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SERVICE INSTRUCTIONS
for
MODEL 670-PR
23 Channel CB Radio

TABLE OF CONTENTS

SECTION I: GENERAL INFORMATION	Page
General Description	1
Specifications.....	1
Mobile Installation.....	2
SECTION II: OPERATING INFORMATION	
Power/Volume Switch	5
Squelch Control	5
Channel Selector	5
Antenna Connector	5
TVI Trap	5
VFO Connector	5
CB Transmitter Operation	5
Antenna Cable Connection	6
SECTION III: CIRCUIT DESCRIPTION, MODEL 670	
Scope	7
Transmission	7
Reception	8
Audio Amplifier	9
SECTION IV: ALIGNMENT PROCEDURES	
Transmitter Alignment Test Set-Up	11
23 mHz Oscillator Circuit Alignment	11
15 mHz Oscillator Circuit Check	11
Mixer, 38 mHz Alignment	12
Mixer, 27 mHz Alignment	12
Final Stage Alignment	12
Frequency Check	12
Receiver Alignment Test Set-UP	12
Receiver Sensitivity Adjustment	13
Squelch Adjustment	13
Schematic Diagram	Foldout
Component Layout	15
SECTION V: PARTS LIST	

SECTION I
GENERAL INFORMATION

**GENERAL
DESCRIPTION**

The Hy-Range Model 670 is a full 23-channel transceiver designed and licensed for Class "D" operation as designated by the F.C.C.

The Hy-Range 670 is completely solid state, and provides you with a compact unit of high reliability and low power consumption. This transceiver utilizes a highly advanced, unique system of frequency synthesization enabling immediate operation on all 23 channels without the need of additional crystals or adjustments. Additional features include a built in factory tuned TVI trap and jack for external VFO "Slider" (optional) Model 675.

The Hy-Range 670 transceiver is designed to operate from 11.5 to 14.5 volts D.C. To obtain the best results from your transceiver, it is suggested that you read all the instructions contained in your manual.

NOTE

It is illegal to transmit with this transceiver until you obtain your citizens band Class "D" license. You are also required to read and understand Part 95 of the F.C.C. rules and regulations before operation of this unit. License Form 505 and Part 95 regulations may be available from your dealer; if not, you may obtain copies from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

It is also prohibited by the F.C.C. to adjust the transmitter circuit of this unit unless you hold a current First or Second Class Radiotelephone License.

SPECIFICATIONS

CB Receiver Section

Circuit Type	Dual conversion superheterodyne with RF stage and 455 kHz ceramic filter
Frequency	23 crystal-controlled channels in the 27 MHz Citizens Band
Sensitivity	0.7 uV for 10 db S + N/N ratio
IF Frequency	1st IF: 11.275 MHz 2nd IF: 455 kHz
Audio Output	2 watts maximum
Receiving Current Drain	About 100 mA on Standby (no signal)

CB Transmitter Section

Frequency	23 crystal-controlled channels in 27 MHz Citizens Band.
Power Input	5 watts
Emission	8A3
Spurious Response Rejection	All harmonic & spurious suppression better than F.C.C. and D.O.T. requirements

Modulation	AM, 90% typical
Range Boost	Yields high average modulation at average voice levels.
Transmitting Current Drain	Less than 1 amp
Antenna	Nominal 50 ohms impedance
Power Source	12 VDC, or with optional 117 VAC Solid State Power Supply

MOBILE INSTALLATION

Location - Before installing the transceiver, choose a location which is protected from moisture and excessive heat, and is convenient to the operator. (See "Transceiver Mounting" and Figure 2 for further details.)

Mounting Bracket - The mounting bracket may be used for base type or gimble type overhead mounting. Secure the bracket by using at least four screws or nuts, washers, bolts combinations or selftapping screws.

Power Connection -

CAUTION

As supplied, the Model 670 is wired to operate from a battery source of 11.5 to 14.5 VDC, on negative ground systems..Connecting the unit to a positive ground vehicle or boat without making the necessary internal wiring change will severely damage the transceiver. Before making any power connections you must determine whether the vehicle or boat has a negative or positive ground electrical system and follow the appropriate instructions below.

For Negative Ground Vehicles or Boats - Connect the fused power lead (Red) of the power cord to the positive terminal of the battery and the negative lead (Black) to the vehicle chassis.

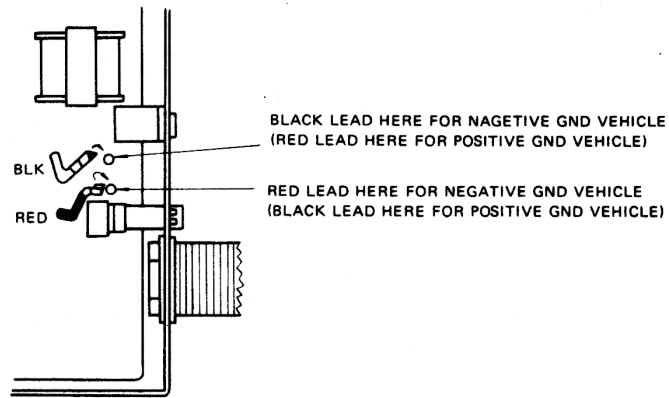
For Positive Ground Vehicles or Boats - Before using the Model 670 for operation in vehicles or boats with a positive ground electrical system, the following internal wiring change must be made.

1. Remove the top cover, removing four screws (two at each side of the unit).
2. Refer to Figure 1 which shows the location of the two leads (red and black) which must be interchanged for positive ground operation. Each lead is attached to its terminal by a push-on type lug.

To remove, simply pull steadily on the lug. Interchange the two leads as indicated in the diagram and push each lug down over its assigned terminal.

3. Replace the top cover.

Connect the DC power cord as follows: Connect the fused (red) lead to the vehicle or boats positive battery terminal and black lead to the chassis or negative battery terminal.

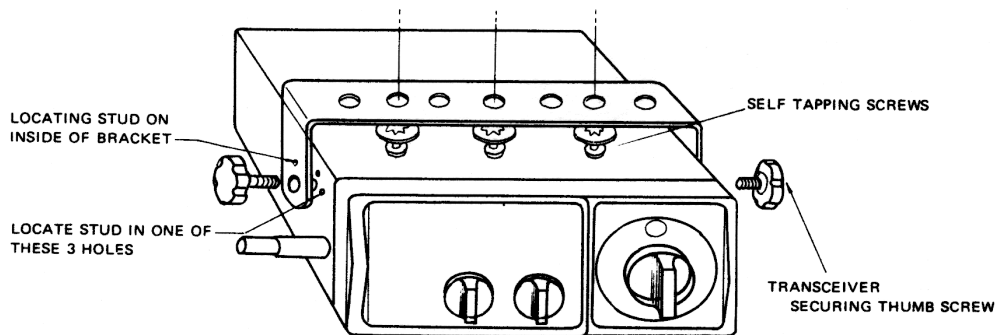


Internal Wiring Change for Positive Ground System

Figure 1

Transceiver Mounting - Before installing the transceiver in a car, truck, boat, etc., be sure to choose a location which is convenient to the operating controls, and will not interfere with the normal functions of the driver. The transceiver may be mounted to the underside of the instrument panel or dashboard of a car, truck, boat, etc., by means of the special bracket supplied with your transceiver.

Attach the bracket to the underside of the instrument panel using four or more screws (see Figure 2). Secure the transceiver to the bracket by means of the large thumbscrews and lockwashers.



Transceiver Mounting

Figure 2

SECTION II OPERATING INFORMATION

POWER/VOLUME SWITCH

To turn the power on, rotate the knob clockwise. Further rotation will increase the sound output from the speaker. To turn the power off, rotate the knob counter-clockwise until the click which indicates that the power is cut off from the power supply is heard.

SQUELCH CONTROL

This control is used to eliminate annoying background noise at no signal. To adjust the squelch control properly first, turn the knob counter-clockwise until background noise is heard. Then, rotate the knob slowly clock-wise until the background noise just disappears. At this point, the receiver will be relatively quiet under no signal conditions, but an incoming signal will overcome the squelch action and be heard. Since this control is variable, it can be used to provide varying degrees of sensitivity to incoming signals. As the control is advanced from the extreme counter-clockwise position the squelch action is progressively increased and stronger signals are needed to overcome it. To receive extremely weak signals or to disable the squelch circuit, simply turn the control fully counter-clockwise.

CHANNEL SELECTOR

Continuously rotating switch selects any one of 23 channels for transmit and receive operation.

ANTENNA CONNECTOR

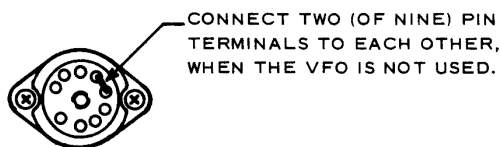
This antenna connector will be used for CB antenna connection, see Antenna Connection in this manual.

TVI TRAP

Adjustable coil for minimizing TV interference. Preset at factory and does not usually require readjustment.

VFO CONNECTOR

This is provided for future connection of an external VFO (optional). When the VFO is not used the two pin terminals must be connected to each other as illustrated. If they are not connected, your transceiver will not operate.



CONNECT TWO (OF NINE) PIN
TERMINALS TO EACH OTHER,
WHEN THE VFO IS NOT USED.

CB TRANSMITTER OPERATION

IMPORTANT

Do not try to transmit without a CB antenna connected to the antenna connector on the rear panel.

1. Turn the power on.
2. Turn CB channel selector to a desired channel.

3. Depress the Push-to-Talk button on the microphone. Hold the microphone 4 to 6 inches from the mouth. Speak at a normal level. During periods of transmission, the receiver is silenced and reception is therefore impossible. In the same way, your signal can not be heard by another station when he is transmitting, each must take turns.

4. To receive, simply release the microphone Push-to-Talk button.

ANTENNA CABLE CONNECTION

The antenna should be connected to the transceiver by means of coaxial cable. Either RG-58/U or RG-8/U coaxial cable is ideal for this purpose. The antenna lead-in cable should be terminated with a PL-259 type male coaxial connector which should be attached to the matching ANT connector at the rear of the transceiver.

SECTION III
CIRCUIT DESCRIPTION, MODEL 670

SCOPE

The Q4 (27 MHz band oscillator circuit), Q9 (14 MHz band oscillator circuit) and Q5 (Mixer) are always operated regardless of the receive and transmit mode. The channel selector, rotary switch S2a and S2b, has such mechanism that S2a moves one step at every four steps of S2b. The channel selector switch also has a neutral position between 22 and 23 channel and at this position common terminals are opened, making Q4 and Q9 oscillation stop. Therefore at this switch position, no receive and transmit operation will be performed.

Q10 is a 11.275 MHz oscillator circuit for transmit and Q18 is a 11.730 MHz oscillator circuit for receive operation. Both circuits are controlled by the push-to-talk switch on the microphone; one of two switching circuits of the push-to-talk switch cuts off or turns on the power line to the Q10 and Q18 and another controls the microphone output.

TRANSMISSION

The Transistor Q6 (mixer for both 38 MHz and 11.275 MHz band) and Q7 (27 MHz band amp.) will be powered and operated when the push-to-talk switch is depressed. Q8 and Q1 are the 27 MHz band driver and power amplifier, respectively. However, since they are employing a "C" Class biasing system, they do not operate (transmit) even though the collector voltage is applied to each collector circuit until all pre-stage (Q4 - 7 and Q9, Q10) are operated and a proper level of 27 MHz signal is supplied to the base of Q8. When the channel selector switch (S2abc) is placed in CH1 position, 23.290 MHz and 14.950 MHz crystals will be connected to the base of Q4 and Q9 respectively. These two frequency voltages are fed to the first mixer Q5 through C5 and C6 respectively and converted into 38.240 MHz as follows:

1st Mixer; $23.290 + 14.950 = 38.240$ MHz

(L1 is a 23 MHz band oscillator coil, L2, L3 & L4 38MHz filter coils.)

This 38.240 MHz voltage is then added to the 2nd Mixer Q6. While Q10 is being oscillated, as previously stated, with frequency of 11.275 MHz and this is also fed to the 2nd Mixer, thus two frequency are converted into the 26.965 MHz transmitting frequency.

2nd Mixer: $38.240 - 11.275 = 26.965$ MHz

This 26.965 MHz signal is then amplified by Q7, Q8 and Q1 to the required level for transmission. (L5, L6, L7, L8 and L9 are 27 MHz band filter coils. L10, L11, C31 and C32 constitutes a pi-type filter for antenna impedance matching.)

Next, when the channel selector switch is placed in the CH2, CH3 or CH4 position, Q9 will oscillate 14.960 MHz, 14.970 MHz or 14.990 MHz respectively, while Q4 will continuously oscillate same frequency, 23.290 MHz, during above four switch positions.

When the channel selector switch is placed in the CH5 position, Q9 oscillates the frequency of 14.950 MHz again due to the previously stated switching mechanism of S2a and S2b. On the other hand, Q4 changes its oscillating frequency from 23.290 MHz to 23.340 MHz. Then both frequencies are led to the first Mixer and converted into the following frequency.

1st Mixer: $23.340 + 14.950 = 38.290$ mHz

The resulting 38.290 mHz output is, then, fed to the 2nd Mixer as previously described and converted into the CH5 transmitting frequency.

2nd Mixer: $38.290 - 11.275 = 27.015$ mHz

In the similar manner, each channel frequency will be made as follows:

CH5	$23.340 + 14.950 - 11.275 = 27.015$ mHz
CH6	$23.340 + 14.960 - 11.275 = 27.025$ mHz
CH7	$23.340 + 14.970 - 11.275 = 27.035$ mHz
↓	↓ ↓ ↓ ↓
CH22	$23.540 + 14.960 - 11.275 = 27.225$ mHz
CH23	$23.540 + 14.990 - 11.275 = 27.255$ mHz

NOTE

Capacitors C41A and C41B are inserted to compensate the spread of crystal frequency and they may not be used in some models.

RECEPTION

In reception mode, the power supply to transistors Q6, Q7 and Q10 is cut off, and the transmitter stops its operation. On the other hand, the power is supplied to transistors, Q18, 11.730 mHz receiver local oscillator and to the voltage regulation diode D1 which in turn supplies its regulated voltage to the base of Q11, Q12, Q13 and Q14, thus the receiver circuit will be ready to operate.

When there is an input signal of 26.965 mHz (CH1) on the antenna circuit with the channel selector switch in CH1 position, this signal will be led to the Q1 collector through the pi-type filter circuit consisting of L10, L11, C31 and C32 (antenna impedance matching circuit).

Q1 collector output is then fed as follows:

Q1 collector -- 27 mHz band tank circuit C46/L13 -- Q11 base-ground amplifier -- L14 27 mHz tank circuit -- Q12 base.

Q12 is a mixer. A 38.240 mHz signal is added to the base of this transistor. Thus the first IF frequency 11.275 mHz as below.

1st IF frequency: $38.240 - 26.965 = 11.275$ mHz

This 11.275 mHz signal is then applied to the mixer diode D2 through L15 and L16 IF tuned-circuit. At the same time a 11.730 mHz signal from Q18 is applied to D2 through C56 and the two signals are converted into 455 kHz 2nd IF frequency.

2nd IF frequency: $11.730 - 11.275 = 0.455$ mHz

This 455 kHz IF signal is then fed to the L17 455 kHz IF coil, ceramic filter, C13, L18, Q14, L19 detector coil and finally D3 detector. In this way audible sound will be obtained.

D10 is a switching diode which shorts the receiver input circuit during transmission operation.

D11 is a signal overload protector. R47, R48, R49, R50, R51, D5 and C65 constitute automatic noise limiter. In the similar way, input signals on other channels will be detected into audible signals as follows:

			Receive			
		1st Local f	Signal	1st IF	2nd Local f	2nd IF
CH1	$23.290 + 14.950 = 38.240$ mHz		-26.965 mHz	$= 11.275 - 11.730$ mHz		$= 455$ kHz
CH2	$23.290 + 14.960 = 38.250$ mHz		-26.975 mHz	$= 11.275 - 11.730$ mHz		$= 455$ kHz
CH3	$23.290 + 14.970 = 38.260$ mHz		-26.985 mHz	$= 11.275 - 11.730$ mHz		$= 455$ kHz
CH4	$23.290 + 14.990 = 38.280$ mHz		-27.005 mHz	$= 11.275 - 11.730$ mHz		$= 455$ kHz
	↓	↓	↓	↓	↓	↓
CH22	$23.540 + 14.960 = 38.500$ mHz		-27.225 mHz	$= 11.275 - 11.730$ mHz		$= 455$ kHz
CH23	$23.540 + 14.990 = 38.530$ mHz		-27.255 mHz	$= 11.275 - 11.730$ mHz		$= 455$ kHz

AUDIO AMPLIFIER

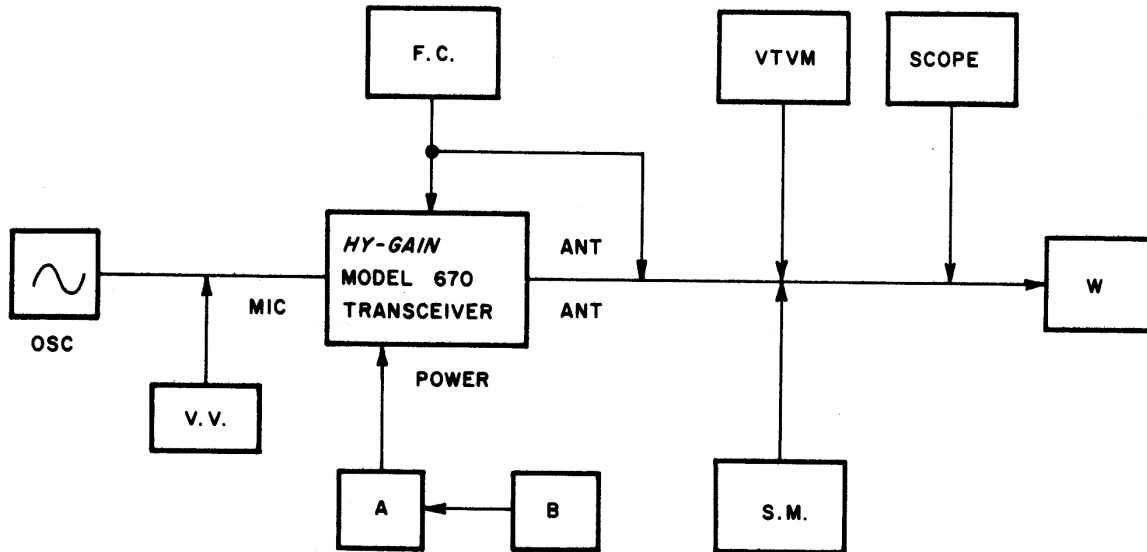
The audio amplifier consists of Q16 pre-amplifier, Q17 driver, Q2/Q3 B-class power amplifier and Q15 squelch circuit.

In transmit operation, the microphone output is applied to the audio amplifier (Q16, Q17, Q2, Q3) and the resultant output is fed to the collectors of Q8 and Q1 through the secondary coil of output transformer T2 and switching diode D9 and modulated. D6 is an AGC diode by which a part of output is rectified to supply AGC voltage to the emitter of Q16 (Range Boost Circuit). D12 is a buffer diode which protects the transmitter circuit from the influence of the receiver circuit impedance variation; This is done by reverse-biasing D12 during transmit operation.

In receive operation, D12 will be forward-biased and the receive-signal will be fed to the base of Q16 through C80, D12 & C79 and amplified. The resulting output is applied to the loudspeaker. Since the base bias of Q15 is supplied only during receive operation, the squelch circuit will only operate in reception mode.

SECTION IV
ALIGNMENT PROCEDURES

TRANSMITTER ALIGNMENT
TEST SET-UP



OSC	Audio Signal Generator
V.V.	Audio Level Meter, 1 mV measurable
A	DC Ampere-Meter
B	DC Power Supply
F.C.	Frequency Counter, 0 - 40 mHz
VTVM	RF Volt Meter
SCOPE	Oscilloscope, 30 mHz
SM	Spurious Meter, 27 mHz band, built-in B.E.F. 1 mV measurable
W	Power Meter, 50 pi, 50 W, thermo-couple type

To set the transceiver to transmit mode, connect No. 2 and No. 3 terminals on the printed circuit board each other by using a clip or wire. When applying modulating signal (MIC input signal), to the unit, connect the signal between the No. 1 terminal and chassis ground.

23 mHz OSCILLATOR
CIRCUIT ALIGNMENT

Place the channel selector in 13CH position. Slowly rotate L1 core in direction from top to bottom until the oscillator just begin to oscillate. This oscillation starting point will be indicated by a rapid increase of Q4 emitter voltage (A DC volt-meter should be connected between Q4 emitter and chassis ground during this alignment).

Further rotate the L1 core 1/2 turn in the same direction (clock-wise) from that oscillation starting point. Finally make sure the oscillating frequency is within ± 300 Hz from the standard oscillating frequency (crystal frequency).

15 mHz OSCILLATOR
CIRCUIT CHECK

Make sure oscillating frequency of Q9 is within ± 300 Hz of the specific frequency.

**MIXER, 38 mHz
ALIGNMENT**

Connect an oscilloscope to the No. 20 terminal on the printed circuit board and adjust L2 - L4 for maximum amplitude.

**MIXER, 27 mHz
ALIGNMENT**

Set the unit in transmit mode and adjust L5, L6, L7, L8 and L9 for maximum reading on the watt-meter. Moreover check for no abnormal oscillation using oscilloscope.

**FINAL STAGE
ALIGNMENT**

Adjust L10 and L11 for maximum power output but the total current does not exceed 750 mA. Next, apply 1 kHz modulating signal to the microphone input terminal and check for normal modulation characteristics, using a oscilloscope.

FREQUENCY CHECK

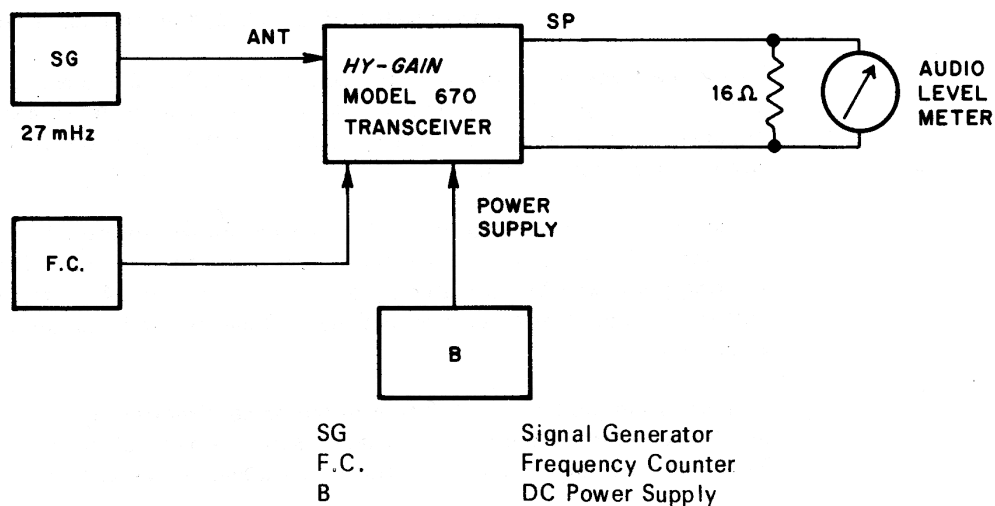
Set the unit in transmit condition and check transmitting frequency accuracy. Each channel frequency should be within ± 800 Hz from respective channel center frequency. When every channel has a same tendency of rising or falling frequency, they will be corrected in 300 or 400 Hz by removing or shorting the one of two capacitors connected to the crystal 11, 11.275 mHz, in series.

When the channel frequency of a given channel does not fall within ± 800 Hz, check crystal units according to the following table.

Defect Channel	Check
CH 1 - 4	Crystal 1 23.290 mHz
CH 5 - 8	Crystal 2 23.340 mHz
CH 9 - 12	Crystal 3 23.390 mHz
CH 13 - 16	Crystal 4 23.440 mHz
CH 17 - 20	Crystal 5 23.490 mHz
CH 21 - 23	Crystal 6 23.540 mHz
CH 1, 5, 9, 13, 17, 21	Crystal 7 14.950 mHz
CH 2, 6, 10, 14, 18, 22	Crystal 8 14.960 mHz
CH 3, 7, 11, 15, 19	Crystal 9 14.970 mHz
CH 4, 8, 12, 16, 20, 23	Crystal 10 14.990 mHz

Connect a spurious meter to the antenna connector and adjust L12 (T.V.I.) for minimum 2nd harmonics (54 mHz) at no modulation.

**RECEIVER ALIGNMENT
TEST SET-UP**



To set the unit to the receive mode, connect No. 3 and No. 5 terminals each other.

**RECEIVER SENSITIVITY
ADJUSTMENT**

Connect a signal generator output, 27.115 MHz, 1 kHz 30% mod, to the receiver with the selector switch placed in 13CH position. Adjust L 13, 14, 15, 16, 17, 18 and 19 for maximum audio output.

SQUELCH ADJUSTMENT

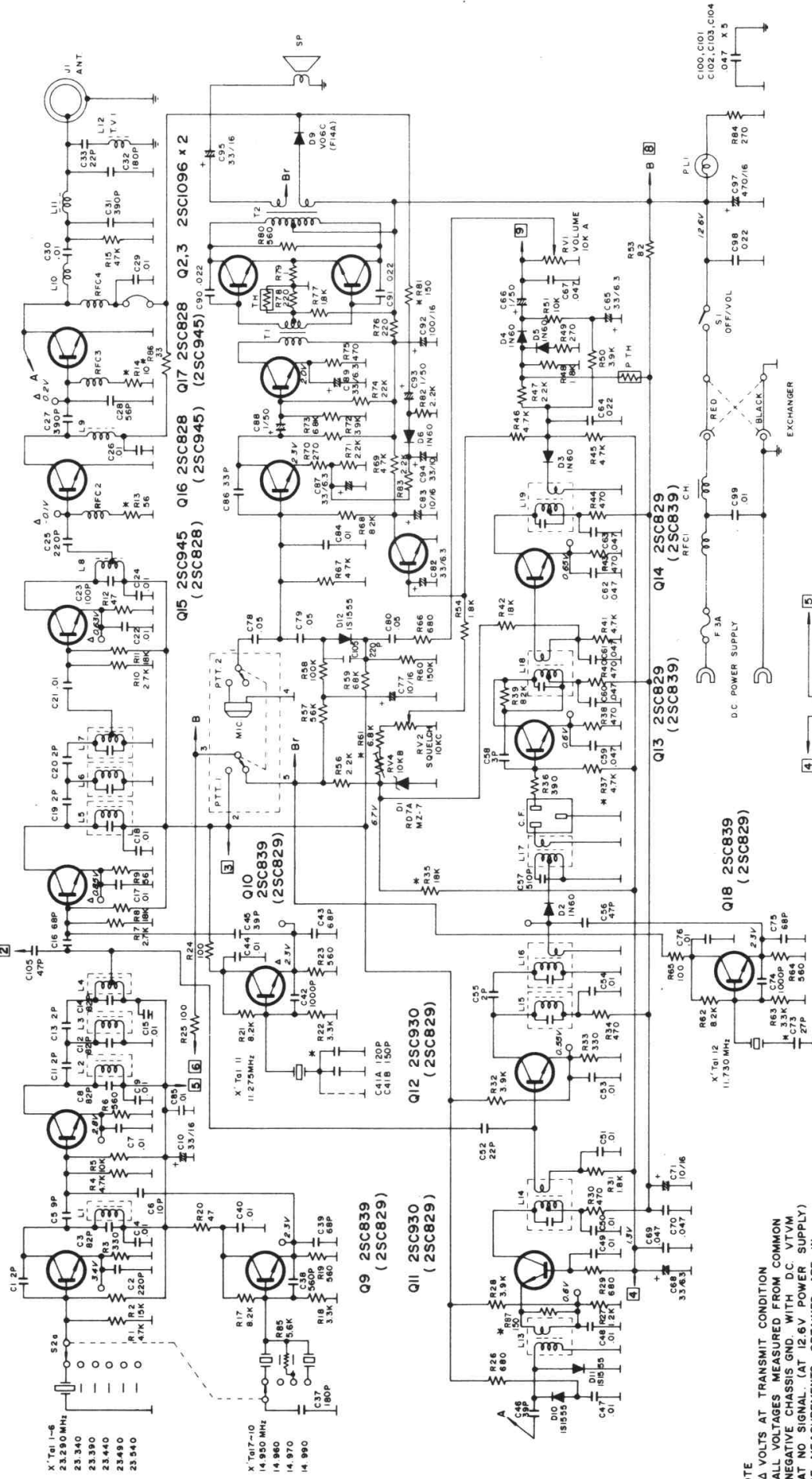
Connect a level meter across the speaker terminal. Set signal generator attenuator to provide 74db, 1 kHz, 30% mod. output and receive this signal. Set the squelch volume on the transceiver to minimum and note the level meter reading. Adjust RV4 so that the level meter reading is decreased by 6 db.

VOLTAGE CHART

Transistor	Emitter (V)	Base (V)	Collector (V)
Q 1	0	-0.2 *	10.2 *
Q 2	0.07	0.6	12.5
Q 3	0.07	0.6	12.5
Q 4	3.4	4.0	10.7
Q 5	2.8	3.4	10.1
Q 6	0.85*	1.3 *	12.5 *
Q 7	0.63*	1.2 *	12.5 *
Q 8	0	-0.1 *	9.0 *
Q 9	2.3	2.8	10.0
Q10	2.3 *	3.2 *	11.8 *
Q11	0.6	1.2	12.0
Q12	0.55	1.1	11.2
Q13	0.6	1.2	12.0
Q14	0.65	1.25	11.5
Q15	0	-0.1 (0.6)	8.0 (0.1)
Q 16	2.3	2.9	10.8
Q17	2.0	2.6	10.7
Q18	2.3	3.2	11.8

* Volts at transmit condition
() Squelch on

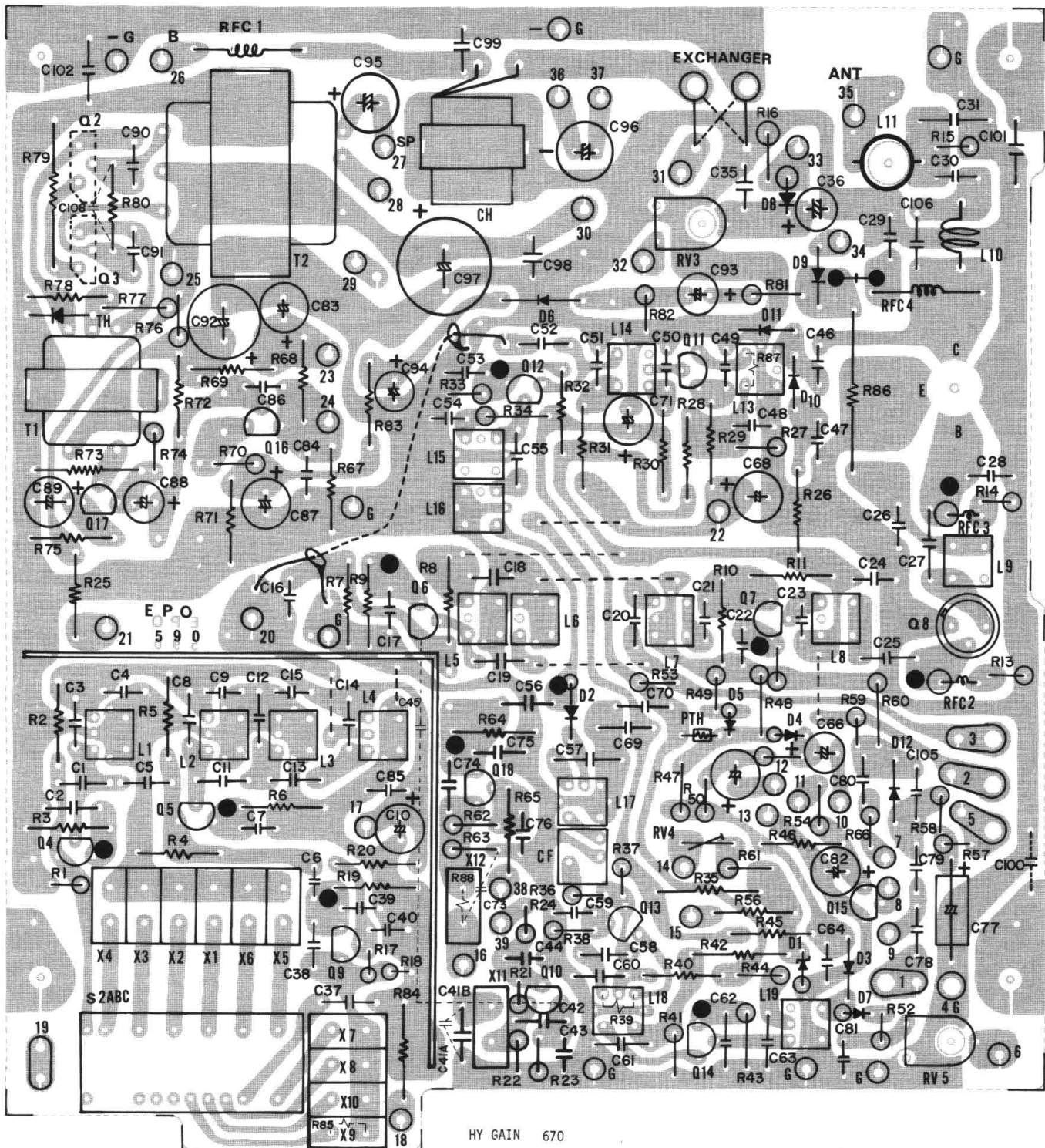
Q4 2SC839 (2SC829) Q5 2SC839 (2SC829) Q6 2SC839 (2SC829) Q7 2SC815 Q8 2SC781 Q1 2SC1239 (2SCF8)



NOTE
 Δ VOLTS AT TRANSMIT CONDITION
 ALL VOLTAGES MEASURED FROM COMMON
 NEGATIVE CHASSIS GND. WITH DC VTVM
 AT NO SIGNAL (AT 12.6V POWER SUPPLY)
 IF MEASUREMENTS OBTAINED ARE IN
 EXCESS OF ± 20% OF VALUES SHOWN
 THEN REASON FOR DIFFERENCE SHOULD
 BE CORRECTED.
 * CHASSIS GND. - BATTERY NEGATIVE
 † VARIABLE

* This Schematic Diagram may be changed for improvement without advance notice.

SCHEMATIC DIAGRAM OF MODEL 670



HY GAIN 670

NOTE: 1. R39, R85, R87, R88, C73, C100, C41A, C45 AND C108 ARE MOUNTED ON BOTTOM OF PC BOARD.

2. C33, C67, C103 AND C104 ARE NOT MOUNTED ON PC BOARD.

SECTION V

PARTS LIST

<u>Parts Name</u>	<u>Description</u>	<u>Part No.</u>	<u>Symbol</u>
Transistor	2SC-1239	EQS-86	Q1
Transistor	2SC-1096	EQS-89	Q2, 3
Volume Control	EVH-B8BK15A14	ERV-96	RV1/5
Volume Control	EVH-B8AK15C14	ERV-91	RV2
Speaker	EAS-9D75S	EAS-14	SP
Microphone		EAM-10B	MIC
Ant. Jack		EZS-66	J1
V. F. O. Jack		EZS-89	J2
Pilot Lamp		EZP-6	PL
TVI Trap Coil		ETR-18	L12
DC Power Cable		ENO-43A	F
Rotary Switch		ESR-126	S2
Cord Bushing		EZZ-25	
Ceramic Capacitor 22pf 50V	ECC-D05220K		C33
Ceramic Capacitor .047u 25V	DD624BC473M25		C67
Ceramic Capacitor .047u 50V	ECK-D054732ZV		C103, 104
P. C. Board Complete		EC45-L3	
P. C. Board		EPO-590	
Transistor	2SC-930	EQS-139	Q11, 12
Transistor	2SC-829(B)	EQS-5	Q13, 14
Transistor	2SC839(H)	EQS-100	Q4-6, 9, 10, 18
Transistor	2SC-828(S)	EQS-9	Q16, 17
Transistor	2SC-945(P)	EQS-131	Q15
Transistor	2SC-815K	EQS-22	Q7
Transistor	2SC-781	EQS-57	Q8
Diode	V06C	EDS-4	D9
Diode	1N60	EDG-3	D2-6
Diode	1S-1555	EDS-1	D10-12
Diode	MZ207-02A	EDZ-20	D1
Input Transformer		ETA-41	T1
Output Transformer		ETA-42	T2
Audio Choke Coil		ELA-2	CH
Ceramic Filter	CFU455G	EFC-23	C. F.
Posistor		EDP-1	PTH
Thermistor	23D25F	EDT-15	TH
Shield Plate		MC45P6	
Crystal	23.290 mHz	EXT-2	Xtal-1
Crystal	23.340 mHz	EXT-2	Xtal-2
Crystal	23.390 mHz	EXT-2	Xtal-3
Crystal	23.440 mHz	EXT-2	Xtal-4
Crystal	23.490 mHz	EXT-2	Xtal-5
Crystal	23.540 mHz	EXT-2	Xtal-6
Crystal	14.950 mHz	EXT-2	Xtal-7
Crystal	14.960 mHz	EXT-2	Xtal-8
Crystal	14.970 mHz	EXT-2	Xtal-9
Crystal	14.990 mHz	EXT-2	Xtal-10
Crystal	11.275 mHz	EXT-2	Xtal-11

<u>Parts Name</u>	<u>Description</u>	<u>Part No.</u>	<u>Symbol No.</u>
Crystal	11.730 mHz	EXT-2	Xtal-12
Polarity Changer (female)		EZS-25	
Test Pin		MYO-128	
Lead Cable w/pin		ENO-40B	
Lead Cable w/pin		ENO-40R	
Tie Point		MYO-9	
RF Choke Coil		ELR-11	RFC1
RF Choke Coil		ELR-4	RFC2-4
Potentiometer 10KB 2-leg	EVL-T5AAOOB14		RV4
Heat Sink for Tr. (2SC-781)		MYO-8	
OSC Coil		ETR-247	L1
RF Coil		ETR-248	L2,3
RF coil		ETR-249	L4
RF Coil		ETR-30	L5,6
RF Coil		ETR-31	L7
RF Coil		ETR-22	L8
RF Coil		ETR-197	L9
RF Coil		ETR-17	L10
RF Coil		ETR-232	L11
RF Coil		ETR-194	L13
RF Coil		ETR-104	L14
RF Coil		ETR-125	L15,16
I. F. Coil		ETI-85	L17
I. F. Coil		ETI-17	L18
I. F. Coil		ETI-18	L19
Carbon Resistor 4.7 ohm 1/4w	ERD-14TJ472		R1, 4, 37, 41, 45, 46
Carbon Resistor 15Kohm 1/4w	ERD-14TJ473		R2
Carbon Resistor 330 ohm "	ERD-14TJ472		R3, 33
Carbon Resistor 10 kohm "	ERD-14TJ103		R5
Carbon Resistor 560 ohm "	ERD-14TJ472		R6, 19, 23, 64, 80
Carbon Resistor 2.7 Kohm "	ERD-14TJ272		R7, 10
Carbon Resistor 18 kohm "	ERD-14TJ183		R8, 11, 35, 42
Carbon Resistor 56 ohm "	ERD-14TJ560		R9, 13
Carbon Resistor 47 ohm "	ERD-14TJ470		R12, 20
Carbon Resistor 10 ohm "	ERD-14TJ100		R14
Carbon Resistor 45 Kohm	ERD-14TJ473		R15
Carbon Resistor 8.2 Kohm "	ERD-14TJ822		R17, 21, 62, 68
Carbon Resistor 3.3 Kohm "	ERD-14TJ332		R18, 22, 63
Carbon Resistor 100 ohm "	ERD-14TJ101		R24, 65
Carbon Resistor 680 ohm "	ERD-14TJ681		R26, 29, 66
Carbon Resistor 1.2 Kohm "	ERD-14TJ122		R27
Carbon Resistor 3.9 Kohm "	ERD-14TJ392		R28, 32, 50, 72
Carbon Resistor 470 ohm "	ERD-14TJ471		R30, 34, 38, 40, 43 44, 75
Carbon Resistor 1.8 ohm "	ERD-14TJ182		R31, 48, 54, 77
Carbon Resistor 390 ohm "	ERD-14TJ391		R36
Carbon Resistor 82 Kohm "	ERD-14TJ823		R39
Carbon Resistor 2.2 Kohm "	ERD-14TJ222		R47, 56, 71, 82, 83
Carbon Resistor 270 ohm "	ERD-14TJ271		R49, 70
Carbon Resistor 10 Kohm "	ERD-14TJ103		R51
Carbon Resistor 82 ohm "	ERD-14TJ820		R53
Carbon Resistor 56 Kohm "	ERD-14TJ563		R57
Carbon Resistor 100 Kohm "	ERD-14TJ104		R58
Carbon Resistor 68 Kohm "	ERD-14TJ683		R59

<u>Part Name</u>	<u>Description</u>	<u>Part No.</u>	<u>Symbol</u>
Carbon Resistor 150 Kohm 1/4w	ERD-14TJ154		R60
Carbon Resistor 2.2 Kohm "	ERD-14TJ223		R74
Carbon Resistor 6.8 Kohm "	ERD-14TJ682		R61, 73
Carbon Resistor 220 ohm "	ERD-14TJ221		R76, 78
Metal Oxide Resistor .8 ohm	ERX1ANJOR8		R79
Carbon Resistor 150 ohm 1/4w	ERD-14TJ151		R81
Solid Resistor 100 ohm 1/2w	ERC-12GK101		R85
Solid Resistor 270 ohm 1/2w	ERC-12GK271		R84
Ceramic Capacitor 2p 500V	ECC-D5020C		C1, 11, 13, 19, 20, 55
Ceramic Capacitor 220 p 50V	ECC-D05221K		C2, 25, 105
Ceramic Capacitor .01u 50V	RD208YZ103P50		C18, 21, 22, 24, 26, 29, 30, 40, 44, 47, 4, 7, 9, 15, 17, 48, 49, 50, 51, 53, 54, 76, 84, 79, 85
Ceramic Capacitor 82p 50V	ECC-D05820KR		C3, 8, 12, 14
Ceramic Capacitor 9p 500V	ECC-D5090C		C5
Elyt. Capacitor 33/16V	ECE-A16V33N		C10
Ceramic Capacitor 68p 50V	ECC-D05680K		C16, 34, 43, 75
Ceramic Capacitor 100p 50V	ECC-D05101K		C23
Ceramic Capacitor 390 p 50V	ECC-D05391K		C27, 31
Ceramic Capacitor 56p 50V	Ecc-D05560K		C28
Ceramic Capacitor 180p 50V	ECC-D05181K		C32
Elyt. Capacitor 1/50V	ECE-A50V1N		C66, 88, 93
Ceramic Capacitor 270p 50V	ECC-D05271K		C37, 41
Mylar Capacitor .001u 50V	ECQ-M05102KZ		C38, 42, 74
Ceramic Capacitor 39p 50V	ECC-D05390K		C45, 46
Ceramic Capacitor 39p 50V	ECC-D05220K		C52
Ceramic Capacitor 47p 50V	ECC-D05470K		C56
Styroflex Capacitor 510p	ECQ-S1511K		C57
Ceramic Capacitor 3p 500V	ECC-D5030C		C58
Ceramic Capacitor .047u 25V	DD624BC473M25		C59, 60, 61, 62, 63, 69, 90
Ceramic Capacitor .022u 50V	RD209YZ223P50		C64, 98
Elyt. Capacitor 33/6V	ECE-A6V33N		C65, 68, 82, 87, 89
Elyt. Capacitor 10/16V	ECE-A16V10N		C71, 83
Ceramic Capacitor .05u 12V	DD601-450BC503M12		C78, 79, 80
Ceramic Capacitor 33p 50V	ECC-D05330K		C86
Ceramic Capacitor .0022u 25V	DD610BC223M25		C91, 90
Elyt. Capacitor 100/16V	ECE-A16V100N		C92
Elyt. Capacitor 33/10V	ECE-A10V33N		C94
Elyt. Capacitor 33/16V	ECE-A16V33N		C95
Elyt. Capacitor 470/16V	ECE-A16V470N		C97
Ceramic Capacitor .047u 50V	ECK-D05473ZV		C100, 101, 102
Elyt. Capacitor 10/16V	ECE-B16V10N		C77
Ceramic Capacitor 27p 50V	ECC-D05270KR		C73
Escutcheon		MC45A1	
Front Panel Mtg. Bracket		MC45P2	
Cage (Upper)		MC45P3	
Cage (Lower)		MC45P4	
Channel Plate		MC45P5	
Bracket		MC45P7	
Chassis		MC46P2	

<u>Part Name</u>	<u>Description</u>	<u>Part No.</u>	<u>Symbol</u>
Mobile Mtg. Bracket		MC46P6	
SPKR Net		MC46P9	
Lamp Holder (Sponge)		MWO-345	
CH Knob		MNO-115	
VR Knob		MNO-116	
Knurled Screw		MMO-108	
Heat Sink		MYO-26	
Mylar Sheet		MWO-104	
Mike Holder		MYO-25	
Spkr Cap		MMO-18	