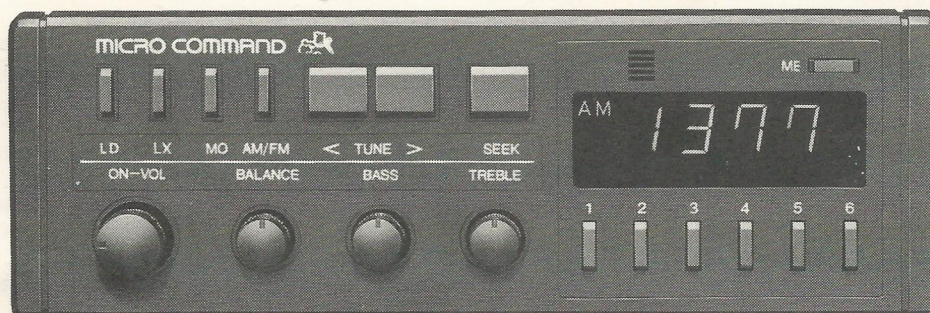




# SERVICE MANUAL

**ELECTRONIC SEEK TUNE AM FM STEREO RADIO**  
**with 12 programmable Memories & Display,**  
**Loudness Contour and separate Bass and Treble Controls**

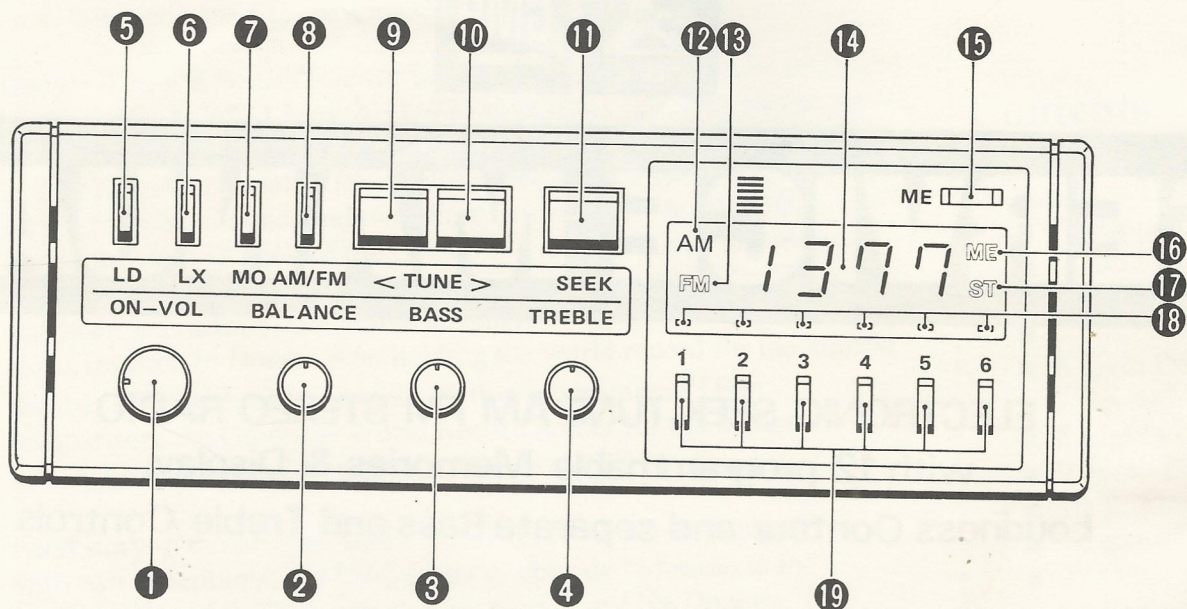


**MRB-6201A**

**FOR ADDITIONAL TECHNICAL DESCRIPTION, REFER TO THE  
SERVICE MANUAL FOR MRB-6201.**



## LOCATION OF CONTROLS



- ① Power On-Off Switch/Volume Control
- ② Balance Control
- ③ Bass Control
- ④ Treble Control
- ⑤ Loudness Contour Switch
- ⑥ Local/Distant Selector
- ⑦ FM Stereo/Mono Selector

- ⑧ Waveband Selector
- ⑨ Manual Tuning Switch
- ⑩ Manual Tuning Switch
- ⑪ Automatic Seek Tuning Switch
- ⑫ AM Indicator
- ⑬ FM Indicator
- ⑭ Digital Frequency Readout

- ⑮ Memory Enable Switch
- ⑯ Memory Enable (ME) Indicator
- ⑰ FM Stereo (ST) Indicator
- ⑱ Memory Address Indicators
- ⑲ Memory Address Switches



## GENERAL INFORMATION

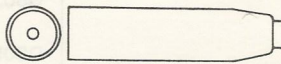
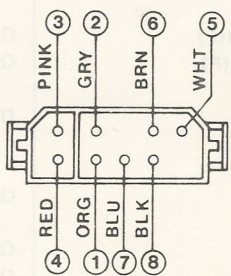
SEMICONDUCTORS: 9 ICs, 3 FETs, 33 Transistors, 44 Diodes

Description	Ref. No.	Q'ty	Equivalent
(AM Radio)			
AM IC LA1135	IC801	1	
Radio frequency amplifier FET 2SK242(T)	Q802	1	2SK242(S)
Switching transistor 2SC230(D)	Q801, 803, 804	3	2SC2814(F4), 2SC2620(B), 2SC2714(O) or (Y)
Oscillator buffer amplifier transistor 2SC2603(F)	Q304	1	2SC2603(E), 2SC2785(F) or (H), 2SC536(F) or (G), 2SC1740S(Q) or (R)
Switching diode 1SS110	D804	1	1N60
Varactor diode SVC321	D801, 802, 803	3	1SV101
Switching diode 1SS133	D102, 202	2	1SS53, 1S1555
Absorber diode EQA02-09(SA)	D602, 603	2	
(FM Radio)			
IF IC LA1140	IC901	1	
NB IC LA2110	IC902	1	
MPX IC LA3376	IC903	1	
Radio frequency amplifier FET 3SK101(GR)	Q501	1	3SK85
Mixer transistor 2SC2714(R)	Q502	1	2SC2714(O) or (Y), 2SC2620
Oscillator buffer amplifier transistor 2SC2714(R)	Q504	1	2SC2714(O) or (Y), 2SC2620
Oscillator FET 2SK210(Y)	Q503	1	2SK210(GR) or (BL)
IF amplifier transistor 2SC930(D)	Q901	1	2SC2787(K) or (L)
Oscillator buffer amplifier transistor 2SC930(D)	Q301	1	2SC2787(K) or (L)
AM and FM LOC/DX switching transistor 2SC2603(F)	Q602	1	2SC2603(E), 2SC2785(F) or (H), 2SC536(F) or (G), 2SC1740S(Q) or (R)
Switching transistor 2SC2603(F)	Q601	1	2SC2603(E), 2SC2785(F) or (H), 2SC536(F) or (G), 2SC1740S(Q) or (R)
Switching diode 1SS133	D101, 201, 601	3	1SS53, 1S1555
Voltage shift diode 1SS133	D901, 902	2	1SS53, 1S1555
Varactor diode 1SV103	D501, 502, 503	3	SVC211
(AM Hi cut)			
Switching transistor 2SC2603(F)	Q603	1	2SC2603(E), 2SC2785(F) or (H), 2SC536(F) or (G), 2SC1740S(Q) or (R)
Switching diode 1SS133	D805, 806	2	1SS53, 1S1555
(Audio)			
Power amplifier IC HA13001	IC151	1	
Muting transistor 2SC2603(F)	Q101, 201	2	2SC2603(E), 2SC2785(F) or (H), 2SC536(F) or (G), 2SC1740S(Q) or (R)
Buffer amplifier transistor 2SC2603(F)	Q102, 202, 103, 203	4	
Buffer amplifier regulator 2SC2603(F)	Q151	1	2SC2603(E), 2SC2785(F) or (H), 2SC536(F) or (G), 2SC1740S(Q) or (R)
Switching diode 1SS133	D152	1	1SS53, 1S1555
(AM FM Regulator)			
Switching transistor 2SC2603(F)	Q701, 703, 704	3	2SC2603(E), 2SC2785(F) or (H), 2SC536(F) or (G), 2SC1740S(Q) or (R)
Switching transistor 2SD400(F)	Q702	1	
Zener diode EQA02-09(SA)	D701, 702	2	
(Search stop)			
Switching transistor 2SA1115(E)	Q705	1	2SA1115(F), 2SA1175(E)
Switching transistor 2SC2603(F)	Q706, 707	2	2SC2603(E), 2SC2785(F) or (H), 2SC536(F) or (G), 2SC1740S(Q) or (R)
Zener diode RD5.6E(B2)	D703	1	
Switching diode 1SS133	D704, 705, 706 707, 708	5	1SS53, 1S1555

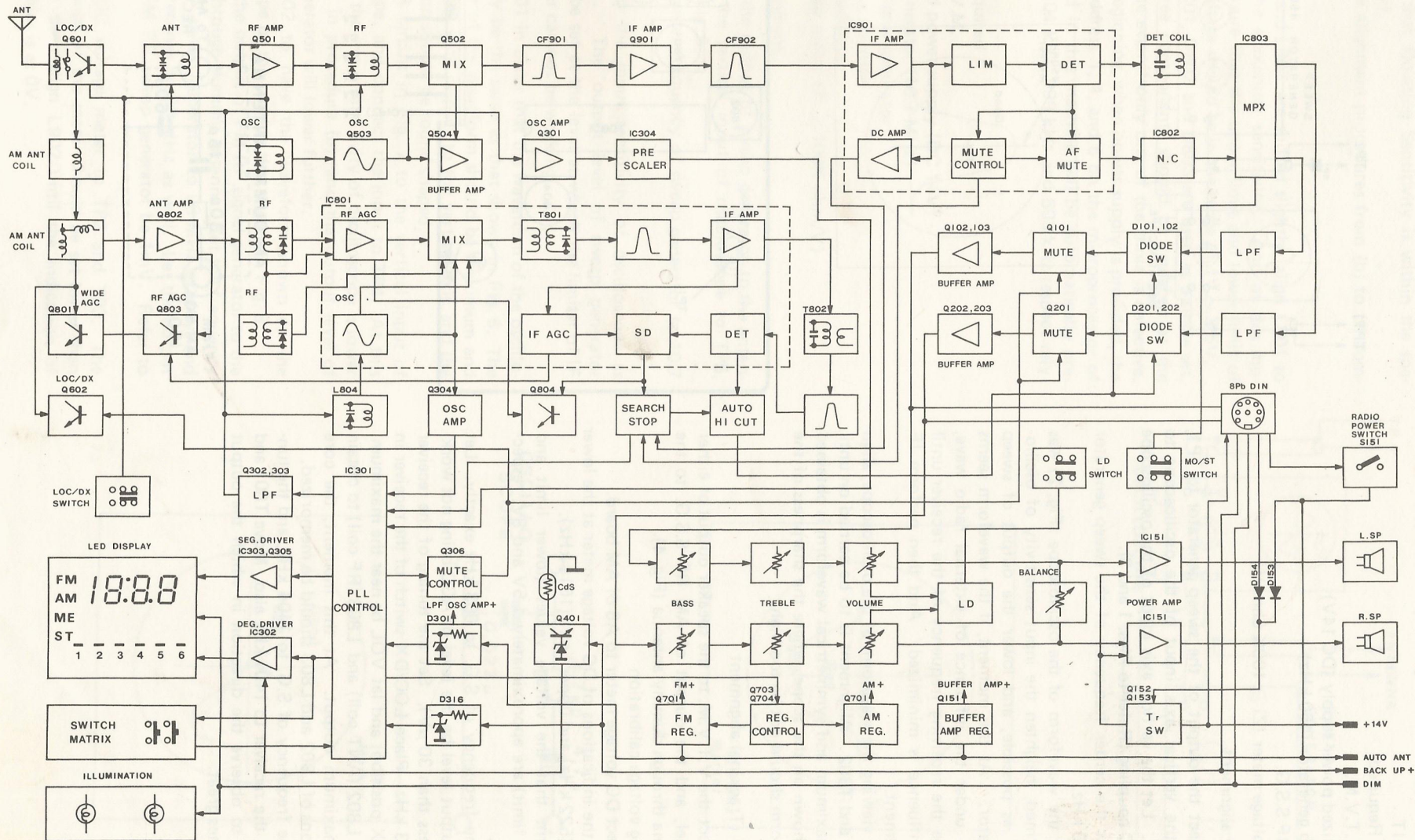


Description	Ref. No.	Q'ty	Equivalent
(PLL)			
PLL control IC $\mu$ PD1710G-016	IC301	1	
Prescaler $\mu$ PB553AC	IC304	1	
Low pass filter transistor 2SC2603(F)	Q302, 303	2	2SC2603(E), 2SC2785(F) or (H), 2SC536(F) or (G), 2SC1740S(Q) or (R)
Switching transistor 2SC2603(F)	Q305, 306	2	2SC2603(E), 2SC2785(F) or (H), 2SC536(F) or (G), 2SC1740S(Q) or (R)
Zener diode RD5.1E(B2)	D301, 304	2	
Zener diode EQA02-09(SA)	D302	1	
Switching diode 1SS133	D305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315	11	1SS53, 1S1555
(Display)			
Transistor array M54562P	IC302	1	
Transistor array M54517P	IC303	1	
Power transistor 2SD313(E)	Q401	1	
Dimmer control transistor 2SC2603(F)	Q402, 403, 404	3	2SC2603(E), 2SC2785(E) or (H), 2SC536(F) or (G), 2SC1740S(Q) or (R)
Zener diode RD5.6E(B2)	D401	1	
Protector diode ERB12(02)	D151, 156	2	DS135(D)

## INPUT & OUTPUT

Indication	For connection of:	Sensitivity	Impedance	Type of Socket	Connection
Antenna receptacle	Car radio aerial	1 $\mu$ V - 3V	75 ohm		Aerial
Power supply, 4P plug or 8P plug	Small light switch	---	---		1. Back light <b>OR.</b>
	Automatic aerial	14V DC (Max. 500mA)	---		2. Automatic aerial <b>GY.</b>
	Power supply +14V (Car battery)	---	---		3. Car battery +14V DC <b>PK.</b>
	Power supply +14V (Ignition switch)	---	---		4. +14V DC <b>RD.</b>
	Output Speaker Left CH and Right CH	5. 7.5W 7. 7.5W	4 ohm 4 ohm		5. Right Speaker <b>WT.</b> 6. Speaker GND <b>BN.</b> 7. Left Speaker <b>BU.</b>
	Chassis of car (Ground)	---	---		8. Ground <b>BK.</b>





CIRCUIT FUNCTION DIAGRAM



## SERVICE ALIGNMENT PROCEDURE

### RADIO SECTION

#### AM CIRCUIT

##### Equipment Required

1. AC V.T.V.M.
2. Stabilized power supply (DC 14V)
3. Sweep generator (450 kHz)
4. AM RF S.S.G.
5. DC voltage meter ( $Z_i \geq 100K \text{ ohm/V}$ )

##### (A) AM, IF alignment

- (a) Connect the output of the sweep generator to TP1, and the vertical axis input of the oscilloscope to TP11. Let the vertical axis input of the oscilloscope be AC coupling (Refer to Figs. 1 and 3).
- (b) Adjust the center frequency of the sweep generator to 450 kHz.
- (c) When the waveform of the oscilloscope (Fig. 2) was confirmed, heighten the input sensitivity of oscilloscope as possible, and lower the output of sweep generator. At this moment, if the waveform seems to be under the influence of external radio wave, change the receiving frequency of the receiver until the influence is minimized. And then perform IF adjustment.
- (d) While viewing the waveform of the oscilloscope, align T801 and T802. Alignment is to be carried on until the maximum and symmetrical waveform is obtained and shown on the scope, where the sharpness of the waveform should not be too high.

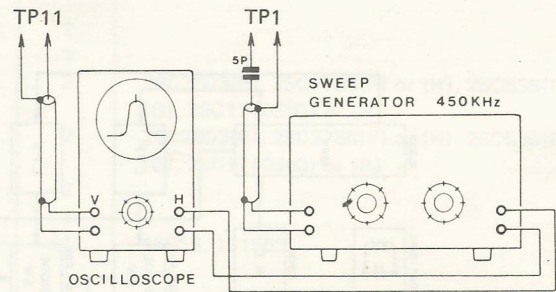


Fig. 1

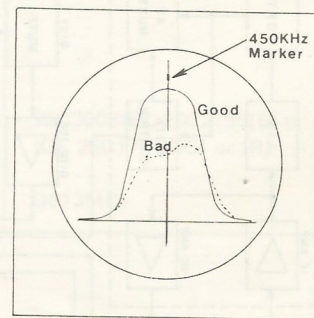


Fig. 2

##### (B) AM RF (Tracking) alignment

- (a) Connect the V.T.V.M. to the speaker output of either channel, and the output of AM RF S.S.G. to the antenna through dummy antenna (Fig. 4).
- (b) Tuning voltage calibration  
Connect DC voltage meter to A6 of AM board.  
Read the indications of DC voltage meter at the lower limit (522 kHz) and upper limit (1611 kHz).  
Confirm that the voltage values (lower limit and upper limit) are approximately 1.5V and 8V, respectively.
- (c) Set the frequency of S.G. to 603 kHz exactly. Let the output level be the level of AGC being not working (less than  $30 \mu\text{V}$ ). Set the tuning of the receiver to 603 kHz. Place LOC/DX switch of the receiver in the DX position, and let VOL be near the maximum.
- (d) Align L802 (ANT coil) and L803 (RF coil) to obtain the maximum output. At this moment, the core positions of L802 and L803 should be memorized.
- (e) Set the frequency of S.G. to 1404 kHz, and the tuning of the receiver to 1404 kHz also. Move T801 and T802 to observe the direction in which the output becomes great.

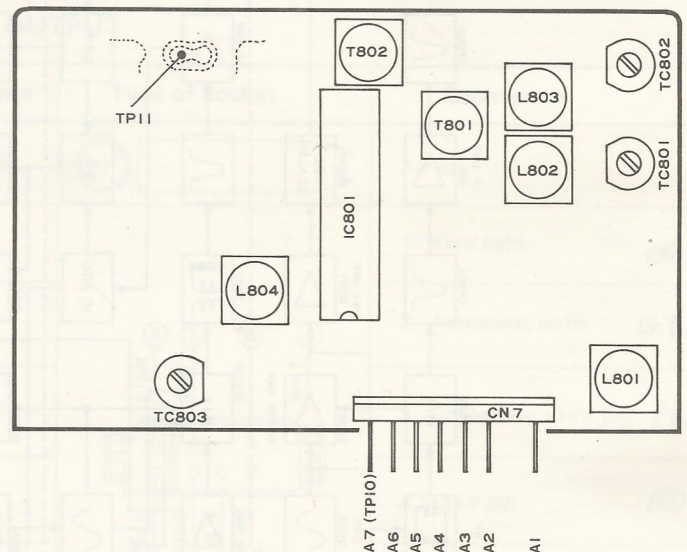


Fig. 3

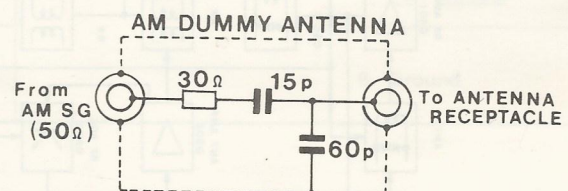


Fig. 4



- (f) Repeat the above mentioned procedure several times. (Ensure that Quieting Sensitivity is within the specification).
- (g) When the alignment procedures from (b) to (f) completed.

**Note:**

1. If L802 and L803 are shifted slightly, align L801 to obtain the maximum sensitivity. And at this moment, ensure that the upper limit and lower limit of tuning voltage should be in the range of 1V ~ 8.5V.
2. Since D801, D802 and D803 are used as a single set, these three components should be replaced at the same time even if only one of the three is defective.
3. At the beginning, when power supply is provided, the pre-set address 1, 4, and 6 on the microprocessor of PLL used in this machine will be automatically pre-set to 1404 kHz, 999 kHz and 603 kHz respectively.

**FM Circuit**

**Equipment Required**

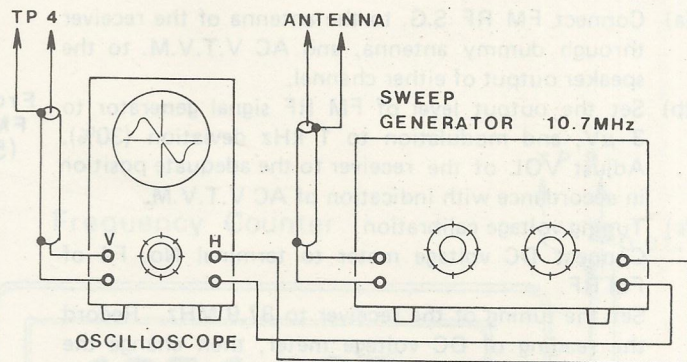
1. AC V.T.V.M.
2. Stabilized power supply (DC 14V)
3. Sweep generator (10.7 MHz)
4. FM RF Signal generator
5. Frequency counter
6. Stereo modulator
7. DC Voltage meter ( $Z_i \geq 100K \text{ ohm/V}$ )

**(A) FM IF alignment**

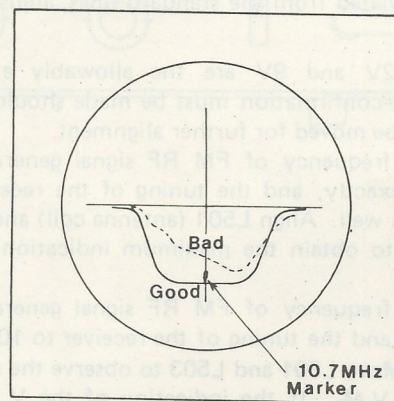
- (a) Connect the output of sweep generator to the antenna, and the vertical input of oscilloscope to TP5. Refer to Fig. 5.
- (b) Set the center frequency of sweep generator to 10.7 MHz.

**Note:** Heighten the input sensitivity of oscilloscope as possible. The output level of sweep generator should be set at the level at which the limiter of IF amplifier can not be working.

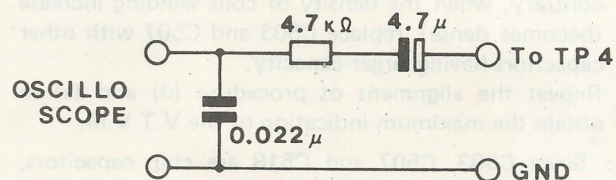
- (c) Align T501 in order that the waveform of the oscilloscope may be the same as that shown in Fig. 6. The amplitude of the waveform should be maximum and symmetrical with respect to the vertical axis, and the end portion should be round shaped.
- (d) Place C.R circuit in Fig. 7 to the vertical input of oscilloscope, and connect the input to TP4. At this moment, the input sensitivity of oscilloscope is lower than that in procedure (b), and the output level of sweep generator will lower further.
- (e) Align L902 to have the waveform shown on the oscilloscope be the same as that shown in Fig. 8.
- (f) Connect the output of FM RF signal generator to the antenna through dummy antenna. Set the frequency of FM RF sweep generator to 98 MHz exactly, and tune the receiver to 98 MHz as well. Let the output level of FM RF sweep generator be 1mV. Refer to Fig. 9.
- (g) Connect DC voltage meter to TP2 and TP3. The voltage range of the meter should be set lower than 0.5V and then align L902 until the indication of voltage meter is at 0V.



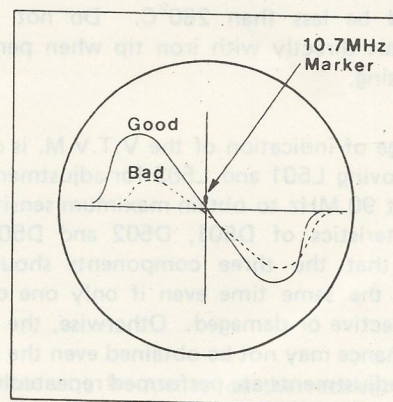
**Fig. 5**



**Fig. 6**



**Fig. 7**



**Fig. 8**



## (B) FM RF board alignment

- Connect FM RF S.G. to the antenna of the receiver through dummy antenna, and AC V.T.V.M. to the speaker output of either channel.
- Set the output level of FM RF signal generator to 3  $\mu$ V, and modulation to 1 kHz deviation (30%). Adjust VOL of the receiver to the adequate position in accordance with indication of AC V.T.V.M.
- Tuning voltage calibration  
Connect DC voltage meter to terminal No. F4 of FM RF

Set the tuning of the receiver to 87.9 MHz. Record the reading of DC voltage meter, then change the tuning of the receiver to 107.9 MHz and in turn record the reading of DC voltage meter. Confirm that the two voltage values are to be approximately 1.5V and 7V, respectively. If the values indicated are greatly deviated from the standard ones, adjust L505 and C518.

**Note:** Since 1.2V and 9V are the allowably extreme values, re-confirmation must be made should L505 or C518 be moved for further alignment.

- Tune the frequency of FM RF signal generator to 90 MHz exactly, and the tuning of the receiver to 90 MHz as well. Align L501 (antenna coil) and L503 (RF coil) to obtain the maximum indication of the V.T.V.M.
- Tune the frequency of FM RF signal generator to 106 MHz, and the tuning of the receiver to 106 MHz as well. Move L501 and L503 to observe the reading of the V.T.V.M. If the indication of the V.T.V.M. increases when the density of coils winding decreases (becomes coarse), replace C503 and C507 with other capacitors having smaller capacity, and then perform the alignment of procedure (d). To the contrary, when the density of coils winding increase (becomes dense), replace C503 and C507 with other capacitors having larger capacity.
- Repeat the alignment of procedure (d) and (e) to obtain the maximum indication of the V.T.V.M.

**Note:** Since C503, C507 and C518 are chip capacitors, soldering iron used in soldering prases should be of less than 30W, and the temperature of the iron tip should be less than 280°C. Do not touch ceramic part directly with iron tip when performing processing.

### Note:

- If the change of indication of the V.T.V.M. is only a bit when moving L501 and L503 for adjustment, adjust L505 at 90 MHz to obtain maximum sensitivity.
- The characteristics of D501, D502 and D503 are similar so that the three components should be replaced at the same time even if only one of the three is defective or damaged. Otherwise, the specified performance may not be obtained even the above mentioned adjustments are performed repeatedly.
- At the beginning, when power supply is provided, the pre-set address buttons 1, 4 and 6 on the micro-processor of PLL used in this machine will be automatically pre-set to 106 MHz, 98 MHz and 90 MHz respectively.

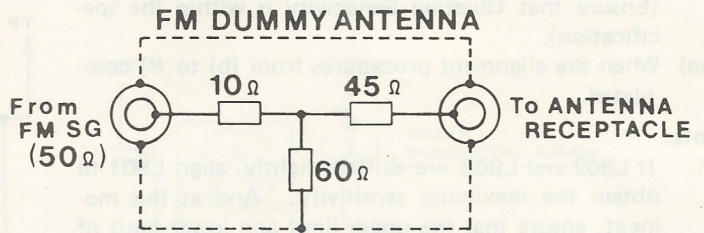


Fig. 9

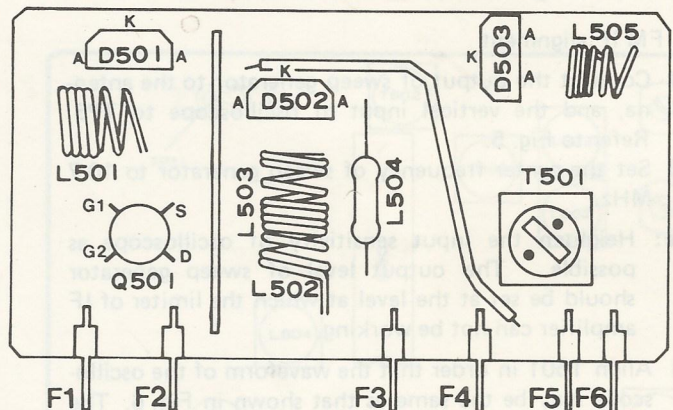


Fig. 10



(g) Gain adjustment

Tune the frequency of FM RF signal generator to 98 MHz and output level to  $3.2\mu\text{V}$  (no modulation). Set the tuning of the receiver to 98 MHz, and set VOL to the maximum. Align trimmer resistor VR 901 to obtain the minimum indication of the V.T.V.M.

**Note:** Noise may be small even if trimmer resistor is dialed to the extreme position, counterclockwise. But, the optimum position of trimmer resistor is, in general at central part.

(C) FM MPX Circuit alignment

- (a) Tune the frequency of FM RF signal generator to 98 MHz and output level to the no modulation value of 1mV. The receiver receives at 98 MHz. Connect a digital frequency counter to TP8. Refer to Fig. 12.
- (b) Align trimmer resistor VR903 until the indication of frequency counter indicating 57 kHz.

(c) MPX separation alignment

Set the output level of FM RF signal generator to 1mV, and set the modulator to 75 kHz deviation (10% for pilot signal and 90% for 1 kHz main signal L + R).

Tune the frequency of FM RF signal generator to 98 MHz and receive 98 MHz by the receiver. Adjust balance Volume to have the right and left volumes be equal.

- (d) Tune the mode selector of the stereo modulator to only R channel. Align trimmer resistor VR903 to obtain maximum separation. Fig. 12.

(e) Pilot cancel alignment

Align trimmer resistor VR905 to obtain the minimum indication of leak component at 19 kHz on V.T.V.M.

(f) Stereo noise control level alignment

Let the stereo modulator be at the same state as that set in procedure (d) and then set the output level of FM RF signal generator to  $56.2\mu\text{V}$ . Align trimmer resistor VR902 to have separation of 20dB. Fig. 12

**Note:** Regarding relationship between a signal output level and a reading of the signal generator,

- (1) Count directly a reading of the attenuator, in case the output of the signal generator is "Load type".
- (2) Count 1/2 of a reading of the attenuator, in case the output of the signal generator is "Open type".

PLL Microprocessor Circuit

Equipment Required

1. Stabilized power supply (DC 14V)
2. Frequency counter with more than 7 digits

Adjustment in crystal oscillator frequency

- (a) Connect the input of frequency counter to TP9. Place the band changeover switch of the receiver in AM position and set receiving frequency to 1404 kHz. Refer to Fig. 12.
- (b) Align trimmer capacitor TC301 to have the indication of frequency counter be of 1854000 Hz. Refer to Fig. 11.

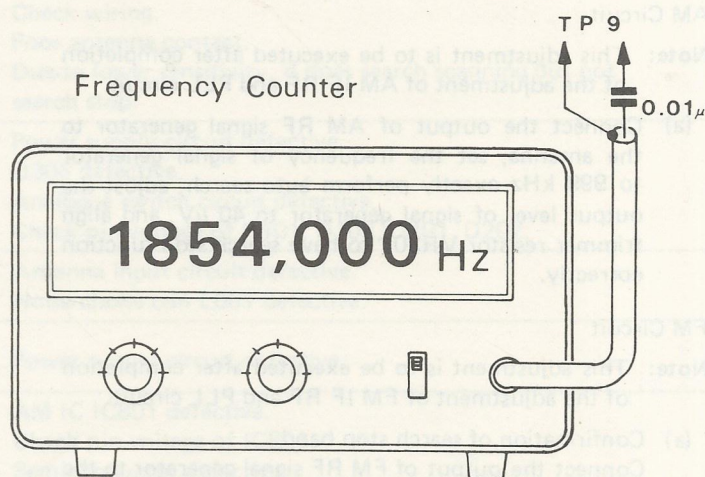


Fig. 11

**Note:** If receiving frequency of the receiver is not 1404 kHz, let the receiving frequency be added by 450 kHz, by performing the alignment of TC301 (trimmer capacitor). Correctly perform the alignment; otherwise radio will be affected.



## AM/FM stop signal circuit alignment

### Equipment Required

1. AM RF signal generator
2. FM RF signal generator
3. Stabilized power supply (DC 14V)
4. DC voltage meter

### AM Circuit

**Note:** This adjustment is to be executed after completion of the adjustment of AM IF RF and PLL circuit.

- (a) Connect the output of AM RF signal generator to the antenna, set the frequency of signal generator to 999 kHz exactly perform auto search, adjust the output level of signal generator to  $40 \mu\text{V}$ , and align trimmer resistor VR301 to have search stop function correctly.

### FM Circuit

**Note:** This adjustment is to be executed after completion of the adjustment of FM IF RF and PLL circuit.

- (a) Confirmation of search stop band  
Connect the output of FM RF signal generator to the antenna, and DC voltage meter to TP6 of IC301 (The voltage range of DC voltage meter is set at 5V). Let the output level of FM RF signal generator be of 1mV and set the frequency to 98 MHz. Set the tuning of the receiver to 98 MHz to confirm receiving condition. Place LOC/DX switch of the receiver in the DX position.

- (b) While observing the DC voltage meter, change the frequency of FM RF signal generator from the set frequency to higher frequency and to lower frequency. Record or memorize the frequencies at which the reading of DC voltage meter starts dropping.

Confirm that the differential of the two frequencies recorded or memorized is to be about 60 ~ 70 kHz. If these two frequencies are unbalanced, execute procedure (f) and (g) of (A) FM IF alignment again.

- (c) Adjustment of FM search stop sensitivity

Set the frequency of FM RF signal generator to 98 MHz and set the output to  $14 \mu\text{V}$ . While observing DC voltage meter, align trimmer resistor VR701. The alignment is made until the indication of DC voltage is of 3 ~ 4V.

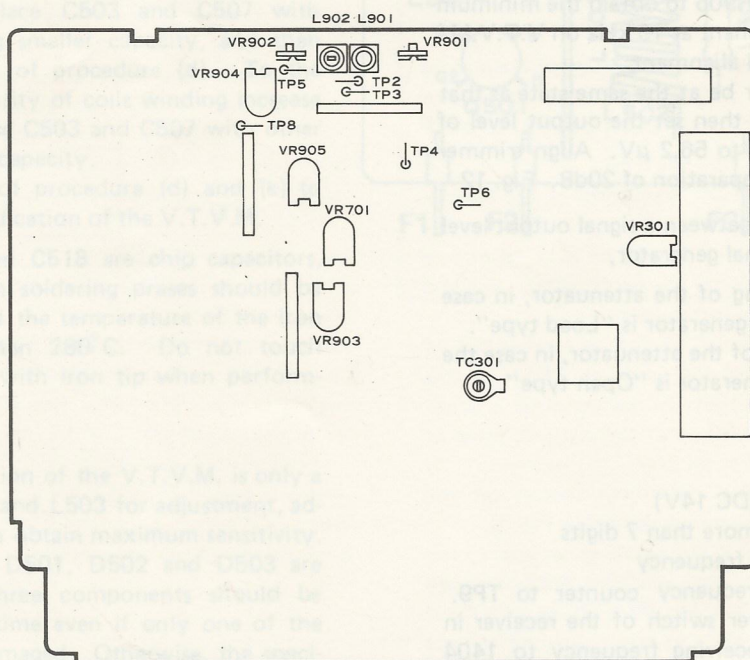


Fig. 12



# TROUBLESHOOTING

## RADIO SECTION

SYMPTOM	DEFECTIVE CIRCUIT		DEFECTIVE POINT AND CAUSE
NO SOUND	AM/FM SECTION	Antenna input circuit	<ul style="list-style-type: none"> <li>* Antenna input circuit defective. Check wiring.</li> <li>* Poor antenna contact. Due to lower sensitivity, it does search scanning but not search stop.</li> </ul>
		Power supply circuit	<ul style="list-style-type: none"> <li>* Power supply circuit defective.</li> <li>* Q306 defective.</li> <li>* Analogue switch circuit defective. Check pin voltage of D101, D102, D201, D202.</li> </ul>
	AM SECTION	Antenna input circuit	<ul style="list-style-type: none"> <li>* Antenna input circuit defective. Noise choke coil L601 defective.</li> </ul>
		Power supply circuit	<ul style="list-style-type: none"> <li>* Power supply circuit defective.</li> </ul>
		RF OSC IF circuit	<ul style="list-style-type: none"> <li>* AM IC IC801 defective. Check pin voltage of IC801.</li> <li>* Semiconductor defective. Check for voltage of semiconductor.</li> <li>* L801, L802, L803, L804, T801 or T802 open.</li> <li>* Q701 defective.</li> </ul>
		Connection of AM board	<ul style="list-style-type: none"> <li>* Insufficient soldering at the terminal of AM board.</li> <li>* Cracked pattern at the terminal of AM board.</li> </ul>
	FM SECTION	Power supply circuit	<ul style="list-style-type: none"> <li>* Power supply circuit defective.</li> </ul>
		RF OSC circuit	<ul style="list-style-type: none"> <li>* Semiconductor defective. Check for voltage of semiconductor.</li> <li>* D501, D502, D503 defective.</li> <li>* L501, L502, L503, L504, L505 and T501 open or insufficient soldering.</li> </ul>
		IF circuit	<ul style="list-style-type: none"> <li>* Semiconductor defective. Check pin voltage of Q901 and IF IC IC901.</li> <li>* CF901, CF902, L901 and L902 defective.</li> <li>* Trimmer resistor VR901 defective.</li> </ul>
		NB MPX output circuit	<ul style="list-style-type: none"> <li>* NB circuit defective. Check pin voltage of IC902.</li> <li>* MPX circuit defective. Check pin voltage of IC903.</li> </ul>
		Analogue switch circuit	<ul style="list-style-type: none"> <li>* Diode D101, D201 defective.</li> </ul>
INSUFFICIENT SOUND	AM/FM SECTION	Antenna input circuit	<ul style="list-style-type: none"> <li>* Poor antenna contact.</li> <li>* Relay RL601 defective.</li> </ul>
	AM SECTION	RF IF circuit	<ul style="list-style-type: none"> <li>* Deviation in tracking alignment (L802, L803).</li> <li>* Deviation in IF transformer T803.</li> <li>* ANT amplifier Q802 defective.</li> <li>* Diode D801, D802 defective.</li> <li>* Semiconductor Q801, Q803 defective.</li> </ul>



## TROUBLESHOOTING

SYMPTOM	DEFECTIVE CIRCUIT		DEFECTIVE POINT AND CAUSE
INSUFFICIENT SOUND	FM SECTION	RF IF circuit	<ul style="list-style-type: none"> <li>* Deviation in tracking alignment (L501, L503).</li> <li>* RF amplifier Q501 defective.</li> <li>* Diode D501 and D502 defective.</li> <li>* IF transformer T501 defective.</li> <li>* IF amplifier Q901 and IC IC901 defective.</li> <li>Check for voltage of Q901 and IC901.</li> <li>* L902 misalignment.</li> <li>* L901 defective.</li> </ul>
		NB circuit	<ul style="list-style-type: none"> <li>* NB circuit defective.</li> <li>Check pin voltage of IC902.</li> </ul>
		MPX circuit	<ul style="list-style-type: none"> <li>* MPX circuit defective.</li> <li>Check pin voltage of IC903.</li> </ul>
DISTORTED SOUND	AM SECTION	IF circuit	<ul style="list-style-type: none"> <li>* AM IC IC801 defective.</li> <li>* Semiconductor Q801, Q803 defective.</li> </ul>
	FM SECTION	IF circuit	<ul style="list-style-type: none"> <li>* Misalignment or defective of L902.</li> </ul>
OSCILLATION	AM/FM SECTION	Power supply circuit	<ul style="list-style-type: none"> <li>* Capacitor C702, C703 defective.</li> </ul>
	AM SECTION	RF IF circuit	<ul style="list-style-type: none"> <li>* Capacitor C810, C814, C816 and C817 defective.</li> </ul>
	FM SECTION	RF IF circuit	<ul style="list-style-type: none"> <li>* RF circuit defective.</li> <li>C513, C515 and C517 defective.</li> <li>* IF circuit defective.</li> <li>C901, C903, C904, C905, C907, C908 and C938 defective.</li> </ul>
POOR NB		NB circuit	<ul style="list-style-type: none"> <li>* NB IC defective.</li> <li>Check pin voltage of IC902.</li> <li>* Capacitor C920, C921, C922, C923 and C924 defective.</li> <li>* Capacitor C918 defective.</li> </ul>
POOR MUTE IN SEARCH SCANNING AND AM/FM SWITCH POP NOISE	MUTE SECTION		<ul style="list-style-type: none"> <li>* Semiconductor defective.</li> <li>* Diode D315 or transistor Q151 defective.</li> <li>* Q101, Q201 defective.</li> </ul>
POOR STEREO EFFECT		MPX circuit	<ul style="list-style-type: none"> <li>* VR903 and VR904 misalignment.</li> <li>* Capacitor C930 defective.</li> <li>* MPX IC defective.</li> <li>Check pin voltage of IC903.</li> </ul>
INDICATOR DOES NOT LIGHT		AM or FM indicator	<ul style="list-style-type: none"> <li>* Check the wiring of indicator circuit.</li> <li>* Driver IC IC302, IC303 defective.</li> <li>* PLL control IC IC301 defective.</li> <li>* LED defective.</li> </ul>
		Stereo indicator	<ul style="list-style-type: none"> <li>* Check the wiring of stereo indicator circuit.</li> <li>* MPX IC IC903 defective.</li> <li>* LED defective.</li> </ul>



## TROUBLESHOOTING

SYMPTOM	DEFECTIVE CIRCUIT	DEFECTIVE POINT AND CAUSE
ENGINE NOISE IS EXTREME	MOTOR COMPARTMENT	<ul style="list-style-type: none"> <li>* Missing or poor connection of resistor wire on high tension coil of car. Insert noise preventing resistor between ignition coil and distributor of car.</li> <li>* Missing or poor connection of noise silencer by alternator of car. Install specified noise silencer on the alternator.</li> <li>* Missing or poor connection of grounding wire between engine chassis and engine, transmission and engine chassis of car.</li> </ul>
	ANTENNA GROUND CIRCUIT	<ul style="list-style-type: none"> <li>* Missing or poor connection of grounding wire for antenna to grounding point of the car chassis.</li> </ul>
LESS SENSITIVITY DRIFT OCCURS WITH AIR CONDITIONER IS ON		<ul style="list-style-type: none"> <li>* If the set was installed near the blower of the air conditioner, the sensitivity drift will be created by the temperature (Hot or Cold). Avoid installing the set near air conditioner or installing the set near air conditioner is unavoidable, isolate the set by isolating material from the air conditioner.</li> </ul>

### AUDIO SECTION

SYMPTOM	DEFECTIVE CIRCUIT	DEFECTIVE POINT AND CAUSE
NO SOUND	Power supply circuit	<ul style="list-style-type: none"> <li>* Fuse open.</li> <li>* Power switch S151 defective.</li> <li>* Faulty connection to the battery.</li> <li>* Lead wire cold soldered.</li> </ul>
	Amplifier circuit	<ul style="list-style-type: none"> <li>* Ripple filter defective. Transistor Q151 open. Diode D152 open.</li> <li>* Buffer amplifier defective. Check each pin voltage of Flat amplifier Q102, Q202, Q103, Q203. Power amplifier IC IC151 defective.</li> </ul>
DISTORTED SOUND OR INSUFFICIENT SOUND	Tone control circuit	<ul style="list-style-type: none"> <li>* Variable resistor VR102, VR103, VR202, VR203 defective.</li> <li>* Lead wire open.</li> </ul>
	Buffer amplifier circuit	<ul style="list-style-type: none"> <li>* Buffer amplifier circuit defective. Check each pin voltage of amplifier Q102, Q202, Q103, Q203.</li> <li>* Power amplifier IC IC151 defective.</li> </ul>
OSCILLATION	Power supply circuit	<ul style="list-style-type: none"> <li>* C154, C155 capacity insufficient or open.</li> </ul>
	Buffer amplifier circuit	<ul style="list-style-type: none"> <li>* Ripple filter defective. Transistor Q151 defective. C157 capacity insufficient or open.</li> </ul>
ENGINE NOISE IS EXTREME	Grounding wire circuit	Missing or poor connection of grounding wire between main unit and power amplifier.
	Amplifier circuit	<ul style="list-style-type: none"> <li>* Ripple filter defective. Transistor Q151 short. C158 capacity insufficient or open.</li> <li>* Capacitor C159 insufficient or open.</li> <li>* Capacitor C154, C155 open.</li> </ul>
DIMMER DOES NOT FUNCTION	DIMMER CIRCUIT	<ul style="list-style-type: none"> <li>* Check emitter voltage of Q401 (The LED display will be incapable but other controls remain their functions, in this case).</li> <li>* CDS or Q403, Q404 defective.</li> </ul>

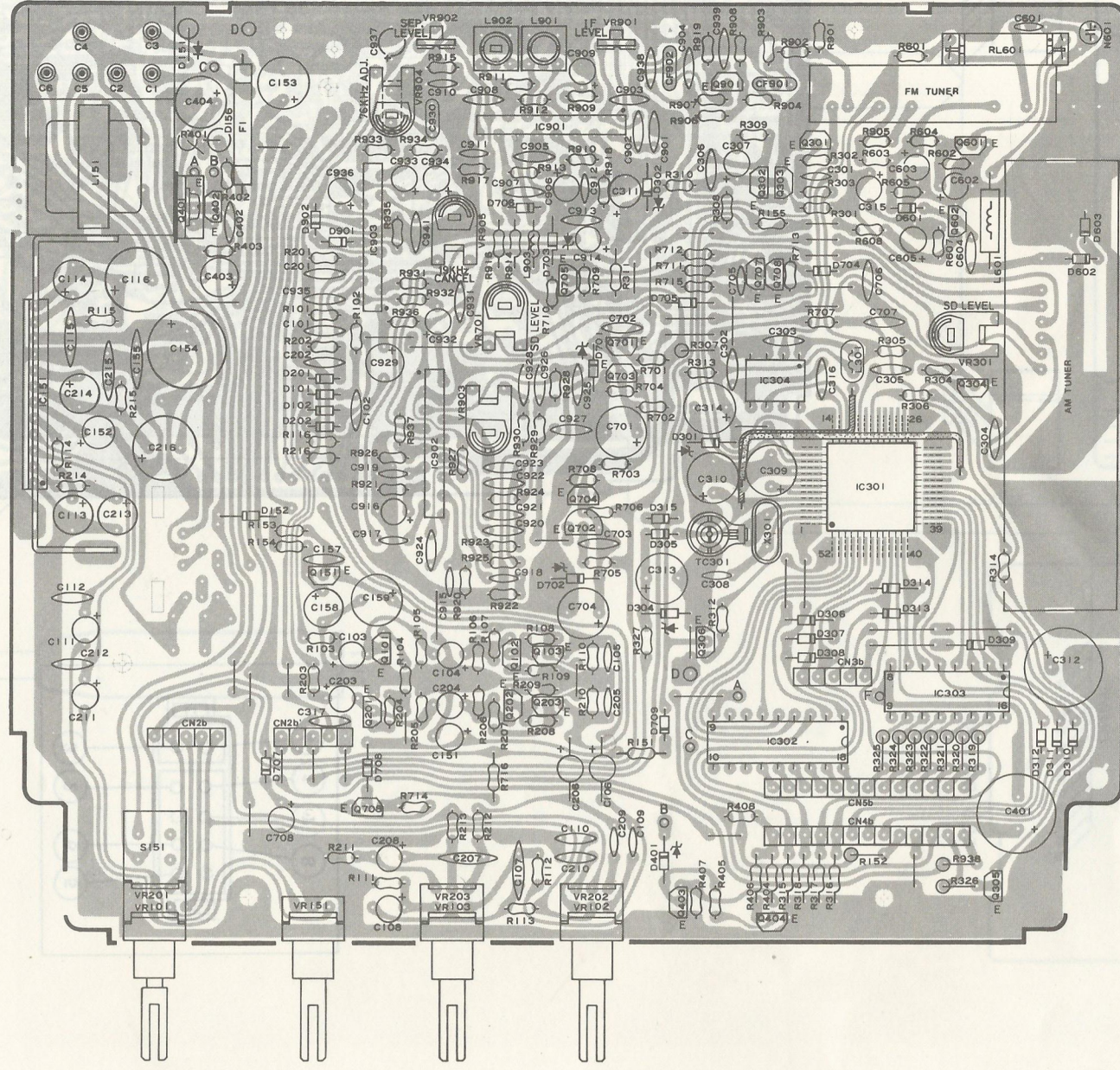


## TROUBLESHOOTING

SYMPTOM	DEFECTIVE CIRCUIT		DEFECTIVE POINT AND CAUSE
A DIGIT OR SEGMENT DOES NOT DISPLAY OR FAIL	POWER SUPPLY CIRCUIT OR BATTERY BACK-UP CIRCUIT		* Diode D301, D304, D305 defective.
	DIGIT/SEGMENT DRIVE CIRCUIT		* IC IC302, IC303 defective. * LED defective.
MANUAL TUNING INOPERATIVE			* Check wiring. * UP, DOWN switch defective. * Diode D310, D311 defective.
PRESETTING OR SELECTION OF PRESET STATIONS INOPERATIVE			* D309, D312 ~ D314 defective. * Switch M1 ~ M6, ME defective.
NO SEARCH SCANNING	AM/FM SECTION	Stop circuit	* Seek switch defective. * Search stop circuit defective.
	AM SECTION	PLL circuit	* Q304 defective.
	FM SECTION	PLL circuit	* IC IC301 defective. * Q301 defective.
THE UNIT SEARCH SCANS BUT DOES NOT STOP	AM/FM SECTION	Stop circuit	* Transistor Q705, Q706 or Q707 defective.
	AM SECTION		* Diode D704 or Transistor Q804 defective. * AM IC IC801 defective. * Ceramic filter CF802 defective.
	FM SECTION		* Diode D706 or Trimmer resistor VR701 defective. * IF IC IC301 defective.
IN THE CASE OF FM, THE RECEIVING FREQUENCY CAN ONLY BE MATCHED EVERY 8 STEPS (800 kHz)			* IC301 or IC304 defective.

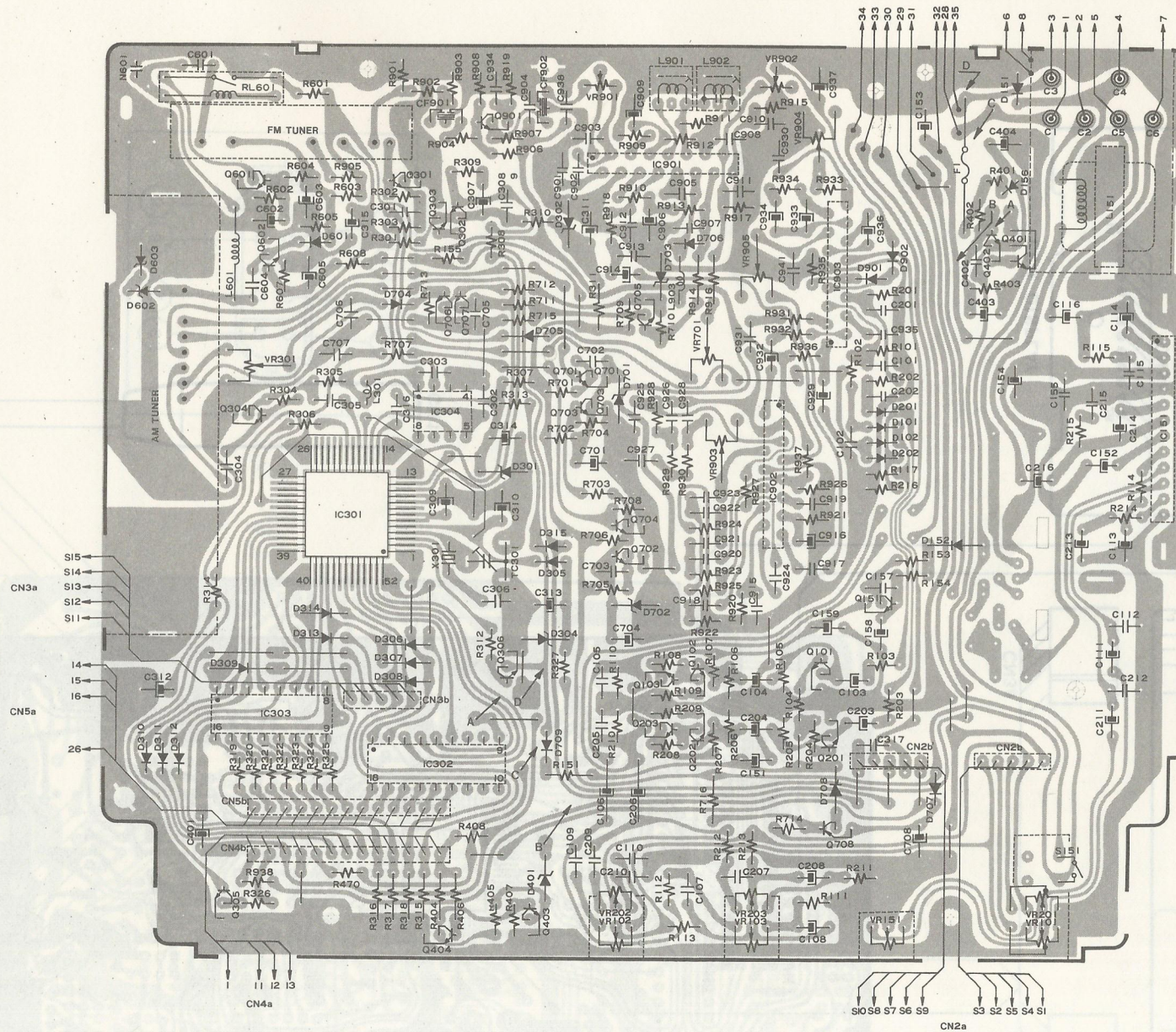


# MAIN CIRCUIT BOARD COMPONENT LOCATION GUIDE



TOP VIEW





BOTTOM VIEW



# Ref. No. 42 RRP-12 MAIN CIRCUIT BOARD ASSEMBLY PARTS LIST

Ref. No.	Description	Part No.
—	Main printed circuit board	EP-972
R320, 321, 322, 323, 324, 325	Carbon film resistor 39 ohm 1/4W ±5%	ECR
R307	Carbon film resistor 180 ohm 1/4W ±5%	ECR
R938, 326	Carbon film resistor 330 ohm 1/4W ±5%	ECR
R152	Carbon film resistor 470 ohm 1/4W ±5%	ECR
R401	Metal film resistor 2.2 ohm 1/2W ±5%	ECR
R115, 215	Carbon film resistor 1 ohm 1/6W ±5%	ECR
R153, 701, 705, 936	Carbon film resistor 10 ohm 1/6W ±5%	ECR
R905	Carbon film resistor 12 ohm 1/6W ±5%	ECR
R114, 214	Carbon film resistor 68 ohm 1/6W ±5%	ECR
R601	Carbon film resistor 100 ohm 1/6W ±5%	ECR
R902	Carbon film resistor 150 ohm 1/6W ±5%	ECR
R301	Carbon film resistor 220 ohm 1/6W ±5%	ECR
R109, 209, 904, 907	Carbon film resistor 330 ohm 1/6W ±5%	ECR
R103, 203, 303, 314	Carbon film resistor 470 ohm 1/6W ±5%	ECR
R111, 211, 311	Carbon film resistor 680 ohm 1/6W ±5%	ECR
R102, 202, 113, 213, 154, 305, 313, 327, 402, 702, 706, 709, 906, 919, 934	Carbon film resistor 1k ohm 1/6W ±5%	ECR
R151, 158, 407, 711	Carbon film resistor 1.5k ohm 1/6W ±5%	ECR
R309, 901, 903	Carbon film resistor 1.8k ohm 1/6W ±5%	ECR
R104, 204, 110, 210, 405, 908, 924, 925, 931	Carbon film resistor 2.2k ohm 1/6W ±5%	ECR
R408, 923	Carbon film resistor 2.7k ohm 1/6W ±5%	ECR
R101, 201, 112, 212, 715	Carbon film resistor 3.3k ohm 1/6W ±5%	ECR
R403, 927	Carbon film resistor 3.9k ohm 1/6W ±5%	ECR
R108, 208, 308, 310, 918, 928, 929, 930	Carbon film resistor 4.7k ohm 1/6W ±5%	ECR
R404, 605, 922	Carbon film resistor 5.6k ohm 1/6W ±5%	ECR
R911, 920, 935	Carbon film resistor 6.8k ohm 1/6W ±5%	ECR
R155, 156, 306, 312, 603, 703, 704, 707, 708, 910, 912	Carbon film resistor 10k ohm 1/6W ±5%	ECR
R913	Carbon film resistor 12k ohm 1/6W ±5%	ECR
R607, 608, 909	Carbon film resistor 15k ohm 1/6W ±5%	ECR
R933	Carbon film resistor 16k ohm 1/6W ±5%	ECR
R106, 206	Carbon film resistor 18k ohm 1/6W ±5%	ECR
R157, 926, 932	Carbon film resistor 22k ohm 1/6W ±5%	ECR
R315, 316, 317, 318	Carbon film resistor 33k ohm 1/6W ±5%	ECR
R406	Carbon film resistor 39k ohm 1/6W ±5%	ECR
R116, 216, 602, 604, 710, 712, 921	Carbon film resistor 47k ohm 1/6W ±5%	ECR
R915	Carbon film resistor 68k ohm 1/6W ±5%	ECR
R105, 205, 302, 713, 914, 916, 917, 937	Carbon film resistor 100k ohm 1/6W ±5%	ECR
R304	Carbon film resistor 150k ohm 1/6W ±5%	ECR
R107, 207	Carbon film resistor 180k ohm 1/6W ±5%	ECR
C601	Ceramic capacitor 2pF 25V SL	ECC
C301	Ceramic capacitor 5pF 25V SL	ECC
C910, 911, 912	Ceramic capacitor 33pF 25V SL	ECC



# ALL CIRCUIT BOARD COMPONENT LOCATION GUIDE

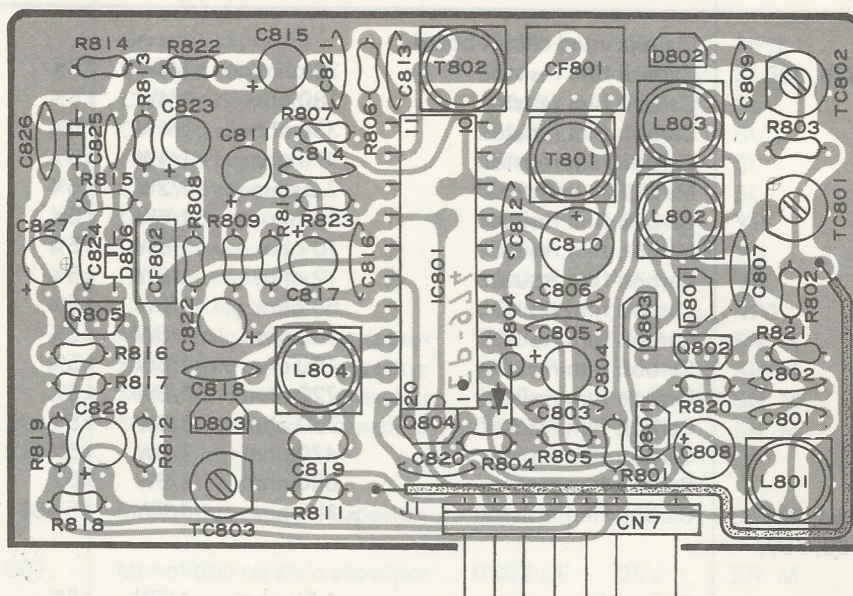
Ref. No.	Description	Part No.
C302	Ceramic capacitor 47pF 25V NPO	ECC
C925	Ceramic capacitor 68pF 25V SL	ECC
C913	Ceramic capacitor 100pF 25V SL	ECC
C920, 921, 922, 923	Ceramic capacitor 270pF 25V SL J	ECC
C927, 928	Ceramic capacitor 680pF 25V SL	ECC
C105, 205	Ceramic capacitor 1000pF 25V SL	ECC
C112, 212	Ceramic capacitor 1000pF 25V YB	ECC
C926	Ceramic capacitor 1200pF 25V YB	ECC
C915	Ceramic capacitor 2200pF 25V YB	ECC
C308	Ceramic capacitor 0.01 $\mu$ F 25V NPO	ECC
C917	Monolithic ceramic capacitor 3300pF 25V SR M	ECC
C604	Monolithic ceramic capacitor 4700pF 25V SR M	ECC
C924	Monolithic ceramic capacitor 6800pF 25V SR M	ECC
C102, 202, 109, 209, 303, 304, 305, 306, 316, 317, 918, 919, 935	Monolithic ceramic capacitor 0.01 $\mu$ F 25V SR M	ECC
C101, 201, 157, 402, 702, 703, 705	Monolithic ceramic capacitor 0.015 $\mu$ F 25V SR M	ECC
C901, 902, 903, 904, 905, 907, 908, 938, 939	Monolithic ceramic capacitor 0.022 $\mu$ F 25V SR M	ECC
C940	Monolithic ceramic capacitor 0.033 $\mu$ F 25V SR M	ECC
C110, 210, 706, 707, 931	Monolithic ceramic capacitor 0.047 $\mu$ F 25V SR M	ECC
C107, 207	Monolithic ceramic capacitor 0.068 $\mu$ F 25V SR M	ECC
C115, 215, 155	Monolithic ceramic capacitor 0.1 $\mu$ F 25V SR M	ECC
C603	Electrolytic capacitor 0.1 $\mu$ F 10V	ECC
C108, 208	Electrolytic capacitor 0.33 $\mu$ F 10V	ECC
C111, 211, 315	Electrolytic capacitor 0.47 $\mu$ F 10V	ECC
C151, 602, 906, 936, 103, 203 104, 204	Electrolytic capacitor 1 $\mu$ F 10V	ECC
C307, 909, 933	Electrolytic capacitor 2.2 $\mu$ F 10V	ECC
C934	Electrolytic capacitor 3.3 $\mu$ F 10V	ECC
C106, 206, 605, 932, 937	Electrolytic capacitor 4.7 $\mu$ F 10V	ECC
C117, 217, 914	Electrolytic capacitor 10 $\mu$ F 10V	ECC
C916	Electrolytic capacitor 22 $\mu$ F 10V	ECC
C929	Electrolytic capacitor 47 $\mu$ F 10V	ECC
C113, 213, 114, 214, 311, 403 152	Electrolytic capacitor 100 $\mu$ F 10V	ECC
C153, 156, 158	Electrolytic capacitor 100 $\mu$ F 16V	ECC
C309, 310, 313, 314, 701, 704	Electrolytic capacitor 220 $\mu$ F 10V	ECC
C159, 404	Electrolytic capacitor 220 $\mu$ F 16V	ECC
C116, 216, 401	Electrolytic capacitor 1000 $\mu$ F 10V	ECC
C154	Electrolytic capacitor 1000 $\mu$ F 16V	ECC
C930	Polypropylene film capacitor 1000pF	ECC
C312	Super capacitor 0.047F 5V	ECC
IC151	Power IC HA13001	ETI-106
IC301	PLL IC $\mu$ PD1710G-016	ETI-115
IC302	Transistor array M54562P	ETI-111
IC303	Transistor array M54517P	ETI-57
IC304	Prescaler IC $\mu$ PB553AC	ETI-89



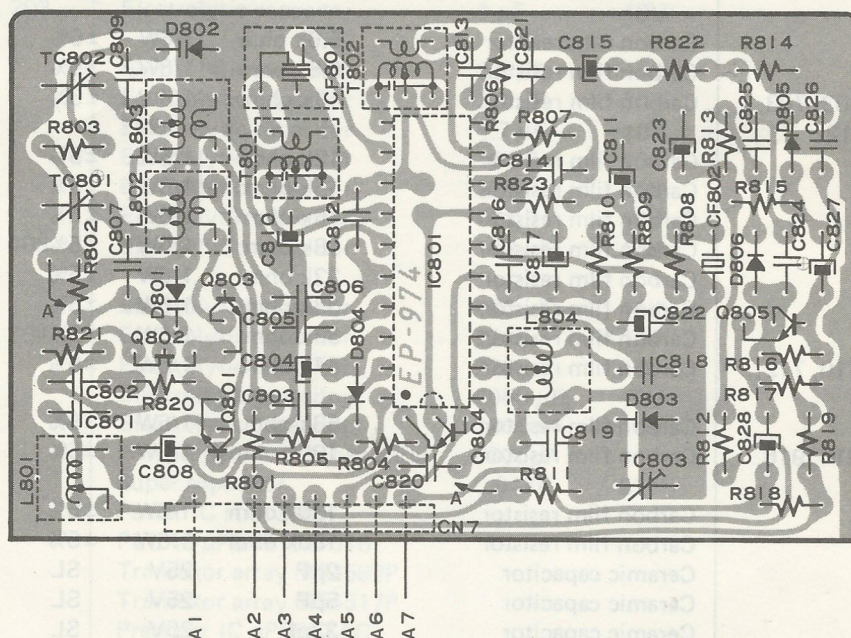
Ref. No.	Description	Part No.
IC901	FM IF IC LA1140	ETI-83
IC902	NB IC LA2110	ETI-145
IC930	FM MPX IC LA3376	ETI-146
Q101, 201, 102, 202, 103, 203, 151, 152, 302, 303, 304, 305, 306, 402, 403, 404, 601, 602, 701, 703, 704, 706, 707	Transistor 2SC2603(F) or equivalent	ETTC
Q153	Transistor 2SB601(L)	ETTB
Q301, 901	Transistor 2SC930(D) or equivalent	ETTC
Q401	Transistor 2SD313(E)	ETTD
Q705	Transistor 2SA1115(E) or equivalent	ETTA
Q702	Transistor 2SD400(F)	ETTD
D101, 201, 102, 202, 152, 153, 154, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 601, 704, 705, 706, 901, 902	Diode 1SS133 or equivalent	ETD
D151, 155	Diode DS135(D) or equivalent	ETD
D301, 304	Zener diode RD5.1E(B2)	ETD
D401, 703	Zener diode RD5.6E(B2)	ETD
D701, 702, 302, 602, 603	Zener diode EQA02-09(SA)	ETD
L151	Choke transformer	ELS-99
L301	Inductor	ELD-164
L601	Inductor	ELA-35
L901	Inductor	ELD-178
L902	Detector tank coil	ELD-179
L903	Inductor	ELD-196
RL601	Reed relay	ESR-68
TC301	Trimmer capacitor	ECCV-24
CF901, 902	Ceramic filter	EOP-10
VR101, 201	Volume control 50k ohm B	ECRV-347
VR102, 202, 103, 203	Tone control 20k ohm A	ECRV-348
VR151	Balance control 30k ohm B	ECRV-349
VR701	Trimmer resistor 300k ohm	ECRV-393
VR901	Trimmer resistor 300 ohm	ECRV-271
VR902	Trimmer resistor 20k ohm	ECRV-242
VR903, 904	Trimmer resistor 10k ohm	ECRV-148
VR905	Trimmer resistor 50k ohm	ECRV-196
VR301	Trimmer resistor 100k ohm	ECRV-150
N601	Neon tube	EIN-4
X301	Crystal	EOC-5
S151	Power ON/OFF switch	ECRV-347
F1	Fuse 2A	ESX-86
	Holder — IC	PL-2778
	Feed-thru capacitor ass'y	CAT-39



## AM CIRCUIT BOARD COMPONENT LOCATION GUIDE



**TOP VIEW**



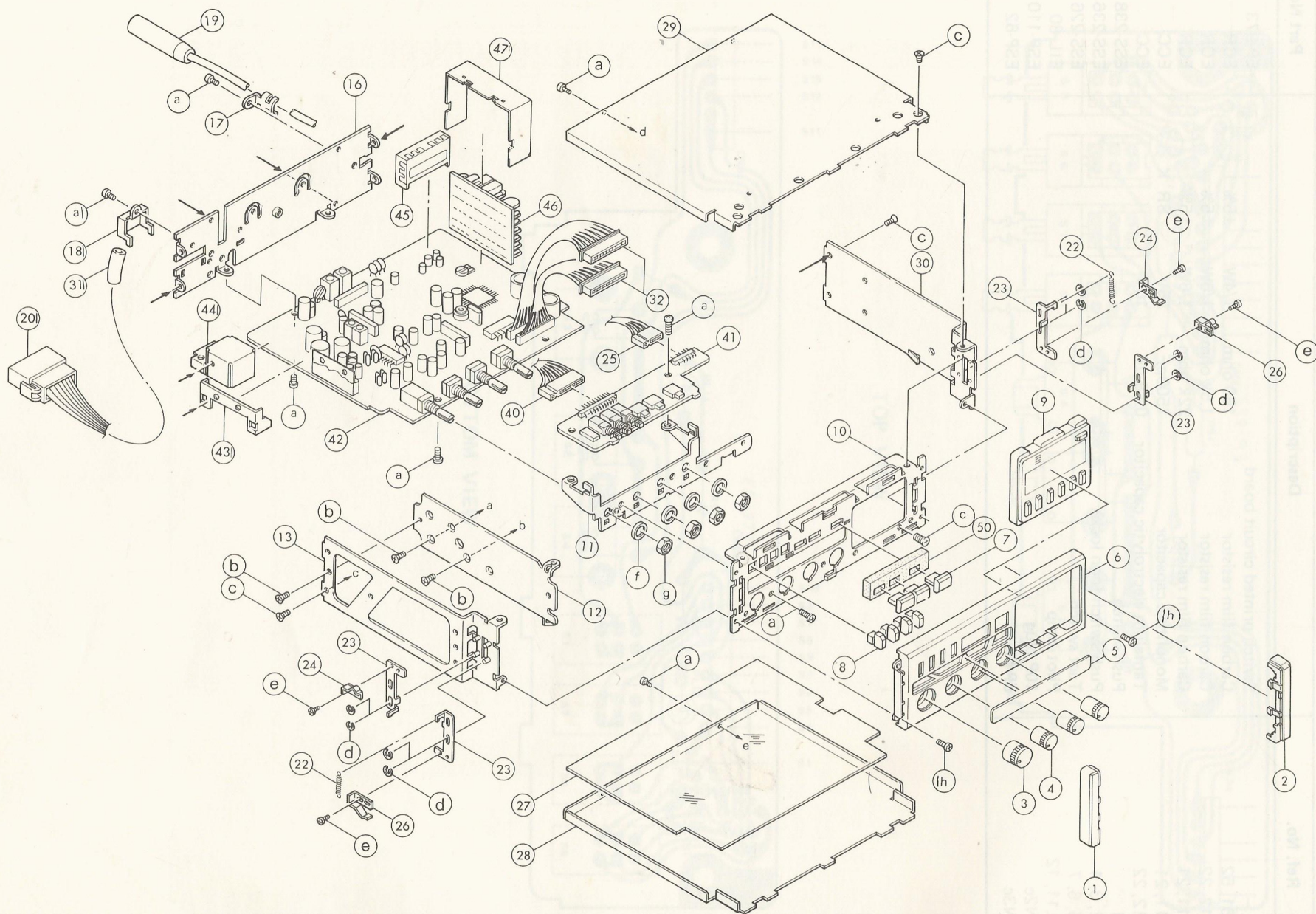
## BOTTOM VIEW



# Ref. No. 46 RRP-9 AM CIRCUIT BOARD ASSEMBLY PARTS LIST

Ref. No.	Description	Part No.
—	AM printed circuit board	EP-974
R806	Carbon film resistor 10 ohm 1/6W ±5%	ECR
R820	Carbon film resistor 56 ohm 1/6W ±5%	ECR
R801, 808	Carbon film resistor 82 ohm 1/6W ±5%	ECR
R817	Carbon film resistor 220 ohm 1/6W ±5%	ECR
R819	Carbon film resistor 1k ohm 1/6W ±5%	ECR
R807, 814	Carbon film resistor 2.7k ohm 1/6W ±5%	ECR
R805	Carbon film resistor 3.3k ohm 1/6W ±5%	ECR
R809	Carbon film resistor 8.2k ohm 1/6W ±5%	ECR
R812, 822, 823, 810	Carbon film resistor 10k ohm 1/6W ±5%	ECR
R818	Carbon film resistor 22k ohm 1/6W ±5%	ECR
R813	Carbon film resistor 47k ohm 1/6W ±5%	ECR
R802, 803, 811, 816, 821	Carbon film resistor 100k ohm 1/6W ±5%	ECR
R815	Carbon film resistor 220k ohm 1/6W ±5%	ECR
R804	Carbon film resistor 4.7k ohm 1/6W ±5%	ECR
C819	Polypropylene film capacitor 470pF 10V	ECC
C824	Monolithic capacitor 2200pF 25V SR M	ECC
C814	Monolithic capacitor 0.01 μF 25V SR M	ECC
C825	Monolithic capacitor 0.015 μF 25V SR M	ECC
C801, 802, 803, 805, 806, 807, 809, 812, 813, 816, 818, 820, 821	Monolithic capacitor 0.022 μF 25V SR M	ECC
C826	Monolithic capacitor 0.047 μF 25V SR M	ECC
C827	Electrolytic capacitor 0.1 μF 10V	ECC
C811, 817	Electrolytic capacitor 0.47 μF 10V	ECC
C804	Electrolytic capacitor 1 μF 10V	ECC
C815	Electrolytic capacitor 2.2 μF 10V	ECC
C828	Electrolytic capacitor 4.7 μF 10V	ECC
C822, 823	Electrolytic capacitor 10 μF 10V	ECC
C808	Electrolytic capacitor 22 μF 10V	ECC
C810	Electrolytic capacitor 100 μF 10V	ECC
IC801	AM IC LA1135	ETI-148
TC801, 802, 803	Ceramic trimmer	ECCV-34
Q801, 803, 804	Transistor 2SC930(D) or equivalent	ETTC
Q802	FET 2SK242(T) or equivalent	ETTF
Q805	Transistor 2SC2603(E) or equivalent	ETTC
D801, 802, 803	Variable capacitance diode SV321 or equivalent	ETD
D804	Diode 1N60 or equivalent	ETD
D805, 806	Diode 1SS133 or equivalent	ETD
CF801	Ceramic filter	EOP-16
CF802	Ceramic filter	EOP-17
T801	AM IFT	ELD-221
T802	AM IFT	ELD-222
L801	ANT coil	ELD-218
L802	RF coil	ELD-219
L803	RF coil	ELD-220
L804	OSC coil	ELD-223
CN7	7P plug	ESP-77





EXPLODED VIEW



# MECHANICAL PARTS LIST

Ref. No.	Description	Part No.
1	Side cover (180)	MP-1823
2	Side cover (180)	MP-1823
3	Knob — Volume	MP-1827
4	Knob — Balance/Bass/Treble	MP-1828
5	Indicator plate	PN-646
6	Escutcheon	MP-1842
7	Push button	MP-1845
8	Push button	MP-1844
9	LED display	EX-4
10	Front chassis	PL-2798
11	Sub front chassis	PL-2799
12	Heatsink plate	PL-2773
13	Side panel ass'y (L)	CMK-131
16	Rear panel ass'y	CMK-147
17	Holder — Aerial socket	PL-2109
18	Holder — 8P wires	PL-2784
19	Aerial socket with cable	AH-294
20	8P plug with wires	AH-502
22	Spring — Snap-in	SC-353
23	Holder — Snap-in spring	PL-2779
24	Spring — Slide-in (L)	PL-2780
25	5P socket with wires	AH-493
26	Spring — Slide-in (R)	PL-2781
27	Insulation sheet	PN-675
28	Bottom lid	PL-2772
29	Top lid	PL-2771
30	Side panel ass'y (R)	CMK-132
31	Tube	WTB-12-40
32	13P socket with wires	AH-480
40	10P socket with wires	AH-557
41	Switch PC board ass'y	RTP-8
42	Main PC board ass'y	RRP-12
43	Holder — IC	PL-2778
44	Feed-thru capacitor ass'y	CAT-39
45	FM tuner	AR-68
46	AM PC board ass'y	RRP-9
47	Shield case	PL-2912
50	Sponge	PN-677
a	Pan head screw 2.6 x 5 (Self tight)	006265ST
b	Flush head screw 2.6 x 6	002266
c	Flush head screw 2.6 x 4 (Self tight)	002264ST
d	E-ring D2.3 x 0.4	030234
e	Pan head screw 2 x 2	006202
f	Plain washer D6	010605
g	Hexagon nut M6	020610
h	Pan head screw 2.6 x 4	006264



## ACCESSORY LIST

Description	Q'ty	Part No.
Plain washer D4	1	010468
SEMS hexagon screw 4 x 8	1	094408
Hat head screw 3 x 6	2	096306
Handbook	1	HPB-651
Warranty card	1	HPC-163
Bracket - Radio Mtg. (92021248)	1	PL-2806
Bracket - Radio rear Mtg. (92023262)	1	PL-2889



15132 : D101,102,152, 201,202,305,306,307,308,309,310  
311,312,313,314,315,601,704,705,706,805,806,801,802

EQAO209SA : D701,702,602,603

RD5.1E82 : D301,302,303,

RD5.6E82 : D401,703

SVC121 : D801,802,803

SVC221 or 1SV103 : D501,502,503





# WIRING LAYOUT

