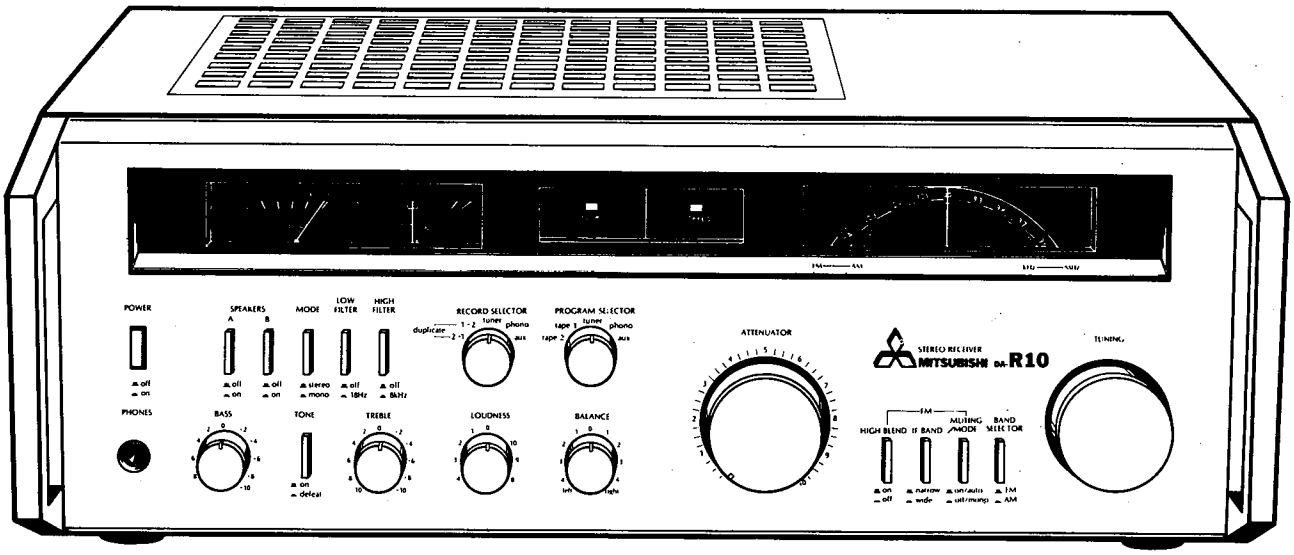
392

MITSUBISHI AUDIO SYSTEMS

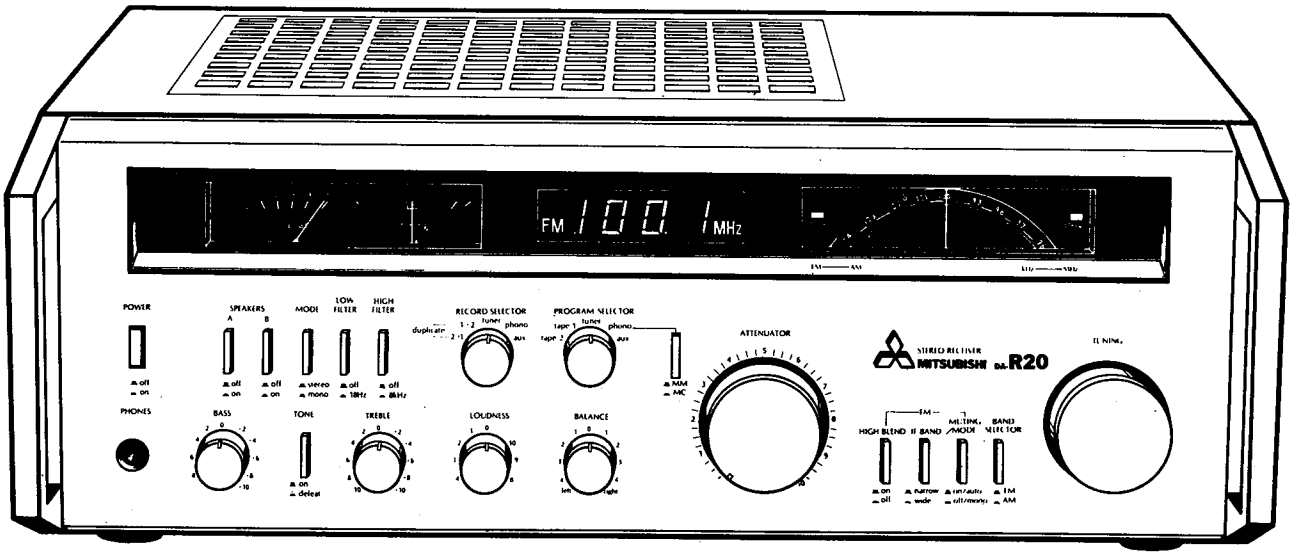
SERVICE MANUAL

AM/FM STEREO RECEIVER

MODEL DA-R10·DA-R20



DA-R10



DA-R20

This service manual covers both the DA-R10 and DA-R20. In the parts list description, R10 and R20 is writen to identify it.

MITSUBISHI ELECTRIC SALES AMERICA, INC.

3030 East Victoria Street • Compton, California 90221

SPECIFICATIONS

	DA-R20	DA-R10
Minimum continuous output power	60W per channel, both channels driven at 8 ohms from 20 Hz to 20 kHz with no more than 0.02% T.H.D.	45W per channel, both channels driven at 8 ohms from 20 Hz to 20 kHz with no more than 0.02% T.H.D.
	65W per channel, both channels driven into 8 ohms at 1 kHz with 0.02% T.H.D.	50W per channel, both channels driven into 8 ohms at 1 kHz with 0.02% T.H.D.
	80W per channel, both channels driven into 4 ohms at 1 kHz with 0.02% T.H.D.	60W per channel, both channels driven into 4 ohms at 1 kHz with 0.02% T.H.D.
Dynamic head room	1.0 dB	1.0 dB
Power bandwidth (0.1% T.H.D.)	$^{0}_{-3}$ dB, 10 Hz – 80 kHz	$^{0}_{-3}$ dB, 10 Hz – 80 kHz
Damping factor (20 Hz – 20 kHz)	120	110
Input sensitivity/impedance		
PHONO MC	100μV/10 ohms	–
PHONO MM	2.5mV/47k ohms	2.5mV/47k ohms
AUX, PLAY	150mV/33k ohms	150mV/33k ohms
Maximum input level Phono MC	7mV	–
Phono MM	140mV	140mV
Output level/impedance		
REC OUT 1, 2	150mV/220 ohms	150mV/220 ohms
Frequency response		
PHONO MC	±0.3 dB, 20 Hz – 20 kHz, RIAA	–
PHONO MM	±0.3 dB, 20 Hz – 20 kHz, RIAA	±0.3 dB, 20 Hz – 20 kHz, RIAA
AUX, PLAY	$^{+0.2}_{-2}$ dB, DC – 100 kHz	$^{+0.2}_{-2}$ dB, DC – 100 kHz
Total harmonic distortion		
PHONO MC		–
(ATT –20 dB, 30W output)	0.01%	
(1V output, 20 Hz – 20 kHz)	0.02%	0.02% (R10 20W)
PHONO MM		
(ATT –20 dB, 30W output)	0.01%	–
(1V output, 20 Hz – 20 kHz)	0.02%	0.02% (R20 20W)
AUX, PLAY		
(half power)	0.01% (30W)	0.01% (22.5W)
MAIN IN		
(half power)	0.007% (30W)	–
Intermodulation distortion		
AUX, PLAY		
(rated power)	0.02%	0.02%
(half power)	0.01%	0.01%
Signal to noise ratio (IHF A-weight)		
PHONO MC 500uV)	89 dB	–
PHONO MC (New IHF)	85 dB	–
PHONO MM (10mV)	94 dB	94 dB
PHONO MM (New IHF)	78 dB	78 dB
AUX, PLAY (rated)	106 dB	106 dB
AUX, PLAY (New IHF)	87 dB	87 dB
Residual noise (IHF A-weighted)	0.1mV	0.1mV
Tone control		
BASS boost/cut	±10 dB at 100 Hz	±10 dB at 100 Hz
TREBLE boost/cut	±10 dB at 10 kHz	±10 dB at 10 kHz
Loudness control (attenuation)	Level related equalization –20 dB	Level related equalization –20 dB
Filter characteristics		
Low filter	18 Hz, 12 dB/oct	18 kHz, 12 dB/oct

FM SECTION

	DA-R20	DA-R10
Tuning range	87.5 ∿ 108 MHz	87.5 ∿ 108 MHz
Usable sensitivity	9.3 dBf (1.6μV)	9.3 dBF (1.6μV)
50 dB quieting sensitivity		
MONO	15.0 dBf (3.0μV)	15.0 dBf (3.0μV)
STEREO	36.8 dBf (38μV)	36.8 dBf (38μV)
Image response ratio	85 dB	50 dB
IF response ratio	100 dB	90 dB
Spurious response ratio	100 dB	80 dB
AM suppression ratio	60 dB	60 dB
Capture ratio	1.5 dB	1.5 dB
Alternate channel selectivity		
WIDE	60 dB	60 dB
NARROW	75 dB	75 dB
Signal to noise ratio		
MONO (65 dBf)	84 dB	84 dB
STEREO (80 dBf)	80 dB	80 dB
Total harmonic distortion		
MONO WIDE	0.08%	0.08%
MONO NARROW	0.15%	0.15%
STEREO WIDE	0.1%	0.1%
STEREO NARROW	0.2%	0.2%
Subcarrier product ratio	60 dB	60 dB
Stereo separation		
WIDE 100 Hz	42 dB	42 dB
WIDE 1 kHz	46 dB	46 dB
WIDE 10 kHz	43 dB	43 dB
NARROW 100 Hz	36 dB	36 dB
NARROW 1 kHz	40 dB	40 dB
NARROW 10 kHz	40 dB	40 dB
HI-BLEND ON 100 Hz	37 dB	37 dB
HI-BLEND ON 1 kHz	20 dB	20 dB
Frequency response		
50 Hz to 15 kHz	±0.5 dB	±0.5 dB
30 Hz to 16 kHz	+0.5 dB −1.0	+0.5 dB −1.0

AM SECTION

Tuning range	525 ∿ 1,605 kHz	525 ∿ 1.605 kHz
Usable sensitivity	300μV/m	300μV/m
Selectivity	30 dB	30 dB
Signal to noise ratio	52 dB	52 dB
Image response ratio	47 dB	47 dB
IF response ratio	35 dB	35 dB
Total harmonic distortion	0.5%	0.5%

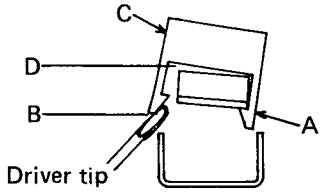
GENERAL

Power consumption (IHF nominal)	210W	160W
Dimensions (W x H x D)	470 x 169 x 410 m/m (18-1/2 x 6-5/8 x 16-1/8")	470 x 169 x 410 m/m (18-1/2 x 6-5/8 x 16-1/8")
Weight	14.0 kg (31 lbs)	12.2 kg (27 lbs)

DISASSEMBLY INSTRUCTIONS

1. **Remove CABINET (Top)**
   Insert a metal rod into the hole A of the CAP as shown in Fig. 1 and remove the CAP, and remove screws (4).
2. **Remove BASE-ASSY. (Bottom)**
   Remove nine screws as shown in Fig. 2.
3. **Removing PANEL-ASSY (Front)**
   (1) Remove the screws (4) as shown in Fig. 3.
   (2) Remove two set screws on top and bottom of the panel, total four screws.
   (3) Loosen the set screw fixing KNOB-METAL (TUNING) by means of a hexagonal wrench of 2 mm in width, and remove KNOB.
   (4) Pull off all the remaining knobs.
4. **Remove the coupler of SW-ROTARY (S6, S7). (Inside)**
   As shown in the exploded view of the cabinet attached to the end of the manual, the SW-ROTARY (S6, S7) is separated into three parts when the coupler is removed.
   a. **Disassembly**
      - The wire and SW slide are connected by the part (A) shown in Fig. 4 and 5. Disconnect that part.
      - Insert a thin screwdriver into the part (B) shown in Fig. 4 and 5, and remove the part (A) to one side as shown in Fig. 4. Then, hold the floated part (C), and insert the screwdriver tip into the clearance of the part (D) and push it up to remove it. Remove in the same manner for the ROTARY portion of the switch.

   b. **Assembly**
      - Turn the knob of SW-ROTARY fully counterclockwise to set it to the position of the part (A) in Fig. 6 (closest to rear panel).
      - Move the movable part on the SW slide toward the rear panel and connect it.
      - After connecting, check SW operation.
5. **Removing METER**
   (1) Remove two set screws securing the meter, and remove HOLDER-U.
   (2) Pull the meter backwards to detach the double adhesive tape on the front side of the meter and then the meter can be removed. (When the front panel has been removed, push the front side of the meter with both thumbs.)



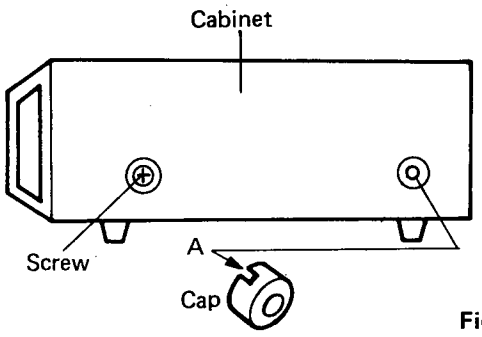


Figure 1

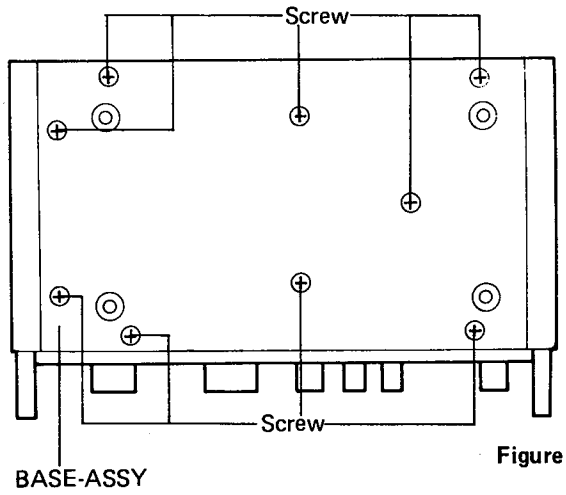


Figure 2

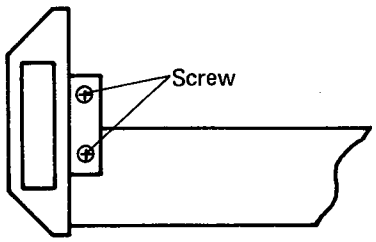
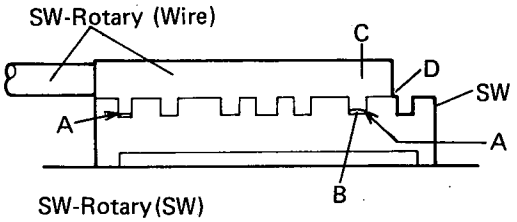
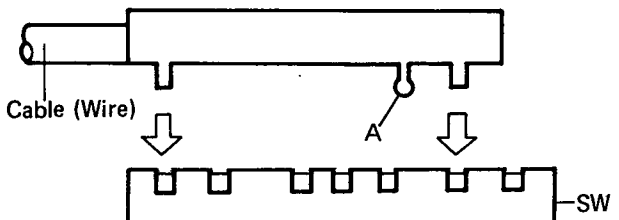


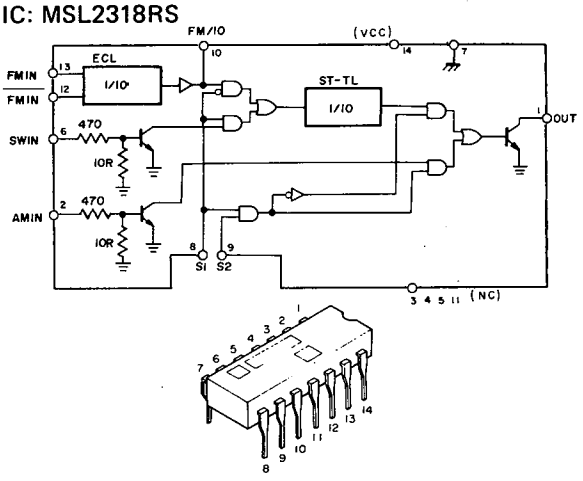
Figure 3





SEMI-CONDUCTOR LEAD IDENTIFICATION

IC: MSL2318RS



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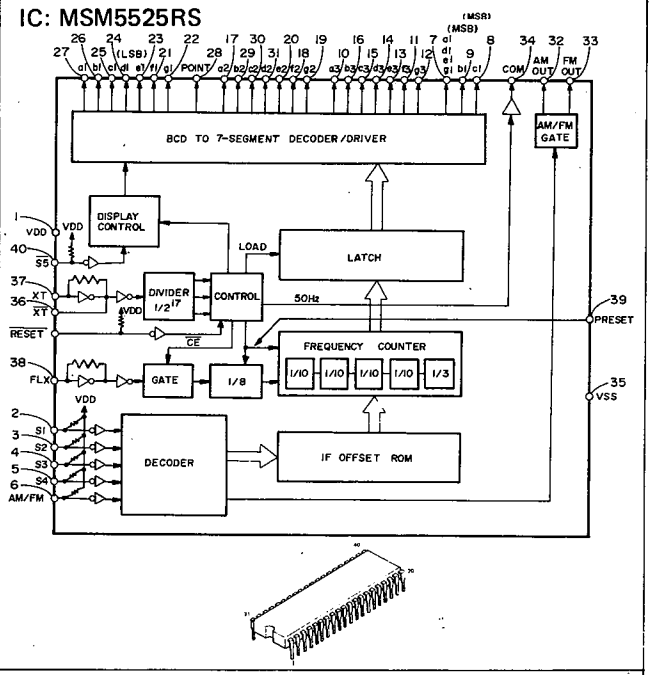
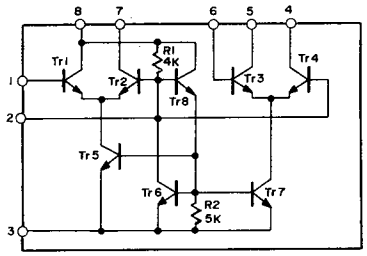
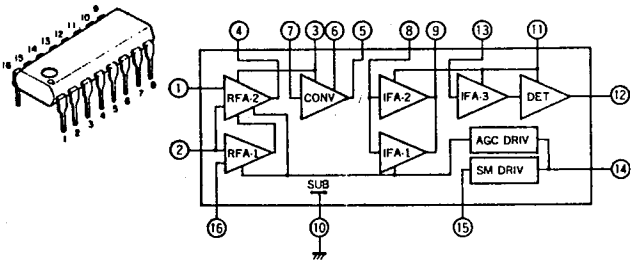


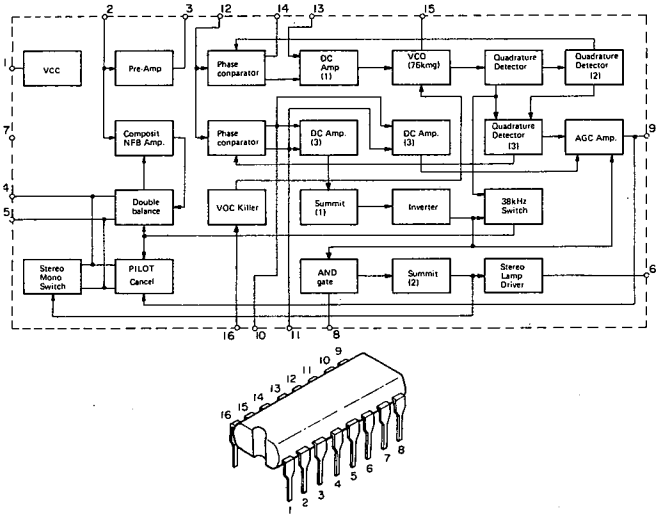
IC: LA1222



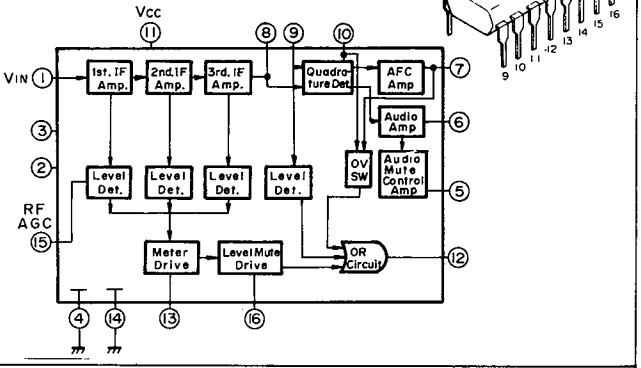
IC: HA11225



IC: KB4437



IC: LA1240



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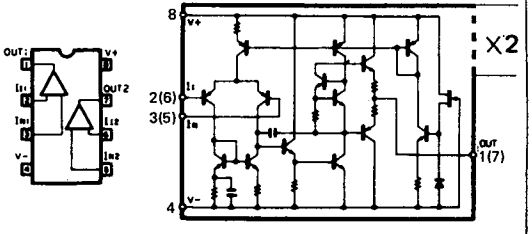
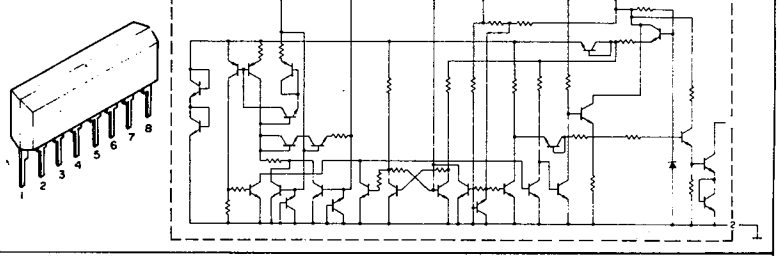
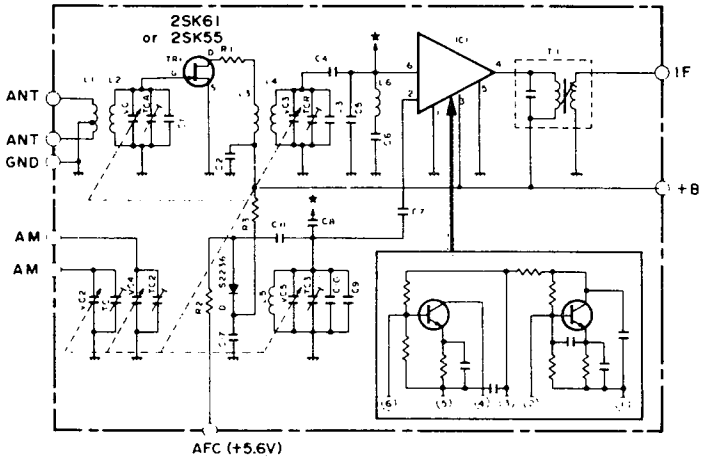


IC: HA12002

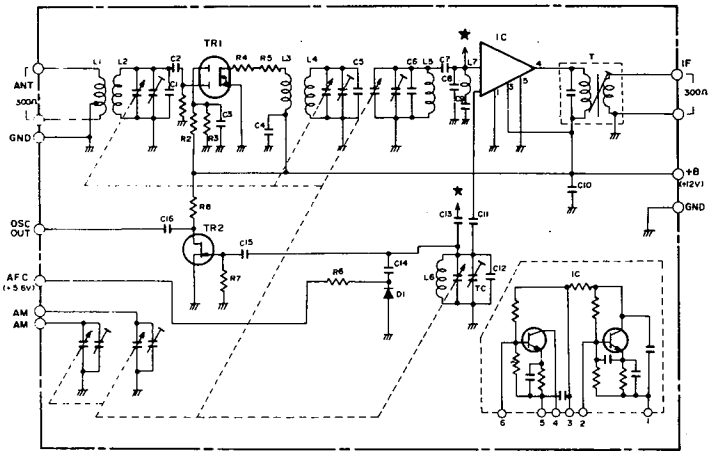


RF-PACK

R10



R20



PARTS LIST

NOTE: ⚠ and [illegible] marks components on Parts list are for performance of this unit, replase them, uses safety critical components or designed component as specified.

Symbol No.	Part No.	Description	Division
Diodes			
D21 ∿ 24	M07447321	GP30D	R10
D21 ∿ 24	M07240320	SR3AM-4	R20
D51	M07300323	ESAB03	
D52	M07133322	MZ308	
D101	M07060320	1S2473	
D102	M07060320	1S2473	
D103	M07060320	1S2473	
D104	M07060320	1S2473	
D201	M07060320	1S2473	
D203	M07060320	1S2473	
D204	M07060320	1S2473	
D251	M07141322	MZ314	
D252	M07060320	1S2473	
D252	M07060320	1S2473	
D253	M07447322	MZ309	
D254	M07391320	1SR34-100	R20
D255	M05174321	MZ303	R20
D271	M07444320	SLP-154B	R10
D271	M05176321	SEL1123R	R20
D272	M07444320	SLP-154B	R10
D272	M05176321	SEL1123R	R20
D501	M07140320	MZ320	
D502	M07133322	MZ308	
D503	M07091331	MV-13 (Varistor)	
D504	M07060320	1S2473	

Symbol No.	Part No.	Description
D505	M07142320	1S2471
D601	M07140320	MZ320
D602	M07133322	MZ308
D603	M07091331	MV-13 (Varistor)
D604	M07060320	1S2473
D605	M07142320	1S2471
D701	M07288320	MZ324
D702	M07288320	MZ324
D703	M07142320	1S2471
D705	M07142320	1S2471
Transistors		
Q51	M07061304	2SD330
Q52	M07390303	2SC2320
Q53	M07390303	2SC2320
Q101	M07070304	2SC710
Q102	M07070304	2SC710
Q103	M07070304	2SC710
Q104	M07070304	2SC710
Q105	M07139304	2SK68A
Q106	M07390303	2SC2320
Q107	M07139304	2SK68A
Q108	M07390304	2SA999
Q109	M07390303	2SC2320
Q110	M07454303	2SD1012

Symbol No.	Part No.	Description	Division
Q111	M07454303	2SD1012	
Q112	M07390303	2SC2320	
Q201	M07070304	2SC710	R20
Q202	M07070304	2SC710	R20
Q250	M07061304	2SD330	
Q251	M04120303	2SB514	
Q252	M07061304	2SD330	R20
Q253	M07390303	2SC2320	R20
Q301	M07215303	2SD467	R20
Q302	M07215304	2SB561	R20
Q303	M07370305	2SD756	R20
Q304	M07390304	2SA999	R20
Q305	M07390304	2SA999	R20
Q321	M07390303	2SC2320	
Q322	M07390303	2SC2320	
Q323	M07390303	2SC2320	
Q351	M07390303	2SC2320	
Q352	M07390303	2SC2320	
Q353	M07390304	2SA999	
Q354	M07390303	2SC2320	
Q381	M07390303	2SC2320	
Q401	M07215303	2SD467	R20
Q402	M07215304	2SB561	R20
Q421	M07390303	2SC2320	
Q422	M07390303	2SC2320	
Q423	M07390303	2SC2320	
Q451	M07390303	2SC2320	
Q452	M07390303	2SC2320	
Q453	M07390304	2SA999	
Q454	M07390303	2SC2320	
Q481	M07390303	2SC2320	
Q501	M07213303	2SK109	
Q502	M07140303	2SA847	
Q503	M07140303	2SA847	
Q504	M07370306	2SB716	
Q505	M07370305	2SD756	
Q506	M07370305	2SD756	
Q507	M07370305	2SD756	
Q508	M07390304	2SA999	R10
Q508	M07140303	2SA847	R20
Q601	M07213303	2SK109	
Q602	M07140303	2SA847	
Q603	M07140303	2SA847	
Q604	M07370306	2SB716	
Q605	M07370305	2SD756	
Q606	M07370305	2SD756	
Q607	M07370305	2SD756	
Q608	M07390304	2SA999	R10
Q608	M07140303	2SA847	R20

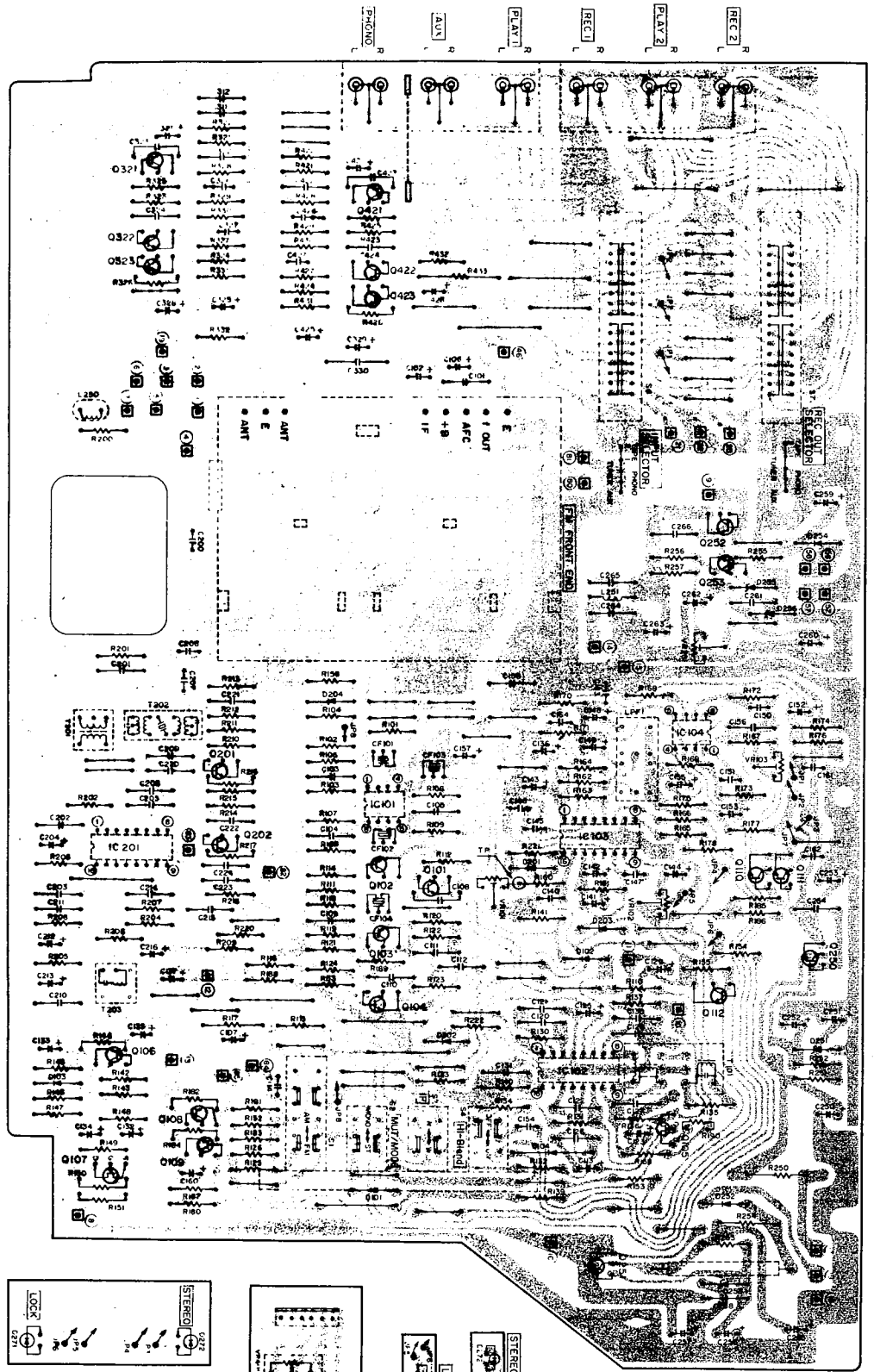
Symbol No.	Part No.	Description	Division
ICs			
IC101	M07115343	LA1222	
IC102	M07465343	HA-11225	
IC103	M07461345	KB4437	
IC104	M07370343	μPC4558C	
IC201	M07461346	LA1240	
IC211	M07461348	MSL2318RS	R20
IC212	M07461349	MSM5525RS	R20
IC501	M07461343	STK-1050	R10
IC501	M07461347	STK-1060	R20
IC601	M07461343	STK-1050	R10
IC601	M07461347	STK-1060	R20
IC701	M07447343	HA12002	
Electrical Parts			
C25	M07461360	C-Elect-45V10000	R10
C25	M07461361	C-Elect-55V12000	R20
C26	M07461360	C-Elect-45V10000	R10
C26	M07461361	C-Elect-55V12000	R20
J1	U541S013H01	Input Jacks	
J2	U451S013H01	Input Jacks	
J3	U451S015H33	Headphone	
J6	M07461575	Terminal Board (SP)	
J7	U451C065H01	Pin Jack	R20
J11	U449C018H01	A.C. Socket	
K701	M07447465	Relay	
K702	M07447465	Relay	
K703	M07236465	Relay	
L201	M07470540	Coil-Antenna	
L501	M07072530	Coil	
L601	M07072530	Coil	
LPF1	M07441381	Filter	
[illegible]	[illegible]	Fuse 6.3A UL ⚠	
M1, 2	M07461260	Meter	
[illegible]	[illegible]	Power Cord ⚠	
PL11	M07461250	Lamp	
[illegible]	[illegible]	[illegible] ⚠	
[illegible]	[illegible]	[illegible] ⚠	R20
[illegible]	[illegible]	[illegible] ⚠	
[illegible]	[illegible]	[illegible] ⚠	
[illegible]	[illegible]	[illegible] ⚠	
S1 ∿ 4	M07461453	SW-Push (High ∿ Band)	
S5	M07366454	SW-Push (MM, MC)	
S6	M07461450	SW-Rotary	
S6	M07461451	SW-Rotary (Wire)	
S6	M07461454	SW-Rotary (SW)	
S7	M07461450	SW-Rotary	
S7	M07461451	SW-Rotary (Wire)	
S7	M07461454	SW-Rotary (SW)	
S8	M07461452	SW-Push (Tone Defeat)	
S9-1 ∿ 5	M07461455	SW-Push (SP ∿ Filter)	
S11	M07213450	SW-Push (Power)	
[illegible]	[illegible]	[illegible] ⚠	R10

Symbol No.	Part No.	Description	Division
T11	M07461501	Trans-Power ⚠	R20
T201	M07085527	Coil-OSC	
VR51	M07446436	VR-Semi-B5K	
VR101	M07115352	VR-Semi-B4.7K	
VR102	M07141351	VR-Semi-B22K	
VR103	M07141351	VR-Semi-B22K	
VR251	M07115352	VR-Semi-B4.7K	R20
VR301, 401	M07461402	VR-W-B100K25 (ATT)	
VR302, 402	M07426401	VR-W-HB250K25 (Balance)	
VR303, 403	M07461400	VR-QUATRE-B100K25	
VR304, 404		(Loudness)	
VR305, 405	M07461401	VR-W-C20K25 (Treble)	
VR306, 406	M07461401	VR-W-C20K25 (Bass)	
VR501	M07213436	VR-Semi-B5K	
VR601	M07213436	VR-Semi-B5K	
Z101	M07236575	Terminal Board (ANT.)	
EXPLODED VIEW PARTS			
1		Ornament	R10
1		Ornament	R20
2	U704D568G04	Knob-Assy (Power)	
3	U704D564H01	Knob(High,IF, Mute, Band)	
4	M07461210	Knob-Assy (ATT)	
5	M07461211	Knob-Assy (Bass, Treble, Loudness, Balance)	
6	U714D182H03	Knob-Metal (Tuning)	
7	U669D116H25	Screw(Fixed Upper Cover)	
8	U567D310H03	Cap (Ornament Screw)	
9		T-Screw 2-3x8	
10	U712C198G01	Panel-Assy (Front)	R10
10	U712C189G02	Panel-Assy (Front)	R20
11	U704D552G12	Knob-Assy	
12		Holder-Z	
13	U720B213G01	Cabinet	
14	U580D041G01	Base-Assy	
15	U669S074H13	Screw-Metal M3x12	
16	U771D058H01	Leg	
17		Holder-U	
18		Holder	R10
18		Holder	R20
19		Holder-U	
20		Bush-Mold	
21		Holder	
22		Holder-U	
23		Ornament	
24		Dial	R10
24		Dial	R20
25		Rivet-PL	R20

Symbol No.	Part No.	Description	Division
28		Screw-B M4x8	
29		Screw-B M5x8	R20
30		T-Screw 2–3x16	
31		Nut M7	
32		Nut M12	
33		Rivet-PL	R20
34		Ornament	R10
34		Ornament	R20
35	U534D509H02	Pointer	
36		Holder	
37		Shield	R20
38		Screw-P M5x50	R20
39		Nut M5	R20
40		Washer Paper	R20
41		Shield	R20
42	U582B100H01	Panel-Back	R10
42	U582B100H02	Panel-Back	R20
43	M07461203	Handle	
44		Clamper	
45		Terminal	
46-a		P.C.B. Assy	R10
46-a		P.C.B. Assy	R20
46-b ∼ e		P.C.B. Assy	R20
47-a		P.C.B. Assy	R10
47-a		P.C.B. Assy	R20
47-b ∼ e		P.C.B. Assy	R20
48		Drum	
49		Holder-L	
50		Screw-B M3x6	
51		Bush-Mold	R20
52	U565D381H02	Radiator	
53		Clamper	
54		Holder-Z	
55		Front Sub-Panel	
56		Spacer	
57		Pulley	
58		Washer-PL	
59		E-Ring 5	
60		Fly-Wheel	
61		Bush-Mold	
62		Washer	
63		Nut M8	
64		Holder-Assy	
65		Pulley-Assy	
66		Dial	R20
67		Leg-Assy	
68		Holder-L	
69		Dial-Cord-Assy	
70a ∼ d		P.C.B.- Assy	R20
71		Holder-Z	R20
72		T-Screw 1– 2.6x5	R20
73		Bush-Mold	R10

Symbol No.	Part No.	Description	Division
	M07484319	RF-PACK	R10
	M07596540 (U929Y030H01)	RF-PACK	R20
CF101	M07461445	Ceramic-Filter	R10
CF102	M07461445	Ceramic-Filter	R10
CF103	M07461445	Ceramic-Filter	R10
CF104	M07467380	Ceramic-Filter	R10
CF101	M07510446	Ceramic-Filter	R20
CF102	M07510446	Ceramic-Filter	R20
CF103	M07510446	Ceramic-Filter	R20
CF104	M07510447	Ceramic-Filter	R20
TF201	M07596340	Tube-Flour	

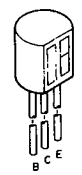
Symbol No.	Part No.	Description	Division



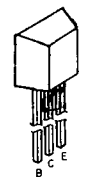
R10

R20

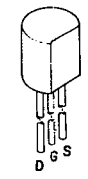
TR: 2SC710, 2SA847



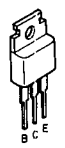
TR: 2SD1012



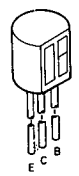
TR: 2SK68A



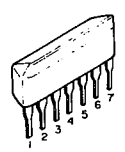
TR: 2SD330, 2SD514



TR: 2SA999, 2SD467,
2SB561, 2SD576,
2SB716, 2SC2320

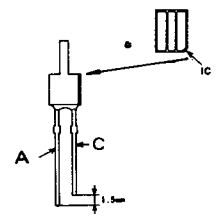


TR: 2SK109

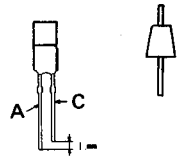


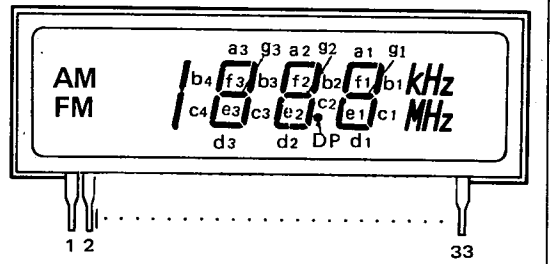
1. Drain 1
2. Gate 1
3. Source 1
4. NC
5. Source 2
6. Gate 2
7. Drain 2

Diode: SLP-154B

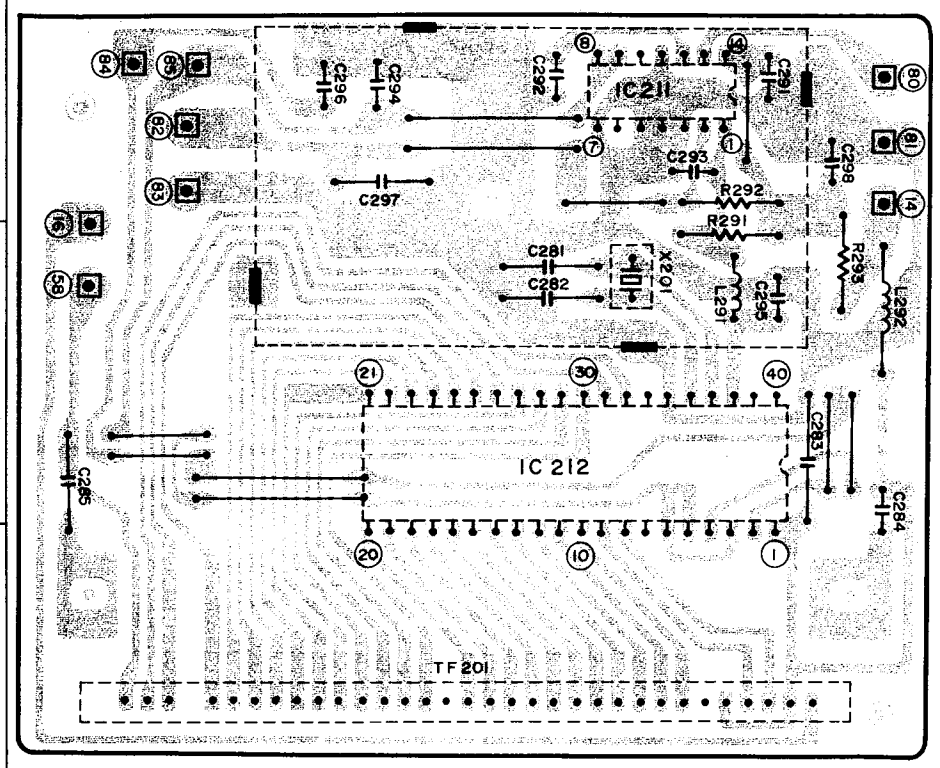


Diode: SEL-1123R



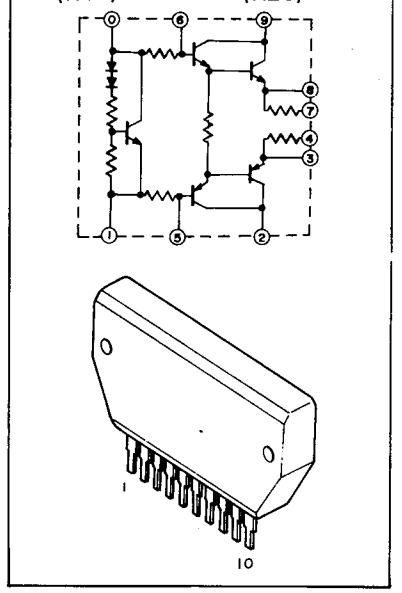


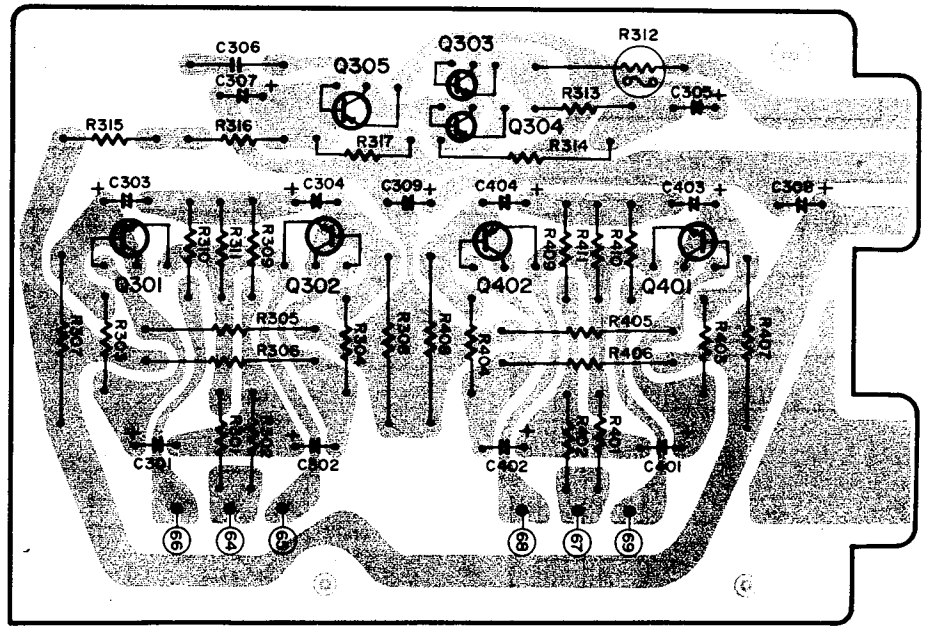
Terminal No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Polarity	F	Nc	C_4	b_4	G	Nc	a_3	f_3	g_3	e_3	d_3	c_3	b_3	a_2	f_2	g_2	e_2	G	d_2	c_2	b_2	Dp	f_1	g_1	e_1	d_1	c_1	b_1	a_1	Np	AM KHz	FM MHz	F



IC: STK-1050, STK-1060

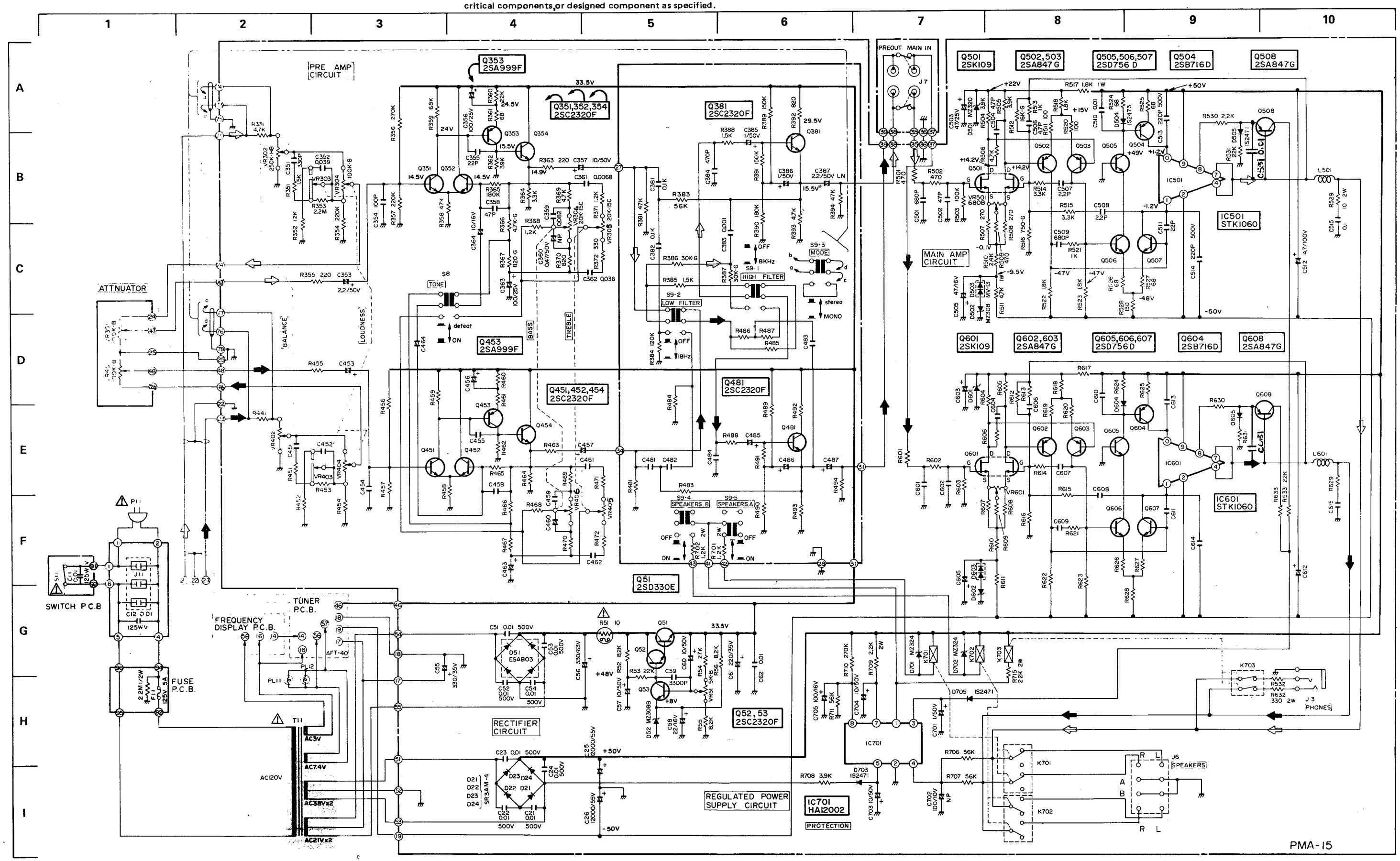
(R10) (R20)





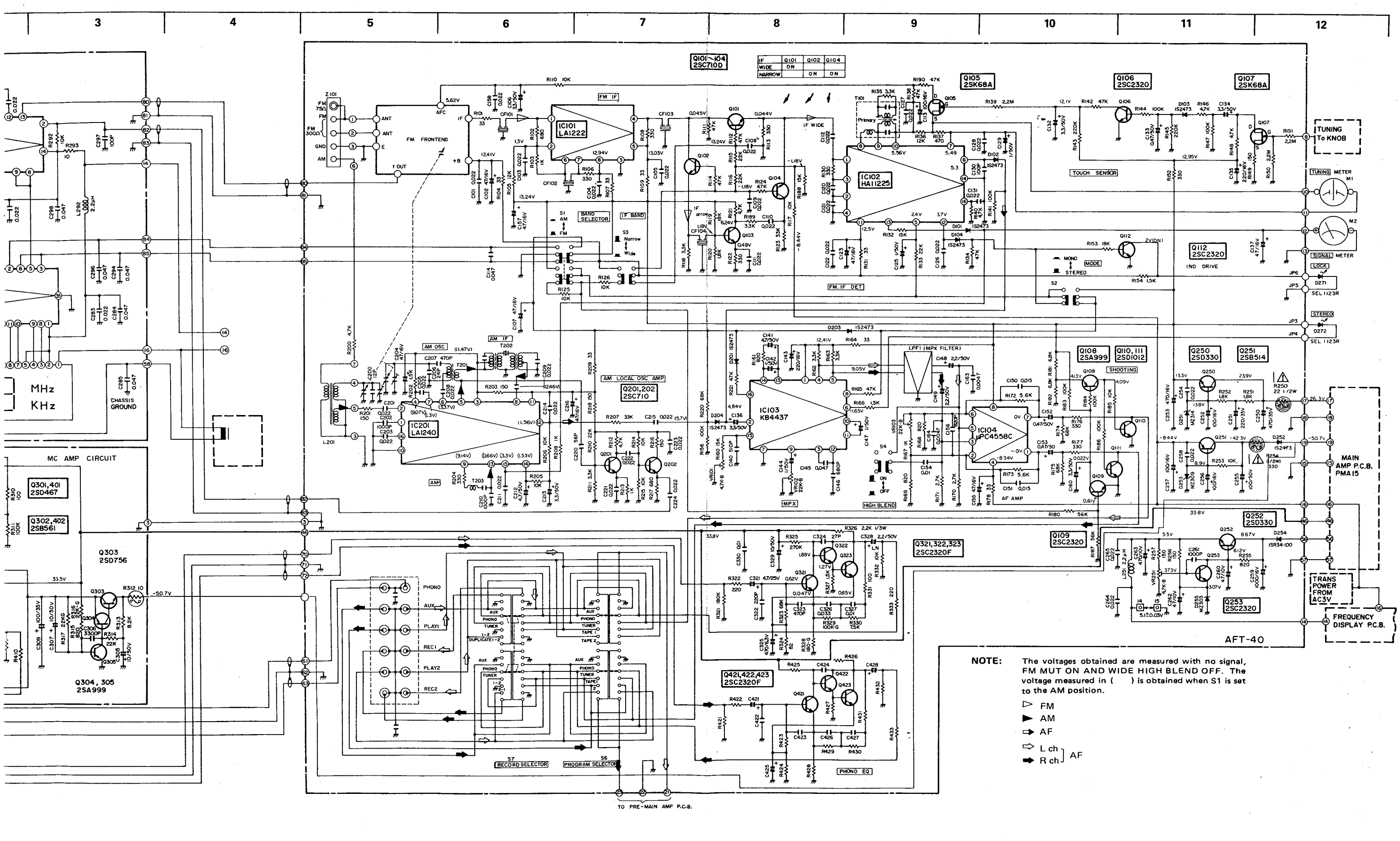
DA-R20 SCHEMATIC DIAGRAM (2/2)

NOTE: ⚠ and marks components on Parts list are for performance of this unit, replase them, uses safety critical components or designed component as specified.



L ch
R ch

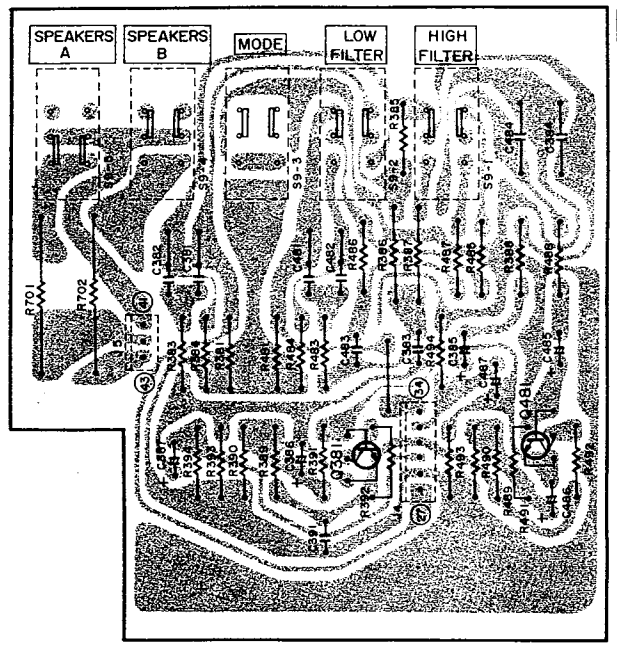
AM (1/2)

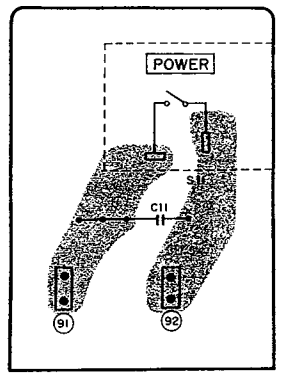


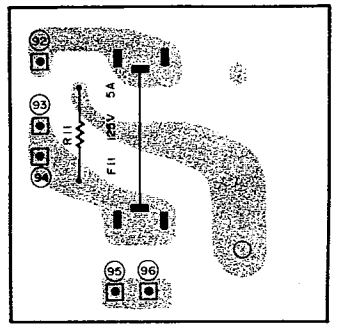
NOTE: The voltages obtained are measured with no signal, FM MUT ON AND WIDE HIGH BLEND OFF. The voltage measured in ( ) is obtained when S1 is set to the AM position.

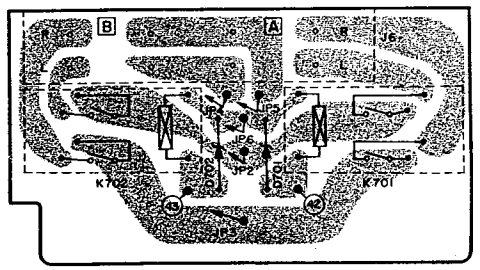
▷ FM
▶ AM
⇨ AF
⇨ L ch
➡ R ch] AF

DA-R20 SCHEMATIC DIAGRAM (1/2)

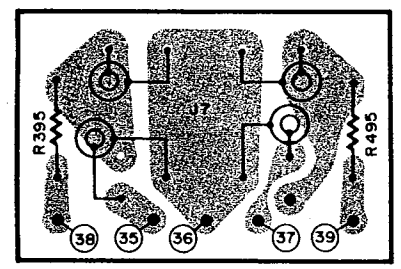




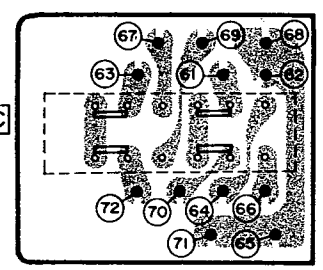


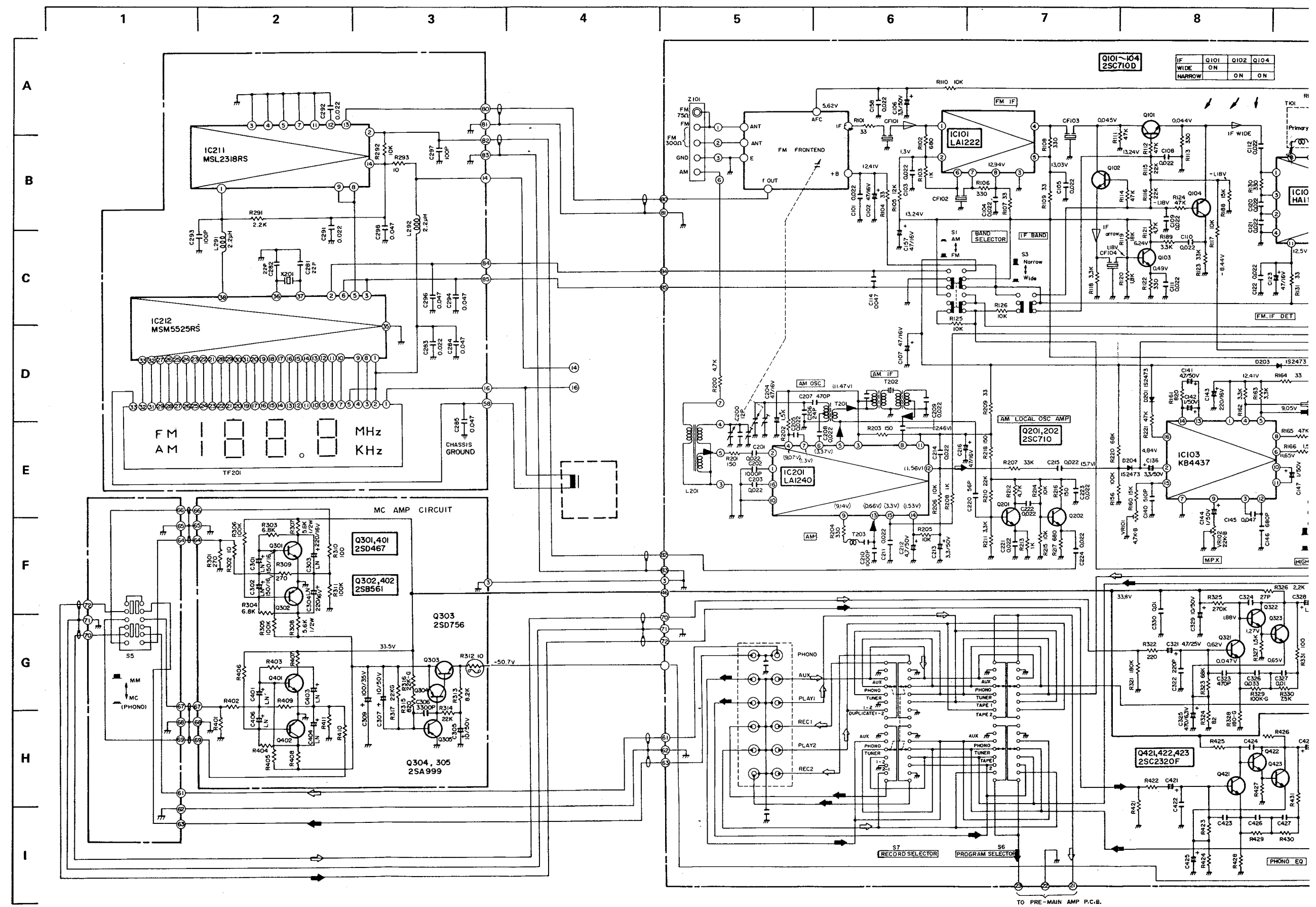


R20



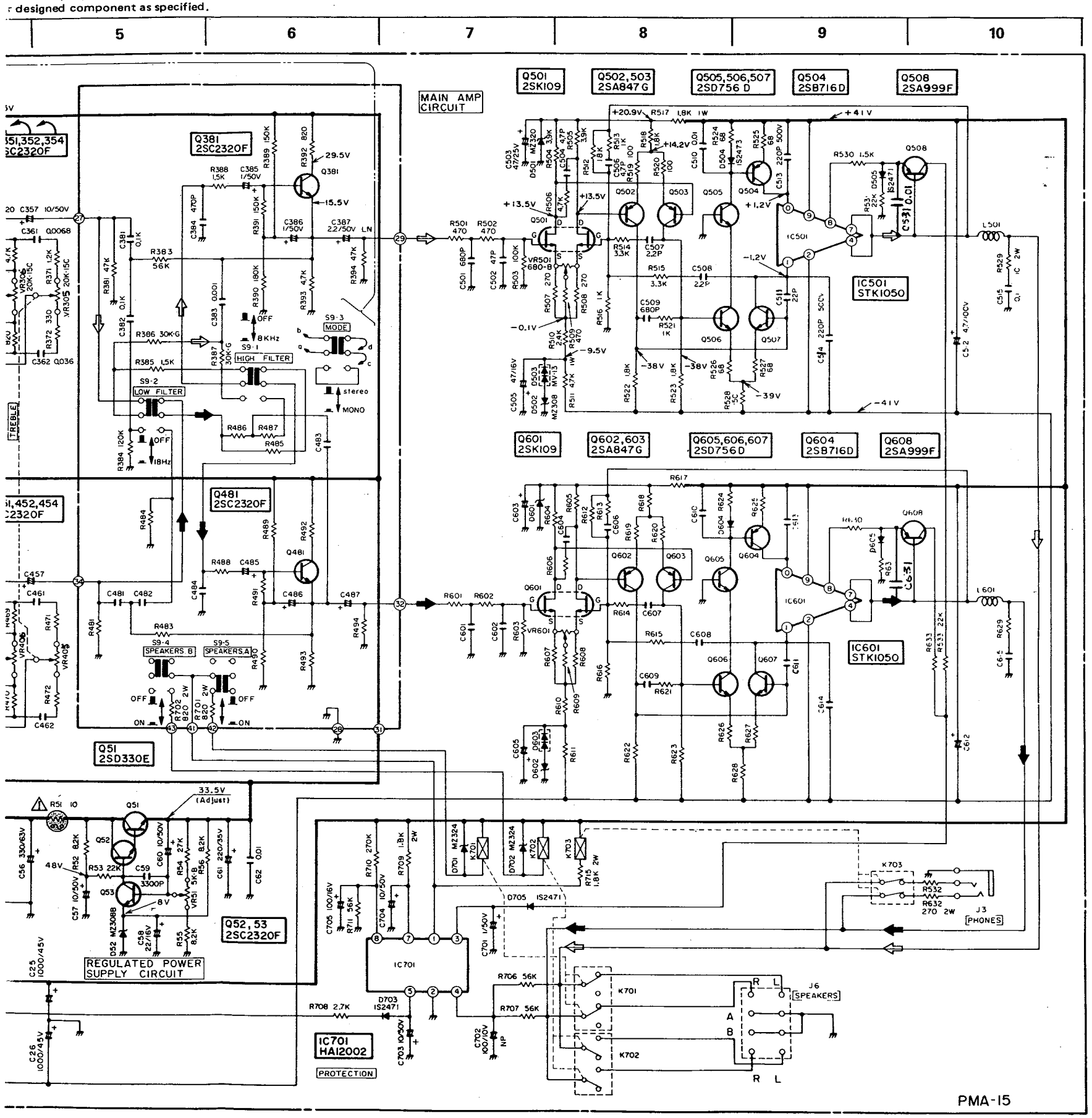
S5
MM/MC

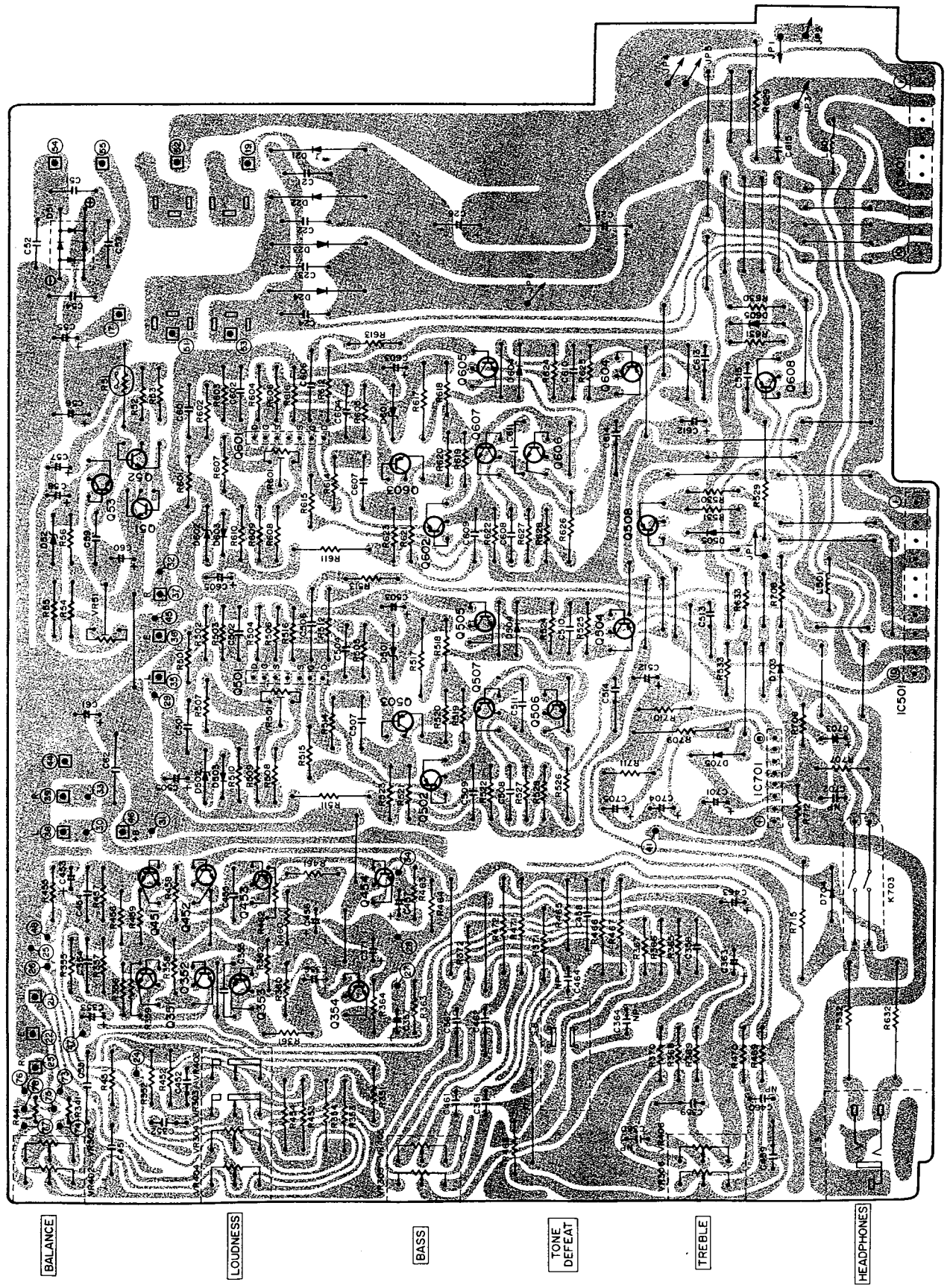




DA-R10	DA-R10
DA-R20	DA-R20

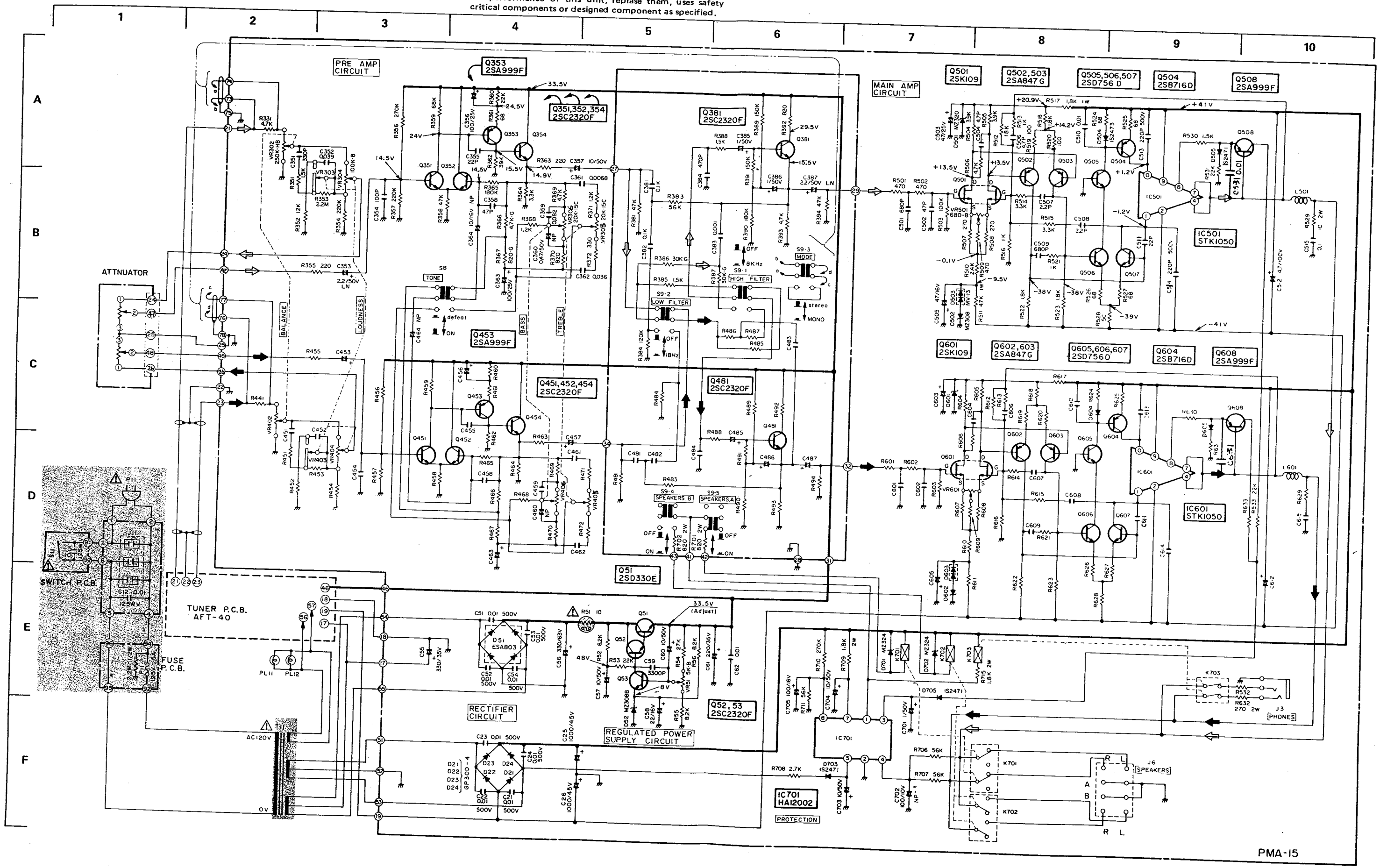
marks components on Parts list are
this unit, replase them, uses safety
r designed component as specified.



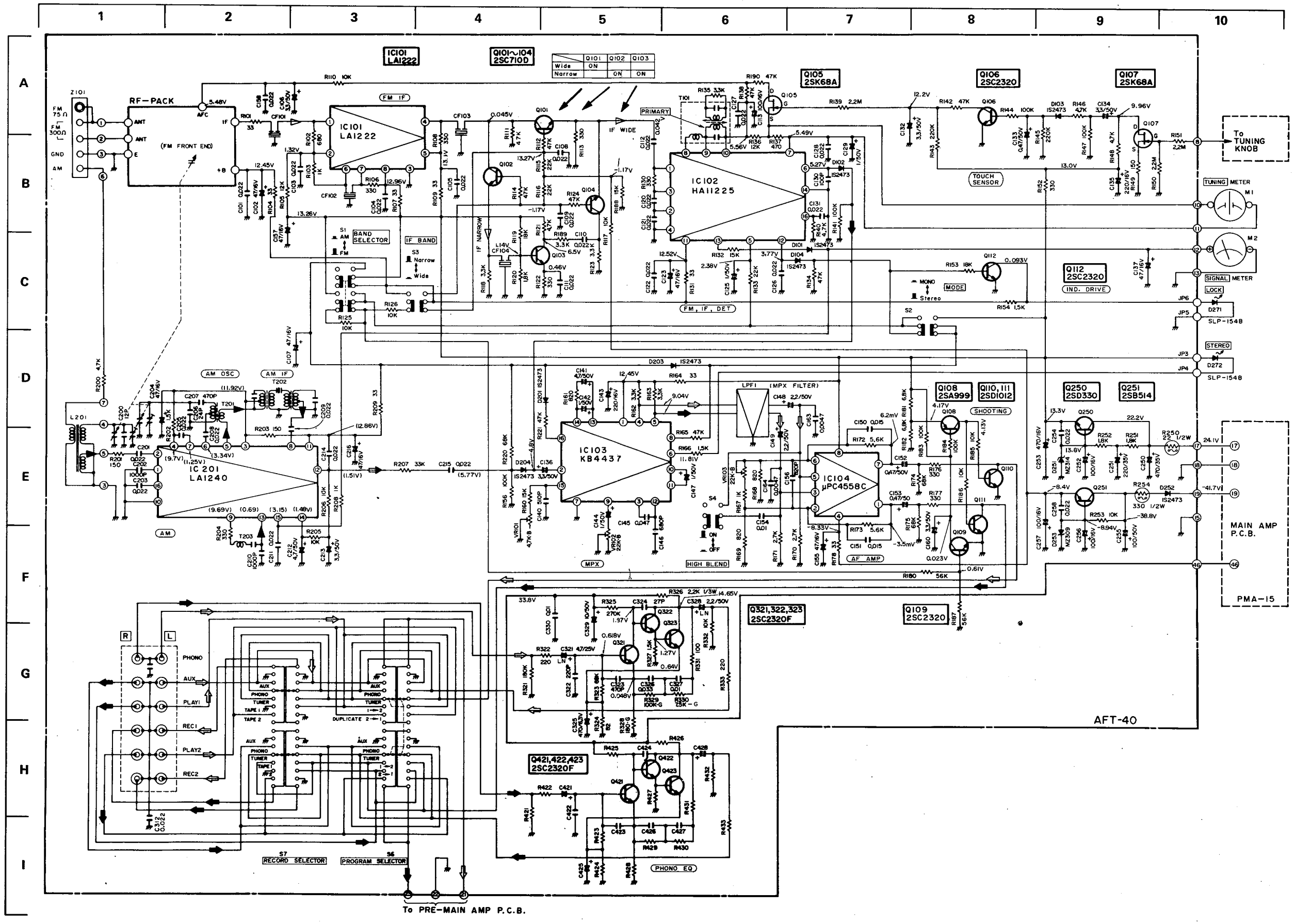


DA-R10 SCHEMATIC DIAGRAM (2/2)

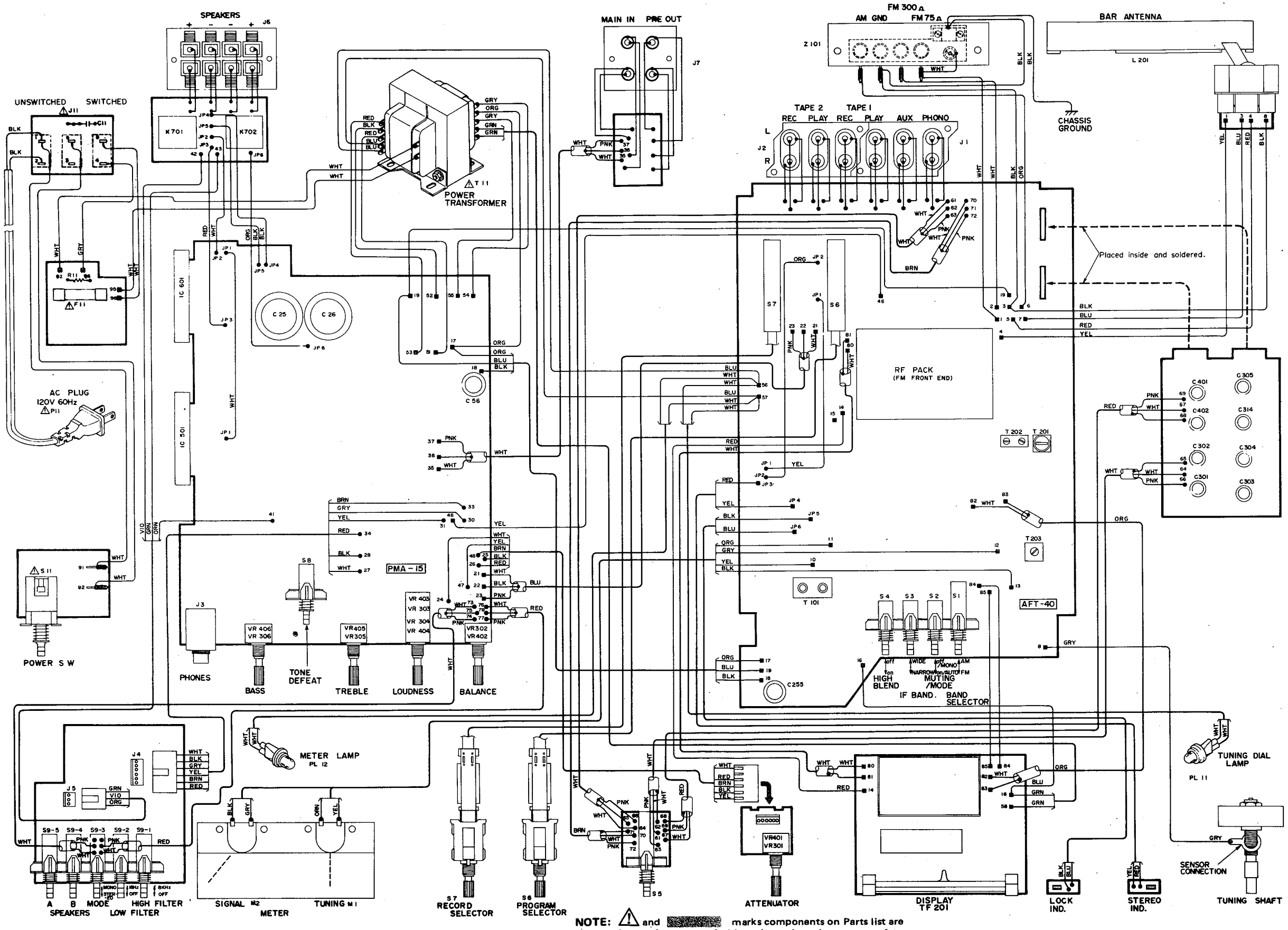
NOTE: ⚠ and [redacted] marks components on Parts list are for performance of this unit, replase them, uses safety critical components or designed component as specified.



DA-R10 SCHEMATIC DIAGRAM (1/2)



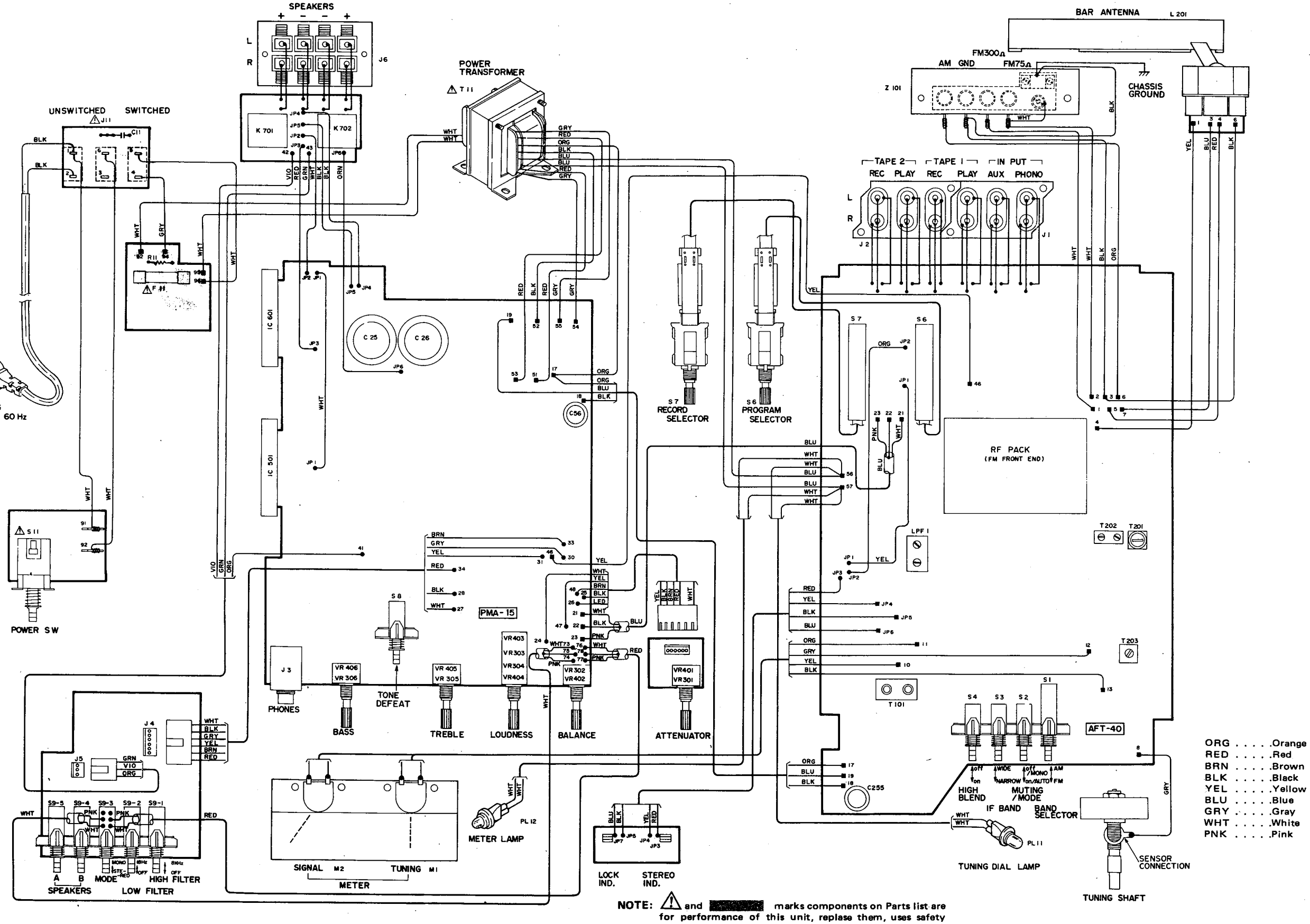
DA-R20 WIRING DIAGRAM



ORG . . . . .Orange
RED . . . . .Red
BRN . . . . .Brown
BLK . . . . .Black
YEL . . . . .Yellow
BLU . . . . .Blue
GRY . . . . .Gray
WHT . . . . .White
PNK . . . . .Pink

NOTE: ⚠ and ▒▒▒ marks components on Parts list are for performance of this unit, replase them, uses safety critical components or designed component as specified.

DA-R10 WIRING DIAGRAM



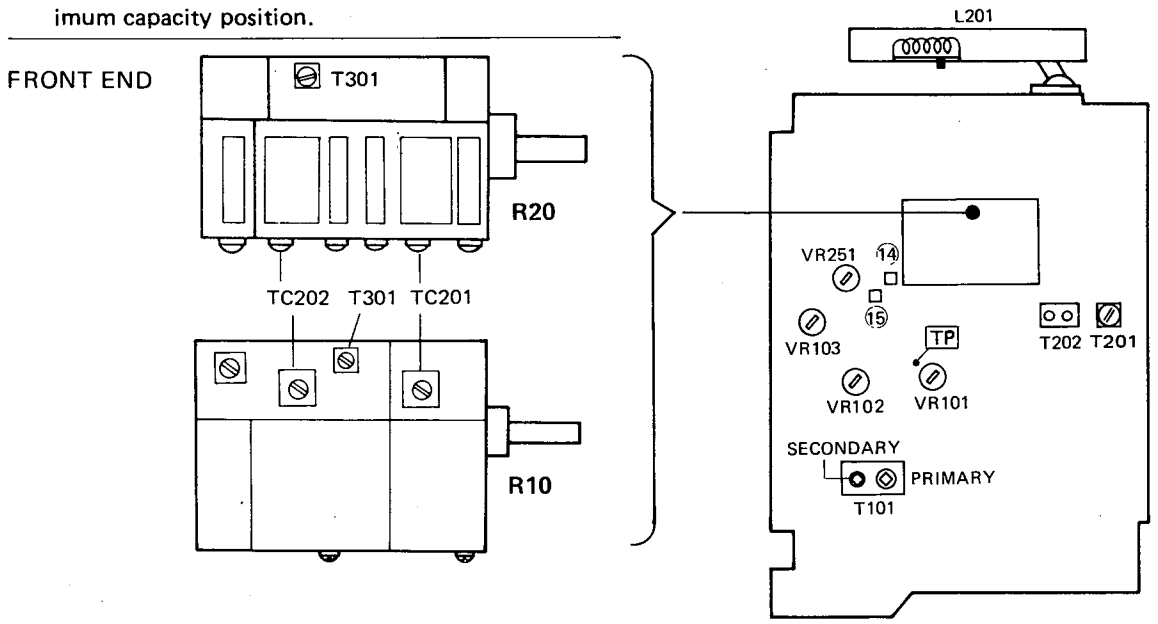
ORG . . . . .Orange
RED . . . . .Red
BRN . . . . .Brown
BLK . . . . .Black
YEL . . . . .Yellow
BLU . . . . .Blue
GRY . . . . .Gray
WHT . . . . .White
PNK . . . . .Pink

NOTE: ⚠ and ▬▬ marks components on Parts list are for performance of this unit, replase them, uses safety critical components or designed component as specified.

ADJUSTMENT

AM

(1) Set BAND SELECTOR-SW to AM.
(2) Adjust T201 so that a signal of 520 MHz can be received with the variable condenser set to the maximum capacity position.
(3) Adjust TC202 so that a signal of 1650 kHz can be received with the variable condenser set to the minimum capacity position.
(4) Adjust L201 so that the sensitivity rises to the highest at 600 kHz. (slide on antenna).
(5) Adjust TC201 so that the sensitivity rises to the highest at 1400 kHz.
(6) Repeat (4) and (5) several times to obtain best performance.



FM-IF

1. (1) Set BAND SELECTOR-SW (S1) to FM.
   (2) Set MODE-SW (S2) to MONO.
   (3) Set BAND-SW (S3) to WIDE.
   (4) Set HIGH-BLEND (S4) to OFF.
2. (1) Set the variable condenser to the middle position (near 100 MHz).
   (2) Set the unit to the condition to receive no signal, and adjust the primary side of T101 so that the TUNING METER comes to the center (zero) position.

FM-MPX

1. (1) Set MODE-SW (S2) to AUTO.
   (2) Modulate the signal of 98 MHz, 60 dBf, 1 kHz from SSG by 100%. Receive the MONO signal.
   (3) Measure the VCO frequency of MPX at the TP point, and adjust VR101 so that the frequency becomes 76 kHz ±50 Hz.
2. Set SSG to stereo, modulation-free, and adjust VR102 so that the signal component of the 19 kHz contained in the low frequency output is minimized.
3. Re-set SSG to 1 kHz MONO, and adjust the secondary side of T101 so that the distortion is minimized.
4. When the center (zero) position of the TUNING METER shifts as a result of the adjustment of 3, proceed adjustment 2, (2) and repeat "FM-IF" adjustment of 3.
5. Set the SSG to the stereo sub (L–R) 1 kHz mode, and adjust T301 (front end section) so that the distortion is minimized.
   However, the rotational angle of T301 should be less than 180° a difference from the initial position.
6. Check the adjustment 3.
7. Set SSG to the stereo 1 kHz 100% modulation, and adjust VR103 so that the separation of L → R and R → L are maximized and become equal to each other.

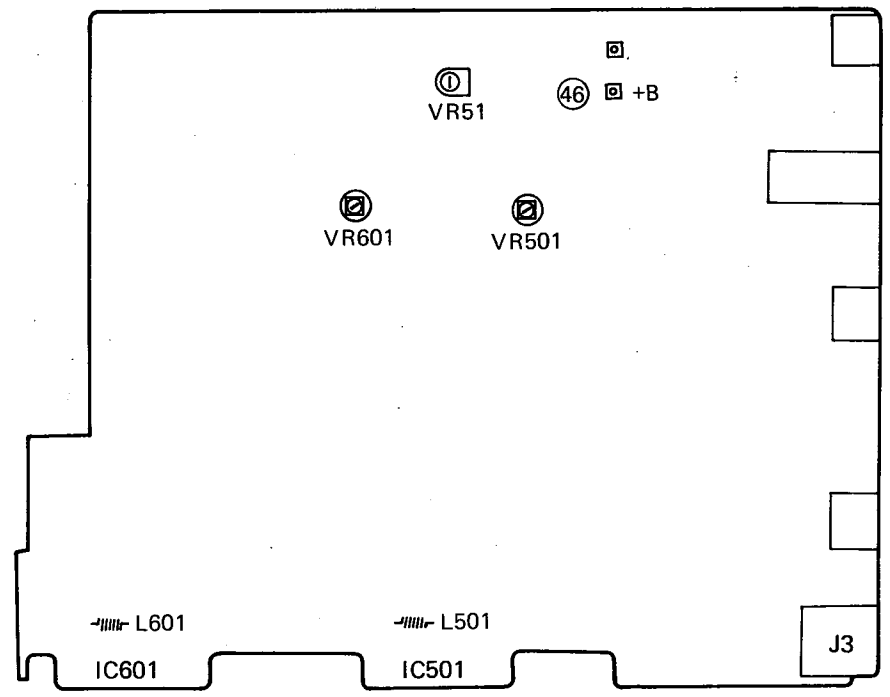
Voltage Adjust (Counter R20)

Measure the frequency counter supply voltage of the DA-R20 between terminals (14) and (15) (ground), and adjust VR251 so that the voltage of 5.2 ±0.03V is obtained.

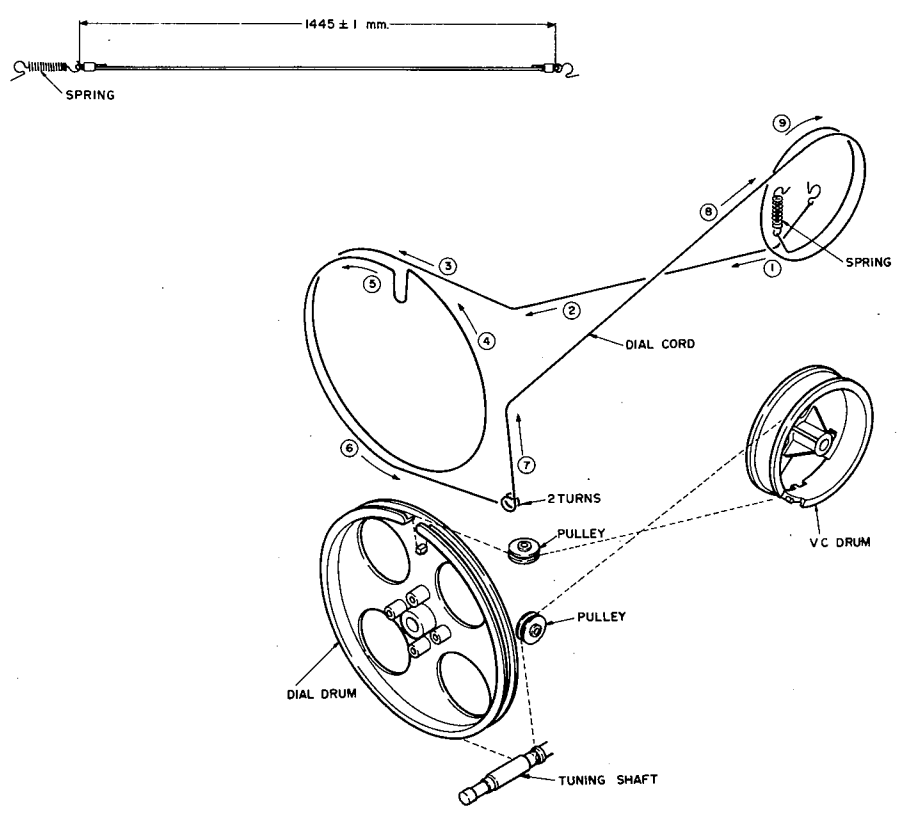
AF-AMP

1. (1) Adjust VR501 so that the voltage between L501 and ground becomes 0 ±10mV.
   (2) Adjust VR601 so that the voltage between L601 and ground becomes 0 ±10mV.
2. Measure the supply voltage of the preamplifier at terminal (46), and adjust VR51 so that the voltage of 33.5 ±0.5V is obtained.

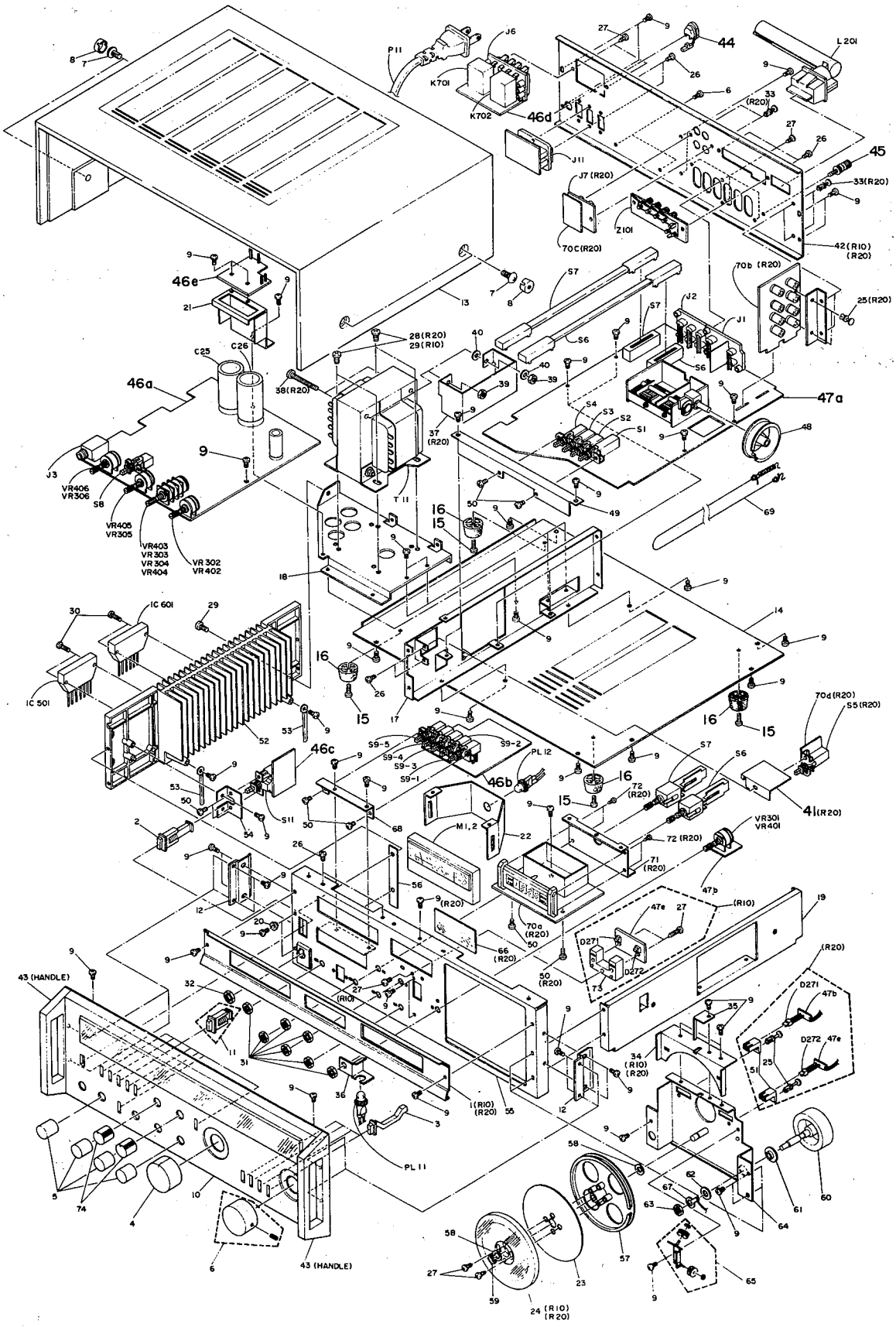
AF AMP ADJUSTMENT PARTS LOCATION



DIAL CORD STRINGING

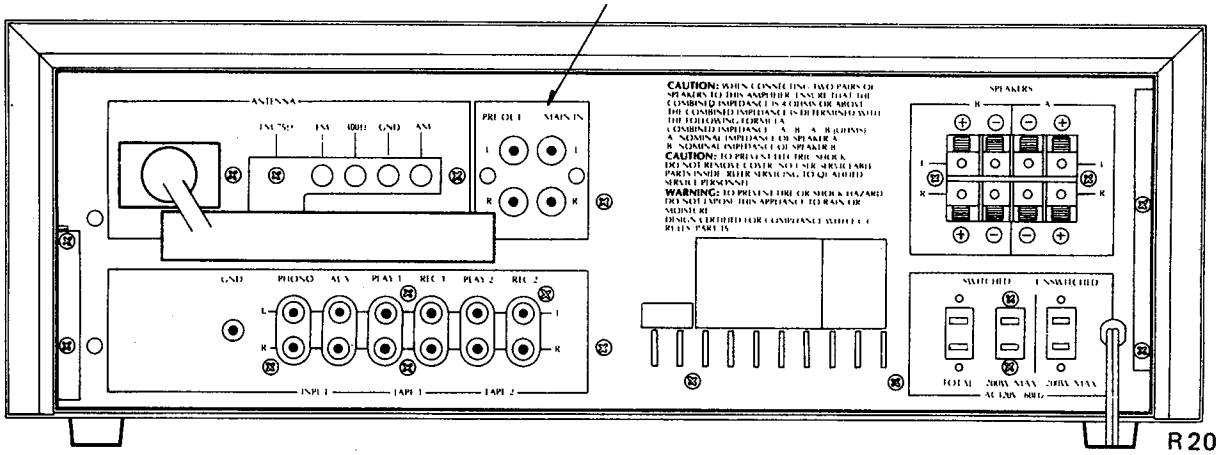


EXPLODED VIEW



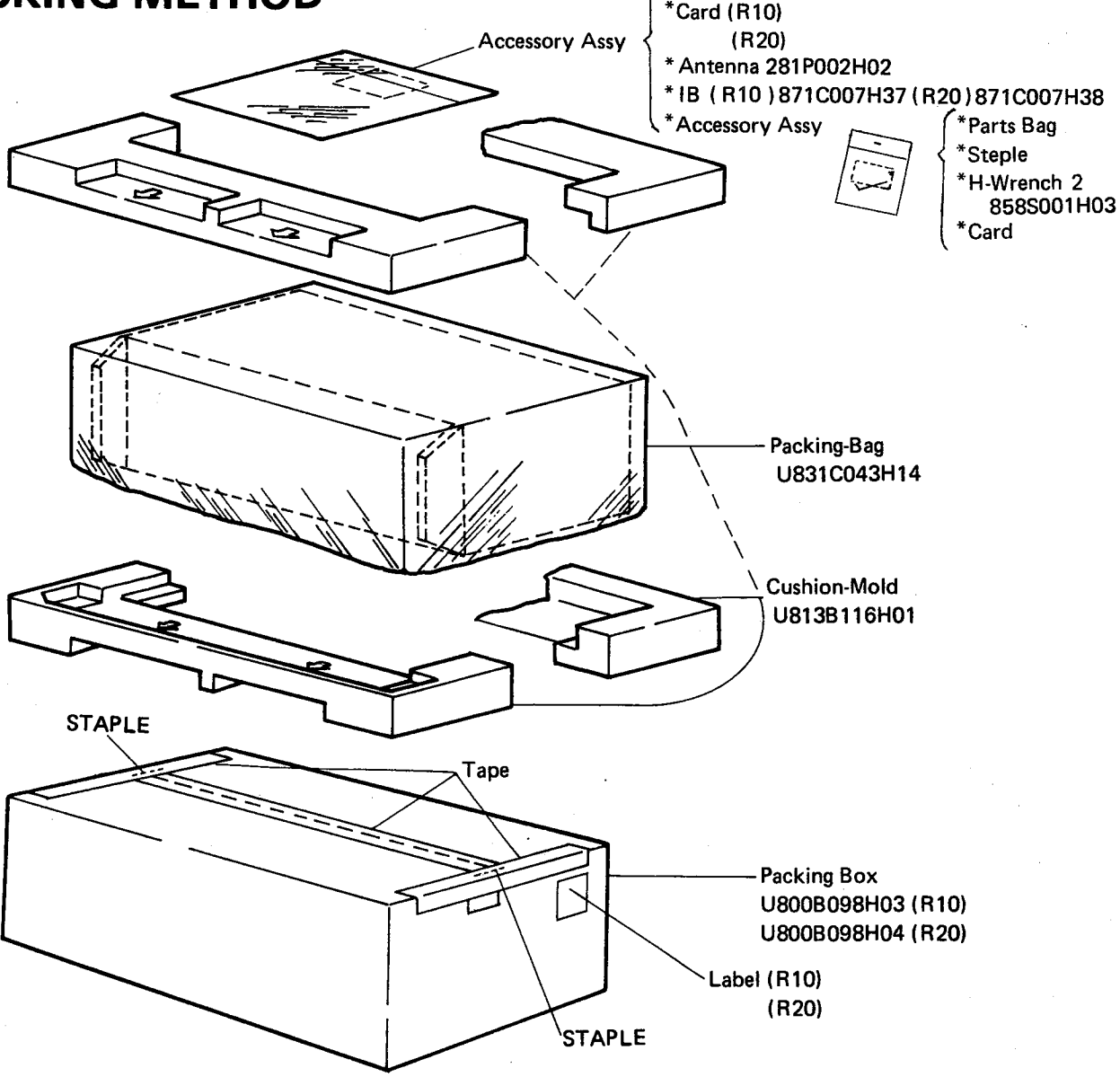
BACK PANEL

NOTE: DA-R10 not used.



R20

PACKING METHOD



R10/R20-US
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