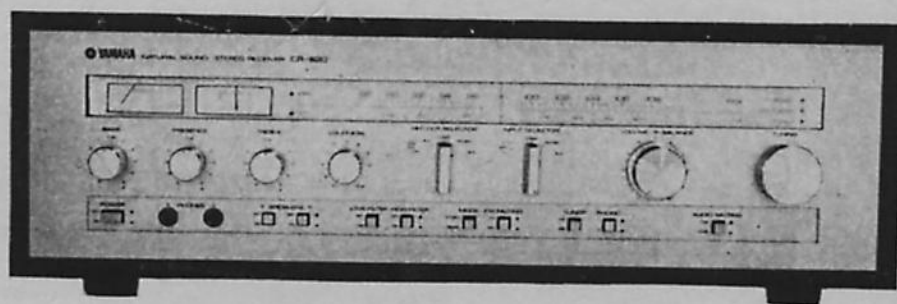


SERVICE MANUAL

CR-820

FM/AM STEREO RECEIVER




SINCE 1887



YAMAHA

NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN

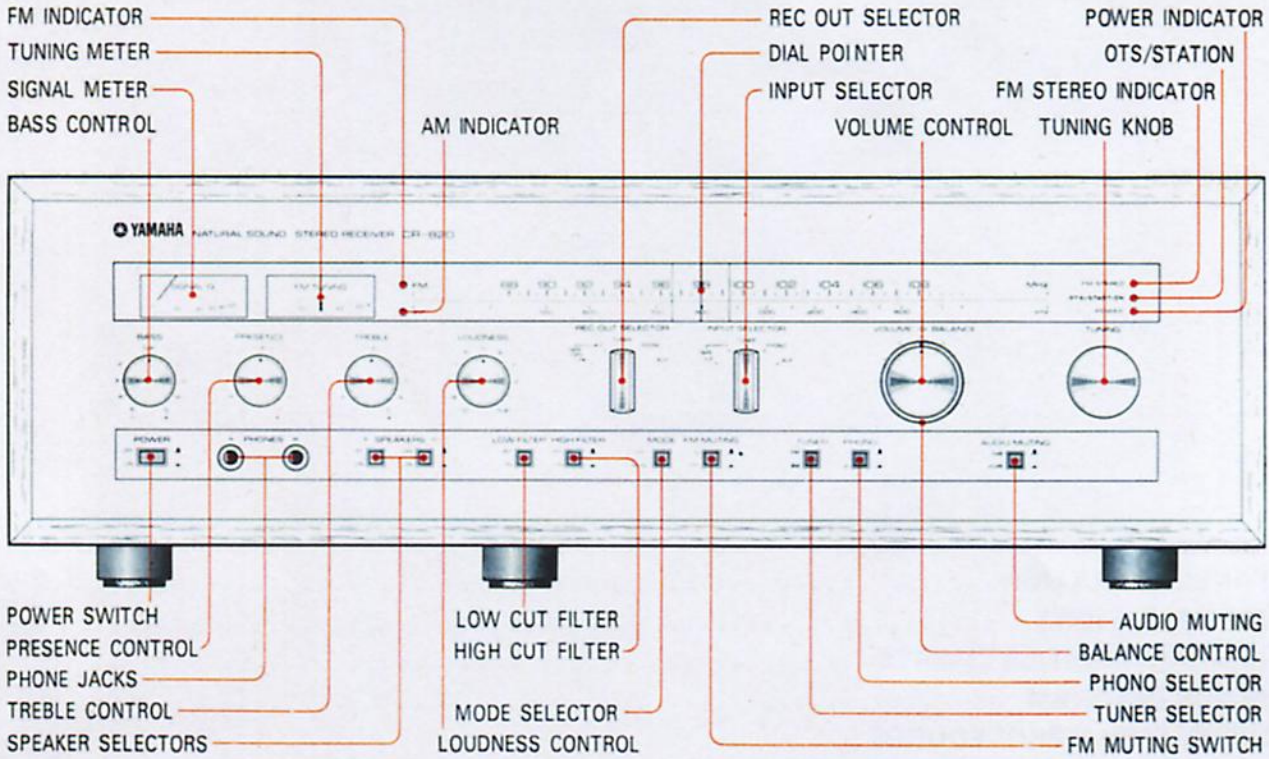
KY.  Printed in Japan. 12.76.2000

CONTENTS

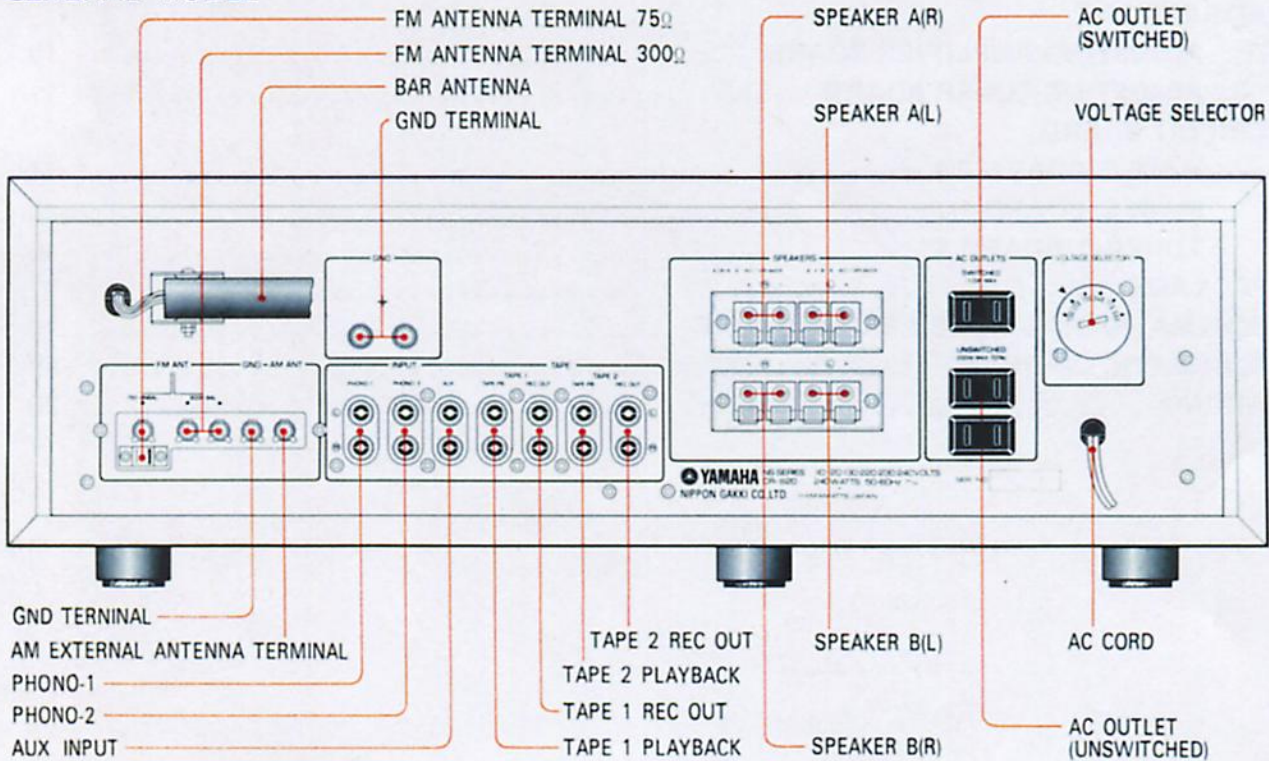
PANEL OPERATION	2
SPECIFICATIONS	4
CHARACTERISTICS CHARTS	5
BLOCK DIAGRAM	6
DISASSEMBLY PROCEDURES	
FLOW CHART	7
PROCEDURES	7
DIAL CORD STRINGING	9
ADJUSTMENT	
ADJUSTING AMPLIFIER BOARD	10
ADJUSTING TUNER BOARD	11
CIRCUIT BOARD	
MAIN C. BOARD 2 & etc.	14
MAIN C. BOARD 1	15
TUNER C. BOARD 1	16
PACKAGE	17
SCHEMATIC DIAGRAM BY EXPORT ZONE	18
SCHEMATIC DIAGRAM	19
WIRING	20

PANEL OPERATION

FRONT PANEL

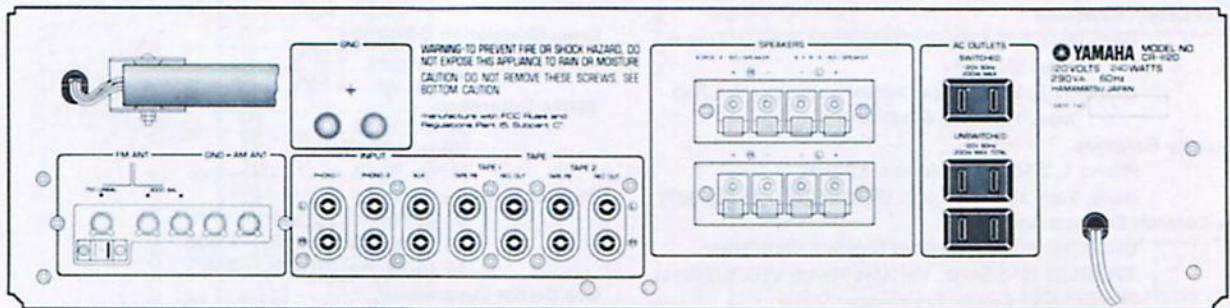


REAR PANEL GENERAL MODEL

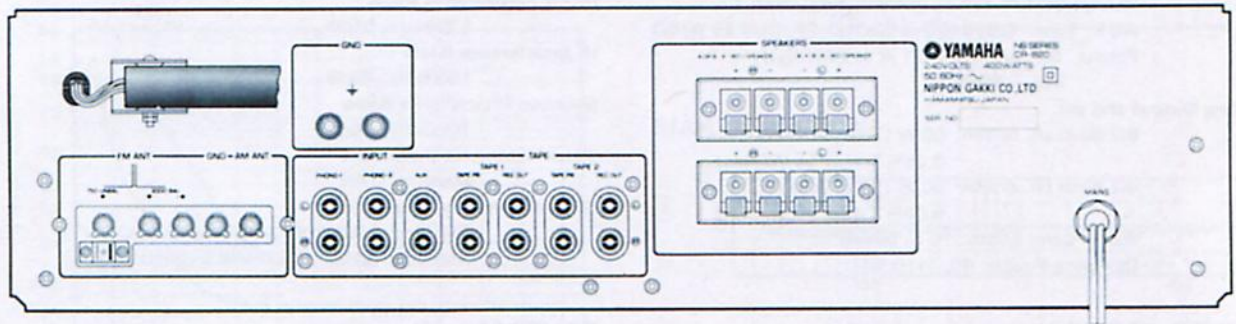


PANEL OPERATION

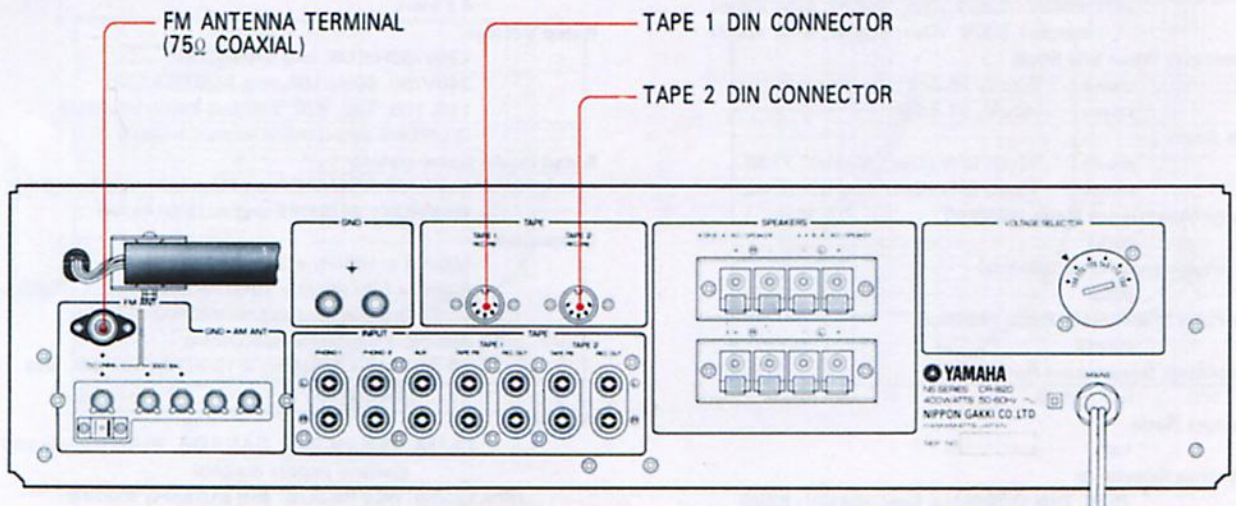
REAR PANEL US & CANADIAN MODEL



UK & AUSTRALIAN MODEL



EUROPEAN MODEL



SPECIFICATION

AMPLIFIER SECTION

Input Sensitivity/Impedance

Phono 1, 2 2mV-1kHz/50k Ω , max. 120mV
AUX, Tape 1, 2 120mV/45k Ω
DIN 1, 2 (European model only) 120mV/45k Ω

Output Level/Impedance

REC. OUT 1, 2 120mV/220 Ω (Phono)/6k Ω (Tuner)
max. 9V/1kHz
DIN OUT 1, 2 (European model only) 30mV/52k Ω
max. 1V/1kHz 50k Ω loaded

Frequency Response

Phono 1, 2 RIAA Deviation: ± 0.5 dB
AUX, Tape 1, 2 to SP out: ± 0.5 dB (20Hz to 20kHz)

Tone Controls Characteristics

BASS: ft=350Hz, Variable Range ± 13 dB/50Hz
TREBLE: ft=3.5kHz, Variable Range ± 10 dB/20kHz
PRESENCE: Center Frequency=3kHz
Variable Range ± 6 dB/3kHz

Filter Characteristics

Low Filter: $f_c = 25$ Hz, 12dB/oct
High Filter: $f_c = 10$ kHz, 12dB/oct

Loudness Characteristics

According to the Fletcher and Munson curve

S/N Ratio and Noise Level

Phono: 78dB (IHF A Network)
AUX, Tape: 97dB (IHF A Network) Input 5.1k Ω
Residual Noise: 0.12mV (IHF A Network)

Total Harmonics Distortion

Phono: 0.012% (20 to 20kHz), REC OUT 2V
AUX, Tape: 0.02% (20 to 20kHz), SP. OUT 25 W/8 Ω
Phono: 0.1%/1kHz (0.1 W to 50W/8 Ω),
Vol. -20dB

Rating Output and etc.

8 Ω Both ch. driven: 50 W (20 to 20kHz),
0.05% T.H.D 55 W/1kHz
4 Ω Both ch. driven: 60 W (20 to 20kHz),
0.05% T.H.D 70 W/1kHz
Power Band Width: 10 to 50kHz
Dumping Factor: 40, 1kHz/8 Ω

Total Harmonics Distortion

mono. 100Hz: 0.1%
1kHz: 0.1%
6kHz: 0.2%
stereo 100Hz: 0.15%
1kHz: 0.15%
6kHz: 0.3%

Cross Modulation Distortion

IHF mono.: 0.05%
stereo: 0.15%

Stereo Separation

50Hz: 30dB
10kHz: 30dB
1kHz: 40dB

Frequency Response

50 to 10kHz: ± 0.3 dB
30 to 15kHz: +0.5dB -1.0dB
10 to 18kHz: +0.5dB -3dB

Sub Carrier Suppression

60dB

Muting Signal Level

5 μ V (19.2dBf)

AM Section Tuning Range

525 to 1605kHz

Usable Sensitivity (Used Bar Antenna)

IHF: 316 μ V/m (49 dB/m)

Selectivity

1000kHz: 30dB

S/N Ratio

80dB/m: 50dB

Image Interference Ratio

1000kHz: 55dB

IF Interference Ratio

1000kHz: 40dB

Spurious Interference Ratio

1000kHz: 55dB

Total Harmonics Distortion

80dB/m: 0.4%

Output Level/Impedance

FM(Mod. 100%): 450mV/6.5k Ω (REC OUT)
AM(Mod. 30%): 120mV/6.5k Ω (REC OUT)

TUNER SECTION

FM Section Tuning Range

87.6 to 108MHz

Usable Sensitivity (98MHz)

IHF mono.: 1.8 μ V (300 Ω) 10.3dBf
0.9 μ V (75 Ω) 10.3dBf
DIN mono.: 1.5 μ V (Dev: 40kHz, S/N: 26dB)
stereo: 50 μ V (Dev: 40kHz, S/N: 46dB)

Sensitivity When S/N 50dB

mono.: 3.2 μ V, 15.3dBf
stereo: 40 μ V, 37.3dBf

S/N Ratio

mono.: 77dB, DIN (Dev: 40kHz): 71dB
stereo: 73dB, DIN (Dev: 40kHz): 67dB

Image Interference Ratio (98MHz)

90dB

IF Interference Ratio (98MHz)

85dB

Spurious Interference Ratio (98MHz)

100dB

Amplitude Suppression Ratio

IHF: 65dB

Capture Ratio

1dB

Effective Selectivity

75dB, DIN (± 300 kHz, Dev: 40kHz): 52dB

GENERAL

Used Semi Conductors

74 Transistors 30 Diodes
4 ICs 5 Zenner Diodes
1 FET 5 LEDs

Used Ceramic Filters

4 Filters

Rated Voltage

120V/60Hz(US. and CANADA),
240V/50, 60Hz(UK. and AUSTRALIA)
110, 120, 130, 220, 230 and 240V/50, 60Hz
(EUROPE and General export models)

Rated Power Consumption

240W(US., CANADA and General export models)
400W(UK., EUROPE and AUSTRALIA)

Dimensions

508(W) x 167(H) x 395(D)mm
20(W) x 6-9/16(H) x 15-9/16(D)in (US., CANADA,
and General export models)
488(W) x 146(H) x 395(D)mm
19-3/16(W) x 5-3/4(H) x 15-9/16(D)in (UK. and
EUROPE)

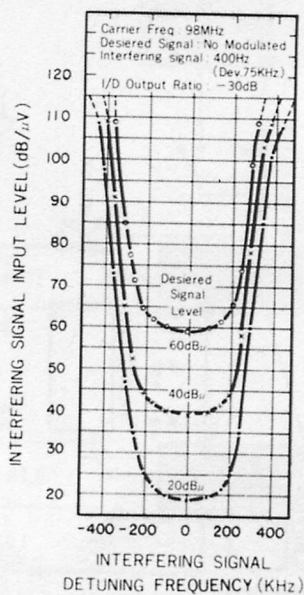
Weight

13.1kg 28.8 lbs.(US., CANADA, AUSTRALIA and
General export models)
12.2kg 26.8 lbs.(UK. and EUROPE models)

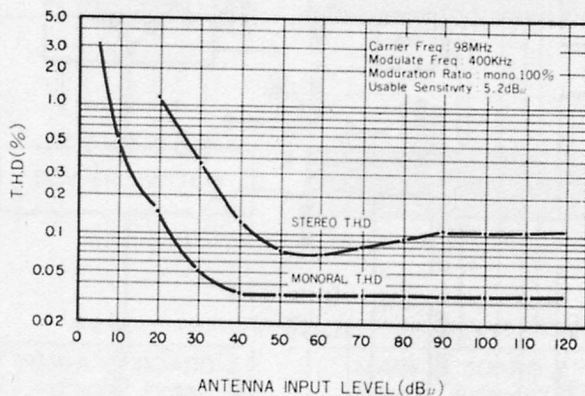
CHARACTERISTICS CHARTS

TUNER SECTION

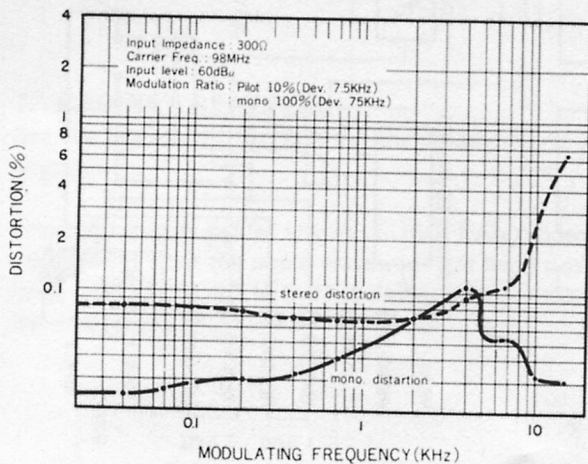
FM 2 SIGNALS EFFECTIVE SELECTIVITY



T.H.D. V. INPUT LEVEL

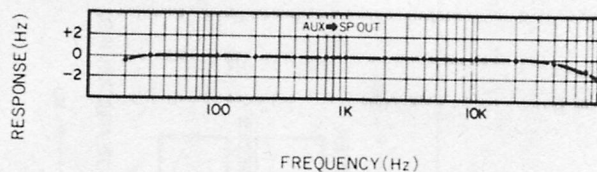


DISTORTION V. MODULATING FREQUENCY

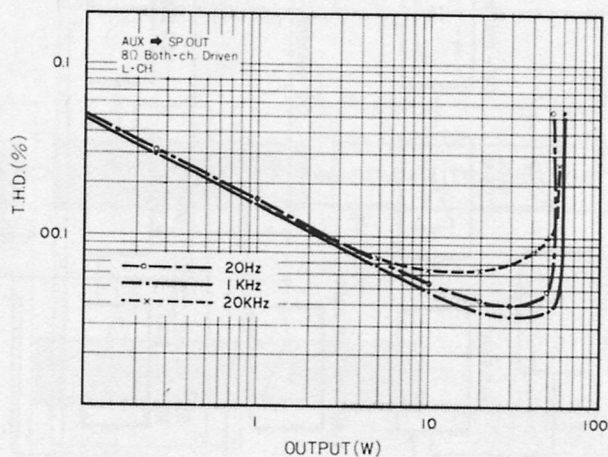


AMPLIFIER SECTION

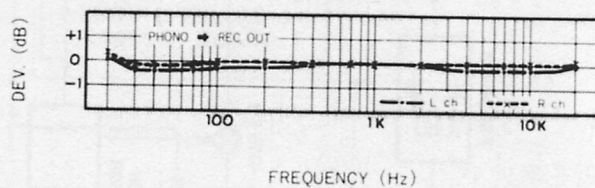
FREQUENCY RESPONSE



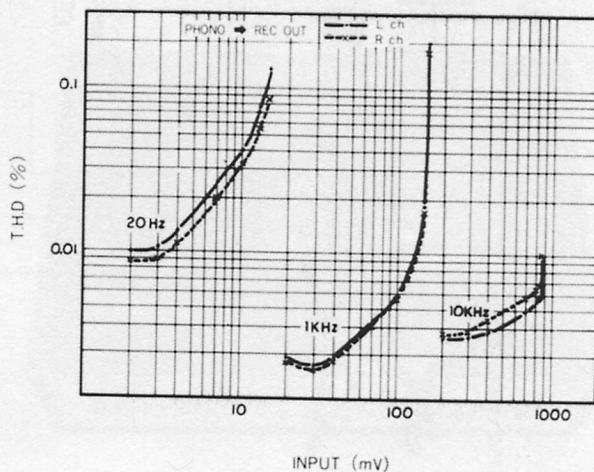
T.H.D. V. OUT PUT



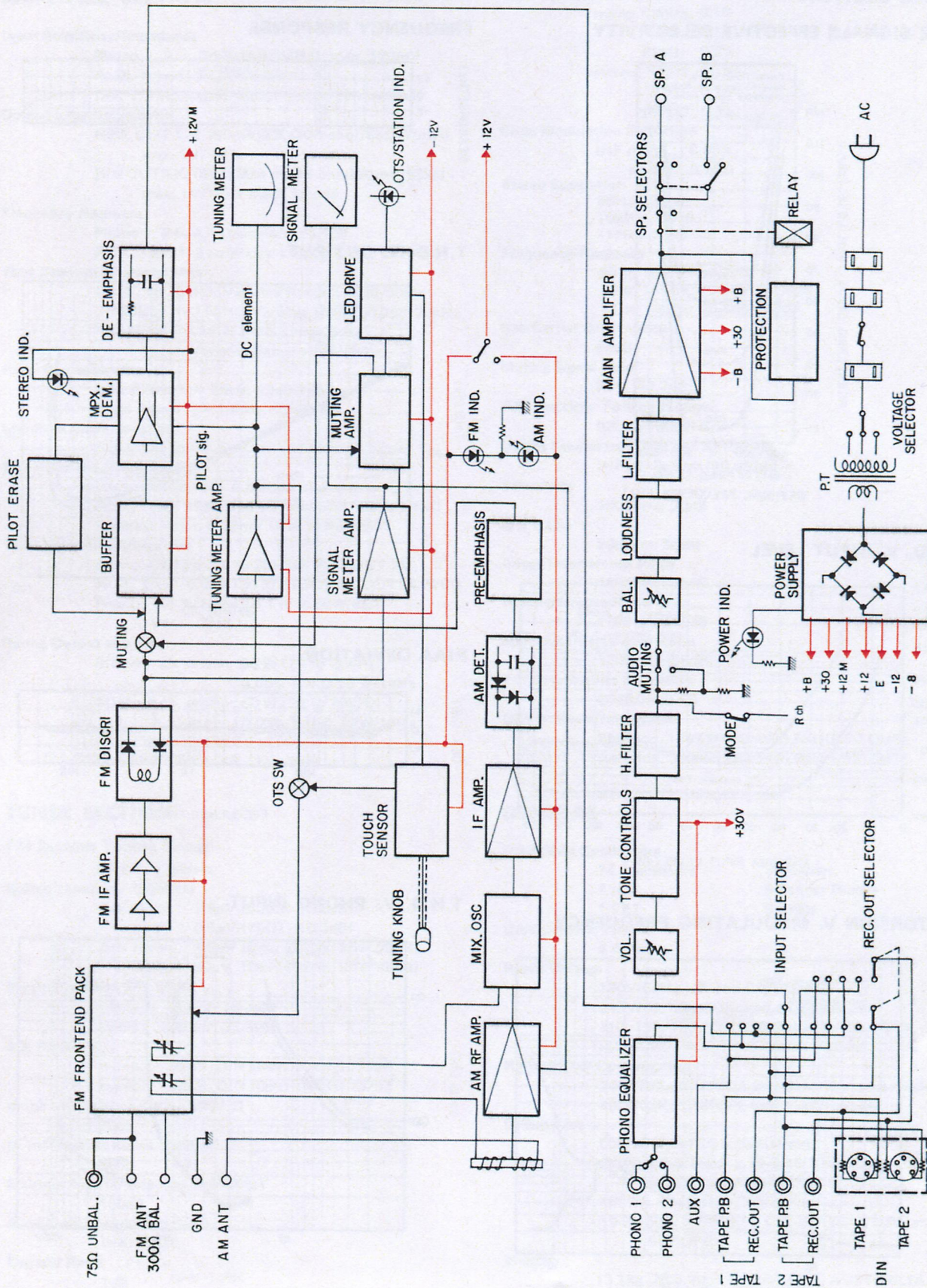
RIAA DEVIATION



T.H.D. V. PHONO INPUT

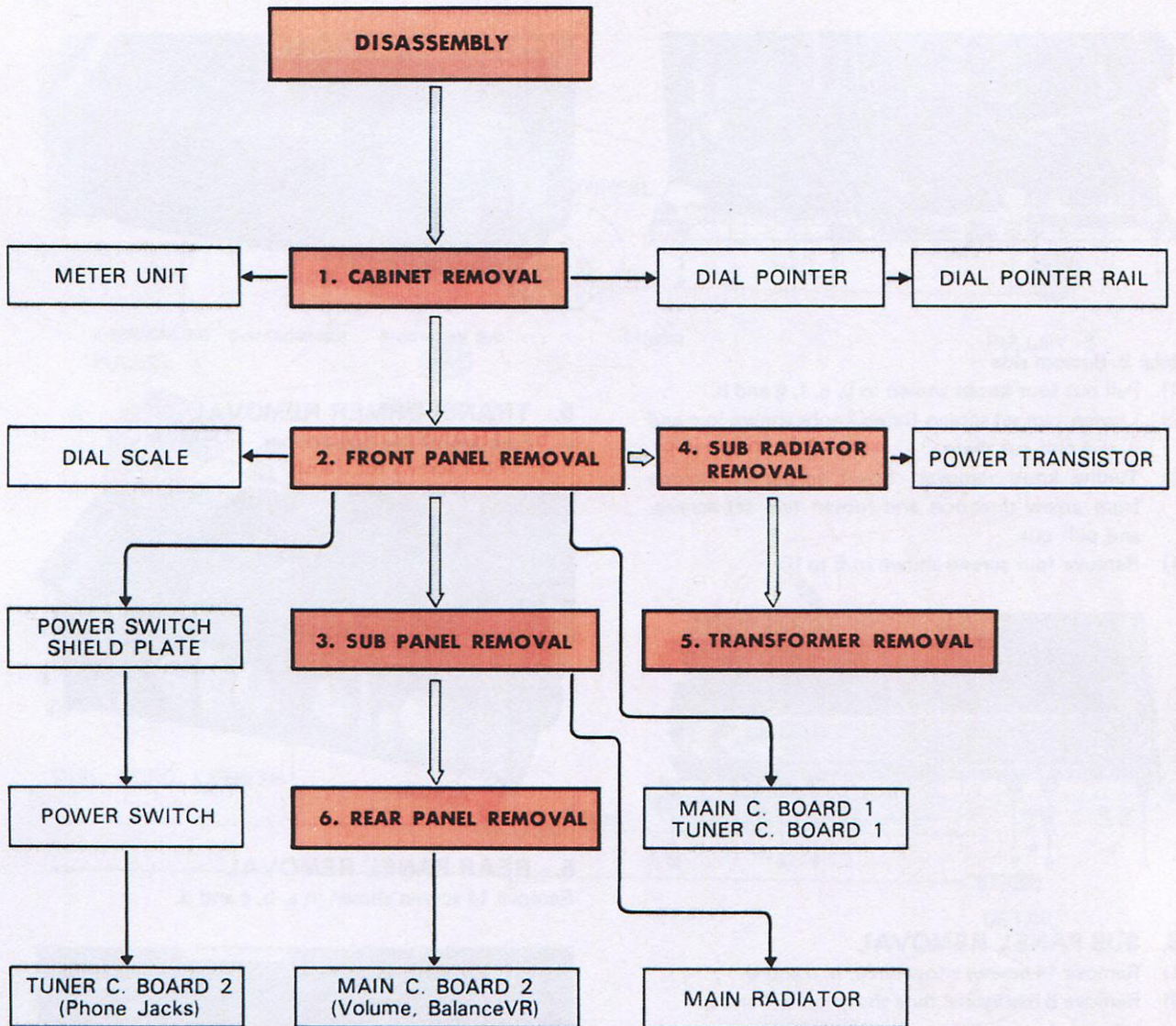


BLOCK DIAGRAM



DISASSEMBLY PROCEDURES

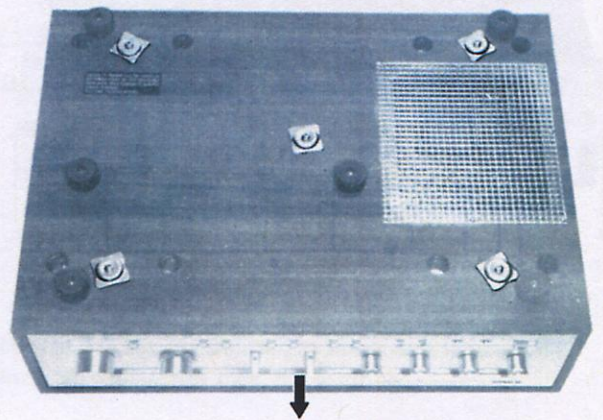
FLOW CHART



1. CABINET REMOVAL

Remove five screws then pull out the chassis in arrow direction.

Since the cabinet used for UK and EUROPEAN models are different from the photo shown in right hand side, refer to "EXPLODED VIEW" as shown in page 1 of the PARTS LIST.

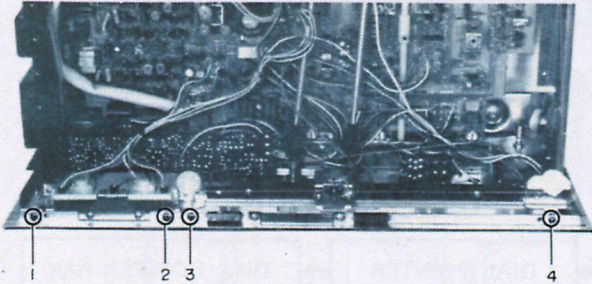


DISASSEMBLY PROCEDURES

2. FRONT PANEL REMOVAL

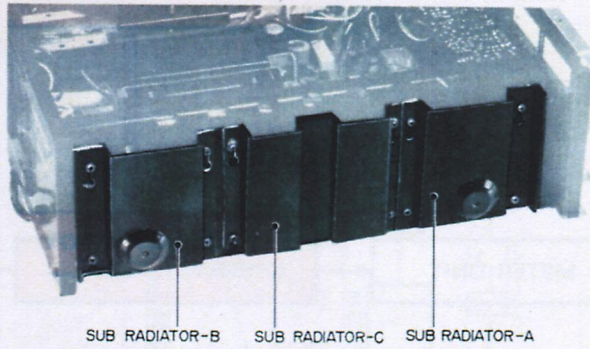
Step 1. Top side

- 1) Remove four screws shown in 1 to 4.



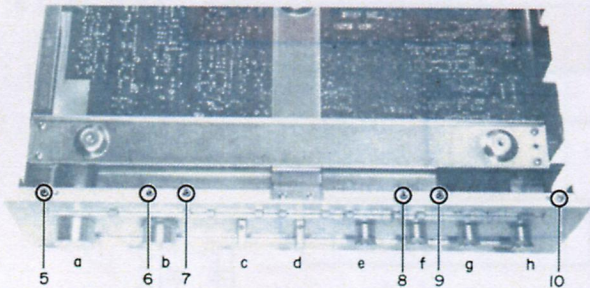
4. SUB RADIATOR REMOVAL

- Loosen 12 (4 x 3) screws then slide radiators up and remove them.



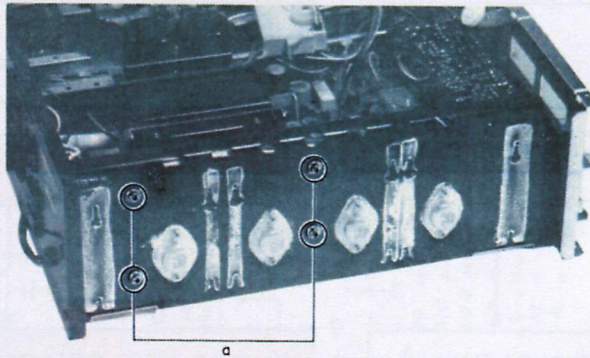
Step 2. Bottom side

- 1) Pull out four knobs shown in b, e, f, g and h.
- 2) Loosen two set screws fixing knobs shown in c and d, and pull out them.
- 3) Tuning knob removal: Insert hexagonal wrench from arrow direction and loosen two set screws, and pull out.
- 4) Remove four screws shown in 5 to 10.



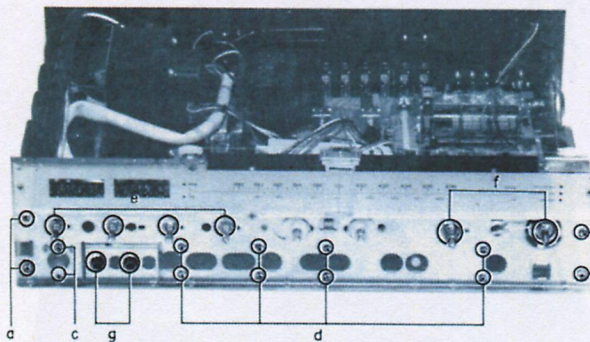
5. TRANSFORMER REMOVAL

- a: Four screws for transformer.



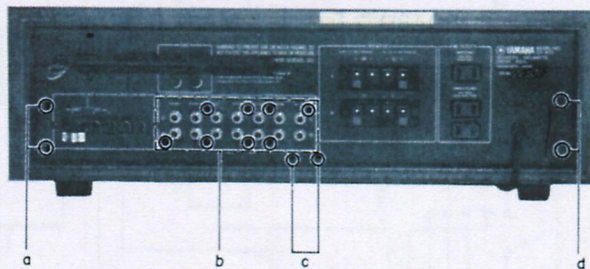
3. SUB PANEL REMOVAL

- 1) Remove 14 screws shown in a, b, c and d.
- 2) Remove 8 hexagonal nuts shown in e, f and g.



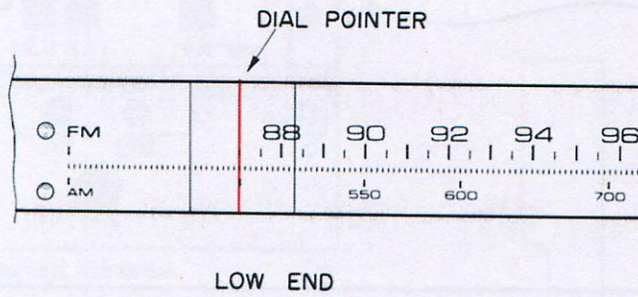
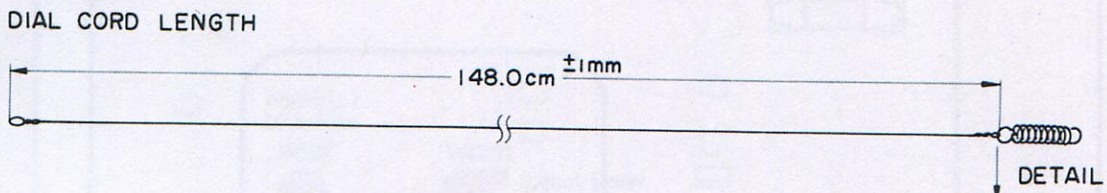
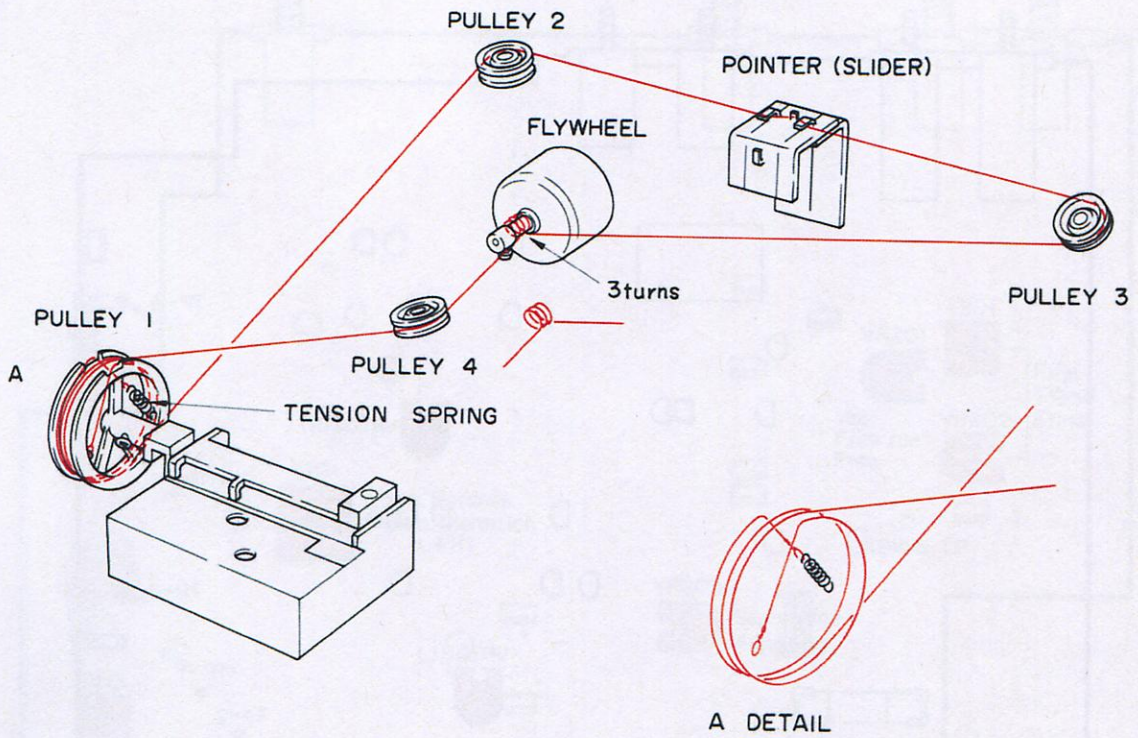
6. REAR PANEL REMOVAL

- Remove 14 screws shown in a, b, c and d.



DIAL CORD STRINGING

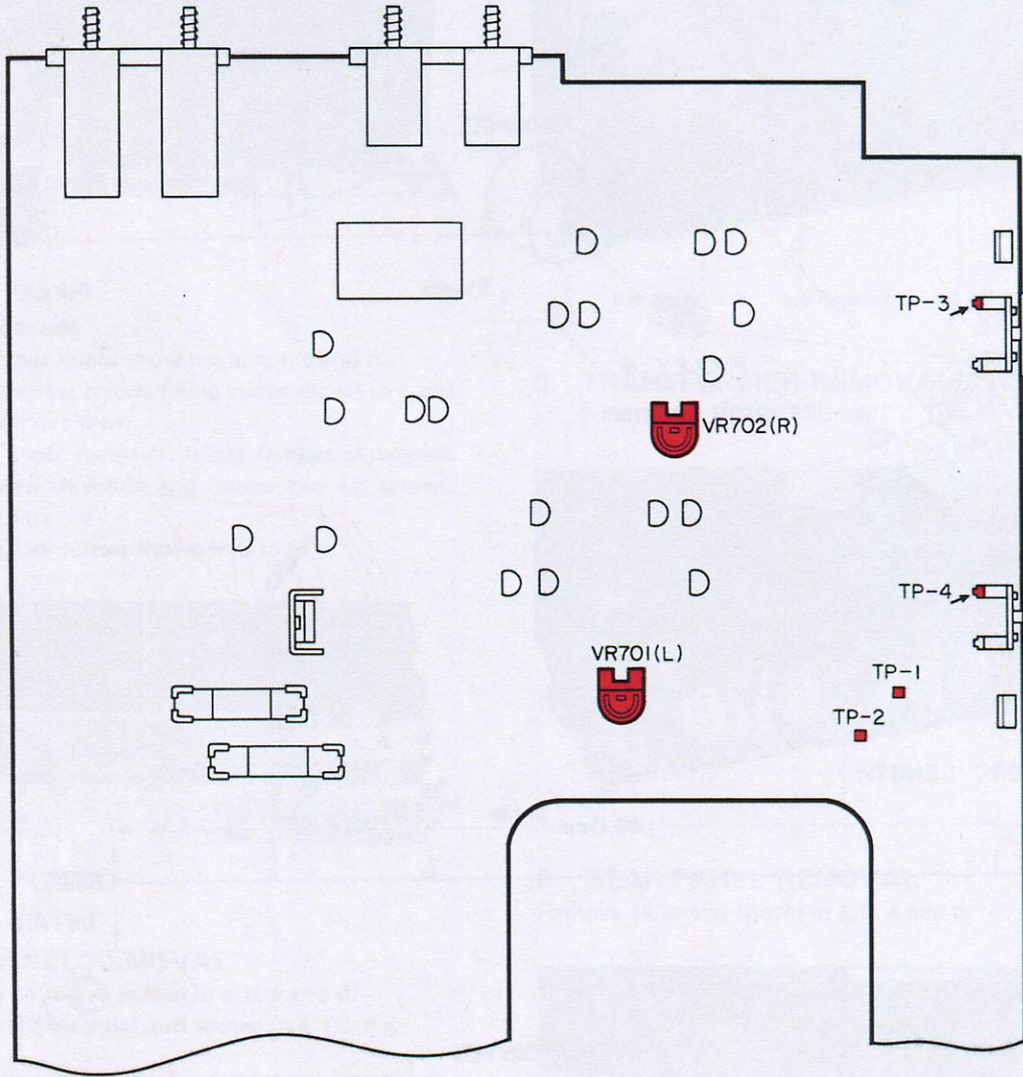
DIAL CORD STRINGING



After dial cord stringing, turn the tuning knob fully counterclockwise and set the pointer to lower end indication of the scale as illustrated above. Then hook the string to the pointer assembly and lock by painting.

ADJUSTMENT

ADJUSTING AMPLIFIER BOARD ADJUSTING POINTS

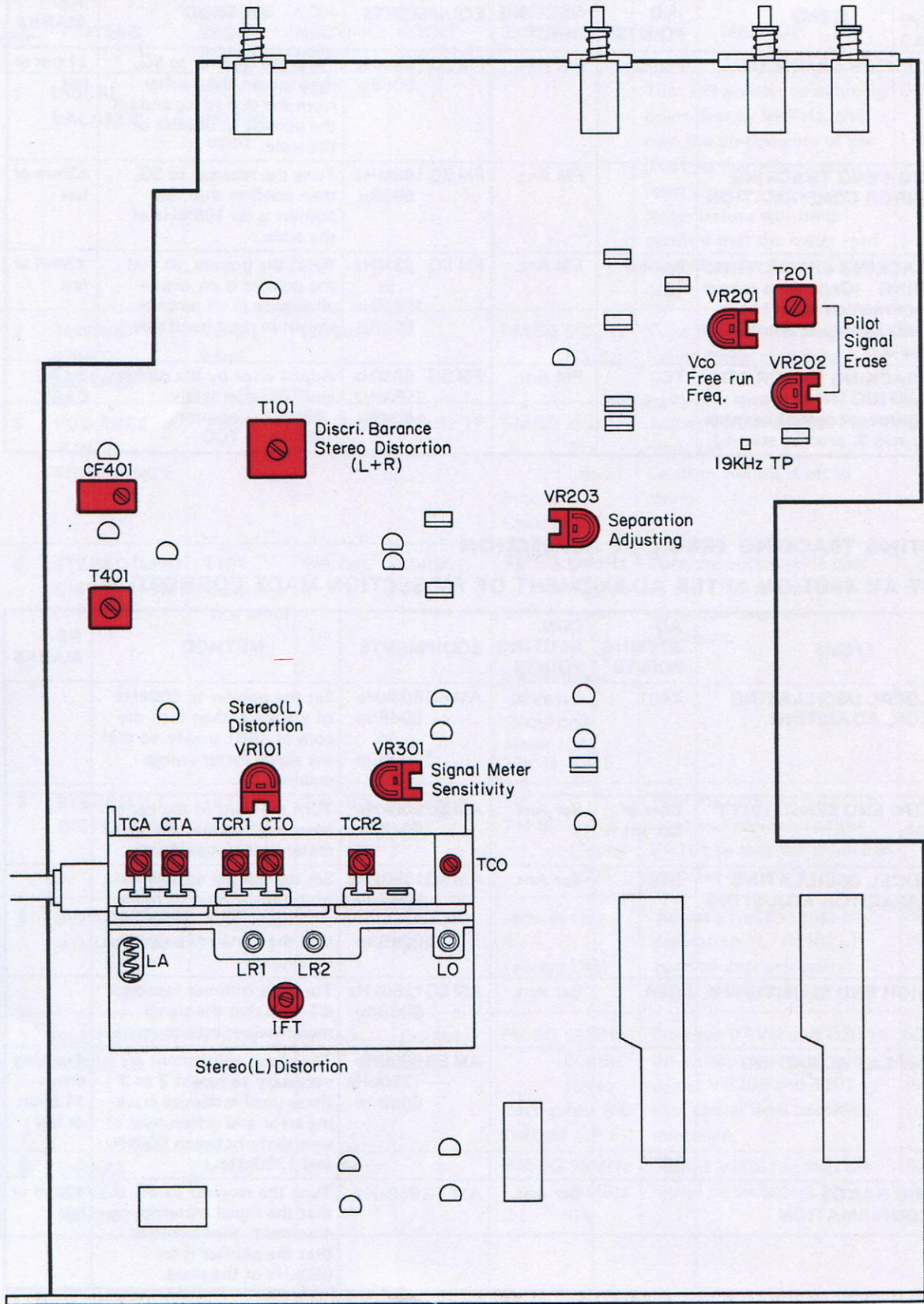


ADJUSTMENT

ITEM	ADJUSTING POINTS	CONNECTING POINTS	EQUIPMENT	METHOD	INDICATION
IDLING CURRENT	VR701(L) VR702(R)	TP1-2 TP3-4	VTVM or Desital Volt Meter	Turn VR701 and VR702, so that the voltages between TP1 and TP2, TP3 and TP4 become rated value as shown in right hand side.	$8 \pm 2\text{mV}$

ADJUSTMENT

ADJUSTING TUNER BOARD ADJUSTING POINTS



ADJUSTMENT

ADJUSTING TRACKING ERROR OF FM SECTION

Step	ITEMS	ADJUSTING POINTS	CONNECTING INPUT	EQUIPMENTS	METHOD	RE-MARKS
1	POINTER OF THE DIAL	Pointer	FM Ant.	FM SG 98MHz 60dB μ	Tune the receiver to SG, then loosen the pointer from the dial string and set the pointer to 98MHz of the scale.	± 1 mm or less
2	HIGH END TRACKING ERROR CONFIRMATION		FM Ant.	FM SG 108MHz 60dB μ	Tune the receiver to SG, then confirm that the pointer is on 108MHz of the scale.	± 2 mm or less
3	TRACKING ERROR TRIMMING (Only when proper confirmation cannot be made by step 2, proceed step 3.)	Pointer	FM Ant.	FM SG 88MHz to 108MHz 60dB μ	Reset the pointer, so that the pointer is on within allowance in all range as shown in right hand side.	± 2 mm or less
4	TRACKING ERROR ADJUSTING (When proper adjustment cannot be made by step 3, proceed step 4.)	TCO (Pack)	FM Ant.	FM SG 98MHz 108MHz 60dB μ	Adjust error by the pointer and TCO alternately. 98MHz – pointer 108MHz – TCO	RARE CASE

ADJUSTING TRACKING ERROR OF AM SECTION

ADJUST AM SECTION AFTER ADJUSTMENT OF FM SECTION MADE CORRECTLY.

Step	ITEMS	ADJUSTING POINTS	CONNECTING POINTS	EQUIPMENTS	METHOD	RE-MARKS
1	LOCAL OSCILLATING COIL ADJUSTING	T401	Bar Ant.	AM SG 600kHz 80dB/m to 100dB/m	Set the pointer to 600kHz of the scale, then turn the core of T401 slowly, so that the signal meter swings maximum.	
2	LOW END SENSITIVITY	Core of bar ant.	Bar Ant.	AM SG 600kHz 60dB/m	Turn the cord of the bar antenna coil, so that the signal meter swings maximum.	
3	LOCAL OSCILLATING CAPACITOR ADJUSTING	CTO	Bar Ant.	AM SG 1350kHz 80dB/m to 100dB/m	Set the pointer to 1350kHz of the scale, then turn the trimmer capacitor CTO, so that the signal meter swings maximum.	
4	HIGH END SENSITIVITY	CTA	Bar Ant.	AM SG 1350kHz 60dB/m	Turn the trimmer capacitor CTA, so that the signal meter swings maximum.	
5	REPEAT ADJUSTING			AM SG 600kHz 1350kHz 60dB/m	The above adjustment are necessary to repeat 2 to 3 times until minimize tracking error and differential of sensitivity between 600kHz and 1350kHz.	Tracking error: ± 1.5 mm or less
6	MID RANGE CONFIRMATION		Bar Ant.	AM SG 950kHz	Tune the receiver to SG, so that the signal meter swings maximum, then confirm that the pointer is on 950kHz of the scale.	± 2 mm or less

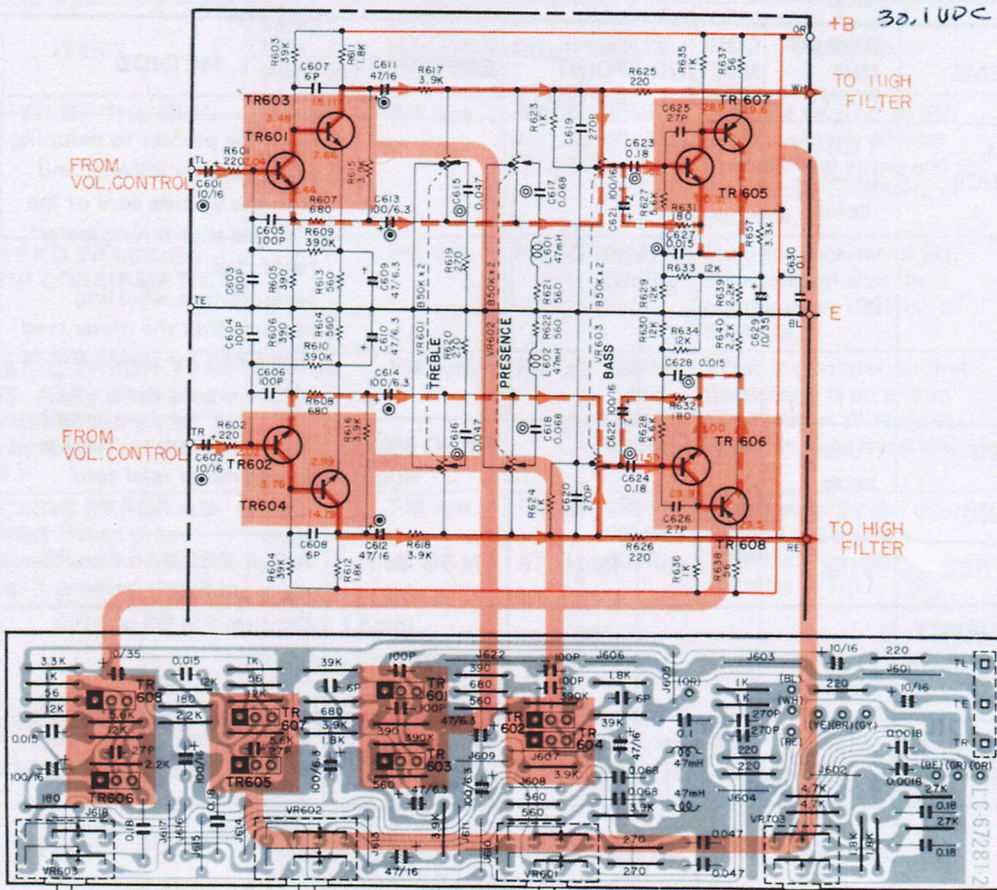
ADJUSTMENT

ADJUSTING TUNER CIRCUIT BOARD

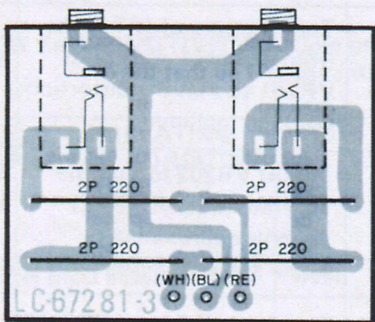
Step	ITEMS	ADJUSTING POINT	CONNECTING INPUT	POINT OUTPUT	EQUIPMENT	METHOD	INDICATION
1	DISCRI. BALANCE	T101 (up-side core)	FM Ant.			Turn the pointer to detuning point near by 98MHz, and turn the up-side core of the T101 so that tuning meter reads zero. Note: Before adjusting confirm that the meter read zero when the power SW. is off.	0(zero)
2	TUNING POINT SETTING	Tuning knob	FM Ant.		FM SG 98MHz 60dB μ	Tune the knob so that the tuning meter read zero.	0(zero)
3	VCO FREE RUN FREQUENCY	VR201	FM Ant.	19kHz TP	FM SG -do.- 0% (mod.) Frequency Counter (FC.)	Adjust VR201 so that FC. reads 19kHz. Confirm FM SG is set to mono.	19kHz \pm 20Hz
4	STEREO (L+R) DISTORTION	T101 (bottom-side core)	FM Ant.	Output (L)	FM SG 98MHz 60dB μ L+R stereo 1kHz 100% Oscilloscope VTVM Distortion Meter (DM.) 17kHz L.P.F.	Turn the bottom-side core of the T101 so that the distortion becomes minimum.	-58dB or less
5	STEREO (L) DISTORTION	IFT VR101	FM Ant.	Output (L)	-do.- FM SG stereo L only 100%	Turn the core of IFT in the front end pack and adjust VR101 so that the distortion becomes minimum.	-52dB or less
6	SEPARATION ADJUSTING	VR203	FM Ant.	Output (L, R)	same as step 4 (except DM)	Adjust VR202 so that the separation, (L- R) (R- L) become approximately equal and maximum.	30dB or more
7	PILOT SIGNAL ERASE	VR202 T201	FM Ant.	Output (L, R)	FM SG 98MHz 60dB μ stereo (MD) pilot: 9% (except L.P.F.)	Connect VTVM and OSC to the Output terminal, and adjust VR202 and T201 so that carrier level becomes minimum.	60dB or more (both ch.)
8	SIGNAL METER SENSITIVITY	VR301	FM Ant.		FM SG 98MHz 80dB μ 0%	Adjust VR301 so that the signal meter swings 90.	90

CIRCUIT BOARDS

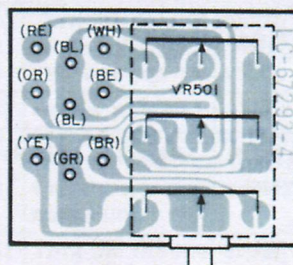
MAIN C. BOARD 2 (Tone Control)



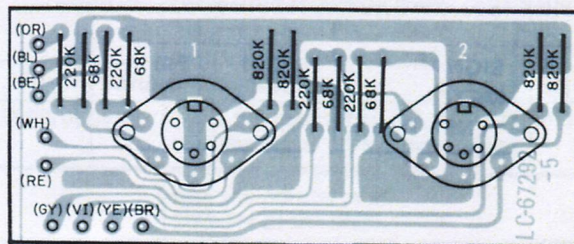
MAIN C. BOARD 3 (Phones)



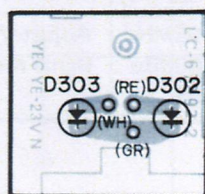
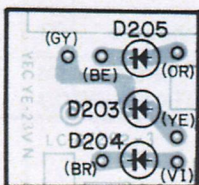
TUNER C. BOARD 2 (Volume)



TUNER C. BOARD 5 (Only for European models)



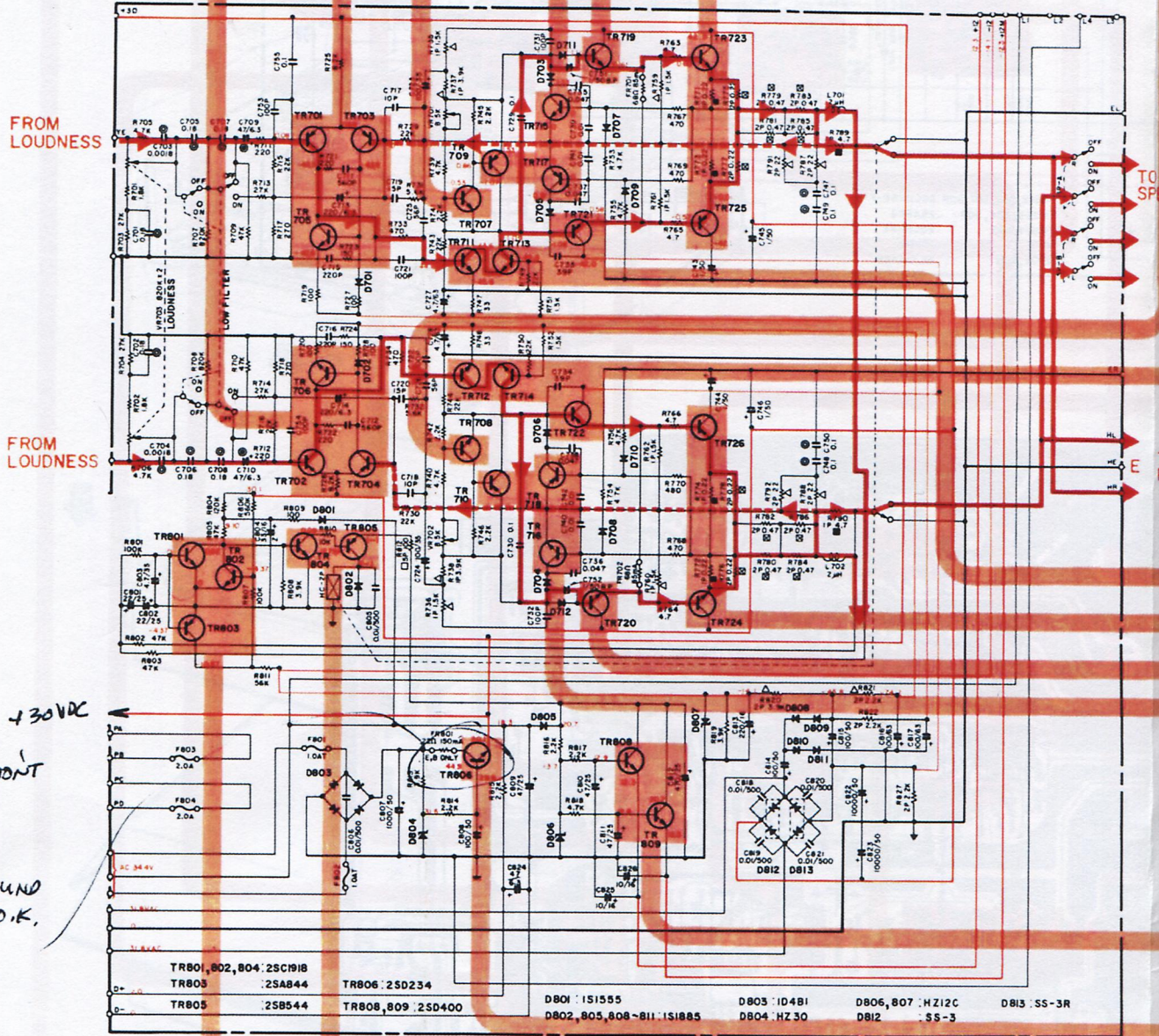
TUNER C. BOARD 3 TUNER C. BOARD 4



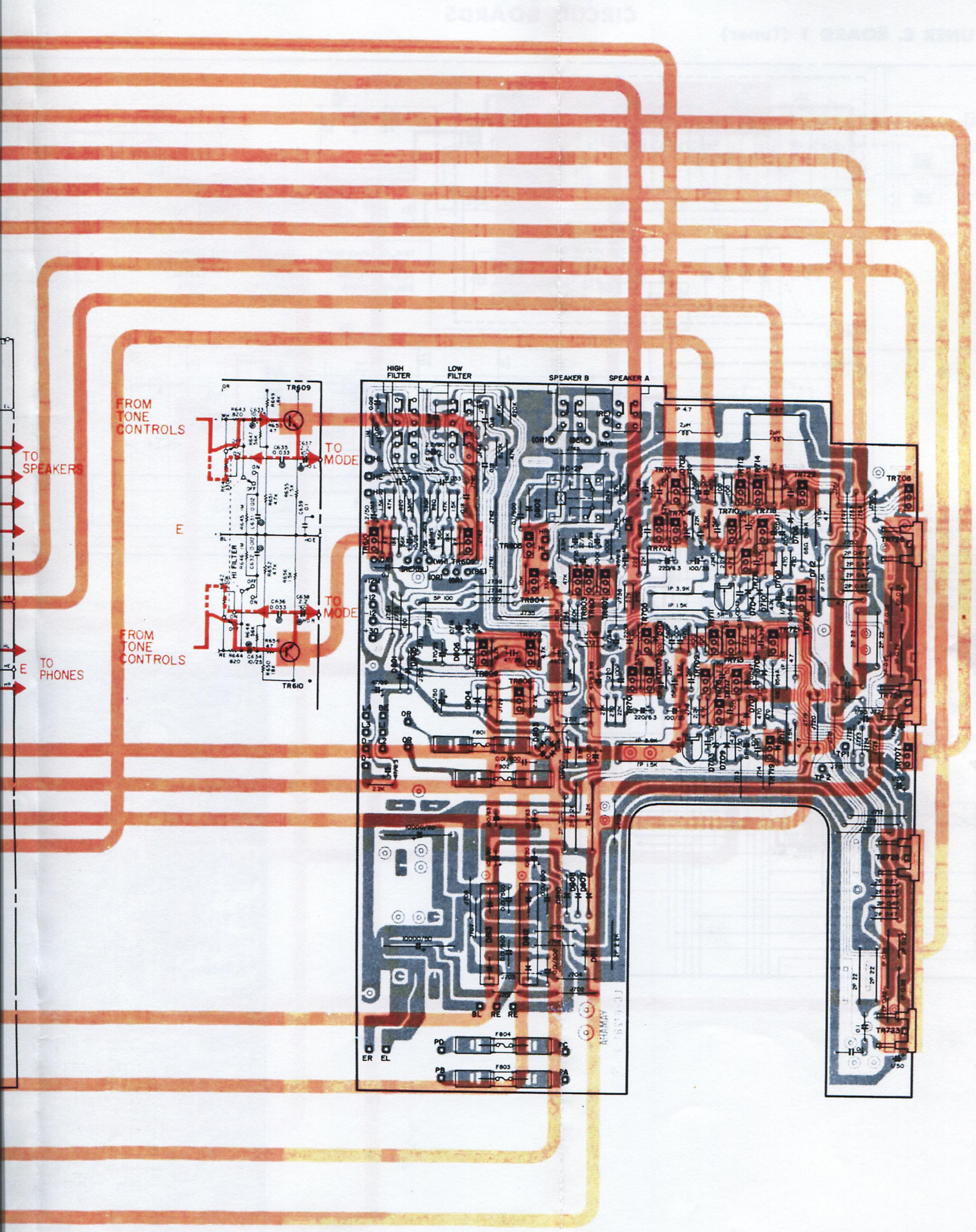
Printed circuit boards of this page are shown as view from pattern side.

CIRCUIT BOARDS

MAIN C. BOARD 1 (Amplifier)

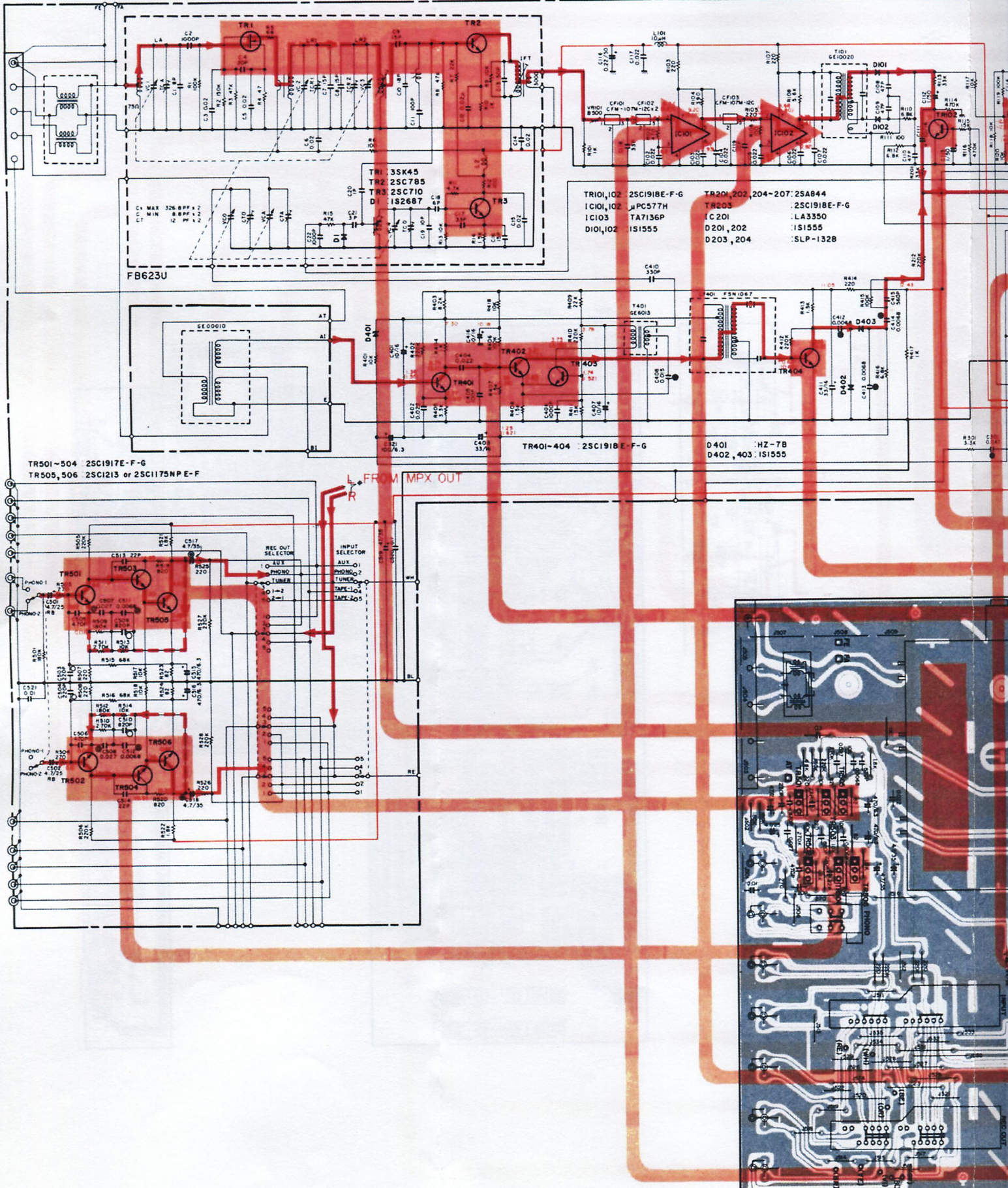


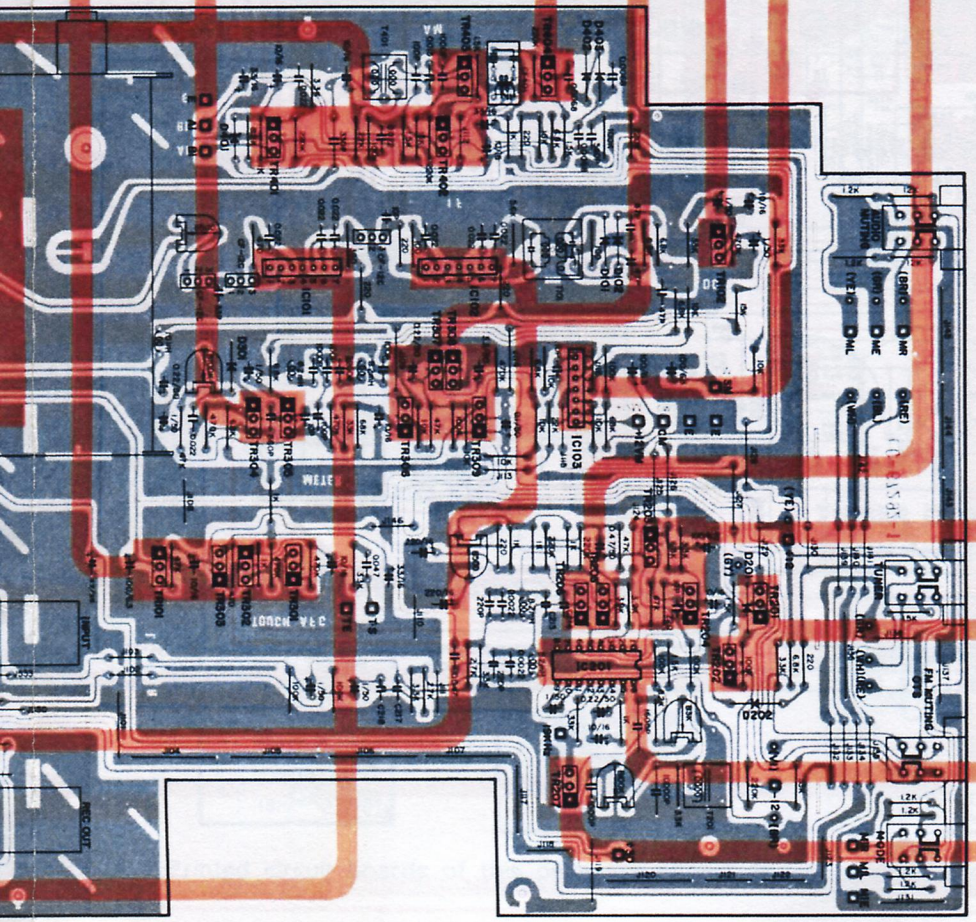
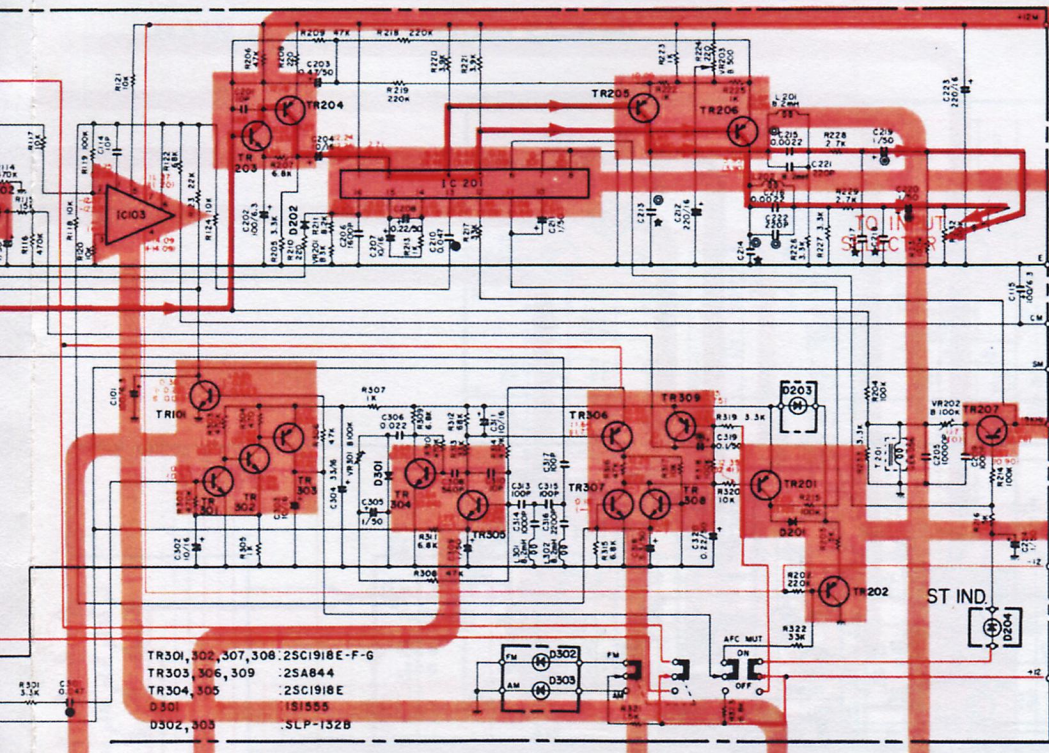
PROTECTION RELAY WON'T
ENERGIZE!
DIAC METER
LITES BUT NO SOUND
OUT - OP SECTION O.K.
BAD REGULATOR
TR 806



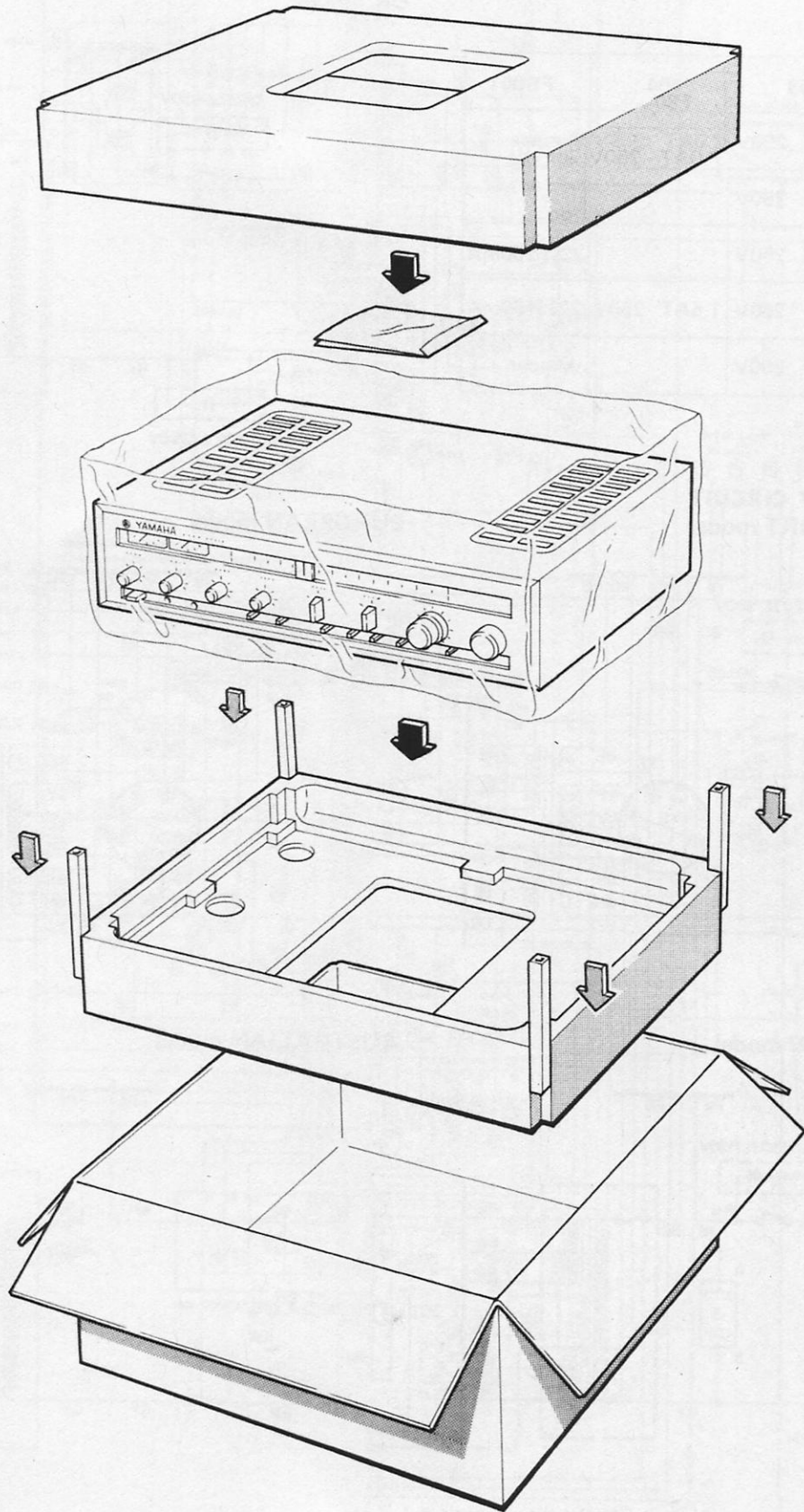
CIRCUIT BOARDS

TUNER C. BOARD 1 (Tuner)





PACKAGE

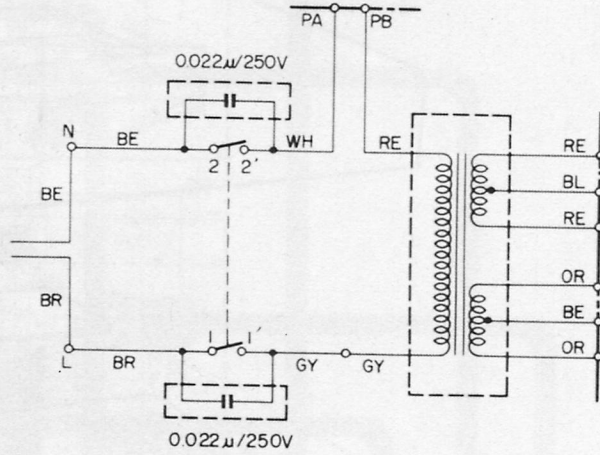


SCHEMATIC DIAGRAM BY EXPORT ZONE

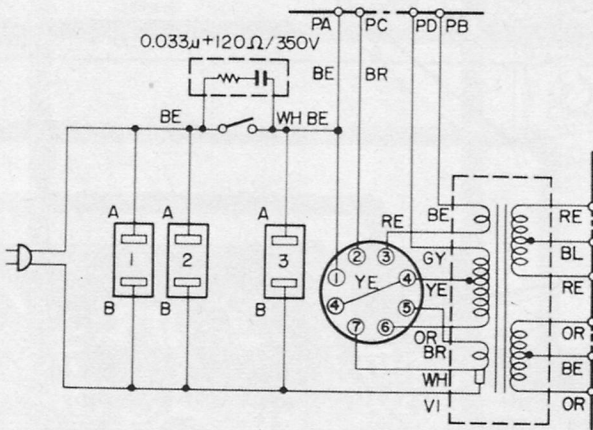
USED FUSE

MODEL	F803	F804	FR801
GENERAL	2.0AT 250V	2.0AT 250V	Jumper
US & CANADIAN	4.0A 250V		-do.-
UK	1.6AT 250V		22Ω 150mA
EUROPEAN	1.6AT 250V	1.6AT 250V	22Ω 150mA
AUSTRALIAN	2.0AT 250V		Jumper

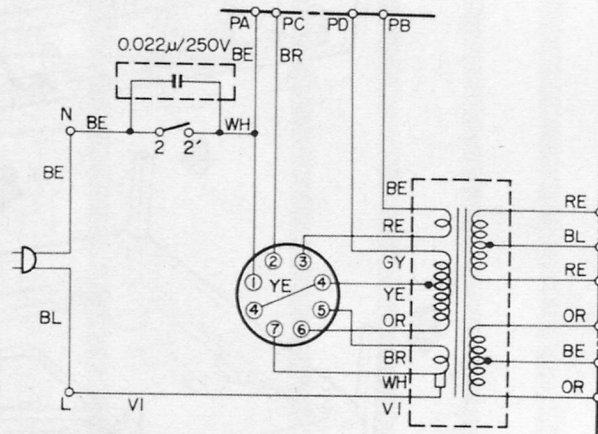
UK model



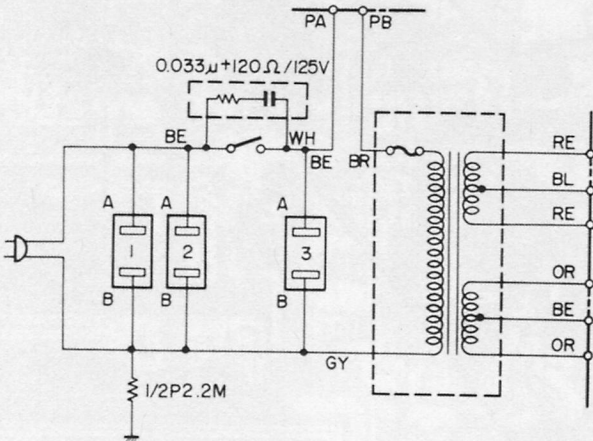
POWER SUPPLY CIRCUIT GENERAL EXPORT model



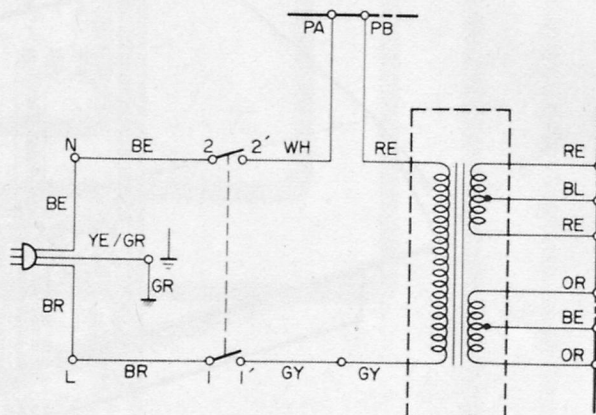
EUROPEAN model



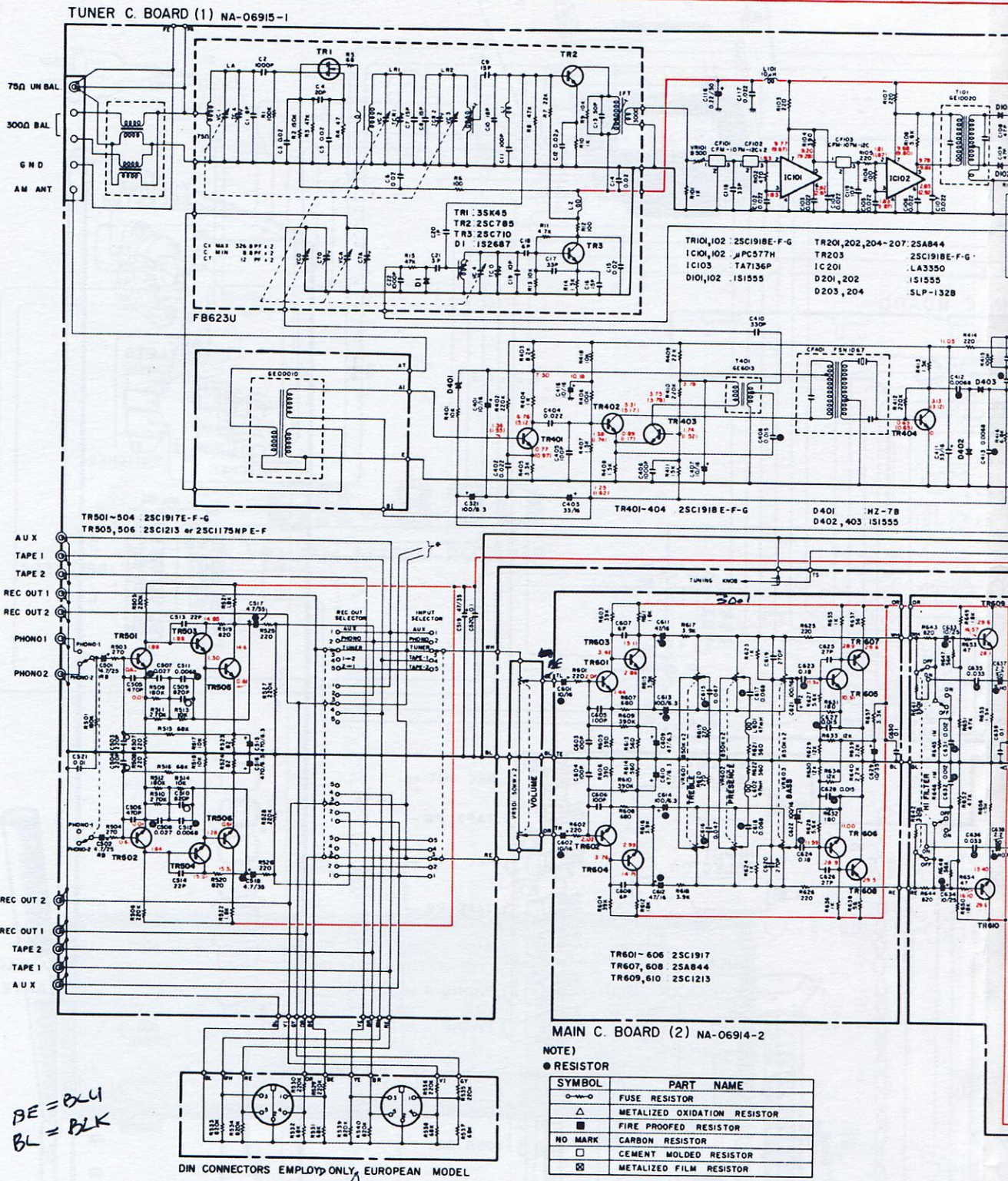
US & CANADIAN model



AUSTRALIAN model



SCHEMATIC DIAGRAM



BE = BLU
BL = BLK

TR101,102 25C1918E-F-G
IC101,102 PC577H
IC103 TA7136P
D101,102 IS1555

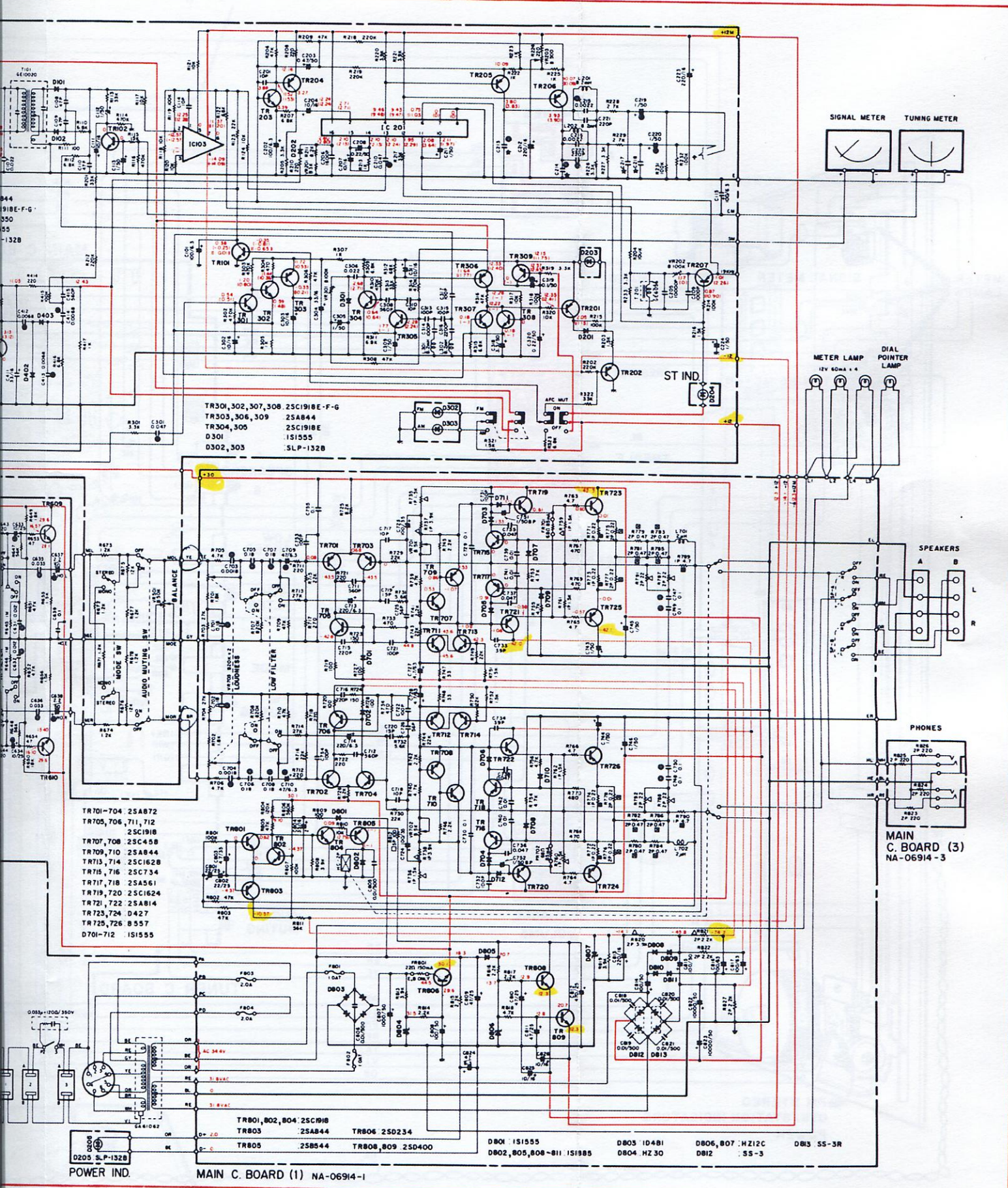
TR201,202,204-207 25A844
TR203 25C1918E-F-G
IC201 LA3350
D201,202 IS1555
D203,204 SLP-1328

TR501-504 25C1917E-F-G
TR505,506 25C1213 or 25C1175NPE-F

TR601-606 25C1917
TR607,608 25A844
TR609,610 25C1213

TR401-404 25C1918E-F-G

D401 HZ-78
D402,403 IS1555



TR301, 302, 307, 308 25C1918E-F-G
 TR303, 306, 309 25A844
 TR304, 305 25C1918E
 D301 1S1555
 D302, 303 SLP-132B

TR701-704 25A872
 TR705, 706, 711, 712 25C1918
 TR707, 708 25C458B
 TR709, 710 25A844
 TR713, 714 25C162B
 TR715, 716 25C734
 TR717, 718 25A561
 TR719, 720 25C1624
 TR721, 722 25A814
 TR723, 724 D427
 TR725, 726 B557
 D701-712 1S1555

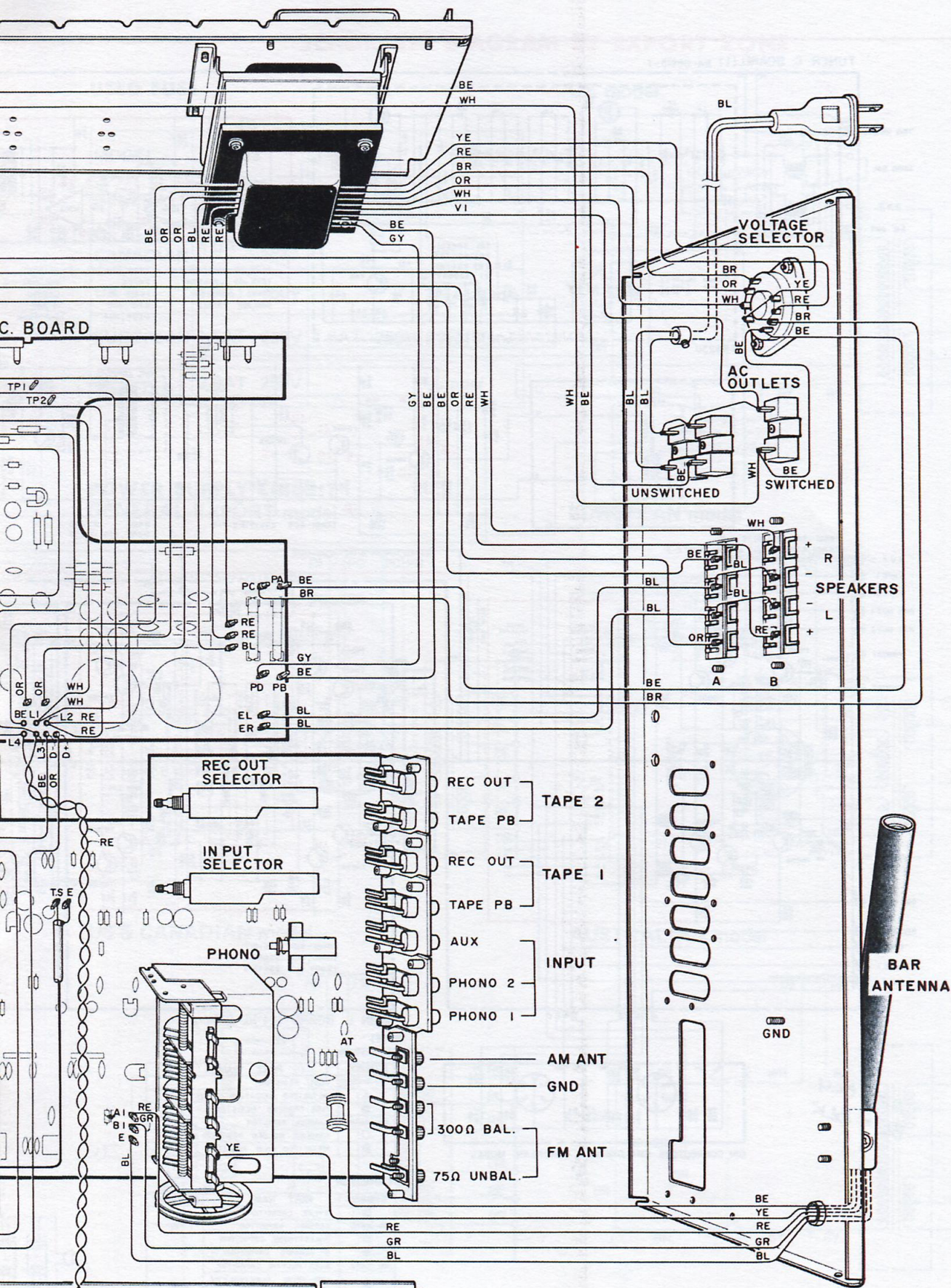
TR801, 802, 804 25C1918
 TR803 25A844
 TR805 25B544
 TR806 25D234
 TR808, 809 25D400

D801 1S1555
 D802, 805, 808-811 1S1985
 D803 1D481
 D804 HZ 30
 D806, 807 HZ12C
 D812 SS-3
 D813 SS-3R

POWER IND.

MAIN C. BOARD (1) NA-06914-1

MAIN C. BOARD (3) NA-06914-3



BL BLACK	GR GREEN
BR BROWN	BE BLUE
RE RED	VI VIOLET
OR ORANGE	GY GRAY
YE YELLOW	WH WHITE

WIRING

