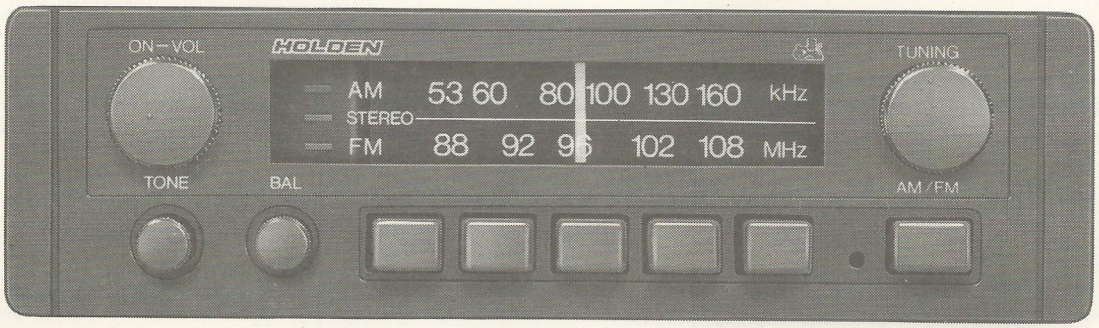
HOLDEN GMH

SERVICE MANUAL

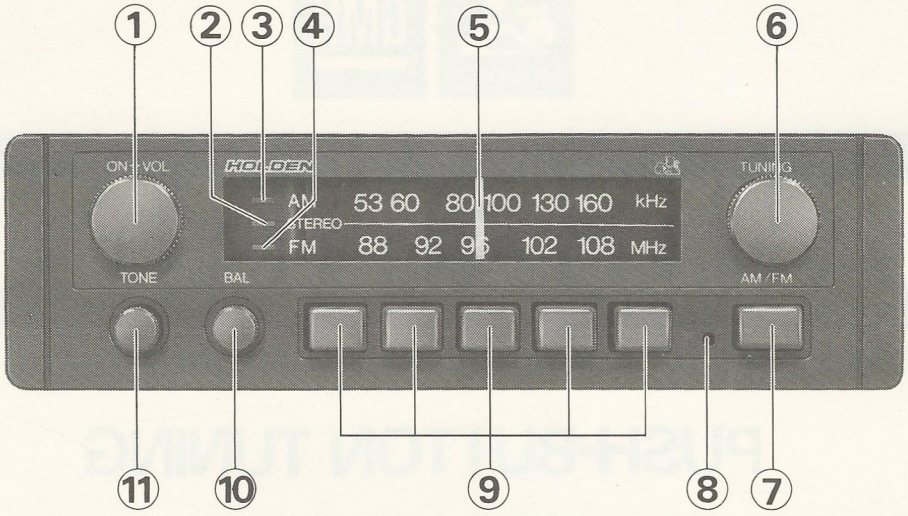
PUSH-BUTTON TUNING
AM/FM/FM STEREO RADIO



MRB-5108

Printed in Japan Aug. '85 Modification Reserved

LOCATION OF CONTROLS



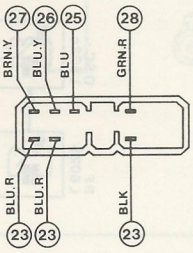
1. Power On-Off Switch/Volume Control
2. FM "STEREO" Indicator
3. AM Indicator
4. FM Indicator
5. Dial Pointer
6. Manual Tuning Control
7. AM/FM Waveband Selector
8. Antenna Trimmer
9. Push button – Preset Tuning
10. Balance Control
11. Tone Control

GENERAL INFORMATION

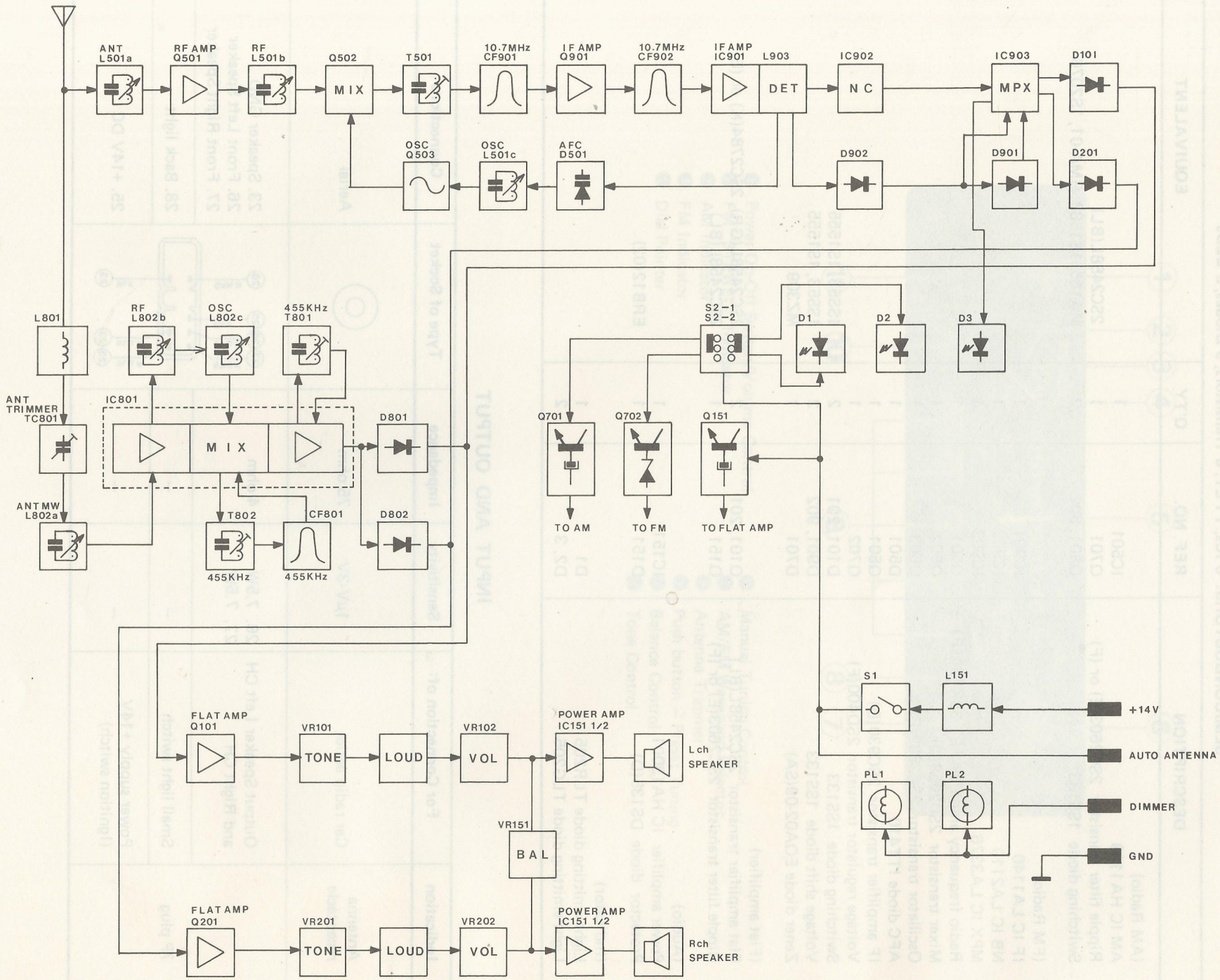
SEMICONDUCTORS: 5 ICs, 1 FET, 8 Transistors, 9 Diodes, 3 LEDs

DESCRIPTION	REF. NO.	Q'TY	EQUIVALENT
(AM Radio)			
AM IC HA1199	IC501	1	
Ripple filter transistor 2SC2603(E) or (F)	Q701	1	2SC2458L(BL)
Switching diode 1SS133	D801, 802	2	MA165, 1S1588, GMA-01, 1S2076
(FM Radio)			
IF IC LA1140	IC901	1	
NB IC LA2110	IC902	1	
MPX IC LA3376	IC903	1	
Radio frequency amplifier FET 3SK73(GR)	Q501	1	
Mixer transistor 2SC2668(O)	Q502	1	
Oscillator transistor 2SC2839(E)	Q503	1	
AFC diode ITT410	D501	1	
IF amplifier transistor 2SC930(D)	Q501	1	
Voltage regulator transistor 2SD400(F)	Q702	1	
Switching diode 1SS133	D101, 201	2	1SS53, 1S1555
Voltage shift diode 1SS133	D901, 902	2	1SS53, 1S1555
Zener diode EQA02-09(SA)	D701	1	MZ309
(Flat amplifier)			
Flat amplifier transistor 2SC2458L(BL)	Q101, 201	2	2SC2458L(GR), 2SC2784(K) or (E)
Ripple filter transistor 2SC2603(E) or (F)	Q151	1	2SC2458L(BL)
(Audio)			
Power amplifier IC HA13001	IC151	1	
Protector diode DS135(D)	D151	1	ERB12(02)
(Indicator)			
Light emitting diode TLR205	D1	1	
Light emitting diode TLG205	D2, 3	2	

INPUT AND OUTPUT

Indication	For Connection of:	Sensitivity	Impedance	Type of Socket	Connections
Antenna receptacle	Car radio aerial	1μV-3V	75 ohm		Aerial
7P plug	Output Speaker Left CH and Right CH	26. 7.5W 27. 7.5W	4 ohm		23. Speaker GND 26. Front Left Speaker 27. Front Right Speaker
	Small light switch	—	—		28. Back light
	Power supply +14V (Ignition switch)	—	—		25. +14V DC

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 (455 KHz)
4. AM RF signal generator

(A) AM IF alignment

(a) Connect sweep generator output to TR1 (AM RF Trimmer TC803) and vertical axis input oscilloscope to TP8 (R803 2.7k ohm 1/6W).

(b) Set the sweep generator to 455 KHz.

(c) Adjust the output level of the sweep generator so that the wave form as shown on Fig. 2 will be observed on the scope, however, keep the generator output as low as possible to avoid clipping or saturation.

(d) Align each of I.F.T. (T801 and T802) to obtain the maximum and symmetrical wave form on the scope. (See Fig. 3)

(B) AM band alignment

(a) Connect V.T.V.M. to the speaker output of either channel, and AM signal generator output to the antenna receptacle through a matching pad shown in Fig. 4.

(b) Tune the receiver dial to the lowest extreme position, and tune the signal generator frequency to 510 KHz. Then, align L804 (AM OSC coil) to obtain the maximum indication of the V.T.V.M.

(c) Then, tune the receiver dial to the highest extreme, and the generator frequency at 1660 KHz. Then, align TC802(AM OSC trimmer) to obtain the maximum response of the receiver output.

(d) Repeat procedure (b) and (c) two or three times.

(e) Tune the signal generator frequency to 1400 KHz, and tune the receiver to it. Align TC801 and TC803 (ANT. RF trimmers) to the maximum output of the receiver. (See Fig. 3) The output level of the signal generator should be kept low, approximately 30μV so that A.G.C. will not affect the alignment.

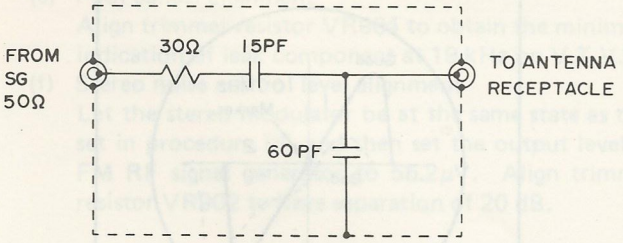


Fig. 4

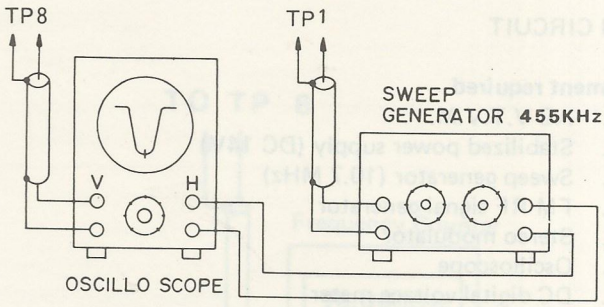


Fig. 1

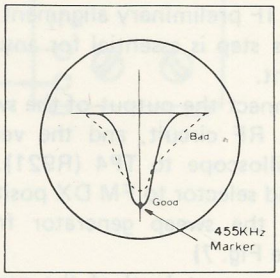


Fig. 2

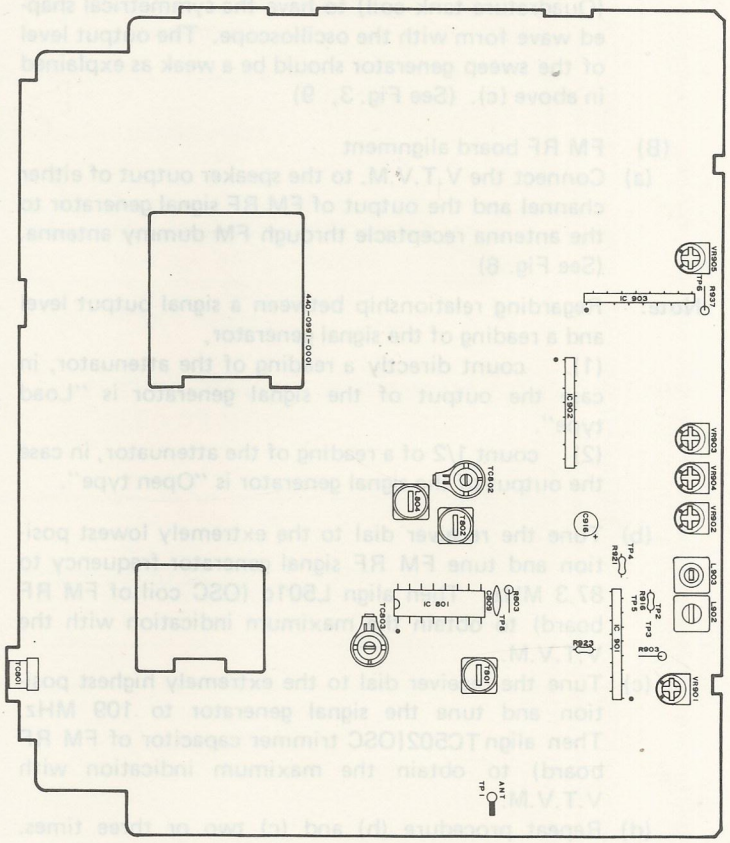


Fig. 3

2. 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. Stereo modulator
6. Oscilloscope
7. DC digital voltage meter

(A) FM IF preliminary alignment

This step is essential for any of further proper alignment.

(a) Connect the output of the sweep generator to TP9 of FM RF circuit, and the vertical axis input of the oscilloscope to TP4 (R921). Set the receiver wave band selector to FM DX position. (See Fig. 3,5)

(b) Set the sweep generator frequency to 10.7 MHz. (See Fig. 7)

(c) The output level of the sweep generator should be controlled to make a noise (a weak input signal from the sweep generator) place on the wave form of the oscilloscope. Align T501 (IFT of FM RF circuit) to have the maximum and symmetrical shaped wave form with the oscilloscope as shown in Fig. 8.

(d) Transfer the vertical axis input of the oscilloscope to TP5 (between R923 and C916). Align L903 (Quadrature tank coil) to have the symmetrical shaped wave form with the oscilloscope. The output level of the sweep generator should be a weak as explained in above (c). (See Fig. 3, 9)

(B) FM RF board alignment

(a) Connect the V.T.V.M. to the speaker output of either channel and the output of FM RF signal generator to the antenna receptacle through FM dummy antenna. (See Fig. 6)

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".

(b) Tune the receiver dial to the extremely lowest position and tune FM RF signal generator frequency to 87.3 MHz. Then align L501c (OSC coil of FM RF board) to obtain the maximum indication with the V.T.V.M.

(c) Tune the receiver dial to the extremely highest position and tune the signal generator to 109 MHz. Then align TC502(OSC trimmer capacitor of FM RF board) to obtain the maximum indication with V.T.V.M.

(d) Repeat procedure (b) and (c) two or three times.

(e) Tune the signal generator frequency to 98 MHz. And align L501a and TC501(RF Trimmer capacitor) to obtain the maximum output of receiver. During this alignment, the output level of the signal generator should be kept as low as 1.5μV, so that the limiter of the receiver will not be interfered by the alignment.

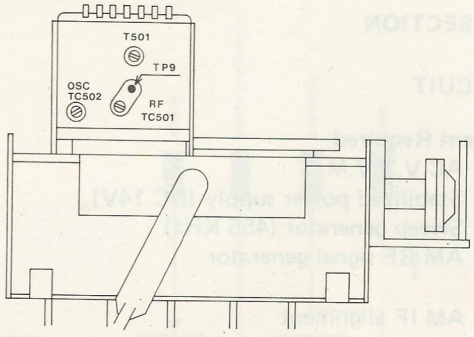


Fig. 5

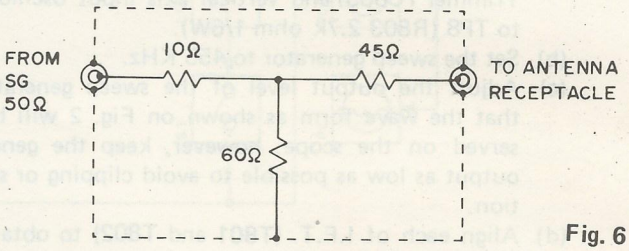


Fig. 6

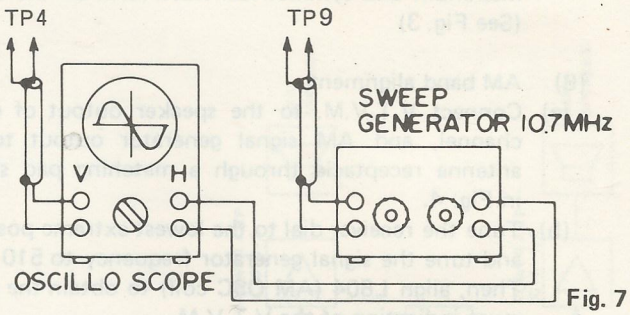


Fig. 7

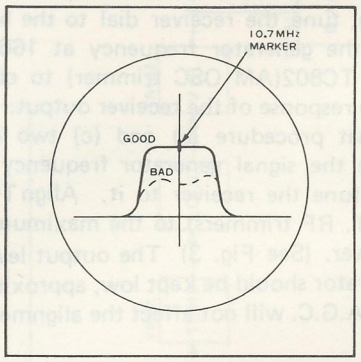


Fig. 8

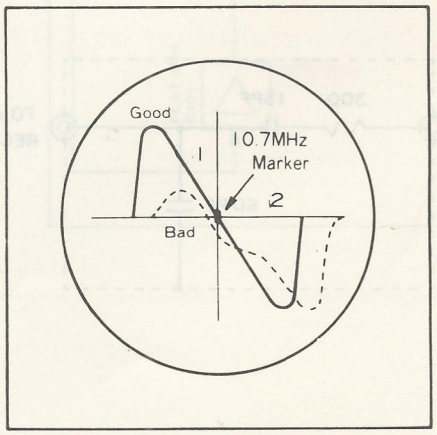


Fig. 9

(C) FM IF alignment

(a) Connect the V.T.V.M. to the speaker output of either channel and the output of FM RF signal generator to the antenna receptacle.

(b) Tune the signal generator frequency to 98 MHz and receive 98 MHz at peak by the receiver.

(c) With FM RF signal generator output set to the no modulation value of 3.2μV, adjust VR901 (Trimmer resistor) noise minimum.

(d) Set the output level of FM RF signal generator to 0 (No signal level).
Connect (–) side of DC digital voltage meter to TP2 (R916) and (+) side of DC digital voltage meter to TP3.

(e) Align L903 (Quadrature tank coil) to obtain the Voltage of 0±0.05V between TP2 and TP3.
After confirming (c), if it is beyond the limits, repeat two or three times from (c) to (e).

Special Note:
Proceed the alignment procedures in regular order of (A), (B) and (C) without fail. If you presume the procedure (B) of FM RF alignment is not necessary, you may skip (B) and go to the procedure (C) of FM IF alignment, after (A) of the preliminary alignment. It is not proper to take the procedure of (B) after (C). The alignment steps must be done in sequence, (B) is not to be performed after (C).

(D) 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 TP6.

(b) Align trimmer resistor VR903 until the indication of frequency counter indicating 76 kHz. (See Fig. 10)

(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.

(e) Pilot cancel alignment
Align trimmer resistor VR904 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 56.2μV. Align trimmer resistor VR902 to have separation of 20 dB.

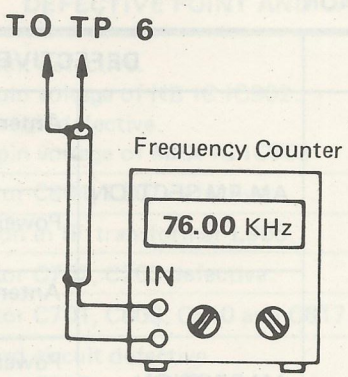


Fig. 10

TROUBLESHOOTING

RADIO SECTION

SYMPTOM	DEFECTIVE CIRCUIT		DEFECTIVE POINT AND CAUSE
NO SOUND	AM FM SECTION	Antenna circuit	* Antenna input circuit defective. Poor antenna contact.
		Power supply circuit	* Power supply circuit defective. Check wiring of function switch S2-1, S2-2.
	AM SECTION	Antenna input circuit	* Antenna input defective. Poor antenna contact.
		Power supply circuit	* Power supply circuit defective. Check wiring of function switch S2-1, S2-2.
		RF, OSC, IF output circuit	* L801 — L804 open. * Check for voltage of Q701. * IF transformer T801 and T802 open. * Check wiring to the tuner pack.
	FM SECTION	Antenna input circuit	* Antenna input circuit defective.
		Power supply circuit	* Power supply circuit defective. Check wiring of function switch S2-1, S2-2. * Diode D902 or Q702 defective.
		RF, OSC circuit	* FM RF board defective. Check voltage of +B terminal. Check voltage of transistor Q501, Q502 and Q503.
		IF circuit	* Check pin voltage of IF IC IC901 and Q901. * L902, L903 defective.
		NB, MPX output circuit	* NB circuit defective. Check pin voltage of NB IC IC902. * MPX circuit defective. Check pin voltage of MPX IC IC903.
INSUFFICIENT SOUND	AM FM SECTION	Antenna input circuit	* Poor antenna contact. * Antenna input circuit defective.
	AM SECTION	ANT, RF, IF circuit	* Antenna trimmer misalignment. * Deviation in tracking alignment. * Deviation if IF transformer T801 and T802. * Antenna input defective. * AM IC IC801 defective. Check pin voltage of AM IC IC801. * Capacitor C801, C803, C805 or C806 defective.
	FM SECTION	RF, IF of Detector	* RF board circuit defective. Deviation in tracking alignment. Q501, 502 defective. * IF board circuit defective. L903 misalignment. Check pin voltage of IF IC IC901.

TROUBLESHOOTING

SYMPTON	DEFECTIVE CIRCUIT		DEFECTIVE POINT AND CAUSE
INSUFFICIENT SOUND	FM SECTION	NB, MPX circuit	* NB circuit defective. Check pin voltage of NB IC IC902. * MPX circuit defective. Check pin voltage of MPX IC IC903
DISTORTED SOUND	AM SECTION	RF, IF output circuit	* Capacitor C804, C807 defective.
	FM SECTION	IF circuit	* Deviation in IF transformer L903.
OSCILLATION	AM FM SECTION	Power supply circuit	* Capacitor C702, C703 defective.
	AM SECTION	RF, IF circuit	* Capacitor C701, C809, C810 and C817 defective.
	FM SECTION	RF, IF circuit	* RF board circuit defective. Capacitor C510 and C516 defective. * IF board circuit defective. Capacitor C901, C905, C906, C907 or C911 defective.
POOR NB	NB circuit		* NB IC defective. Check pin voltage of IC902. * Capacitor C921, C922, C923, C924 and C926 defective. * Capacitor C919 defective.
NO STEREO EFFECT	MPX circuit or Stereo noise control circuit		* Capacitor C932 defective. * Diode D901 or D902 open. * Trimmer resistor VR902 defective. * IC903 defective. * VR902 misalignment.
POOR STEREO EFFECT			* VR902, VR903 and VR905 misalignment. * IC903 defective.
NO HIGH TONE SOUND	High cut control circuit		* R902 misalignment. * Trimmer resistor R902 defective. * IC903 defective. * Diode D901 and D902 defective.
INTERSTATION NOISE IS EXTREME (Background noise without input signal)	Mute circuit		* Resistor R917 and R918 defective. * Resistor R920 defective. * Resistor R915 defective. * Resistor R922 defective. * IC901 defective.
INDICATOR DOES NOT LIGHT	MPX indicator circuit		* Check wiring of Indicator circuit. * LED D3 defective. * MPX IC IC903 defective. * Resistor R705 open.
	AM indicator circuit		* LED D1 defective. * Resistor R704 open.
	FM indicator circuit		* LED D2 defective. * Resistor R704 open.

TROUBLESHOOTING

SYMPTOM	DEFECTIVE CIRCUIT	DEFECTIVE POINT AND CAUSE
ENGINE NOISE IS EXTREME	Motor compartment	* Missing or poor connection of resistor wire on high tension coil of car. Insert noise preventing resistor between ignition coil and distributor of car. * Missing or poor connection of noise silencer by alternator of car. Install specified noise silencer on the alternator. * Missing or poor connection of grounding wire between engine chassis and engine, transmission and engine chassis of car.
	Antenna ground circuit	* Missing or poor connection of grounding wire for antenna to grounding point of the car chassis.
LESS SENSITIVITY CR FREQUENCY DRIFT OCCURS WHEN AIR CONDITIONER IS ON		* If installed the set near blower of air conditioner, the temperature (hot or cold) create tuning or sensitivity drift. Avoid installing the set near air conditioner or if installing the set near air conditioner is unavoidable isolate the set by isolating material from temperature of air conditioner.

AUDIO SECTION

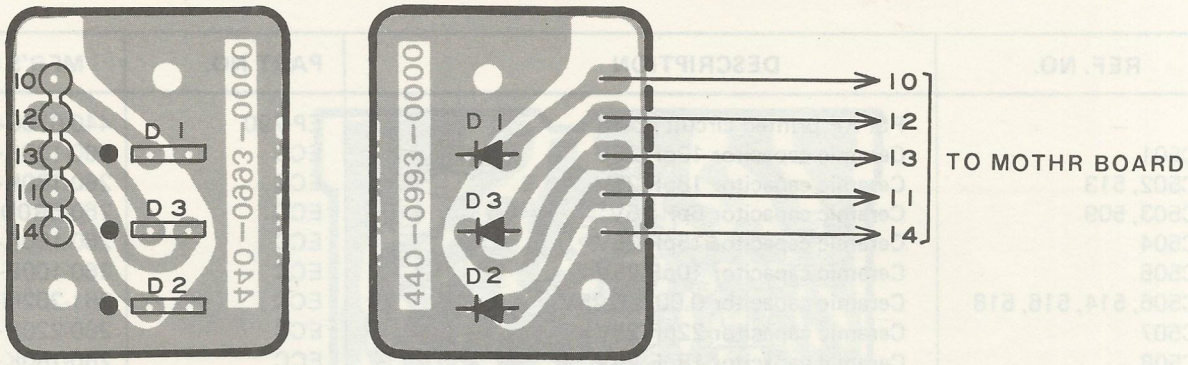
SYMPTOM	DEFECTIVE CIRCUIT	DEFECTIVE POINT AND CAUSE
NO SOUND	Power supply circuit	* Fuse open. * Faulty connection between battery. * Diode D151 short. * Power switch S1 defective.
	Output circuit	* Speaker voice coil open. * Faulty connection between speaker and connection core, * Power amplifier defective. Check each pin voltage of power amplifier IC151.
	Control circuit Flat amplifier circuit	* Variable resistor VR101, VR201 defective. * Flat amplifier defective. Check voltage of transistor Q101, Q201. * Ripple filter defective.
DISTORTED SOUND OR INSUFFICIENT SOUND	Output circuit	* Speaker wire grounded. * Power amplifier defective. Check each pin voltage of power amplifier IC151. Capacitor C109, C209 defective.
	Control circuit Flat amplifier circuit	* Variable resistor VR101, VR201 defective. * Flat amplifier defective. Check voltage of transistor Q101, Q201.
OSCILLATION	Output circuit	* C112, C212 capacitor insufficient. * R111, R211 resistor defective.
	Flat amplifier circuit	* Ripple filter defective. C152 capacity insufficient or open.
ENGINE NOISE IS EXTREME	Power supply circuit	* Missing or poor connection of grounding wire. * C155 capacity insufficient. * C3, C4, C156, C157, L152 defective.
	Control circuit Flat amplifier circuit	* Ripple filter defective. Check voltage of transistor Q151. C152 capacity insufficient or open.

REF. NO. 13 600-1157-0000 MAIN CIRCUIT BOARD ASSEMBLY PARTS LIST

REF. NO.	DESCRIPTION	PART NO.	MFR'S NO.
—	Main printed circuit board	EP-991-1	440-0991-0001
C3, 4	Feed-thru capacitor 3300pF	ECC	264-332Z-1CJB
C101, 201, 804, 931, 937, 939	Electrolytic capacitor 4.7μF 25V	ECC	250-4R7M-1E00-012
C102, 202	Tantalum electrolytic capacitor 0.1μV 16V	ECC	255-R10M-1C00-020
C103, 203	Monolithic capacitor 0.047μF 25V	ECC	262-473K-1EJR-020
C106, 109, 206, 209	Electrolytic capacitor 100μF 10V	ECC	250-101M-1A00-025
C107. 207, 908, 936	Electrolytic capacitor 1μF 50V	ECC	250-1R0M-1H00-012
C108, 208	Monolithic capacitor 1000pF 25V	ECC	262-102M-1EJR-006
C110, 918	Electrolytic capacitor 22μF 16V	ECC	250-220M-1C00-022
C111, 211	Electrolytic capacitor 1000μF 10V	ECC	250-102M-1A00-057
C112, 154, 212	Monolithic capacitor 0.1μF 16V	ECC	262-104M-1CJR-035
C113, 213	Monolithic capacitor 0.015μF 25V	ECC	262-153K-1EJR-006
C114, 214, 919, 920, 940	Monolithic capacitor 0.01μF 25V	ECC	262-103K-1EJR-006
C115, 215	Electrolytic capacitor 1μF 50V (nonpolar)	ECC	251-1R0M-1H00-025
C151, 811	Monolithic capacitor 0.01μF 25V	ECC	262-103M-1EJR-006
C152, 155	Electrolytic capacitor 220μF 16V	ECC	250-221M-1C00-046
C153	Electrolytic capacitor 1000μF 16V	ECC	250-102M-1C00-065
C156, 157, 808	Monolithic capacitor 0.022μF 25V	ECC	262-223M-1EJR-011
C701, 810	Electrolytic capacitor 100μF 16V	ECC	250-101M-1C00-044
C702, 703	Monolithic capacitor 0.015μF 25V	ECC	262-153M-1EJR-006
C704	Electrolytic capacitor 470μF 10V	ECC	250-471M-1A00-048
C801	Polyester film capacitor 0.01μF 50V	ECC	270-103K-1H00-000
C802	Polyester film capacitor 3300pF 50V	ECC	270-332K-1H00-000
C803, 809, 901, 902, 903, 904, 905, 906, 907, 909, 911, 938	Monolithic capacitor 0.047μF 25V	ECC	262-473M-1EJR-020
C805	Ceramic capacitor 470pF 50V	ECC	260-471M-1H00-030
C806	Monolithic capacitor 2200pF 25V	ECC	262-222M-1EJR-006
C807, 916	Electrolytic capacitor 10μF 16V	ECC	250-100M-1C00-026
C812, 927	Ceramic capacitor 68pF 50V	ECC	260-680K-1HCH-020
C813	Polyester film capacitor 1000pF 50V	ECC	270-102K-1H00-000
C814	Ceramic capacitor 240pF 50V	ECC	260-241J-1HTH-025
C815	Ceramic capacitor 120pF 50V	ECC	260-121J-1HCH-025
C816	Monolithic capacitor 1000pF 25V	ECC	262-102K-1EJR-006
C817	Electrolytic capacitor 47μF 16V	ECC	250-470M-1C00-026
C910, 933	Electrolytic capacitor 2.2μF 50V	ECC	250-2R2M-1H00-012
C912, 913, 914	Ceramic capacitor 33pF 50V	ECC	260-330M-1H00-005
C915	Ceramic capacitor 100pF 50V	ECC	260-101M-1H00-010
C917	Monolithic capacitor 0.0022μF 25V	ECC	262-222K-1EJR-006
C921, 922, 923, 924	Ceramic capacitor 270pF 50V	ECC	260-271J-1H00-020
C925	Monolithic capacitor 0.0033μF 25V	ECC	262-332M-1EJR-006
C926	Monolithic capacitor 0.0068μF 25V	ECC	262-682M-1EJR-006
C928	Ceramic capacitor 1200pF 50V	ECC	261-122M-1HJB-011
C929, 930	Ceramic capacitor 680pF 50V	ECC	260-681J-1H00-035
C932	Polypropylene film capacitor 1000pF 16V	ECC	272-102J-1C00-011
C934	Tantalum electrolytic capacitor 3.3μF 16V	ECC	255-3R3M-1C00-020
C935	Monolithic capacitor 0.033μF 25V	ECC	262-333M-1EJR-016
CF801	Ceramic filter	EOP-12	360-0012-0400
CF901, 902	Ceramic filter	EOP-10	360-0010-0400
D101, 201, 801, 802, 901, 902	Diode 1SS133 or equivalent	ETD-1SS133	304-0033-0000
D151	Diode DS135(D) or equivalent	ETD-135D	304-0023-1000
D701	Zener diode EQA02-09(SA)	ETD-EQA0209SA	306-0018-1000
F1	Fuse 5A	ESX-64	419-0064-0000
IC151	Power IC HA13001	ETI-106	310-0106-0000
IC801	AM IC HA1199	ETI-39	310-0039-0000
IC901	FM IC LA1140	ETI-83	310-0083-0000
IC902	FM NB IC LA2110	ETI-145	310-0145-0000

REF. NO.	DESCRIPTION	PART NO.	MFR'S NO.
IC903	FM MPX IC LA3376	ETI-146	310-0146-0000
L151	Choke transformer	ELS-99	350-0099-1400
L152	Inductor 2.2mH	ELD-301	351-0301-1700
L801	Coil	ELD-180	351-0180-1000
L803, 901	Inductor 4.7 μH	ELD-196	351-0196-1200
L804	OSC coil	ELD-198	351-0198-0800
L902	Inductor	ELD-178	351-0178-0900
L903	Detector tank coil	ELD-179	351-0179-0900
N801	Surge protector	EIN-5	431-0005-0000
Q101, 201	Transistor 2SC2458L(BL) or equivalent	ETTC-2458LBL	302-0078-1400
Q151, 701	Transistor 2SC2603(E) or equivalent	ETTC-2603F	302-0091-1200
Q702	Transistor 2SD400(F)	ETTD-400F	302-0032-1200
Q901	Transistor 2SC930(D) or equivalent	ETTC-930D)	302-0014-1000
R101, 201, 901, 933, 940	Carbon film resistor 22k ohm 1/6W ± 5%	ECR	200-223J-2C00-010
R102, 202	Carbon film resistor 470k ohm 1/6W ± 5%	ECR	200-474J-2C00-010
R103, 203	Carbon film resistor 1.2k ohm 1/6W ± 5%	ECR	200-122J-2C00-010
R104, 204, 909, 912, 913	Carbon film resistor 330 ohm 1/6W ± 5%	ECR	200-331J-2C00-010
R105, 205	Carbon film resistor 470 ohm 1/6W ± 5%	ECR	200-471J-2C00-010
R106, 107, 206, 207	Carbon film resistor 1.5k ohm 1/6W ± 5%	ECR	200-152J-2C00-010
R110, 210	Carbon film resistor 68 ohm 1/6W ± 5%	ECR	200-680J-2C00-010
R111, 211	Carbon film resistor 1 ohm 1/6W ± 5%	ECR	200-1R0J-2C00-010
R112, 212, 805	Carbon film resistor 3.3k ohm 1/6W ± 5%	ECR	200-332J-2C00-010
R113, 213, 703, 704, 705, 707, 910, 914, 938	Carbon film resistor 1k ohm 1/6W ± 5%	ECR	200-102J-2C00-010
R151, 702, 706, 932	Carbon film resistor 10 ohm 1/6W ± 5%	ECR	200-100J-2C00-010
R152, 902	Carbon film resistor 33k ohm 1/6W ± 5%	ECR	200-333J-2C00-010
R701	Carbon film resistor 5.6 ohm 1/6W ± 5%	ECR	200-5R6J-2C00-010
R801, 919, 923, 934, 935, 936	Carbon film resistor 4.7k ohm 1/6W ± 5%	ECR	200-472J-2C00-010
R802	Carbon film resistor 220 ohm 1/6W ± 5%	ECR	200-221J-2C00-010
R803, 929	Carbon film resistor 2.7k ohm 1/6W ± 5%	ECR	200-272J-2C00-010
R804, 918	Carbon film resistor 12k ohm 1/6W ± 5%	ECR	200-123J-2C00-010
R806, 915, 937	Carbon film resistor 15k ohm 1/6W ± 5%	ECR	200-153J-2C00-010
R903, 904, 922, 928	Carbon film resistor 100k ohm 1/6W ± 5%	ECR	200-104J-2C00-010
R905	Carbon film resistor 12 ohm 1/6W ± 5%	ECR	200-120J-2C00-010
R906	Carbon film resistor 150 ohm 1/6W ± 5%	ECR	200-151J-2C00-010
R907, 908	Carbon film resistor 1.8k ohm 1/6W ± 5%	ECR	200-182J-2C00-010
R911, 930, 931, 939	Carbon film resistor 2.2k ohm 1/6W ±5%	ECR	200-222J-2C00-010
R916, 925, 941	Carbon film resistor 6.8k ohm 1/6W ±5%	ECR	200-682J-2C00-010
R917	Carbon film resistor 10k ohm 1/6W ±5%	ECR	200-103J-2C00-010
R920, 926	Carbon film resistor 47k ohm 1/6W ±5%	ECR	200-473J-2C00-010
R921	Carbon film resistor 68k ohm 1/6W ±5%	ECR	200-683J-2C00-010
R924	Carbon film resistor 3.9k ohm 1/6W ±5%	ECR	200-392J-2C00-010
R927	Carbon film resistor 820 ohm 1/6W ±5%	ECR	200-821J-2C00-010
S2-1, 2-2	Push switch	ESS-226	400-0226-0100
T801	AM IFT	ELD-193	351-0193-0800
T802	AM IFT	ELD-192	351-0192-0800
TC801	ANT trimmer capacitor	ECCV-38	345-0038-0400
TC802, 803	Ceramic trimmer 70pF	ECCV-24	345-0024-0100
VR101, 201	Tone control 10k ohm B	ECRV-409	340-0409-0100
VR151	Balance control 30k ohm B	ECRV-408	340-0408-0100
VR901	Trimmer resistor 330 ohm	ECRV-399	340-0399-0100
VR902	Trimmer resistor 20k ohm	ECRV-396	340-0396-0100
VR903	Trimmer resistor 10k ohm	ECRV-397	340-0397-0100
VR904	Trimmer resistor 47k ohm	ECRV-403	340-0403-0100
VR905	Trimmer resistor 4.7k ohm	ECRV-402	340-0402-0100
—	Holder — Power amplifier IC	PL-2972	100-2972-0001

LED CIRCUIT BOARD COMPONENT LOCATION GUIDE

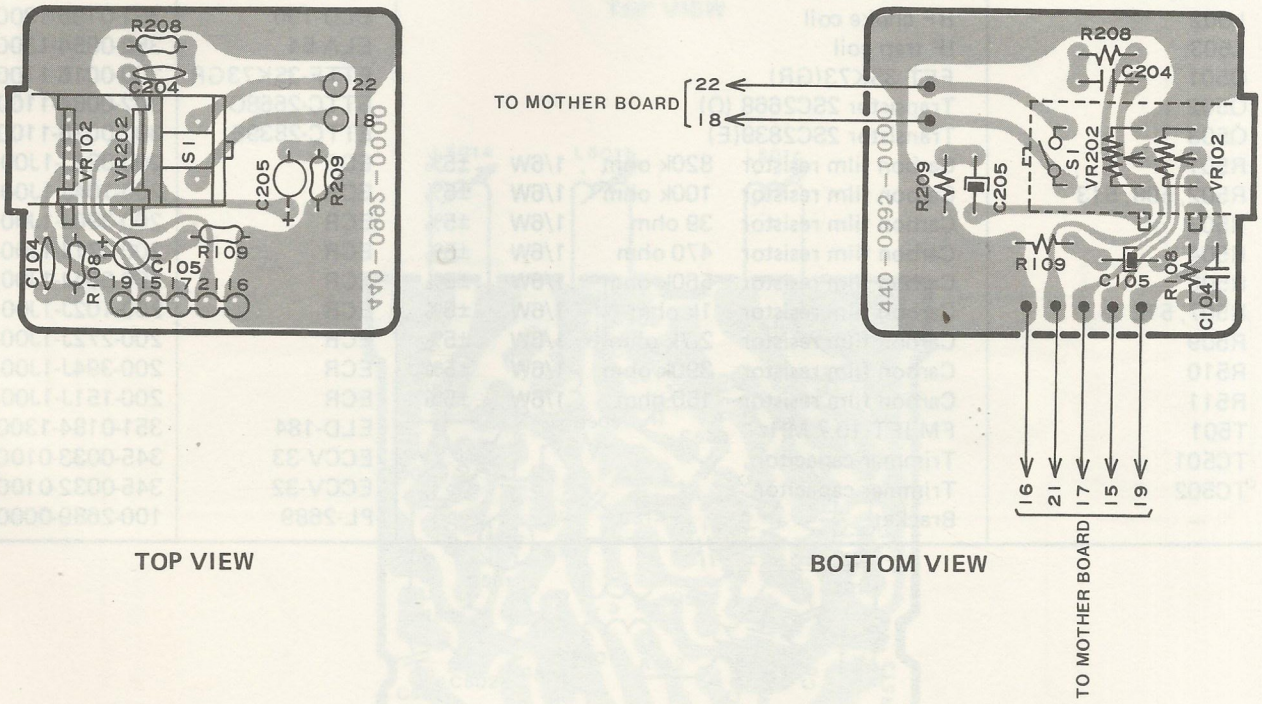


TOP VIEW BOTTOM VIEW

REF. NO. 11 600-1159-0000 LED CIRCUIT BOARD ASSEMBLY PARTS LIST

REF. NO.	DESCRIPTION	PART NO.	MFR'S NO.
—	LED printed circuit board	EP-993	440-0993-0000
D1	Light emitting diode TLR205	ETD-TLR205	320-0022-0000
D2, 3	Light emitting diode TLG205	ETD-TLG205	320-0023-0000

CONTROL CIRCUIT BOARD COMPONENT LOCATION GUIDE

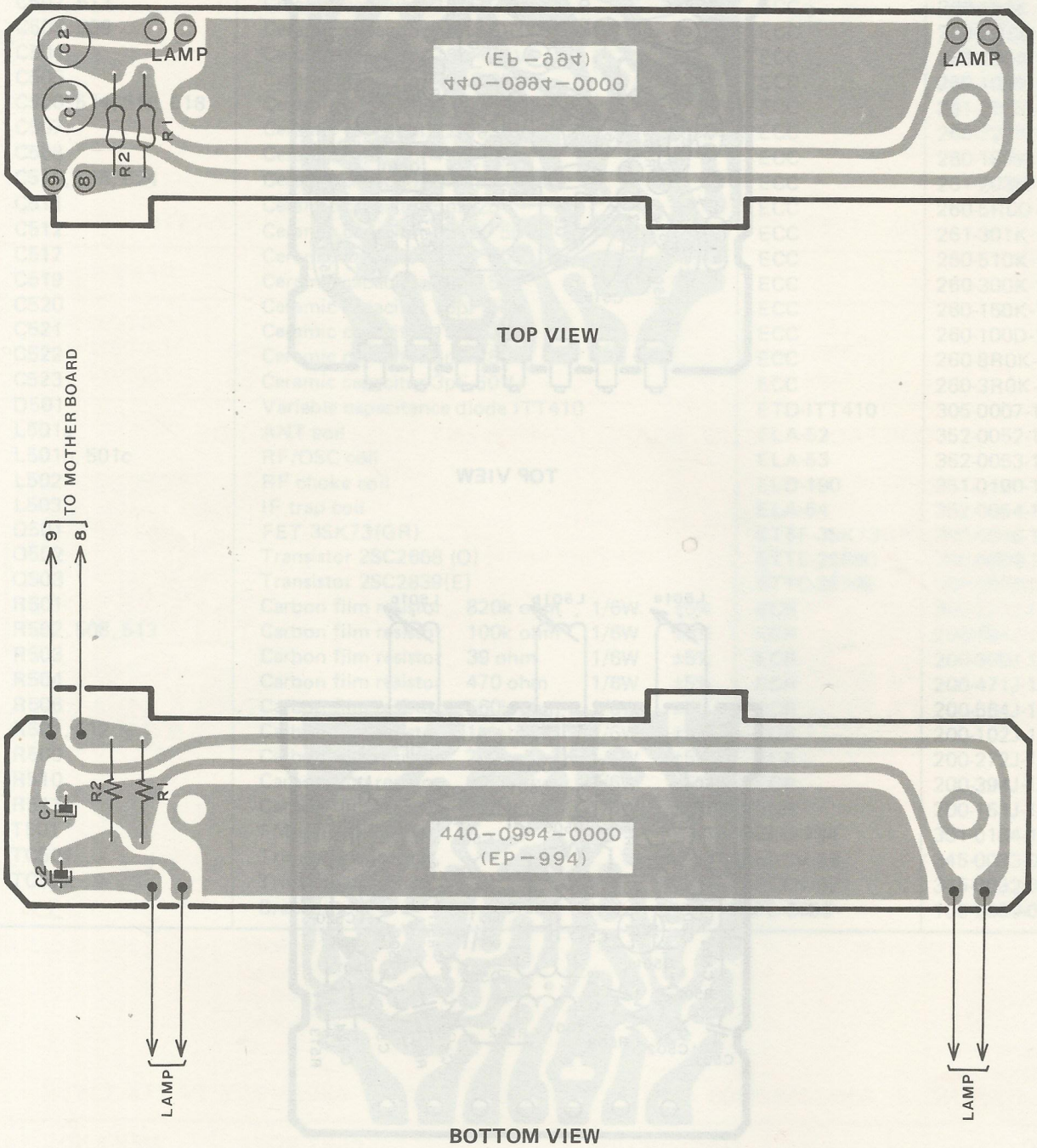


TOP VIEW BOTTOM VIEW

REF. NO. 8 600-1158-0000 CONTROL CIRCUIT BOARD ASSEMBLY PARTS LIST

REF. NO.	DESCRIPTION	PART NO.	MFR'S NO.
—	Control printed circuit board	EP-992	440-0992-0000
C104, 204	Monolithic capacitor 0.0015μF 25V	ECC	262-152K-1EJR-006
C105, 205	Tantalum electrolytic capacitor 0.15μF 16V	ECC	255-R15M-1C00-020
R108, 208	Carbon film resistor 22k ohm 1/6W ±5%	ECR	200-223J-2C00-010
R109, 209	Carbon film resistor 1.5k ohm 1/6W ±5%	ECR	200-152J-2C00-010
	Variable resistor with switch	ECRV-405	340-0405-0100
VR102, 202	Volume control 50k ohm A		
S1	Power ON/OFF		

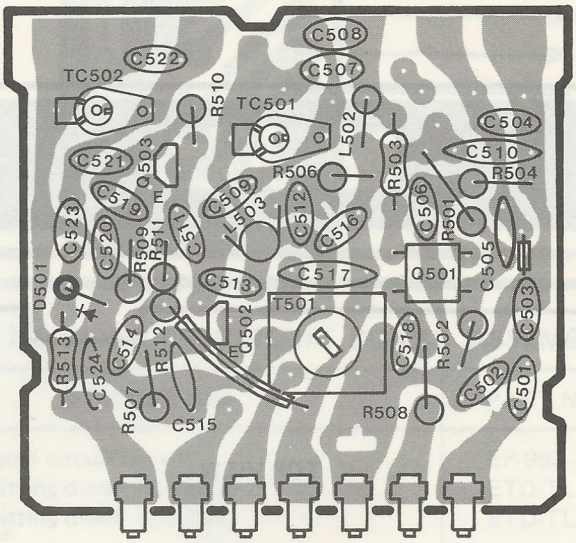
RELAY CIRCUIT BOARD COMPONENT LOCATION GUIDE



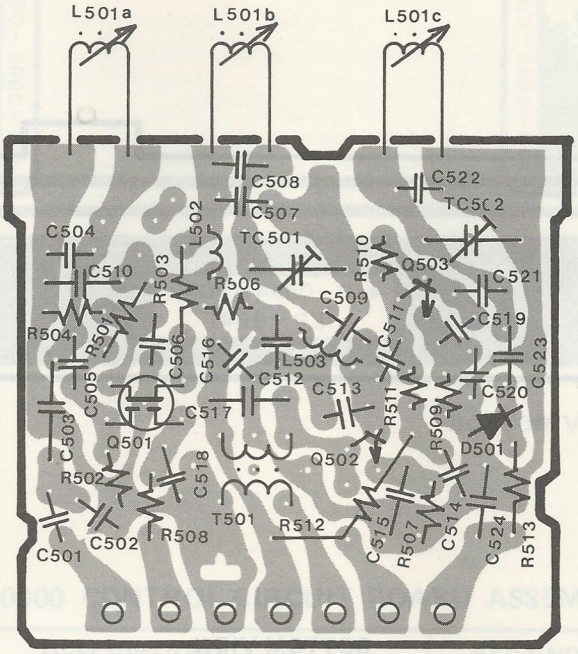
REF. NO. 39 600-1160-0000 RELAY CIRCUIT BOARD ASSEMBLY PARTS LIST

REF. NO.	DESCRIPTION	PART NO.	MFR'S NO.
—	Relay printed circuit board	EP-994	440-0994-0000
C1, 2	Electrolytic capacitor 22μF 16V	ECC	250-220M-1C00-022
R1, 2	Carbon film resistor 120 ohm 1/2W ±5%	ECR	200-121J-2H00-010

FM RF CIRCUIT BOARD COMPONENT LOCATION GUIDE



TOP VIEW

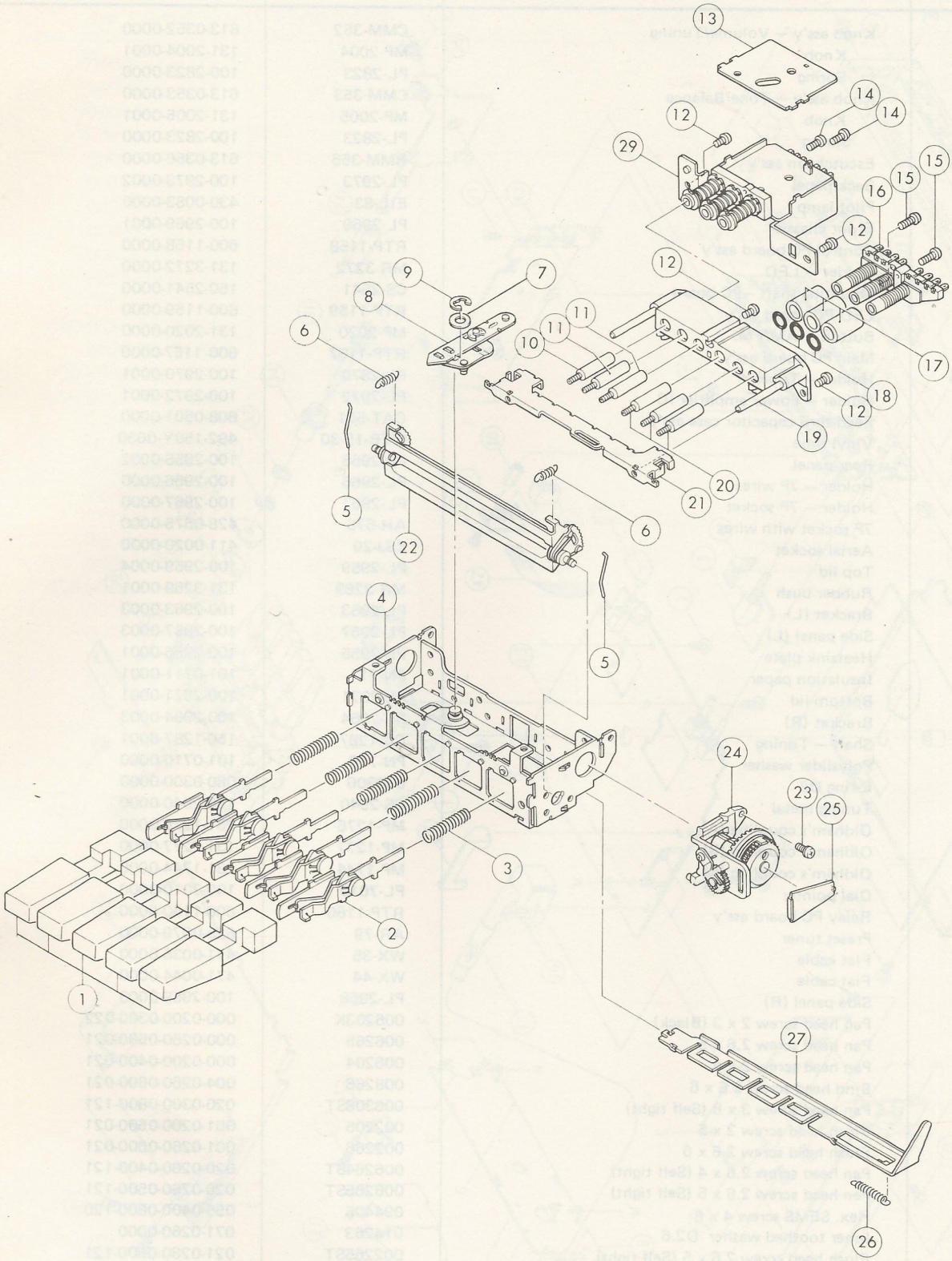


BOTTOM VIEW

REF. NO. 40-29 600-0813-0000 FM RF CIRCUIT BOARD ASSEMBLY PARTS LIST

REF. NO.	DESCRIPTION	PART NO.	MFR'S NO.
—	FM RF printed circuit board	EP-790	440-0790-0000
C501	Ceramic capacitor 12pF 25V	ECC	260-120K-1E00-005
C502, 513	Ceramic capacitor 18pF 25V	ECC	260-180K-1E00-005
C503, 509	Ceramic capacitor 6pF 25V	ECC	260-6R0D-1E00-005
C504	Ceramic capacitor 15pF 25V	ECC	260-150K-1ERH-005
C505	Ceramic capacitor 10pF 25V	ECC	260-100F-1E00-005
C506, 514, 516, 518	Ceramic capacitor 0.002μF 25V	ECC	261-202M-1E00-016
C507	Ceramic capacitor 22pF 25V	ECC	260-220K-1E00-005
C508	Ceramic capacitor 18pF 25V	ECC	260-180K-1ERH-005
C510, 515, 524	Ceramic capacitor 0.02μF 50V	ECC	261-203M-1HMF-016
C511	Ceramic capacitor 5pF 25V	ECC	260-5R0D-1E00-005
C512	Ceramic capacitor 300pF 50V	ECC	261-301K-1HJB-005
C517	Ceramic capacitor 51pF 50V	ECC	260-510K-1HRH-016
C519	Ceramic capacitor 30pF 50V	ECC	260-300K-1HTH-005
C520	Ceramic capacitor 15pF 50V	ECC	260-150K-1HTH-005
C521	Ceramic capacitor 10pF 25V	ECC	260-100D-1ECH-005
C522	Ceramic capacitor 8pF 25V	ECC	260-8R0K-1ERH-005
C523	Ceramic capacitor 3pF 50V	ECC	260-3R0K-1HTH-005
D501	Variable capacitance diode ITT410	ETD-ITT410	305-0007-1000
L501a	ANT coil	ELA-52	352-0052-1300
L501b, 501c	RF/OSC coil	ELA-53	352-0053-1300
L502	RF choke coil	ELD-190	351-0190-1300
L503	IF trap coil	ELA-54	352-0054-1300
Q501	FET 3SK73(GR)	ETTF-3SK73GR	300-0016-1100
Q502	Transistor 2SC2668 (O)	ETTC-2668O	302-0064-1100
Q503	Transistor 2SC2839(E)	ETTC-2839E	302-0076-1100
R501	Carbon film resistor 820k ohm 1/6W ±5%	ECR	200-821J-1J00-010
R502, 508, 513	Carbon film resistor 100k ohm 1/6W ±5%	ECR	200-104J-1J00-010
R503	Carbon film resistor 39 ohm 1/6W ±5%	ECR	200-390J-1J00-010
R504	Carbon film resistor 470 ohm 1/6W ±5%	ECR	200-471J-1J00-010
R506	Carbon film resistor 560k ohm 1/6W ±5%	ECR	200-564J-1J00-010
R507, 512	Carbon film resistor 1k ohm 1/6W ±5%	ECR	200-102J-1J00-010
R509	Carbon film resistor 2.7k ohm 1/6W ±5%	ECR	200-272J-1J00-010
R510	Carbon film resistor 390k ohm 1/6W ±5%	ECR	200-394J-1J00-010
R511	Carbon film resistor 150 ohm 1/6W ±5%	ECR	200-151J-1J00-010
T501	FM IFT 10.7 MHz	ELD-184	351-0184-1300
TC501	Trimmer capacitor	ECCV-33	345-0033-0100
TC502	Trimmer capacitor	ECCV-32	345-0032-0100
—	Bracket	PL-2689	100-2689-0000

EXPLODED VIEW – PRESET TUNER



The above reference number should be added after number 40–,
Example: No.1 should be No.40-1

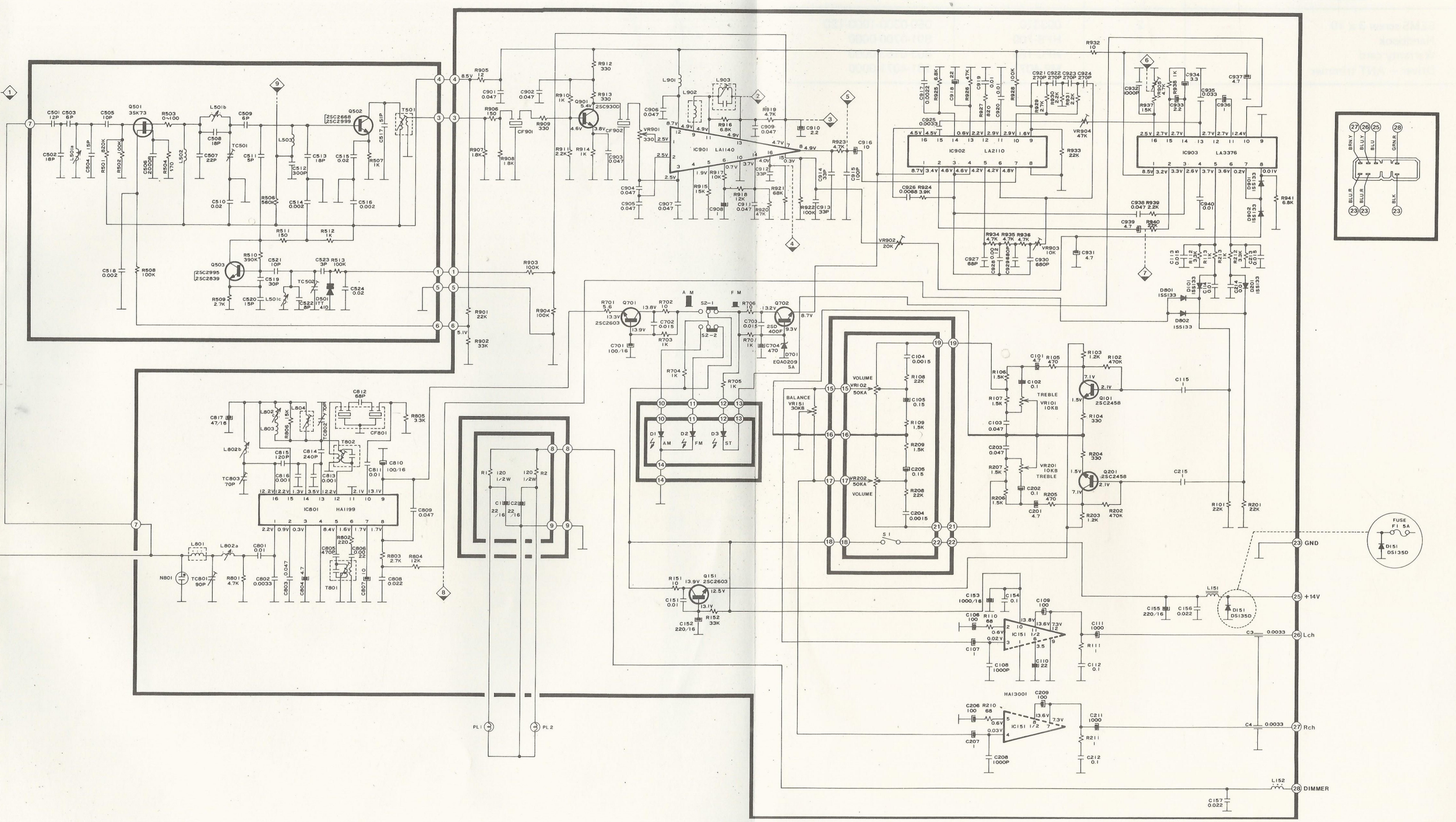
REF. NO. 40 625-0079-0000 PRESET TUNER ASSEMBLY PARTS LIST

REF. NO.	DESCRIPTION	PART NO.	MFR'S NO.
40-1	Push button	MP-4078	131-4078-0000
40-2	Lever ass'y	AA-1216	179-1216-0000
40-3	Spring	SC-346	160-0346-0000
40-4	Frame ass'y	AA-1217	179-1217-0000
40-5	Spring	PL-2690	100-2690-0000
40-6	Spring	SC-2050	160-2050-0000
40-7	Wave washer	PP-0004	079-0004-0000
40-8	Dial pointer link ass'y	AA-723	179-0723-0000
40-9	E-ring D2 x 0.3	030203	080-0200-0000
40-10	Core (FM OSC)	EHD-7	367-0007-1300
40-11	Core (FM ANT/RF)	EHD-8	367-0008-1300
40-12	Pan head screw 2.6 x 4	006264	000-0260-0400-020
40-13	Cover	PP-508	100-6508-0000
40-14	Pan head screw 2 x 6	006206	000-0200-0600-020
40-15	Pan head screw 2 x 8	006208	000-0200-0800-020
40-16	AM coil ass'y	AA-724	179-0724-0000
40-17	Sleeve core	EHD-9	367-0009-1300
40-18	Ring	MR-248	131-3248-0000
40-19	Coil holder	AA-725	179-0725-0000
40-20	Core (AM ANT/RF/OSC)	EHD-10	367-0010-1300
40-21	Core holder	PL-2691	100-2691-0000
40-22	Rotator ass'y	AA-726	179-0726-0000
40-23	Pan head screw 2.6 x 5	006265	000-0260-0500-020
40-24	Clutch ass'y	AA-727	179-0727-0000
40-25	Supporting plate	PL-7108	100-7108-0000
40-26	Spring	SC-348	160-0348-0000
40-27	Clutch lever	PL-2693	100-2693-0000
40-29	FM RF PC board ass'y	RRP-13	600-0813-0000

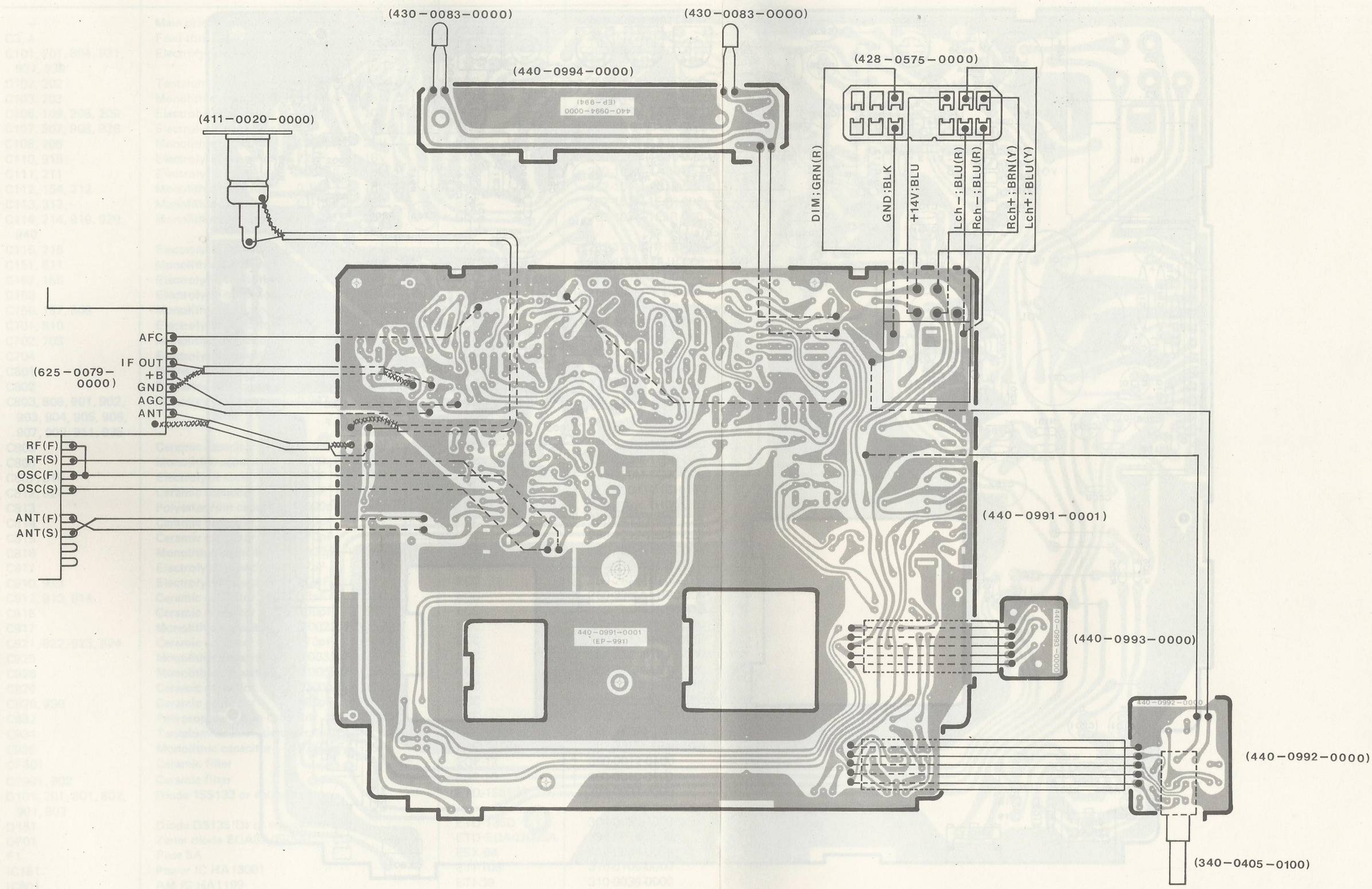
ACCESSORY LIST

DESCRIPTION	Q'TY	PART NO.	MFR'S NO.
SEMS screw 3 x 10	2	093310	050-0300-1000-120
Handbook	1	HPB-700	801-0700-0000
Warranty card	1	HPC-163	803-0163-0000
Driver – ANT trimmer	1	MP-4071	131-4071-0000

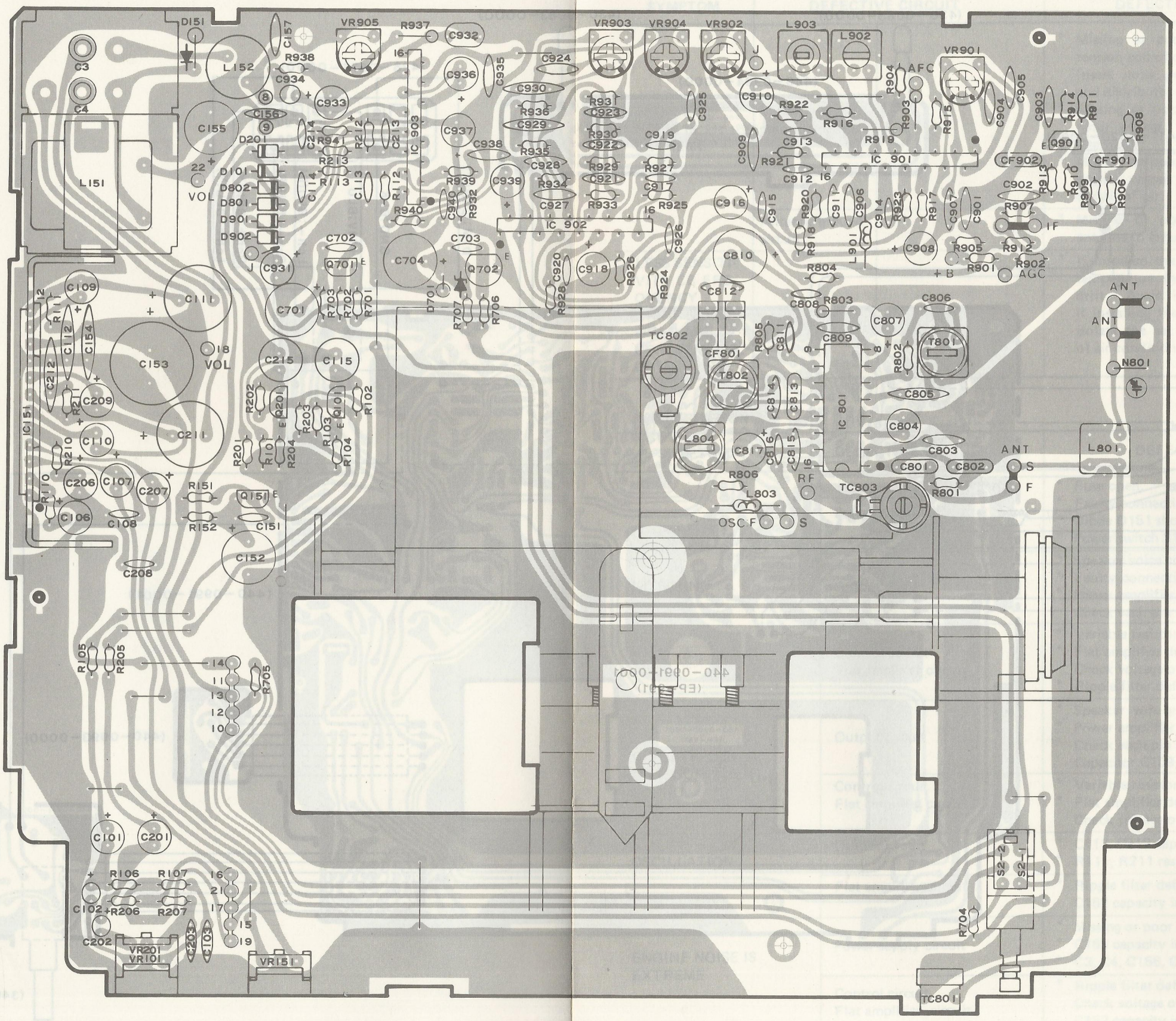
SCHEMATIC DIAGRAM



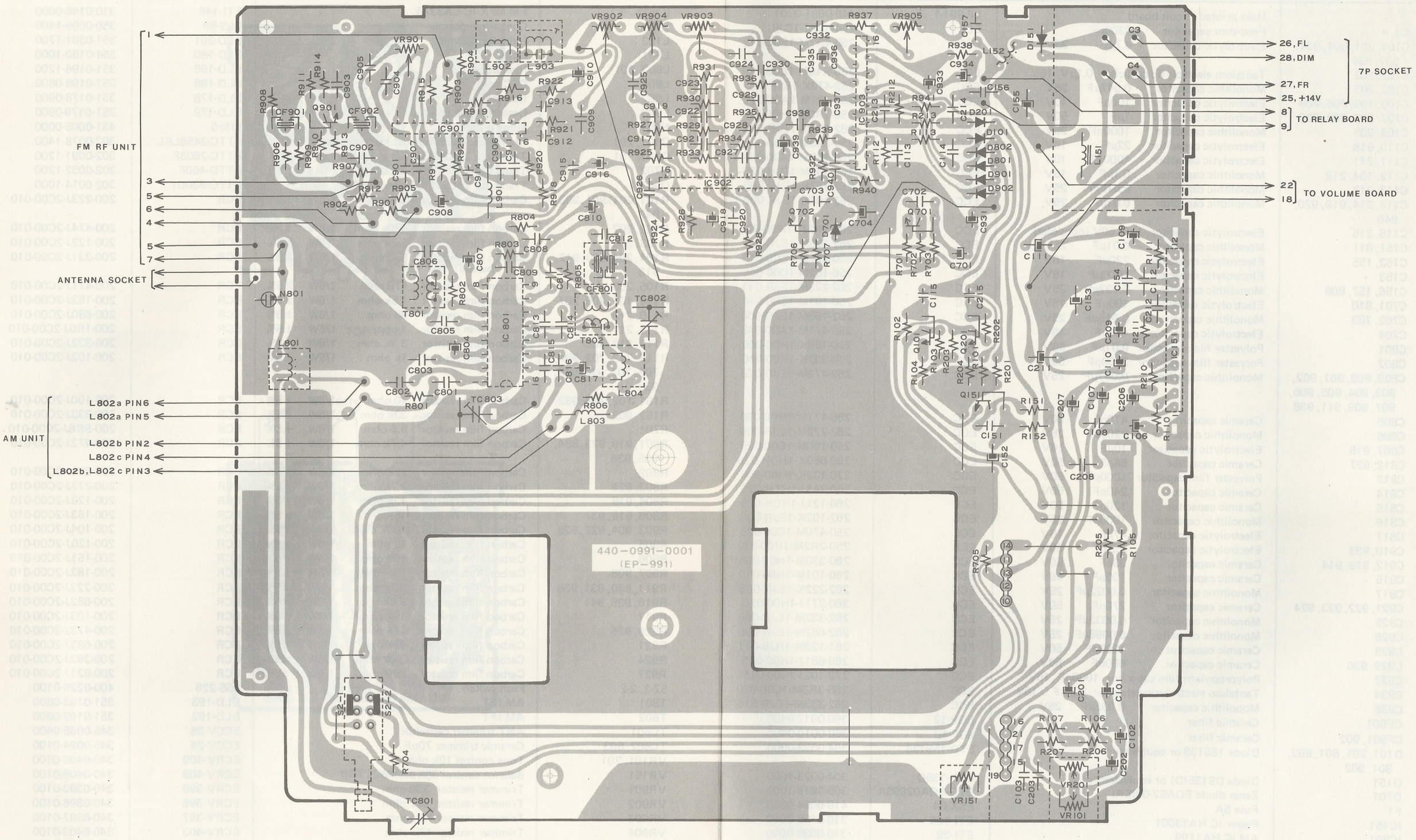
WIRING LAYOUT



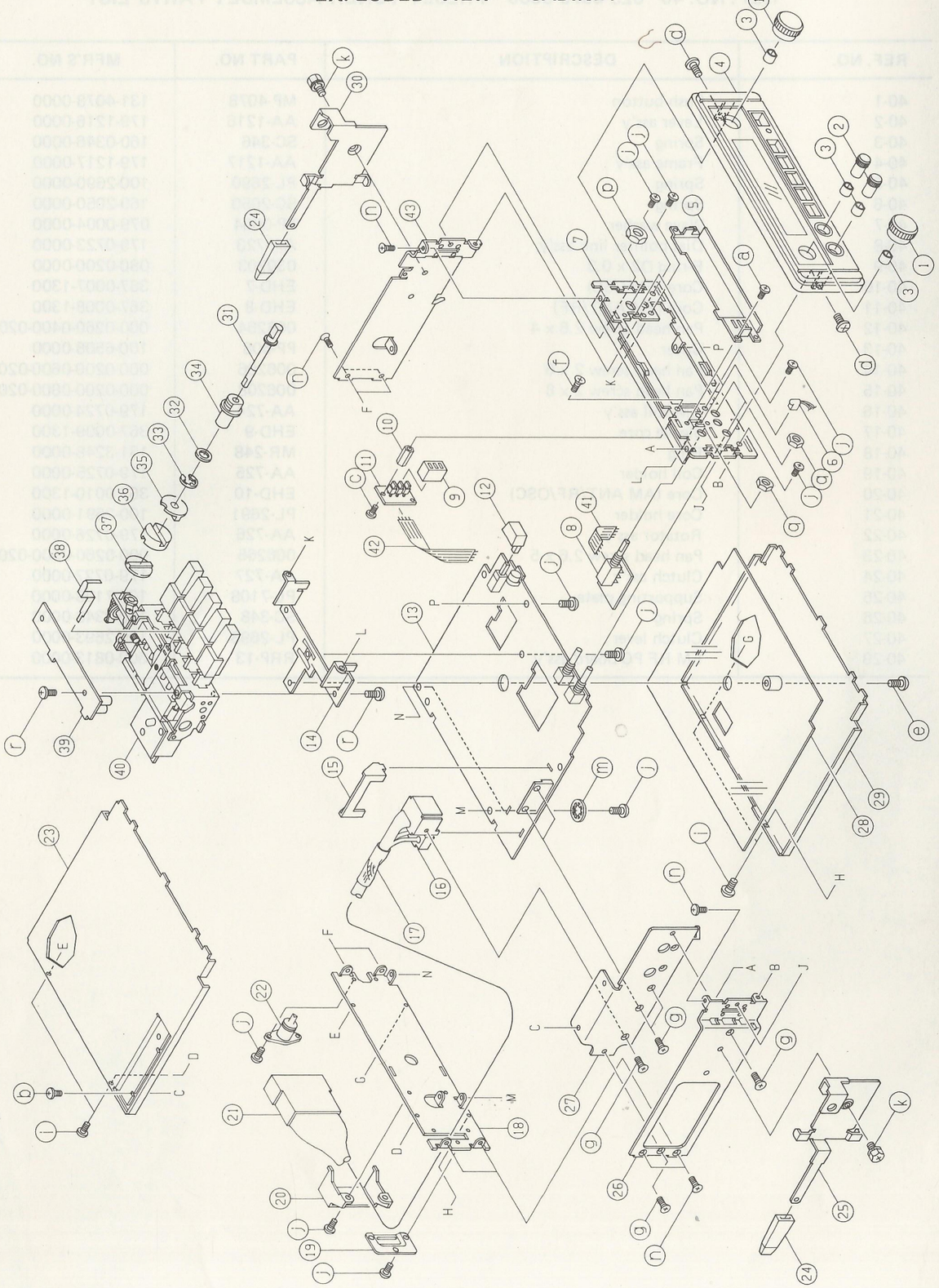
MAIN CIRCUIT BOARD COMPONENT LOCATION GUIDE



TOP VIEW


FM RF UNIT
ANTENNA SOCKET
AM UNIT
L802a PIN6
L802a PIN5
L802b PIN2
L802c PIN4
L802b,L802c PIN3
7P SOCKET
26, FL
28, DIM
27, FR
25, +14V
TO RELAY BOARD
TO VOLUME BOARD
440-0991-0001
(EP-991)
BOTTOM VIEW

EXPLODED VIEW – CABINET



MECHANICAL PARTS LIST

REF. NO.	DESCRIPTION	PART NO.	MFR'S NO.
	Knob ass'y – Volume/Tuning	CMM-352	613-0352-0000
1	Knob	MP-2004	131-2004-0001
3	Spring	PL-2823	100-2823-0000
	Knob ass'y – Tone/Balance	CMM-353	613-0353-0000
2	Knob	MP-2005	131-2005-0001
3	Spring	PL-2823	100-2823-0000
4	Escutcheon ass'y	RMM-356	613-0356-0000
5	Back panel	PL-2973	100-2973-0002
6	Pilot lamp	EIL-83	430-0083-0000
7	Front chassis	PL-2969	100-2969-0001
8	Control PC board ass'y	RTP-1158	600-1158-0000
9	Holder – LED	MR-3272	131-3272-0000
10	Mounting shaft –PC board	CS-2541	150-2541-0000
11	LED PC board ass'y	RTP-1159	600-1159-0000
12	Button – AM/FM	MP-2020	131-2020-0000
13	Main PC board ass'y	RTP-1157	600-1157-0000
14	Holder – Tuner	PL-2970	100-2970-0001
15	Holder – Power amplifier IC	PL-2972	100-2972-0001
16	Feed-thru capacitor case ass'y	CAT-501	608-0501-0000
17	Vinyl tube	WTB-15-30	492-150Y-0030
18	Rear panel	PL-2956	100-2956-0002
19	Holder – 7P wires	PL-2966	100-2966-0000
20	Holder – 7P socket	PL-2967	100-2967-0000
21	7P socket with wires	AH-575	428-0575-0000
22	Aerial socket	ESJ-20	411-0020-0000
23	Top lid	PL-2959	100-2959-0004
24	Rubber bush	MR-3269	131-3269-0001
25	Bracket (L)	PL-2963	100-2963-0003
26	Side panel (L)	PL-2957	100-2957-0003
27	Heatsink plate	PL-2955	100-2955-0001
28	Insulation paper	PN-711	101-0711-0001
29	Bottom lid	PL-2971	100-2971-0001
30	Bracket (R)	PL-2964	100-2964-0003
31	Shaft – Tuning	CC-1287	150-1287-0001
32	Polyslider washer	PN-710	101-0710-0000
33	E-ring D3	030306	080-0300-0000
34	Tuning metal	CS-2540	150-2540-0000
35	Oldham's coupling (A)	MP-1276	131-1276-0000
36	Oldham's coupling (B)	MP-1277	131-1277-0000
37	Oldham's coupling (C)	MP-1744	131-1744-0000
38	Dial pointer	PL-7010	100-7010-0000
39	Relay PC board ass'y	RTP-1160	600-1160-0000
40	Preset tuner	AR-79	625-0079-0000
41	Flat cable	WX-35	471-0035-0000
42	Flat cable	WX-44	471-0044-0000
43	Side panel (R)	PL-2958	100-2958-0003
a	Pan head screw 2 x 3 (Black)	006203K	000-0200-0300-022
b	Pan head screw 2.6 x 5	006265	000-0260-0500-021
c	Pan head screw 2 x 4	006204	000-0200-0400-021
d	Bind head screw 2.6 x 6	008266	004-0260-0600-021
e	Pan head screw 3 x 8 (Self tight)	006308ST	020-0300-0800-121
f	Flush head screw 2 x 5	002205	001-0200-0500-021
g	Flush head screw 2.6 x 6	002266	001-0260-0600-021
i	Pan head screw 2.6 x 4 (Self tight)	006264ST	020-0260-0400-121
j	Pan head screw 2.6 x 5 (Self tight)	006265ST	020-0260-0500-121
k	Hex. SEMS screw 4 x 6	094406	055-0400-0600-120
m	Inner toothed washer D2.6	014263	071-0260-0000
n	Flush head screw 2.6 x 5 (Self tight)	002265ST	021-0260-0500-121
p	Hexagon nut D10	0201020	064-1000-0002
q	Hexagon nut D6	020620	060-0600-0002
r	Pan head screw 3 x 5 (Self tight)	006305ST	020-0300-0500-121