	68 ohm, 10%, 2W (Wire Wound)	4707-0680-041
	CAPACITORS	
C101	220pf, 5% 50V (MICA)	1506-0221-550
C102	.01mf, 10% 100V (Mylar Film)	1508-0103-610
C103	.01mf, +80%-20% 500VZ5U (Disc)	1503-0103-001
C104	.01mf, 10%, 100V (Mylar Film)	1508-0103-610
C105	220pf, 5% 50V (Mica)	1506-0221-550
C106	27pf, 5% 50V (Mica)	1506-0271-550
C107	.01mf +80%-20% 500VZ5U (Disc.)	1503-0103-001
C108	.01mf +80%-20% 500VZ5U (Disc.)	1503-0103-001
C109	68pf, 5% 50V (Mica)	1506-0680-550
C110	.2mf, +80%-20% 12V (Disc.)	1502-0204-006
C111	180pf, 5% 50V (Mica)	1506-0181-550
C112	390pf, 5% 50V (Mica)	1506-0391-550
C113	270pf, 5% 50V (Mica)	1506-0271-550
C114	250pf, 5% 50V (Mica)	1506-0251-550
C115	.2mf, +80%-20% 12V (Disc.)	1502-0204-006
C116	.2mf, +80%-20% 12V (Disc.)	1502-0204-006
C117	.2mf, +80%-20% 12V (Disc.)	1502-0204-006
C118	39pf, 10% NPO (Disc.)	1500-0390-605
C119	.002mf, 20% 500VZ5U (Disc.)	1523-0202-001
C120	.047mf, 10% 100V (Mylar Film)	1508-0475-610
C121	.01mf, 10% 100V (Mylar Film)	1508-0103-610
C122	470pf, 20% 500V Z5F (Disc.)	1523-0471-001
C124	.015mf, 10% 100V (Mylar Film)	1508-0153-610
C124	.002mf, 20% 500V Z5U (Disc.)	1523-0202-001
C125	.047mf, 10% 100V (Mylar Film)	1508-0473-610
C126	.1mf, 20% 12V (Disc.)	1502-0104-005
C127	1mf, 85°C 50V (Electrolytic)	1513-0010-004
C128	.047mf, 10% 100V (Mylar Film)	1508-0473-610
C129	.047mf, 10% 100V (Mylar Film)	1508-0473-610
C130	50mf, 85°C 10V (Electrolytic)	1511-0500-001
C131	.001 +80%-20% 500V Z5U (Disc.)	1503-0102-001
C132	.001 +80%-20% 500V Z5U (Disc.)	1503-0102-001
C133	.001 +80%-20% 500V Z5U (Disc.)	1503-0102-001
C134	.2mf, +80%-20% 12V (Disc.)	1502-0204-006
C135	250mf, 85°C 16V (Electrolytic)	1511-0251-002
C136	1000mf, 85°C 16V (Electrolytic)	1511-0102-002
C137	250mf, 85°C 10V (Electrolytic	1511-0251-001
	COILS	
T101	Coil, 10.7 MHz Input	1800-1250-700
T102	Coil, 10.7 MHz Output	1800-3173-000
L101	Choke, 820uh	1802-0000-002
L102	Choke, 820uh	1802-0000-002
L103	Coil, Quadrature	1800-3151-700
	INTEGRATED CIRCUITS	
IC101	Integrated Circuit	3130-3167-901
IC102	Integrated Circuit, MC-1357P	3130-3157-603
	DIODES	
CR101		
CR101	Diode, Silicon, 1N4148	4805-1241-200
CR102	Diode, Zener, 8.2V 5% 1W	4809-0000-009
CR103	Diode, Rectifier	4806-0000-004
CR104	Diode, Rectifier	4806-0000-004
	FILTER	
CF-1	455KHz Ceramic Filter (TME-16H/L/U only)	2700-0000-007
CF-1	455KHz Ceramic Filter (TME-16H/L only)	2700-0000-006
	CRYSTAL	
Y101	10.245 MHz or	2301-3151-601
	11.155 MHz	2301-3151-602

Item No.	Description	Part No.
	TRANSISTORS	
Q101	Silicon NPN, MPS 5172	4801-0000-010
Q102	Silicon NPN, MPS 5172	4801-0000-010
Q103	Silicon PNP, 2N5227 (WT)	4801-0000-060
Q104	Silicon NPN, MPS 5172	4801-0000-010
Q105	Silicon NPN, MPS 5172	4801-0000-010
Q106	Silicon NPN, MPS 5172	4801-0000-010
Q107	Silicon PNP	4801-0000-135
Q108	Silicon PNP	4801-0000-135
Q109	Silicon NPN, AF Power	4802-0000-001
Q110	Silicon NPN, AF Power	4802-0000-001

NOTE: WT=White Top

4-4 SCANNER BOARD 500-924 (PRIMARY BOARD)

Item No.	Description	Part No.
	RESISTORS	
R401	62ohm, 2W, 5%	
R402	56ohm, ½W, 10%	
R403	4.7K, ¼W, 10%	
R404	47K, ¼W, 10%	
R405	22K, ¼W, 10%	
R406	4.7K, ¼W, 10%	
R407	68K, ¼W, 10%	
R408	18K, ¼W, 5%	
R409	220ohm, ¼W, 10%	
R410	470ohm, ¼W, 10%	
R411	2.2K, ¼W, 10%	
R412	12K, ¼W, 10%	
R413	2.2K, ¼W, 10%	
R414	10K, ¼W, 10%	
R415	470ohm, ¼W, 10%	
R416	4.7K, ¼W, 10%	
	CAPACITORS	
C401	.047mf, 10%, 100V (Mylar Film)	1508-0473-610
C402	10mf, 85°C, 25V (Electrolytic)	1513-0100-003
C403	3.3mf, 20%, 15V, TANT. (Electrolytic)	1515-0339-003
C404	.015mf, 10%, 100V (Mylar Film)	1508-0153-610
C405	10mf, 85°C, 25V (Electrolytic)	1513-0100-003
	INTEGRATED CIRCUITS	
IC401	4-Bit Binary Counter	3130-3157-608
IC402	Decoder/Driver	3130-3193-501
IC403	Decoder/Driver	3130-3193-501
	TRANSISTORS	
Q401	Silicon PNP, White Top, 2N5227	4801-0000-060
Q402	Silicon NPN, MPS5172	4801-0000-010
Q403	Silicon NPN, MPS5172	4801-0000-010
Q404	PN Silicon, Unijunction, 2N4871	4813-0000-010
Q405	Silicon NPN, MPS5172	4801-0000-010
Q406	Silicon NPN, MPS5172	4801-0000-010
	DIODES	
CR401	Diode, Zener, 5.1V, 5% 1W	4808-0000-007
CR402	Diode, Silicon IN4148	4805-1241-200
CR403	Diode, Silicon IN4148	4805-1241-200
CR403	Diode, Silicon IN4148	4805-1241-200
	LAMPS	
M401	Incandescent, 14V, 80MA, #756	3901-0000-005
M402	Incandescent, 14V, 80MA, #756	3901-0000-005
M403	Incandescent, 14V, 80MA, #756	3901-0000-005
M404	Incandescent, 14V, 80MA, #756	3901-0000-005
M405	Incandescent, 14V, 80MA, #756	3901-0000-005
M406	Incandescent, 14V, 80MA, #756	3901-0000-005
M407	Incandescent, 14V, 80MA, #756	3901-0000-005
M408	Incandescent, 14V, 80MA, #756	3901-0000-005

4-5 SCANNER BOARD 500-925 (SECONDARY BOARD)

Item No.	Description	Part No.
M501	Incandescent, 14V, 80MA, #756	3901-0000-005
M502	Incandescent, 14V, 80MA, #756	3901-0000-005
M503	Incandescent, 14V, 80MA, #756	3901-0000-005
M504	Incandescent, 14V, 80MA, #756	3901-0000-005
M505	Incandescent, 14V, 80MA, #756	3901-0000-005
M506	Incandescent, 14V, 80MA, #756	3901-0000-005
M507	Incandescent, 14V, 80MA, #756	3901-0000-005
M508	Incandescent, 14V, 80MA, #756	3901-0000-005

4-6 CHASSIS ASSEMBLY

Item No.	Description	Part No.
	ELECTRICAL COMPONENTS	
R1	5K, Volume Control	4752-0502-001
R2	7.5K, Squelch Control	4752-0752-001
R3	33 ohms, 10%, ½W	4701-0330-004
R4	1 Meg, 10%, 122W	4701-0105-004
C1	.047mf, 10%, 100V (Mylar Film)	1508-0473-610
C2	250mf, 85°C 16V (Electrolytic)	1511-0251-002
C3	.005mf, +80%-20% 1400 Z5U (Disc.)	1501-0502-002
C4	2mf, 85°C, 50V (Electrolytic)	1511-0020-004
T1	Transformer, Power	5604-3169-900
M1	Lamp, No. 53	3901-0000-002
Y200	See Section 1–2	
Y300	See Section1–2	
SW1-8,	1P2T, 8 Stations on Single Frame, P-P	
SW12-19		5112-6035-803
SW-11	1P2T, Push-push (UL)	5112-5087-406
SW9-10	2P2T	5112-6035-820
SW20-22	2P2T (TME-16H/L only)	5112-6035-814
SW20-24	(TME-16H/L/U only)	5112-6035-806
Ant.-1	Telescoping Antenna (UHF)	1201-0000-003
Ant.-1	Telescoping Antenna (H/L)	1201-0000-002
Spk.-1	Speaker, 3.2 ohm, 3½" Square Assembly	
		1301-0000-003
J1	Antenna, Connector	2105-0000-005
P1	Connector, Chassis, Power	2104-0000-004
S1	Connector, Cable, Power	2108-0000-001
	AC Power Cord Assembly	MA-1
	Cable, Coaxial 50ohm, Teflon	RG-188/U
	MECHANICAL COMPONENTS	
	Panel, Front (TME-16H/L)	1405-6038-200
	Panel, Front (TME-16H/L/U)	600-307
	Panel, Back	1405-3167-402
	Knob, Volume and Squelch	2402-3167-002
	Lens, Green, Power Indicator	3900-0000-001
	Lens, Red, Channel Lamps	3900-0000-002
	Socket, Lamp (Power)	2108-3026-904
Terminal Board, 4-Lug (Rear Apron)		2103-3008-001
Foot, Rubber		1401-0000-001
Cabinet/Wrap Assembly		1408-6031-105
Manual, Owner's Instruction (TME-16H/L/U)		7001-1047-000
Manual, Owner's Instruction (TME-16H/L)		7001-1047-100
Manual, Service ($5.00 Prepaid)		SM-10-470