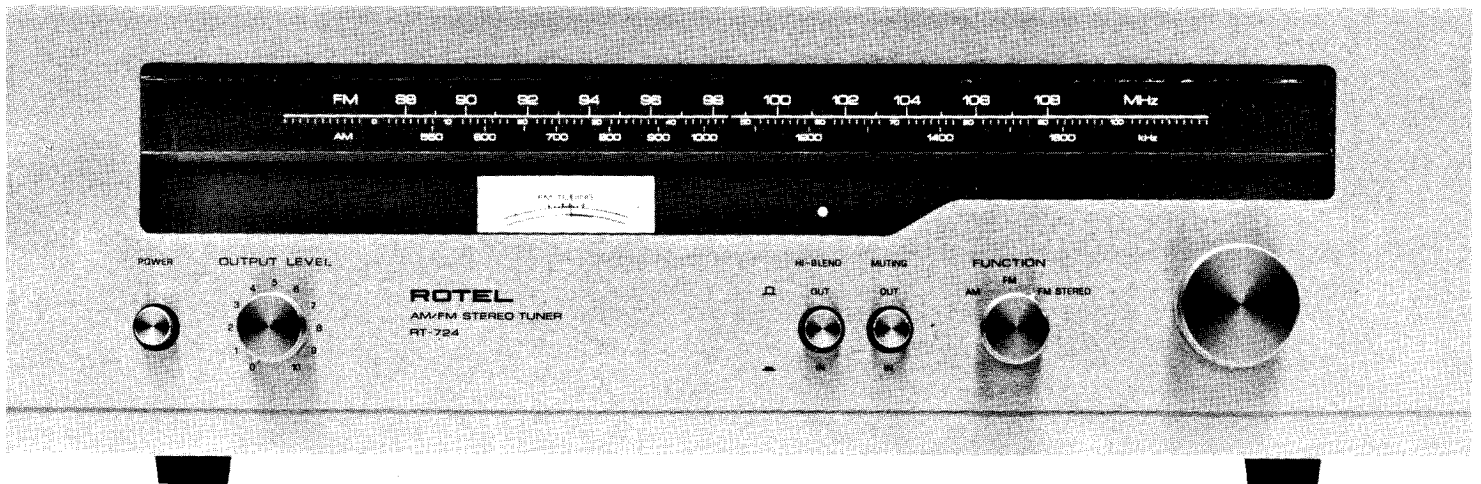


# ROTEL®

## STEREO TUNER RT-724



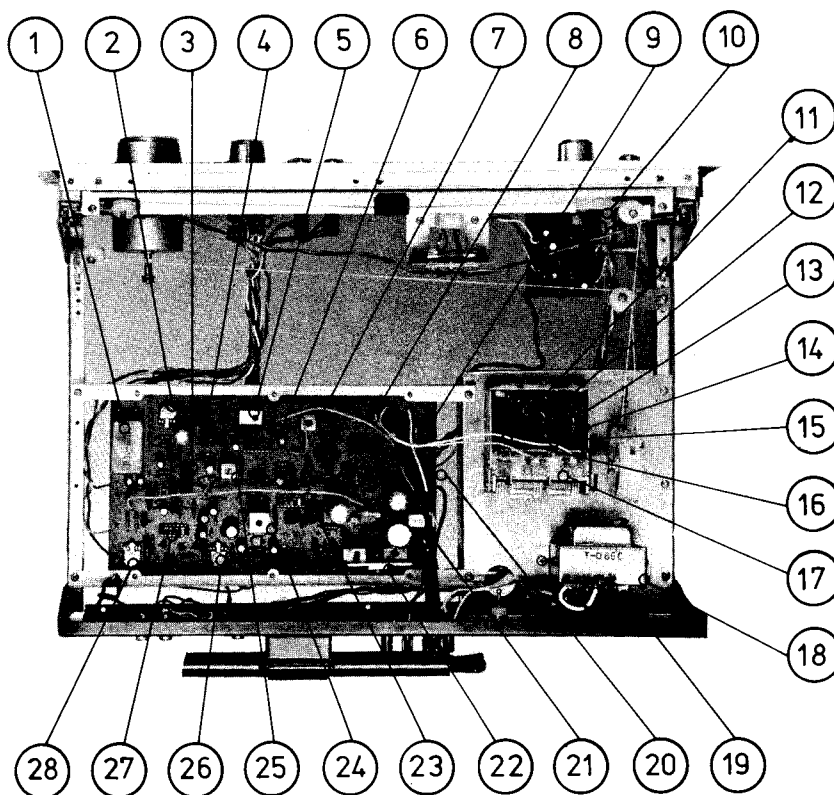
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## technical manual

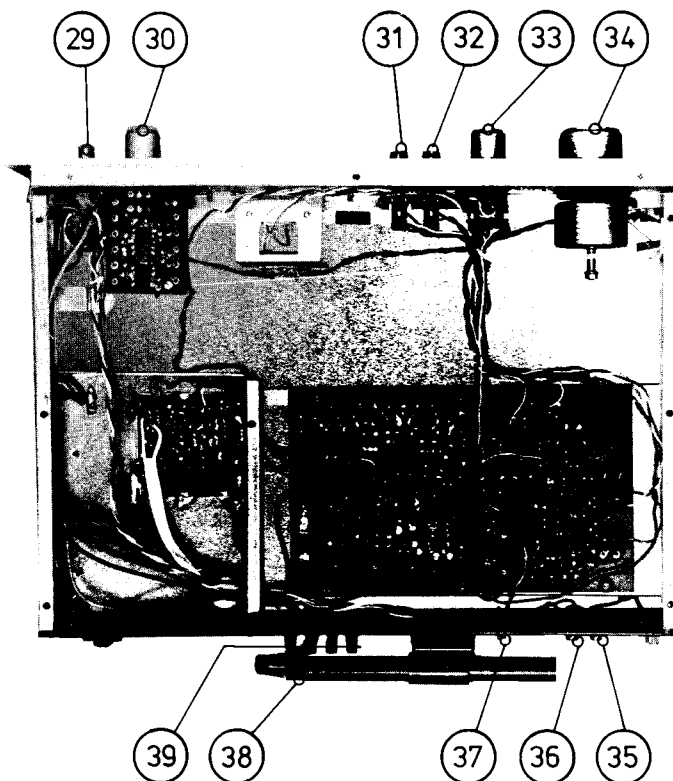
# CHASSIS LAYOUT

1. L301, Low Pass Filter
2. VR303, FM Stereo Separation Adj.
3. S5, FM De-emphasis Switch
4. L109, Whistle Filer
5. L108, AM IFT 2nd.
6. IC102, AM Conv. & IF AMP. IC.
7. L105, AM Osc Coil
8. L003, RF Choke
9. L002, RF Choke
10. Audio Amp. Circuit Board
11. L7, FM IF (AM/FM Only)
12. L5, FM IF Trap Coil
13. L1, FM ANT Coil
14. L2, FM ANT Coil
15. L3, L4, FM RF Coil
16. L6, FM OSC Coil
17. Front-End
18. T001, Power Transformer
19. Voltage Selector Switch
20. AM/FM/MPX AMP. PCB
21. F901, AC Fuse, 0.5A
22. Q901, Requirator
23. IC101, FM IF AMP. IC
24. L103, FM Detector
25. L107, AM IFT 1st.
26. VR301, Auto-Switching Adj.
27. IC301, MPX AMP. IC.
28. VR302, FM VCO Adj.



(TOP VIEW)

29. S4, Power supply Switch
30. Output Level Control
31. S2, Hi-Blend Switch
32. S3, Muting Switch
33. S1, Function Selector Switch
34. Tuning Knob
35. FM Variable Output Jack
36. FM Fixed Output Jack
37. FM Detector Output Jack
38. L001, AM ANT Coil
39. Antenna Terminal



(BOTTOM VIEW)

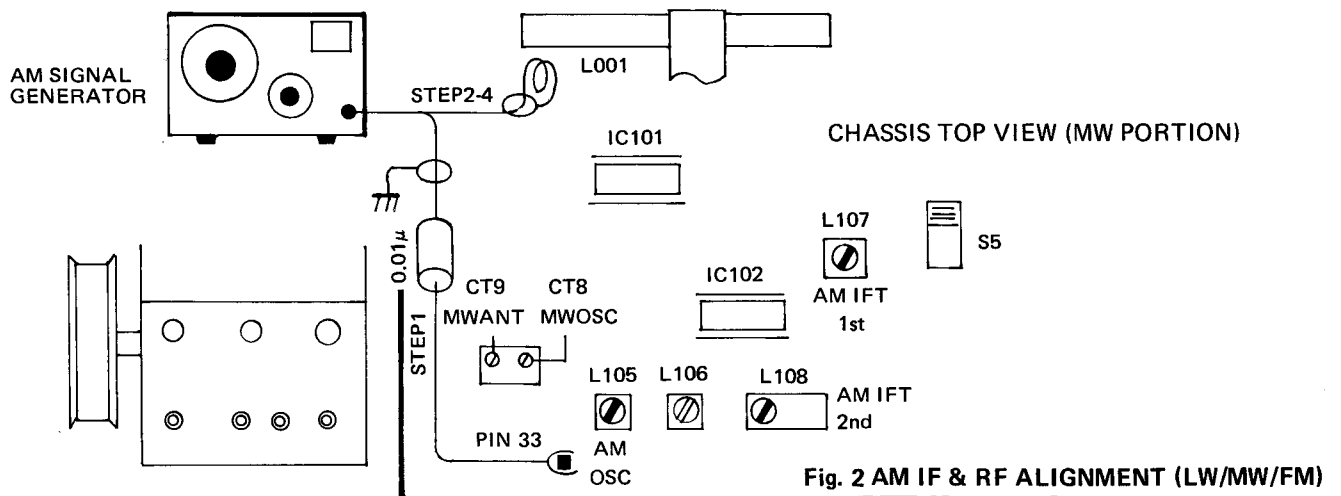
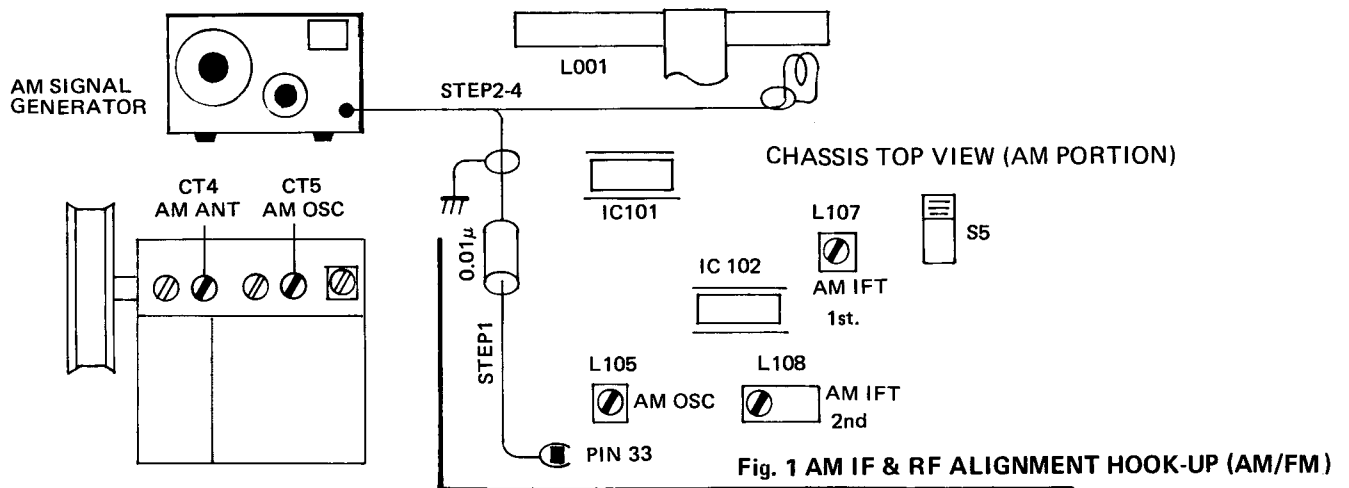
# AM IF & RF ALIGNMENT PROCEDURE

## PART I MW Section (LW/MW/FM, AM/FM)

**Instruments:** AM Signal Generator and AC VTVM

**Notes:** Set Function Selector Switch to MW position Input Signal must be kept as low as possible to avoid AVC action.

Step	Generator		Tuning Dial Setting	Output Indicator Connected to	Adjust	Adjust for
	Connected to	Frequency				
1	Pin NO. 33 (on IF pcb) thru. a 0.01 mfd Capacitor	455 KHZ (400HZ 30% Mod.)	Non interfering at Low end of scale	AC VTVM to Output jack	L107 and L108 (on IF pcb)	Maximum reading on AC VTVM
2	Test loop Radiate Signal into ferrite Loop Stick antenna	600KHz (400Hz 30% Mod.)	600KHz on Dial scale		L105 (OSC) and L001 (ANT) Coil (lead line side)	
3		1400KHz (400Hz 30% Mod.)	1400KHz on Dial Scal		CT8 (OSC) and CT9 (ANT)(LW/MW/FM) CT4 (ANT) and CT5 (OSC) (AM/FM)	
4	Repeat steps 2 and 3 until no further improvement is noticed.					



# AM IF & RF ALIGNMENT PROCEDURE

**PART II: LW Section (LW/MW/FM only)**

**Instruments:** AM Signal General and AC VTVM

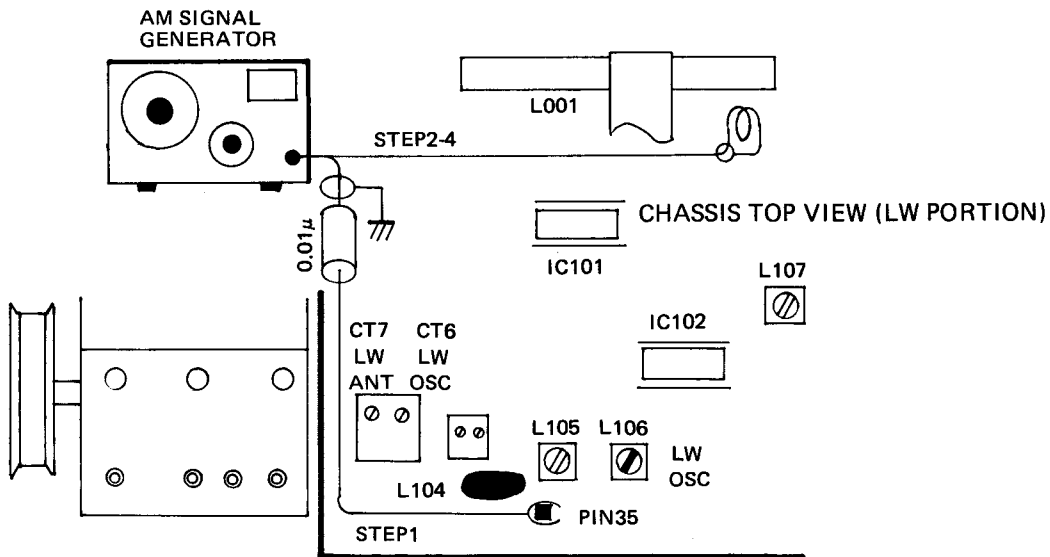
**Notes:** Set Function Selector to LW position.

Input Signal must be kept. as low as possible to avoid AVC action.

Step	Generator		Tunning Dial Setting	Output Indicator Connected to	Adjust	Adjust for
	Connected to	Frequency				
1	Pin NO. 35 (on IF pcb) thru. a 0.01 mfd Capacitor	455 KHZ (400HZ 30% Mod.)	Non interfering at Low end of scale	AC VTVM to Output jack	L107 and L108 (on IF pcb)	Maximum reading on AC VTVM
2	Test loop Radiate Signal into ferrite loop Stick:  antenna	600KHz (400Hz 30% Mod.)	160KHz on Dial scale		L106 (OSC) and L001 (ANT) Coil (against the lead line side)	
3		330KHz (400Hz 30% Mod.)	330KHz on Dial Scal		CT6 (OSC) and CT7 (ANT)	
4	Repeat steps 2 and 3 until no further improvement is noticed.					

✳ **Notes:** After adjustment, check to make sure that, indeed, Both LW and MW alignments are in the best state.

Otherwise repeat LW and MW alignment procedure until no further improvement is noticed. (LW/MW/FM only)



**Fig. 3 AM IF & RF ALIGNMENT HOOK-UP (LW SECTION)**

# FM IF & RF ALIGNMENT PROCEDURE

**Instruments:** FM Signal Generator and H.D. Analyzer.

- Set Function Selector to "FM" Position.
- Set Muting switch and Hi-blend switch to "OFF" Position.
- Set VR301 to mid-position.
- Connect FM Signal Generator to FM antenna terminals.
- Connect Oscilloscope and H.D. Analyzer to OUTPUT jack.

## A. FM IF Alignment

1. Set Signal Generator Frequency at 98 MHz (400Hz, 100% Mod.) and adjust the tuner to maximum output point by turning the tuning knob (The antenna terminal voltage should be 1mV).
2. Adjust the meter to center position by adjusting the lower core of L103
3. Adjust IF Coil (on FL-136U) = (LW/MW/FM), L7 (on RF-321-U) = (AM/FM) to obtain maximum deflection on scope.
4. Set distortion to minimum by adjusting the upper core of L103.

## B. FM RF Alignment

1. Set Signal Generator Frequency at 106 MHz (400Hz, 100% Mod.) and also the tuner at 106 MHz on the dial scale. Then adjust FM OSC trimmer TCO (on FL-136U) = (LW/MW/FM), CT3 (on RF-321-U) = (AM/FM) to obtain maximum deflection on scope.

2. Set the tuner at 90 MHz on the dial scale, and change the frequency of Signal Generator so that the output of the tuner becomes maximum. Then make sure Signal generator frequency stays within 90 MHz  $\pm$  150 KHz.
3. Sensitivity on this alignment must be attempted at 106 MHz by adjusting TCA and TCR = (LW/MW/FM), CT1 and CT2 = (AM/FM) to obtain maximum deflection on scope, and fine tune to balance sensitivity at 90 MHz and 106 MHz.
4. Adjust FM OSC Coil LO, FM RF Coil LR and FM ANT Coil LA = (LW/MW/FM), L6, L2, L3 & L4 = (AM/FM) as described below only when tracking and sensitivity adjustments are not attained by adjusting TCA, TCR and TCO = (LW/MW/FM), CT1, CT2 and CT3 = (AM/FM).
  - a. Fine tune Signal Generator and tuner to 90 MHz, and adjust LO, LR and LA = (LW/MW/FM), L6, L2, L3 & L4 = (AM/FM).
  - b. Fine tune Signal Generator and tuner to 106 MHz and adjust TCA, TCR and TCO = (LW/MW/FM), CT1, CT2 and CT3 = (AM/FM). so that maximum output is obtained.
  - c. Repeat steps a and b to obtain enough effect.

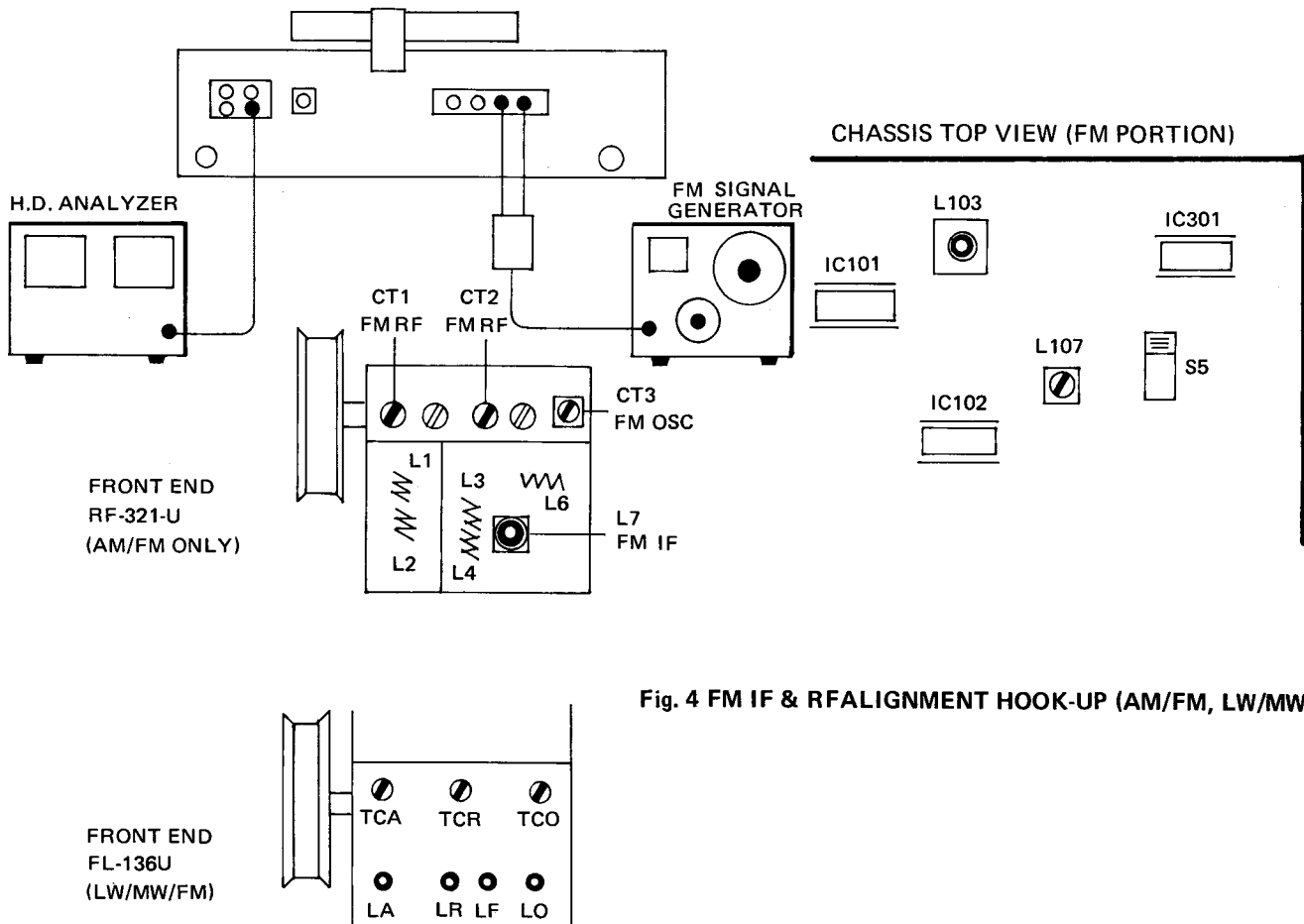


Fig. 4 FM IF & RF ALIGNMENT HOOK-UP (AM/FM, LW/MW/FM)

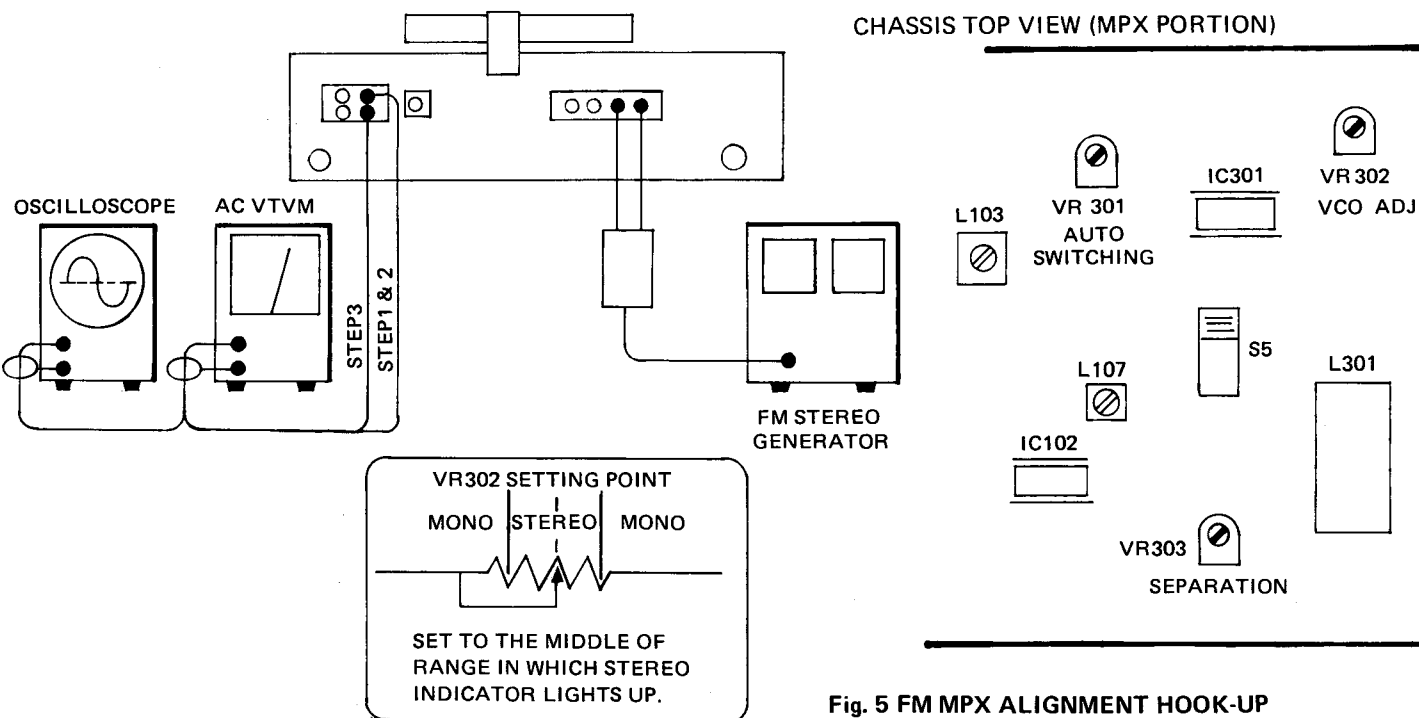
# FM MPX ALIGNMENT PROCEDURE

**Instruments:** FM Stereo Signal Generator, AC VTVM and Oscilloscope.

**Notes:** Be sure the FM IF alignment is in the best state before attempting the FM MPX alignment, IF FM IF is not properly aligned, FM MPX alignment may give inferior result.

- Set Function Selector to "FM STEREO" position.
- Set VR303 to mid-position.
- Connect FM Stereo Generator to FM antenna terminals.

Step	Stereo Generator		Output Indicator Connected to	Adjust	Adjust for
	Modulation	RF Deviation			
1	19KHz Pilot Signal only	2 ~ 5%	Oscilloscope to Point 17 (on IF pcb)	VR 302	Maximum Amplitude on scope.
2	Composite 1 KHz signal to Left Channel only	Pilot 10% Signal 90%	Oscilloscope and VTVM to Right Channel Output jack	VR 303	Leakage signal on scope and AC VTVM reading Minimum.
3	Composite 1 KHz signal to Right Channel only		Same as in step 2 (Change Right to Left Channel only)		
4	Repeat the steps 2 and 3 so as to obtain equal levels between the leakage signals. (R channel to L channel and L to R channel)				



# FM STEREO AUTO-SWITCHING LEVEL ADJUSTMENT PROCEDURE

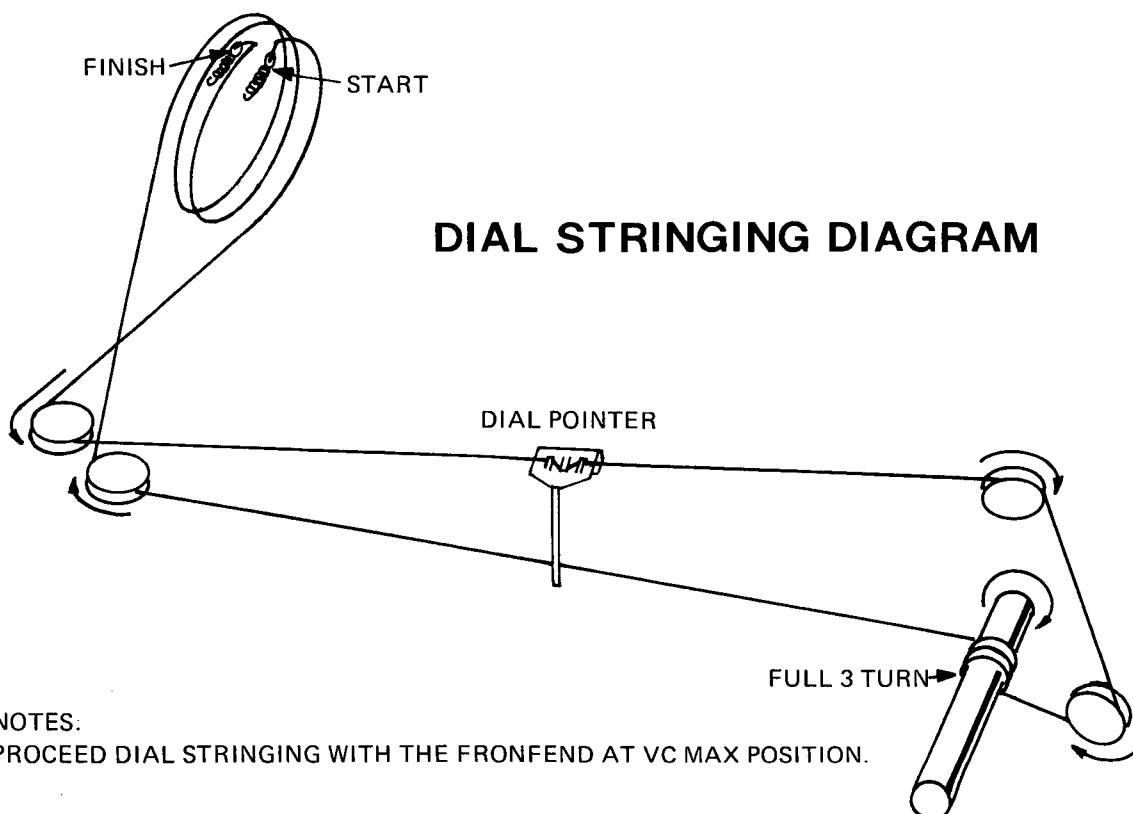
1. Connect a VTVM and Oscilloscope to the OUTPUT jack (Left or Right).
2. Feed the FM Signal whose MPX has been varied into the FM ANT terminals.  
MPX VARIATION:  
Pilot 10%  
Modulation Frequency 1KHz Left or Right.  
RF Deviation  $\pm 45$  KHz
3. Set the frequency at 98 MHz (when there is disturbing signal, choose another setting).
4. Set the selector switch to "FM STEREO" position.
5. Turn CCW the MONO-STEREO Auto-Switching does not function.
6. Adjust the VR301 so that when the antenna input is  $1.5\sim 5\mu\text{V}$ , Stereo will switch in and when the input level is a little below than above the input level (stereo switch in), Mono will switch in.
7. After adjustment, check to make sure that, indeed, when the antenna input level is  $5\mu\text{V}$ , Stereo will switch in, and when the antenna input level is  $1.5\mu\text{V}$ , Mono will switch in.

## FM MUTING LEVEL ALIGNMENT PROCEDURE

**Instruments:** FM Signal Generator and Oscilloscope

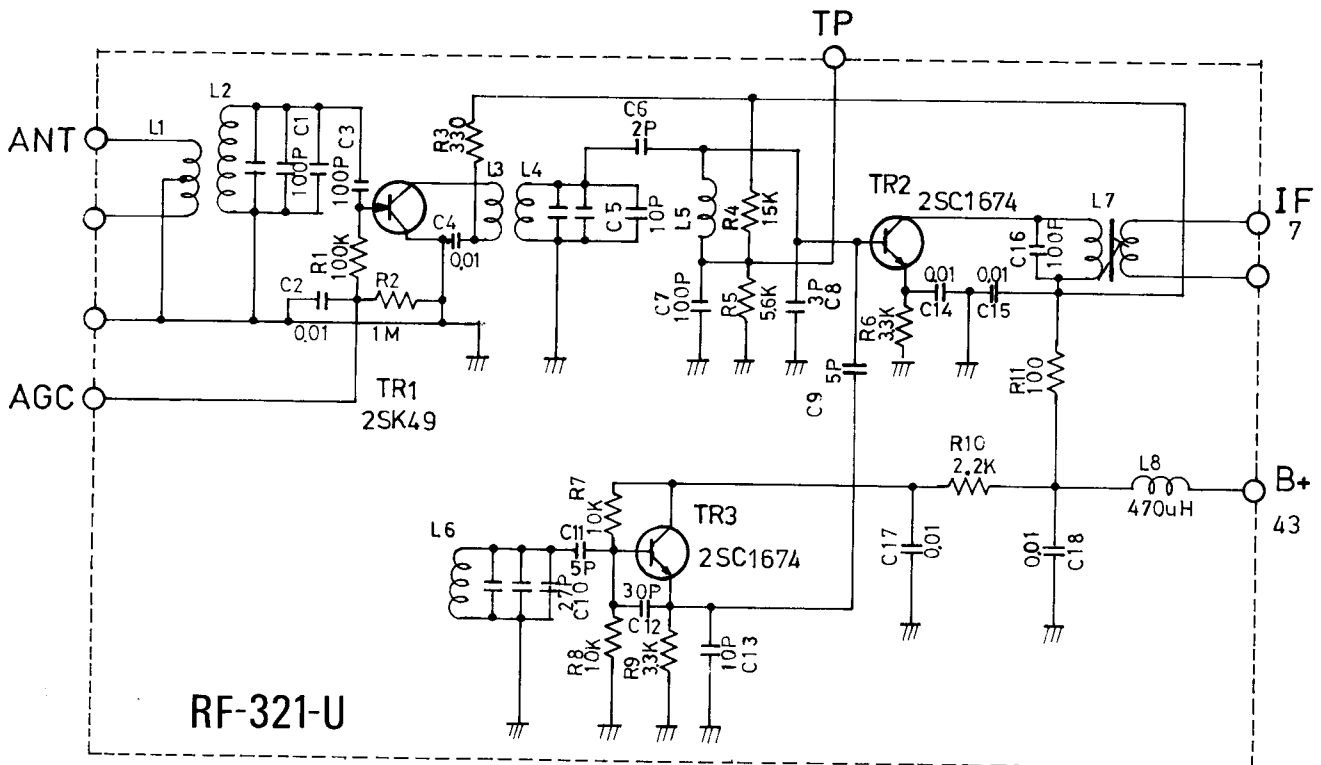
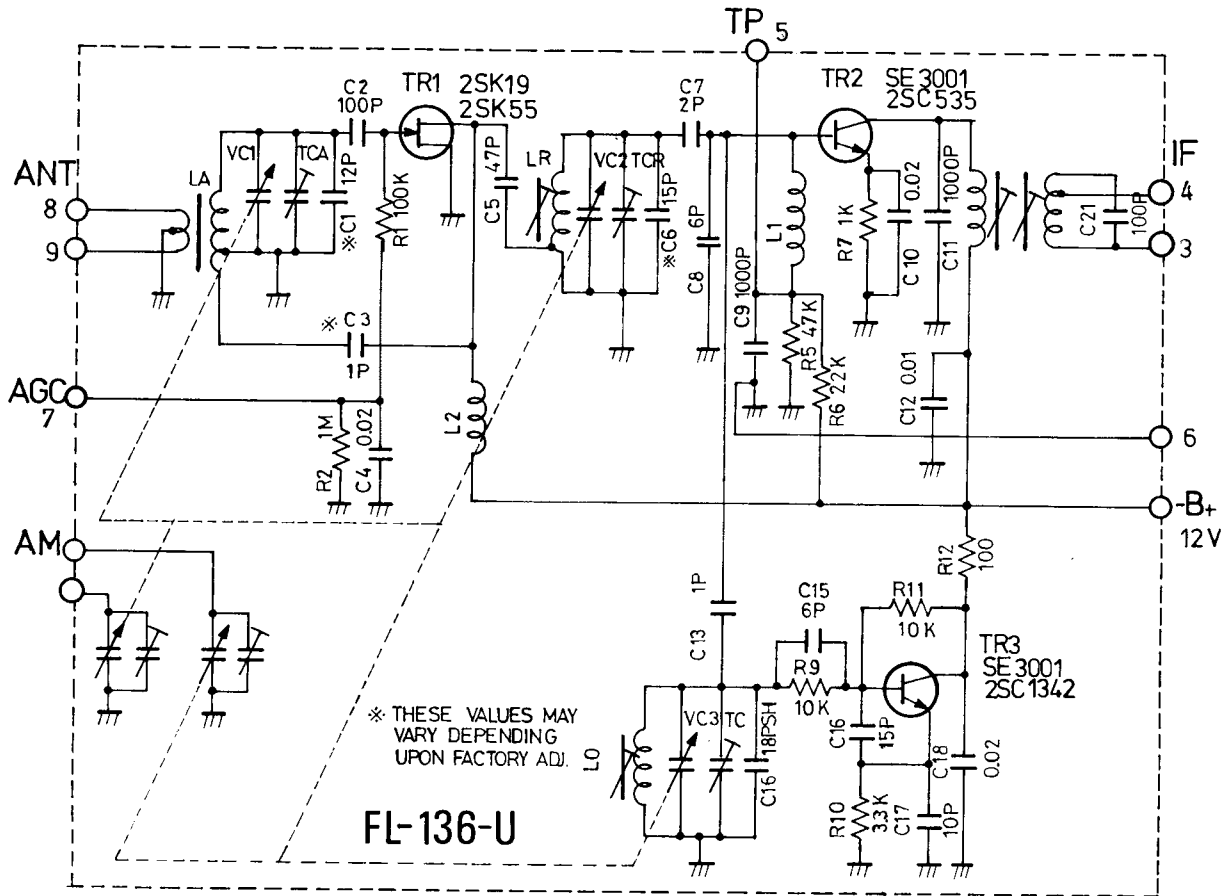
**Notes:** The circuit on FM IF and FM RF should be set in proper way before the following steps of muting level test are taken.

1. Set selector switch to "FM" position and Muting switch to "ON" position.
2. Connect the FM Signal Generator to the FM antenna terminals and connect Oscilloscope to the output jack (Left or Right Channel).
3. Set the frequency at 98 MHz (when there is disturbing signal choose another setting).
4. Adjust the FM Signal Generator output level so that when the antenna terminal voltage is  $1.5\sim 5\mu\text{V}$ , the signal on scope will vanish.
5. Make sure that output waveform appears on oscilloscope when antenna input level becomes  $5\mu\text{V}$  by increasing the FM Signal Generator output level, and it vanishes when antenna input level becomes  $1.5\mu\text{V}$  again by decreasing the FM Signal Generator output level
6. a. When the signal on scope will not Vanish (Antenna input level is below than  $1.5\mu\text{V}$ ), expedite the FM IF & RF alignment and start again.  
b. When the signal on scope will vanish (Antenna input level is more than  $5\mu\text{V}$ ) expedite the FM IF & RF alignment and start again, too.

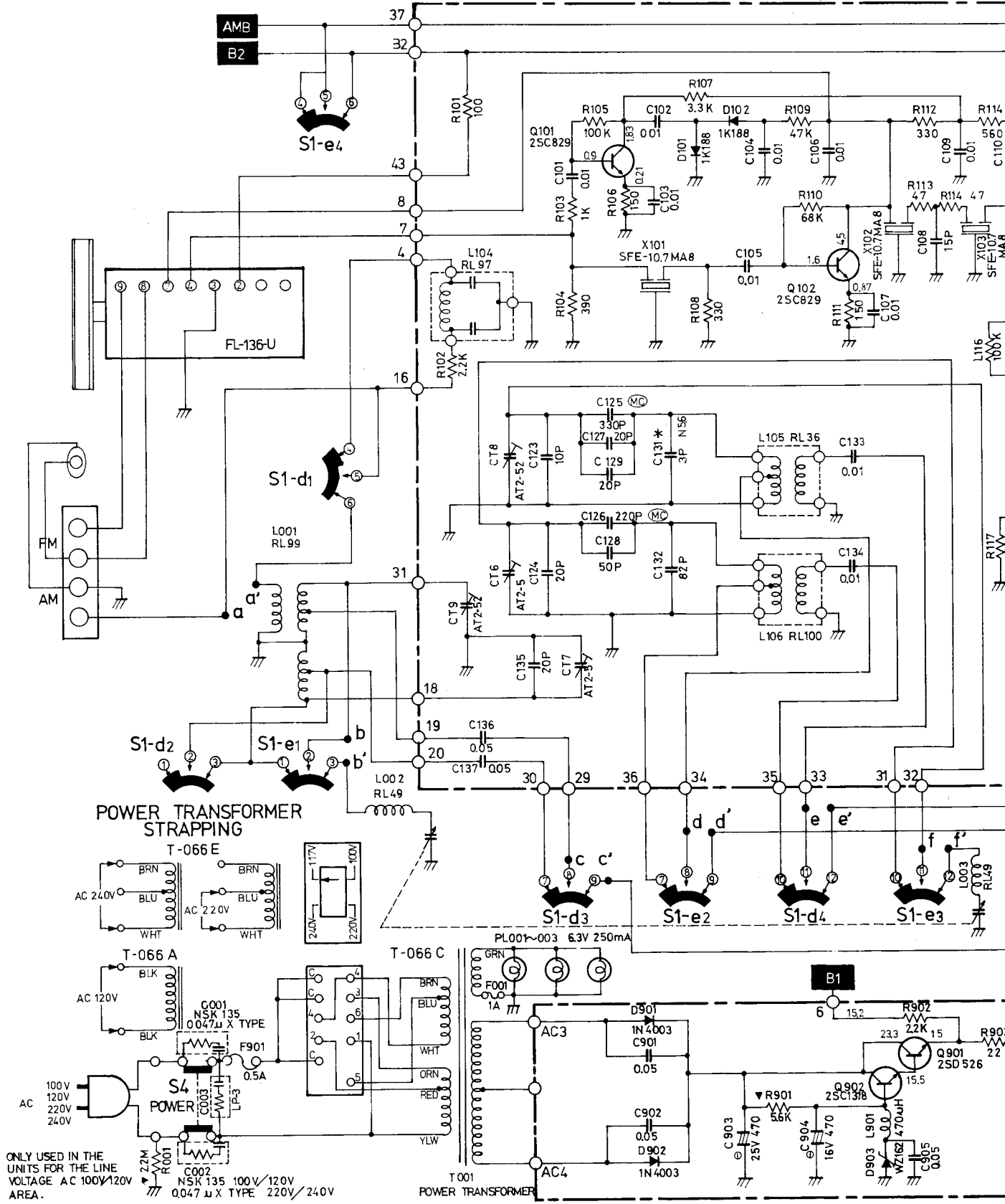


**NOTES:**  
PROCEED DIAL STRINGING WITH THE FRONFEND AT VC MAX POSITION.

# FRONT-END SCHEMATIC DIAGRAM



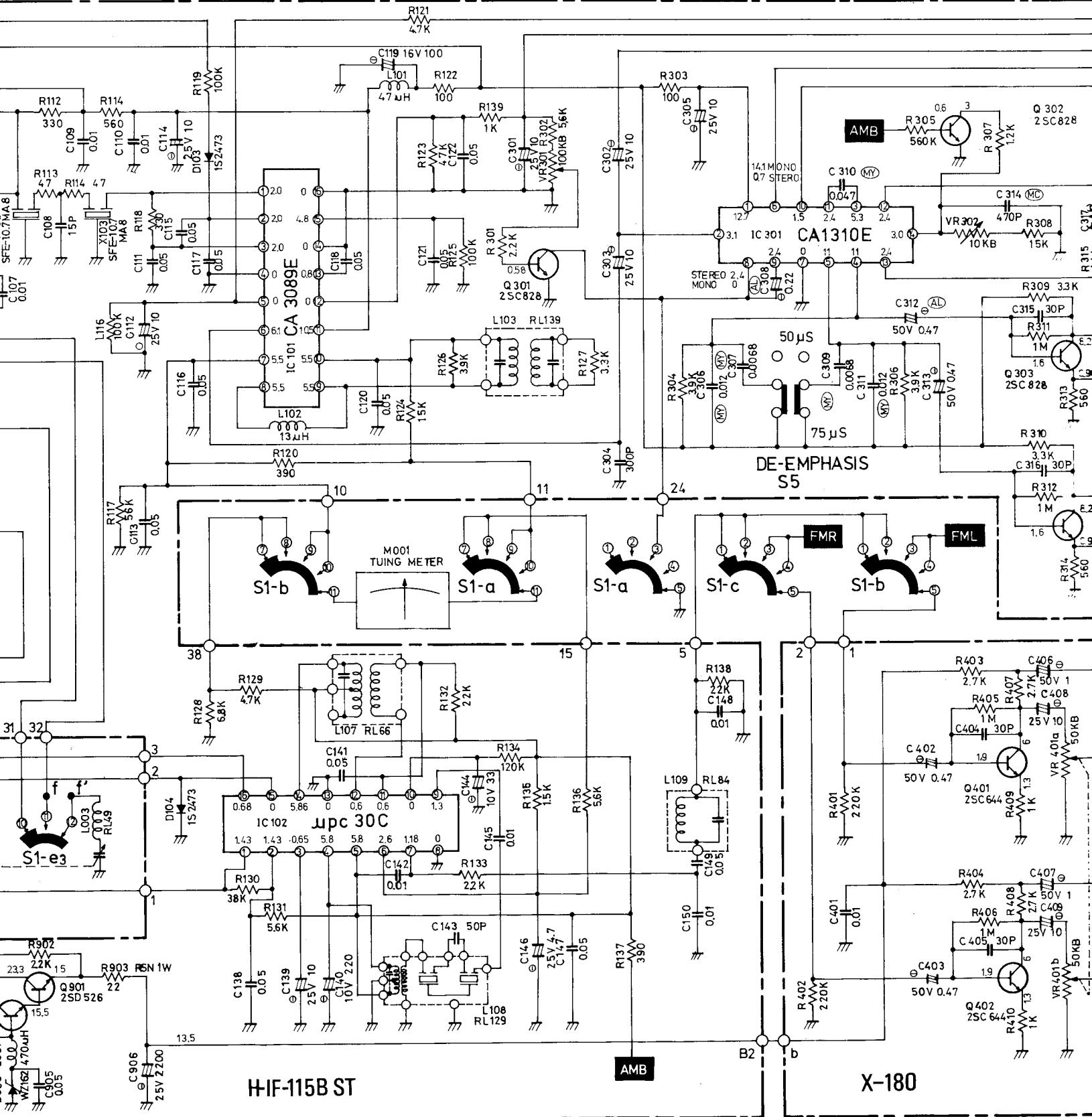




ONLY USED IN THE UNITS FOR THE LINE VOLTAGE AC 100V/120V AREA.

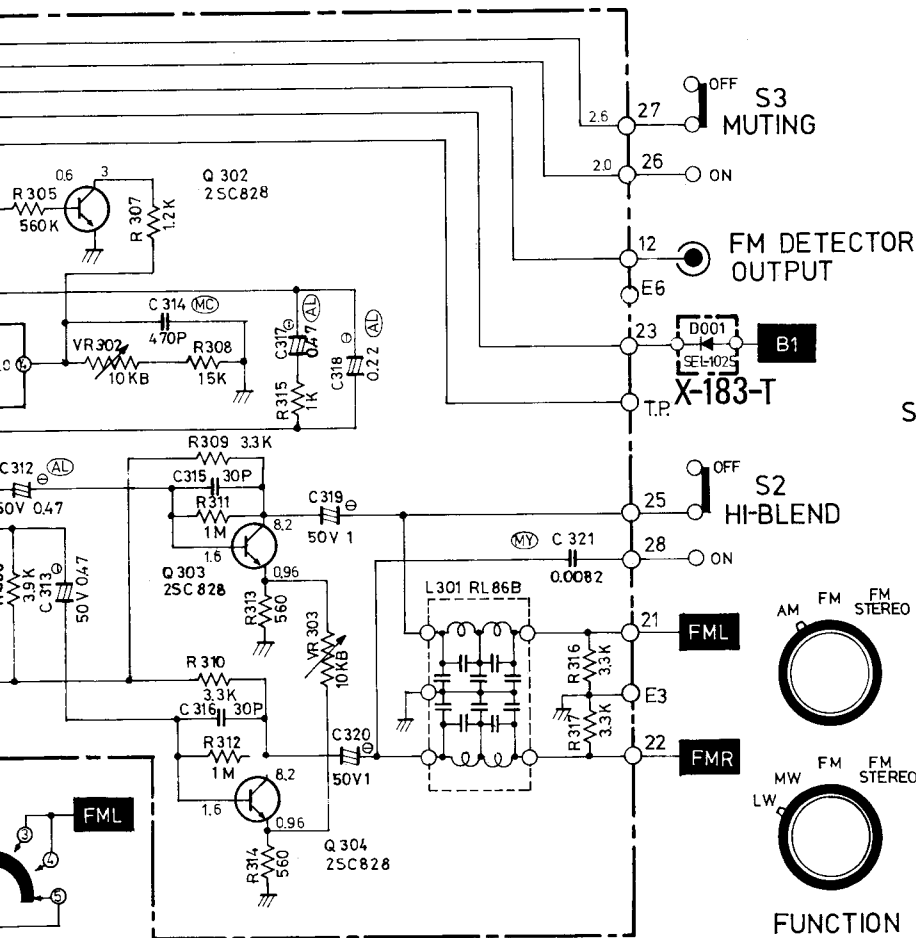
FOR CSA  
 1. CANCELED SPARK KILLER C001, C002. ADD C003.  
 2. ADD F001.  
 3. CHANGED TRANSFORMER TO A TYPE.

# SCHEMATIC DIAGRAM

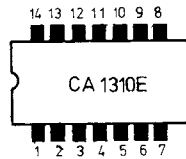
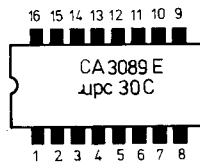


FOR CEE

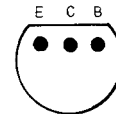
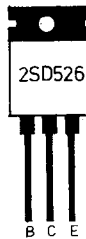
1. ALL FUSE USED MINATURE FUSE.
2. CHANGED TRANSFORMER TO E TYPE.



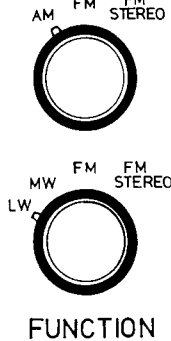
TOP VIEW



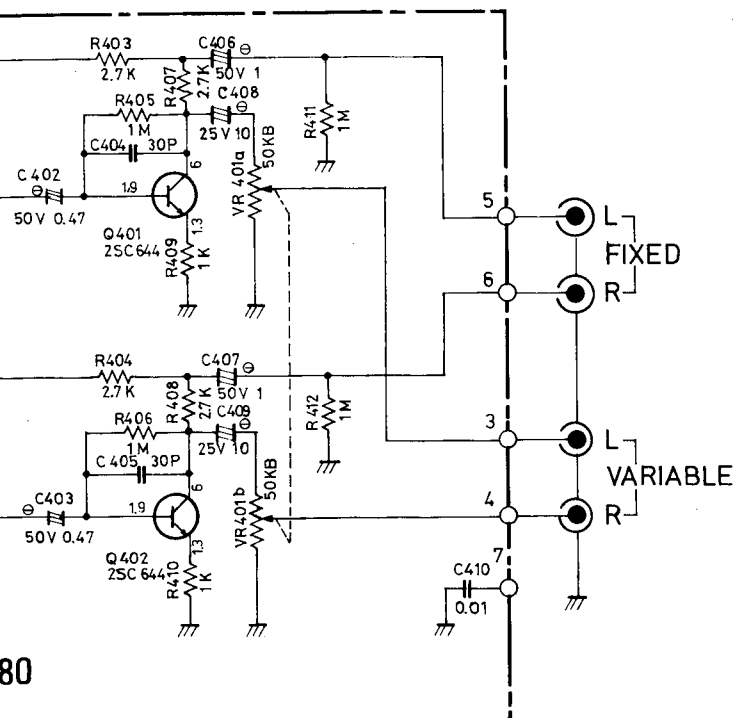
SIDE VIEW BOTTOM VIEW



2SD529  
2SC828  
2SC644  
2SC1318



ITEM	SCHEMATIC LOCATION(LAS)
MW LW FM IF AMP.	R138
	C150
FM MPX AMP.	R317
	C321
AUDIO AMP.	R412
	C410
POWER SUPPLY	R903
	C906
CHASSIS	R001
	C002



RESISTORS

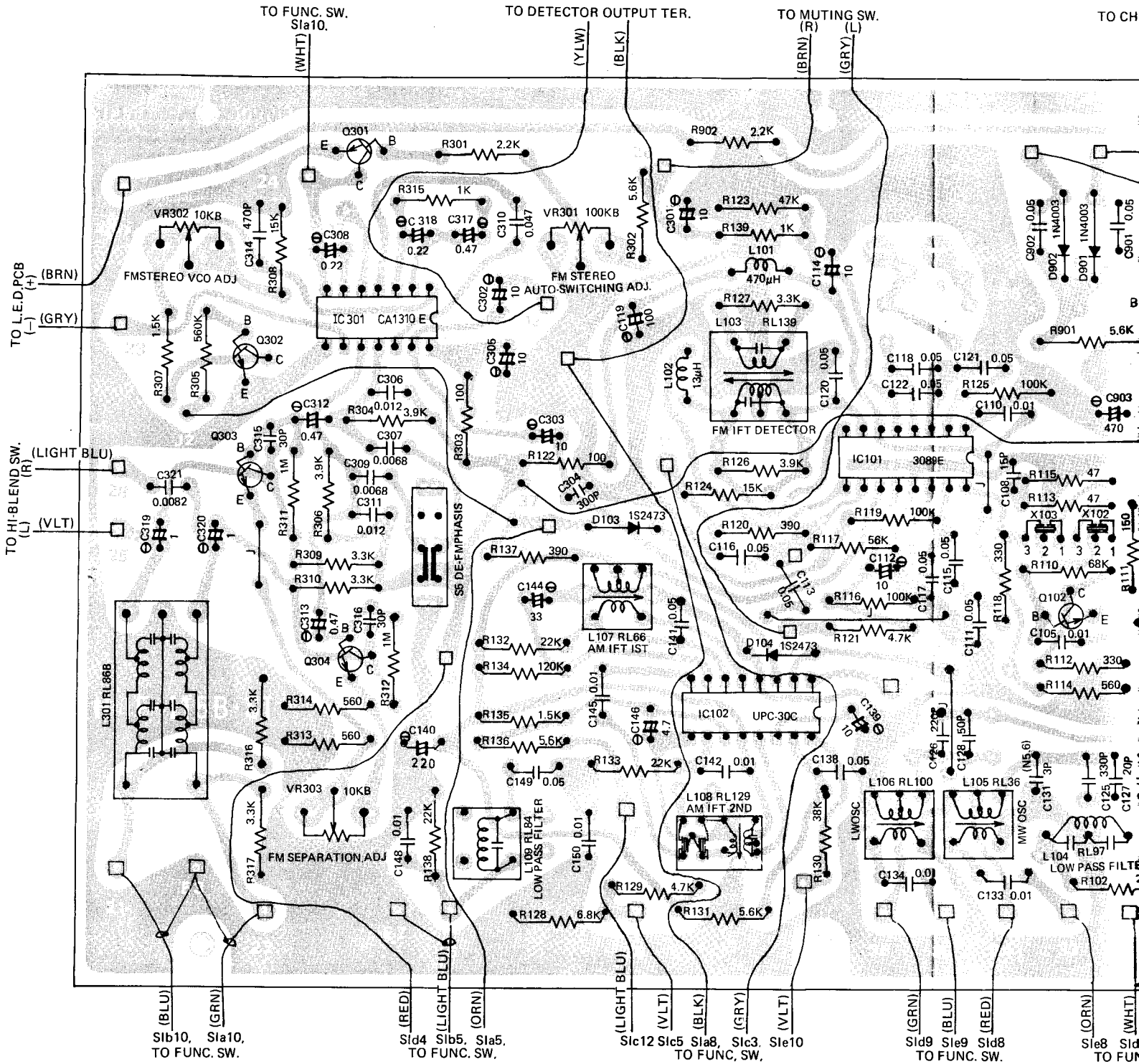
5% TOLERANCE UNLESS OTHERWISE NOTED.  
K---KILO OHM  
M---MEGA OHM  
▼---COMPOSITION RESISTORS 1/2W.  
NON MARK---LOW NOISE TYPE CARBON RESISTORS 1/4W.

CAPACITORS

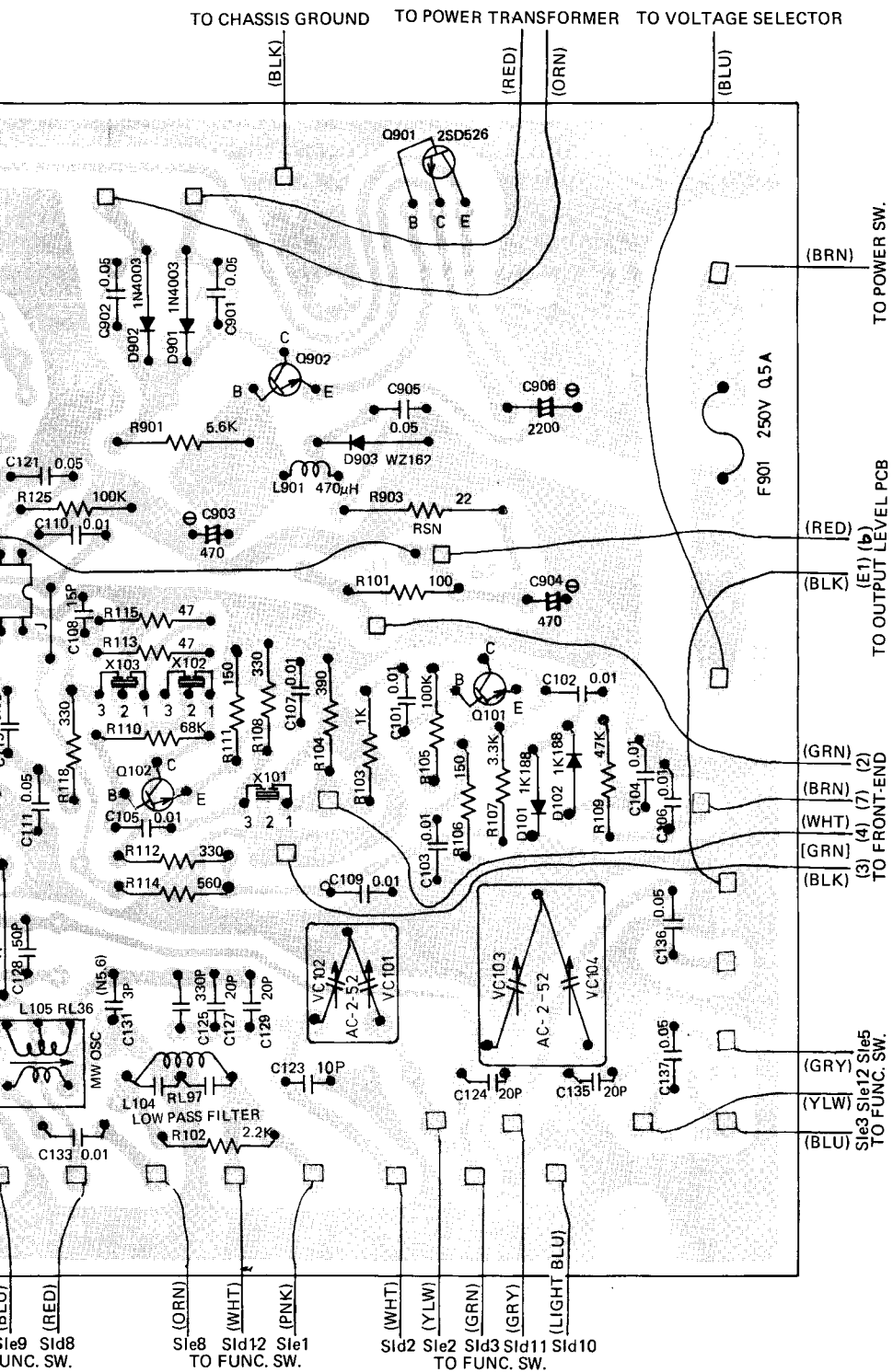
Ⓜ---MYLAR FILM CAPACITORS.  
ⓐ---ALUMINUM SOLID ELECTROLYTIC CAPACITORS.  
ⓔ---ELECTROLYTIC CAPACITORS.  
\*---TEMPERATURE COEFFICIENT CAPACITORS.  
NON MARK---CERAMIC CAPACITORS  
• UNLESS OTHERWISE NOTED IN SCHEMATIC ALL CAPACITANCE VALUES ARE EXPRESSED IN MFD.  
• VOLTAGE READING WITH VTVM FROM THE POINT SHOWN TO THE CHASSIS GROUND(LINE VOLTAGE 120V).  
• VOLTAGE READING MAY VARY ±20%.  
• SCHEMATIC SUBJECT TO CHANGES FOR IMPROVEMENT WITHOUT PRIOR NOTICE.

THIS SCHEMATIC DIAGRAM IS AVAILABLE FOR COMBINATION OF LW/MW/FM UNIT ONLY. WHEN UNIT COMBINE JUST AM FM ONLY, THERE WERE MAKE SOME MODIFICATIONS AS FOLLOWING:  
1.FRONT-END CHANGED FROM FL136-U TO RF-321-U.  
2.ANT COIL L001 CHANGE FROM RL99 TO RL72B  
3.CANCELED S1d1 AND L104. SHORTED a AND a' POINTS.  
4.CANCELED S1e1, CT9, CT7, C135. SHORTED b AND b' POINTS.  
5.CANCELED S1d3, C137. SHORTED c AND c' POINTS.  
6.CANCELED C134, L106, C132, C126, C128, C124, CT6, C123, CT8, S1e2, S1d4, S1e3. SHORTED d' AND d', e AND e', f AND f' POINTS.  
7.CHANGED LOCAL OSC COIL L105 FROM RL36 TO RL39.  
8.CANCELED R130.  
9 CANCELED D104.

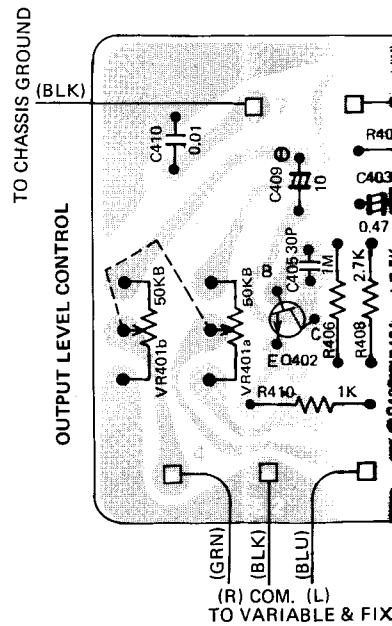
# AM/FM/MPX & POWER SUPPLY CIRCUIT BOARD DIAG



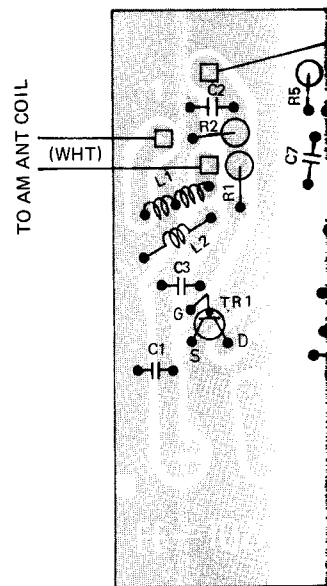
# BOARD DIAGRAM



# AUDIO AMP CIRCUIT

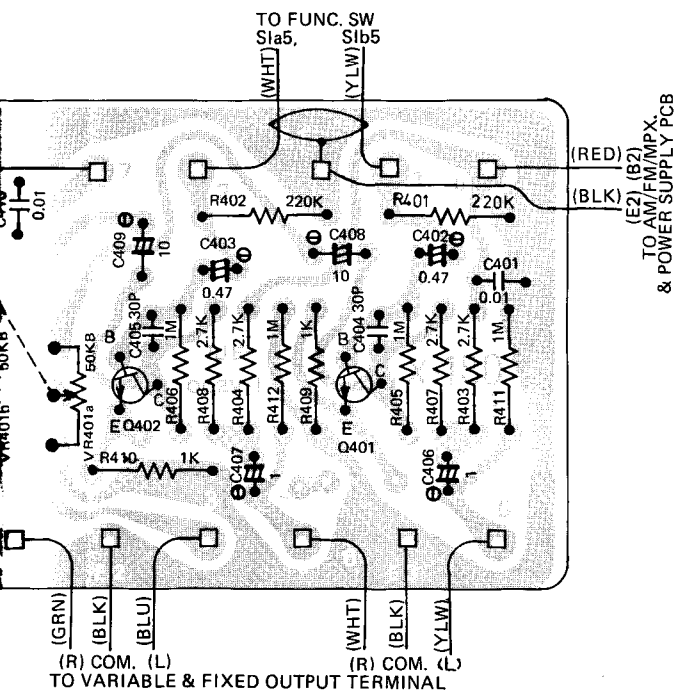


# FRONT-END CIRCUIT BOARD

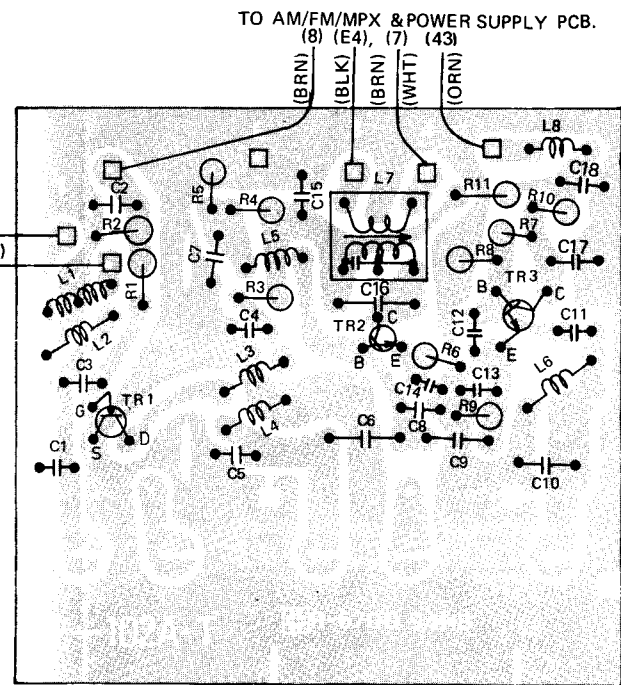


# INDICATOR CIRCUIT BOARD DIAGRAM

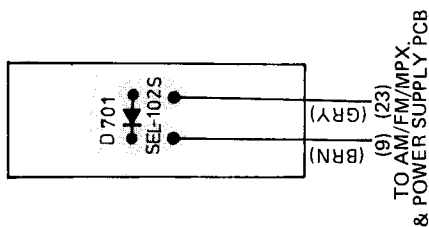
# AMP CIRCUIT BOARD DIAGRAM



# CIRCUIT BOARD DIAGRAM (AM/FM)



# OR CIRCUIT BOARD DIAGRAM



# TROUBLE SHOOTING

## I All LW, MW and FM are inoperative. (LW/MW/FM, MW/FM)

A. If the pilot lamp does not light, check to see the AC fuse F901.

1. If AC fuse is OK.
  - a. The AC Cord may be broken, or
  - b. Connections in the power switch may be faulty, or
  - c. Power Transformer (Primary) may be open.
2. If AC fuse is blown.
  - a. Power Transformer may be shorted, or
  - b. Rectifier D901 or 902 may be shorted, or
  - c. Capacitor C901, 902, or 906 may be shorted.

B. If the pilot lamp does light, measure voltage B1 and B2 (see the schematic diagram) and

1. If no voltage across
  - a. Rectifier D901 or 902 may be open, or
  - b. Secondary winding of the power transformer may be opened.
2. If there is proper voltage across
  - a. Connection of selector switch may be faulty.

## II LW and MW are inoperative (LW/MW/FM only).

A. If there is proper voltage at Pin 37 (See schematic diagram).

1. IC102 may be faulty, or
2. Coil L107, 108, or 109 may be faulty.

## III ONLY LW is inoperative (LW/MW/FM only).

A. Coil L001 (LW part) or L106 may be faulty, or  
 B. Connection of selector switch may be faulty.

## IV Only MW is inoperative (LW/MW/FM, MW/FM)

A. If there is proper voltage at Pin 37 (See schematic Diagram)

1. Coil L001 or L105 may be faulty, or
2. Connection of selector switch may be faulty.

## V Only FM is inoperative, (LW/MW/FM, MW/FM)

A. Check to see if there is signal at pin No.2 of IC301

1. If there is no signal
  - a. IC 101 may be faulty, or
  - b. Transistor Q102 = (LW/MW/FM), Q1, Q2, Q3 or Q102 = (MW/FM) may be faulty, or
  - c. Coil L103 may be faulty, or
  - d. Capacitor C303 may be faulty, or
  - e. Front end may be faulty.
2. If there is proper signal
  - a. IC 301 may be faulty, or
  - b. Coil L301 may be faulty, or
  - c. Connection of selector switch may be faulty.

B. At FM Stereo broadcast, the set only receive in MONO.

1. Stereo separation may be miss-aligned, or
2. Connection of selector switch may be faulty, or
3. IC 301 may be faulty.

# REPAIR PARTS LIST

Symbol	Part No.	Description
<b>TRANSISTORS, IC, AND DIODES</b>		
Q101, 102	301201117	2SC829, FM AGC, FM IF Amp.
Q103,	301201115	2SC828, FM Muting
Q301	301201115	2SC828, For Anto-Switching
Q302, 303	301201115	2SC828, FM MPX Amp.
Q401, 402	301201114	2SC644, Audio Amp.
Q901, 902	301201155	2SC1318, Stabilizer
IC101	303452167	CA-3089E, FM IF Amp.
IC102	303452157	μPC-30C, AM Conv. & AM IF Amp.
IC301	303452162	CA-1310E, FM MPX Decoder
D101, 102	300111008	1K188, FM AGC Det.
D103, 104	300111010	1S2473, For Switching
D901, 902	300919026	1N 4003, Rectifier
D903	300313017	WZ-162, Zener Regulator 16V, ½W
D001	300414005	SEL102S, FM Stereo Ind.
<b>COIL AND SMEI-FIXED VARIABLE RESISTORS</b>		
L101	226501123	47μH, RF choke
L102	226501136	13μH, Phase Shifter
L103	225501132	FM IFT, Quadrature Detector
L104	228641120	Low Pass Filter (LW/MW/FM only)
L105	223301123	MW OCS (LW/MW/FM only)
	223301127	MW OSC (AM/FM only)
L106	223301130	LW OSC (LW/MW/FM only)
L107	225301131	AM IFT, 1st.
L108	229101183	AM IFT, 2nd. and 3rd.
L109	228641119	AM Whistle Filter
L301	228641118	38 KHZ, Filter
L001	222391128	AM ANT Coil (LW/MW/FM only)
	222391121	AM ANT Coil (AM/FM only)
L002, 003	226501124	2μH, RF choke
X101, 103	229101171	SFE-10.7MA Bandpass Filter
VR301	510502163	100KB, FM Stereo Auto-Switching Adj.
VR302	510502162	10KB, MPX VCO Adj.
VR303	510502162	10KB, FM Stereo Separation Adj.
VR401	525101128	50KBX2, Output Level Adj.

Symbol	Part No.	Description
<b>OTHERS</b>		
M001	231310069	Meter, AM/FM Tuning.
S1	601011288	Switch, Function Selector (LW/MW/FM only)
	601011278	Function Selector (AM/FM only)
S2, 3 (1set)	614020402	Switch, Push 2-Key, Hi-Blend and Muting
S4	614010118	Switch, Power Supply
S5	613000024	Switch, Deemphasis
PL001, 003	359101116	Lamp. 6.3V 250mA, Pilet
T001	205001391	Transtormer, Power Supply (Multi-Voltage)
	201001415	Transformer, Power Supply (100V/120V)
	206001391	Transformer, Power Supply (220V/240V)
	141010128	AM/FM/MPX Circuit Board Assembly (AM/FM)
	141010129	AM/FM/MPX Circuit Board Assembly (AM/FM) For BS, CEE Spec. Application.
	141010130	AM/FM/MPX Circuit Board Assembly (LW/MW/FM)
	141810684	Audio Amp Circuit Board Assembly
	141810685	Indicator Circuit Board Assembly
	111911356	Front Panel Assembly (AM/FM)
	111911357	Front Panel Assembly (LW/MW/FM)
	112011321	Dial Board (LW/MW/FM)
	112011322	Dial Board (LW/MW/FM)
	624110204	Pin Jack, 4P RCA Type
	624101101	Pin Jack, 1P RCA Type
	649201115	Terminal, 4P Speaker
	648211121	Voltage Selector
	628111111	Coaxial Connector
	321304386	AM/FM Front-end.
	321304380	LW/MW/FM Front end