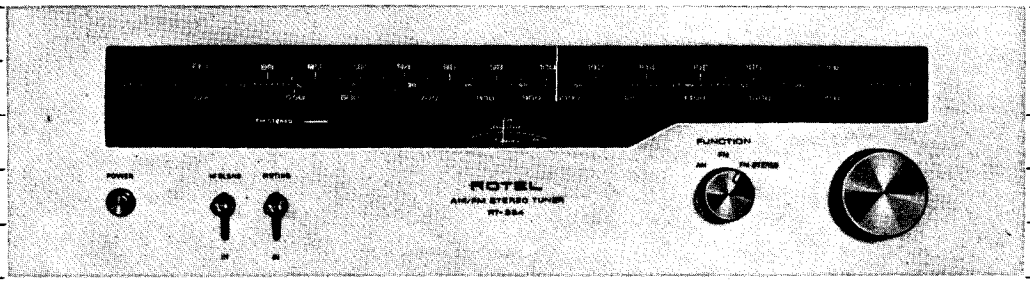
ROTEL®

RT-324

AM/FM STEREO TUNER



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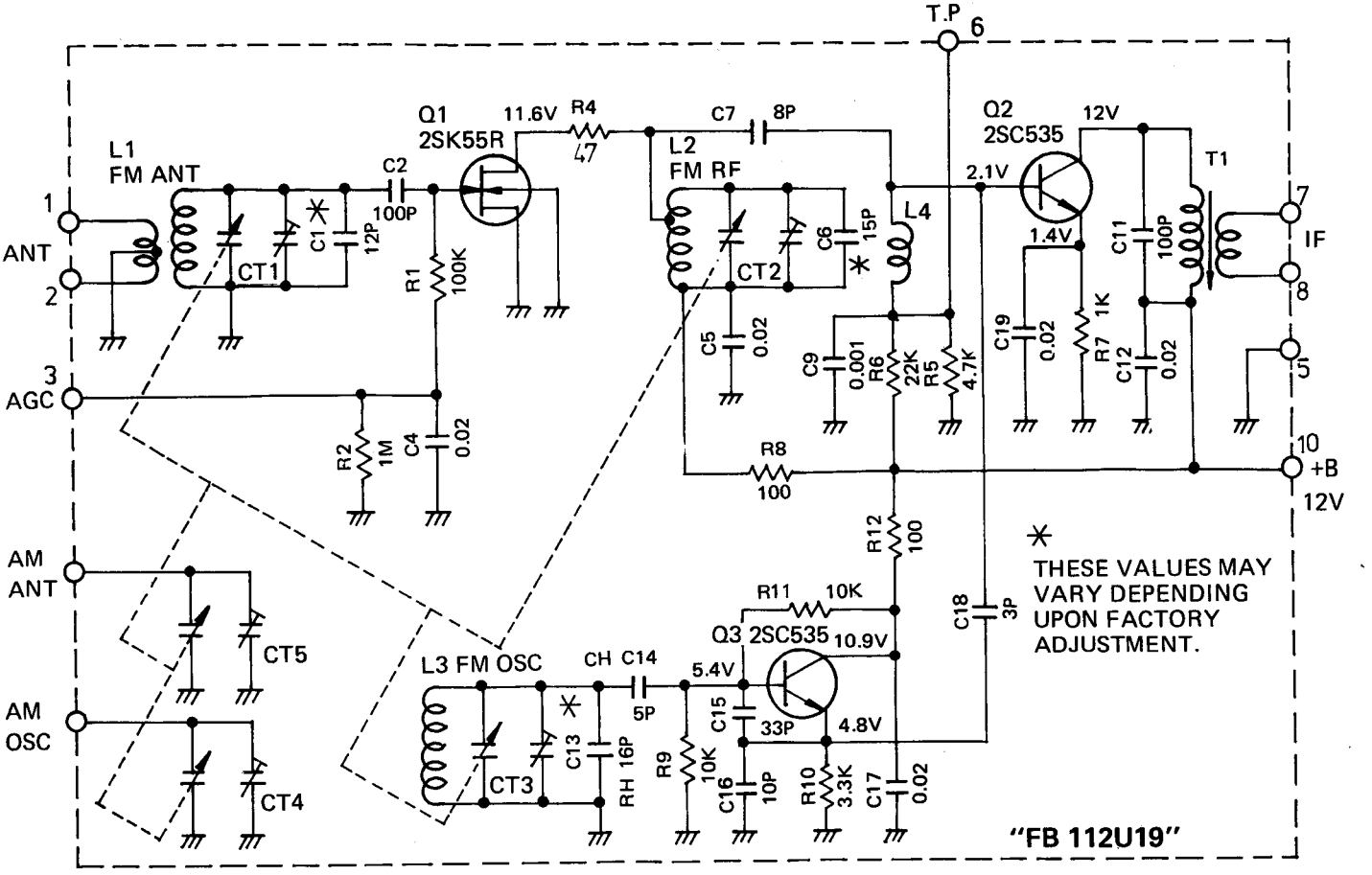
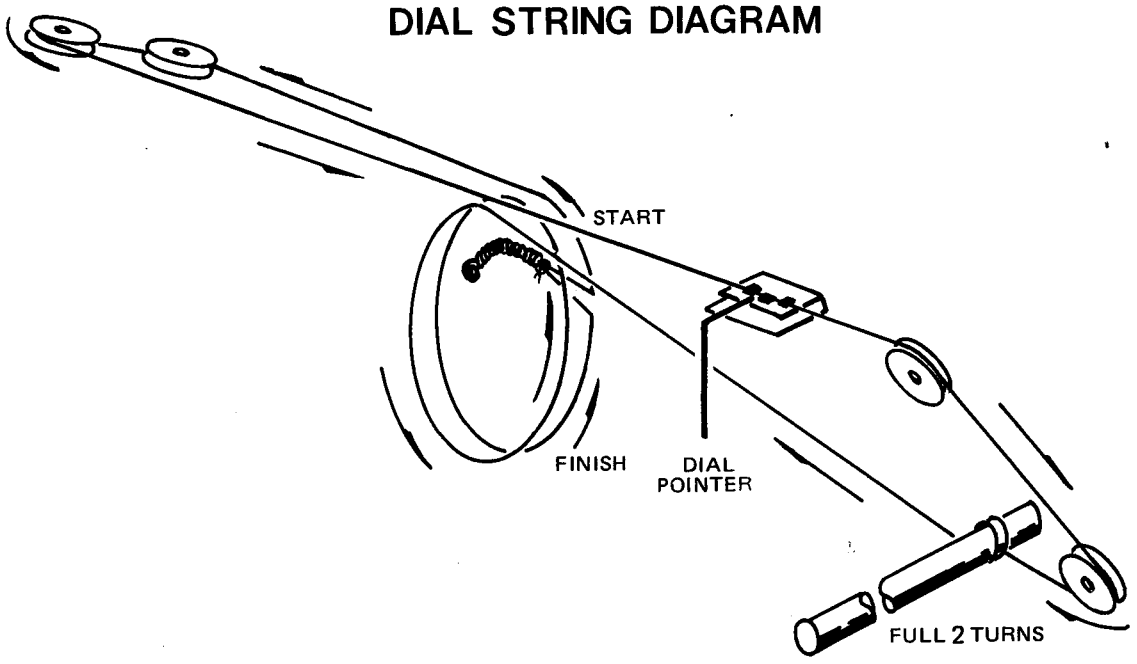


DIAL STRING DIAGRAM



ROLAND ELECTRONICS CO., LTD. 1–36–8 OHOKAYAMA, MEGURO-KU, TOKYO, JAPAN
ROTEL ELECTRONICS CO., LTD. 310 SEC. 5, NANKING E. ROAD, TAIPEI, TAIWAN
ROTEL OF AMERICA, INC. 2642 CENTRAL PARK AVE., YONKERS, N.Y. 10710, U.S.A.

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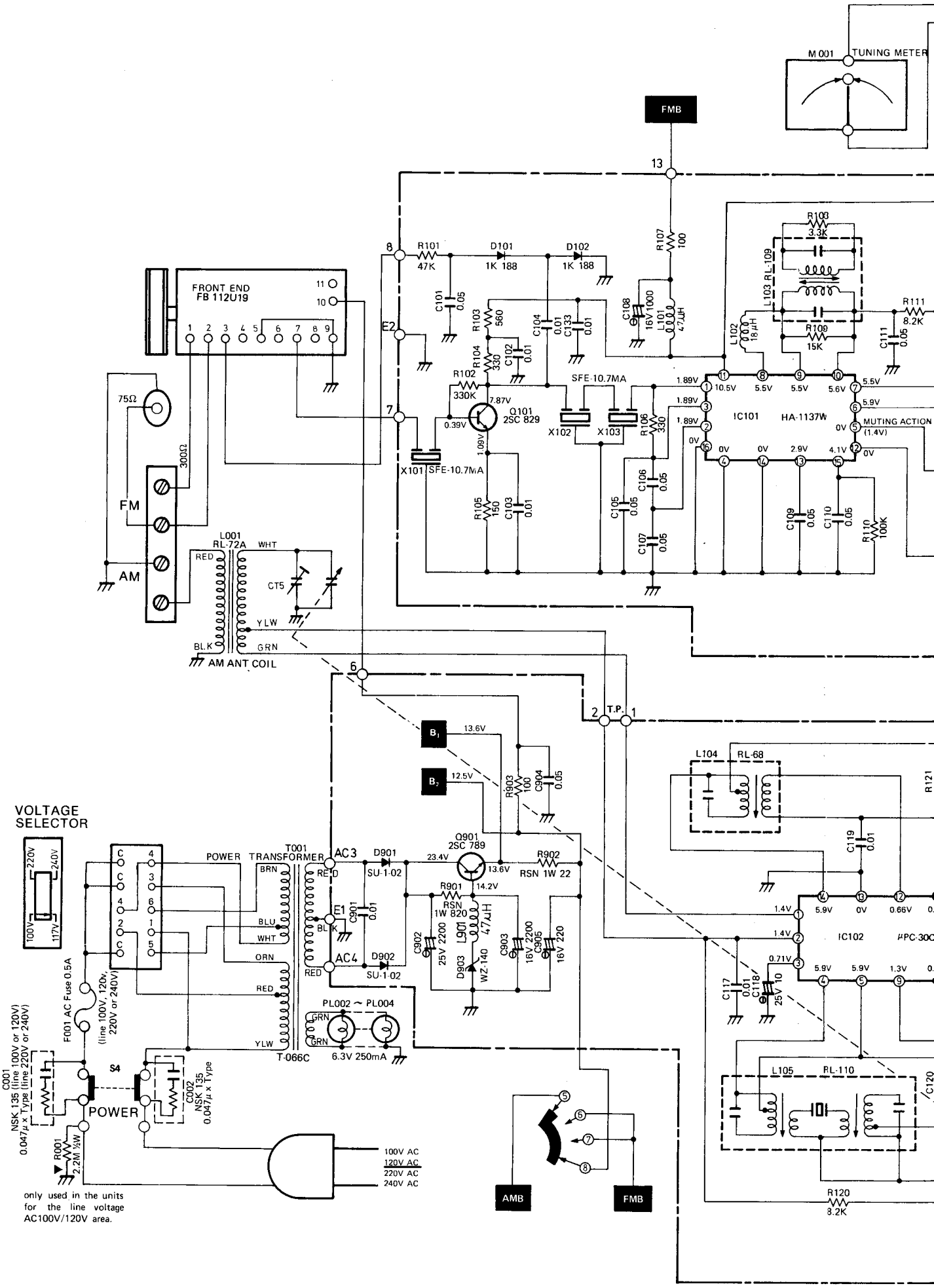
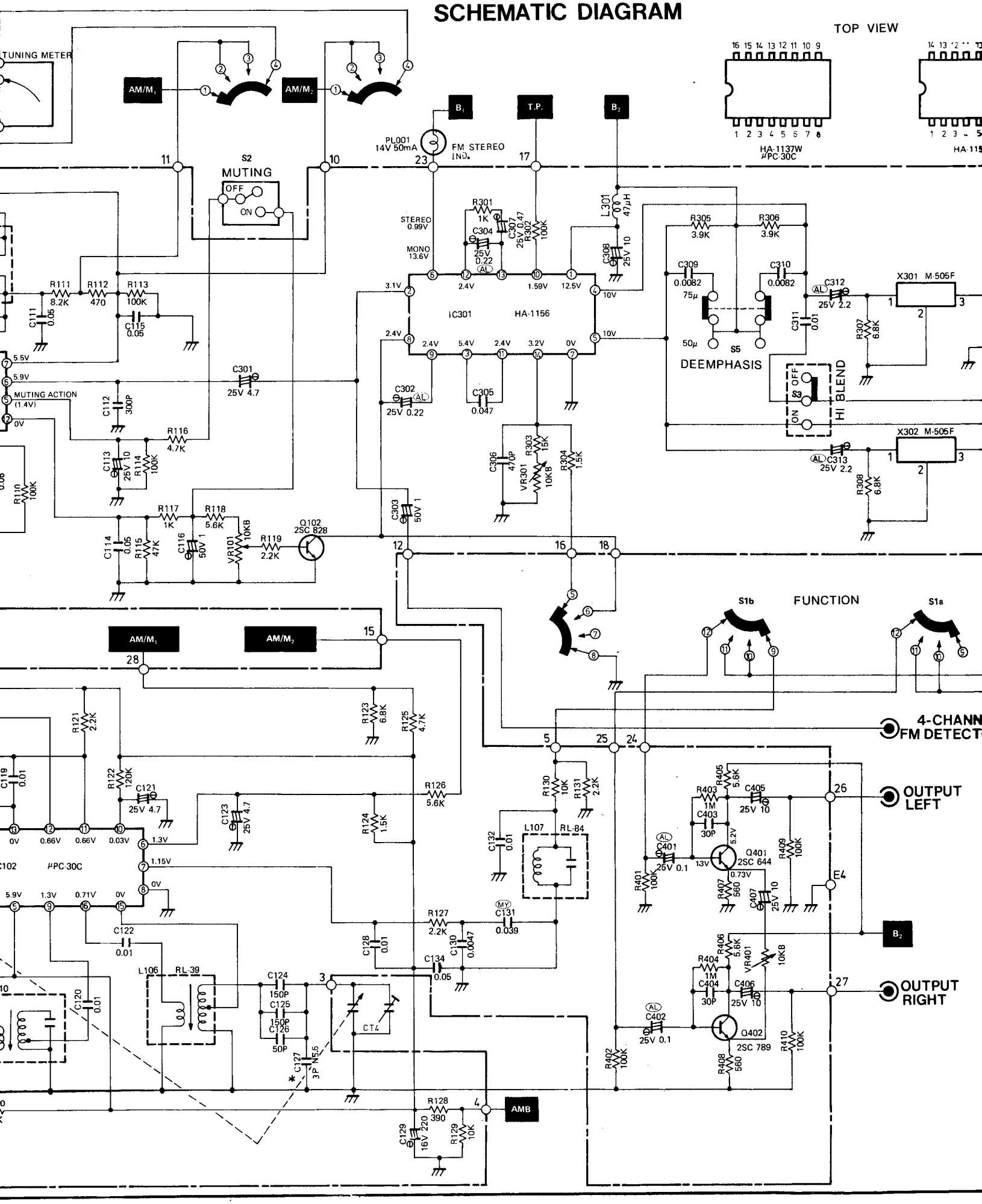
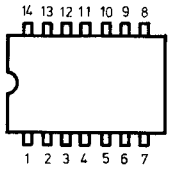

M 001 TUNING METER
FMB
13
FRONT END FB 112U19
11
10
1 2 3 4 5 6 7 8 9
75Ω
300Ω
FM
AM
L001 RL-72A
WHT
RED
CT5
YLW
BLK
GRN
AM ANT COIL
8
E2
7
R101 47K
D101 1K 188
D102 1K 188
R107 100
C101 0.05
R103 560
C104 0.01
C133 0.01
C108 16V 1000
L101 47μH
R104 330
C102 0.01
R102 330K
7.87V
Q101 2SC 829
0.39V
1.09V
SFE-10.7MA
X102
X103
X101 SFE-10.7MA
R106 330
R105 150
C103 0.01
C106 0.05
C105 0.05
C107 0.05
R103 3.3K
L103 RL-109
L102 18μH
R109 15K
C111 0.05
R111 8.2K
IC101 HA-1137W
1.89V
10.5V
5.5V
5.5V
5.6V
5.5V
5.9V
MUTING ACTION (1.4V)
0V
2.9V
4.1V
C109 0.05
C110 0.05
R110 100K
6
2
T.P.
1
B1 13.6V
B2 12.5V
R803 100
C904 0.05
L104 RL-68
R121
C119 0.01
VOLTAGE SELECTOR
220V
240V
100V
117V
POWER
T001 TRANSFORMER
BRN
BLU
WHT
ORN
RED
YLW
T-066C
AC3
RED
AC4
RED
D901 SU-1-02
D902 SU-1-02
23.4V
Q901 2SC 789
13.6V
R902 RSN 1W 22
R901 RSN 1W 820
14.2V
E1
BLK
C901 0.01
C902 25V 2200
L901 47μH
D903 WZ-140
C903 16V 2200
C905 16V 220
PL002 ~ PL004
GRN
GRN
6.3V 250mA
F001 AC Fuse 0.5A
(line 100V, 120V, 220V or 240V)
S4
POWER
C001 NSK 135 (line 100V or 120V) 0.047μ × Type (line 220V or 240V)
C002 NSK 135 0.047μ × Type
R001 2.2M ½W
only used in the units for the line voltage AC100V/120V area.
100V AC
120V AC
220V AC
240V AC
AMB
FMB
1.4V
5.9V
0V
0.66V
IC102 μPC-30C
0.71V
5.9V
1.3V
C117 0.01
C118 25V 10
L105 RL-110
C120
R120 8.2K

SCHEMATIC DIAGRAM

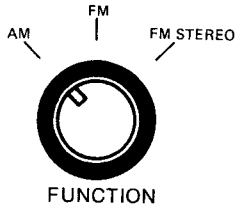


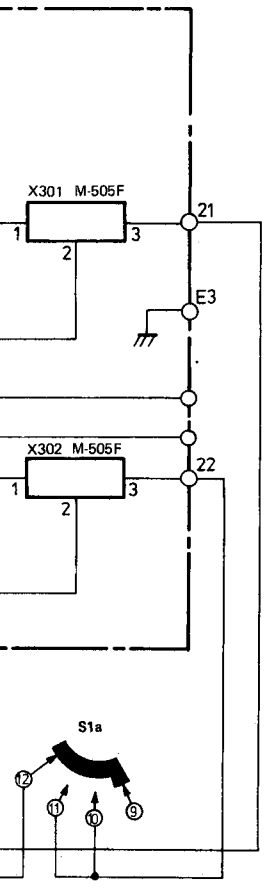
AM/FM AMP. & MPX DECODER

EW

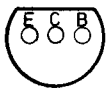


HA-1156





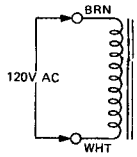
BOTTOM VIEW



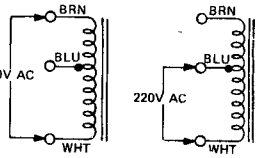
2SC 644
2SC 789
2SC 828
2SC 829

POWER TRANSFORMER STRAPPING

T-066A



T-066E



4-CHANNEL FM DETECTOR OUTPUT

OUTPUT LEFT

OUTPUT RIGHT

ITEM	SCHEMATIC LOCATION (LAST)
AM/FM IF AMP.	R131
	C134
FM MPX. AMP.	R308
	C313
AF AMP.	R410
	C407
POWER SUPPLY	R903
	C905
CHASSIS	R001
	C002

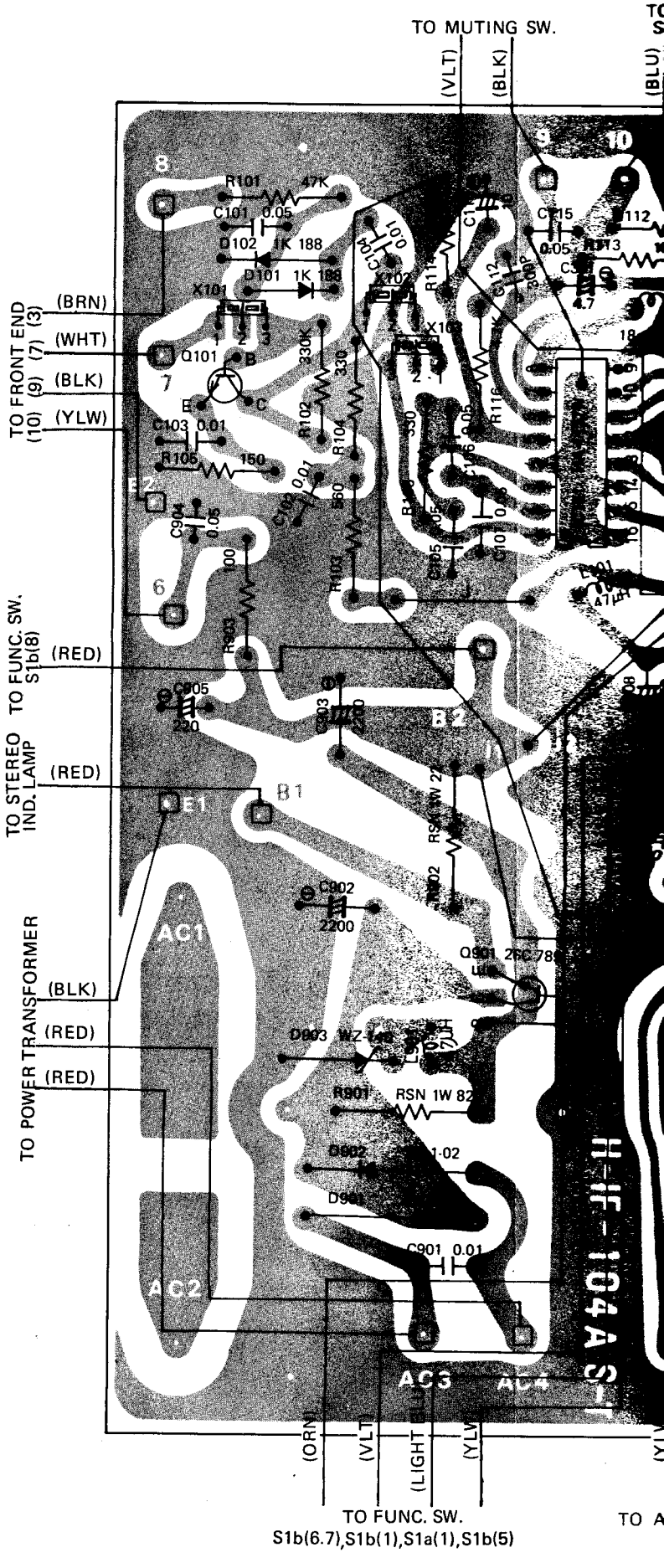
B_2

RESISTORS

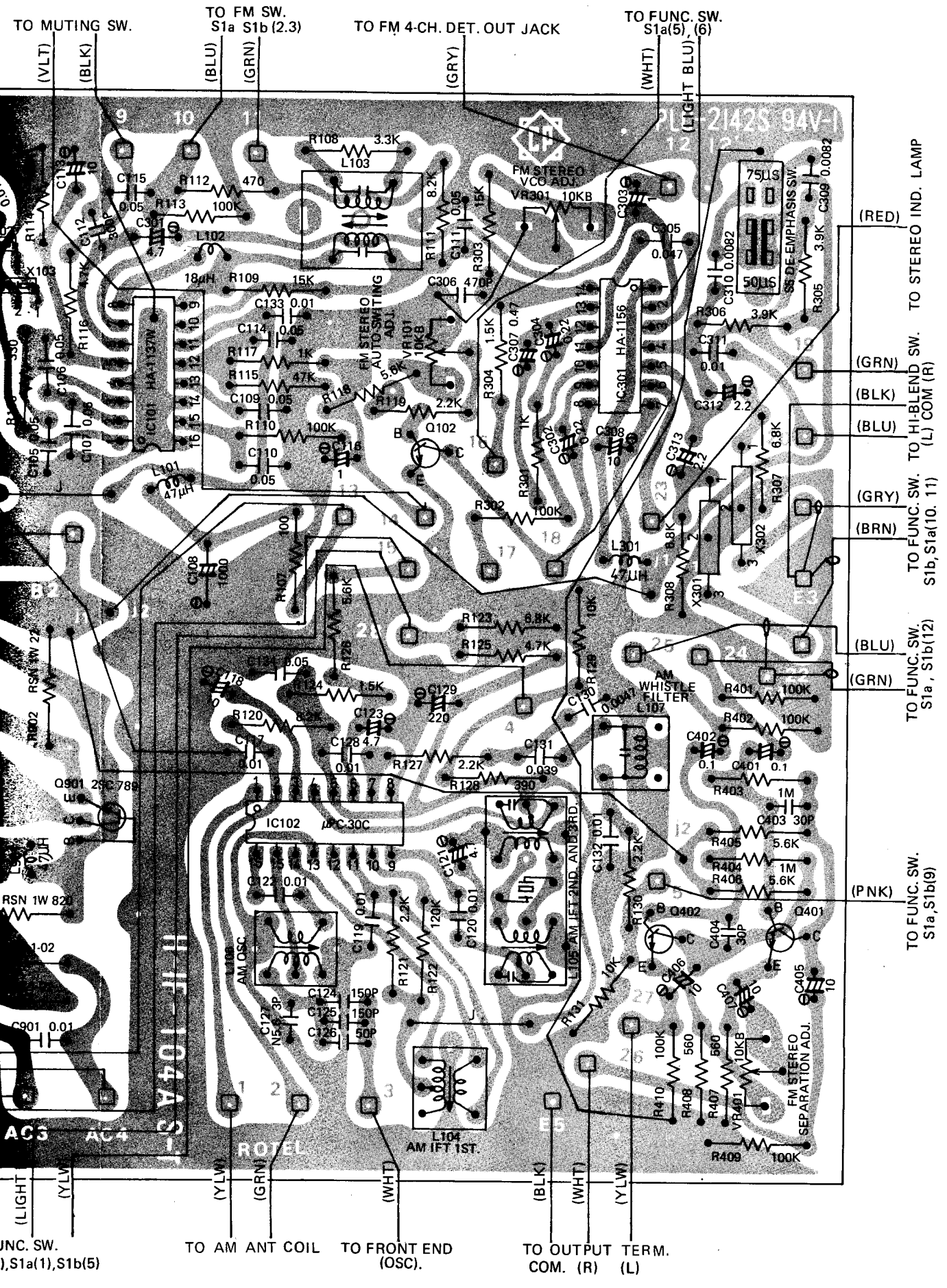
5% TOLERANCE UNLESS OTHERWISE NOTED
K - - - KILO OHM
M - - - MEGA OHM
RSN - METAL OXIDE FILM RESISTORS
▼ - - - COMPOSITION RESISTORS ½ WATT
NON MARK - - - LOW NOISE TYPE CARBON RESISTORS ¼ WATT

CAPACITORS

(MY)-MYLAR FILM CAPACITORS
⊣⊢ - - ELECTROLYTIC CAPACITORS
✳ - - - TEMPERATURE COEFFICIENT CAPACITORS
(AL) - - ALUMINUM CAPACITORS
(MC) - - MICA CAPACITORS
NON MARK - - - CERAMIC CAPACITORS
• UNLESS OTHERWISE NOTED IN SCHEMATIC ALL VALUES ARE EXPRESSED IN MFD
• VOLTAGE READING MAY VARY ±20%

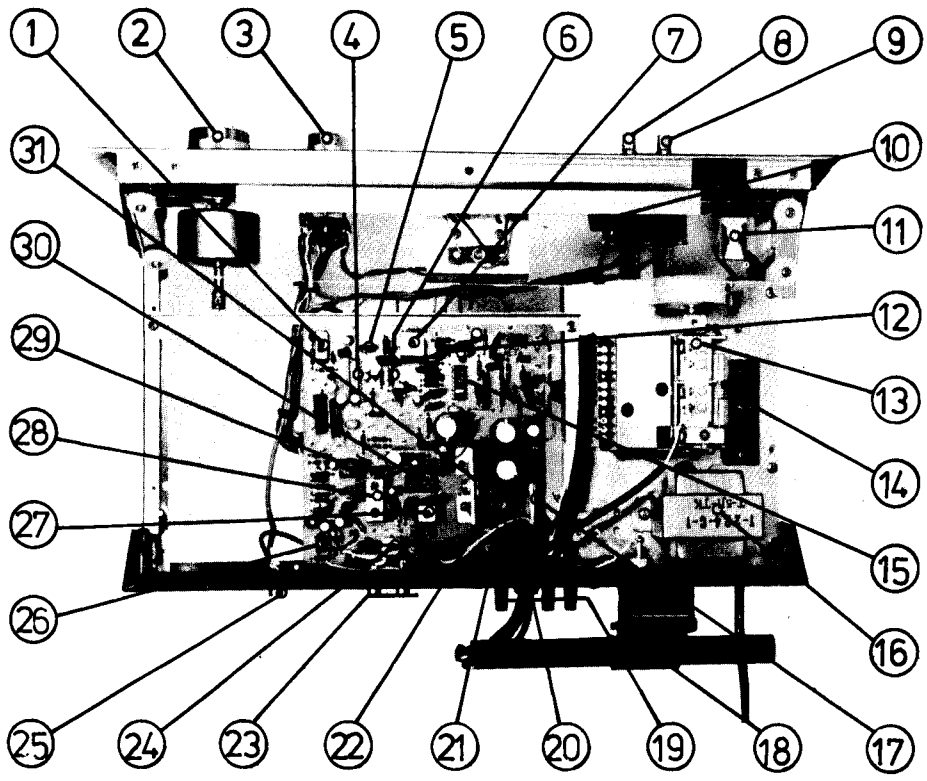


MPX DECODER CIRCUIT BOARD DIAGRAM



CHASSIS LAYOUT

1. S5, Deemphasis Switch
2. Tuning knob
3. S1, Function Selector
4. IC301, FM MPX Decoder
5. VR301, FM Stereo VCO Adj.
6. VR101, FM Stereo Auto-Switching Adj.
7. L103, FM IFT, Detector
8. S2, FM Muting Switch
9. S3, Hi-Blend Switch.
10. PL001, FM Stereo Indicator Lamp
11. S4, Power Switch.
12. L102, RF Choke Coil
13. AM/FM Front-end
14. Voltage Selector
15. IC101, FM IF Amp.
16. T001, Power Transformer
17. F001, AC Fuse
18. L001, AM Antenna Coil
19. Antenna Terminals
20. D903, Zener Diode
21. D901, Rectifier
22. D902, Rectifier
23. Output Jack
24. L104, AM IFT, 2nd.
25. 4-channel FM Detector Output
26. VR401, FM Stereo Separation Adj.
27. L106, AM OSC Coil
28. L105, AM IFT, 1st.
29. L107, AM Whistle Filter
30. IC102, AM Conv. & IF Amp.
31. Q901, Stabilizer



PRECAUTIONS

1. Always disconnect the chassis from power line when soldering. Turning the power switch OFF is not enough. Power leakage paths through the heating element may destroy transistors and IC.
2. Never attempt to do any work on the transistor amplifiers without first disconnecting the AC line cord and waiting until the power supply filter capacitors have discharged.

AM ALIGNMENT PROCEDURE

Instruments: AM Signal Generator and AC VTVM.
NOTES: Set Selector switch to AM postion.
Input Signal must be kept as low as possible to avoid AVC action.

Step	Generator		Turning Dial	Output Indicator	Adjust	Adjust for
	Coupling	Frequency	Setting	Connected to		
1	PIN NO. 1 on IF board through a 0.01 mfd capacitor	455KHz (400Hz 30% Mod.)	Non interfering at low end of scale	AC VTVM to output jack	L104 and 105 (Black & Red) (on IF board)	Maximum reading on VTVM
2	Connect to short loop of wire, Radiate signal into ferrite loop-stick antenna	600KHz (400Hz 30% Mod.)	600KHz		L106 (OSC) (on IF board) and L001 (ANT)	
3		1400KHz (400Hz 30% Mod)	1400KHz		CT4 (OSC) and CT5 (ANT) (on Front end)	
4	Repeat Step 2 and 3 until no further improvement is noticed.					

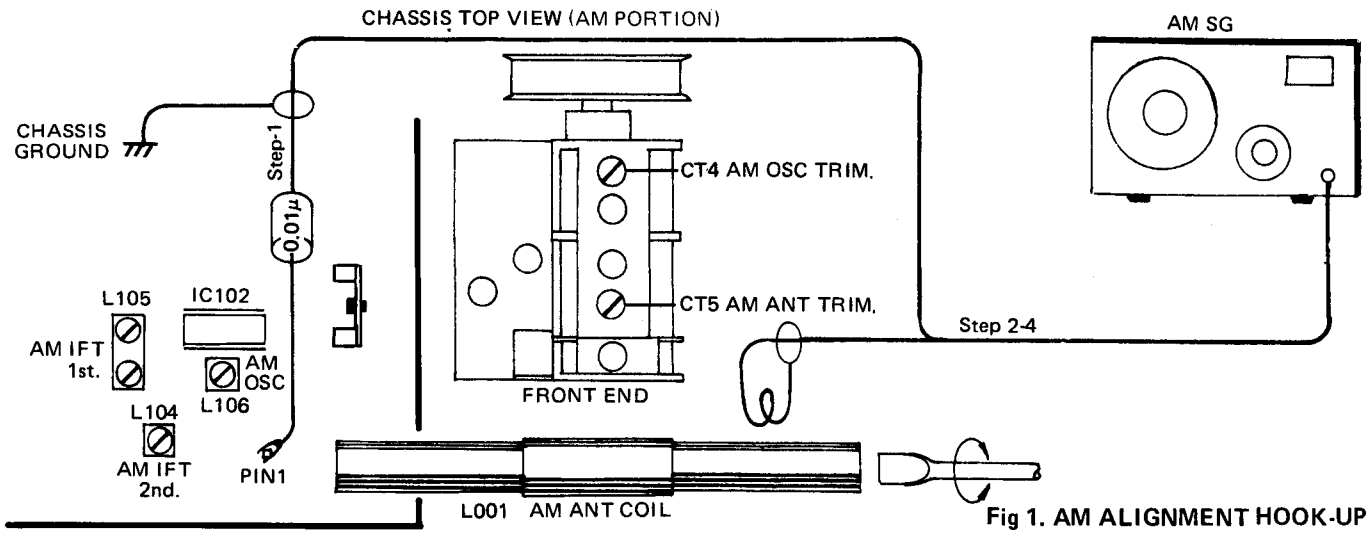


Fig 1. AM ALIGNMENT HOOK-UP

FM IF & RF ALIGNMENT PROCEDURE

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

- Set Function Selector switch to "FM" position.
- Set Muting switch and Hi-blend switch to "OFF" position.
- Set VR101 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 (400 Hz, 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 T1 (on Front-end) 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 and also the tuner, at 106 MHz on the dial scale. Then adjust FM OSC trimmer CT3 (on Front-end) 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 ±150 KHz.
3. Sensitivity on this alignment must be attempted at 106 MHz by adjusting CT1 and CT2 to obtain maximum deflection on scope, and fine tune to balance sensitivity at 90 MHz and 106 MHz.
4. Adjust Coil L3 (FM OSC) and L2 (FM RF) as described below only when tracking and sensitivity adjustments are not attained by adjusting CT1, CT2 and CT3.
   a. Fine tune Signal Generator and tuner to 90 MHz, and adjust L2 and L3 so that maximum output is obtained.
   b. Fine tune Signal Generator and tuner to 106 MHz and adjust CT1, CT2 and CT3 so that maximum output is obtained.
   c. Repeat steps a and b to obtain enough effect.

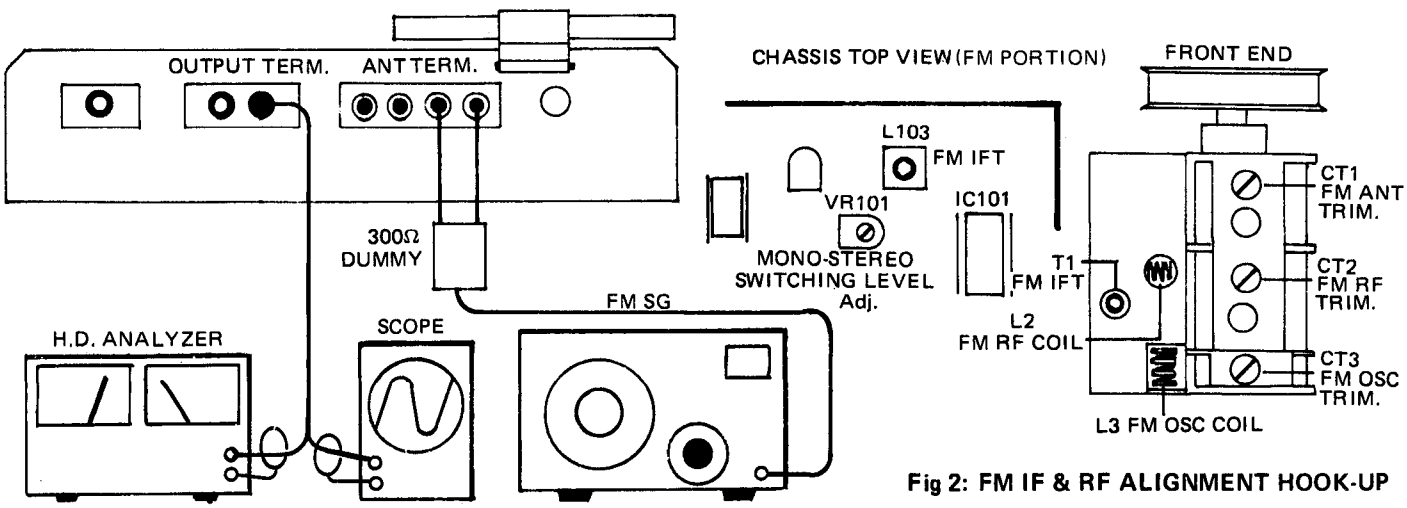


Fig 2: FM IF & RF ALIGNMENT HOOK-UP

FM MPX ALIGNMENT PROCEDURE

Instruments: FM stereo 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 VR401 to mid-position.
- Connect FM stereo Generator to FM antenna terminals.

Step	Stereo Generator		Output Indicator	Adjust	Adjust for
	Modulation	RF Deviation	Connected to		
1	19KHz Pilot signal only	2-5%	Oscilloscope to Point 17 (on IF board)	VR301	Maximum Amplitude on scope
2	Composite 1KHz signal to Left channel only	Pilot 10% signal 90%	Oscilloscope and VTVM to Right Channel Output jack	VR401	Leakage signal on scope and AC VTVM reading Minimum
3	Composite 1KHz 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 (Rchannel to L channel and L channel to R channel)				

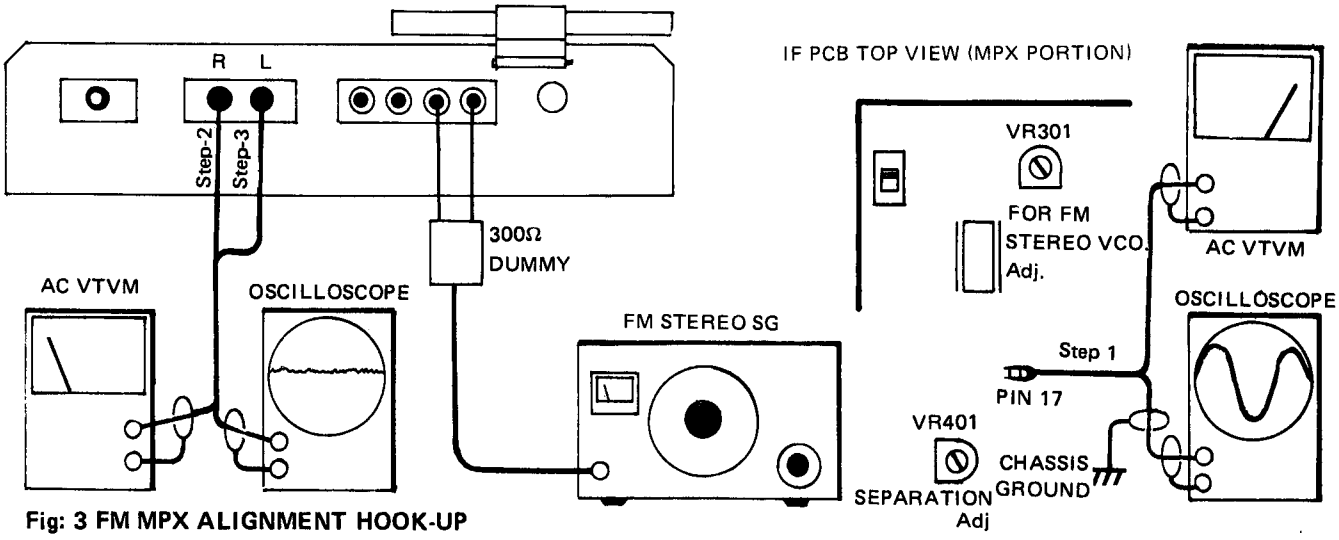


Fig: 3 FM MPX ALIGNMENT HOOK-UP

FM MUTING LEVEL ALIGNMENT PROCEDORE

Instrument: 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" 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 voltagei is 1.5-5μV, the signal on scope will vanish.
5. Make sure that output waveform appears on oscilloscope when antenna input level becomes 5μV by increasing the FM Signal Generator output level, and it vanishes when antenna input level becomes 1.5μV 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 1.5μV), expedite the FM IF & RF alignment and start again.
   b. When the signal on scope will vanish (Antenna input level is more than 5μV), expedite the FM IF & RF alignment and start again, too.

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 ±45KHz
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 Level Adj. VR101; this is a condition in which Auto-switching does not function.
6. Adjust the VR101 so that when the antenna input level is 1.5-5μV, 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 5μV, Stereo will switch in, and when the antenna input level is 1.5μV, Mono will switch in.

TROUBLE SHOOTING

I Both AM and FM are inoperative.
- A. If the pilot lamp does not light, check to see the AC fuse F001.
  1. If the 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 the AC fuse is blown.
     a. Power Transformer may be shorted, or
     b. Rectifier D901 or 902 may be shorted, or
     c. Capacitor C901, 902, 905 or 308 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 Only AM is inoperative.
- A. If there is proper voltage at Pin 4 (See schematic diagram)
  1. IC 102 may be faulty, or
  2. Coil L104, 105, 106, or 107 may be faulty

III Only FM is inoperative.
- A. Check to see if there is signal at pin No.2 of IC301
  1. If there is no signal,
     a. IC101 may be faulty, or
     b. Transistor Q101 may be faulty, or
     C. Coil 103 may be faulty, or
     d. Capacitor C301 may be faulty, or
     e. Front end may be faulty
  2. If there is signal,
     a. IC301 may be faulty, or
     b. 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. IC301 may be faulty.

REPAIR PARTS LIST

Symbol	Parts No.	Description
TRANSISTORS, DIODES AND IC'S		
Q101	301201117	2SC829(C), FM IF 1st. Amp.
Q102	301201115	2SC828(R), For Auto-Switching
Q401	301201114	2SC644(S), Audio Amp.
Q402	301201114	2SC644(S), Audio Amp.
Q901	301201146	2SC789(O), Stabilizer
D101	300111008	1K188, FM AGC Rect.
D102	300111008	1K188, FM AGC Rect.
D901	300919021	SU-1-02, Rectifier
D902	300919021	SU-1-02, Rectifier
D903	300313018	WZ-140, Zener Regulator,14V
IC101	303452156	HA-1137W, FM IF Amp.
IC102	303452157	μPC-30C, AM Conv. and IF Amp.
IC103	303452151	HA-1156, FM MPX Decoder
VARIABLE RESISTORS, COILS AND FILTERS		
VR101	510502126	10KB, FM Stereo Auto-Switching Adj.
VR301	510502126	10KB, FM Stereo VCO Adj.
VR401	510502126	10KB, FM Stereo Separation Adj.
L101	226501123	47μH, RF Choke
L102	226501125	18μH, Phase Shifter
L103	225501128	FM IFT, Quadrature Detector
L104	225301133	AM IFT,1st.
L105	229101176	AM IFT, 2nd. and 3rd.
L106	223301127	AM OSC
L107	228641119	AM Whistle Filter
L901	226501123	47μH, RF Choke
L001	222391122	AM Antenna Coil
X101	229101171	SFE-10.7MA, Bandpass Filter
X102	229101171	SFE-10.7MA, Bandpass Filter
X103	229101171	SFE-10.7MA, Bandpass Filter
X301	228641125	FM 38KHz, Filter
X302	228641125	FM 38KHz, Filter
OTHERS		
S1	601011278	Switch, Function Selector
S2, 3 (1 Set)	611001634	Switch, Lever, 2-Key, Muting and Hi-Blend
S4	614010107	Switch, Power Supply
	614010102	Switch, Power Supply (for SEMKO Approved)
S501	613000024	Switch, Deemphasis
M001	231310050	Meter, AM/FM Tuning
	321304368	AM/FM Front-end
PL001	351140005	Lamp, 14V 50mA, FM Stereo Ind.
PL002	352063025	Lamp, 6.3V 250mA , Dial Illumination
PL003	352063035	Lamp, 6.3V 250mA , Dial Illumination
PL004	352063025	Lamp, 6.3V 250mA , Dial Illumination
T001	205001391	Transformer, Power Supply (Multi-voltage Type)
	201001391	Transformer, Power Supply (line 120V only)
	206001391	Transformer, Power Supply (line 220V or 240V)
	141010112	AM/FM and MPX Dec. Circcuit Board Assembly