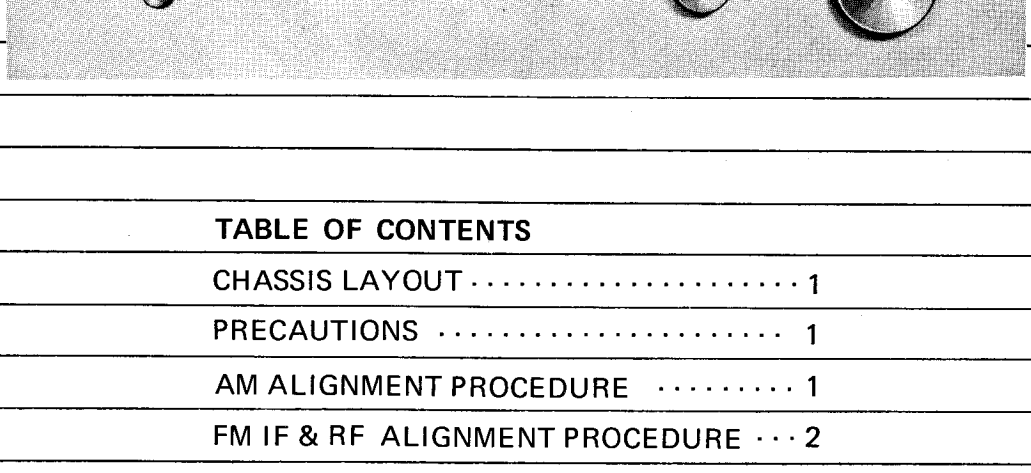
ROTEL®

RT-224

AM/FM STEREO TUNER



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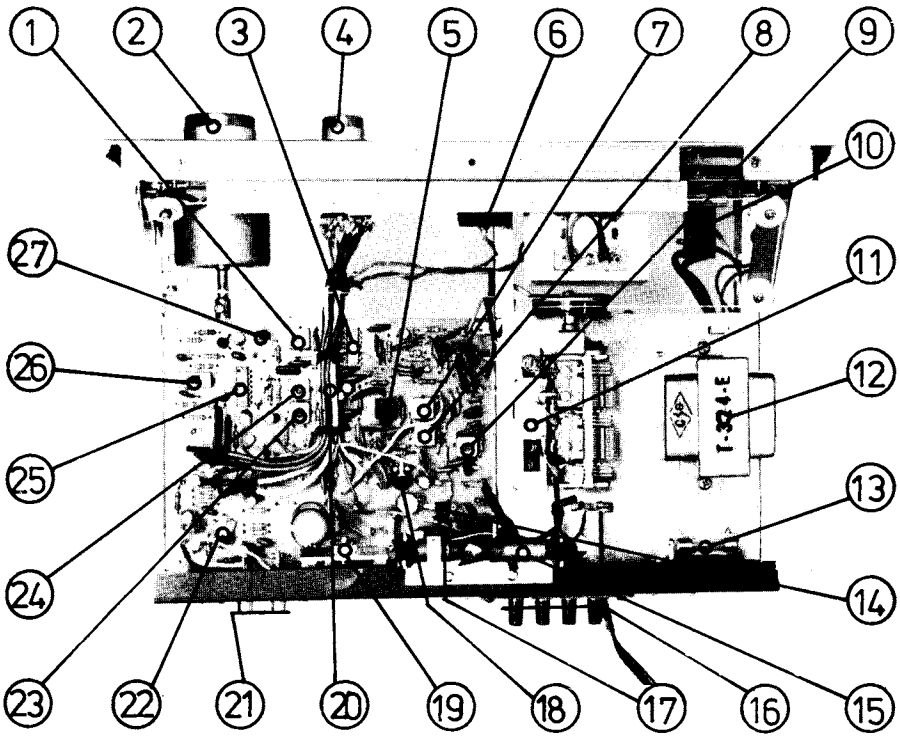
TECHNICAL MANUAL

CHASSIS LAYOUT

1. L106, AM IFT, 3rd.
2. Tuning knob
3. AM/FM IF Amp.
4. S1, Function Selector
5. L107, AM Whistle Filter Coil
6. PL001, FM Stereo Lamp
7. L104, AM IFT, 1st.
8. L105, AM IFT, 2nd.
9. L103, AM OSC.
10. S2, Power Switch
11. AM/FM Front-end
12. T001, Power Transformer
13. F001, AC Fuse
14. D901, Rectifier
15. L001, AM ANT. Coil
16. Antenna Terminal
17. D902, Rectifier
18. VR102, AM Gain Adj.
19. Q902, Stabilizer
20. VR101, FM Meter Level Adj.
21. Output Jack
22. VR401, FM Stereo Seperation Adj.
23. L102, FM IFT Ratio (Sec)
24. L101, FM IFT Ratio (Pri)
25. IC 301, MPX Decoder
26. S3, Deemphasis Switch
27. VR301, 19KHz Pilot Adj.



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" position.

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. 5 on IF board through a 0.01 mfd. capacitor	455 KHz (400 Hz 30% Mod.)	Non interfering at low end of scale	AC VTVM to Output jack	L104, 105 and 106 (on IF board).& VR 102	Maximum reading on VTVM
2	Connect to Short loop of wire. Radiate signal into ferrite loop-stick antenna.	600 KHz (400 Hz 30% Mod.)	600 KHz		L103 (OSC) (on IF board). and L001 (ANT)	
3		1400 KHz (400 Hz 30% Mod.)	1400 KHz		CT4 (OSC) and CT5 (ANT) (on Front end)	
4	Repeat Steps 2 and 3 until no further improvement is noticed.					

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.

1. Set Function Selector to "FM STEREO" position.
2. Set VR 401 to mid-position.
3. Connect FM Stereo Generator to FM antenna terminals.
4. Connect AC VTVM and Oscilloscope to Test point (PIN 15 on IF board) and set the Stereo Generator modulation is 19 KHz Pilot Signal only (6%).
5. Turn and adjust VR 301 so that the wave form on the Oscilloscope and AC VTVM is Maximum.
6. Then, change the connections of AC VTVM and Oscilloscope, from Test point to output (R-CH) jack.
7. Set the frequency at 98 MHz (If a disturbing Signal appears, select another frequency). FM Stereo Generator modulation is as follows:
   Pilot: 10%
   Modulation Frequency 1 KHz (L-ch. Signal) 90%.
8. Turn and adjust VR 401 so that the leakage signal on the Oscilloscope and AC VTVM is minimum.
9. Then, change the connections of oscilloscope and AC VTVM from R-ch. to L-ch. Output jack, as well as the modulation Signal from L-ch. to R-ch. At the same time, check that the leakage signal is minimum. If the difference in leakage signals between R-ch. and L-ch. is large, Adjust the VR 401 precisely so as to obtain equal levels between leakage signals.
10. Make sure the Stereo can be operated normally even when the modulation degree of Pilot Signal of FM Stereo Generator is reduced from 10% to 6%.

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 O.K.
         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 D 901 or 902 may be shorted, or
         c. Capacitor C 901 or 902 or 904 or 308 may be shorted.
   B. If the pilot lamp does light, measure Voltage B_1 and B_2 (see the schematic diagram) and
      1. If no Voltage across.
         a. Rectifier D 901 or 902 may be open, or
         b. Secondary winding of the power transformer may be opened.
      2. If there is proper Voltage across.
         a. IC 101 may be faulty, or
         b. Connection of selector switch may be faulty.

II. Only AM is inoperative
   A. If there is proper voltage at pin 7 (AM B2 see schematic diagram).
      1. IC 101 or Transistor Q 103 may be faulty, or
      2. Coil L 103, 104, 105, 106 or 107 may be faulty.

III. Only FM is inoperative.
   A. If there is proper voltage at pin 3 (FM B2 see schematic diagram).
      1. IC 101 or 301 may be faulty, or
      2. Transistor Q 101, 102 or 301 may be faulty, or
      3. Coil L 101 or 102 may be faulty, or
      4. Capacitor C 301 or 302 may be faulty, or
      5. Front-end may be faulty
   B. At FM Stereo broad case, the set only receives 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.

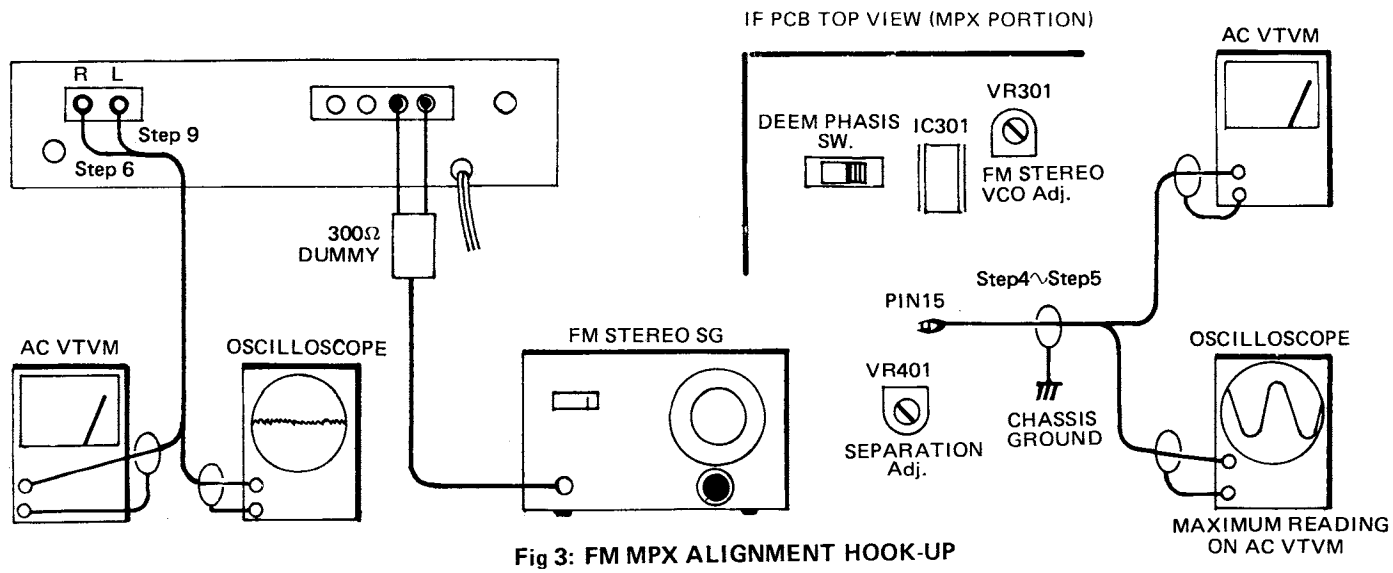
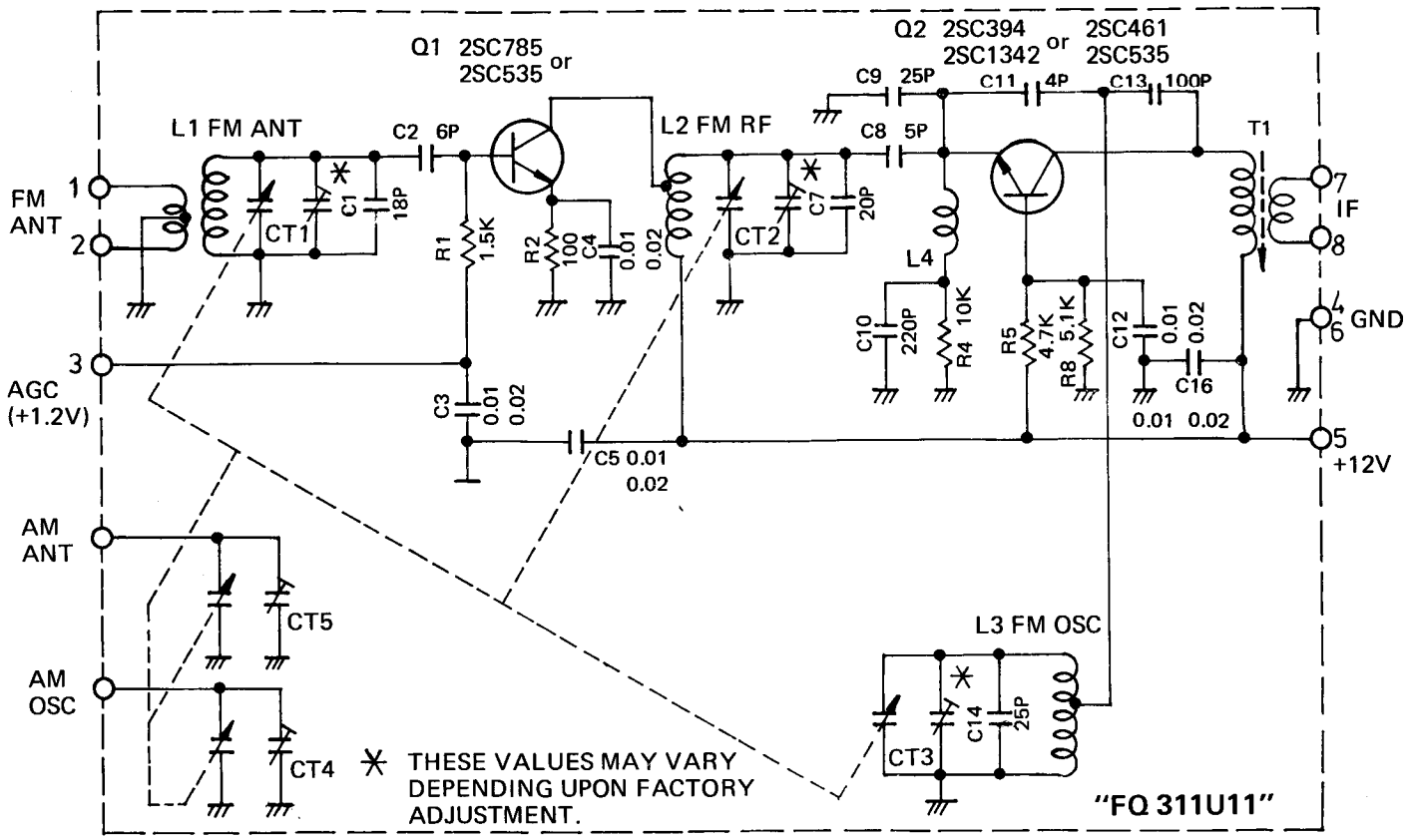
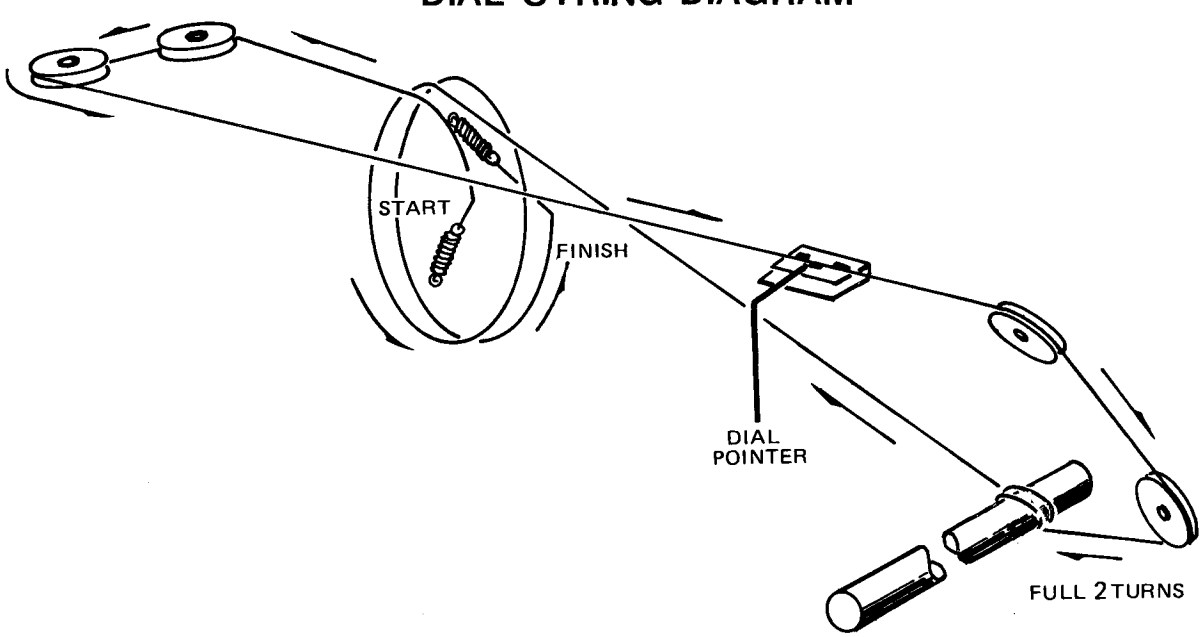


Fig 3: FM MPX ALIGNMENT HOOK-UP

FRONT-END SCHEMATIC DIAGRAM



DIAL STRING DIAGRAM



REPAIR PARTS LIST

Symbol	Parts No	Description
TRANSISTORS, DIODES AND IC'S		
Q101	301201117	2SC829, FM IF 1st. Amp.
Q102	301201117	2SC829, FM Meter Amp.
Q103	301201117	2SC829(C), AM Conv.
Q301	301201114	2SC644(S), FM Andio Amp.
Q401	301201114	2SC644(S), Audio Amp.
Q402	301201114	2SC644(S), Audio Amp.
Q901	301301122	2SD317(O)(P)(Q), Stabilizer
D101	300111008	1K188, FM AGC Rectifier
D102	300111008	1K188, FM AGC Rectifier
D103	300111008	1K188, AM/FM Meter Rectifier
D104	300111008	1K188, AM/FM Meter Rectifier
D105	300111008	1K188, AM/FM Meter Rectifier
D106	300111008	1K188, FM Det.
D107	300111008	1K188, FM Det.
D108	300111008	1K188, AM AGC Rectifier
D901	300919016	SM-1-08, Rectifier
D902	300919016	SM-1-08, Rectifier
D903	300313018	WZ-140, Zener Regulator
IC101	303452148	LA-1201 AM/FM IF Amp.
IC301	303452151	HA-1156 MPX Decoder
VARIABLE RESISTORS, COILS AND FILTERS		
VR101	510502134	3KB, FM Meter Adj.
VR102	510512125	10KB, AM Gain Adj.
VR301	510502125	10KB, MPX VCO Adj.
VR401	510502125	10KB, FM STEREO Separation Adj.
L101	225501125	FM IFT Ratio (Pri.)
L102	225501126	FM IFT Ratio (Sec.)
L103	223301127	AM OSC
L104	225301131	AM IFT, 1st.
L105	225301131	AM IFT, 2nd.
L106	225301133	AM IFT, 3rd
L107	228641119	AM Whistle Filter
L301	226501123	47μH, RF Choke
L901	226501123	47μH, RF Choke
L001	222301204	AM Antenna Coil
X101	229101171	SFE-10.7MA, FM Bandpass Filter
X102	229101171	SFE-10.7MA, FM Bandpass Filter
X301	228641125	M-505F, FM 38KHz Filter (L-ch)
X302	228641125	M-505F, FM 38KHz Filter (R-ch)
OTHERS		
S1	601011268	Switch, Function Selector
S2	614010107	Switch, Power Supply
	614010102	Switch, Power Supply (for SEMKO Approved)
S3	613000024	Switch, Deemphasis
PL001	351140005	Lamp, 14V 50mA, FM Stereo Indicator
PL002	352063025	Lamp, 6.3V 250mA, Dial Illumination
PL003	352063025	Lamp, 6.3V 250mA, Dial Illumination
PL004	352063025	Lamp, 6.3V 250mA, Dial Illumination
M001	231310049	Meter, AM/FM Tuning Meter
T001	205001391	Transformer, Power Supply (Multivoltage Type)
	201001391	Transformer, Power Supply (120V only)
	206001391	Transformer, Power Supply (220V or 240V)
	141010113	AM/FM Amp. & MPX Decoder Circuit Board Assembly
	321304374	AM/FM Front-end

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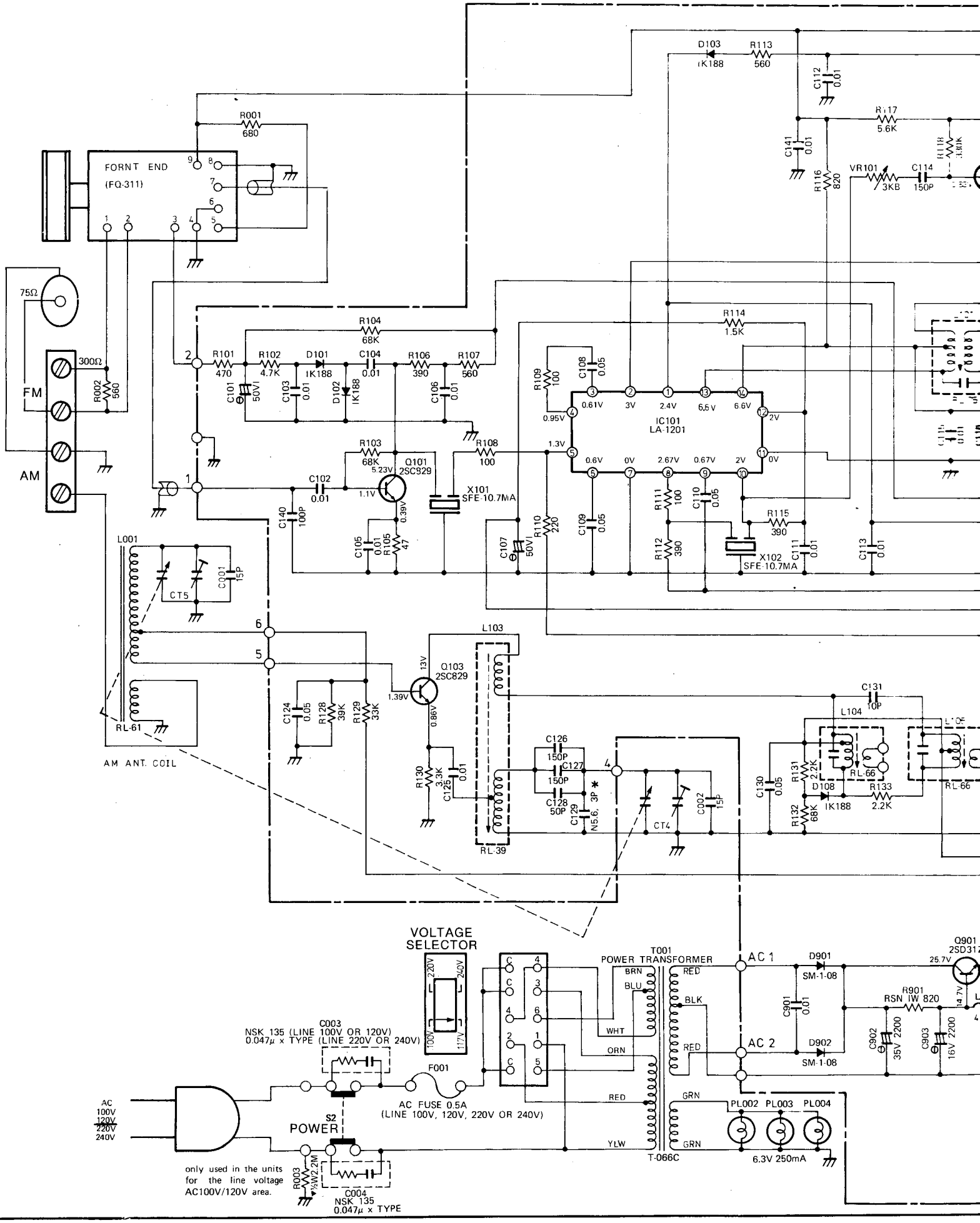
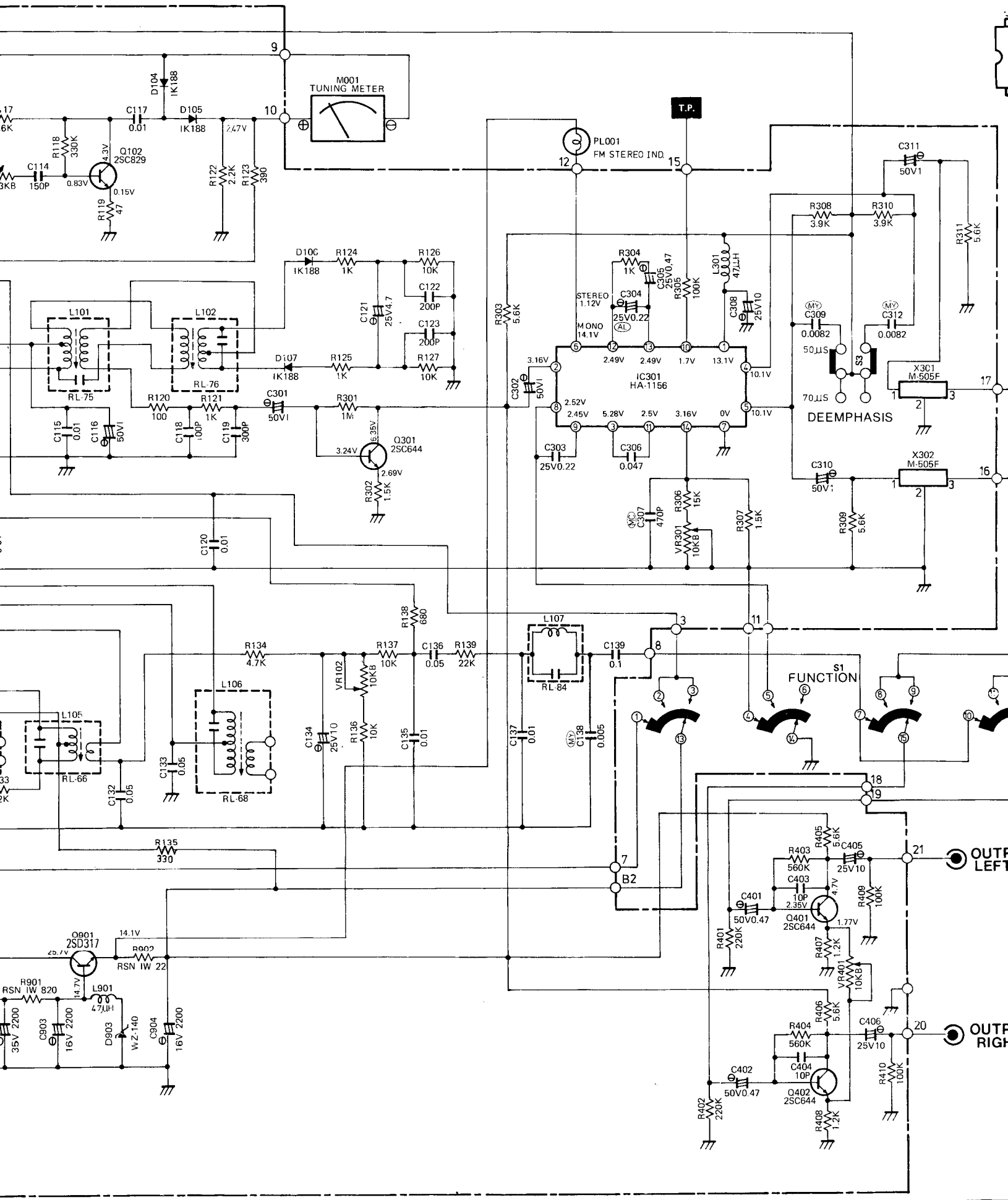
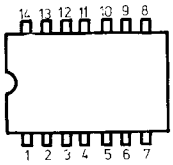

FORNT END
(FQ-311)
R001
680
D103
1K188
R113
560
C112
0.01
R117
5.6K
C141
0.01
R116
820
VR101
3KB
C114
150P
R118
3.3K
75Ω
FM
AM
300Ω
R002
560
R104
68K
R101
470
R102
4.7K
D101
1K188
C104
0.01
R106
390
R107
560
C101
50V1
C103
0.01
D102
1K188
C106
0.01
R114
1.5K
R109
100
C108
0.05
IC101
LA-1201
0.95V
1.3V
0.61V
3V
2.4V
6.5V
6.6V
2V
0.6V
0V
2.67V
0.67V
2V
0V
R103
68K
5.23V
Q101
2SC829
1.1V
0.39V
R108
100
X101
SFE-10.7MA
C102
0.01
C140
100P
C105
0.01
R105
47
C107
50V1
R110
220
C109
0.05
R111
100
C110
0.05
R112
390
R115
390
X102
SFE-10.7MA
C111
0.01
C113
0.01
L001
CT5
C001
15P
AM ANT. COIL
RL-61
L103
Q103
2SC829
1.39V
13V
0.86V
C124
0.05
R128
39K
R129
33K
R130
3.3K
C125
0.01
C126
150P
C127
150P
C128
50P
C129
N5.6, 3P *
CT4
C002
15P
RL-39
C131
10P
L104
RL-66
C130
0.05
R131
2.2K
D108
1K188
R132
68K
R133
2.2K
VOLTAGE
SELECTOR
220V
240V
100V
117V
C003
NSK 135 (LINE 100V OR 120V)
0.047μ x TYPE (LINE 220V OR 240V)
F001
AC FUSE 0.5A
(LINE 100V, 120V, 220V OR 240V)
AC
100V
120V
220V
240V
S2
POWER
only used in the units
for the line voltage
AC100V/120V area.
R003
½W2.2M
C004
NSK 135
0.047μ x TYPE
T001
POWER TRANSFORMER
BRN
BLU
WHT
ORN
RED
YLW
RED
BLK
RED
GRN
GRN
T-066C
AC 1
AC 2
D901
SM-1-08
D902
SM-1-08
C901
0.01
R901
RSN IW 820
C902
35V 2200
C903
16V 2200
Q901
2SD317
25.7V
14.7V
PL002
PL003
PL004
6.3V 250mA

SCHEMATIC DIAGRAM

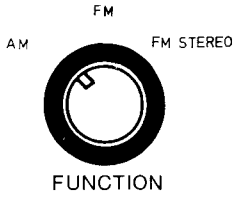


AM/FM AMP. & M

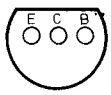
TOP VIEW



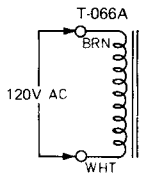
HA-1156
LA-1201

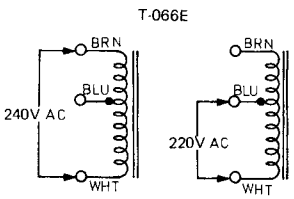


BOTTOM VIEW



POWER TRANSFORMER STRAPPING





ITEM	SCHEMATIC LOCATION (LAST)
AM / FM IF AMP.	R139
	C141
FM MPX, AMP.	R311
	C321
AF AMP.	R410
	C406
POWER SUPPLY	R902
	C904
CHASSIS	R003
	C004

RESISTORS

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

CAPACITORS

(MY) --- MYLAR FILM CAPACITORS
⊣⊢ --- ELECTROLYTIC CAPACITOR
✳--- TEMPERATURE COEFFICIENT CAPACITORS
(AL)---ALUMINUM CAPACITORS
(MC) --- MICA CAPACITORS
NON MARK --- CERAMIC CAPACITORS

- UNLESS OTHERWISE NOTED IN SCHEMATIC ALL CAPACITANCE VALUES ARE EXPRESSED IN MFD
- VOLTAGE READING MAY VARY ± 20%

X301
M-505F
X302
M-505F
R311
5.6K
OUTPUT LEFT
OUTPUT RIGHT

TO FUNC. SW
S1(2, 3)
(ORN)
TO FRONT END
CT(4), (8), (7), (3)
(GRN)
(WHT)
(GRY)
(BLK)
(WHT)
TO AM ANT.
(YLW)
(BLK)
TO POWER TRANSFORMER
(RED)
(RED)
(BLK)
(PNK)
(YLW)
(RED)
TO FUNC. SW. S1(1)
TO FUNC. SW. S1(7. 10)
TO STEREO IND. LAMP
TO

R101 470
C102 0.01
D102 1K188
D101 1K188
Q101
C109 0.05
C103 0.01
R102 4.7K
R104 68K
C120 0.01
R107 560
X101
D103 1K188
R113 560
C130 0.05
N5.6
C129 3P
C126 150P
C127 150P
C128 50P
C125 0.01
L103
AM OSC
L104
AM IFT 1ST.
L105
AM IFT 2ND.
L107
AM WHISTLE FILTER
D108 1K188
R129 33K
Q103
C124 0.05
C131 10P
C132 0.05
C134 10
VR102 10KB
AM METER ADJ.
C136 0.05
C137 0.01
C139 0.1
C138 0.005
R134 4.7K
R137 10K
C135 0.01
D901 SM-1-02
D902 SM-1-02
C901 0.01
L901 47μH
D903 WZ-140
C904 220
C903 2200
R901 RSN 1W 820

AM/FM AMP. & MPX DECODER CIRCUIT BOARD DIAGRAM