

MIDLAND SYN-TECH™

VHF (HIGH BAND)

SERVICE MANUAL

70-340

70-440



MIDLAND
INTERNATIONAL
1690 North Topping Avenue
Kansas City, Missouri 64120

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INTRODUCTION

The Midland Models 70-340A, 70340B, 70-440A and 70-440B are solid state VHF High Band Land Mobile transceivers designed to operate in the 136-156 MHz (70-340A, 70-440A) and 148-174 MHz (70-340B, 70-440B) ranges. Providing up to 36 channel capability and field programmable/eraseable/reprogrammable frequencies and options, these SYNTECH models are designed to provide flexible communications for a variety of applications.

The Service Manual is laid out to facilitate maintenance and service of the units. Careful use of the manual information will insure properly aligned, installed and maintained units. Comments or suggestions concerning manual corrections or areas of improvement are welcome.

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	<u>MODEL NO.</u>
CTCSS Board	70-2102
Scan Kit (UD)	70-2141
Scan Kit (TM)	70-2142
High Side Injection Kit	70-2171
12.5 KHz Channel Spacing Kit.	70-2134
2.0 PPM Oscillator Kit	70-2124
2.5 PPM Oscillator Kit	70-2125

GENERAL SPECIFICATIONS

70-340/440

Nominal operating voltage:	13.6V DC (negative ground) (10.5-16V DC range)
Temperature range:	-30°C to +60°C
Antenna impedance:	50 ohms, unbalanced
Microphone:	Dynamic element, with amplifier
Speaker - internal:(70-340A/340B) - external:	8 ohms 4 ohms
Frequency control:	Frequency synthesized with EPROM Programming
Frequencies of operation:	136-156 MHz (70-340A/440A) 148-174 MHz (70-340B/440B)
Receiver and transmitter performance bandwidth without adjustment:	4.5 MHz
Frequency tolerance and stability:	+5 PPM Tx and Rx (Standard) <u>±</u> 2.5 or 2.0 PPM Tx and Rx (Optional)
Duty cycle:	Intermittent EIA RS 152-B (1 minute Tx, 4 minutes Rx)
High humidity:	95% @ 50°C per EIA RS-152-B, sec. 13
Vibration stability:	EIA RS-152-B, sec. 14
Shock stability:	EIA RS-152-B, sec. 15
Channel capability:	Up to 36 channel transmit/receive
Current drain - Standby:	0.35 A DC
Receive:	1.00 A DC
Transmit:	8.00 A DC
Dimensions (HWD):	
Main chassis:(70-340/440)	65 x 185 x 280mm (2½" x 7¼" x 11")
Control head:(70-440)	50 x 88 x 80mm (2" x 3½" x 3 3/16")
Speaker:(70-440)	100 x 100 x 77mm (4" x 4" x 3")
Weight:	
Main chassis:(70-340/440)	3.0 kg (6.6 lb.)
Control Head:(70-440)	0.8 kg (1.8 lb.)
Speaker: (70-440)	0.71 kg (1.58 lb.)

RECEIVER PERFORMANCE SPECIFICATIONS

70-340/440

Refer to EIA RS-204-C and DOC RSS-119 for Method of Measurement and Standard of Performance.

Sensitivity:	12dB SINAD	0.25uV @ 50 ohm
Squelch sensitivity:	Threshold	0.2uV max or 6dB SINAD
	Tight	1.0uV min, 2.0uV max
Squelch blocking:	10 dB	
Receiver attack (squelch release) time:	100ms max	
Receiver squelch closing time:	200ms max	
Modulation acceptance bandwidth:	+7.0KHz min @ 20/25/30 KHz	
	+4.5KHz min @ 12.5 KHz	
Adjacent channel two signal selectivity and desensitization:	90dB @ +30KHz	
Spurious response attenuation:	90dB	
Intermodulation spurious response attenuation: (measured at useable sensitivity)	80dB	
Audio power output:	1W @ 5% THD @ 8 ohms (Internal)	
	5W @ 5% THD @ 4 ohms (External)	
Audio frequency response:	Per EIA and DOC Specifications	
Hum and noise:	Unsquelled 40dB	
	Squelled 50dB	
Conducted spurious RF power:	200uV across 50 ohms (800pW)	
	from DC to 1000MHz	
Intermediate Frequencies:	21.4MHz (1st) and 455KHz (2nd)	

SCAN SPECIFICATIONS

Scan speed:	3 channels/second
Channel capacity:	32 (PRI) 32 (SCAN)
Scan detection:	Carrier or tone
Scan resume delay:	5 seconds

TRANSMITTER PERFORMANCE SPECIFICATIONS

70-340/440

Refer to EIA RS-152-B and DOC RSS-119 for Method of Measurement and Standard of Performance.

Carrier power output:	40W minimum, adjustable 20 - 40W
Modulation system:	PM
Audio frequency response:	Per EIA and DOC RSS-119 Specifications
Audio frequency harmonic distortion:	3% @ 1000Hz for ± 3.0 KHz deviation
System deviation:	± 5 KHz, max
Modulation limiting:	Instantaneous peak clipping with low pass audio filter
Hum and noise:	50dB
Occupied bandwidth:	Less than 25uW adjacent channel power, ± 30 KHz (-60dB from carrier power)
Transmitter carrier attack time:	100ms max for 50% rated power
Conducted spurious emissions:	Less than 25uW, 1MHz to 1000MHz
Microphone input level and impedance:	-8dbm ± 3 dB/600 ohms
Output protection:	Shall withstand for 5 minutes all VSWR around Smith Chart of 20:1 without failure or damage.
Output stability:	Shall not exceed spurious emission requirements when operated into a mis-match load with 5:1 VSWR at any point on the Smith Chart.

CTCSS SPECIFICATIONS

(Optional, not supplied with unit)

Code Frequencies:	All EIA Standard from 67Hz to 241.8Hz
Modulation limits:	500 - 1000Hz
Decode sensitivity:	Less than 5dB SINAD
Receiver response time:	200ms max
Encoder Response time:	50ms max
Transmitter tone distortion:	5% max
Transmitter intermodulation distortion:	10%

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

E/PROM MODULE LOCATION AND REMOVAL

The operating frequencies and optional functions for the Midland 70-340/440 transceivers are programmed in a semiconductor-memory E/PROM module. To remove the module for programming, first remove the transceiver top cover, then locate the small printed circuit board near the front of the unit marked "Z-273". The module is mounted on two connectors and can be separated from the main printed circuit board by simply pulling straight up.

PROGRAMMING PREPARATION

The 70-1000 E/PROM Programmer Operator's Manual contains detailed information concerning E/PROM module programming. Be careful to observe the following precautions.

DO NOT APPLY OR REMOVE PROGRAMMER AC POWER WHILE THE E/PROM MODULE IS PLUGGED INTO THE PROGRAMMER.

IT IS NOT NECESSARY OR RECOMMENDED TO PLUG THE E/PROM MODULE INTO THE PROGRAMMER EXCEPT TO PERFORM BLANK CHECK, WRITE, VERIFY OR COPY OPERATIONS.

Apply power to the 70-1000 programmer and confirm the correct display is present.

BAND SELECTION

A band selection code must be entered to program the frequency range, IF and reference frequencies and local oscillator injection. The standard configuration 70-340A, -340B, -440A, -440B will accept only Band 150, which is entered as KEY CODE 2. Band 150 corresponds to a 136-174 MHz frequency range, 21.4 MHz RX IF, 20.48 MHz TX IF, 5KHz reference frequency and low side local oscillator injection.

The 70-340/440 can be converted to accept band selection codes 15A, 15B or 15C as follows:

1. Band 15A, KEY CODE 7 differs from Band 150 only in using high side receiver local oscillator injection instead of low side. High side injection may be used to reduce or eliminate interference from intermodulation products. Band 15A should be programmed only if the High Side Injection KIT 70-2171 has been installed in the transceiver. If this kit has been installed, Band 150 may not be used. Refer to the option description portion of this manual for details concerning the 70-2171 KIT.
2. Band 15B, KEY CODE A, utilizes a 19.2 MHz TX IF, 12.5 KHz reference frequency and low side local oscillator injection. This band selection allows the programming of "splinter" frequencies at 12.5KHz channel spacings. The 70-2134 12.5 KHz Channel Spacing Kit must be added to the transceiver to allow operation on these frequencies. Only those frequencies which are evenly divisible by 12.5 KHz may be programmed in Band 15B. If full-specification receiver performance is required on adjacent 12.5 KHz spaced channels, the 12.5 KHz 1st/2nd IF Filter Kit 70-2135 should also be added to the transceiver.

3. Band 15C, KEY CODE C, allows the programming of "splinter" frequencies with high side local oscillator injection instead of low side. To utilize this band, both the 70-2134 12.5 KHz Channel Spacing Kit and the 70-2171 High Side Injection Kit must be installed in the transceiver. Other band selection codes may not be used after this conversion.

CHANNEL AND AUXILIARY DATA PROGRAMMING

When the band select key code has been entered, channel and auxiliary data may be programmed as outlined in the 70-1000 Operator's Manual. Note that Auxiliary Code "0" (tone disable) is automatically programmed for each transmit and receive channel if no other code is entered. Auxiliary data may be programmed in E/PROM even if the CTCSS option is not installed in the transceiver.

SCAN PROGRAMMING

Up to 32 channels can be programmed in each scan mode, A (PRI) and B (SCAN). This allows scanning of separate or combined groups under control of the user. It is recommended that channels be programmed in both scan groups A and B. If one scan group is left unprogrammed, engaging the corresponding scan pushbutton on the radio may result in a lockup condition preventing manual channel change. Normal operation can be restored by cycling the radio power switch off and on, but elimination of the possibility of this condition is recommended by programming at least one channel in each scan group.

BUSY CHANNEL LOCKOUT AND TIME OUT TIMER PROGRAMMING

The Busy Channel Lockout function, if programmed, can be jumper selected to operate on carrier or CTCSS tone. The standard radio is configured for carrier BCLO by JP107. If Tone BCLO is desired, remove JP107 and install a jumper in the JP108 position. DO NOT operate the radio with both JP107 and JP108 installed. Time Out Timer programming is selectable from 30 to 180 seconds as detailed in the 70-1000 manual.

PROGRAMMING THE E/PROM MODULE

Carefully check the programming data entered in the buffer RAM for correctness by repeatedly pressing ENTER or by printing out the buffer RAM contents on the 70-1300A printer. Note that BCLO and TOT functions are not included in the printout and must be checked manually.

Prepare the E/PROM module for programming by a thorough erasure in the 70-1100 E/PROM Eraser. Plug the E/PROM module in the programmer adapter, noting the following precaution.

MAKE SURE THE E/PROM MODULE CONNECTORS MATE PROPERLY WITH THE ADAPTER PINS AND ARE NOT OFFSET IN EITHER DIRECTION.

Remove the module at the completion of the Blank Check, Write and Verify operations. Reinstall the E/PROM module in the transceiver, again checking for proper mating of the connectors.

PLL/Synthesizer Function

The frequency synthesizer consists of two phase-locked loops. One loop (Main PLL) is controlled directly by the microcomputer and generates the receive local oscillator frequency. This loop also generates a frequency used in the second loop (Transmit PLL) for transmitter operation.

Reference Oscillator and Main PLL

A stable frequency for the entire radio is generated by a crystal oscillator composed of X101, Q701 and related components. This oscillator operates at 5.12 MHz and stability is maintained by use of a positive crystal heater. This 5.12 MHz signal is divided by 1024 in IC 701 to give the 5KHz reference frequency for the Main PLL loop, consisting of IC 701 phase comparator and programmable divider, Q704-706 loop low pass filter, VCO D702/Q707 and pre-scaler IC 703. The VCO frequency is equal to the channel frequency -21.4 MHz in receive and channel frequency -20.48 MHz in transmit. The VCO frequency is divided by 4 by pre-scaler IC 703 and further divided in IC 701, this division ratio being controlled by the output of the EPROM which is latched in the 8 bit shift register IC 902 under control of the microcomputer IC 901. Besides being a programmable divider, IC 701 also is a phase comparator which generates an error signal for VCO control if the programmable divider output is out of phase with the 5 KHz reference frequency.

Modulator and Transmit PLL

The 5.12 MHz oscillator output is also fed to IC 702 where it is divided by 4 to give 1.28 MHz. This signal goes directly to the transmit phase shift modulator D101/102. Audio from the microphone is shaped and limited by IC 101 (instantaneous deviation control) filtered and buffered and fed to the phase shift modulator. The modulator output becomes the reference frequency for the Transmit PLL loop, consisting of IC 103 phase comparator, D104/Q108 VCO, D108 Mixer and IC 106 fixed divider. The VCO output is at the transmit channel frequency and is mixed at D108 with the ftx -20.48MHz signal from the Main PLL loop to yield 20.48 MHz. This frequency is divided by 16 at IC 106 to give 1.28 MHz and compared with the 1.28 MHz reference signal from the modulator. Thus the VCO output is forced to track the modulated reference signal, reproducing this modulation at the transmit frequency. IC 102 detects any large difference between the two phase comparator inputs and generates an out-of-lock signal which biases Q111 on and prevents any transmitter signal from reaching the power amplifier stages. Q111 is also biased on during receive by a signal from the microcomputer IC 901.

Transmit Power Amplifier and APC (Automatic Power Controller)

The transmit PLL output is amplified by Q110 and fed to the PA section, where it is amplified to rated output. A sample of the RF output is detected by D504 and coupled to the differential amplifier Q505/Q506. The output of Q505 controls the conduction of Q504 which in turn controls the gain of the pre-driver Q501. Thus any changes in output power are automatically corrected by this control loop. Output power is set at alignment by RV502. Transmitter harmonics are eliminated by output low pass filtering composed of L512-L515 and C525-C529. The PIN diode switch D501 is biased to a low resistance state during transmit and a high impedance condition during receive.

Receiver RF/IF/Detector

The receiver front end consists of filtering by C201-C206 and L201-L203 and RF amplification by Q201. After further filtering the RF signal is mixed at the FET mixer Q202 with the local oscillator signal generated by the Main PLL loop to give the 21.4 MHz IF. The IF signal is filtered by the crystal filter FL 251, amplified by Q251 and fed to the internal mixer of IC 251. The 2nd local oscillator frequency of 20.945 MHz is generated by X251 and the IC251 internal oscillator and injected into the internal mixer, producing the 2nd IF of 455 KHz. The 2nd IF signal is filtered by FL252 and FL253, amplified and limited by the amplifier-limiter stage of IC251, and injected into the quadrature detector circuit consisting of L252 and the internal balanced mixer of IC 251. The output of the balanced mixer is the detected audio signal.

Squelch and Audio Amplifier

The noise signal from the detector is amplified by Q252, detected by D253 and controlled in level by the squelch control RV301. This detected noise signal is coupled to the DC switching amplifier of IC 251. Under conditions of no RF signal, the detected noise signal increases and turns on the DC switching amplifier, which in turn biases off the transceiver audio squelch gate (Q259). The detected audio signal is buffered by Q250 and passed through the squelch gate and volume control RV302 to the audio power amplifier IC252 and then to the speaker.

Microcomputer Channel Data Transfer

At unit power up a pulse is generated by Q405, resetting the microcomputer to an autotest mode. A check is made to insure the EPROM module is installed. If valid data is present at the EPROM, 3 bits of address data corresponding to the selected receive channel frequency are strobed from the microcomputer IC 901 to the latch IC 952. The remaining three address bits are then strobed and latched in IC 952. The EPROM data corresponding to the selected receive channel frequency is then strobed to the 8 bit shift register IC 902 which transfers this data to the programmable divider IC 701 under microcomputer control. IC 701 divides its input signal by the correct ratio to yield the desired local oscillator frequency. IC 701 outputs an out-of-lock signal which mutes the receiver until phase lock is achieved. The microcomputer strobes data corresponding to the selected channel to the latched LED display drivers IC 301 and IC 302 which in turn drive the channel LEDs. Brightness of the LED display is automatically adjusted to ambient light conditions by photosensor CDS 301 and transistors Q301 and Q302.

Manual Channel Selection

Activation of the Up-Down channel selector switch is sensed by the microcomputer, the receive audio is muted and incrementing or decrementing of the channel display is begun. Upon release of the channel selector switch, EPROM data corresponding to the new channel is strobed to the programmable divider. If the synthesizer lock signal is not detected after a channel change, receiver and transmitter are inhibited and the channel indicator displays the error code 95. When the PTT is depressed, the microcomputer switches the voltage regulator IC 401 to the transmit condition, outputting 8VDC to the transmitter and disabling the receive 8VDC output. The microcomputer then outputs EPROM address data corresponding

to selected transmit channel, which results in the programmable divider IC 701 being reprogrammed for the correct transmit frequency.

Scan Operation

When Scan Operation is activated by selection of either of the front panel pushbuttons, the transmit and receive addresses of the displayed channel are stored in microcomputer memory as the priority channel. The address data corresponding to the first scan channel is then strobed to the latch IC 952, resulting in the generation of the correct local oscillator frequency as described above. The microcomputer then checks for the presence of a high signal level on its Pin 4 input indicating the squelch gate is open (active channel). If this signal is present, scanning stops until the squelch gate stays closed for 5 seconds, at which time address data for the next scan channel is sent to IC 952. If the active channel address is identical to the priority channel address stored in memory, a two-beep signal is generated to alert the operator of the priority channel signal. When a PTT switch closure is sensed by the microcomputer Pin 30, the priority channel transmit address is immediately latched in IC 952 and an audio beep signal is generated. When a second PTT switch closure is sensed by the microcomputer the transmitter is activated.

Busy Channel Lockout and Time Out Timer

The Busy Channel Lockout function can be jumper selected by JP107 to provide lockout on either carrier or CTCSS tone. The busy channel signal, tone or carrier, is input to the microcomputer pin 28 (transmit inhibit). If the Busy Channel Lockout function is programmed in E/PROM, transmit is inhibited while the busy channel signal is present. An audio alert signal (if programmed) is generated when the transmitter is keyed to indicate the channel busy condition. The time out timer function is completely internal to the microcomputer. If the continuous transmit time exceeds the time limit programmed in E/PROM, the transmitter is disabled and an audio beep signal is sounded to alert the operator.

Power Supply

The 13.6 VDC input is filtered by L256 and related components and switched by K201 (70-440) or the unit on-off switch (70-340). This filtered 13.6 VDC is supplied directly to the transmit PA driver and final stages and also to pin 2 of IC401, the main voltage regulator. IC401 outputs a constant 8VDC from Pin 1 as well as 8VDC during receive from pin 8 and 8VDC during transmit from pin 6. The receive/transmit switching signal is output from IC901 pin 13 through Q402 and Q403 to IC401 Pin 5. Regulator IC402 (TX board) provides +5VDC for the reference oscillator, synthesizer integrated circuits and the E/PROM module. Regulator IC303 (70-340 control panel and 70-440 control head) supplies +8VDC for microphone bias and LED displays. The microcomputer IC901 is supplied +5VDC from zener diode D402, which is powered by an unswitched 13.6 VDC source. This allows the microcomputer to retain memory of the last selected channel as long as power is connected to the radio. Other microcomputer functions are disabled at unit turn off, since power is removed from pin 19, the standby control pin.

CTCSS Operation

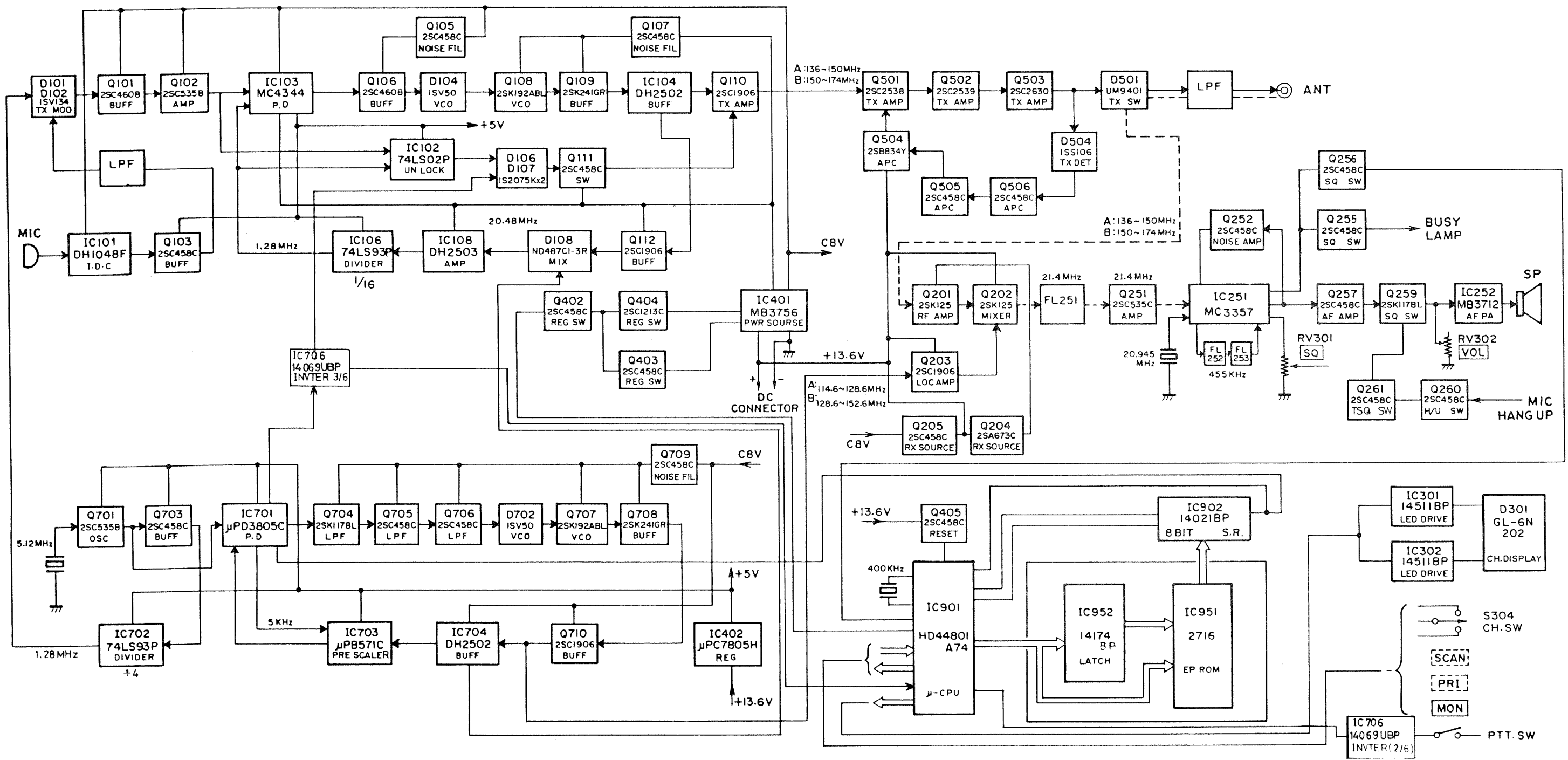
(Optional Accessory)

The CTCSS option provides, under microcomputer control, encode and decode of 35 standard EIA CTCSS tones. At each channel change and transmit/receive transition, data corresponding to the selected channel and mode is strobed on lines D0 - D4 and latched in IC1. IC1 outputs this data to IC3 for generation or detection of the correct CTCSS tone. This data is also input to IC2, which outputs a high logic level for encode/decode inhibit if all data lines are low (Aux Code "0"). Encode inhibit is accomplished by holding IC3 pin 17 at a high level through D2. Decode is inhibited by biasing Q1 on through D4. As long as the collector of Q1 is low, the base of Q261 (Receiver board) is also held low. The collector of Q261, which is also connected to the gate of the squelch FET, is then under control of the noise squelch signal from IC251 pin 13. If decode is not inhibited by Code "0" programming, control of the squelch FET is by IC251 pin 13 and Q261. Q261 is controlled by Q260, which is in turn switched by Q2 (CTCSS board). Q2 is normally biased on by IC1 pin 12 but is switched off when the correct tone is detected. The Monitor switch and microphone hangup box both control the status of Q1 and thus allow or inhibit squelch gate control by the CTCSS board in the same manner as Code "0" tone disable programming.

Crystal X1 generates a stable reference frequency for IC 3 tone generation and detection. IC 4 functions as an audio highpass filter to remove CTCSS tones from the speaker audio. Encode tone output is from IC3 pin 16 with tone modulation level adjustable by RV1.

BLOCK DIAGRAM

70-340/440



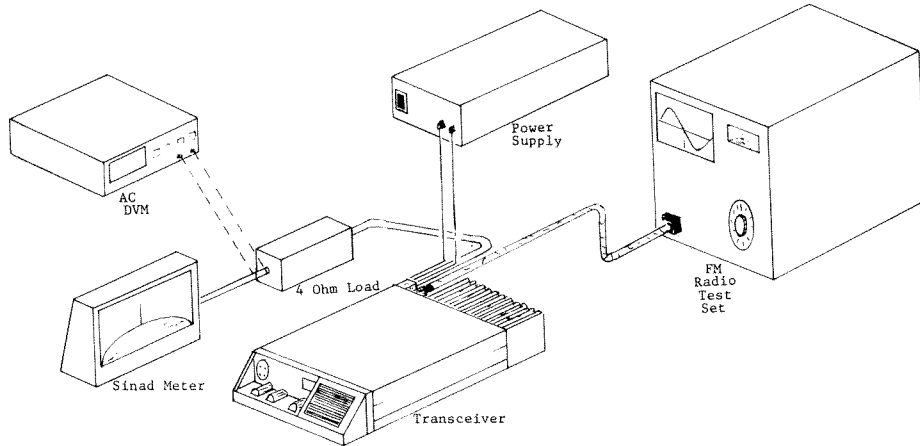
E SUGGESTED TEST INSTRUMENTS

70-340/440

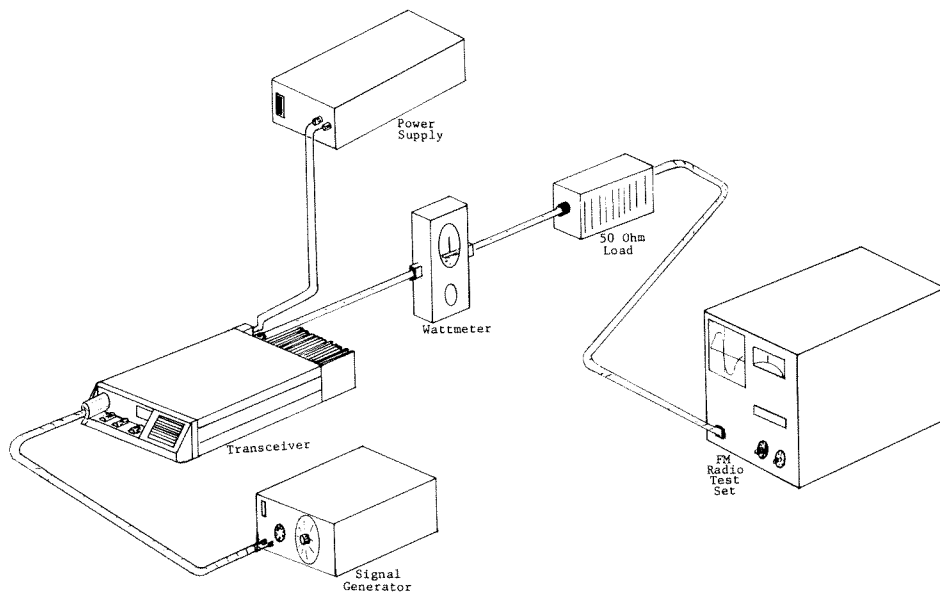
<u>TEST INSTRUMENT</u>	<u>REQUIRED SPECIFICATIONS</u>	<u>INSTRUMENT TYPE</u>
DC Power Supply	13.8 VDC 10amps	Power/Mate BPA-20F
Watt Meter	150-174 MHz	Bird Model 43 with 50C Element and 50 watt, 50 ohm load
Digital Multimeter	AC 100 mv - 10v DC 100 mv - 100v	B-K 2810
AC Voltmeter	10mv - 10v	Heath SM-5238
Speaker Load	4 ohm speaker and resistive load (switchable)	Shop Fabricated
RF Signal Generator	136 -174 MHz Range. Calibrated output 0.1 to 100 uV. Internal and external modulation capability with internal frequency of 1 KHz at 5 KHz deviation.	Cushman CE-31A
Deviation Meter	0 - 5 KHz Deviation Range +/- Deviation Capability	Cushman CE-31A
Frequency Meter	Frequency Range 150-174 MHz Frequency tolerance of +/- .00002%	Cushman CE-31A or Heath SM-4120
Signal Generator	0-10 KHz Sine Wave 0-5V	Heath SG-5218
LMR Test Set	- - - - -	Midland 70-E10
Sinad Meter	- - - - -	Helper Instru- ments Sinadder

Fold Out 

RECEIVER TEST SET-UP



TRANSMITTER TEST SET-UP



Preliminary:

Remove the 8 screws securing the top and bottom covers. Loosen the 4 screws securing the PA assembly and pivot the top of the PA assembly to the rear. Turn the volume control to a mid position and the squelch control fully counter clockwise. If the 70-E10 test set is used, the red 5 pin test socket should be connected to CM101 for transmitter alignment and the white 5 pin test socket to CM201 for receiver alignment. Both test sockets should be connected with the unused socket position toward the rear of the radio. Refer to the test pins switch position underlined in the steps below. Supply power to the radio and connect a wattmeter and dummy load with a reduced power output for a frequency counter and modulation meter.

IMPORTANT NOTE

A "95" error code display and triple beep can be expected at unit turn on if the channel frequencies programmed in the E/PROM are outside the 4.5 MHz band for which the Main VCO is currently aligned. To eliminate this error indication, adjust L702 (TX board) for approximately 4 volts at TP701. Cycle the unit power off and on. The normal alignment procedures can then be performed.

Error codes "90" and "94" indicate the E/PROM module to be missing, improperly inserted, or incorrectly programmed. Refer to the general troubleshooting chart if these error conditions occur.

VCO AND TRANSMITTER ALIGNMENT

1. Turn RV502 (PA) maximum counter clockwise.

Main VCO Alignment

2. The Main VCO should be adjusted with the radio operating on the channel and in the condition (transmit or receive) corresponding to the highest programmed frequency. If the highest frequency is a transmit frequency, select this channel, key the transmitter and adjust L702 to give 4.5 VDC at TP701. If the highest programmed frequency is a receive frequency, adjust L702 for 4.0VDC at TP701 while in the receive mode.

Transmit VCO Alignment

3. Monitor TP101 (TX) with a DC voltmeter. Key the transmitter and adjust L107 for 4.5 VDC.

Transmit Driver Alignment

4. Monitor CM 101 pin 2 (position 9) with a selected channel frequency near the center of the programmed frequencies. Adjust CV102 for a dip between two peaks.

Power Amplifier Alignment

5. Adjust RV502 (PA) maximum clockwise and adjust CV501, CV502 & CV503 for maximum RF output power. Readjust RV502 for 40 watts RF output.

Modulation Adjustment

6. If the Call Signal CTCSS option is installed, select any channel programmed for CTCSS encode. Key the transmitter and adjust RV1 (Call Signal board) for the desired CTCSS modulation.
7. Input audio modulation of 2500 Hz and adjust RV101 (TX) for 5 KHz deviation. Adjust L101 and L102 for maximum deviation and balance. Vary the modulating signal level to insure deviation does not exceed ± 5 KHz.

Oscillator Frequency Adjustment

8. Monitor the frequency of the transmitted signal and adjust CV701 for the correct frequency.

Note: RV102, L110-L112 and L707-L709 are factory set and should not require field adjustment.

9. Pivot the PA assembly to its original position and tighten the 4 retaining screws.

RECEIVER ALIGNMENT

L. O. Amplifier Alignment

1. Select a channel with a receive frequency near the center of the programmed frequencies. Monitor CM 202 Pin 1 (position 2) and adjust L209 and L210 for a maximum indication.

RF-IF Alignment

2. Connect an on-channel signal generator to the antenna connector. Adjust L201 and L202, L204 - L206 for a maximum indication at CM202 Pin 2 (position 3).
3. Adjust L208 and L251 for minimum audio distortion.

Quadrature Coil Alignment

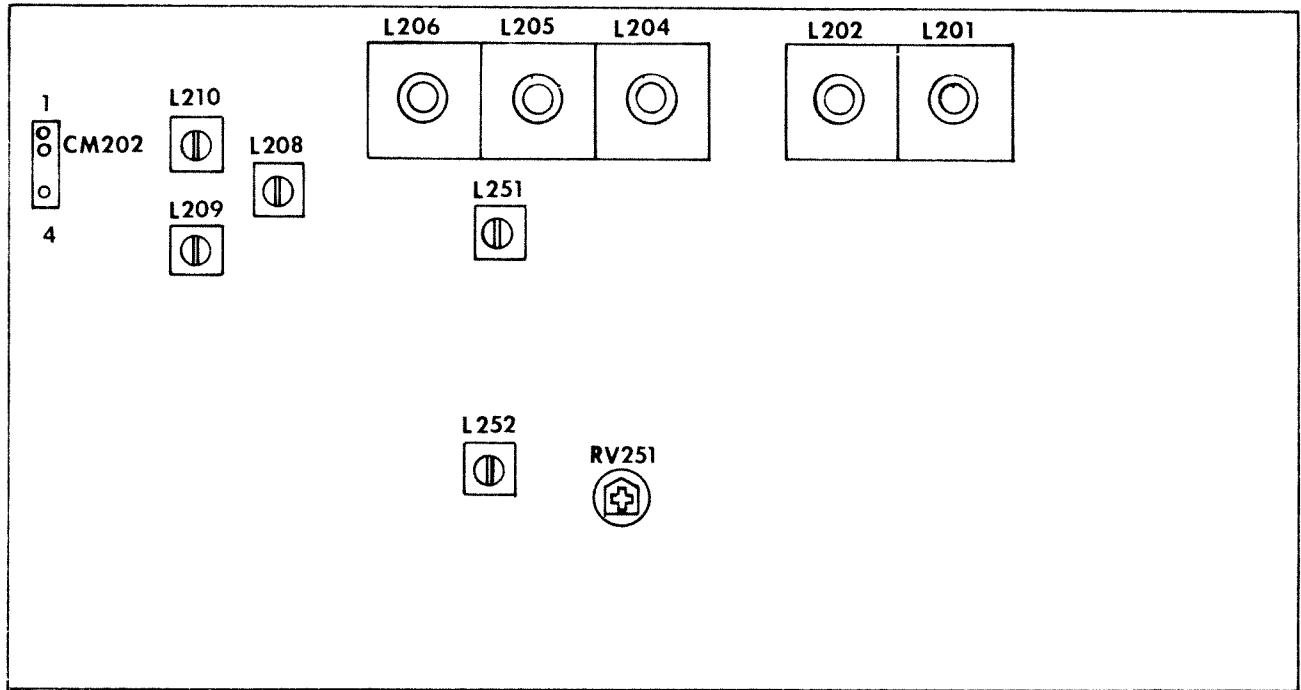
4. Adjust L252 for maximum audio output.

Tight Squelch Adjustment

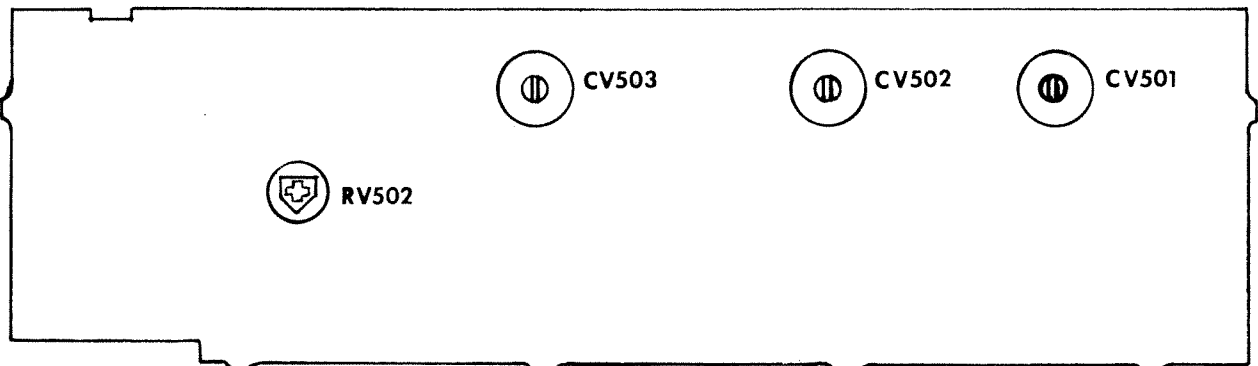
5. Adjust RV251 for the desired tight squelch sensitivity.

RECEIVER ALIGNMENT POINTS

70-340/440

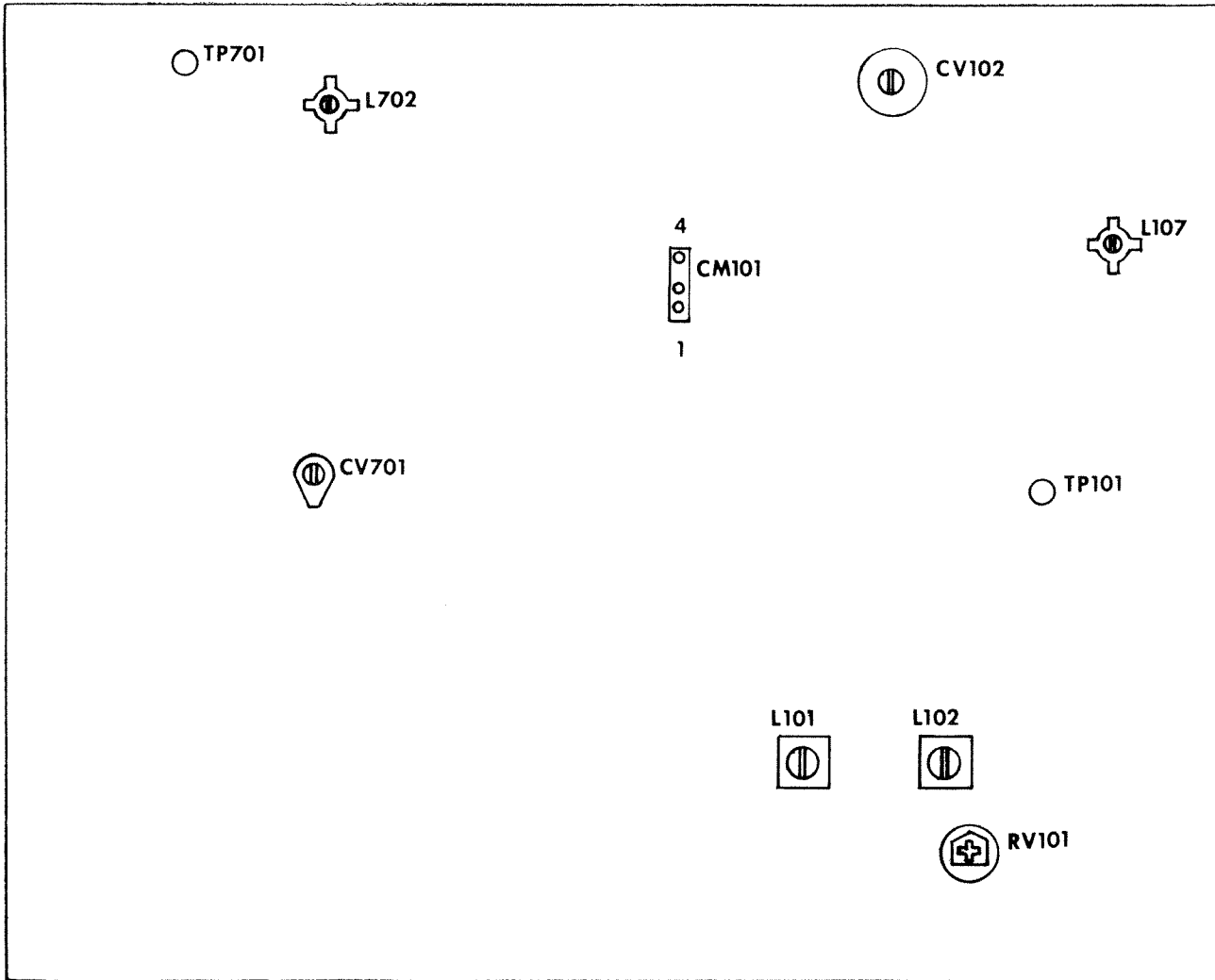


PA BOARD ALIGNMENT POINTS

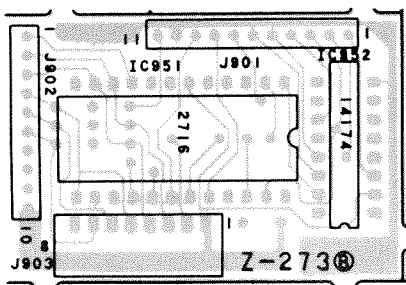


TRANSMITTER ALIGNMENT POINTS

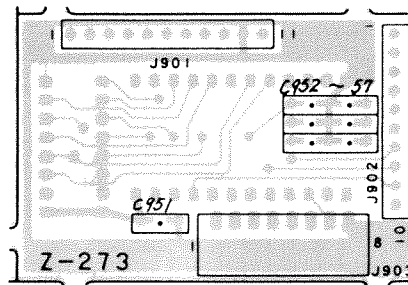
70-340/440



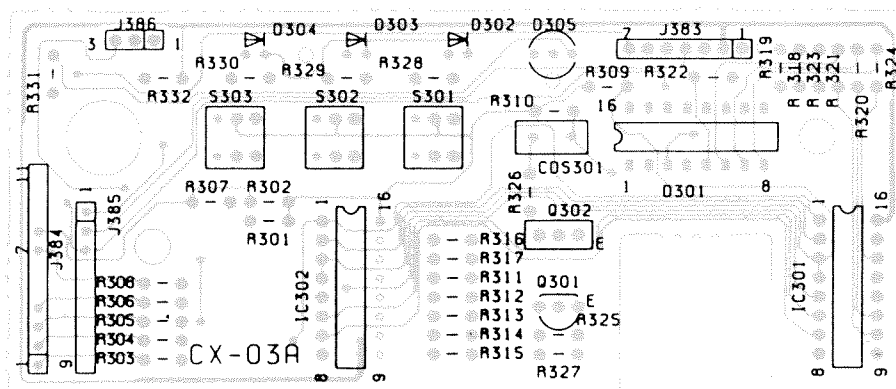
70-340/440
E/PROM MODULE PCB (TOP VIEW) (Z-273)



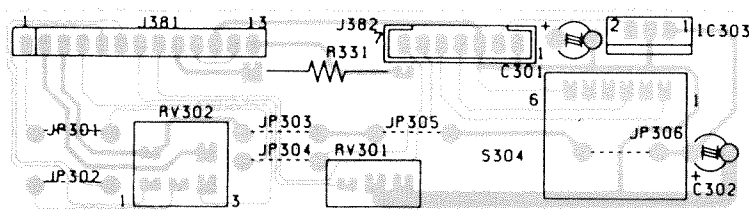
70340/440
E/PROM MODULE PCB (BOTTOM VIEW) (Z-273)



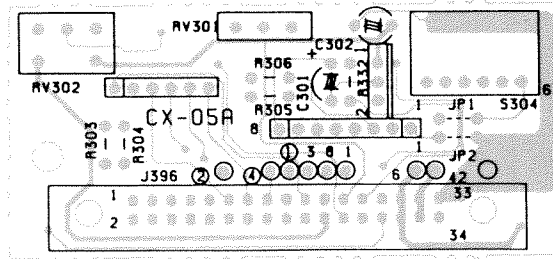
70-340 DISPLAY PCB (CX-03)



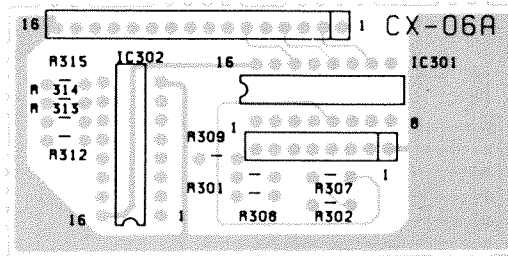
70-340 CONTROL PCB (CX-04)



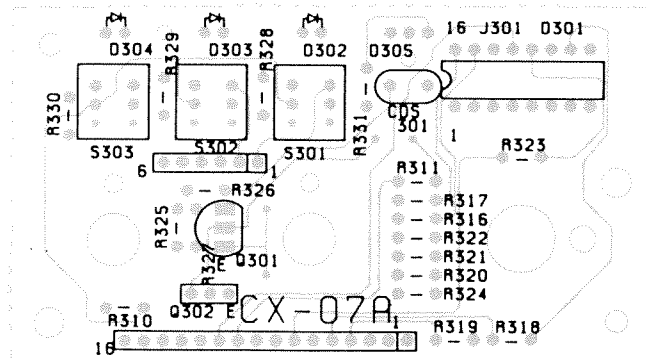
70-440 CONTROL INTERFACE PCB (CX-05)



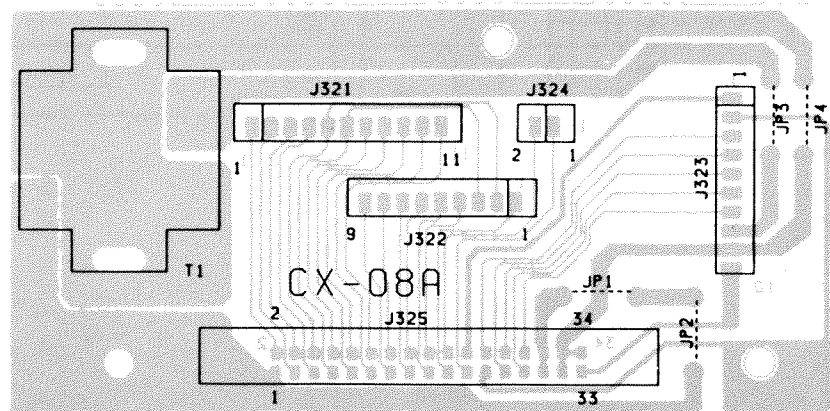
70-440 DISPLAY DRIVER PCB (CX-06)



70-440 DISPLAY PCB (CX-07)

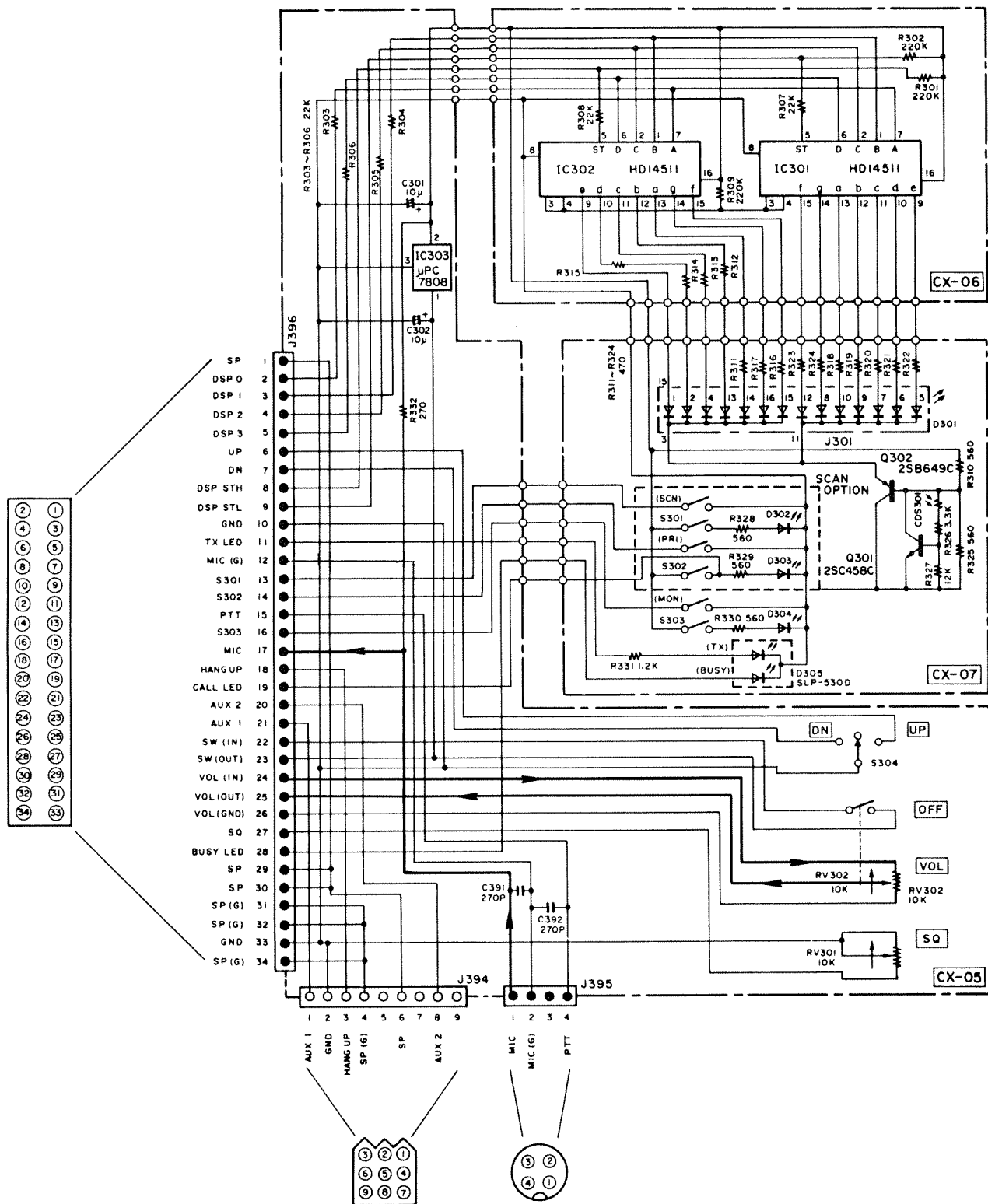


70-440 CONTROL CABLE INTERFACE PCB (CX-08)



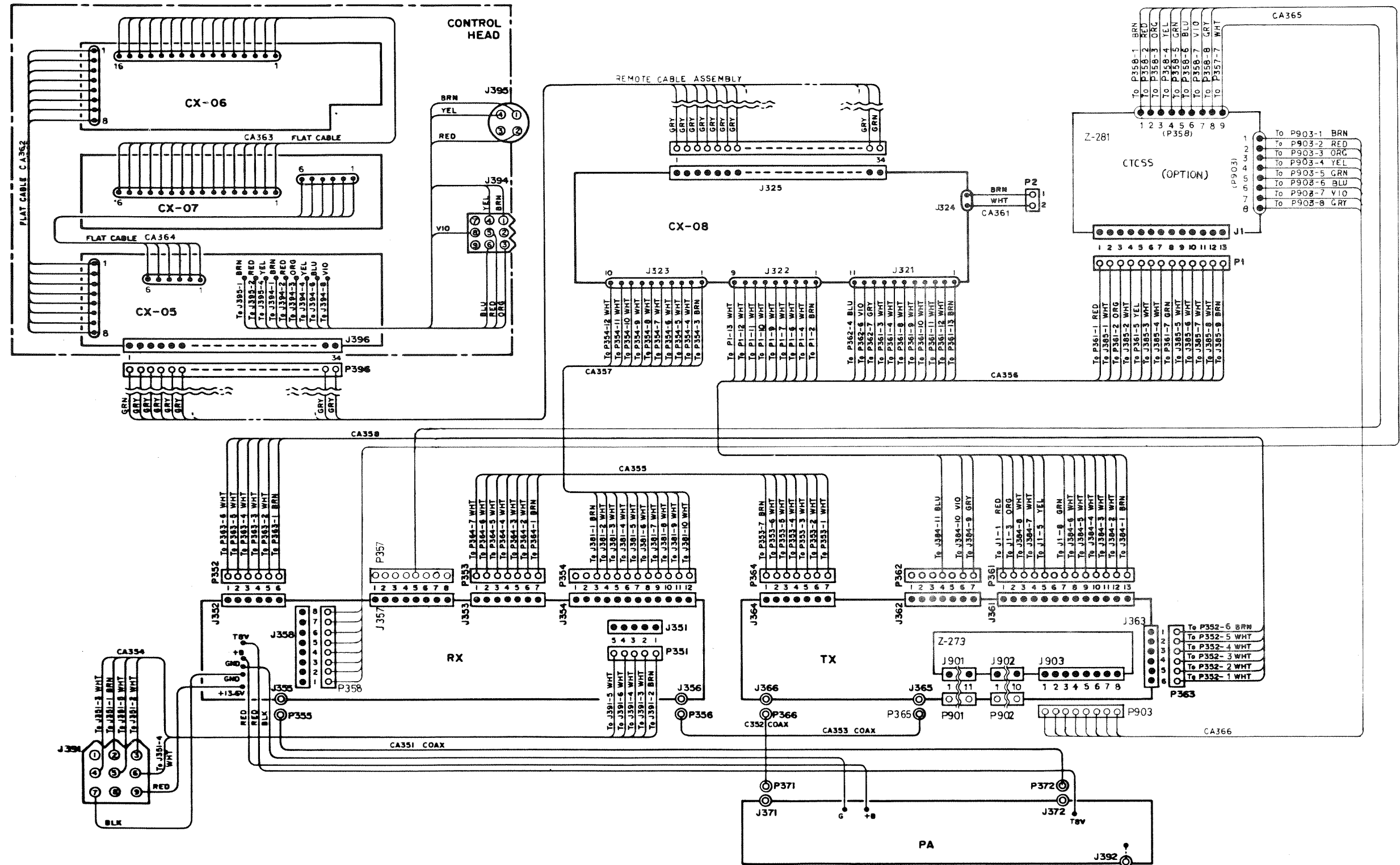
CONTROL HEAD SCHEMATIC DIAGRAM

70-440A/B



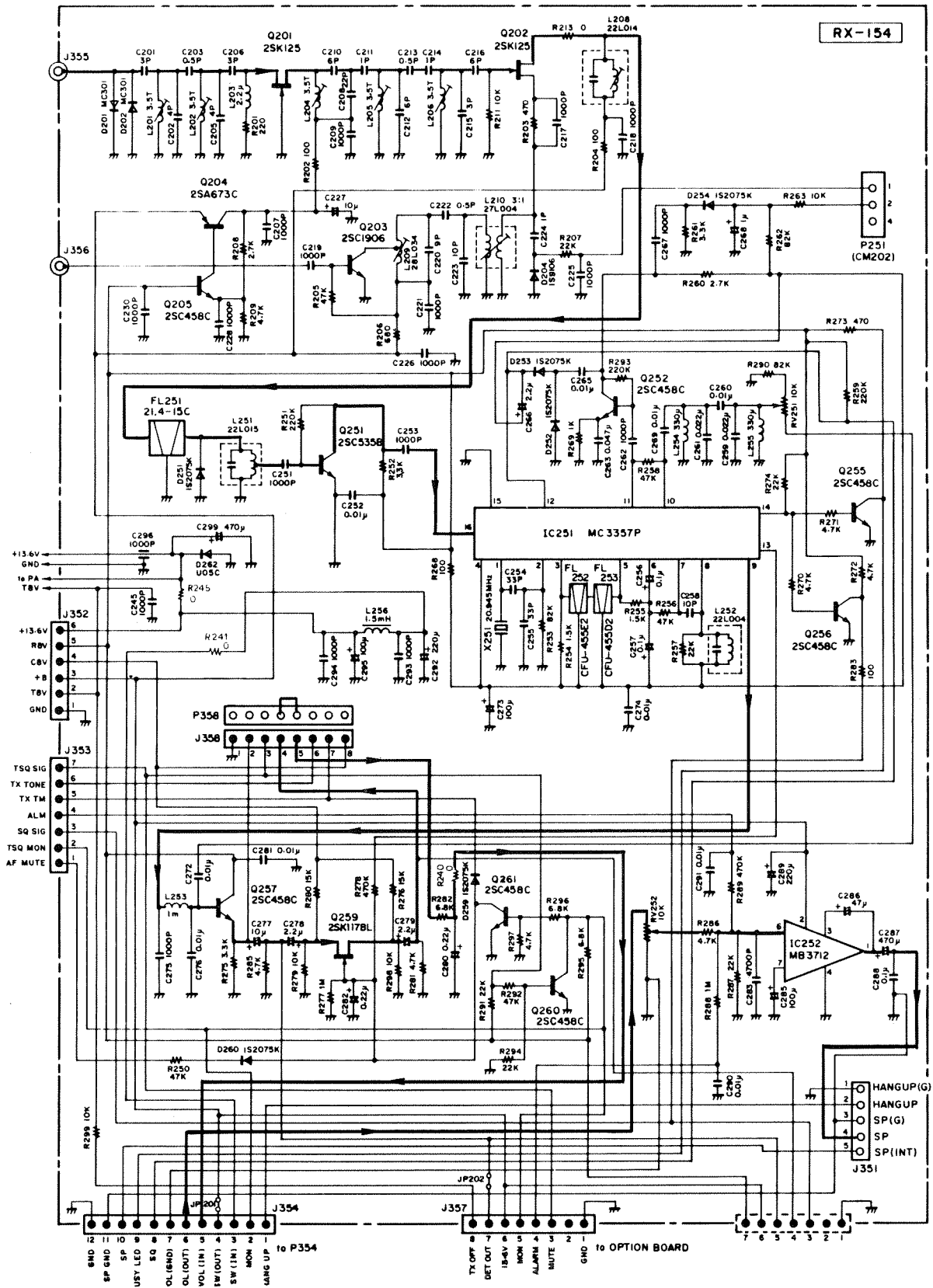
PC BOARD INTER-CONNECT DIAGRAM

70-440A/B



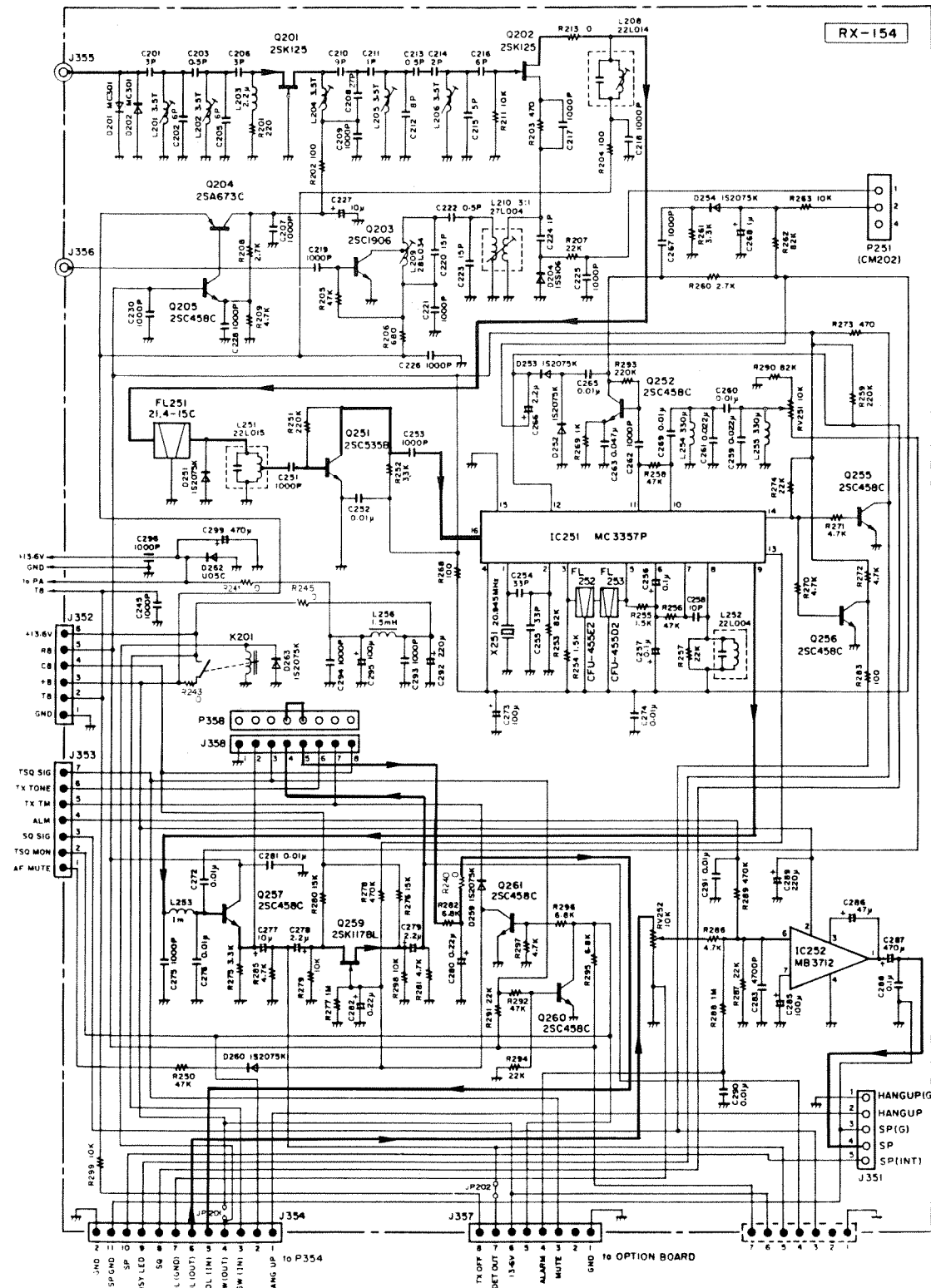
RECEIVER BOARD SCHEMATIC DIAGRAM

70-340B



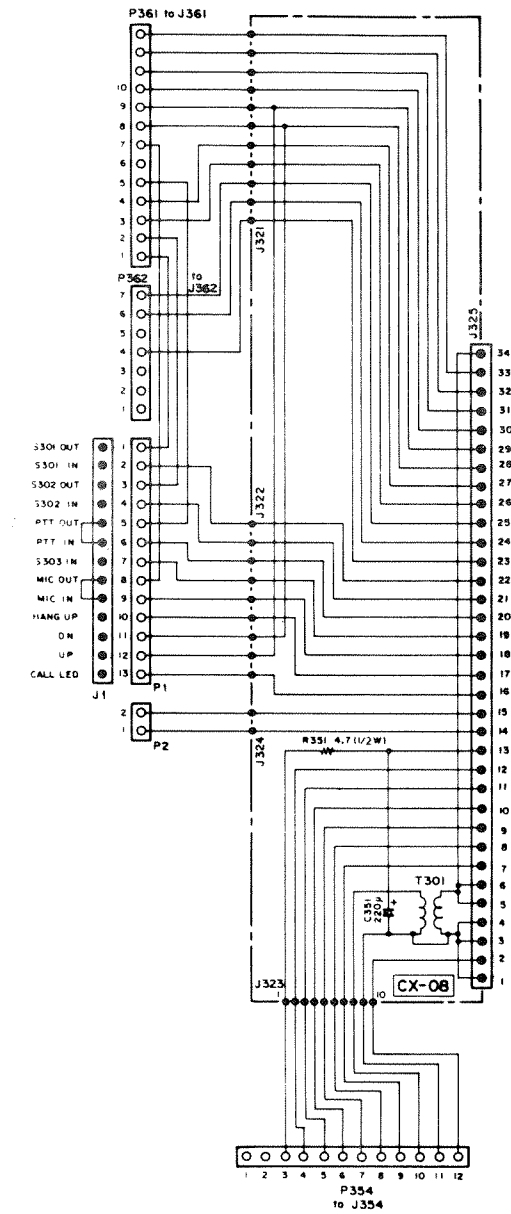
RECEIVER BOARD SCHEMATIC DIAGRAM

70-440A



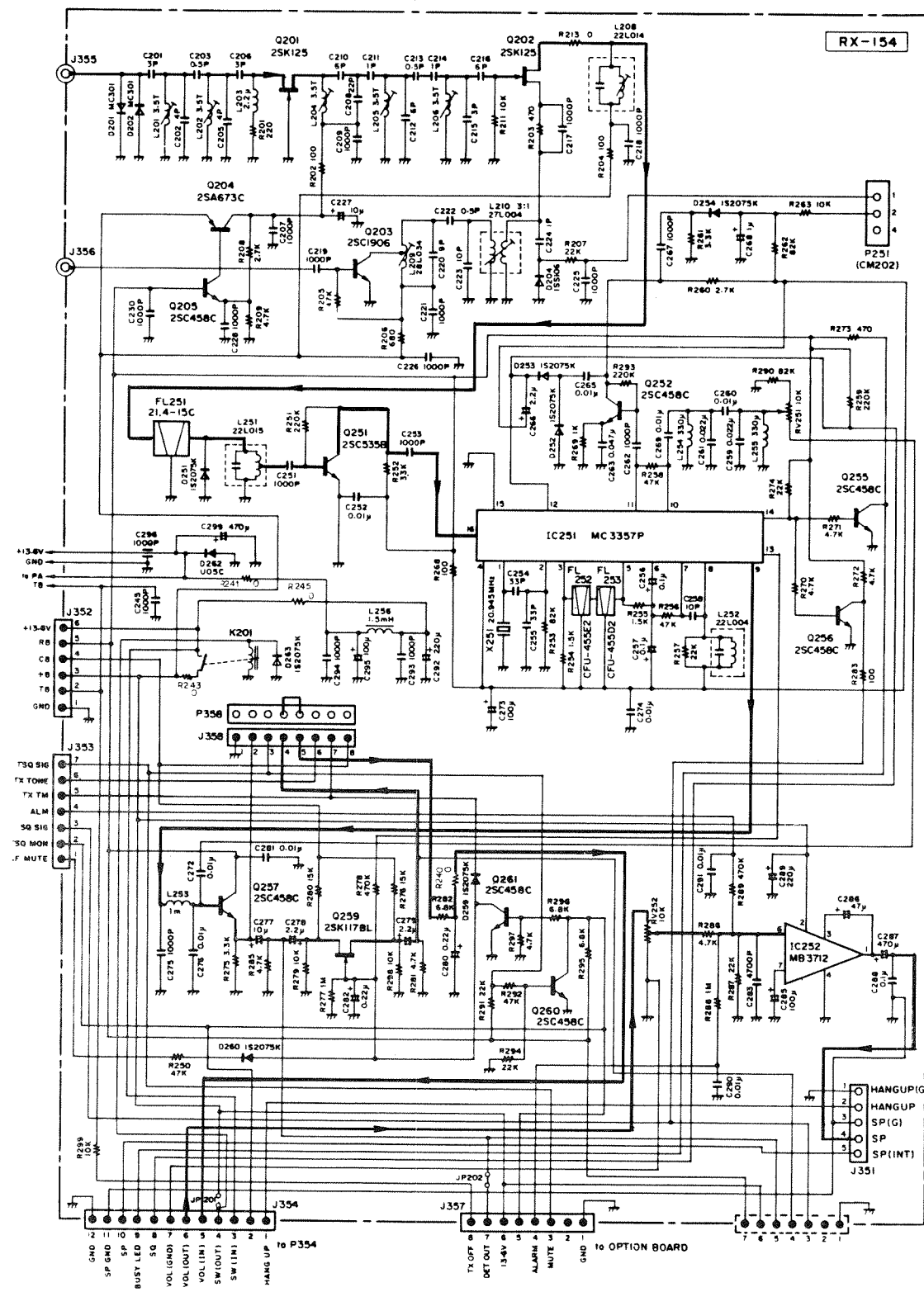
CONTROL INTERFACE PCB

70-440



RECEIVER BOARD SCHEMATIC

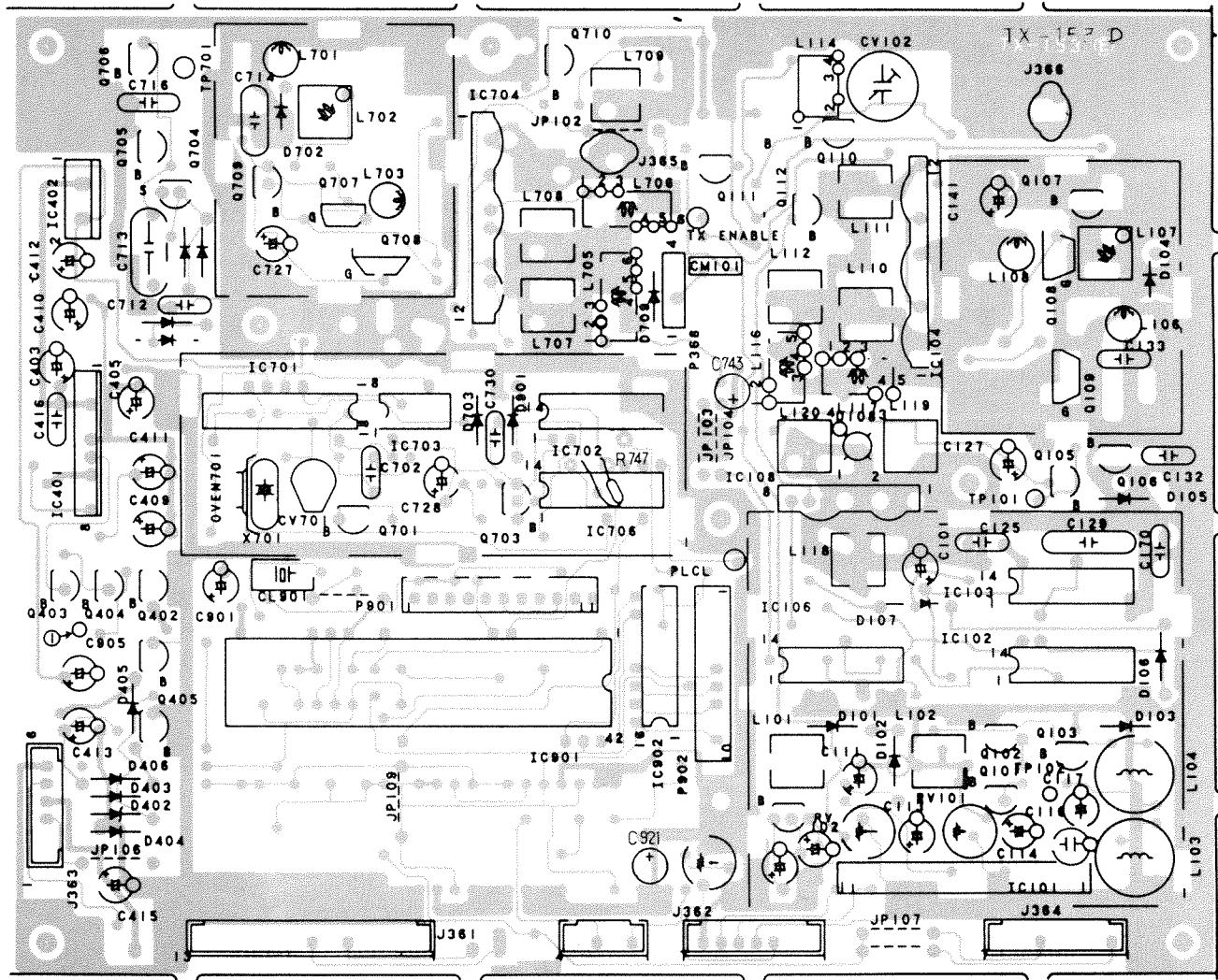
70-440B



Fold Out

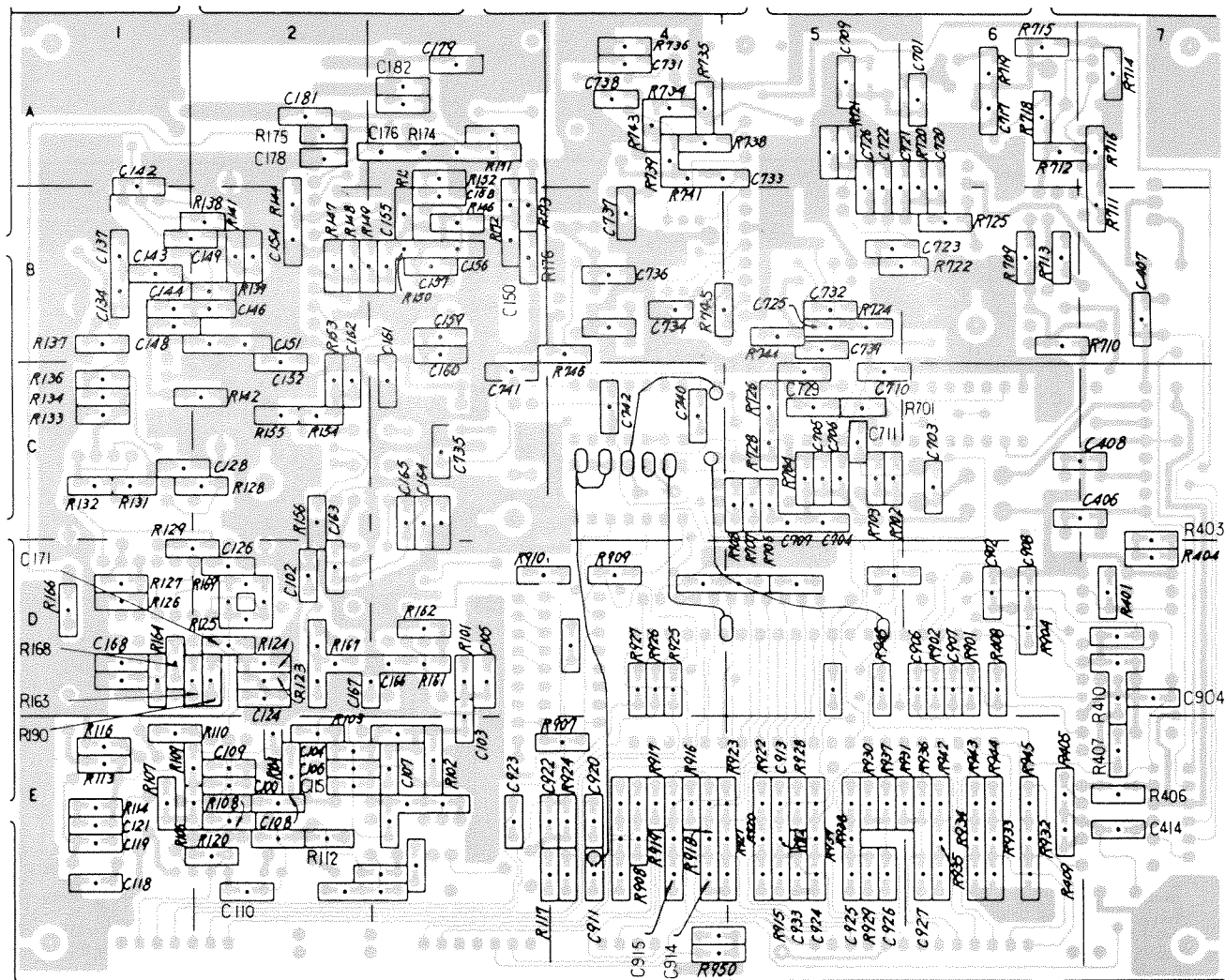
TRANSMITTER PC BOARD (TOP VIEW)

70-340/440



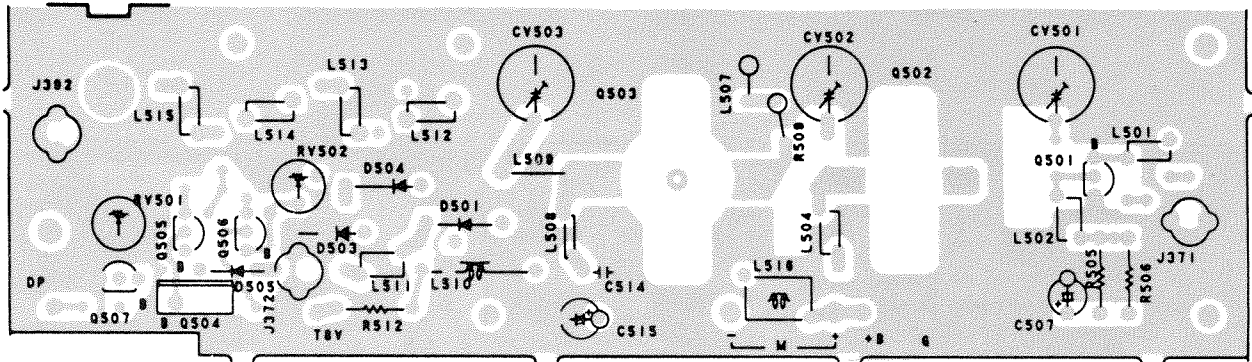
TRANSMITTER PC BOARD (BOTTOM VIEW)

70-340/440



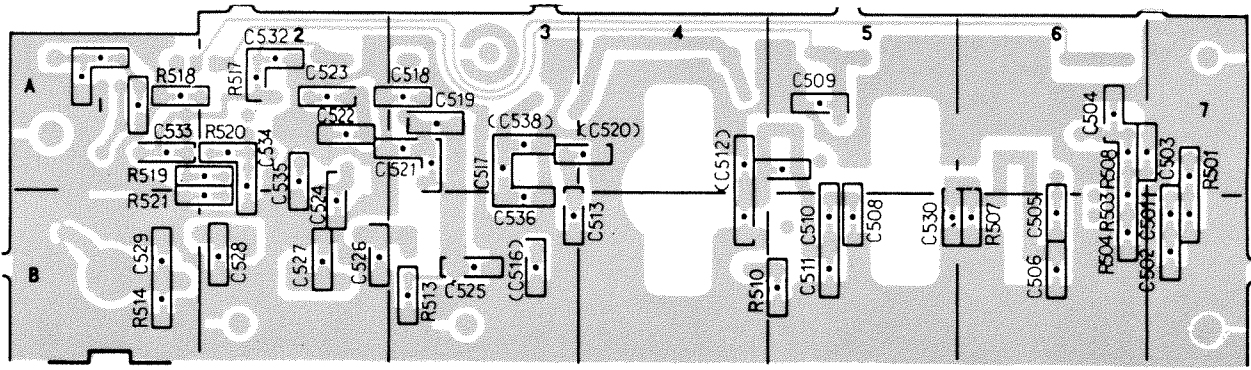
PA PC BOARD (TOP VIEW)

70-340/440



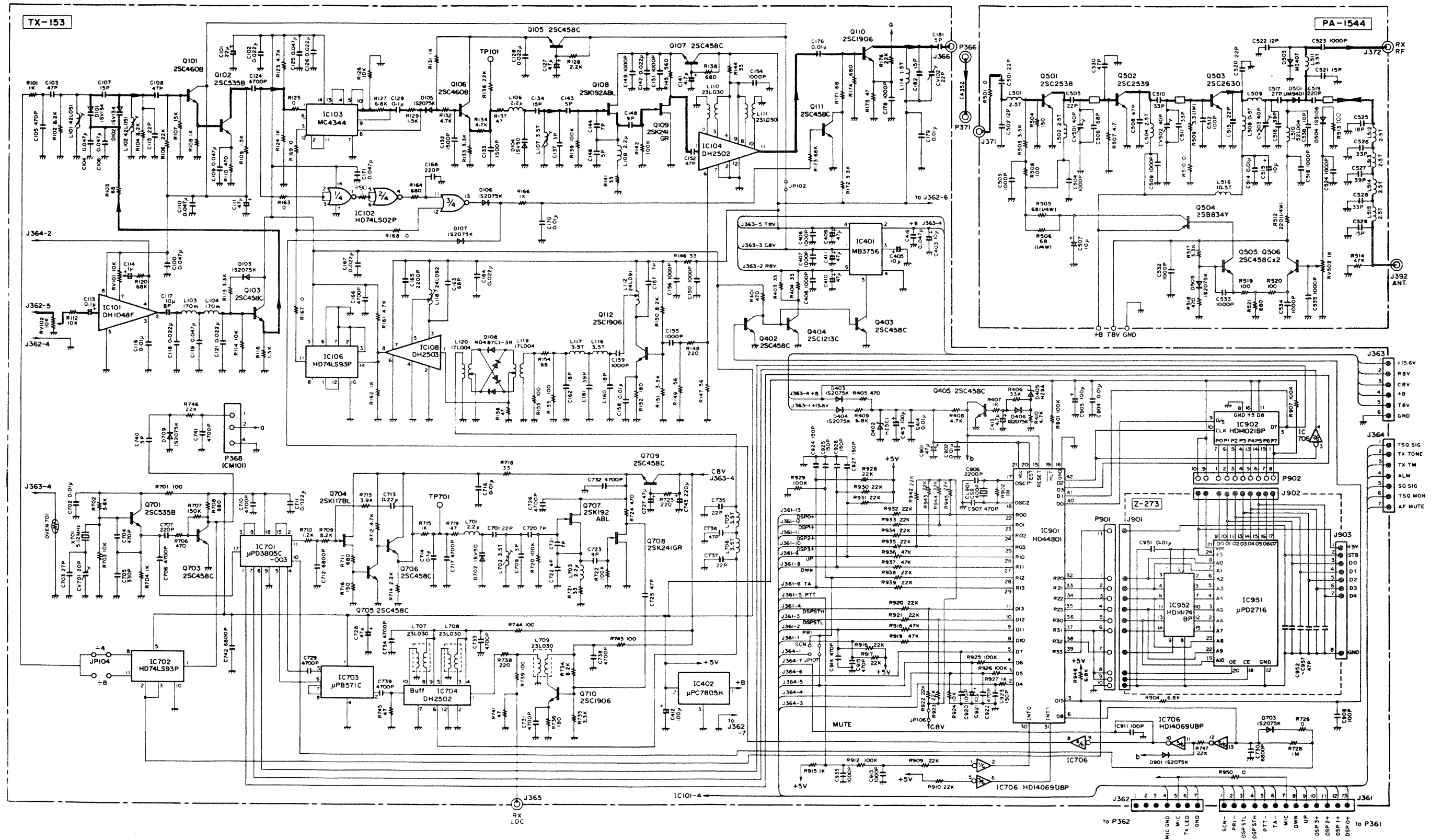
PA PC BOARD (BOTTOM VIEW)

70-340/440



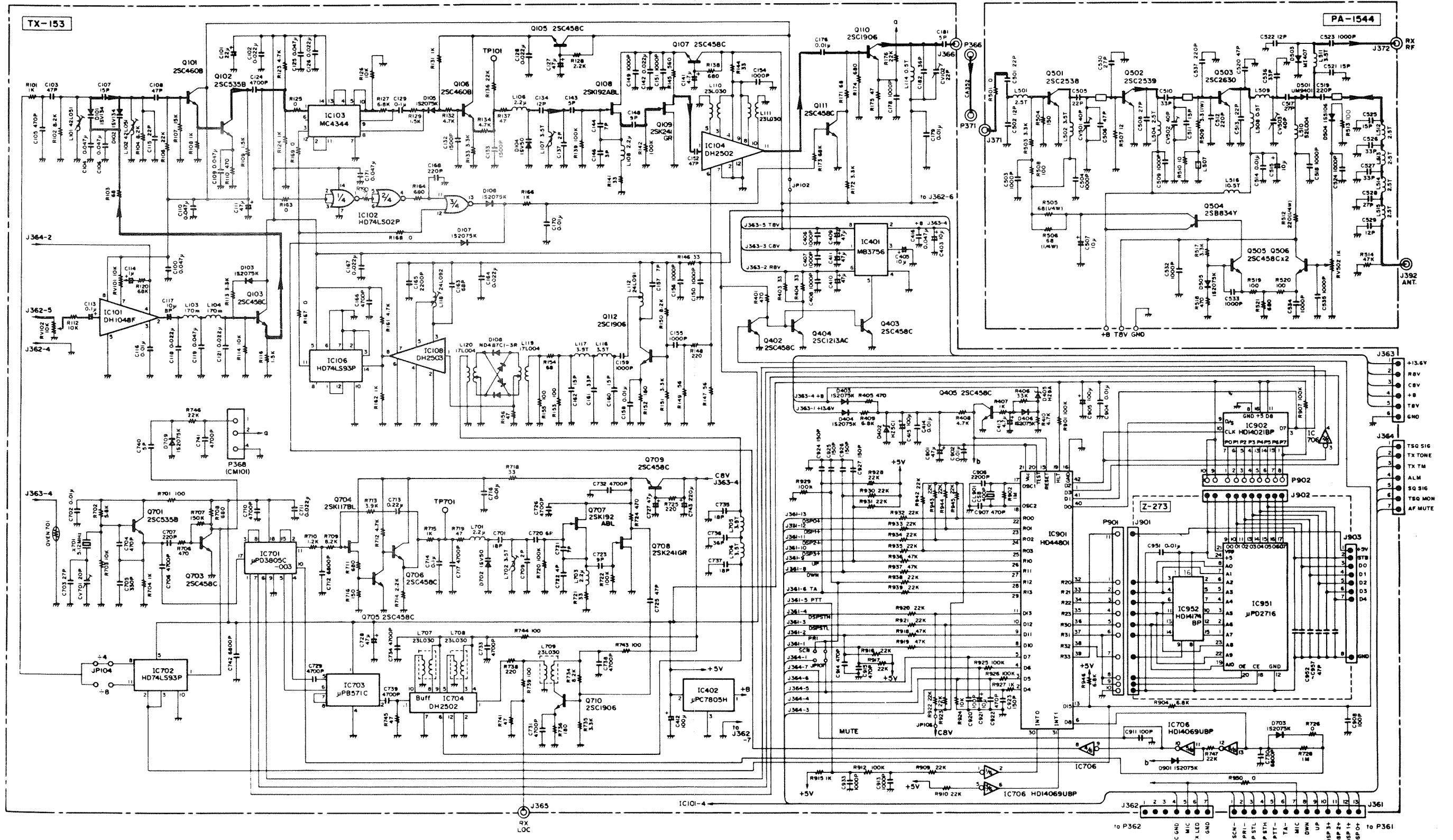
TRANSMITTER SCHEMATIC DIAGRAM

70-340A/440A



TRANSMITTER SCHEMATIC DIAGRAM

70-340B/440B



Fold Out

VOLTAGE CHARTS

70-340/440

TRANSISTORS

REF. NO.	DESCRIPTION	MODE	BASE	COLLECTOR	EMITTER	FUNCTION
Q101	2SC460B	TX	3.2	8.0	2.5	Buffer
Q102	2SC535B	TX	2.5	3.2	1.8	Buffer
Q103	2SC458C	TX	3.2	5.0	2.5	AF Buffer
Q105	2SC458C	TX	7.9	8.0	7.3	Power Line Filter
Q106	2SC460B	TX	2.3--7.0	7.3	1.6--6.3	Buffer
Q107	2SC458C	TX	7.9	8.0	7.3	Power Line Filter
Q110	2SC1906	TX	1.2	8.0	0.5	Pre Driver
Q111	2SC458C	TX	.1	1.35	0	Pre Driver Control
Q112	2SC1906	TX	1.9	7.6	1.35	Buffer

Q203	2SC1906	RX	0.6	6.0	0	1st Local Amplifier
Q204	2SA673C	RX	13.0	11.5	13.6	Power Regulator
Q205	2SC458C	RX	8.0	13.0	7.4	Power Control
Q251	2SC535B	RX	0.7	3.8	0	1st IF Amplifier
Q252	2SC458C SQ ON 2SC458C SQ OFF	RX RX	2.1 1.9	3.4 5	1.5 1.6	Noise Amplifier
Q255	2SC458C	RX	0	2.0	0	Sq. Switch
Q256	2SC458C	RX	0	7.4	0	Sq. Switch
Q257	2SC458C	RX	3.5	8.0	2.8	AF Pre Amplifier
Q260	2SC458C	RX	0.6	0.06	0	Sq. Switch
Q261	2SC458C SQ ON 2SC458C SQ OFF	RX RX	0.02 0	0.1 4.7	0 0	Sq. Switch

Q301	2SC458C 2SC458C	TX RX	.3-.7 .3-.7	1.8-4.0 1.8-4.0	0 0	Dimmer Control
Q302	2SB649C 2SB649C	TX RX	1.6-4.0 1.6-4.0	0 0	2.1-4.6 2.1-4.6	Dimmer Control

Q402	2SC458C	TX RX	0 0.7	0.7 0	0 0	Power Control
Q403	2SC458C	TX RX	0.7 0	0 2.0	0 0	Power Switch
Q404	2SC1213C	TX RX	0.7 0	0 8	0 0	Power Control
Q405	2SC458C	TX RX	0.6 0.6	0 0	0 0	Reset (MCPU)

Q501	2SC2438	TX	0.1	3--8	0	Pre Driver
Q502	2SC2539	TX	---	13.6	0	Driver
Q503	2SC2630	TX	---	13.6	0	RF Power Amp.
Q504	2SB834Y	TX	12.9	3--8	13.6	APC
Q505	2SC458C	TX	1.6	12.9	1.1	APC Amp.
Q506	2SC458C	TX	1.6--1.9	8.0	1.2	APC Amp.

TRANSISTORS (cont)

REF. NO.	DESCRIPTION	MODE	BASE	COLLECTOR	EMITTER	FUNCTION
Q701	2SC535B	TX RX	2.9 2.9	4.5 4.5	2.4 2.4	OSC (RX SYN)
Q703	2SC458C	TX RX	0.7 0.7	2.8 2.8	0 0	Buffer
Q705	2SC458C	TX RX	0.6 0.6	5.0 5.0	0 0	Loop Filter (RX Syn.)
Q706	2SC458C	TX RX	5.0 5.0	7.3 7.3	4.35 4.35	Loop Filter (RX Syn.)
Q709	2SC458C	TX RX	8.2 8.2	8.2 8.2	7.4 7.4	Power Line Filter
Q710	2SC1906	TX RX	1.9 1.9	7.3 7.3	1.4 1.4	Buffer

F.E.T'S

REF. NO.	DESCRIPTION	MODE	GATE	DRAIN	SOURCE	FUNCTION
Q108	2SK192A BL	TX	0	7.3	0.3	VCO (TX PLL)
Q109	2SK241GR	TX	0	2.9	0	Buffer

Q201	2SK125	RX	0	10.5	2.5	Front End Amp.
Q202	2SK125	RX	0	11.0	2.5	1st Mixer
Q259	2SK117BL SQ.OPN. 2SK117BL SQ.CLS.	RX RX	3.3 0	3.2 3.2	3.3 3.3	AF Switch

Q704	2SK117BL	TX RX	3.3 3.3	7.3 7.3	3.5 3.5	Loop Filter (RX Syn)
Q707	2SK192ABL	TX RX	0 0	7.4 7.4	0.3 0.3	VCO (RX Syn)
Q708	2SK241GR	TX RX	0 0	3.0 3.0	0.6 0.6	Buffer

DIGITAL IC

REF. NO.	DESCRIPTION	PIN NO.	+ V VOLTAGE	GND PIN NO.	FUNCTION:
IC 102	HD74LS02P	14	5	7	Nor Gates
IC 103	MC4344	14	5	7	Phase Detector
IC 106	HD74LS93P	5	5	10	4 Bit Binary Counter
IC 301	HD14511BP	16	8	8	Led Driver
IC 302	HD14511BP	16	8	8	Led Driver
IC 701	uPD3805C	18	5	9	PLL
IC 702	HD74LS93P	5	5	10	4 Bit Binary Counter
IC 703	uPB571C	1	5	4	Pre Scaler (Rx Syn)
IC 706	HD1406uPB	14	5	7	Buffer
IC 901	HD14021	20/21	5	16	CPU
IC 902	HD14021BP	16	5	8	Date Shifter (Rx Syn)
IC 951	uPD2716D	24	5	12	Read Only Memory
IC 952	HD14174BP	16	5	8	Data Buffer

VOLTAGE CHARTS

70-340/440

ANALOG IC

REF. NO.	DESCRIPTION	MODE	PIN No.1	PIN No.2	PIN No.3	PIN No.4	PIN No.5	PIN No.6	PIN No.7	PIN No.8	PIN No.9	PIN No.10	PIN No.11	PIN No.12	FUNCTION			
IC 101	DH 1048	TX	--	3.8	4.5	3.8	0	--	4.5	8	--	--	4.5	--	IDC			
IC 104	DH 2502	TX	0	0	0	7.5	7.5	0	0	0	7.5	7.5	0	0	BUFFER			
IC 108	DH 2503	TX	0	0	7.5	0	7.5	0	7.5	1.55	--	--	--	--	BUFFER			
IC 251	MC3357P	SQUELCH																
		CLSD. RX	7.6	7.1	7.6	7.6	1.0	1.0	1.0	7.5	3.7	1.9	1.9	.8	0	1.4	0	2.0
		OPEN RX	7.6	7.1	7.6	7.6	1.0	1.0	1.0	7.5	3.7	1.9	1.9	0.2	7.0	0	0	2.0
IC 252	MB 3712	RX	7.0	13.8	13.0	0	--	--	0.6	--	--	--	--	--				2nd IF AMP
IC 303	uPC7808H	TX RX	13.8 13.8	8.0 8.0	0	--	--	--	--	--	--	--	--	--				AF PWR AMP
IC 401	MB 3756	TX RX	8.0 8.0	13.6 13.6	8.0 8.0	0 0	0 1.7	0 8	0 0	8 0	-- --	-- --	-- --	-- --				POWER REGULATOR
IC 402	uPC7805H		13.8	0	4.9													POWER REGULATOR
IC 704	DH2502	RX	0	0	6.8	6.8	0	0	0	6.8	6.8	0	0	0				BUFFER

MICROCOMPUTER (IC 901) PIN OUT DESCRIPTION

PIN NO.	PIN NAME	INPUT OUTPUT	SIGNAL NAME	FUNCTION
1	D3	OUT	DSTB+	Strobe for serial data to synthesizer
2	D4	OUT	TXTM-	Signalling option control (TX: LOW, RX: HIGH)
3	D5	OUT	ALM-	Alert (2KHz Tone)
4	D6	IN	SQSIG+	Squelch Signal (Busy; High)
5	D7	OUT	TSQMON-	Audio Enable in Scan Mode (Enable: LOW)
6	D8	IN	PLCL-	Synthesizer Unlock: LOW (input)
		OUT	PLCL-	Audiomute & TX Inhibit: LOW (output)
7	D9	OUT	VCOCNT	Not Used
8	D10	IN	SCN-	Scan Switch (on:LOW)
9	D11	IN	PRI-	Pri Switch (on: LOW)
10	D12	OUT	DSPSTL-	Display Data Ones Digit Strobe
11	D13	OUT	DSPSTH-	Display Data Tens Digit Strobe
12	D14	-	---	Not Used
13	D15	OUT	TXDL	TX/RX Control (Tx:LOW Rx: HIGH)
14	NC	-	---	No Connection
15	RESET	-	---	General Reset (Reset: HIGH)
16	GND	-	---	Ground
17	OSC1	-	---	Clock Oscillator (400 KHZ ±5%)
18	OSC2	-	---	" " " " " "
19	HLT	-	---	Standby Mode Control (Standby:LOW)
20	TEST	-	---	Not Used (HIGH)
21	Vcc	-	---	Power Supply (+5V±10%)
22	R00	OUT	DSPO+	LED Display Data (HIGH: 6 to 8V, LOW: 0 to 2V)
23	R01	OUT	DSP1+	" " " " " "
24	R02	OUT	DSP2+	" " " " " "
25	R03	OUT	DSP3+	" " " " " "
26	R10	IN	UP-	Channel Up Switch (ON:LOW)
27	R11	IN	DWN-	Channel Down Switch (ON:LOW)
28	R12	IN	INH+	PTT Inhibit (Inhibit: HIGH)
29	R13	IN	TA-	Not Used (HIGH)
30	INTO	IN	PTTINT+	PTT Switch (PTT: HIGH)
31	INT1	IN	---	Not Used
32	R20	OUT	RMA0+	E/PROM ADDRESS DATA
33	R21	OUT	RMA1+	RMA5+ is also used as the E/PROM ENABLE SIGNAL
34	R22	OUT	RMA2+	" " " " " "
35	R23	OUT	RMA3+	" " " " " "
36	R30	OUT	RMA4+	" " " " " "
37	R31	OUT	RMA5+	" " " " " "
38	R32	OUT	ASTB+	Strobe for E/PROM address data latch
39	R33	OUT	AUXSTB+	Strobe for AUX.DATA (Signalling Option Board)
40	D0	OUT	PSST+	Strobe for E/PROM DATA OUTPUT TO SHIFT REGISTER
41	D1	IN	CHDT+	Serial data from Shift Register
42	D2	OUT	DCLK	Clock for CHDT+

HIGH: 3.5 to 5V, LOW: 0 to 1.5V

Measure with high input impedance meter or oscilloscope

CHIP COMPONENT IDENTIFICATION

Chip components used in Midland SYN-TECH transceivers can be identified as follows:

<u>COLOR</u>	<u>COMPONENT TYPE</u>
Black	Metal Film Resistor
White with value marking	Metal Film Resistor
Light Brown	Ceramic Capacitor
Green	Ceramic Capacitor
White (no marking)	Ceramic Capacitor

Resistor value marking is as follows:

1st two digits - significant digits
 3rd digit - number of added zeros

Example: 105 = 10 0000 = 1M Ohm

CHIP COMPONENT REMOVAL/REPLACEMENT

NOTE: Temperature of soldering iron must be maintained at 600-700°F.

COMPONENT REMOVAL

1. Place solder iron tip directly on component in order to melt solder and glue as shown in figure #1 & #2. Remove component with tweezers or long nose pliers.

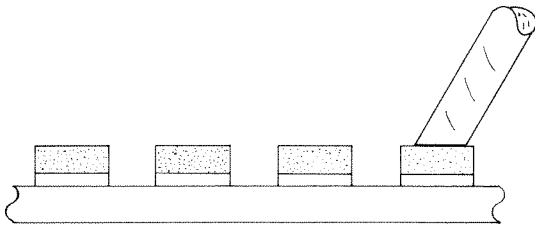


FIG. #1

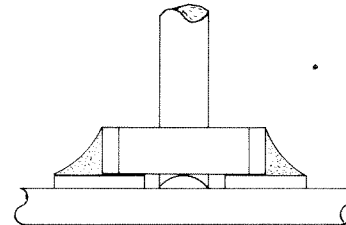


FIG. #2

2. Completely remove old solder from PC board, using a desoldering tool. Application of a small amount of flux will greatly aid in the removal of old solder.

CHIP COMPONENT REPLACEMENT

3. After component has been removed and PC pattern cleaned, apply a small amount of solder on PC pattern and let cool, as shown in figure #3.

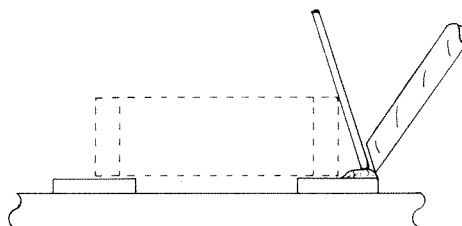
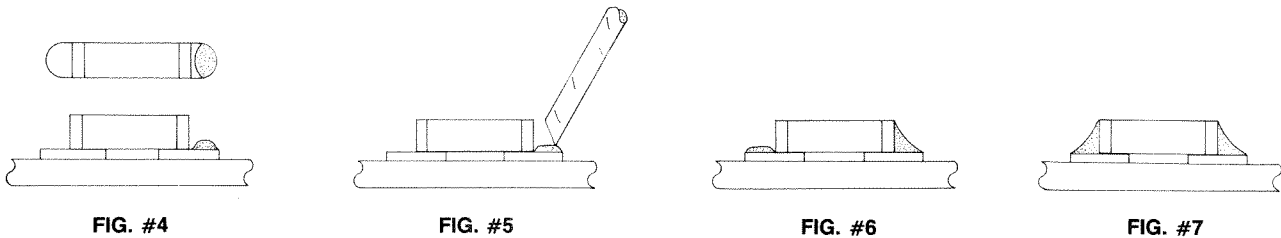


FIG. #3

CHIP COMPONENT REPLACEMENT (CONTINUED)

4. Insert new component and apply soldering iron tip to PC pattern as shown in figures 4, 5, 6 and 7.



CAUTION: As patterns and components are close to each other, extreme care must be exercised when soldering, as not to damage components or bridge PC pattern paths. High soldering iron temperatures can cause component damage. DO NOT apply the soldering iron tip to a new component during installation.

IC COMPONENT REMOVAL/REPLACEMENTCOMPONENT REMOVAL:

Extreme care must be exercised when removing and replacing defective transistors and IC's. Keep in mind that copper foil is employed on both sides of the printed circuit board. IC's and transistors may be removed from the circuit for testing. If IC's are to be removed from the circuit intact and unharmed, an IC desoldering tip attached to a soldering iron should be used. This tip will melt solder on all pin connections simultaneously and the IC may be pulled from the PC board.

A solder suction tool or braided desoldering wick may be used to remove the solder, freeing one pin at a time. Carefully and thoroughly remove solder from all IC pins until the IC can be removed without resistance. When removing transistors for testing, use needle nose or clamping type seizing pliers that will act as a heatsink on the transistor leads. If a transistor or IC is defective, it may be cut from the leads and removed. The leads may be unsoldered and removed one at a time.

REPLACEMENT:

If it is necessary to bend IC leads, firmly hold and bend the lead with needle nose pliers. Make sure the leads are free from solder and are parallel to the IC body. Remove all solder from the holes in the PC board before attempting replacement. When replacing an IC or transistor on the PC board, make sure the component is properly orientated. Before soldering an IC, verify there is no AC voltage between the solder iron tip and common ground.

PC BOARD REMOVALTX/SYNTHESIZER PC BOARD

To remove the Tx/Synthesizer PC board, remove the 8 Phillips head PC board mounting screws. Disconnect the 4 multi pin connectors at J363, J361, J362 and J364, located at the front of the board. Next disconnect the 2 Coaxial connectors at J365 and J366, located at the rear of the board. Slide the PC board to the rear of the radio to clear the front retaining tab, then pull up.

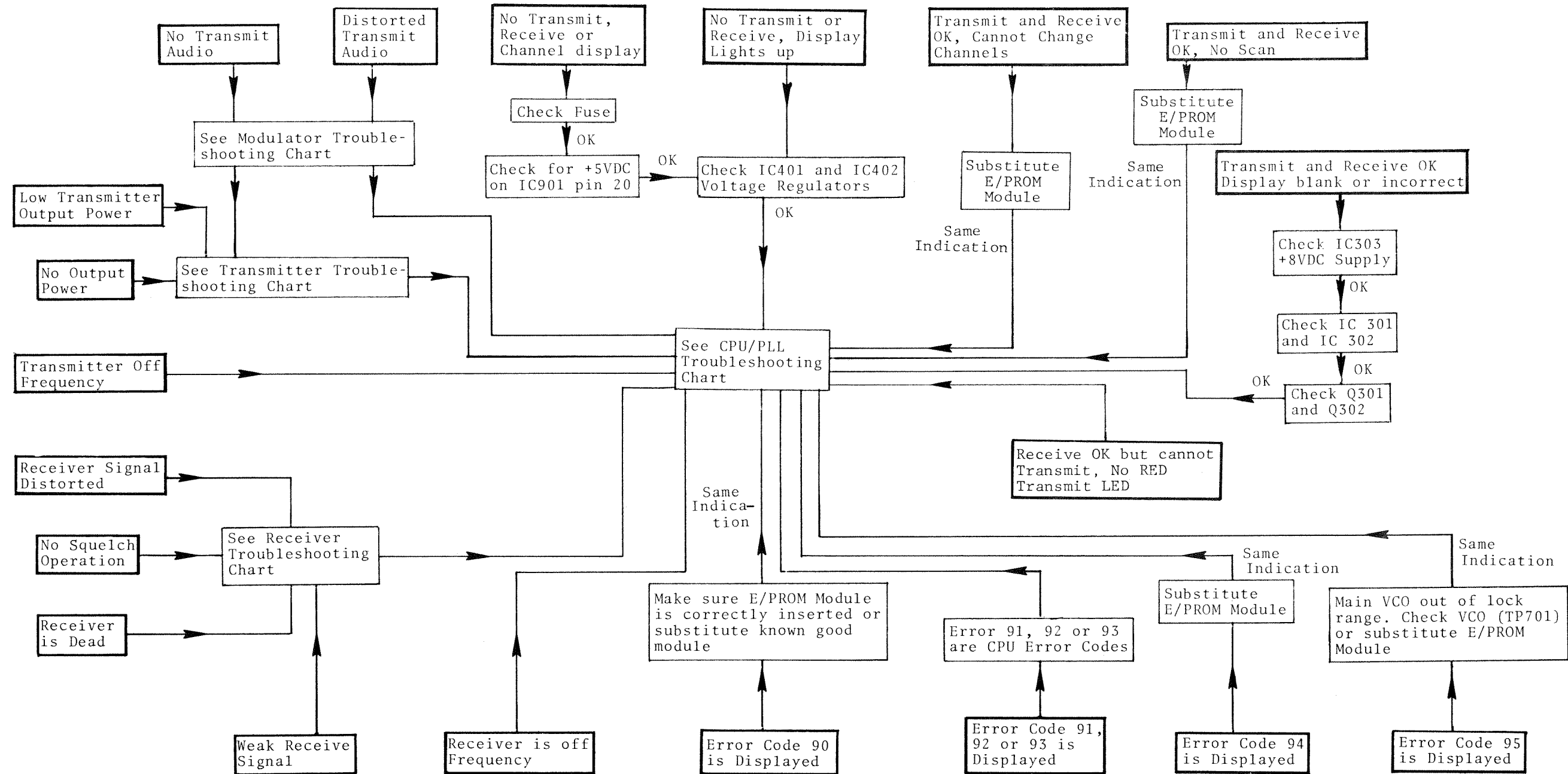
RX PC BOARD

To remove RX PC board, remove the 5 Phillips head PC board mounting screws. Next disconnect the 5 multi pin connectors at J351, J354, J353, J352 and J358 located at the middle and front of the board. Next disconnect the 2 Coaxial connectors at J356 and J355 located near the rear of the board. Slide PC board to the rear of the radio to clear front retaining tab and then pull up. Board will still be retained by power wiring but can be laid over.

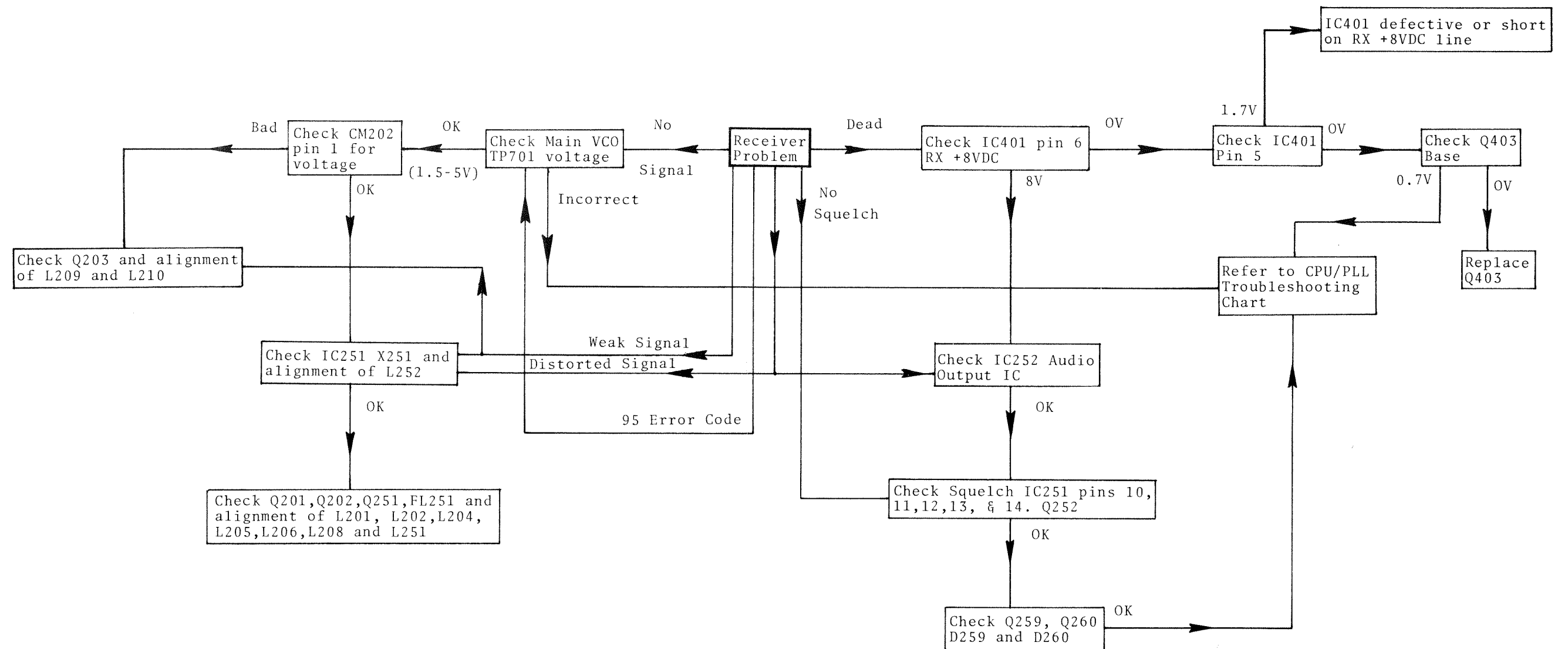
PA PC BOARD

To remove PA PC board, loosen the 4 Phillips head screws (2 on each side) located to the outside rear of the unit. Tilt PA/heatsink downwards and remove the 2 Phillips head screws holding the PA cover and remove the cover. Remove the 10 Phillips head mounting screws holding the PC board and output transistors. Next unsolder the antenna connector which protrudes through the PC board on the left hand side. The antenna connector is soldered to the board at 3 connections. All solder must be removed from these connections before attempting to remove the board. Next disconnect the 2 coaxial connectors at J372 and J371 and pull up on board. The board will still be retained by power wiring but access to the rear of the PCB is possible.

General Troubleshooting Chart



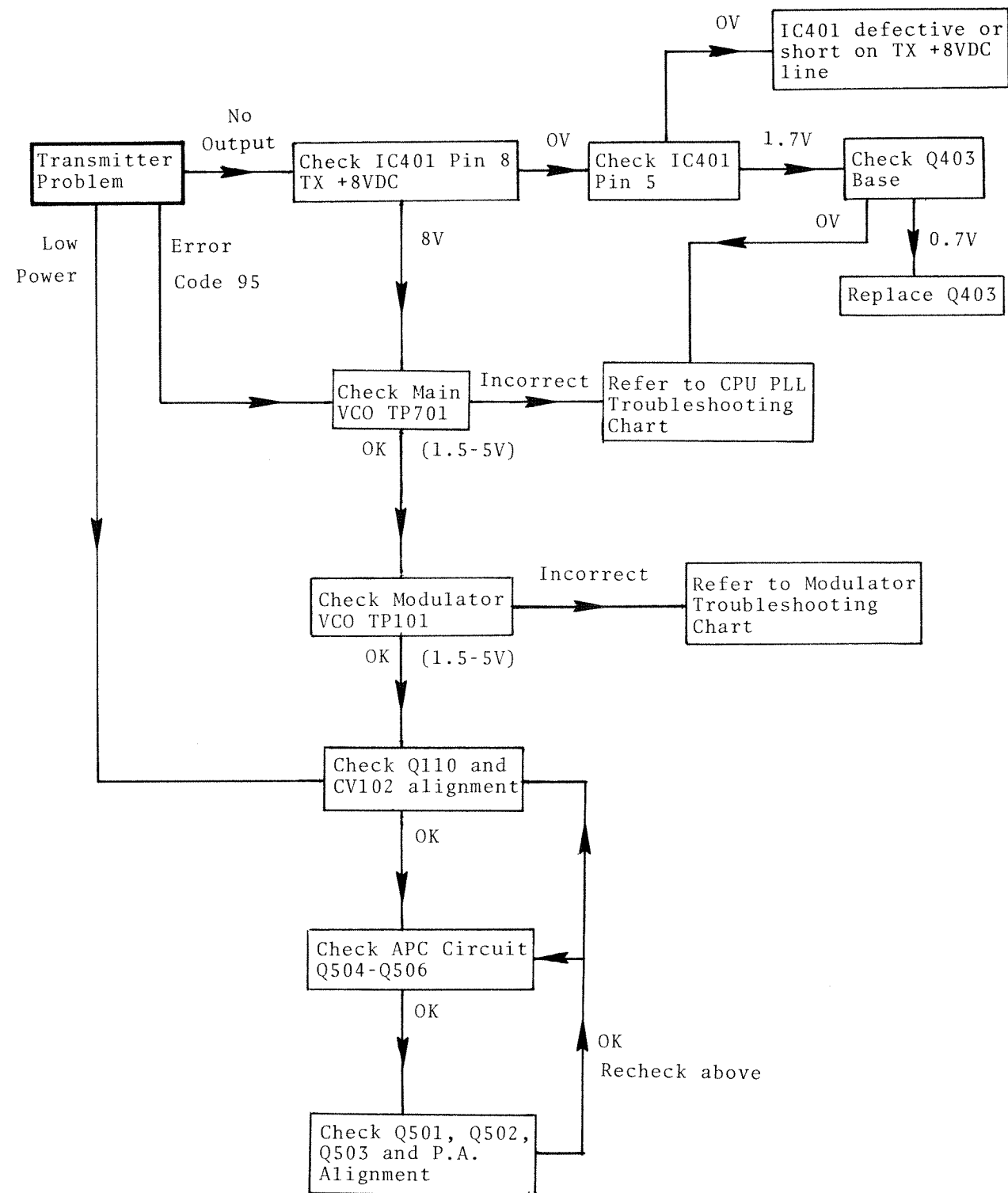
Receiver Troubleshooting Chart



TRANSMITTER TROUBLESHOOTING CHART

70-340/440

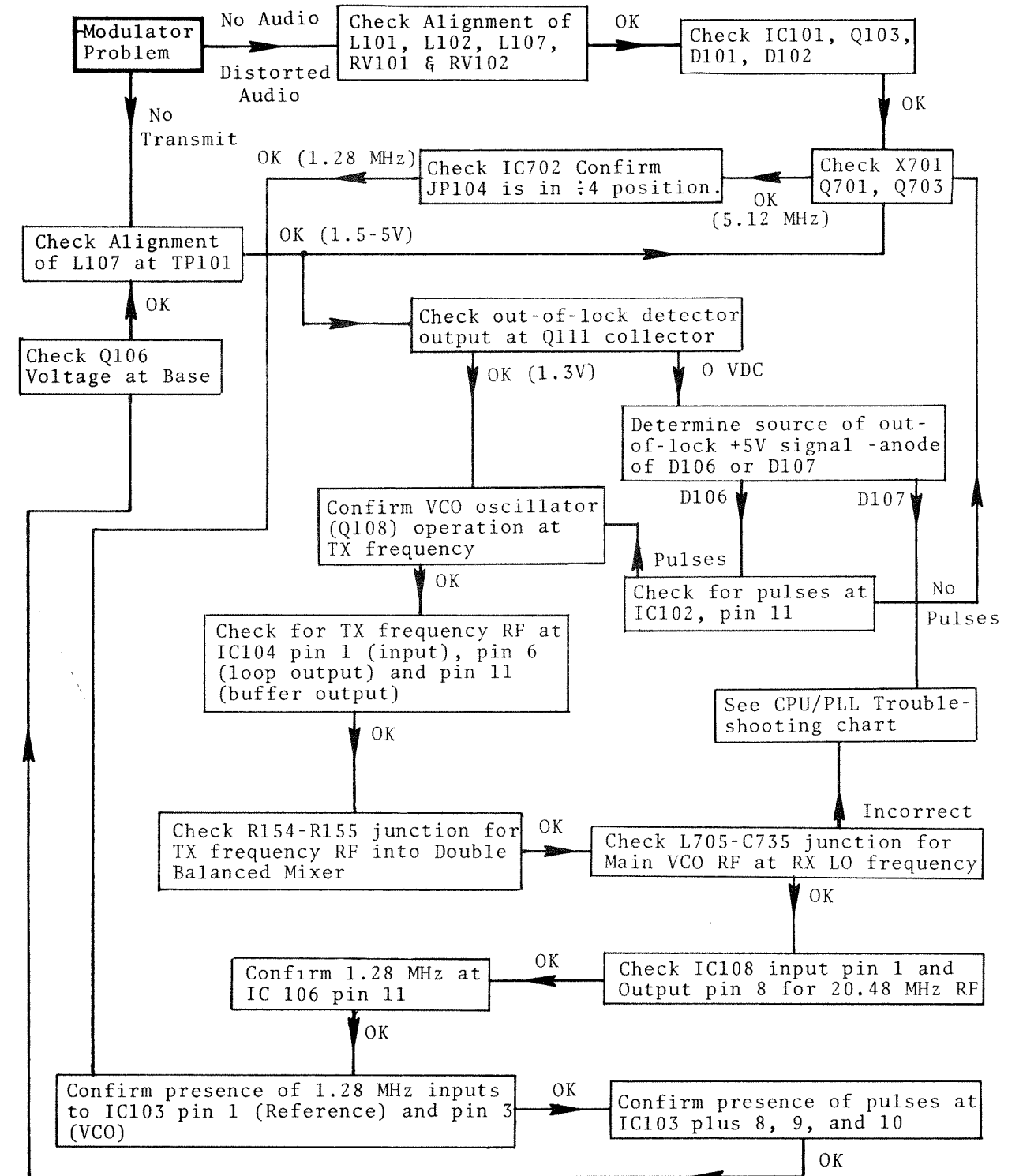
Transmitter Troubleshooting Chart



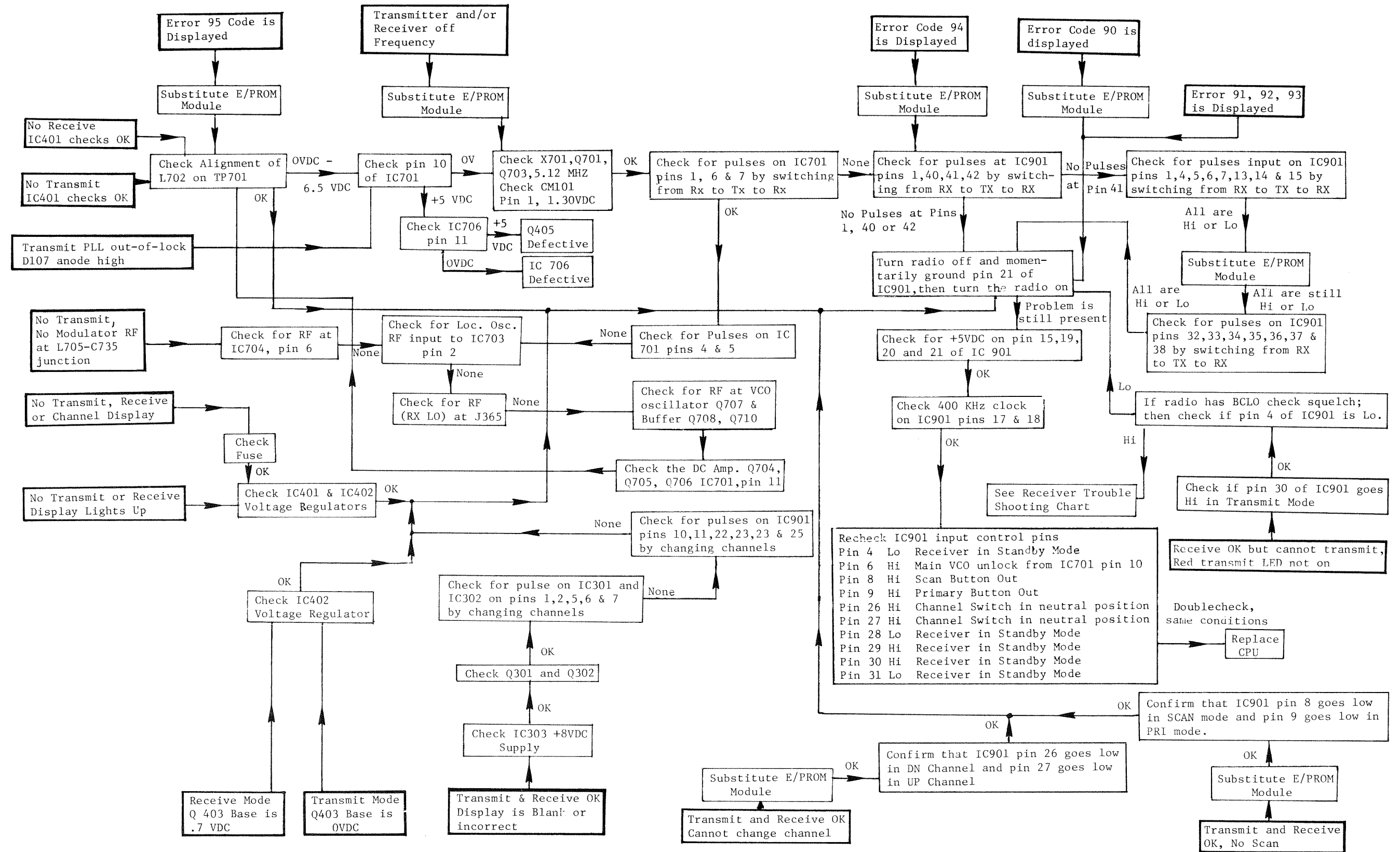
MODULATOR TROUBLESHOOTING CHART

70-340/440

Modulator Troubleshooting Chart



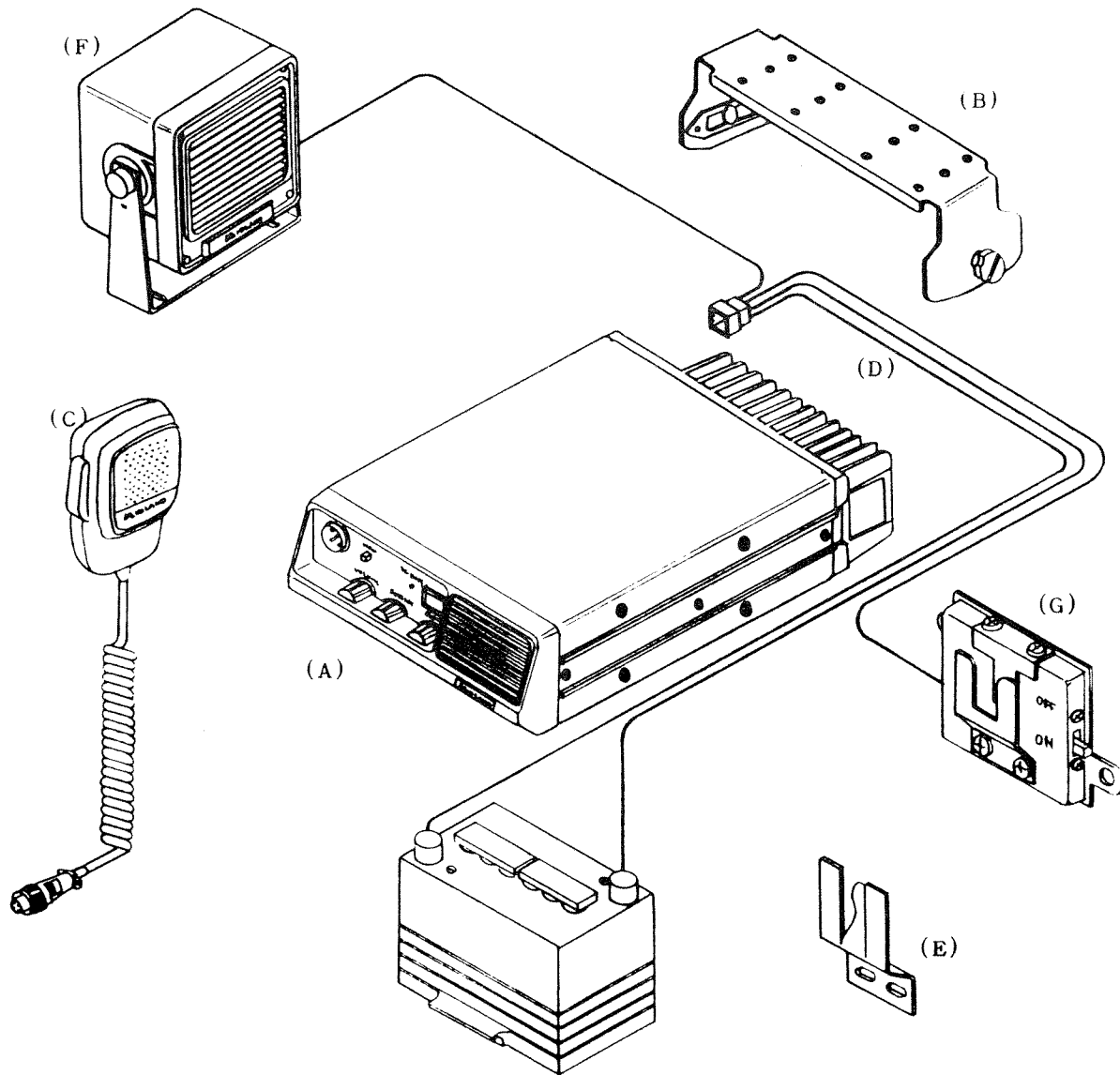
CPU/PLL Troubleshooting Chart



Fold Out →

MOBILE INSTALLATION DIAGRAM

70-340



UNIT AND INCLUDED ACCESSORIES:

- (A) Under Dash Type Land Mobile Radio
- (B) Mobile Mounting Bracket
- (C) Dynamic Microphone
- (D) DC Power Cord
- (E) Microphone Clip

MODEL NO.

PART NUMBER

- 70-2201
- 70-2301 70-038013
- 70-2211 70-034031
- 70-158015

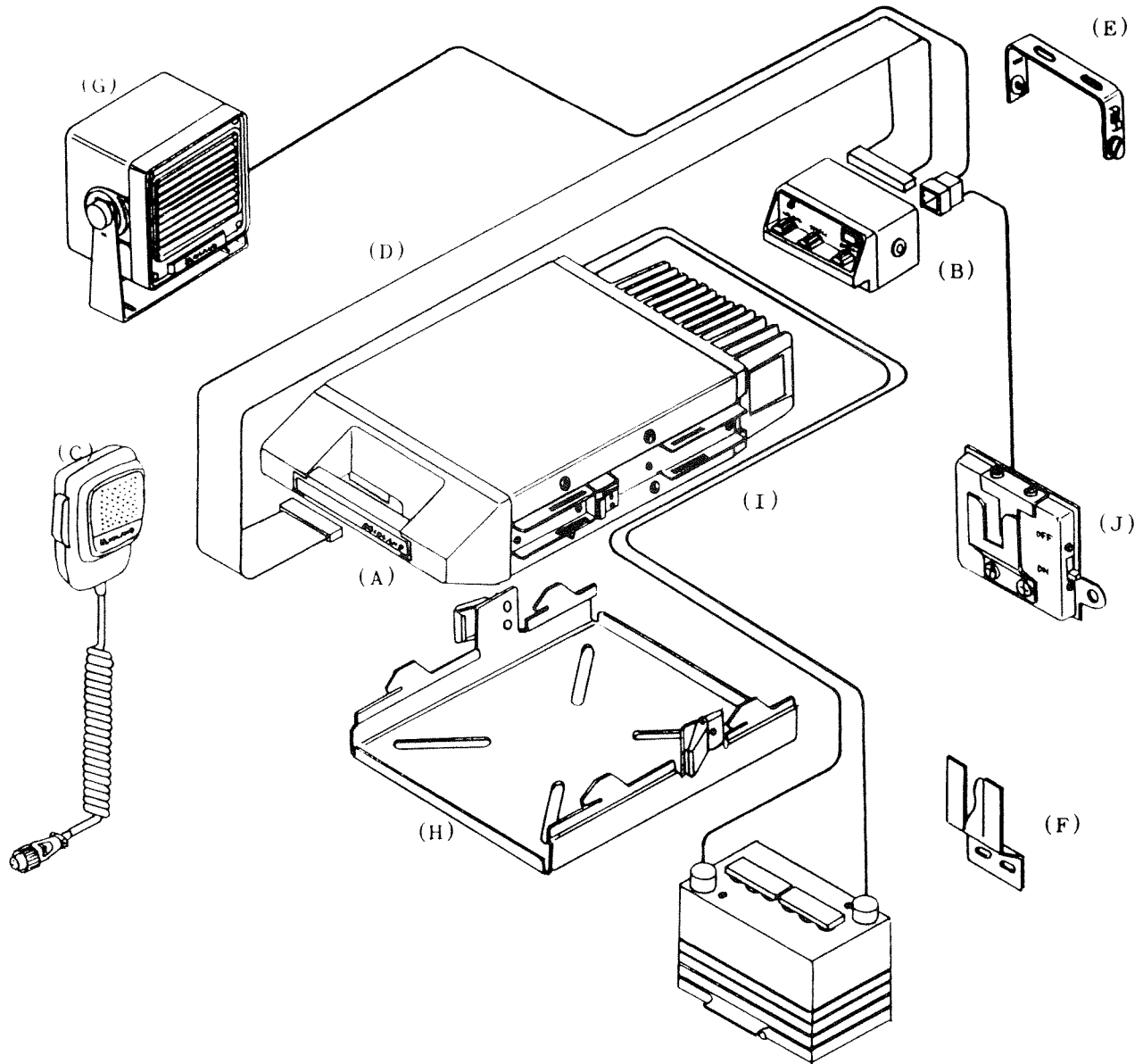
OPTIONAL ACCESSORIES:

- (F) Mobile Trunk Mount External Speaker
- (G) Microphone Hang Up Box

- 70-2351
- 70-2195

MOBILE INSTALLATION DIAGRAM

70-440



UNIT AND INCLUDED ACCESSORIES:

- (A) Trunk Mount Type Remote Unit
- (B) Trunk Mount Type Control Head
- (C) Dynamic Microphone
- (D) Trunk Mount Control Cable
- (E) Bracket, Control Head
- (F) Microphone Clip
- (G) External Speaker
- (H) Mounting Tray, Remote Unit, W/Keys
- (I) DC Power Cord

MODEL NUMBER

PART NUMBER

- 70-2206
- 70-2301
- 70-2222
- 70-2351
- 70-2205
- 70-2212

- 70-038013
- 70-034061
- 70-158069
- 70-158015
- 70-158069
- 70-034032

OPTIONAL ACCESSORIES:

- (J) Microphone Hang Up Box

70-2195

LOCATION

UNDER DASH UNIT:

Where you place the transceiver in the vehicle is not critical to its performance; convenience and accessibility are the key factors when installing the transceiver. The mobile mounting bracket will provide you with some guide as to placement. Locations where it can be mounted with metal screws, bolts or pop-rivets generally will work.

REMOTE UNIT:

The remote unit may be mounted up to 4 meters away from the control head utilizing the flat cable assembly supplied with the unit. In larger vehicles, longer control cables available from Midland or assembled in the field may be used. Refer to the accessory list for part numbers of bulk cable, connectors and assembly tooling. The flat cable allows routing under vehicle carpeting if desired. When installing, route the connecting cables away from locations where they will be exposed to heat, sharp edges or mechanical damage and where it will be out of the way of the driver and passengers. Wherever possible, existing holes in the trunk wall, door channels and window columns should be utilized. The remote unit may be mounted horizontally, vertically or on it's side. Select a location with sufficient room for the unit to be unlocked and removed from the mounting tray. The mounting tray can be attached using the sheet metal screws and washers provided with the unit.

CONTROL HEAD:

Control head mounting location is not critical to it's performance. Convenience and accessibility are the key factors when installing. Refer to the Mobile Installation Diagram for the control head mount bracket. The mount bracket may be installed with metal screws, bolts or pop rivets.

POWER REQUIREMENTS:

This transceiver is designed to operate from any 13.8 V DC, 10 amp negative ground source. A standard automotive, 12 volt negative ground system generally is adequate. Inspection of the vehicle's electrical system is recommended prior to installation of the transceiver. A low battery, worn generator/alternator or poor voltage regulator can impair the operation of the transceiver. Noise interference or low voltage output can sometimes be traced to these problems. If an external AC power supply is used with the transceiver, it must be adequately regulated for voltage and current. Low voltage output will produce unsatisfactory results from the transceiver. Receiver sensitivity and transmitter output will be greatly impaired.

CAUTION: EXCESSIVE VOLTAGE OUTPUT ABOVE 16 V DC CAN CAUSE DAMAGE TO THE TRANSCEIVER. CHECK THE VOLTAGE SOURCE BEFORE CONNECTING THE POWER CABLE.

Included with the transceiver is a DC power cable. The red wire is positive (+) and the black wire is negative (-). If at all possible, make direct connection to the battery terminals to prevent random noise and transient spikes from being fed back into the transceiver and also insure adequate operating voltage. If this type of installation cannot be made, a convenient voltage lead or terminal and

chassis ground in the vehicle may be used. This transceiver operates on a negative ground system only, do not attempt to operate in a positive ground vehicle.

ANTENNA:

The most important single factor that can influence the performance of any communications system is the antenna. A good quality antenna of 50 ohms impedance, designed for VHF applications in the 136-174 MHz range is recommended. When adjusting the antenna, whether mobile or fixed, be sure to follow the manufacturers suggested instructions. When adjusting the antenna for VSWR, a high quality SWR meter must be used. The transceiver equipped with an Automatic Protection Circuit (APC) which will disable the transmitter should a high SWR or short circuit in the antenna system occur.

MICROPHONE HANG-UP BOX:

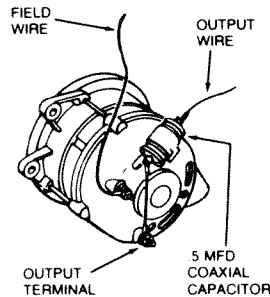
The optional accessory microphone hang-up box (Model 70-2195) is intended to be used in conjunction with the CTCSS option board Model 70-2102. This unit may be installed in place of the microphone clip or any other location convenient to the operator. The hang-up box may be mounted on a metal or non-metalic surface with the two screws provided. Wiring instructions are shown in the accessory jacks diagrams.

EXTERNAL SPEAKER:

The 70-440 is supplied with an external speaker (Model 70-2351). The 70-2351 can also be attached to the 70-340 in applications requiring higher audio levels. Consult the installation wiring diagrams for hook up instructions. The external speaker impedance is rated at 4 ohms.

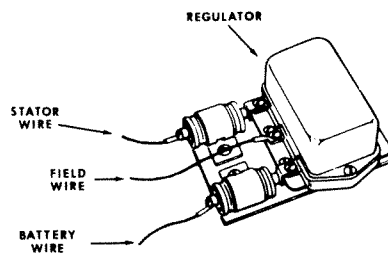
1. ALTERNATOR:

The alternator slip rings should be clean and the brushes should make good contact. A .5uf coaxial capacitor may be installed at the alternator output terminal. Verify that the current rating of the capacitor is sufficient to handle the alternator output current.



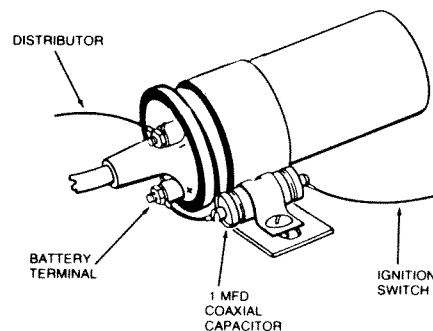
2. Voltage Regulator Interference:

Vibrating breaker contacts in the voltage regulator can cause arcing which results in interference. This interference can be noted as popping in the receiver which will change in frequency as engine speed is varied. To reduce voltage regulator noise, place two .5 uf coaxial capacitors as shown.



3. Ignition Coil Interference:

A .1uf coaxial capacitor placed at the battery side of the ignition coil, will eliminate pulses from the low voltage leads. Refer to diagram.



4. Distributor Interference:

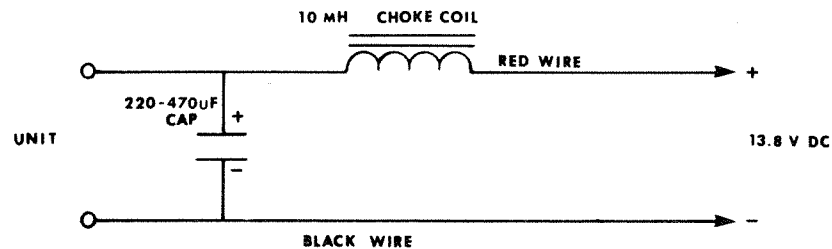
Should sparking in the distributor cause radio interference, replace wire connecting the ignition coil to the distributor cap with a piece of radio ignition wire. Some vehicles are factory equipped with radio ignition wire.

5. Battery Connection:

Connecting the leads of the power cable directly to the vehicle battery will greatly help reduce noise by preventing random noise and transient spikes from being fed back into the transceiver.

6. Generator Interference:

Generator noise is characterized by a high pitched whine and will vary with engine speed. To reduce this interference a .5 uF coaxial capacitor should be placed in series with the generator armature as shown in diagram.



ACCESSORIES

70-340/440

USE DESIGNATION:

PART APPLICATION:

UD	70-340A, 70-340B
TM	70-440A, 70-440B
NO DESIGNATION	70-340A, 70-340B, 70-440A, 70-440B

ACCESSORIES INCLUDED WITH UNIT

<u>USE</u>	<u>DESCRIPTION</u>	<u>MODEL NO.</u>	<u>PART NO.</u>
	Microphone		70-038013
	Microphone Clip		70-158015
UD	Mounting Bracket		70-158066
UD	Nut, Mounting Bracket		70-151354
UD	Plate Side, Mounting Bracket		70-158075
TM	Mounting Bracket, Cont. Head		70-158069
TM	Screw, Mounting Bracket		70-151362
TM	Washer (outside) Mtng. Brkt.		70-151363
TM	Washer (inside) Mtng. Brkt.		70-151364
TM	Clamp, Cable, Mtng. Brkt.		70-158079
TM	Screw, Cable Clamp, Mtng. Brkt.		70-151366
UD	DC Power Cable, 2M		70-034031
TM	DC Power Cable, 6M		70-034032
	Fuse, 10A		70-204026
TM	Remote Cable Assy, 4M		70-034061
TM	Mounting Tray, W/Keys		70-158068

OPTIONAL ACCESSORIES

	CTCSS Assy.	70-2102	
	2PPM Frequency Stability Kit	70-2124	
	2.5PPM Frequency Stability Kit	70-2125	
	12.5KHz Channel Spacing Kit	70-2134	
	12.5KHz 1st/2nd IF Filter Kit for	70-2134	70-2135
UD	Scan Kit	70-2141	
TM	Scan Kit	70-2142	
	Remote Speaker, 5W	70-2351	
TM	Remote Cable Assy. 2M, Flat	70-2223	
	High Side Injection Kit	70-2171	
	Microphone Hang-Up Box	70-2195	
TM	Remote Cable Assy, 4M, Round	70-2226	
TM	Remote Cable Assy, 2M, Round	70-2227	
TM	Connector, Remote Cable	70-2228	
TM	Cable, 34 Cond, Flat (Bulk)		70-034068
UD	Tray Mounting W/Lock Kit	70-2256	
TM	Slide Bracket Mounting Kit	70-2255	
UD	Lock, with Keys Kit	70-7080	

OPTIONAL ACCESSORY EQUIPMENT

	E/Prom Programmer (110/220V)	70-1000
	E/Prom Eraser (110V)	70-1100
	E/Prom Eraser (220V)	70-1101
	E/Prom Printer (110V)	70-1300A
	E/Prom Printer (220V)	70-1300B
	LMR Test Set	70-E10

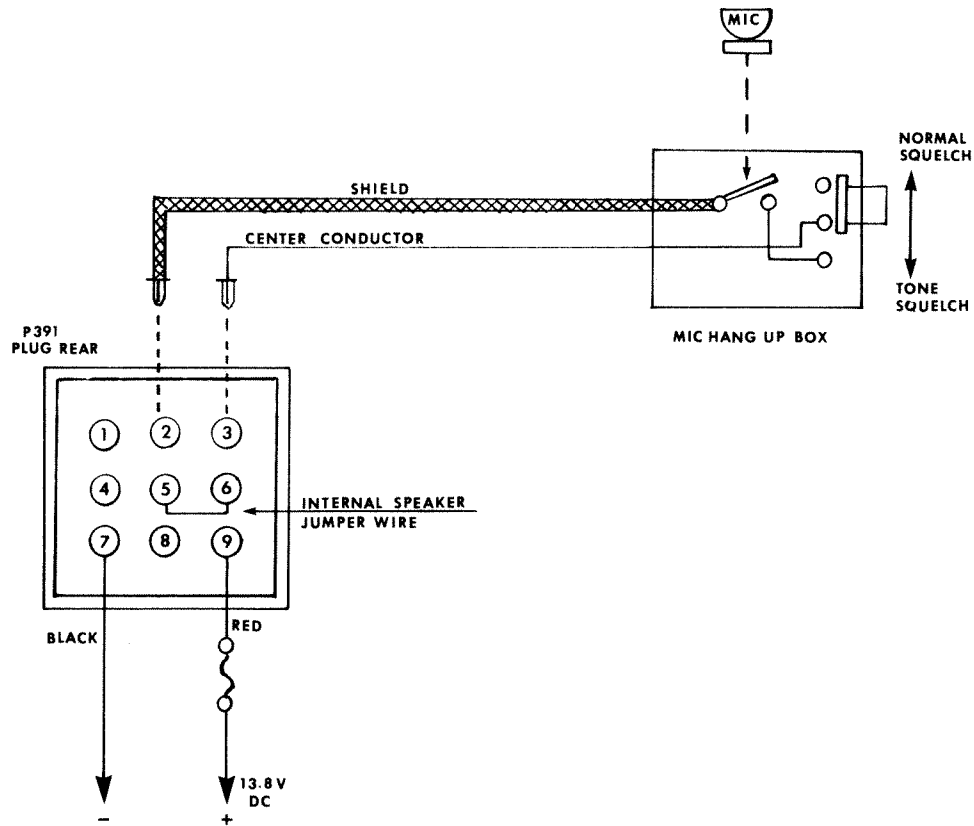
ACCESSORY TOOLS:

<u>USE</u>	<u>DESCRIPTION</u>	<u>MODEL NO.</u>	<u>PART NO.</u>
TM	Hand Press	70-2229	70-156077
TM	Hand Shear	70-2230	70-156078
	Tuning Tool, Single Metal Blade		70-156019
	Tuning Tool, Double Metal Blade		70-156020
	Mic Jack Removal Tool		70-156018

UNDER DASH DC POWER/ACCESSORY PLUG INSTRUCTIONS

70-340

The accessory jack J391 is designed to accept the 9 pin plug supplied with the unit for DC power. Connections to the plug are shown in the following diagram.

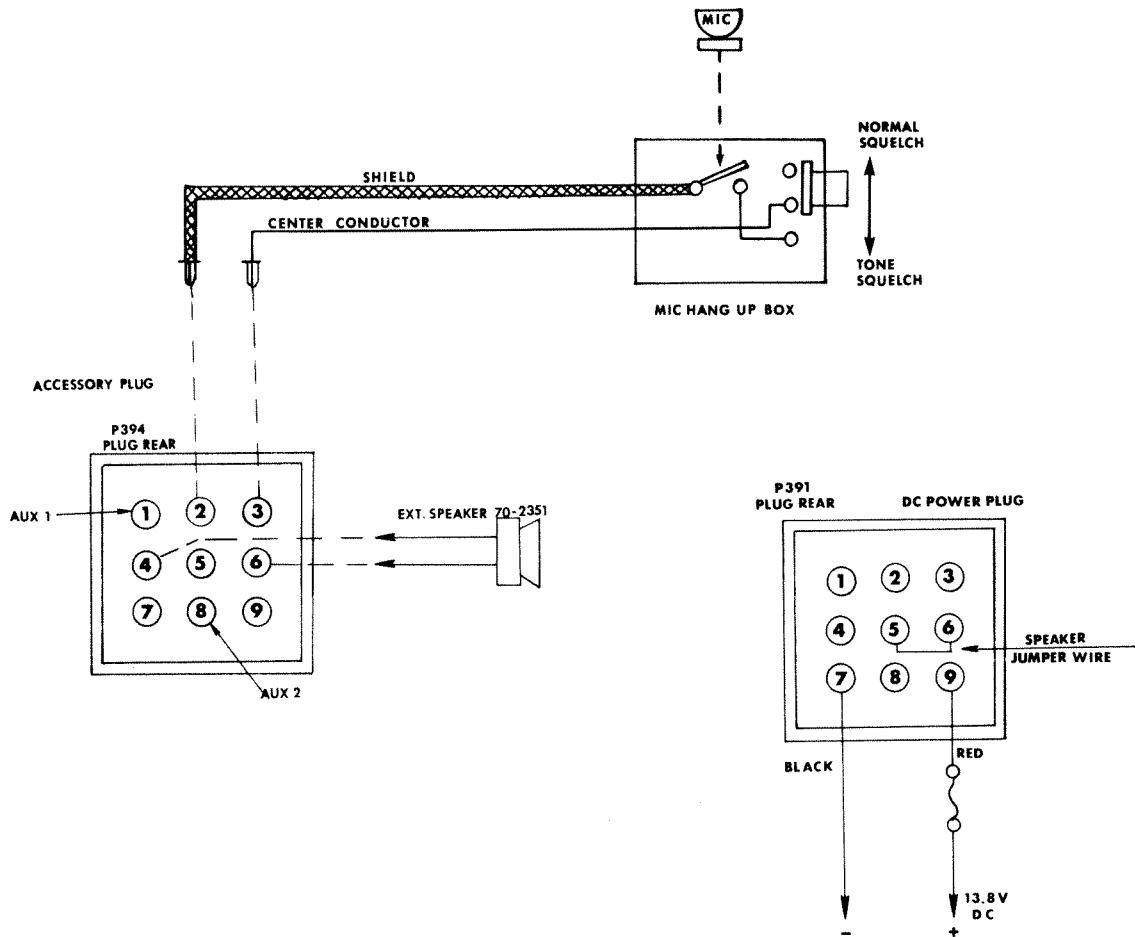


- A. For internal speaker operation, pins #5 and #6 are connected as shown.
- B. For external speaker connections, remove pins #5 and #6 and connecting jumper wire with Molex extractor tool. Speaker wires are equipped with male Molex pins. Insert striped speaker wire in #4 pin position (ground) and insert plain speaker wire to #6 pin position.
- C. For CTCSS operation, connect pins #2 and #3, as shown to mic hang-up box.
- D. Pins #1 and #8 are not connected.

NOTE: Accessory plug P391 utilizes .093" mail pins, Molex #02-0902143. Use Molex crimping tool #HT-1919 and extractor tool #11-03-0006.

TRUNK MOUNT DC POWER/ACCESSORY PLUGS INSTRUCTIONS 70-440

The DC power jack 391 is designed to accept the 9 pin plug supplied with the unit for DC power. The control head accepts the 9 pin Accessory plug supplied with the unit for connection of the external speaker and MIC hang up box. Connections to the plugs are shown in the following diagrams.

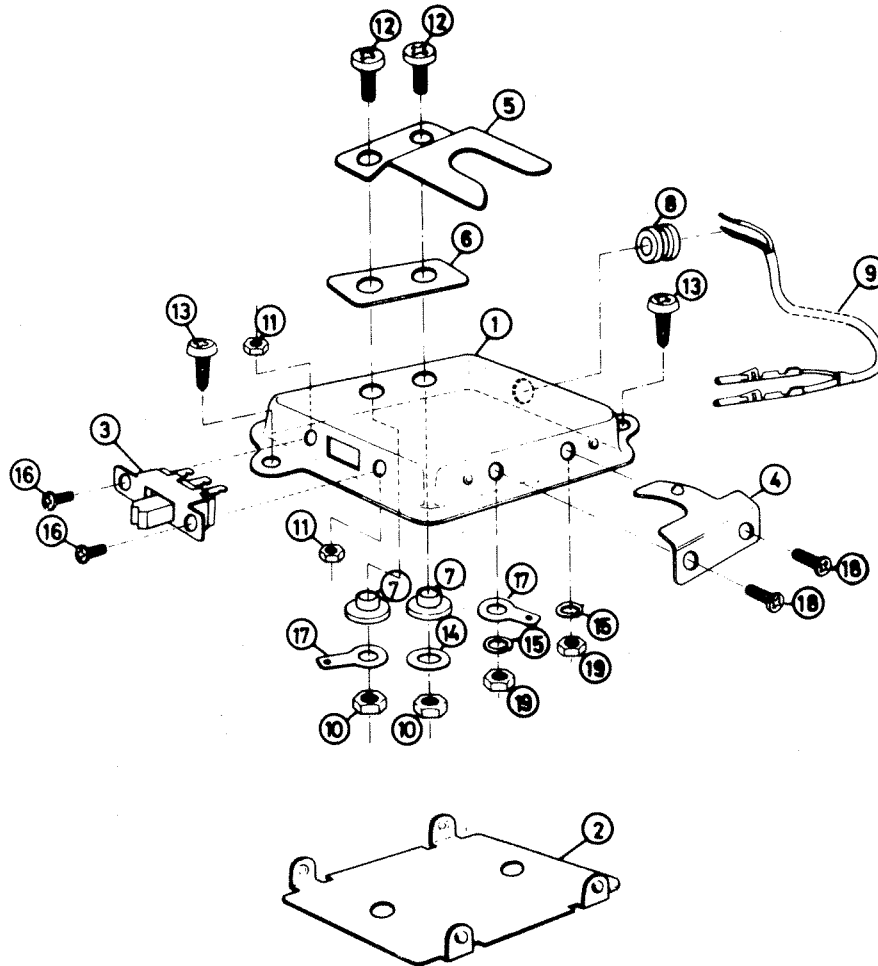


- The external speaker is normally connected to P394, the Accessory plug as shown above. Insert the male Molex pin connected to the striped wire in pin position #4 (ground), and the other wire in pin position #6. Do not remove the jumper wire between pins 5 and 6 of the DC Power plug P391.
- For subaudible tone (CTCSS) operation, the Mic hangup box 70-2195 is connected as shown above to pin positions 2 and 3 of the Accessory plug.
- Depending on the installation and the user's preference, the external speaker may be connected directly to the remote unit DC power plug P391 instead of at the control head. If this is desirable, the molex pins and connecting jumper wire between positions 5 and 6 of the DC Power plug P391 should be removed. The external speaker molex pins can then be inserted, the striped wire in pin position 4 and the plain wire in pin position 6. If it becomes desirable to relocate the external speaker and connect it to the control head plug as outlined in (A) above, a jumper connection between pins 5 and 6 of P391 must be made.

NOTE: Plug P391 and P394 utilize .093" male pins, Molex #02-0902143. Use Molex crimping tool #HT-1919 and extractor tool #11-03-0006.

MICROPHONE HANG-UP BOX — EXPLODED VIEW

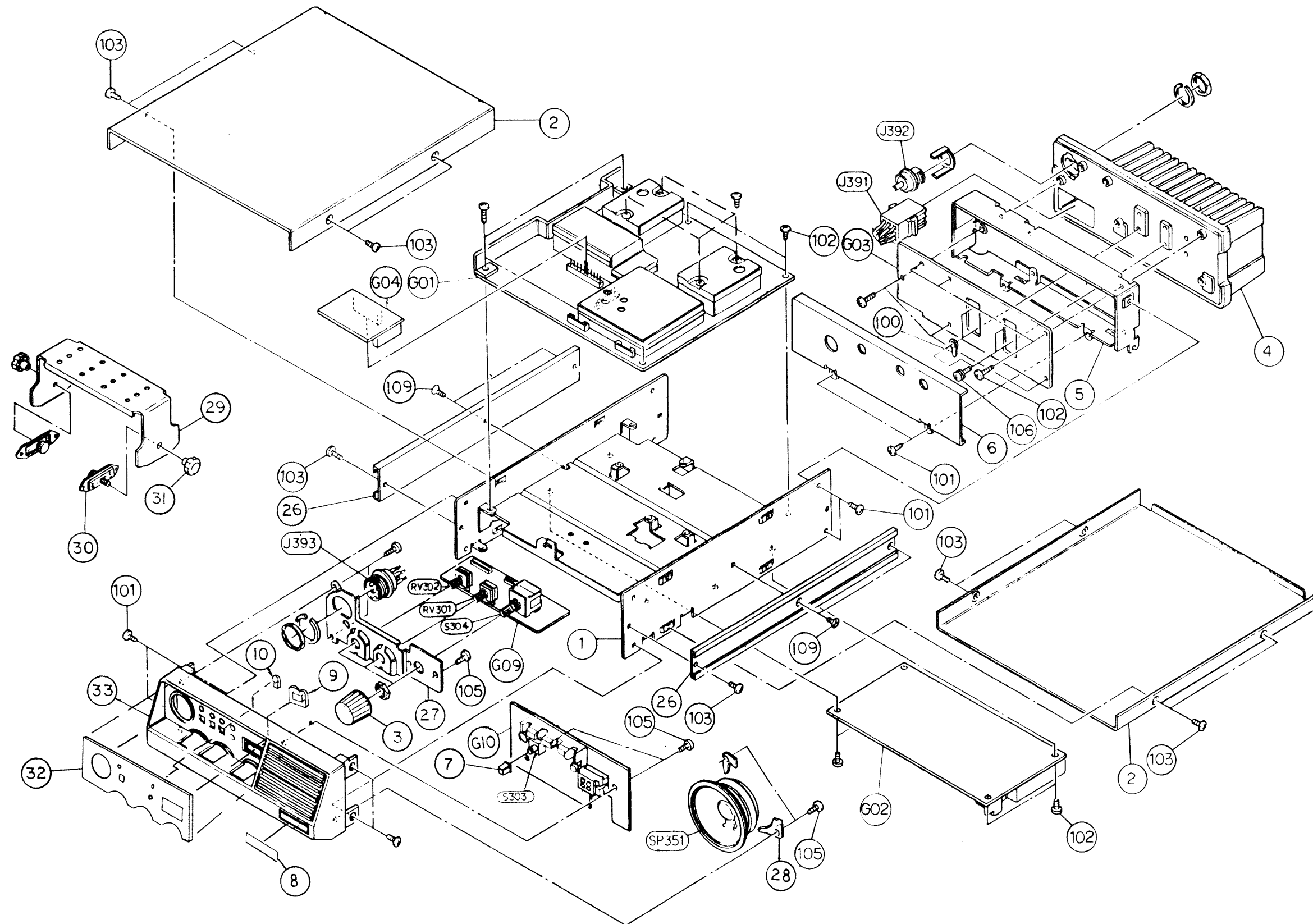
70-340/440



<u>REF. NO.</u>	<u>DESCRIPTION</u>	<u>PART NO.</u>
	<u>MICROPHONE HANG-UP BOX</u>	
1	Cover, Top	70-010068
2	Cover, Bottom	70-010069
3	Switch, Slide	70-183003
4	Hanger, A	70-158022
5	Hanger, B	70-158023
6	Spacer	70-151062
7	Washer, Insulation	70-151063
8	Rubber Bushing, Cord	70-156006
9	Shielded Wire Assy.	70-151064
10	Hex Nut, M3	70-151065
11	Hex Nut, M2	70-151066
12	Bind Head Screw 3 x 8	70-151067
13	Tapping Screw 3 x 8	70-151068
14	Washer 3.2	70-151069
15	Spring Washer 2.6	70-151070
16	Bind Head Screw 2 x 6	70-151071
17	Terminal	70-151072
18	Bind Head Screw 2.6 x 8	70-151073
19	Hex Nut, M2.6	70-161074

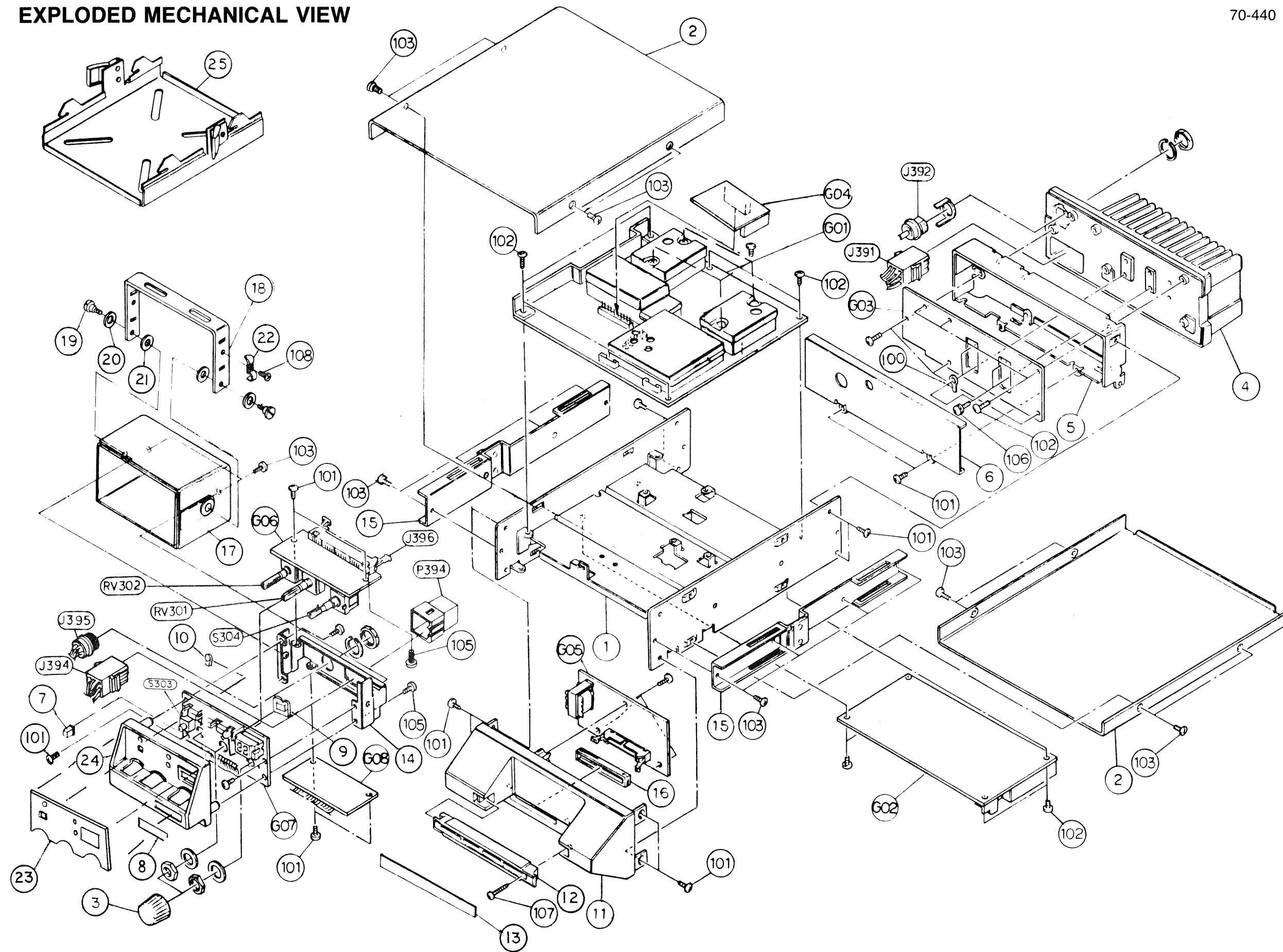
EXPLODED MECHANICAL VIEW

70-340



EXPLODED MECHANICAL VIEW

70-440



Fold Out →

PARTS LIST

70-340/440

The following parts list is a composite listing for the 70-340A, 70-340B, 70-440A and 70-440B. For the application of each individual part, refer to the "USE" column as follows:

<u>"USE" DESIGNATION</u>	<u>PART APPLICATION</u>
A	70-340A, 70-440A
B	70-340B, 70-440B
UD	70-340A, 70-340B
TM	70-440A, 70-440B
NO DESIGNATION	70-340A, 70-340B, 70-440A, 70-440B

Refer to the separate exploded mechanical views for mechanical parts unique to trunk-mount or under-dash models. Mechanical parts common to both trunk-mount and under-dash versions are shown with the same reference number on both drawings and in the parts list.

REF. NO.	USE	DESCRIPTION	PART NO.	REF. NO.	USE	DESCRIPTION	PART NO.
CASE MATERIALS EXPLODED MECH. VIEW				30	UD	Plate, Side	70-158075
1		Chassis	70-015021	31	UD	Nut, Mntg. Brkt.	70-151354
2		Cover	70-010040	32	UD	Face Plate, Std.	70-020068
3		Knob, Volume	70-110012	33	UD	Panel Front	70-010039
4		Heat Sink	70-089061	100		Grounding Lug	70-151109
5		Case, PA	70-010064	101		Screw Bind Hd.	70-151355
6		Cover, PA	70-010065	102		Screw Bind Hd.	70-151356
7		Button, Switch	70-110013	103		Screw Bind Hd.	70-151357
8		Plate, Brand	70-020070	105		Screw Tap Bnd.Hd.	70-151359
9		Lens, Chnl	70-020071	106		Screw Pan Hd.	70-151361
10		Lens, CDS	70-020072	107	TM	Screw Tap Bnd.Hd.	70-151365
11	TM	Panel, Front	70-010041	108	TM	Screw Bind Hd.	70-151366
12	TM	Grip	70-158077	109	UD	Screw Flat Hd.	70-151360
13	TM	Plate, Grip	70-158078	<u>PCB ASSEMBLIES</u>			
14	TM	Chassis, Control	70-015023	G01		TX-153 PCB Assy.	
15	TM	Side Rail	70-158076	G02		RX-154 PCB Assy.	
16	TM	Rubber Spacer	70-157056	G03		PA-1544 PCB Assy.	
17	TM	Cover, Control Hd	70-010066	G04		Z-273 PCB Assy.	
18	TM	Mtng. Bracket	70-158069	G05	TM	CX-08 PCB Assy.	
19	TM	Screw Mounting	70-151362	G06	TM	CX-05 PCB Assy.	
20	TM	Washer	70-151363	G07	TM	CX-07 PCB Assy.	
21	TM	Washer	70-151364	G08	TM	CX-06 PCB Assy.	
22	TM	Clamp	70-158079	G09	UD	CX-04 PCB Assy.	
23	TM	Face Plate, Std.	70-020069	G10	UD	CX-03 PCB Assy.	
24	TM	Panel, Front	70-010067	<u>JACKS AND CONNECTORS</u>			
25	TM	Mtng.Brkt.Assy.	70-158068	J391		Pwr/Acssy. Conn.	70-159108
26	UD	Rail, Side	70-158067	J392		RF Connector	70-159090
27	UD	Holder, Volume	70-158073	J393	UD	Mic Jack	70-159100
28	UD	Bracket, Spkr.	70-158074	J394	TM	Molex Conn.	70-159108
29	UD	Mntg. Bracket	70-158066				

PARTS LIST

70-340/440

REF. NO.	USE	DESCRIPTION	PART NO.	REF. NO.	USE	DESCRIPTION	PART NO.
<u>JACKS & CONNECTORS CONT.</u>				<u>TRANSMIT/SYNTHESIZER PCB</u>			
				TX - 153			
				TOP SIDE COMPONENTS			
J395	TM	Mic Jack	70-159100	<u>TRANSISTORS</u>			
J396	TM	Conn. Rem. Cbl.	70-159107	Q101,106		2SC460B	70-080083
P394	TM	Conn. Cont. Hd.	70-159112	Q102,701		2SC535B	70-080095
<u>CONTROLS</u>				Q103,105,107,			
RV301	TM	Squelch, 10K	70-164030	111,402,403,			
RV302	TM	Vol.W/Sw. 10K	70-164027	405,703,705			
RV301	UD	Squelch, 10K	70-164031	706,709		2SC458C	70-080082
RV302	UD	Vol.W/Sw. 10K	70-164026	Q108,707		2SK192A BL	70-080087
<u>SWITCHES</u>				Q109,708		2SK241GR	70-080110
S303		Mod./Scn.,Pri.	70-180012	Q110,112,710		2SC1906	70-080086
S304	TM	Chnl. Select	70-180014	Q404		2SC1213C	70-080096
S304	UD	Chnl. Select	70-180013	Q704		2SK117BL	70-080088
<u>SPEAKER</u>				<u>INTEGRATED CIRCUITS</u>			
SP351	UD	Speaker	70-060011	IC101		DH1048F	70-076141
				IC102		HD74LS02P	70-076099
				IC103		MC4344	70-076086
<u>CABLE ASSEMBLIES</u>				IC104,704		DH2502	70-076100
CA351		J355 to J365	70-034059	IC106,702		HD74LS93P	70-076084
CA352		J366 to J371	70-034059	IC108		DH2503	70-076101
CA353		J356 to J365	70-034060	IC401		MB3756	70-076008
CA354		J391 to J351	70-034052	IC402		UPC7805H	70-076087
CA355		J353 to J364	70-034055	IC701		UPD3805C-003	70-076090
CA358		J352 to J363	70-034056	IC703		UPB571C	70-076102
CA362	TM	CX-05 to CX-06	70-034071	IC706		HD14069UBP	70-076097
CA363	TM	CX-06 to CX-07	70-034072	IC901		HD44801A74	70-076098
CA364	TM	CX-05 to CX-07	70-034073	IC902		HD14021BP	70-076079
				<u>COILS</u>			
				L101,102		Trnsfmr 42L051	70-090105
				L103,104		Inductor LPF	70-178055
				L106,108,			
				701,703		Coil, Choke 2.2uH	70-178045
				L107,702		Coil, VCO	70-090117
				L110,111,			
				707,708,			
				709		Trnsfmr. Tx	70-090106
SP352	TM	Remote Speaker	70-060014	L112		Trnsfmr, Tx	70-090107
C391,392		270pf, 50V	70-131033	L114	A	Coil, Choke	70-090098
F391		Fuse, 10A	70-204026	L114	B	Coil, Choke	70-090160
				L116,117		Coil, LPF	70-090101
				L118		Trnsfmr, Tx	70-090108
				L119,120		Trnsfmr. dblr mix	70-090114
				L705,706		Coil	70-090099

PARTS LIST

70-340/440

REF. NO.	USE	DESCRIPTION	PART NO.	REF. NO.	USE	DESCRIPTION	PART NO.
		<u>CERAMIC CAPACITOR</u>				<u>VARIABLE RESISTORS</u>	
C921		10pf CH, 50V	70-131201	RV101,102		Trim Pot. 10K	70-144045
		<u>MYLAR CAPACITORS</u>				<u>CRYSTALS</u>	
C416		0.047uf, 50V	70-132034	X701		Crystal 5.12 MHZ	70-128019
C129,714		.1uf, 50V	70-137039			<u>CERAMIC OSCILLATOR</u>	
C132,133		1500pf, 50V	70-137035				
C170,702, 716,116		.01uf, 50V	70-137037	CL901		Ceramic Osc.	70-179020
C712,730		6800pf, 50V	70-137036			<u>JACKS, PLUGS & SOCKETS</u>	
C713		.22uf, 50V	70-137040				
		<u>ELECTROLYTIC CAPACITORS</u>		J361		13 Pin Jack	70-159098
C101		22uf, 50V	70-135060	J362,364		7 Pin Jack	70-159095
C111,127, 409,410, 411		47uf, 25V	70-135055	J363		6 Pin Jack	70-159094
C921,403, 405		10uf, 50V	70-135059	J365,366		Jack, Coax	70-159089
C113		0.1uf, 35V	70-138086	P368, (CML01)		3 Pin Plug	70-159092
C114		1uf, 50V	70-135057	P901		11 Pin Plug	70-159103
C117		10uf, 16V (BP)	70-135083	P902		10 Pin Plug	70-159104
C141,413		4.7uf, 50V	70-135058	TP101,701		Test Point	70-151368
C412,415, 905		100uf, 10V	70-135053			<u>MISCELLANEOUS</u>	
C727,728, 901		47uf, 10V	70-135052	Oven 701		Posister	70-086010
C743		220uf, 16V	70-135081			TX-153 PCB	70-070077
		<u>DIODES</u>				Htsnk IC401/402	70-089075
D101,102		1SV134	70-085045			Shield Mixer	70-089077
D103,105, 106,107, 403,404, 406,703, 709,901		1S2075K	70-085001			Shield Mix Cover	70-089078
D104,702		1SV50	70-085044			Shield Synth.	70-089079
D108		ND487C1-3R	70-085057			Shield Synth Covr	70-089080
D402		HZ5C1	70-085058			Shield VCO	70-089081
D405		HZ9A	70-085076			Cover, VCO Main	70-089082
		<u>TRIMMER CAPACITORS</u>				Cover, VCO TX	70-089087
CV102		Trimmer Cap.	70-123026				
CV701		Trimmer Cap.	70-123023				

PARTS LIST

70-340/440

REF. NO.	USE	DESCRIPTION	PART NO.	REF. NO.	USE	DESCRIPTION	PART NO.
<u>TRANSMIT/SYNTHESIZER PCB</u>							
TX - 153							
<u>BOTTOM SIDE COMPONENTS</u>							
<u>CERAMIC CHIP CAPACITORS</u>							
C100,104, 106,109, 119,125, 171,110		.047uf W5R 50V	70-132034	C406,407, 408,913, 933		1000pf W5R 50V	70-131205
C102,118, 121,126, 128,142, 164,167, 711		.022uf W5R 50V	70-132033	C158,176, 179,414, 902,904		.01uf, W5R 50V	70-132032
C103,108, 152,725		47pf CH 50V	70-131196	C160	A	18pf, CH 50V	70-131186
C736	A	47pf CH 50V	70-131196	C160	B	15pf, CH 50V	70-131185
C736	B	36pf CH 50V	70-131193	C162	A	18pf, CH 50V	70-131186
C105,704, 907,914, 915,922		470pf SL 50V	70-131204	C162	B	15 pf, CH 50V	70-131185
C107		15pf CH 50V	70-131185	C161	A	39pf, CH 50V	70-131194
C134	A	15pf CH 50V	70-131185	C161	B	33pf CH 50V	70-131192
C134	B	12pf CH 50V	70-131183	C165,906		2200pf, W5R 50V	70-131206
C182	A	15pf CH 50V	70-131185	C163		68pf, CH 50V	70-131198
C182	B	36pf CH 50V	70-131193	C168,707		220pf CH 50V	70-131199
C124,166, 706,710, 717,726, 729,731, 732,733, 734,738, 739,741		4700pf, W5R 50V	70-131207	C701	A	22pf, CH 50V	70-131188
C137	A	3pf, CH 50V	70-131175	C701	B	18pf CH 50V	70-131186
C137	B	2pf CK 50V	70-131174	C735	A	22pf, CH 50V	70-131188
C709	A	3pf, CH 50V	70-131175	C735	B	18pf, CH 50V	70-131186
C709	B	2pf CK 50V	70-131174	C737	A	22pf, CH 50V	70-131188
C143,181, 740		5pf, CH 50V	70-131177	C737	B	18pf, CH 50V	70-131186
C146	A	5pf, CH 50V	70-131177	C115		22pf, CH 50V	70-131188
C146	B	3pf, CH 50V	70-131175	C703		27pf, CH 50V	70-131190
C144,157, 721		7pf, CH 50V	70-131179	C705		330pf SL 50V	70-131203
C720	A	7pf, CH 50V	70-131179	C722		4pf, CH 50V	70-131176
C720	B	6pf, CH 50V	70-131178	C742		6800pf, W5R 50V	70-131208
C148,723		9pf, CH 50V	70-131181	C908,911, 920		100pf, SL 50V	70-132040
C149,150, 151,154, 155,156, 159,178		1000pf, W5R 50V	70-131205	C923,924, 925,926, 927		150pf, SL 50V	70-131201
				<u>METAL CHIP RESISTORS</u>			
				R101,108, 124,131, 162,166, 407,704, 715,915, 927		1K, 1/8 W	70-144019
				R102,104, 150,709, 734		8.2K, 1/8 W	70-144028
				R103,154, 171		68 ohm, 1/8 W	70-144008
				R106,136, 176,746, 747,909, 910,916, 917,920, 921,922		22K 1/8 W	70-144032

PARTS LIST

70-340/440

REF. NO.	USE	DESCRIPTION	PART NO.	REF. NO.	USE	DESCRIPTION	PART NO.
<u>METAL CHIP RESISTORS CONT.</u>				R738		220 ohm, 1/8 W	70-144013
R923,928,				R152,736		180 ohm, 1/8 W	70-144012
930,931,				R153,155,			
932,933,				701,739,			
934,935,				743,744		100 ohm, 1/8 W	70-144009
938,939,				R918,919,			
942,943,				936,937		47K, 1/8 W	70-144034
944,945		22K, 1/8 W	70-144032	R702		5.6K, 1/8 W	70-144026
R107		15K, 1/8 W	70-144031	R707		150K, 1/8 W	70-144038
R109,116,				R710		1.2K, 1/8 W	70-145007
129		1.5K, 1/8 W	70-144021	R713		3.9K, 1/8 W	70-144024
R110,401,				R716		150 ohm, 1/8 W	70-144011
405,706,				R406		33K ohm, 1/8 W	70-144033
724		470 ohm, 1/8 W	70-144015	R728,902		1M ohm, 1/8 W	70-144042
R112,114,				<u>MISCELLANEOUS</u>			
126,703,						Shield VCO (Tx)	70-089088
924		10K, 1/8 W	70-144029			Insltr Mylr. Flm.	70-089091
R113,133,						Shield Pre Amp	70-089089
151,172,						Insltr Pre Amp	70-089090
735		3.3K, 1/8 W	70-144023	<u>RECEIVER PCB</u>			
R120,173		68K, 1/8 W	70-144035	<u>RX 154</u>			
R123,132,				<u>TOPSIDE COMPONENTS</u>			
134,161,				<u>COILS & TRANSFORMERS</u>			
408,410,							
712		4.7K, 1/8 W	70-144025				
R125,163,							
167,168,							
169,726,							
950		0 ohm	70-144001				
R127,409,							
904,946		6.8K, 1/8 W	70-144027	L201,202,			
R128,714		2.2K, 1/8 W	70-144022	204,205,			
R137,156,				206		Coil, Rx, 35T	70-090116
175,719,				L203		Coil, RX	70-090121
741,745		47 ohm, 1/8 W	70-144006	L208		Trnsfmr. 21.4MHz	70-090109
R138,164,				L209		Trnsfmr Loc. Osc.	70-090110
174,708,				L210		Trnsfmr Loc.Osc.	70-090111
711		680 ohm, 1/8 W	70-144017	L251		Trnsfmr 21.4 MHz	70-090113
R139,142,				L252		Coil Quad.	70-090112
720,722,				L253		Coil, Choke	70-090125
901,907,				L254,255		Coil, Choke	70-090124
912,925,				L256		Coil, DC Filter	70-090126
926,929		100K, 1/8 W	70-144037	<u>JACKS, PLUGS & SOCKETS</u>			
R141,144,							
146,403,							
404,718,				P251		Plug 3 Pin	70-159091
721		33 ohm, 1/8 W	70-144005	J351		Jack, 5 Pin	70-159093
R145		560 ohm, 1/8 W	70-144016	J352		Jack, 6 Pin	70-159094
R147,149		56 ohm, 1/8 W	70-144007	J353		Jack, 7 Pin	70-159095
R148,725		220 ohm, 1/8 W	70-144013	J354		Jack, 12 Pin	70-159097

PARTS LIST

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REF. NO.	USE	DESCRIPTION	PART NO.	REF. NO.	USE	DESCRIPTION	PART NO.
<u>JACKS, PLUGS & SOCKETS CONT.</u>				<u>MYLAR CAPACITORS</u>			
J355,356		Jack, Coax	70-159089	C288		.1uf, 50V	70-137039
J357,358		Jack, 8 Pin	70-159096			<u>RESISTORS</u>	
P358		Plug, 8 Pin	70-034053				
<u>INTEGRATED CIRCUITS</u>				R293		220K metal,1/8 W	70-144039
IC251		MC3357P	70-076005			<u>MISCELLANEOUS</u>	
IC252		MB3712	70-076085				
<u>TRANSISTORS</u>				X251		Xtal,20.945MHz	70-128021
Q201,202		2SK125	70-080089	FL251		Crystal Filter	70-179017
Q203		2SC1906	70-080086	FL252		Fltr.CFU 455E2	70-179019
Q204		2SA673C	70-080079	FL253		Fltr.CFU 455D2	70-179018
Q205,252		2SC458C	70-080082	RV251,252		Trim Pot, 10K	70-144045
Q251		2SC535B	70-080095	K201 (TM)		Relay	70-105009
Q255,256,				C296		1000 pf, 500V	70-132043
257,260,				CL201,202,			
261		2SC458C	70-080097	204,205,			
Q259		2SK117BL	70-080088	206		Coil Case, 15F	70-090115
<u>DIODES</u>						Heatsink IC252	70-089076
D201,202		MC301	70-085077			RX PCB,RX154	70-070079
D204		1SS106	70-085043	<u>RECEIVER PCB</u>			
D251,252,				<u>RX 154</u>			
253,254,				<u>BOTTOMSIDE COMPONENTS</u>			
259,260,				<u>METAL CHIP RESISTORS</u>			
263		1S2075K	70-085001	R201		220 ohm,1/8 W	70-144013
D262		U05C	70-085048	R202,204,			
<u>ELECTROLYTIC CAPACITORS</u>						100 ohm,1/8 W	70-144009
C227,277		10uf, 50V	70-135059	R203,273		470 ohm,1/8 W	70-144015
C273,285		100uf, 10V	70-135053	R205,250,			
C287		470uf, 16V	70-135062	256,258,			
C289,292		220uf, 25V	70-135063	292		47K, 1/8 W	70-144034
C295		100uf, 25V	70-135056	R206		580 ohm, 1/8 W	70-144017
C299		470uf, 25V	70-135082	R207,257,			
<u>TANTALUM CAPACITORS</u>						22K, 1/8 W	70-144032
C256,257		.1uf, 35V	70-138086	274,287,			
C268		1uf, 35V	70-138087	291,294		2.7K, 1/8 W	70-144046
C266,278,				R208,260			
279		2.2uf, 16V	70-138103	R211,263,			
C280,282		.22uf, 35V	70-138102	279,298,			
C286		47uf, 25V	70-135055	299		10K, 1/8 W	70-144029
				R213,240,			
				241,243,			
				245		0 ohm	70-144001

PARTS LIST

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REF. NO.	USE	DESCRIPTION	PART NO.	REF. NO.	USE	DESCRIPTION	PART NO.
<u>METAL CHIP RESISTORS CONT.</u>				C223	A	15pf CH, 50V	70-131185
R251,259		220K, 1/8 W	70-144039	C223	B	10pf CH, 50V	70-131182
R252,261, 275		3.3K 1/8 W	70-144023	C252,260, 265,269, 272,274, 276,281, 290,291		.01uf W5R, 50V	70-132032
R253,262, 290		82K, 1/8 W	70-144036	C254,255		33pf CH, 50V	70-131192
R254,255		1.5K, 1/8 W	70-144021	C258		10pf CH, 50V	70-131182
R269		1K, 1/8 W	70-144019	C259,261		0.022uf, 50V	70-132033
R209,270, 271,272, 281,285, 286,297		4.7K, 1/8 W	70-144025	C263		0.047uf, 50V	70-132034
R277,288		1M ohm, 1/8 W	70-144042	C283		4700pf, 50V	70-131207
R282,295, 296		6.8K, 1/8 W	70-144027	<u>MISCELLANEOUS</u>			
R280,276		15K, 1/8 W	70-144031			Shield RX	70-089085
R289,278		470K, 1/8 W	70-144041			Insulator RX	70-089086
<u>CHIP CAPACITORS</u>				<u>TRANSMIT POWER AMPLIFIER</u>			
C201,206		3pf CH, 50V	70-131175	PA - 1544			
C202	A	6pf CH, 50V	70-131178	<u>TOP SIDE COMPONENTS</u>			
C202	B	4pf CH, 50V	70-131176	<u>RESISTORS</u>			
C205	A	6pf CH, 50V	70-131178	R505,506		68 ohm 1/4 W	70-145008
C205,	B	4pf CH, 50V	70-131176	R509		3.3 ohm 1W	70-144048
C216		6pf CH, 50V	70-131178	R512		220 ohm 1/4 W	70-145009
C203,213, 222		.5pf CK, 50V	70-131172	<u>VARIABLE CAPACITORS</u>			
C207,209, 217,218, 219,221, 225,226, 228,230, 245,251, 253,267, 275,293, 294		1000pf W5R,50V	70-131205	CV501,502, 503		Var.Cap. 40 pf.	70-123024
C208	A	27pf CH, 50V	70-131190	<u>VARIABLE RESISTORS</u>			
C208	B	22pf CH, 50V	70-131188	RV502		Var.Res., 1K	70-144044
C210	A	9pf CH, 50V	70-131181	<u>TRANSISTORS</u>			
C210	B	6pf CH, 50V	70-131178	Q501		2SC2538	70-080108
C211,224		1pf CK, 50V	70-131173	Q502		2SC2539	70-080090
C212	A	8pf CH, 50V	70-131180	Q503		2SC2630	70-080091
C212	B	6pf CH, 50V	70-131178	Q504		2SB834Y	70-080081
C214	A	2pf CK, 50V	70-131174	Q505,506		2SC458C	70-080082
C214	B	1pf CK, 50V	70-131173	<u>DIODES</u>			
C215	A	5pf CH, 50V	70-131177	D501		UM9401	70-085056
C215	B	3pf CH, 50V	70-131178	D503		MI407	70-085047
C220	A	15pf CH, 50V	70-131185	D504		1SS106	70-085043
C220	B	9pf CH, 50V	70-131181	D505		1S2075K	70-085001

PARTS LIST

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REF. NO.	USE	DESCRIPTION	PART NO.	REF. NO.	USE	DESCRIPTION	PART NO.
<u>COILS</u>				<u>CERAMIC CHIP CAPACITORS</u>			
L501,504		Coil, RF Cplg.	70-090098	C501,505,			
L502	A	Coil, RF Cplg.	70-090098	513		22pf CH 50V	70-131188
L502	B	Coil, RF Cplg.	70-090099	C520	A	22pf CH 50V	70-131188
L507	B	Ferrite Bead	70-090122	C520	B	47pf CH 50V	70-131196
L508		Coil, RF Choke	70-090097	C502,522		12pf CH 50V	70-131183
L509	A	Coil, RF Cplg.	70-090104	C503,504,			
L509	B	Coil, RF Cplg.	70-090123	509,518,			
L510		Coil, RF Choke	70-090127	523,524,			
L511		Coil, Receive RF	70-090099	532,533,			
L512,513,				534,535		1000pf W5R 50V	70-131205
514,515		Coil, RF Cplg.	70-090102	C506	A	68pf CH 50V	70-131198
L516		Coil, RF Choke	70-090100	C506	B	47pf CH 50V	70-131196
<u>CERAMIC DISC CAPACITOR</u>				C508	A	47pf CH 50V	70-131196
C514		.01uf, 50V	70-132041	C508	B	27pf CH 50V	70-131190
<u>ELECTROLYTIC CAPACITORS</u>				C530	A	47pf CH 50V	70-131196
C507,515		10uf, 50V	70-135059	C530	B	27pf CH 50V	70-131190
<u>JACKS</u>				C510		33pf CH 50V	70-131192
J371,372		Connector,Jack V	70-159089	C511	A	33pf CH 50V	70-131192
J392		Antenna Jack	70-159090	C511	B	15pf CH 50V	70-131185
<u>MISCELLANEOUS</u>				C512	A	100pf CH 50V	70-132051
		PA PCB PA1544	70-070078	C512	B	220pf CH 50V	70-131199
<u>BOTTOM SIDE COMPONENTS</u>				C537		220pf CH 50V	70-131199
<u>METAL CHIP RESISTORS</u>				<u>MICA CHIP CAPACITORS</u>			
R501		0 ohm	70-144001	C516	A	39pf 500V	70-138099
R510	A	0 ohm	70-144001	C527	A	39pf 500V	70-138099
R510	B	10 ohm 1/8 W	70-144068	C527	B	33pf Mica 500V	70-138098
R503,517		3.3K 1/8 W	70-144023	C517		27pf 500V	70-138097
R504		150 ohm 1/8 W	70-144011	C519		220pf 100V	70-138112
R507	A	4.7 ohm 1/8 W	70-144002	C521		15pf 500V	70-138095
R507	B	12 ohm 1/8 W	70-144003	C529	A	15pf 500V	70-138095
R508,513,				C529	B	12pf Mica 500V	70-138094
519,520		100 ohm 1/8 W	70-144009	C525	A	18pf 500V	70-138096
R514		47K 1/8 W	70-144034	C525	B	15pf Mica 500V	70-138095
R518		470 ohm 1/8 W	70-144006	C526		33pf 500V	70-138098
R521		680 ohm 1/8 W	70-144017	C528	A	33pf 500V	70-138098
				C528	B	27pf Mica 500V	70-138097
				C536	A	33pf 500V	70-138098
				C536	B	33pf Mica 500V	70-138098
				C538	A	10pf 500V	70-138100

PARTS LIST

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REF. NO.	USE	DESCRIPTION	PART NO.	REF. NO.	USE	DESCRIPTION	PART NO.
<u>EPROM PCB</u>				<u>TRANSISTORS</u>			
Z 273				Q301	UD	2SC458C	70-080082
<u>CAPACITORS</u>				Q302	UD	2SB649C	70-080080
C951		0.01 uf 50V	70-132032	<u>DIODES</u>			
C952 - 957		47 pf 50V	70-131200	D301	UD	GL-6N202	70-085051
<u>INTEGRATED CIRCUITS</u>				D302,303, 304	UD	SLP436B	70-085052
IC 951		uPD 2716D	70-076089	D305	UD	SLP530D	70-085053
IC 952		HD 14174BP	70-076081	CDS301	UD	CDS CELL	70-085054
<u>CONNECTORS</u>				<u>PC BOARD</u>			
J901		Jack, 11 Pin	70-159101	CX 03A	UD	PCB	70-070081
J902		Jack, 10 Pin	70-159102	<u>CABLE ASSEMBLY</u>			
J903		Jack, 8 Pin	70-159099	J1	UD	Jack 13 Pin	70-034063
<u>PC BOARD</u>				CA356	UD	Cable J384,J385	70-034058
Z273		PCB	70-070070	CA357	UD	Cable W/J381	70-034057
<u>DISPLAY PCB</u>				CA359	UD	Cable W/J383	70-034051
CX - 03				CA360	UD	Cable W/J386	70-034050
<u>SWITCHES</u>				<u>MISCELLANEOUS</u>			
S301	UD	Scan	70-180012	LED Holder			
S302	UD	PRI	70-180012	<u>CONTROL PCB</u>			
S303	UD	MON	70-180012	CX - 04			
<u>RESISTORS:</u>				<u>SWITCHES</u>			
R332	UD	270 ohm 1/8W	70-144047	S 304	UD	SW, Rotary	70-180013
R311-324	UD	470 ohm 1/8W	70-145004	<u>CONTROLS</u>			
R310,325, 328-330	UD	560 ohm 1/8W	70-145003	RV 301	UD	Squelch	70-164031
R331	UD	1.2K ohm 1/8W	70-145007	RV302	UD	Volume	70-164026
R326	UD	3.3K ohm 1/8W	70-145005	<u>RESISTORS</u>			
R327	UD	12K ohm 1/8W	70-145006	R333	UD	1W 4.7 ohm	70-144043
R303-308	UD	22K ohm 1/8W	70-145002	<u>CAPACITORS</u>			
R301,302, 309	UD	220K ohm 1/8W	70-145001	C301,302	UD	10uf 50V	70-135059
<u>INTEGRATED CIRCUITS</u>							
IC301,302	UD	HD 14511BP	70-076082				

PARTS LIST

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REF. NO.	USE	DESCRIPTION	PART NO.	REF. NO.	USE	DESCRIPTION	PART NO.
<u>CONTROL PCB</u>				<u>DISPLAY DRIVER PCB</u>			
CX - 04 CONTINUED				CX - 06			
		<u>INTEGRATED CIRCUITS</u>				<u>RESISTORS</u>	
IC303	UD	uPC 78084	70-076088	R312,313, 314,315	TM	470 ohm 1/8 W	70-145004
		<u>CONNECTORS</u>		R307,308	TM	22K ohm 1/8 W	70-145002
J382	UD	Jack, 7 Pin	70-159095	R301,302, 309	TM	220K ohm 1/8 W	70-145001
		<u>PCB</u>				<u>INTEGRATED CIRCUITS</u>	
CX - 04A	UD	PCB	70-070082	IC 301,302	TM	HD14511BP	70-076082
<u>CONTROL/INTERFACE PCB</u>						<u>PC BOARD</u>	
CX - 05				CX-06A	TM	PCB	70-070085
		<u>SWITCHES</u>		<u>DISPLAY PCB</u>			
S304	TM	SW, Rotary	70-180014	CX - 07			
		<u>CONTROLS</u>				<u>SWITCHES</u>	
RV 301	TM	Squelch Control	70-164030	S301,302, 303	TM	Scan,Pri,Mon	70-180012
RV 302	TM	Volume Control	70-164027			<u>RESISTORS</u>	
		<u>RESISTORS</u>		R311,316- 324	TM	470 ohm 1/8 W	70-145004
R332	TM	270 ohm 1/8 W	70-144047	R310,325, 328-330	TM	560 ohm 1/8 W	70-145003
R303-306	TM	22K ohm 1/8 W	70-145002	R331	TM	1.2K ohm 1/8 W	70-145007
		<u>CAPACITORS</u>		R326	TM	3.3K ohm 1/8 W	70-145005
C301,302	TM	10uf 50V	70-135059	R327	TM	12K ohm 1/8 W	70-145006
		<u>INTEGRATED CIRCUITS</u>				<u>TRANSISTORS</u>	
IC303	TM	uPC7808H	70-076088	Q301	TM	2SC458C	70-080082
		<u>CONNECTORS</u>		Q302	TM	2SB649C	70-080080
J396	TM	Jack 34 Pin	70-159107			<u>DIODES</u>	
		<u>PCB</u>		D301	TM	GL-6N202	70-085051
CX - 5A	TM	PCB	70-070084	D302,303, 304	TM	SLP436B	70-085052
				D305	TM	SLP530D	70-085053

PARTS LIST

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REF. NO.	USE	DESCRIPTION	PART NO.
<u>DISPLAY PCB</u>			
CX - 07 CONTINUED			
		<u>CONNECTORS</u>	
J301	TM	Jack, 16 Pin	70-159105
		<u>PC BOARD</u>	
CX-07A	TM	PCB	70-070086
		<u>MISCELLANEOUS</u>	
		LED Holder	70-159113
<u>CONTROL CABLE INTERFACE PCB</u>			
CX - 08			
		<u>RESISTORS</u>	
R351	TM	4.7 ohm 1/2 W	70-145052
		<u>CAPACITORS</u>	
C351	TM	220uf 25V	70-131224
		<u>TRANSFORMER</u>	
T301	TM	8392159	70-090144
		<u>CONNECTORS</u>	
J325	TM	Jack, 34 Pin	70-159106
		<u>PC BOARD</u>	
CX-08A	TM	PCB	70-070076
		<u>CABLE ASSEMBLY</u>	
CA357	TM	Cable W/J323	70-034069

PARTS ORDERING INFORMATION

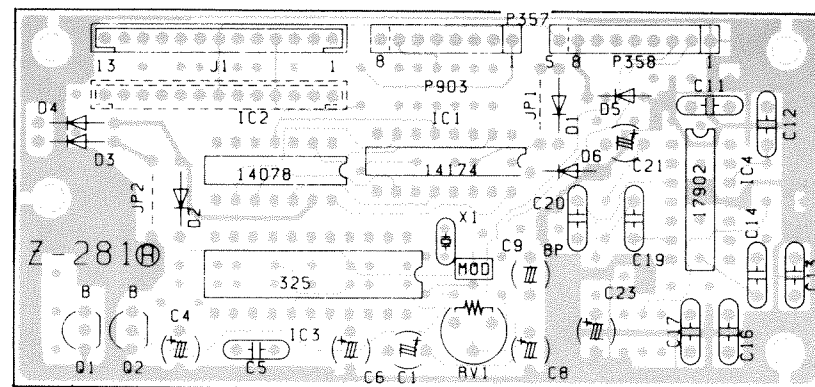
HOW TO ORDER REPLACEMENT PARTS

NOTE: To eliminate error and speed delivery of replacement parts, always include the following information on your order:

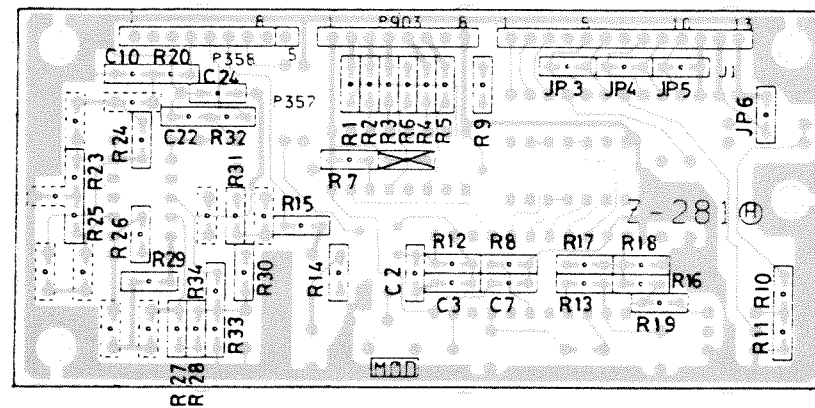
1. Complete identification of model which requires the part.
 - A. Model Number
 - B. Serial Number

2. Best possible identification of the part itself.
 - A. Part Number
 - B. Schematic Reference Number
 - C. Part Description
 - D. Quantity Requested
 - E. If necessary, return old part as sample

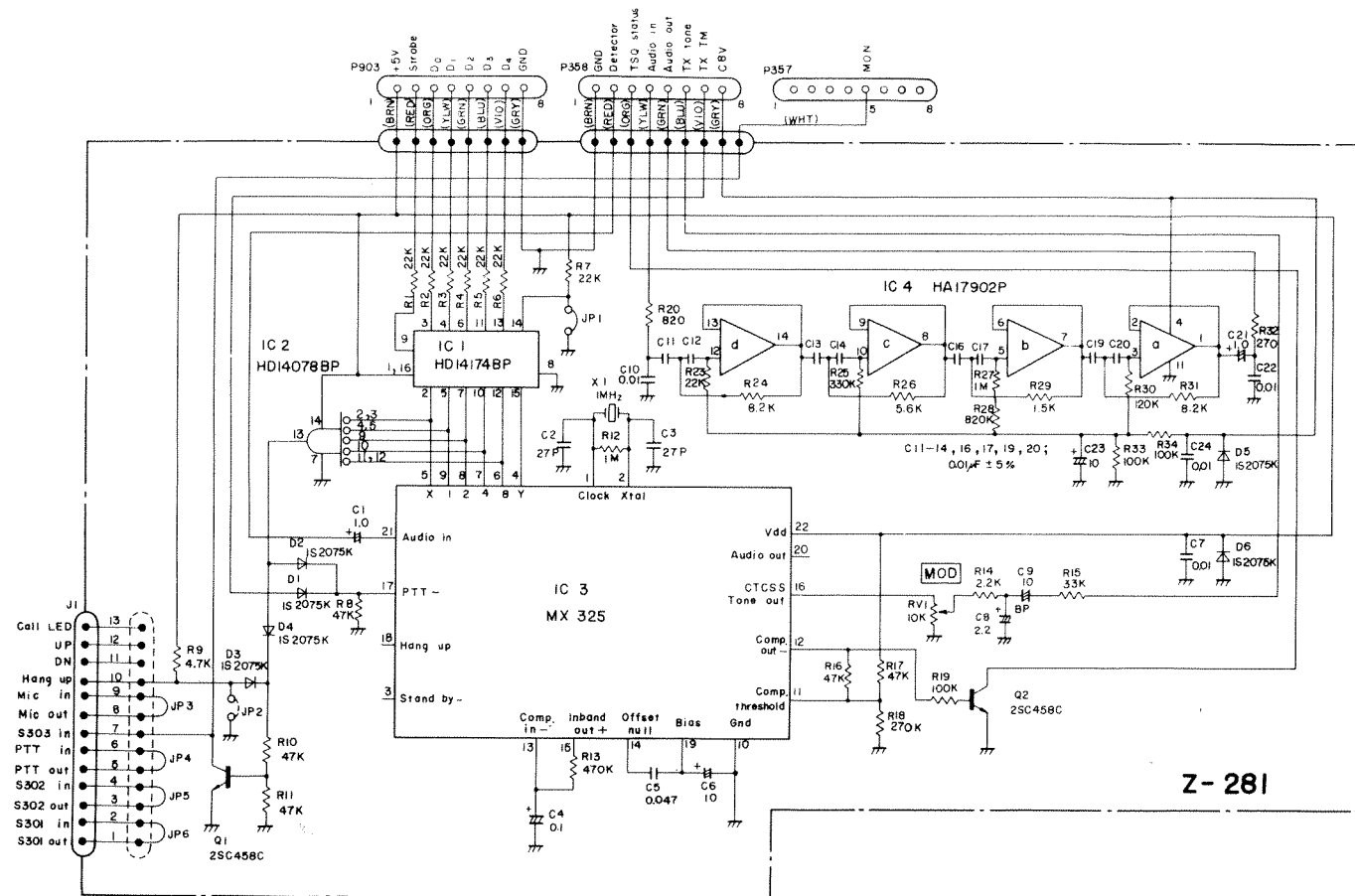
CTCSS PCB (TOP VIEW)



CTCSS PCB (BOTTOM VIEW)



CTCSS SCHEMATIC DIAGRAM



SYNTECH - CTCSS

REF. NO.	DESCRIPTION	PART NO.
MISCELLANEOUS		
J1	Jack, 13 Pin	70-159098
P357, 358	Cable, Assy. W/Plug	70-034065
P903	Cable, Assy. W/Plug	70-034066
	PC Board	70-075026
X1	Crystal, 1 MHz	70-128024
RV1	Trim Potentiometer	70-144045
	Stud, Mt.	70-156072
	Screw, Mt.	70-151355
TRANSISTORS		
Q1, 2	2SC458C	70-080082
INTEGRATED CIRCUITS		
IC1	HD1417BP	70-076081
IC2	HC1407BP	70-076142
IC3	MX325	70-076092
IC4	HA17902P	70-076143
DIODES		
D1,2,3,4,5,6	IS2075 (K)	70-085001
TANTALUM CAPACITORS		
C1,21	1uF, 35V	70-138087
C4	.1uF, 35V	70-138086
C8	2.2uF, 35V	70-138103
ALUMINUM ELECTROLYTIC CAPACITORS		
C6,23	10uF, 50V	70-135059
C9	10uF, 16V	70-135083
CERAMIC CAPACITORS		
C2,3	27Pf, 50V	70-131190
C7,10,22,24	10,000Pf, 50V	70-132032
MYLAR CAPACITORS		
C2,3	27Pf, 50V	70-131190
C5	47000 PF, 50V	70-137038
C11,12,13,14,16,17,19,20	10000PF, 50V	70-137048
DESCRIPTION		
METAL FILM CHIP RESISTORS		
JP3,4,5,6	Zero Ohm	70-144001
R1,2,3,4,5,6,7,23	22K, 1/8 W	70-144032
R8,10,11,16,17	47K, 1/8 W	70-144034
R9	4.7K, 1/8 W	70-144025
R12,27	1M, 1/8 W	70-144042
R13	470K, 1/8 W	70-144041
R14	2.2K, 1/8 W	70-144067
R15	33K, 1/8 W	70-144033
R19	100K, 1/8 W	70-144037
R20	820 Ohm, 1/8 W	70-144018
R24,31	8.2K, 1/8 W	70-144028
R25	330K, 1/8 W	70-144040
R26	5.6K, 1/8 W	70-144026
R28	820K, 1/8 W	70-144069
R29	1.2K, 1/8 W	70-144020
R30	120K, 1/8 W	70-144070
R32	270 Ohm, 1/8 W	70-144014
R33,34	100K, 1/8 W	70-144037
R18	270K, 1/8 W	70-144071

SYNTECH 70-2102 CTCSS KIT INSTALLATION INSTRUCTIONS

UNDER-DASH AND TRUNK-MOUNT MODELS

1. Remove the 4 screws securing the radio top and bottom covers and remove the covers.
2. Turn the radio upside-down on the bench. Screw the threaded standoff supplied with the CTCSS board into the right hand hole located in the option area in front of the receiver board.
3. If the 70-2195 microphone hangup box is not to be installed, a jumper must be installed in the JP2 location on the CTCSS board for proper monitor operation. If the 70-2195 is to be installed, JP2 should not be used.
4. As supplied, the CTCSS board can be programmed to encode and decode on any of the standard EIA Group A and B tones from 71.9 to 241.8 Hz. If Group C tones are desired, remove JP1 from the CTCSS board. In this condition, however, Group A and B tones cannot be selected. Refer to the 70-1000 E/Prom Programmer Operator's Manual for a complete tone selection listing.
5. Remove the jumper plug from J358 (right side of receiver board) and connect the 8 pin connector and cable running from P358 on the CTCSS board.
6. Connect the 8 pin plug with the single wire, P357, to J357 on the receiver board.
7. Remove the clear sleeve and jumper plug from the floating option connector P1. Connect P1 to J1 on the CTCSS Board.
8. Feed the remaining 8 pin connector and cable connected to P903 (CTCSS Board) to the top of the radio through the opening just behind the front panel assembly. Remove the E/Prom module and connect P903 to the J903 jack on the E/Prom module. Reinstall the E/Prom module.
9. Carefully position the CTCSS board over the option area, connector side down and install the 3 screws supplied (left side and center) to secure the board in place.
10. CTCSS modulation adjustment is made by RV1, marked "MOD" on the CTCSS board. Refer to the radio service manual for complete alignment instructions.

70-2102 KIT COMPONENTS

<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>PART NUMBER</u>
CTCSS PCB Assembly	1	70-075026
Threaded Standoff	1	70-156072
3 x 6 mm Panhead screw	3	70-151355

SYNTECH 70-2141 SCAN KIT INSTALLATION INSTRUCTIONS

UNDER DASH MODELS ONLY

NOTE

When programming the E/PROM for scan operation, it is recommended that channels be programmed in both scan groups (primary and secondary). If one scan group is left unprogrammed, engaging the corresponding scan button on the radio may result in a lockup condition preventing manual channel change. This condition is removed when unit power is cycled off and on, but can be eliminated by programming at least one channel in each group.

1. Remove the 4 screws securing the radio top and bottom covers and remove the covers.
2. Remove the 4 screws securing the front panel assembly to the radio. Carefully slide the front panel assembly forward and away from the radio.
3. Remove the 2 screws securing the display/switch PCB (CX-03) and carefully separate the PCB from the front panel.
4. Note the mounting locations for the switches S301 and S302 and LEDs D302 and D303. Using a solder-sipper or solderwick, carefully remove solder from the switch and diode mounting holes.
5. Install S301 and S302 in the same manner as the monitor switch S303 already installed. Make sure the switches fit completely against the PCB before soldering.
6. Install the yellow LEDs D302 and D303 with the flat side toward the TX/Busy LED (LED's will not seat completely unless oriented correctly).
7. Push the blue switch covers on S301 and S302.
8. Remove the face plate by pushing from the rear of the front panel through the two available holes.
9. Remove the protective backing from the new face plate and carefully press it in place.
10. Carefully re-install the CX-03 PCB in place on the front panel, checking for proper switch operation.
11. Reinstall the front panel assembly on the radio.
12. Remove the clear sleeving and the jumper plug from P1, the floating option connector. Install the jumper plug from the kit and re-install the sleeving. If the CTCSS option board is installed, this jumper plug is not used.
13. Install an E/PROM module programmed for scan operation and confirm correct operation. Reinstall the unit covers.

70-2141 KIT COMPONENTS

<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>PART NUMBER</u>
Yellow LED	2	70-085052
Pushbutton Switch	2	70-180012
Switch Cover	2	70-110013
Scan Faceplate	1	70-020066
Jumper Plug	1	70-159109

SYNTECH 70-2142 SCAN KIT INSTALLATION INSTRUCTIONS

TRUNK MOUNT MODELS ONLY

NOTE

When programming the E/PROM for scan operation, it is recommended that channels be programmed in both scan groups (primary and secondary). If one scan group is left unprogrammed, engaging the corresponding scan button on the radio may result in a lockup condition preventing manual channel change. This condition is removed when unit power is cycled off and on, but can be eliminated by programming at least one channel in each group.

1. Remove the 2 thumb screws securing the mounting bracket to the control head. Remove the 2 screws securing the rear cover and remove the cover.
2. Remove the 2 screws securing the front panel assembly. Carefully remove the front panel assembly.
3. Remove the 3 control knobs.
4. Note the mounting locations for the switches S301 and S302 and LEDs D302 and D303. Using a solder-sipper or solderwick, carefully remove solder from the switch and diode mounting holes.
5. Install S301 and S302 in the same manner as the monitor switch S303 already installed. Make sure the switches fit completely against the PCB before soldering.
6. Install the yellow LEDs D302 and D303 with the flat side toward the TX/Busy LED (LEDs will not seat completely unless oriented correctly).
7. Push the blue switch covers on S301 and S302.
8. Remove the face plate by pushing from the rear of the front panel through the two available holes.
9. Remove the protective backing from the new face plate and carefully press it in place.
10. Carefully re-install the control knobs, checking for proper orientation.
11. Reinstall the front panel assembly, rear cover and mounting bracket.
12. Remove the radio bottom cover for access to the option area. Remove the clear sleeving and the jumper plug from P1, the floating option connector. Install the jumper plug from the kit and re-install the sleeving. If the CTCSS option board is installed, this jumper plug is not used.
13. Install an E/Prom module programmed for scan operation and confirm correct operation. Reinstall the unit covers.

70-2142 KIT COMPONENTS

<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>PART NUMBER</u>
Yellow LED	2	70-085052
Pushbutton Switch	2	70-180012
Switch Cover	2	70-110013
Scan Faceplate	1	70-020067
Jumper plug	1	70-159109

SYNTECH 70-2134 12.5 KHz Channel Spacing Kit
70-340A, 70-340B, 70-440A, 70-440B

Remove the 8 screws securing the Transmit/Synthesizer board. Disconnect P361-366 and remove the board. Referring to the accompanying diagram for locations, change the top and bottom side components as follows:

1. Top Side Components (Pull off the oscillator and TX PLL covers)

Remove IC106 74LS93 IC
Remove X701 Crystal and Oven 701
Remove JP104 Jumper

Install IC106 74LS92 IC
Install X701 12.8MHz Crystal and Oven 701
Install JP103 Jumper

2. Bottom Side Components

Remove C703 27pf Chip Capacitor (Grid C6)
Remove C704 470pf Chip Capacitor (Grid C5)
Remove C705 330pf Chip Capacitor (Grid C5)
Remove C115 22pf Chip Capacitor (Grid E2)
Remove R113 3.3K ohm Chip Resistor (Grid E1)
Remove R114 10K ohm Chip Resistor (Grid E1)
Remove R127 6.8K ohm Chip Resistor (Grid D1)
Remove R167 0 ohm Chip Resistor (Grid D2)

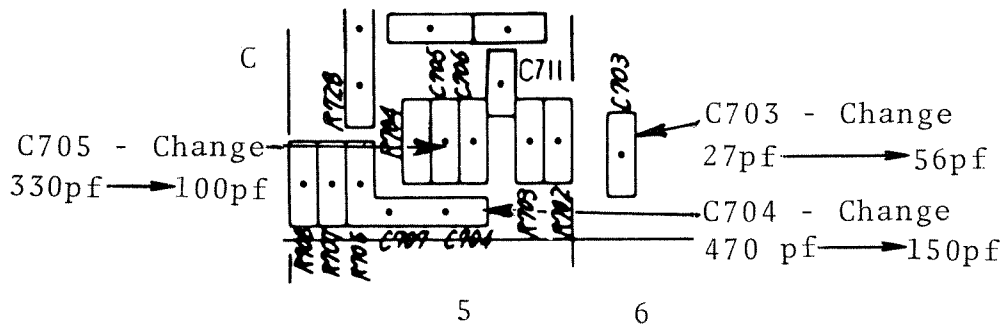
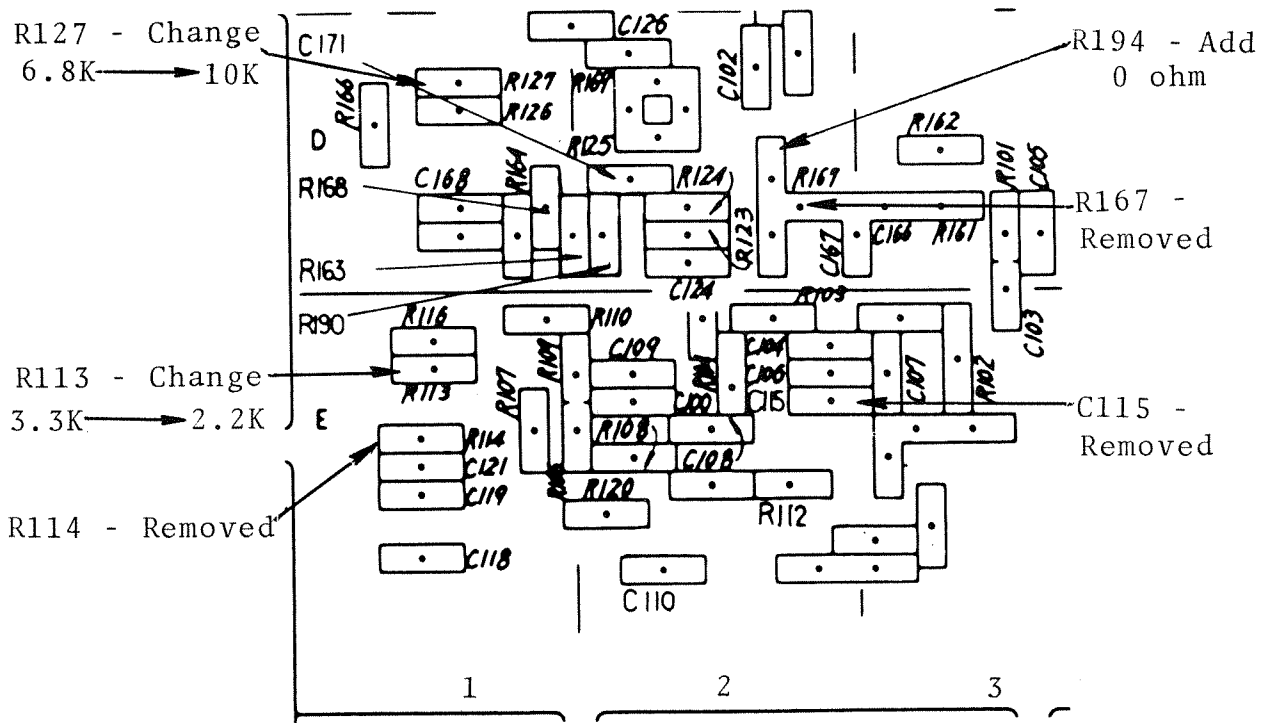
Install C703 56pf Capacitor (Grid C6)
Install C704 150pf Chip Capacitor (Grid C5)
Install C705 100pf Chip Capacitor (Grid C5)
Install R113 2.2K ohm Chip Resistor (Grid E1)
Install R127 10K ohm Chip Resistor (Grid D1)
Install R194 0 ohm Chip Resistor (Grid D2)

3. Reinstall the printed circuit board.

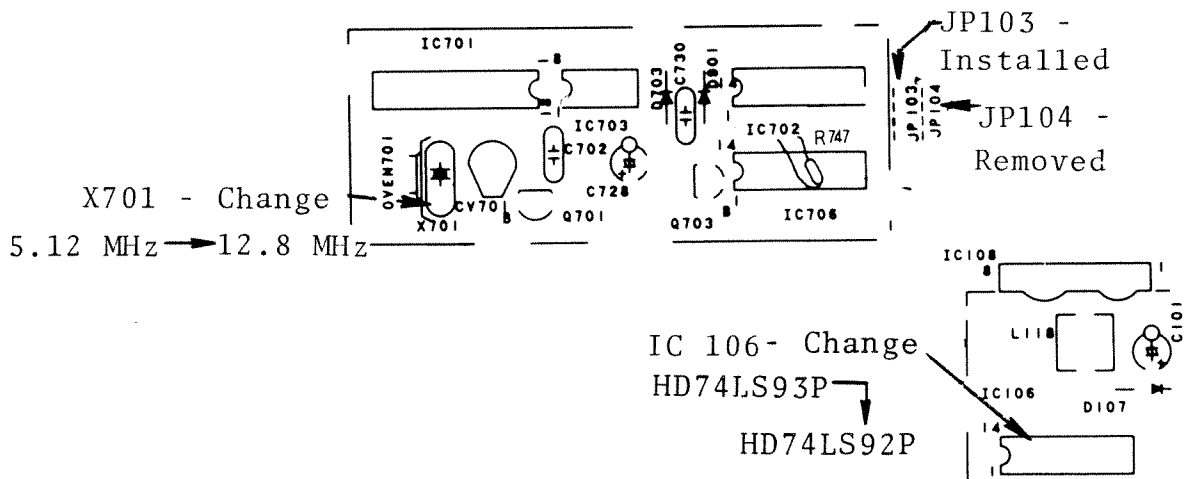
4. Erase and reprogram the E/Prom, using Band 15B (Key Code A) if the radio is of standard configuration (low side injection) or Band 15C (Key Code C) if the High Side Injection Kit 70-2171 has been installed. It is recommended that a label be attached inside the unit top cover to indicate any kits installed.

5. Follow the standard transmitter and receiver alignment instructions in the unit service manual.

TX-153 Bottom



TX-153 Top



SYNTECH 70-2124 2.0 PPM OSCILLATOR KIT INSTALLATION INSTRUCTIONS

70-2125 2.5 PPM OSCILLATOR KIT INSTALLATION INSTRUCTIONS

70-050A/B/C, 70-055A/B/C, 70-066A/B, 70-076A/B, 70-340A/B, 70-440A/B

1. Remove the 8 screws securing the Transmit/Synthesizer board (TX153).
Disconnect P361-366. Remove the Oscillator Shield cover.
2. Remove the crystal X701 and Oven 701.
3. Install the new X701 and Oven 701.
4. Reinstall the circuit board in the unit.
5. Adjust CV701 for the correct oscillator frequency, following the service manual alignment instructions.