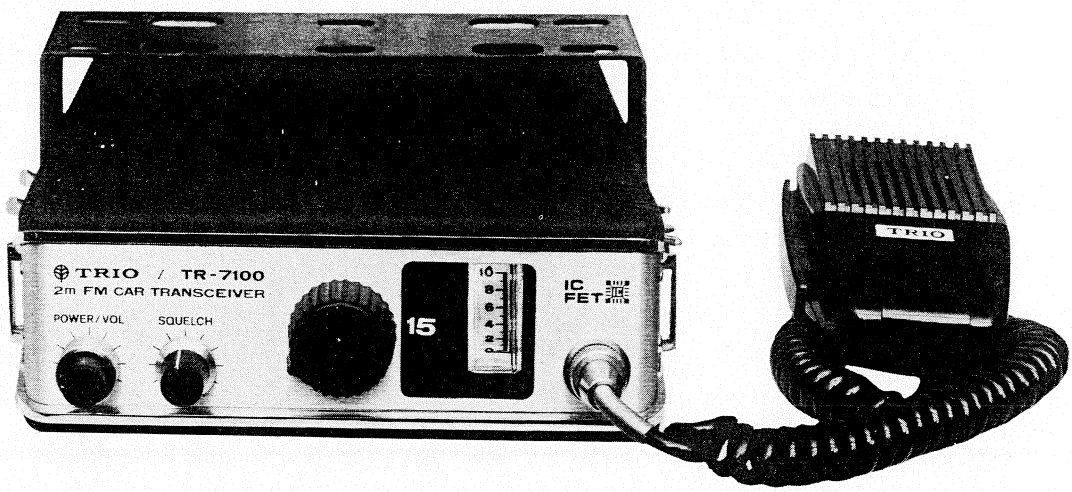
TRIO

SERVICE MANUAL

TR-7100



2 METER FM CAR TRANSCEIVER

TABLE OF CONTENTS

ALIGMENT PROCEDURE

HOW TO REMOVE COVER PLATES

To remove the top or bottom cover plate from the transceiver case for adjustment, proceed as follows:

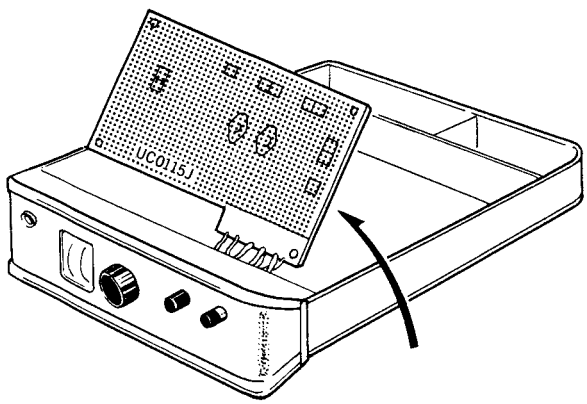
For adjustment of transmitter chassis . . . . . Unscrew 4 set-screws from the top side of the transceiver cabinet and remove the top cover plate. For adjustment of receiver chassis . . . . . Unscrew 4 setscrews from the bottom side of the transceiver cabinet and remove the bottom cover plate.

CHECK OR REPAIR OF PRINTED CIRCUIT BOARD

To check or repair the printed circuits board proceed as follows:

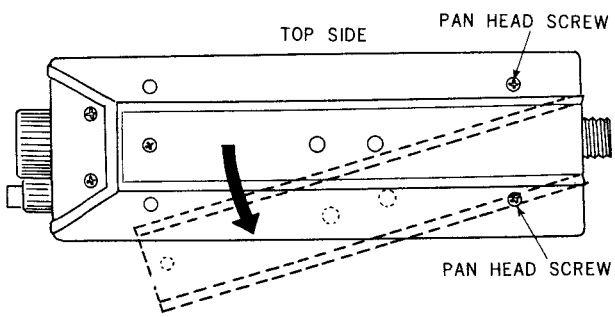
Remove the top and bottom cover plates from the transceiver case. Unscrew 4 setscrews from the receiver printed circuit board (UC 0115J). With the receiver printed circuit board opened frontwards as shown below, proceed to check or repair of the multiplier printed circuit board (UC1603J) and receiver printed circuit board (UC0115J).

NOTE: *Don't try to remove the multiplier printed circuit board (UC1603J) from the transceiver chassis.*



HOW TO REMOVE THE FINAL UNIT (UC1412J)

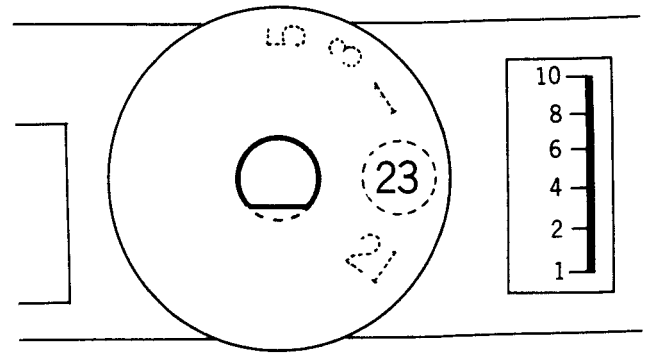
Unscrew 2 side escutcheon screws and 2 final unit setscrews. Unsolder the lead wires and press the FINAL UNIT down as shown below.



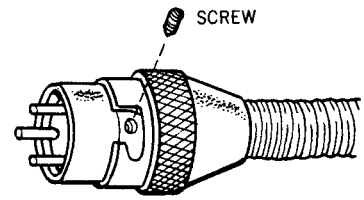
Remove 2 clamper screws for the U-shaped band.
Push down one end of the U-shaped band as shown above and remove 4 pan head screws.

HOW TO MOUNT DIAL SCALE ON ROTARY SWITCH

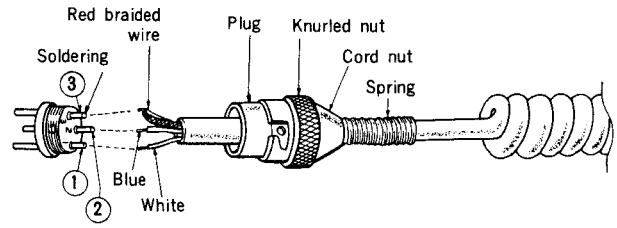
Turn rotary switch (S1) until the cut of its shaft is positioned as shown below. Place the dial scale onto the shaft of rotary switch so that digits 23 are positioned in the lamp window.



CONNECTION AND REPAIR OF MICROPHONE CONNECTOR

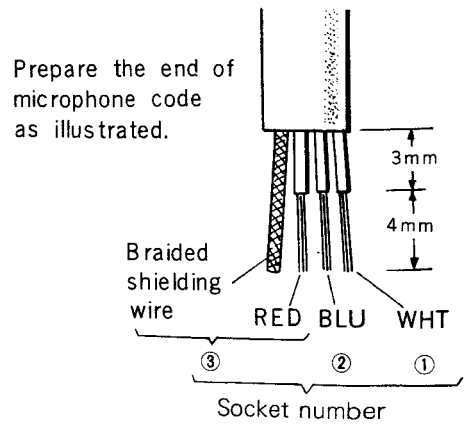


Remove the screw.
Insert the plug into the socket of connector body. Remove the plug by turning it counterclockwise.

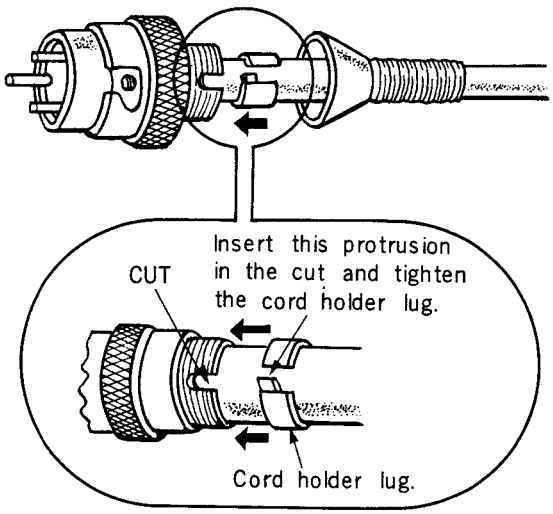


Pass the microphone cord through the plug.
Solder the conductors of the microphone cord to the terminals as illustrated bolow.

NOTE: *Be careful to connect the color conductors to their proper socket terminals numbered.*



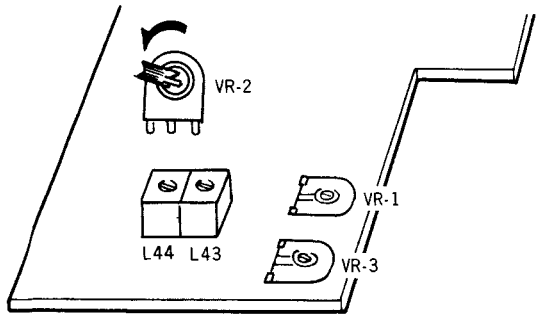
■ ALIGMENT PROCEDURE



Screw the cord socket into the connector body socket and fix it to the latter with the screw.

ADJUSTMENT OF RECEIVER UNIT

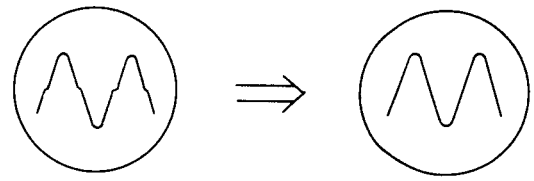
1. Check the power supply for an output voltage of 13.8V.
2. Connect a 8Ω (approx. 2W) dummy to the earphone terminal. Connect a vacuum tube voltmeter and oscilloscope across the dummy. Turn the receiver unit on and adjust variable resistor VR1 (Bias adjustment of IC). the receiver printed circuit board (UCO115J) until the unit delivers the maximum noise with no signal input applied.
3. Prepare a receiving crystal having a frequency of 145.0 (44.766) MHz or it near frequency. Insert the prepared crystal in an empty channel socket and connect a signal generator (with an output of 50Ω) to the ANT terminal.
4. Turn the signal generator. While receiving the signal generator output, adjust coils L29 ~ L33, L35, L36 and L33 ~ L42 so that the S-meter for the receiver unit gives a maximum deflection. Further adjust coils L43 and L44 until the oscilloscope represents a well-shaped large waveform on its scope. Note that coil L34 shall be adjusted by turning it clockwise only when the oscillator stops for some channel.
5. With the output level of signal generator raised to 30 dB, adjust variable resistor VR3 in UCO115J until the S-meter reads the full scale.
6. Audio bias adjustment



Set variable resistor VR2 to the expreme counterclockwise position as illustrated above.

While observing the waveform of the signal generator output on the oscilloscope, turn variable resistor VR2 in UCO115J clockwise until the waveform becomes free from any crossover distortion as shown below.

Check under the above condition to see that the receiver unit draws a current of approx. 330 mA for 50 mW output (0.63 V at 8Ω).



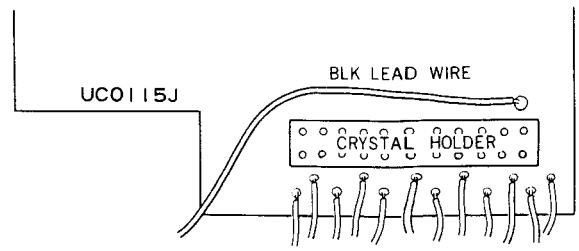
NOTE: *The unit should never be operated with a current draw of more than 350 mA or 50 mW output.*

KEY POINTS ON REPAIR OF RECEIVER UNIT

Problem on Adjoining Channels

It sometime happens that the receiver unit receives an incoming signal from an idle channel for which no crystal resonator is inserted. This is due to the induction of the output of the crystal resonator for the adjoing channel to the lead wire to the idle channel. In sure case, take the following actions:

Arrange "the common black lead wire" of rotary switch so as to run along the crystal holder at the side opposite that accommodating lead wire terminals.Then, keep "the common black lead wire" away from all channel crystal lead wire. Also, arrange the crystal lead wires so as to keep them away from each other.



About IC Bias

If IC bias control VR (VR1) in UCO115J is set improperly, it sometimes causes the receiver to suffer from an insufficient sensitivity. Pay sufficient care, therefore, when setting the IC bias control.

Part liable to be brought in contact with others.

Check C13, C35, R5, R9, R19 and C57 for possible contact to other part, since these parts are most liable to be brought into contact with others.

Poor sensitivity due to improper relay contact.

Check a relay for any stains or lowered contact pressure. If the relay is left as it is with its stains unremoved and its contact pressure improperly adjusted, the receiver unit may suffer from a sensitivity reduced by approx. 10 dB.

ALIGMENT PROCEDURE

CAUTIONS ON TRANSMITTER UNIT ADJUSTMENT

Use always an insulated rod (made of such material as bakelite) when making adjustments of the trimmers and the protection dircuit.

Never fail to use parafin or lacquer when fixing the core of coil in position.

ADJUSTMENT OF TRANSMITTER UNIT

Adjustment of transmitting power

1. Connect a 50Ω dummy load power meter to the ANT terminal and a microphone to the MIC terminal.

Proceed to the coarse adjustment of the transmitting power with the power supply voltage set at 12 to 12.5V. Then, make the fine adjustment with the supply voltage set at 13.8V.

2. Prepare 3 crystals for a transmitting frequency of 144 MHz (6000 kHz), 145 MHz (6041.6 kHz) and 146 MHz (6083.3 kHz) or their near frequencies respectively. Insert these crystals in the sockets for idle channels.

3. With the CHANNEL selector switch set at the 145 MHz position, place the transmitter unit in the transmitting condition.

Adjust trimmer TC18 for the output terminal on the multiplier unit (UC1603J) until the power meter reads a maximum output power.

4. Then, finely adjust trimmer TC19, TC20, TC21, and TC22 in order until the power meter reads a maximum output power.

5. With the CHANNEL selector switch turned to the 144 MHz position and then to the 146 MHz position, check to see that the transmitter unit delivers an output power above specified value.

6. Set the power supply voltage at 11.6V and adjust trimmer TC13 ~ TC18 in order until the transmitter unit provides the outputs with less level differences for transmitting frequencies 144, 145 and 146 MHz.

If the outputs provide a conceivable level difference between them, it means the multiplier coils within the shielded case to set improper adjustments.

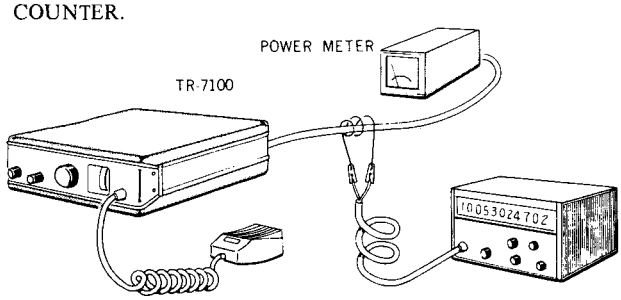
In this case, readjust the multiplier coils.

7. With the power supply voltage set at 13.8V, check to see that the transmitter unit draws an overall current within 2.1 ~ 2.4 A during transmission.

If the transmitter unit fulfills the above, there is no need of having the unit deliver an extremely high power output. If the current in unit draws more than 2.4 A owing to an excessive power output, adjust trimmer capacitors TC19 and TC20 to decrease drive to the FINAL UNIT.

Adjustment of Transmitting Frequency

1. Approach a detector coil to the input of a FREQUENCY COUNTER.



2. Place the transmitter unit in the transmitting condition with the CHANNEL selector switch set at position channel.

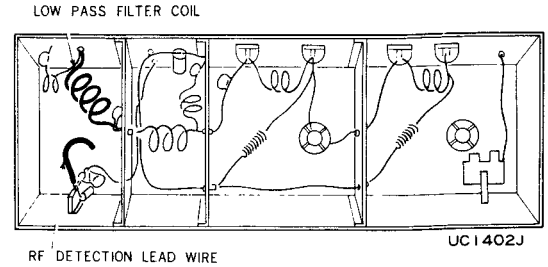
While observing the frequency counter positioned close to the antenna feeder, adjust trimmer TC1 until the COUNTER reads a frequency of 144.48 MHz.

Repeat the above step with the switch set at positions channel 3 and channel 15 until the COUNTER reads frequencies 144.60 and 145.32 MHz, respectively.

Adjustment of RF Meter

Place the transmitter unit in the transmitting condition with its power supply voltage set at 13.8V.

Adjust variable resistor VR5 under the above condition until the RF meter gives an indication of 8 to 8.5. If adjustment of variable resistor VR5 fails to make the meter read a value of 8 to 8.5 within the movable range of the resistor, proceed as follows: Take the final unit out of the transceiver case. Try to position the RF detection lead wire closer or away from the low pass filter coil until the meter is coarsely adjusted so that it gives an indication of 8 to 8.5 Then, finely adjust variable resistor VR5 until the meter deflection is set to the above value.



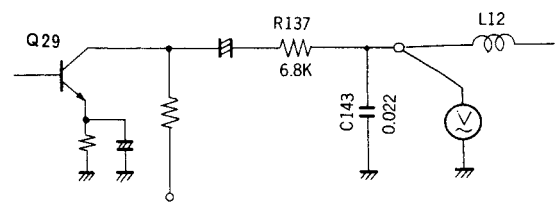
Adjustment of Modulation Degree

The adjustment of the transmitter unit about its modulation degree depends on the operational conditions of the unit and the individual charactor of the user. In general, however, the modulation degree of the transmitter unit is adjusted as follows:

First, set up a measuring circuit as shown below with an ammeter connected to the terminal designated.

With the transmitter unit set up so as to diable the carrier oscillator and apply a 1 kHx, 4 mV input (at 600Ω) to the MIC input terminal.

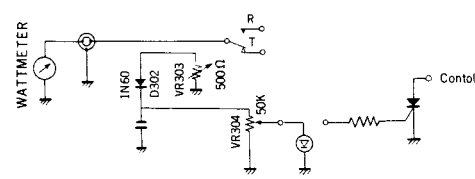
Adjust variable resistor VR4 until the meter reads a 100 mV under the above condition.



Adjustment of Protection Circuit

1. Set up a measuring circuit shown below as follows:

Disconnect the lead wires soldered from variable resistor VR304 (50 kΩ) and the check coil respectively.Connect a DC voltmeter or a circuit tester to the mid-terminal of variable resistor VR304. Set the voltmeter or the tester for a measuring range of 3 ~ 5V.



2. Operate the transmitter unit from a power supply voltage of 12V. With the unit placed in its transmitting condition, adjust variable resistor VR303 (500Ω) until the voltmeter reads the minimum DC voltage developed across diode D302.
3. Then, disconnect the WATTMETER from the measuring circuit and open the ANT terminals. With the transmitter unit placed in its transmitting condition, adjust variable resistor VR304 (50kΩ) until the voltmeter reads 1V precisely.

NOTE: *Note that the above adjustment should be completed within 30 seconds.*

4. Solder the disconnected lead wires to the choke coil and the mid-terminal of variable resistor VR304.
5. While opening and closing the ANT terminals, check to see that the protection circuit operates normally.

KEY POINTS ON REPAIRS OF TRANSMITTER UNIT

No transmitting power output

The coil in the final unit (UC1402J) brought in touch with the chassis when the final unit is placed in the chassis.

Coil L15 which is brought into contact with each other at either primary or secondary side.

Improperly contacted relay.

Voltage values of coils that may be used as a measure for repair of multiplier stage

Secondary side of L1	0.3V
Tap of L3 winding	0.7V
Tap of L5 winding	1.1V
Secondary side of L7	1.3V

The above voltage values are those measures at the points specified using an RF vacuum tube voltmeter. (These values are changed if the transmitter circuit is adjusted down to the output stage because of the RF superposed on the above coils.)

144 MHz amplifier unit

Live side of L10	6.2V
Live side of L18	5.6V
Live side of L20	3.2V

The above voltage values are those measured at the open OUT terminal on UC1603J using an RF vaccum tube voltmeter.

BLOCK DIAGRAM

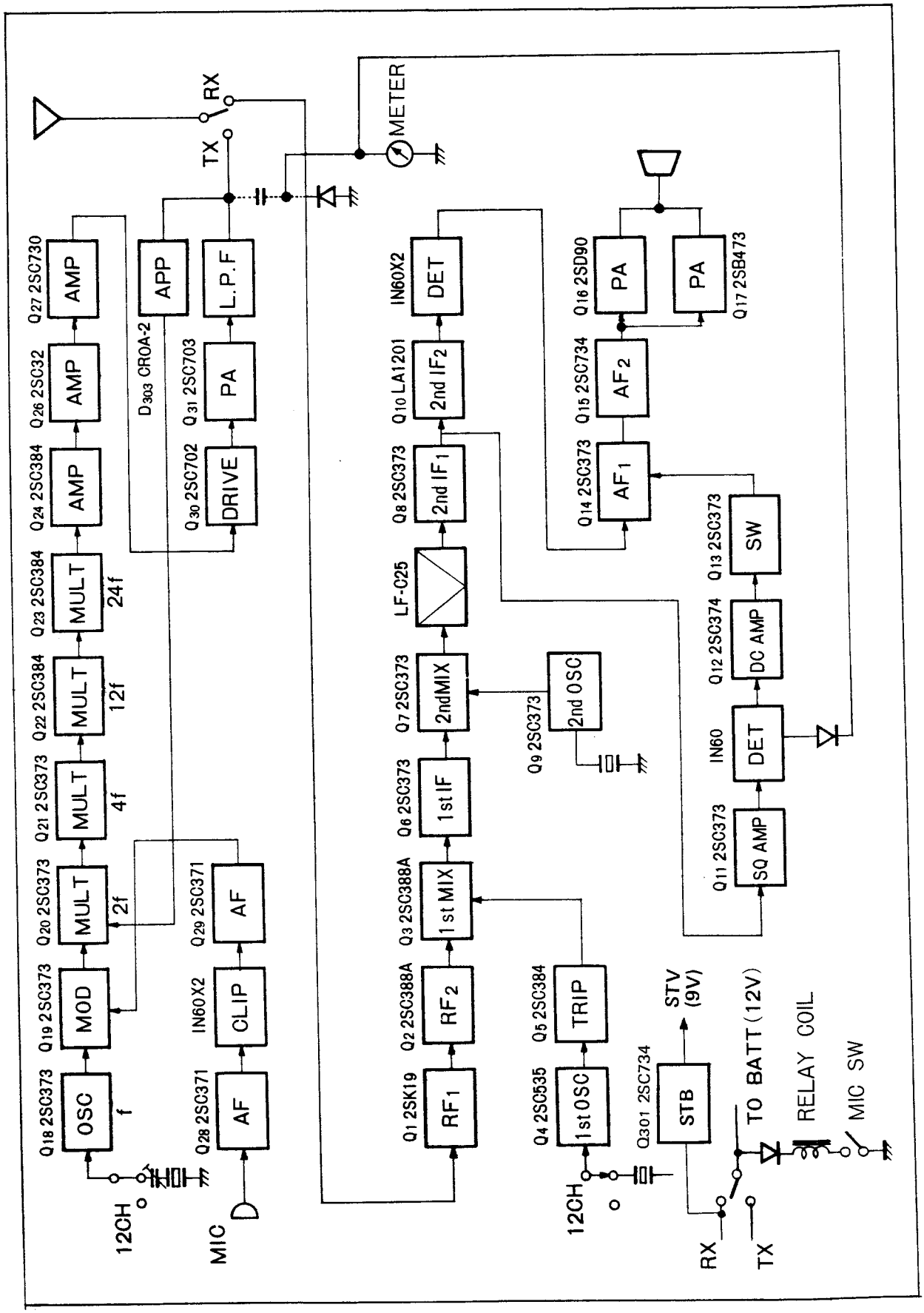


PHOTO OF TOP VIEW

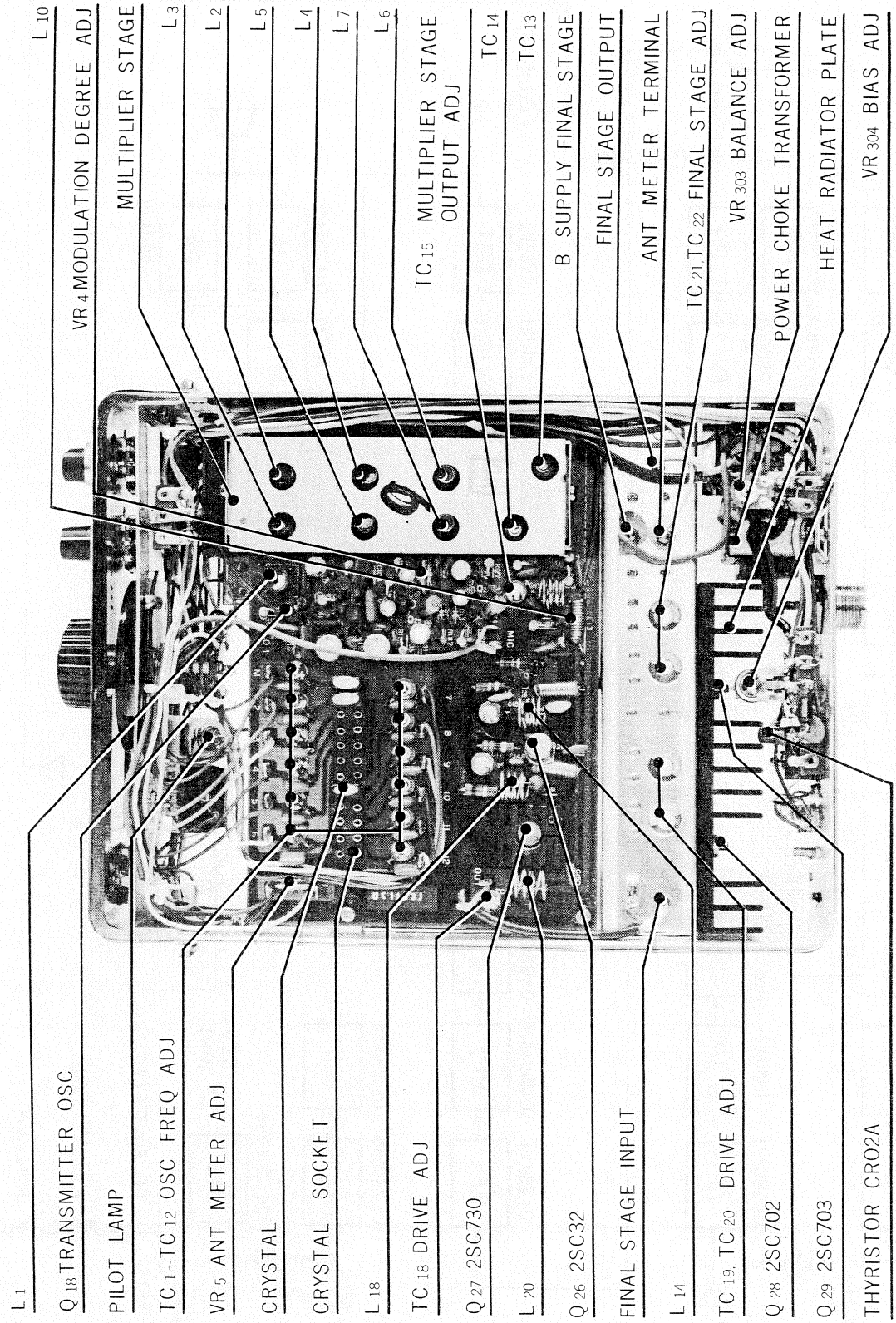
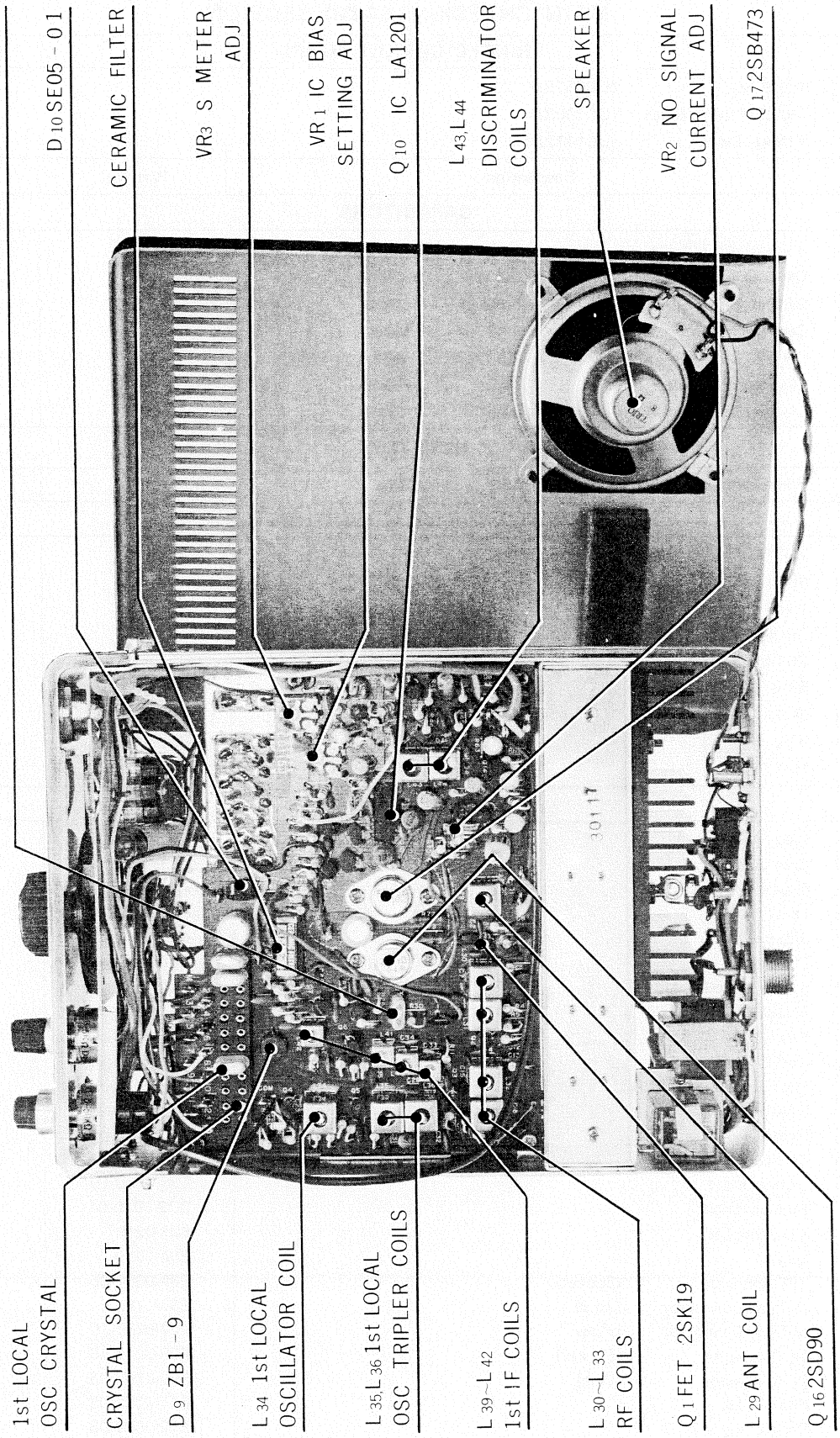


PHOTO OF BOTTOM VIEW



PARTS LIST

MAIN CHASSIS (LC4JM) SECTION

PRINTED CIRCUIT BOARD

–	RX Block	(UC0115J)
–	MULTIPLIER Block	(UC1603J)
–	FINAL Block	(UC1412J)

Symbol No.	Description	Part No.	Remarks
CAPACITORS			
C301	Electrolytic Tubular 33μF 16WV		
C302	Ceramic 0.01μF +80%, –20%		
C303	Ceramic 0.001μF ±20%		
C309	Ceramic 0.001μF ±20%		
C310	Ceramic 0.001μF +80%, –20%		
C311	Electrolytic Tubular 10μF 25WV		
C312	Electrolytic Tubular 47μF 25WV		
RESISTOR			
R301	Fixed Carbon Composition 68Ω ±5% 1/2W		
TRANSISTOR/DIODE/POTENITOMETER			
Q301	2SC734		
D301	SE05-01		
D302	1N60		
D303	CR02A-2		
D304	ZB1-9		
VR301	50kΩ (B) with SW (S2)	R02-4001-05	
VR302	5kΩ (B)	R02-2001-05	
VR303	500 (B)	R10-46	
VR304	1kΩ (B)	R10-98	
MISCELLANEOUS			
–	Case (A)	A01-0005-02	
–	Case (B)	A01-0006-02	
–	Chassis	A10-0014-02	
–	Panel	A20-0022-04	
–	Sub-panel	A22-0010-05	
–	Dial Board	A30-0005-04	
–	Speaker Holder x 4	A5010	
–	Escashion	B01-0005-03	
–	Felt	B05-0005-04	
–	Acryl Board	B19-0003-04	
–	Pilot Lamp (for Car, A72 12V 3W)	B30-0002-05	
M	S-Meter	B31-0003-05	
–	Name Plate	B40-0025-04	
–	Certificate	B42-0009-04	
–	Instruction	B50-0100-10	
–	Relay Stopper	D32-0010-04	
–	Vinyl Socket	E03-02H	
–	Lug	E04-101B	
J5	3P Connector (Socket)	E06-0301-05	
J1	M Type Connector (Jack)	E07-11P	
–	M Type Connector (Plug)	E07-0301-15	
J4	2P Connector (Socket)	E08-0203-15	
–	2P Connector (Plug)	E09-0203-05	
J2, 3	Phone Jack	E11-0003-05	
–	Phone Plug x 2	E12-0001-05	
–	Relay Socket (P x 08)	E18-0801-05	

Symbol No.	Description	Part No.	Remarks
–	Speaker Cord (with Socket)	E30-0011-05	
–	Lug	E22-0502-05	
–	Beaded Band x 2	E4097	
–	Beaded Band x 3	E4099	
–	Insulating Rubber	G03-04	
–	Cushion	G11-0002-04	
–	Corrugated Cardboard Case	H01-0134-03	
–	Corrugated Cardboard Case	H02-0010-03	
–	Polystyrene Form Fixture x 2	H10-0057-03	
–	Accessory Bag x 2	H13-22	
–	Protection Bag x 2	H21-0007-03	
–	Protection Bag (100 x 250)	H25-0002-03	
–	Protection Bag (240 x 350)	H25-0003-03	
–	Fuse Holder	J13-0001-05	
–	Holder (for Car)	J19-0011-03	
–	MIC Hanger	J19-0018-04	
–	Dial Metal Fittings	J21-0050-24	
–	Rubber Bushing x 4	J43-0004-04	
–	Knob (C) - for Channel Select	K21-0005-04	
–	Knob (A) - for AF. VR	K23-0001-14	
–	Knob (B) - for SQE. VR	K23-0002-04	
L	Choke Coil	L15-0001-05	
L	Choke Coil	L20-010	
–	Sumb Screw x 4	N09-0007-05	
–	Screw (6 x 20, Hexagon) x 4	N09-0008-04	
–	Decorative Screw (for AF. VR)	N13-0002-04	
–	Nut (6mm Hexagon) x 4	N14-0009-04	
S1	Channel Selector (Rotary)	S01-2001-05	
F	Fuse (3A) x 3	S17-03	
RL	Relay (M x 2P)	S51-2002-05	
SP	Speaker (77mm)	T03-0003-05	
M	Mic	T91-0001-15	
–	P.V.C. Insulated Wire (Red) 0.3m	W02-82	
–	P.V.C. Insulated Wire (White) 0.6m	W02-89	
–	Tinned Wire (0.8φ, TCW) 0.2m	W03-08	
–	Vinyl Tube 0.1m	W06-154	
–	Vinyl Tube 0.1m	W06-204	
–	AC Cord (Red, Black) 2.1m	W10-08	
–	Single-Core Shielded Wire 0.3m	W11-016K	
–	Coaxial Cable (1.5C2V) 0.7m	W13-06	
–	Double-Core Shielding Wire 0.5m	W51-020	
–	Stranded Wire (KV-18) 0.6m	020-0001-05	
–	Stranded Wire (KV-18) 1.4m	020-0111-05	
–	Stranded Wire (KV-18) 1.1m	020-0221-05	
–	Stranded Wire (KV-18) 1.2m	020-0441-05	
–	Stranded Wire (KV-18) 1.5m	020-0551-05	
–	Stranded Wire (KV-18) 0.9m	020-0661-05	
–	Stranded Wire (KV-18) 1.2m	020-0991-05	
–	Screw (⊕P3 x 4 – F – ISO) x 11		
–	Screw (⊕P3 x 6 – F – ISO) x 11		
–	Screw (⊕P2 x 6 – F) x 2		
–	Screw (⊕P4 x 10 – F – ISO)		
–	Screw (⊕P2 x 4 – F) x 2		

■ PARTS LIST

Symbol No.	Description			Part No.	Remarks
–	Black Screw	(⊕MH3 x 6 – F · B – ISO)	x 14		
–	Flat Head Screw	(⊕S3 x 6 – F – ISO)	x 4		
–	Nut	(N3 – F – ISO)	x 2		
–	Nut	(N2 – F)	x 2		
–	Flat Washer	(NW4 – F · NA)	x 2		
–	Flat Washer	(NW6 – F · NA)	x 12		
–	Spring Washer	(SW4 – P · NA)			
–	Spring Washer	(SW6 – S · NA)	x 4		

PARTS DESCRIPTION LIST

Symbol No.	Description			Part No.	Remarks
	CAPACITORS				
C1	Silver Mica	5pF	±5pF		
C2	Ceramic	0.001μF	+80%, −20%		
C3~5	Ceramic	0.01μF	+80%, −20%		
C6	Silver Mica	7pF	±5%		
C7	Ceramic	1pF	±0.25pF		
C8	Ceramic	0.01μF	+80%, −20%		
C9	Silver Mica	7pF	±5%		
C10~13	Ceramic	0.01μF	+80%, −20%		
C14	Silver Mica	7pF	±5%		
C15	Ceramic	1pF	±0.25pF		
C16	Silver Mica	7pF	±5%		
C17~19	Ceramic	0.01μF	+80%, −20%		
C20	Silver Mica	27pF	±5%		
C21, 22	Ceramic	0.02μF	+80%, −20%		
C23	Silver Mica	22pF	±5%		
C24~26	Ceramic	0.01μF	+80%, −20%		
C27	Silver Mica	3pF	±5pF		
C28	Ceramic	2pF	±0.25pF		
C29, 30	Silver Mica	3pF	±5pF		
C31	Ceramic	0.01μF	+80%, −20%		
C32	Ceramic	0.02μF	+80%, −20%		
C33, 34	Ceramic	1pF	±0.25pF		
C35	Ceramic	0.02μF	+80%, −20%		
C36	Ceramic	2pF	±0.25pF		
C37~39	Ceramic	0.02μF	+80%, −20%		
C40	Ceramic	0.002μF	+80%, −20%		
C41	Ceramic	0.001μF	±10%		
C42	Silver Mica	47pF	±5%		
C43	Silver Mica	220pF	±5%		
C44, 45	Ceramic	0.02μF	+80%, −20%		
C46, 47	Ceramic	0.001μF	+80%, −20%		
C48	Ceramic	0.02μF	+80%, −20%		
C49	Ceramic	0.002μF	+80%, −20%		
C50, 51	Ceramic	0.02μF	+80%, −20%		
C52	Ceramic	0.01μF	+80%, −20%		
C53	Electrolytic Tubular	10μF	10WV		
C54	Ceramic	0.02μF	+80%, −20%		
C55	Ceramic	100pF	±10%		
C56, 57	Ceramic	0.02μF	+80%, −20%		
C58, 59	Ceramic	560pF	±10%		
C60	Electrolytic Tubular	10μF	10WV		
C61, 62	Ceramic	0.005μF	±20%		
C63	Ceramic	0.002μF	+80%, −20%		
C64	Ceramic	0.02μF	+80%, −20%		
C65	Ceramic	0.002μF	+80%, −20%		
C66	Ceramic	0.01μF	+80%, −20%		
C67	Ceramic	0.002μF	+80%, −20%		
C68	Ceramic	0.02μF	+80%, −20%		
C69, 70	Electrolytic Tubular	10μF	10WV		
C71	Ceramic	0.02μF	+80%, −20%		
C72	Electrolytic Tubular	3.3μF	50WV		

PARTS DESCRIPTION LIST

Symbol No.	Description				Part No.	Remarks
C73	Electrolytic Tubular	33μF	6.3WV			
C74	Electrolytic Tubular	4.7μF	25WV			
C75	Ceramic	0.001μF	+80%,	−20%		
C76	Electrolytic Tubular	10μF	25WV			
C77	Electrolytic Tubular	33μF	6.3WV			
C78	Electrolytic Tubular	33μF	16WV			
C79	Electrolytic Tubular	100μF	10WV			
C80~82	Ceramic	0.02μF	+80%,	−20%		
C83	Electrolytic	100μF	16WV			
	RESISTORS					
R1	Fixed Carbon Composition	100kΩ	±5%	1/4W		
R2	Fixed Carbon Composition	100Ω	±5%	1/4W		
R3	Fixed Carbon Composition	220Ω	±5%	1/4W		
R4	Fixed Carbon Composition	22kΩ	±5%	1/4W		
R5	Fixed Carbon Composition	4.7kΩ	±5%	1/4W		
R6, 7	Fixed Carbon Composition	1kΩ	±5%	1/4W		
R8	Fixed Carbon Composition	22kΩ	±5%	1/4W		
R9	Fixed Carbon Composition	4.7kΩ	±5%	1/4W		
R10, 11	Fixed Carbon Composition	1kΩ	±5%	1/4W		
R12	Fixed Carbon Composition	4.7kΩ	±5%	1/4W		
R13	Fixed Carbon Composition	15kΩ	±5%	1/4W		
R14	Fixed Carbon Composition	560Ω	±5%	1/4W		
R15	Fixed Carbon Composition	1kΩ	±5%	1/4W		
R16	Fixed Carbon Composition	47kΩ	±5%	1/4W		
R17	Fixed Carbon Composition	4.7kΩ	±5%	1/4W		
R18	Fixed Carbon Composition	560Ω	±5%	1/4W		
R19	Fixed Carbon Composition	1kΩ	±5%	1/4W		
R21	Fixed Carbon Composition	33kΩ	±5%	1/4W		
R22	Fixed Carbon Composition	4.7kΩ	±5%	1/4W		
R23, 24	Fixed Carbon Composition	1kΩ	±5%	1/4W		
R25	Fixed Carbon Composition	33kΩ	±5%	1/4W		
R26	Fixed Carbon Composition	4.7kΩ	±5%	1/4W		
R27	Fixed Carbon Composition	1kΩ	±5%	1/4W		
R28	Fixed Carbon Composition	3.3kΩ	±5%	1/4W		
R29	Fixed Carbon Composition	4.7kΩ	±5%	1/4W		
R30	Fixed Carbon Composition	10kΩ	±5%	1/4W		
R31~34	Fixed Carbon Composition	1kΩ	±5%	1/4W		
R35	Fixed Carbon Composition	33kΩ	±5%	1/4W		
R36	Fixed Carbon Composition	4.7kΩ	±5%	1/4W		
R37	Fixed Carbon Composition	1kΩ	±5%	1/4W		
R38	Fixed Carbon Composition	3.3kΩ	±5%	1/4W		
R39	Fixed Carbon Composition	10kΩ	±5%	1/4W		
R40	Fixed Carbon Composition	4.7kΩ	±5%	1/4W		
R41	Fixed Carbon Composition	12kΩ	±5%	1/4W		
R42	Fixed Carbon Composition	1.5kΩ	±5%	1/4W		
R43	Fixed Carbon Composition	470Ω	±5%	1/4W		
R44, 45	Fixed Carbon Composition	1kΩ	±5%	1/4W		
R46, 47	Fixed Carbon Composition	5.6kΩ	±5%	1/4W		
R48	Fixed Carbon Composition	33kΩ	±5%	1/4W		
R49	Fixed Carbon Composition	470Ω	±5%	1/4W		
R50	Fixed Carbon Composition	5.6kΩ	±5%	1/4W		

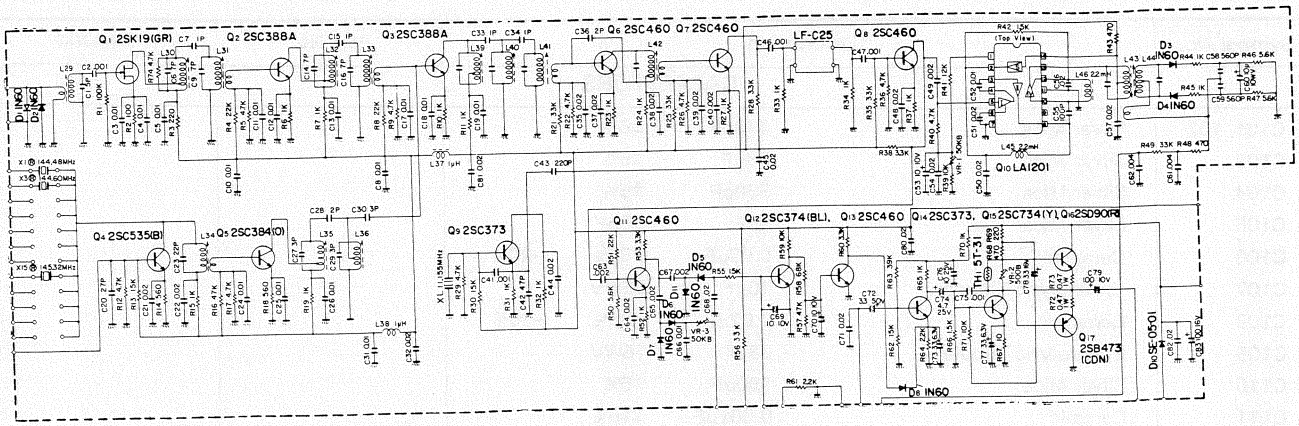
PARTS DESCRIPTION LIST

Symbol No.	Description				Part No.	Remarks
R51	Fixed Carbon Composition	22kΩ	±5%	1/4W		
R52	Fixed Carbon Composition	1kΩ	±5%	1/4W		
R53	Fixed Carbon Composition	3.3kΩ	±5%	1/4W		
R55	Fixed Carbon Composition	15kΩ	±5%	1/4W		
R56, 57	Fixed Carbon Composition	47kΩ	±5%	1/4W		
R58	Fixed Carbon Composition	68kΩ	±5%	1/4W		
R59	Fixed Carbon Composition	10kΩ	±5%	1/4W		
R60	Fixed Carbon Composition	3.3kΩ	±5%	1/4W		
R61	Fixed Carbon Composition	2.2kΩ	±5%	1/4W		
R62	Fixed Carbon Composition	15kΩ	±5%	1/4W		
R63	Fixed Carbon Composition	39kΩ	±5%	1/4W		
R64	Fixed Carbon Composition	2.2kΩ	±5%	1/4W		
R65	Fixed Carbon Composition	1kΩ	±5%	1/4W		
R66	Fixed Carbon Composition	1.5kΩ	±5%	1/4W		
R67	Fixed Carbon Composition	10Ω	±5%	1/4W		
R68	Fixed Carbon Composition	470Ω	±5%	1/4W		
R69	Fixed Carbon Composition	220Ω	±5%	1/4W		
R70	Fixed Carbon Composition	1kΩ	±5%	1/4W		
R71	Fixed Carbon Composition	10kΩ	±5%	1/4W		
R72, 73	Metal Film	0.47Ω	1W			
R74	Fixed Carbon Composition	4.7kΩ	±5%	1/4W		
VR1, 3	Semi-Fixed Potentiometer	50kΩ(B)			R10-57	
VR2	Semi-Fixed Potentiometer	500 (B)			R10-69	
	TRANSISTOR/IC/DIODE					
Q1	2SK19 (GR)	FET				
Q2, 3	2SC388A					
Q4	2SC535(B)					
Q5	2SC384(O)					
Q6~8	2SC460(B)					
Q9	2SC373					
Q10	LA1201	IC				
Q11	2SC460(B)					
Q12	2SC374(BL)					
Q13	2SC460(B)					
Q14	2SC733(GR)					
Q15	2SC734(Y)					
Q16	2SD90(R)					
D1~8	1N60					
D10	SE05-01					
D11	1N60					
	THERMISTOR/COIL/CRYSTAL					
TH1	5T-31					
L29	VHF Coil	(ANT)			L34-0009-05	
L30	VHF Coil	(RF-A)	145MHz		L34-0010-05	
L31	VHF Coil	(RF-B)	145MHz		L34-0011-05	
L32	VHF Coil	(RF-A)	145MHz		L34-0010-05	
L33	VHF Coil	(RF-C)	145MHz		L34ß0012-05	
L34	OSC Coil		44.5MHz		L32-0012-05	
L35	OSC Coil	(TRIP-B)	133.5MHz		L34-0014-05	
L36	OSC Coil	(TRIP-A)	133.5MHz		L34-0013-05	

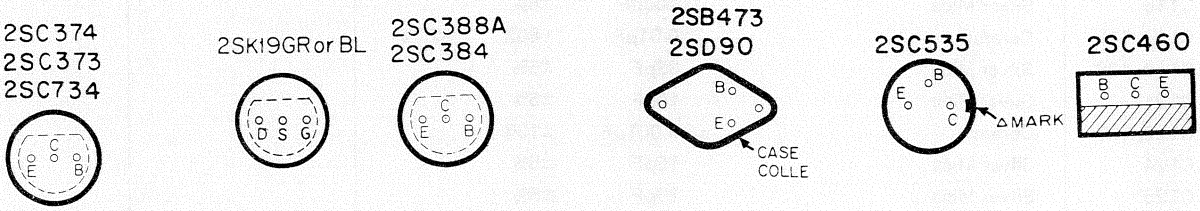
PARTS DESCRIPTION LIST

Symbol No.	Description	Part No.	Remarks
L37, 38	Ferri-Inductor (FL5H-1ROM)		
L39~42	I.F.T. (10.7MHz)	L30-0005-05	
L43	Discriminator Coil (D) (455MHz)	L30-0006-05	
L44	Discriminator Coil (E) (455MHz)	L30-0007-05	
L45, 46	Ferri-Inductor (FL7H-222J)		
X1	Quartz-Oscillator (HC25U, Ⓡ 144.48MHz)	L77-0006-05	
X3	Quartz-Oscillator (HC25U, Ⓡ 144.60MHz)	L77-0007-05	
X15	Quartz-Oscillator (HC25U, Ⓡ 145.32MHz)	L77-0008-05	
XL	Quartz-Oscillator (HC18U, 11.155MHz)	L77-0005-05	
	MISCELLANEOUS		
–	Printed Circuit Board	J25-0022-03	
–	Crystal Socket (HC25U, 12P)	E18-2401-05	
–	Terminal x 6	N4085	
–	Terminal x 18	N4086	
–	P.V.C. Insulated Wire (Red, 0.5φ) 0.4m	W02-52	
–	P.V.C. Insulated Wire (Yellow, 0.5φ) 0.1m	W02-54	
–	P.V.C. Insulated Wire (Blue, 0.5φ) 0.1m	W02-56	
–	Tinned Wire (0.8φ) 0.03m	W03-08	
–	Screw (⊕P3 x 8 – F – ISO) x 4		
–	Nut (N3 – F – ISO) x 4		
–	Toothed Lock Washer (KW13 – S) x 4		

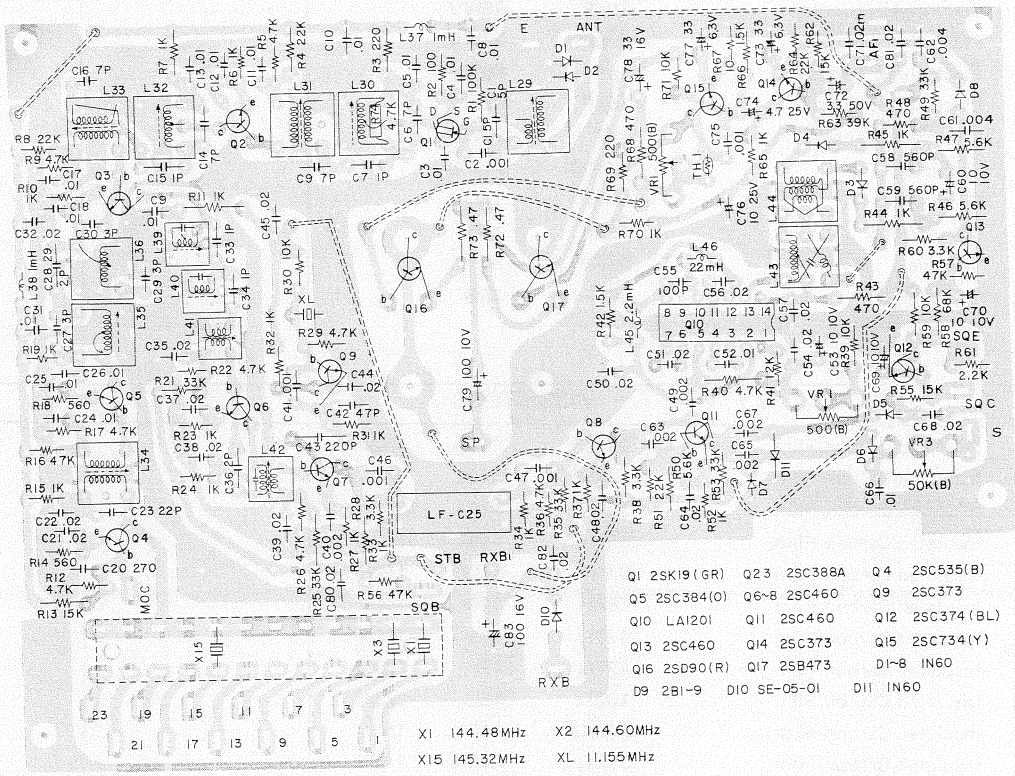
SCHEMATIC DIAGRAM



BOTTOM VIEW OF TRANSISTORS



SEALED CIRCUIT ASSEMBLIES-PHANTOM VIEWS



PARTS DESCRIPTION LIST

Symbol No.	Description				Part No.	Remarks
	CAPACITORS					
C101, 102	Silver Mica	470pF	±5%			
C103	Silver Mica	68pF	±5%			
C104	Silver Mica	330pF	±5%			
C105	Silver Mica	5pF	±5pF			
C106	Ceramic	0.02μF	+80%,	−20%		
C107	Electrolytic Tubular	10μF	25WV			
C108	Ceramic	0.02μF	+80%,	−20%		
C109	Electrolytic Tubular	33μF	16WV			
C110	Silver Mica	150pF	±5%			
C111	Ceramic	0.001μF	±10%			
C112, 113	Ceramic	0.02μF	+80%,	−20%		
C114, 115	Silver Mica	82pF	±5%			
C116	Silver Mica	100pF	±5%			
C117, 118	Ceramic	0.01μF	+80%,	−20%		
C119, 120	Silver Mica	33pF	±5%			
C121	Silver Mica	10pF	±5%			
C122, 123	Ceramic	0.001μF	±10%			
C124	Silver Mica	15pF	±5%			
C125	Silver Mica	10pF	±5%			
C126	Silver Mica	2pF	±0.25pF			
C127	Silver Mica	56pF	±5%			
C128	Silver Mica	0.001μF	±10%			
C129	Silver Mica	2pF	±0.25pF			
C130~133	Silver Mica	0.001μF	±10%			
C134	Electrolytic Tubular	1μF	50WV			
C135	Ceramic	0.01μF	+80%,	−20%		
C136	Electrolytic Tubular	10μF	25WV			
C137	Electrolytic Tubular	33μF	16WV			
C138~140	Electrolytic Tubular	1μF	50WV			
C141	Electrolytic Tubular	10μF	25WV			
C142	Electrolytic Tubular	1μF	50WV			
C143	Polyester	0.22μF	±10%			
C147	Silver Mica	33pF	±5%			
C148	Silver Mica	12pF	±5%			
C149, 150	Ceramic	0.001μF	±10%			
C151~162	Silver Mica	56pF	±5%			
TC1~12	Ceramic Trimmer (ECV-1ZW40P)				C4047	
TC13~18	Ceramic Trimmer (ECV-1ZW12P)				C4036	
	RESISTORS					
R101	Insulated Carbon Film	22kΩ	±10%	1/4W		
R102	Insulated Carbon Film	4.7kΩ	±10%	1/4W		
R103	Insulated Carbon Film	1kΩ	±10%	1/4W		
R104	Insulated Carbon Film	3.3kΩ	±10%	1/4W		
R105	Insulated Carbon Film	6.8kΩ	±10%	1/4W		
R106	Insulated Carbon Film	68kΩ	±10%	1/4W		
R107	Insulated Carbon Film	470Ω	±10%	1/4W		
R108	Insulated Carbon Film	470Ω	±5%	1/2W		
R109	Insulated Carbon Film	100Ω	±5%	1/2W		
R110	Insulated Carbon Film	3.3kΩ	±10%	1/4W		
R111	Insulated Carbon Film	33kΩ	±10%	1/4W		
R112	Insulated Carbon Film	220Ω	±10%	1/4W		

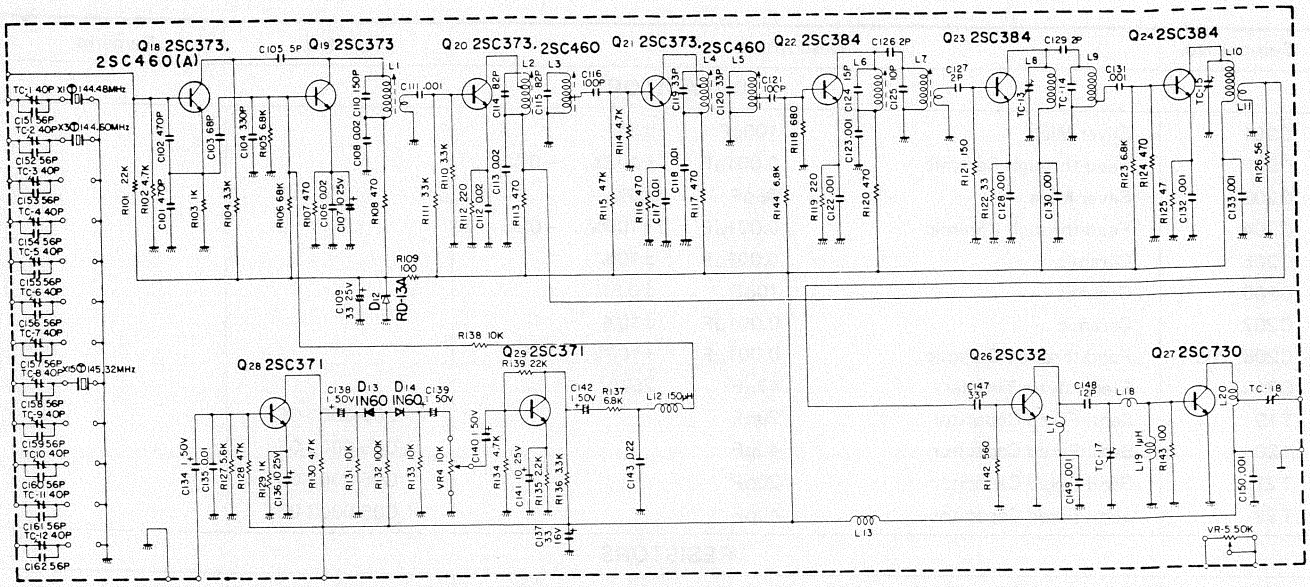
PARTS DESCRIPTION LIST

Symbol No.	Description				Part No.	Remarks
R113	Insulated Carbon Film	470Ω	±10%	1/4W		
R114	Insulated Carbon Film	4.7kΩ	±10%	1/4W		
R115	Insulated Carbon Film	47kΩ	±10%	1/4W		
R116, 117	Insulated Carbon Film	470Ω	±10%	1/4W		
R118	Insulated Carbon Film	680Ω	±10%	1/4W		
R119	Insulated Carbon Film	220Ω	±10%	1/4W		
R120	Insulated Carbon Film	470Ω	±10%	1/4W		
R121	Insulated Carbon Film	150Ω	±10%	1/4W		
R122	Insulated Carbon Film	33Ω	±10%	1/4W		
R123	Insulated Carbon Film	6.8kΩ	±10%	1/4W		
R124	Insulated Carbon Film	470Ω	±10%	1/4W		
R125	Insulated Carbon Film	47Ω	±10%	1/4W		
R126	Insulated Carbon Film	56Ω	±10%	1/4W		
R127	Insulated Carbon Film	5.6kΩ	±10%	1/4W		
R128	Insulated Carbon Film	47kΩ	±10%	1/4W		
R129	Insulated Carbon Film	1kΩ	±10%	1/4W		
R130	Insulated Carbon Film	4.7kΩ	±10%	1/4W		
R131	Insulated Carbon Film	10kΩ	±10%	1/4W		
R132	Insulated Carbon Film	100kΩ	±10%	1/4W		
R133	Insulated Carbon Film	10kΩ	±10%	1/4W		
R134	Insulated Carbon Film	4.7kΩ	±10%	1/4W		
R135	Insulated Carbon Film	2.2kΩ	±10%	1/4W		
R136	Insulated Carbon Film	3.3kΩ	±10%	1/4W		
R137	Insulated Carbon Film	6.8kΩ	±10%	1/4W		
R138	Insulated Carbon Film	10kΩ	±10%	1/4W		
R139	Insulated Carbon Film	22kΩ	±10%	1/4W		
R142	Insulated Carbon Film	560Ω	±5%	1/2W		
R143	Insulated Carbon Film	100Ω	±5%	1/2W		
R144	Insulated Carbon Film	6.8kΩ	±10%	1/4W		
VR4	Insulated Carbon Film	10kΩ (B)			R10-63	
VR5	Insulated Carbon Film	50kΩ (B)			R10-64	
	TRANSISTOR/DIODE/COIL					
Q18	2SC373 or 2SC460(A)					
Q19	2SC373					
Q20, 21	2SC373 or 2SC460(A)					
Q22~24	2SC384(O)					
Q26	2SC32(4)					
Q27	2SC730					
Q28, 29	2SC371					
D12	RD13A(L)					
D13, 14	1N60					
L1	Tuning Coil	6MHz			L31-0003-04	
L2	Tuning Coil	12MHz			L31-0004-05	
L3	Tuning Coil	12MHz			L31-0005-05	
L4	Tuning Coil	24MHz			L31-0006-05	
L5	Tuning Coil	24MHz			L31-0007-05	
L6	Tuning Coil	72MHz			L31-0008-04	
L7	Tuning Coil	72MHz			L31-0009-04	
L8, 9	VHF Coil (A)				L34-0004-04	
L10	VHF Coil (B)				L34-0005-04	
L11	VHF Coil (C)				L34-0006-04	
L12	Ferri-Inductor	(FL5H151K)				

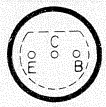
PARTS DESCRIPTION LIST

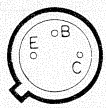
Symbol No.	Description	Part No.	Remarks
L13	Choke Coil	L22-01	
L17	Choke Coil	L22-01	
L18	VHF Coil (A)	L34-0005-04	
L19	Ferri-Inductor (FL5H1ROM)		
L20	VHF Coil (B)	L34-0005-04	
	CRYSTAL		
X1	Quartz-Oscillator (Ⓣ 144.48MHz)	L77-0002-05	
X3	Quartz-Oscillator (Ⓣ 144.60MHz)	L77-0003-05	
X15	Quartz-Oscillator (Ⓣ 145.32MHz)	L77-0004-05	
	MISCELLANEOUS		
–	Printed Circuit Board	J25-0021-03	
–	Crystal Socket	E18-2401-05	
–	Radiator Fittings	F02-0001-05	
–	Shielding Plate	F10-0006-03	
–	Shielding Plate (B)	F10-0017-04	
–	Terminal x 8	N4085	
–	Terminal	N4086	
–	P.V.C. Insulated Wire (0.5φ) 0.2m	W02-52	
–	Tinned Wire (0.8φ) 0.1m	W03-08	
–	Stranded Wire (KU-18) 0.4m	020-0111-05	
–	Screw (⊕3 x 4 – F – ISO) x 2		

SCHEMATIC DIAGRAM

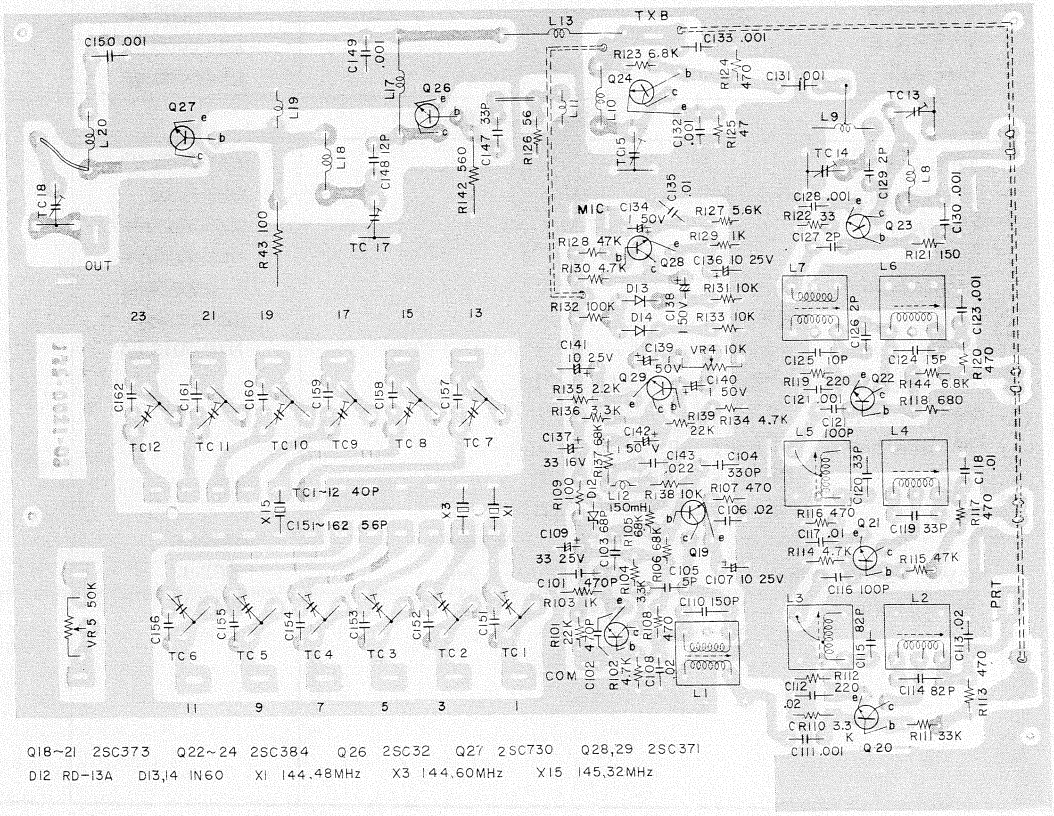


BOTTOM VIEW OF TRANSISTORS





SEALED CIRCUIT ASSEMBLIES-PHANTOM VIEWS



Q18~21 2SC373 Q22~24 2SC384 Q26 2SC32 Q27 2SC730 Q28,29 2SC371
D12 RD-13A D13,14 IN60 X1 144.48MHz X3 144.60MHz X15 145.32MHz

PARTS DESCRIPTION LIST

Symbol No.	Description				Part No.	Remarks
	CAPACITORS					
C201	Silver Mica	100pF	±5%			
C202	Feed-through Ceramic	0.001μF	+100%,	−0%		
C203	Silver Mica	56pF	±5%			
C204	Feed-through Ceramic	0.001μF	+100%,	−0%		
C205	Ceramic	0.001μF	±10%			
C206	Ceramic	10pF	±0.5%			
C207	Ceramic	0.001μF	±10%			
C208, 209	Feed-through Ceramic	0.001μF	+100%,	−0%		
C210	Electrolytic Tubular	47μF	25WV			
T19	Semi-Fixed Capacitor	20pF			C05-0001-05	
T20	Semi-Fixed Capacitor	40pF			C05-0002-05	
T21	Semi-Fixed Capacitor	20pF			C05-0001-05	
T22	Semi-Fixed Capacitor	40pF			C05-0002-05	
	RESISTORS					
R201	Fixed Carbon Composition	220Ω	±10%	1/2W		
R202	Fixed Carbon Composition	33kΩ	±10%	1/2W		
	TRANSISTOR/DIODE/COIL					
Q30	2SC702					
Q31	2SC703					
D15	1N60					
L21	Ferri-Inductor	(FL5H100k)				
L22	Choke Coil				L22-01	
L23	VHF Coil D				L34-0007-04	
L24	Ferri-Inductor	(FL5H100k)				
L25	Choke Coil				L22-01	
L26	VHF Coil D				L34-0007-04	
L27, 28	VHF Coil E				L34-0008-04	
L29, 30	VHF Coil				L34-0054-04	
	MISCELLANEOUS					
–	Final Chassis				A11-0002-03	
–	Lug Assembly	x 2			E04-101B	
–	Lug (A112)				E23-0001-05	
–	Radiator				F01-0002-04	
–	Shielding Plate	x 3			F10-0007-04	
–	Collar	x 8			J31-0013-24	
–	Washer	x 8			N19-0013-04	
–	Pan Head Screw	(⊕2 x 4 – F – ISO)	x 12			
–	Pan Head Screw	(⊕2 x 12 – F – ISO)	x 8			
–	Pan Head Screw	(⊕3 x 6 – F – ISO)	x 6			
–	Nut	(N2 – F – ISO)	x 8			
–	Nut	(N3 – F – ISO)	x 2			
–	P.V.C. Insulated Wire	(0.5φ)	0.1m		W02-59	
–	P.V.C. Insulated Wire	(0.8φ)	0.2m		W02-82	
–	Tinned Wire	(0.8φ)	0.1m		W03-08	

SCHEMATIC DIAGRAM