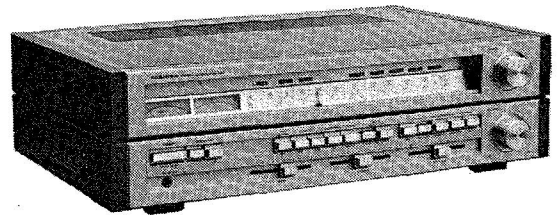


TOSHIBA

AM/FM STEREO RECEIVER

SA-520



SPECIFICATIONS

■ SEMICONDUCTORS

FETs	: 6
IC's	: 2
Transistors	: 42
Diodes	: 24
Zener Diodes	: 3

■ AMPLIFIER SECTION

Power Output

40 watts per channel, min. RMS. at 4 ohms from
20 Hz to 20 KHz.

35 watts per channel, min. RMS. at 8 ohms from
20 Hz to 20 KHz.

20 watts per channel, min. RMS. at 16 ohms from
20 Hz to 20 KHz.

With no more than 0.4% total harmonic distortion.

Continuous Power Output

1 KHz (Both channels driven)	40W + 40W 8 ohm
	50W + 50W 4 ohm

Total Harmonic Distortion

20 Hz ~ 20 KHz Continuous Power Output	Less than 0.4%
1W + 1W Power Output	Less than 0.05%

Intermodulation Distortion

Continuous Power Output	Less than 0.4%
1W + 1W Power Output	Less than 0.05%

Power Bandwidth (IHF Both channels driven): 5 Hz ~ 60 kHz (THD 0.4%)

Output Speaker: A, B, A + B (4 ~ 16 ohm)

Frequency Response: 10 ~ 50 ±1 dB

Input Sensitivity/Impedance: 1.5 V/30K ohm

MAIN IN

Damping Factor (1 KHz, 8 ohm): More than 45

Residual Noise (8 ohm through Per & Power Amplifier): Less than 1 mV

Input Sensitivity/Impedance

PHONO 1:	2.5 mV/47K ohm
PHONO 2:	2.5 mV/47K ohm

PHONO Overload Level (rms): 150 mV

AUX: 150 mV/50K ohm

TAPE PLAY 1, 2: 150 mV/50K ohm

TAPE PLAY 2 (DIN connector): 150 mV/50K ohm

Output Level

TAPE REC. 1, 2: 150 mV

TAPE REC. 2 (DIN connector): 30 mV

Frequency Response

PHONO (RIAA equalization): 30 Hz ~ 15 kHz ±1 dB

AUX, TAPE PLAY: 20 Hz ~ 40 kHz ±1 dB

Tone Control

BASS: ±10 dB (100 Hz)

TREBLE: ±10 dB (10 kHz)

Tone Filter

High cut Filter: -3 (50 Hz) 6 dB/oct

Low cut Filter: -3 (8 kHz) 6 dB/oct

Loudness Control: +8.5 dB (100 Hz)

(Volume control set at -40 dB position): +3.5 dB (10 kHz)

S/N (IHF short-circuited, A net work)

PHONO: More than 70 dB

AUX TAPE PLAY: More than 90 dB

■ FM SECTION

Receiving Frequency: 88 ~ 108 MHz

Usable Sensitivity (IHF): 1.8µV

Capture Ratio (IHF): 1.0 dB

Selectivity (IHF): 65 dB

S/N: 70 dB (MONO)

65 dB (STEREO)

Image Rejection (98 MHz): 80 dB

IF Rejection (98 MHz): 100 dB

Spurious Rejection: 100 dB

AM Suppression: 55 dB

Harmonic Distortion MONO: Less than 0.2%

STEREO: Less than 0.4%

Frequency Response: 20 Hz ~ 15 kHz

+0.2, -2.0 dB

Stereo Separation 1 kHz: More than 40 dB

50 Hz ~ 10 kHz: More than 30 dB

Sub-carrier Suppression: 40 dB

Antenna Inputs: 300 ohm Balanced

75 ohm Unbalanced

FM Muting: ON - OFF

■ AM SECTION

Receiving Frequency: 525 ~ 1605 kHz

Sensitivity (IHF, Ferrite antenna): 200µV/m

(IHF, Ext. antenna): 15µV

Selectivity: 35 dB

S/N: 50 dB

Image Rejection: 60 dB

IF Rejection: 65 dB

■ MISCELLANEOUS

Power Requirement: AC 120 V 60 Hz or 220/240 V ~ 50 Hz

Power Consumption: 190W (AC 120 V 60 Hz),

310W (220/240 V ~ 50 Hz)

Dimensions: 530(W) x 163(H) x 435(D) (mm)

Weight (body): 17 Kg

■ FURNISHED PARTS

FM T-type Antenna: 1

Owner's Guidebook: 1

Note:

Specifications and design subject to change without notice due to continuing improvements.

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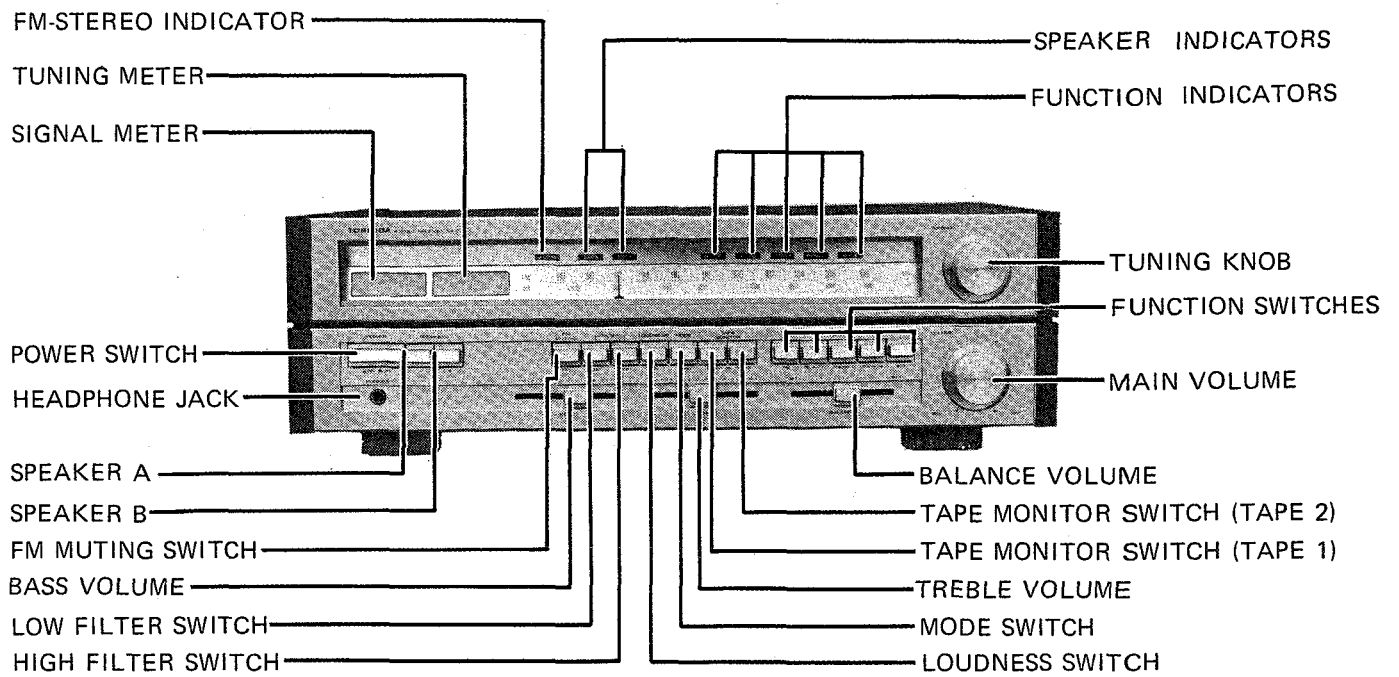
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FEATURES

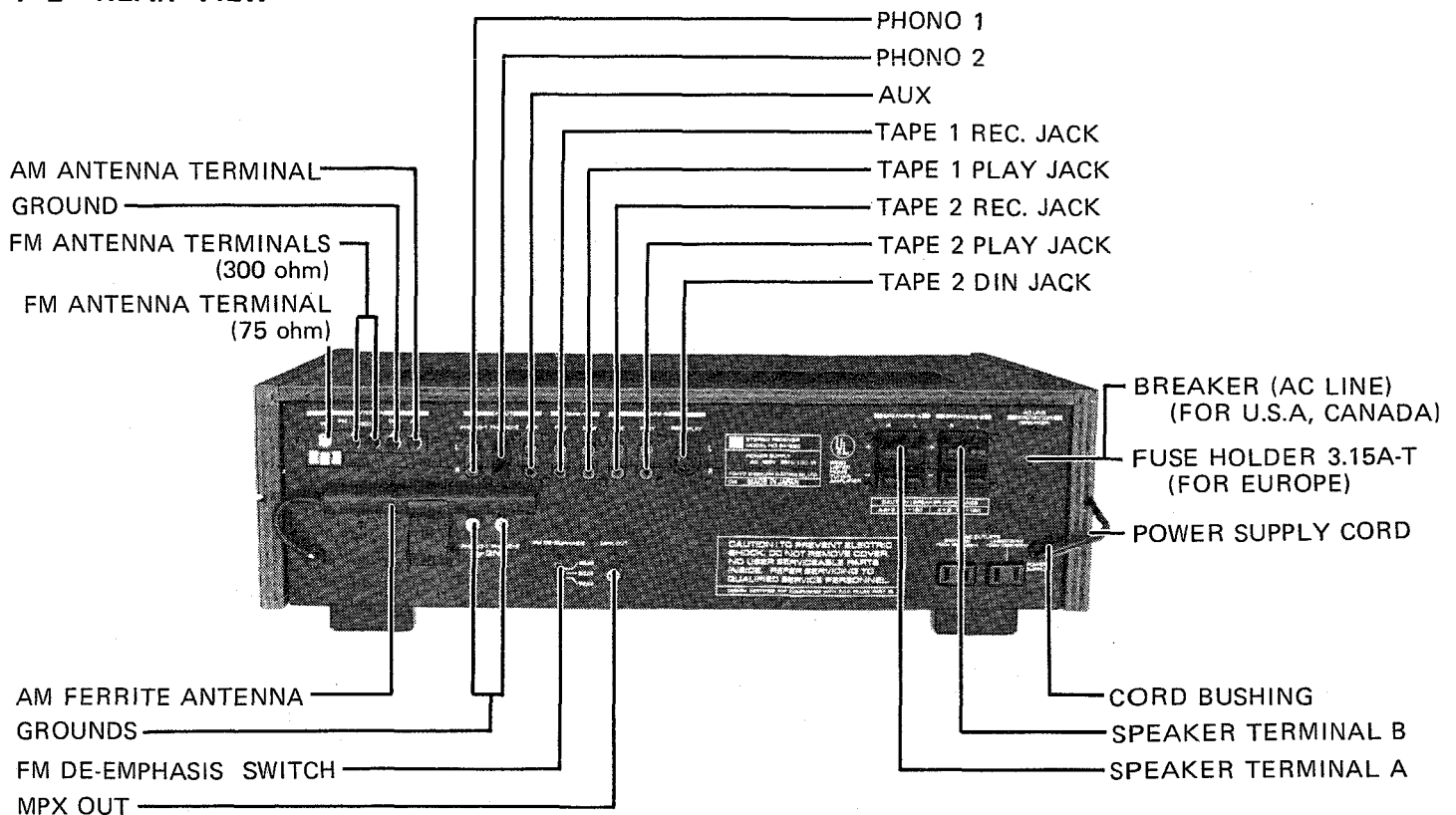
1. Automatic Reset Protective Circuit (Speaker Protection, Power Transistor Protection)
2. Totally Direct-connected Pure Complementary OCL Power Amplifier
3. FM Front-end using FET and Four-variable Capacitors
4. Wide Scale Dial (FM Frequency Linear Type)
5. FM De-emphasis Built-in Change-over Switch
6. 22-Step Detent Volume

1. OPERATING CONTROLS

1-1 FRONT VIEW

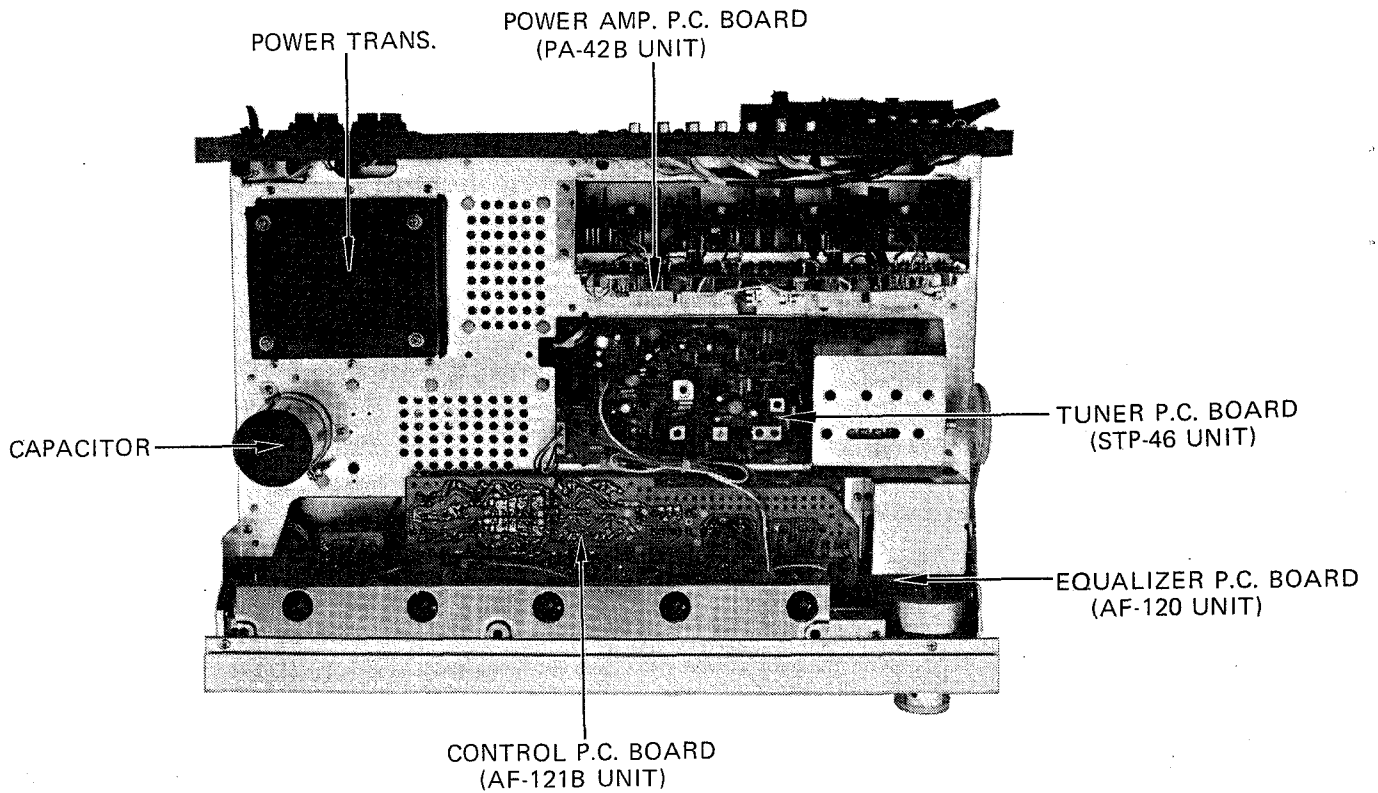


1-2 REAR VIEW

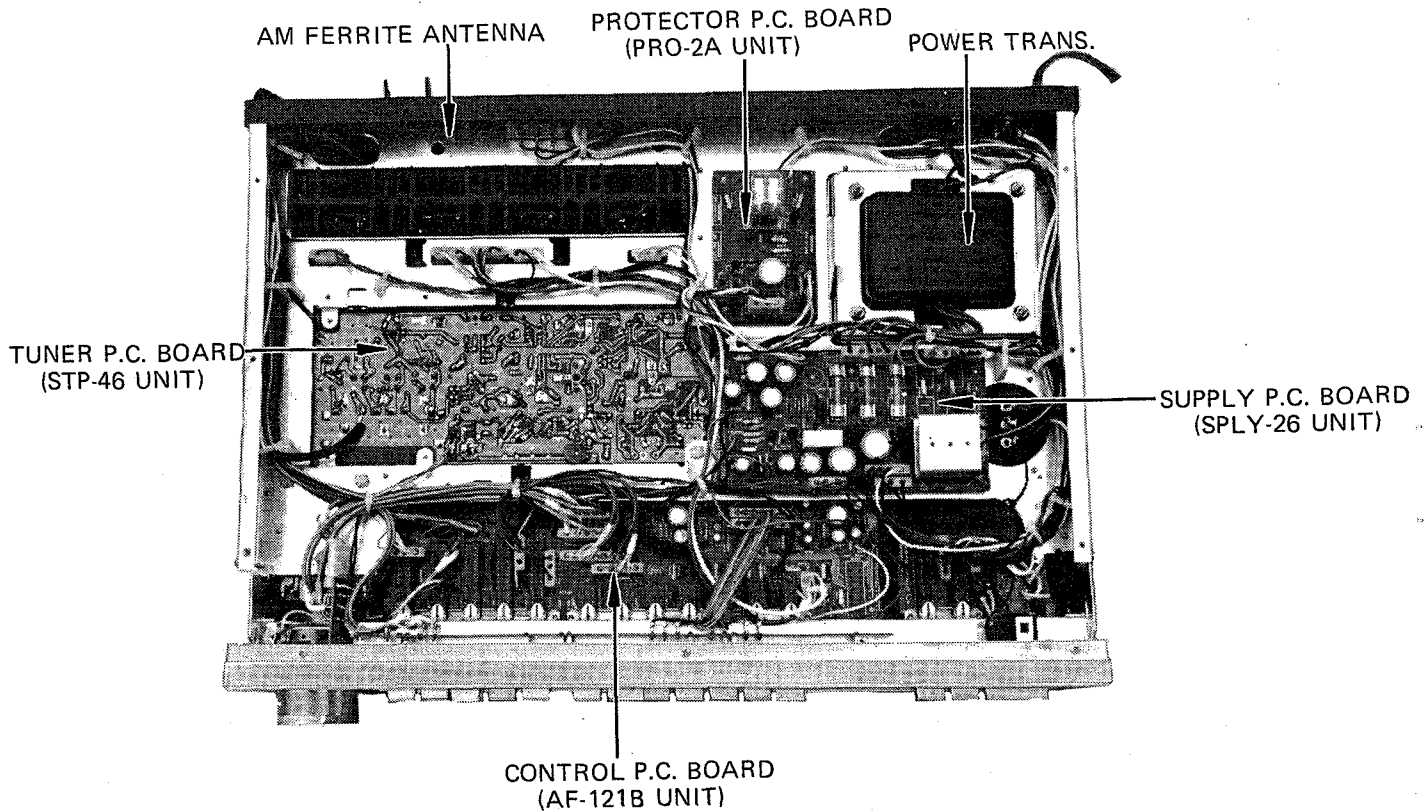


2. PARTS LOCATIONS

2-1 CHASSIS TOP VIEW



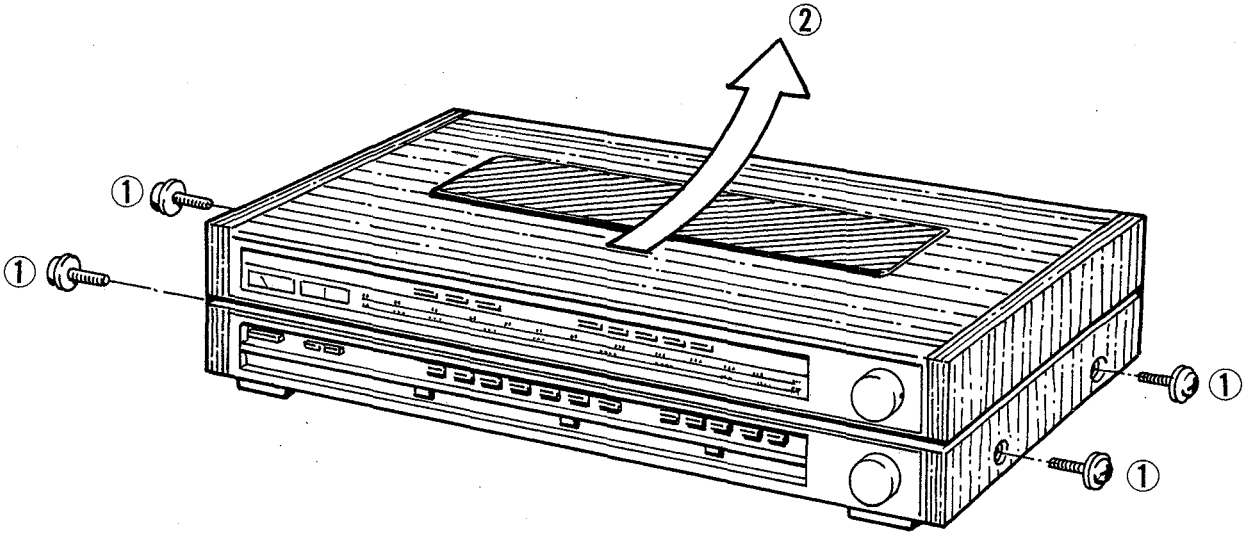
2-2 CHASSIS BOTTOM VIEW



3. DISASSEMBLY INSTRUCTIONS

3-1 CABINET REMOVAL

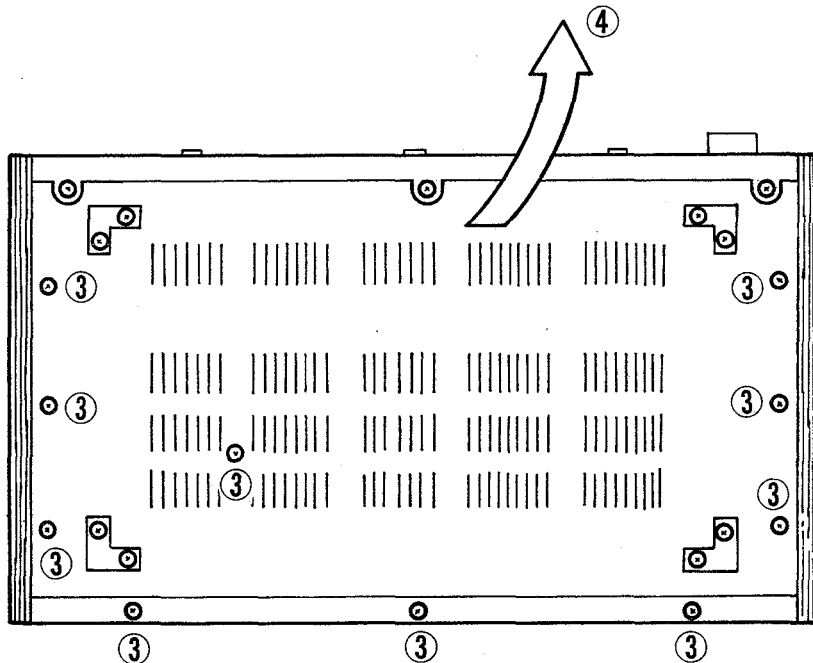
1. Remove four screws ①.
2. Open the cabinet in the direction ②.



(Fig. 1)

3-2 BOTTOM BOARD REMOVAL

1. Remove ten screws ③.
2. Open the bottom board in the direction ④.



(Fig. 2)

4. TECHNICAL POINTS

1. AUTOMATIC RESET PROTECTIVE CIRCUITS

1 Speaker Protection:

This device keeps direct current voltage in a definite value through whole circuits and prevents the speaker from low-pass shock, allowing the power source to be connected to the speaker only in 3 to 6 seconds after the power switch is turned on. As the speaker is disconnected immediately after the power switch is turned off prior to the disconnection of all power sources, the speaker is free from effect of unstable fluctuating electrical potential which is produced while the direct voltage is reduced to zero.

2 Power Transistor Protection:

This device prevents the power transistor from damage caused by disconnecting the speaker when the speaker terminal is short-circuited or when using the speaker rated 4 ohm or less.

Being operated by automatic reset electronic circuit, the above device eliminates the trouble of manual reset operation.

2. HIGH PRECISION 22 DETENTS VOLUME

This device is an attenuator type volume and regulates gang error and step error in 7 to 22 steps within ± 1 dB. Attenuating value in each step is as follows:

Step	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Attenuating Value	-80	-70	-60	-50	-40	-34	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	-4	-2	0

3. TOTALLY DIRECT-CONNECTED PURE COMPLEMENTARY OCL POWER AMPLIFIER

As employing a direct-connected circuit without connection capacitor in its power amplifier, this unit holds flat characteristics over all ranges from ultra low-pass to high-pass field (10Hz ~ 50kHz ± 1 dB).

Power bandwidth is as wide as from 20Hz or more to 20kHz or less on both channels driven (output is 35W at 8 ohm load), and T.H.D. is regulated within 0.4%.

4. HIGH PERFORMANCE FM TUNER

Being equipped with Four-variable capacitors and FET in FM front-end, and also high integrated circuit of exceeding limiter characteristics and ceramic filter in IF section, this unit features in high sensitivity (1.8 μ V, IHF) and high selectivity which enables the unit to receive a stable signal in frequency range from weak signal to strong signal, making the unit almost free from disturbance caused by other stations.

5. HIGH RELIABILITY PLL MPX IC

Being incorporated PLL IC in FM tuner MPX circuit, there is no characteristic deterioration caused by the change of temperature or humidity or aging.

6. MPX-OUT TERMINAL, DE-EMPHASIS SELECT SWITCH

This unit is supplied with MPX-OUT terminal and de-emphasis change-over switch (25 μ s — 50 μ s — 75 μ s) which are provided for reception of FM 4 channel and FM Dolby broadcasts in future.

5. CIRCUIT ADJUSTMENTS

5-1 POWER AMP. ADJUSTMENT

TEST EQUIPMENTS AND TOOLS REQUIRED

1. Voltage tester (Lower Range)
2. Adjustment screw driver with negative head; ⊖

IDLING ADJUSTMENT

R channel

1. Touch on the both sides of the RESISTOR (R531) with tester.
Then turn the SEMI-FIXED RESISTOR (VR 503) left and right with an adjustment screwdriver.
2. Adjust the voltage at both sides of the RESISTOR (R531) to 10 ± 2 mV.

L channel

1. Touch on the both sides of the RESISTOR (R532) with tester.
Then turn the SEMI-FIXED RESISTOR (VR504) left and right with an adjustment screwdriver.
2. Adjust the voltage at both sides of the RESISTOR (R532) to 10 ± 2 mV.

CENTER BALANCE ADJUSTMENT

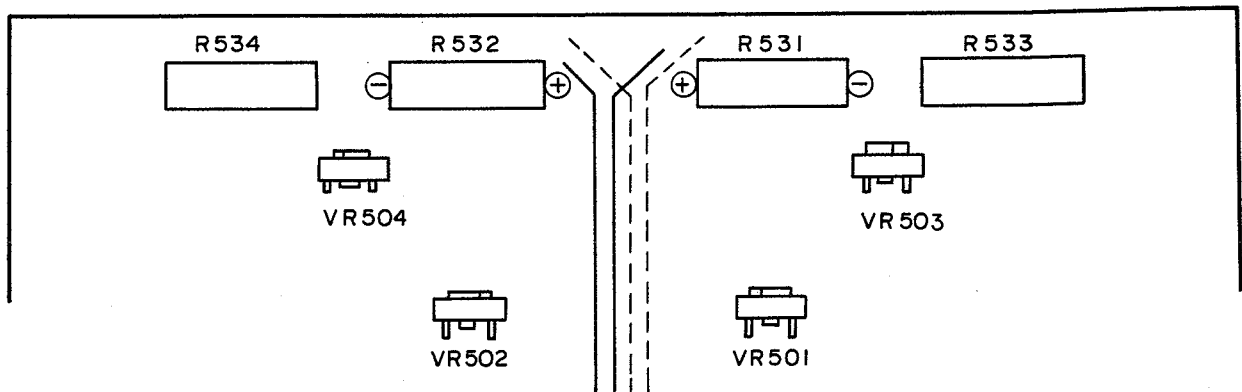
R channel

1. Touch on the one side (—) of the RESISTOR (R531) and Chassis frame with contact as shown in Fig. 3.
Then turn the SEMI-FIXED RESISTOR (VR501) left and right with an adjustment screwdriver.
2. Adjust the voltage to 0 ± 5 mV.

L channel

1. Touch on the one side (—) of the RESISTOR (R532) and chassis frame with contact as shown in Fig. 3.
Then turn the SEMI-FIXED RESISTOR (VR502) left and right with an adjustment screwdriver.
2. Adjust the voltage to 0 ± 5 mV.

NOTE: When voltage reading is impossible, change the positive and negative sides of contact.



(Fig. 3)

5-2 AM ADJUSTMENT

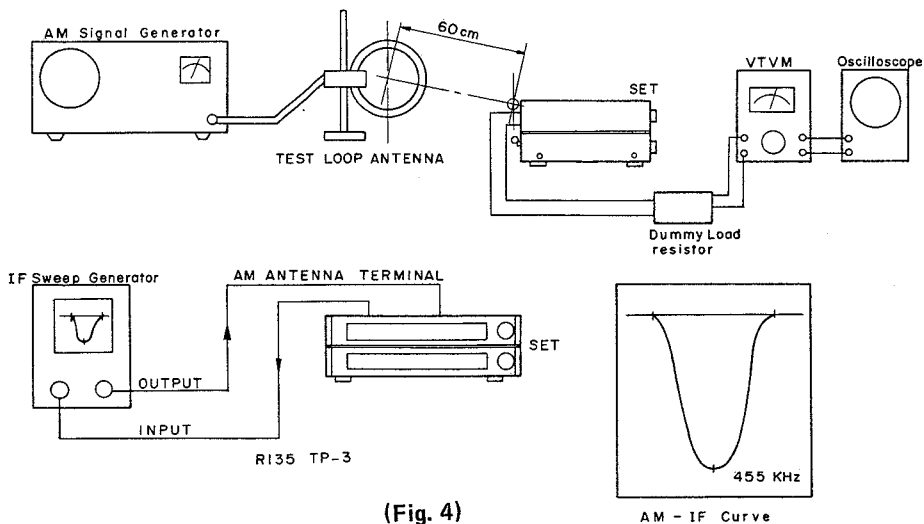
1. Turn on the AM signal generator and the VTVM allowing a fifteen minute warm-up period.
2. Using the test loop across the output of the signal generator, inductively connect the signal generator to the receiver.
3. Connect the VTVM across the voice coil or an 8 ohm dummy load.
4. Set signal generator frequency as listed in AM ADJUSTMENT CHART and maintain a sufficient output level to provide an indication on VTVM.
5. Set volume control at mid-position.
6. Proceed as outlined in AM ADJUSTMENT CHART.

TEST EQUIPMENTS AND TOOLS REQUIRED

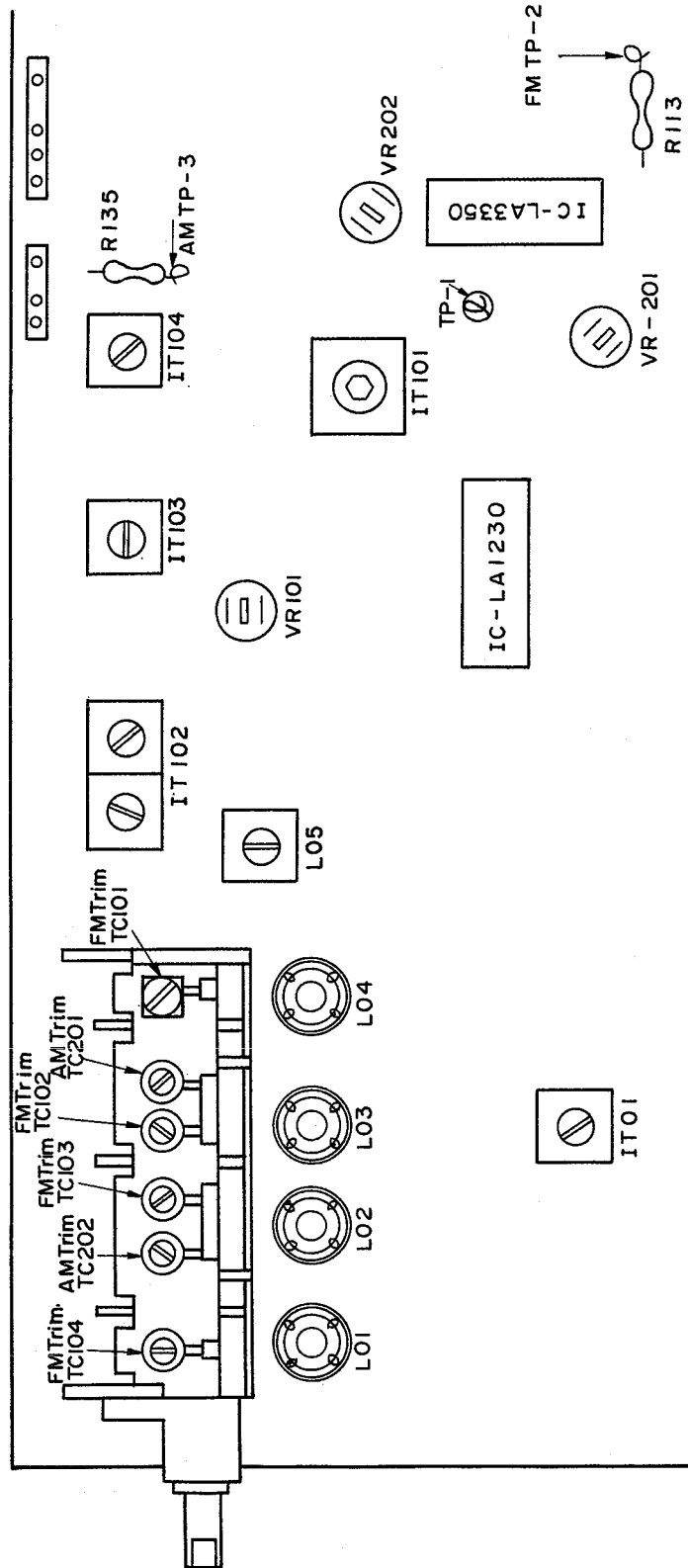
1. AM signal generator with a frequency range at least from 455 kHz to 23 MHz.
2. IF sweep generator.
3. Oscilloscope with a wide range amplifier of approximately 100 kHz.
4. VTVM.
5. Dummy load resistor (8 ohm)
6. Test loop antenna.

AM ADJUSTMENT CHART

Item	Step	Signal Generator Frequency	Radio Dial Setting	Adjustment	Remarks
IF	1	455 kHz	Tuning gang fully counterclockwise Lowest Frequency	IT 102 103 104	Adjust for maximum indication
	2	515 kHz	Tuning gang fully counterclockwise Lowest Frequency	OSC. Coil L 05	Adjust for maximum indication
AM	3	1650 kHz	Tuning gang fully clockwise Highest Frequency	OSC. Trim TC 201	Adjust for maximum indication
	4	Repeat steps 2 and 3 as required			
	5	600 kHz	Tune to Signal	FERRITE ANT. Coil	Adjust for maximum indication
	6	1400 kHz	Tune to Signal	AM ANT. Trim TC 202	Adjust for maximum indication
	7	Repeat steps 5 and 6 as required			



(Fig. 4)



(Fig. 5)

CAUTION

When realigning the FM receiving frequency, the lowest side of the frequency range must not be below 87.5 MHz in order to comply with FTZ regulations in West Germany.

5-3 FM ADJUSTMENT

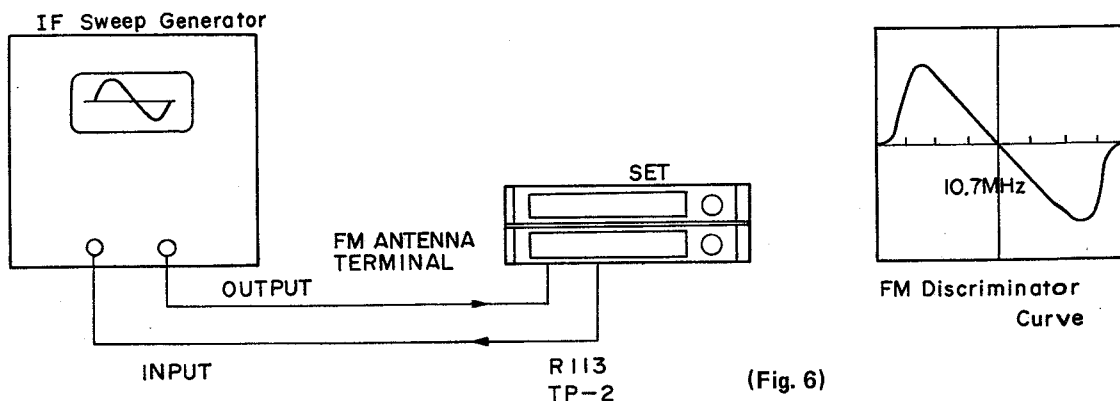
1. Turn on the FM signal generator and the VTVM allowing a fifteen minute warm-up period.
2. Connect the VTVM across the voice coil or 8 ohm dummy load.
3. Set signal generator frequency as listed in FM ADJUSTMENT CHART and maintain a sufficient output level to provide an indication on VTVM.
4. Set volume control to mid-position.
5. Proceed as outlined in FM ADJUSTMENT CHART.

TEST EQUIPMENTS AND TOOLS REQUIRED

1. FM signal generator with a frequency range at least from 10 MHz to 220 MHz.
2. IF sweep generator.
3. Osilloscope with a wide range amplifier of approximately 100 KHz.
4. VTVM
5. FM dummy antenna (300 ohm)
6. Dummy load resistor (8 ohm)
7. FM-ST MODULATOR

FM ADJUSTMENT CHART

Item	Step	Signal Generator Frequency	Radio Dial Setting	Adjustment	Remarks
IF	1	10.7 MHz	Tuning gang fully counterclockwise (Lowest Frequency)	IT 01 IT 101 (secondary)	Adjust for the best waveform
OCS Freq. Response	2	87.5 MHz	Tuning gang fully counterclockwise (Lowest Frequency)	OSC Coil L04	Adjust for maximum indication
	3	109 MHz	Tuning gang fully clockwise (Highest Frequency)	OSC Trim TC 101	Adjust for maximum indication
	4	Repeat steps 2 and 3 as required			
RF Tracking	5	88 MHz	Tune to signal	ANT. Coil L01/L02/L03	Adjust for maximum indication
	6	108 MHz	Tune to signal	FM-ANT Coil TC102/TC103/TC104	Adjust for maximum indication
	7	Repeat steps 4 and 5 as required			



(Fig. 6)

5-4 FM MPX ADJUSTMENT

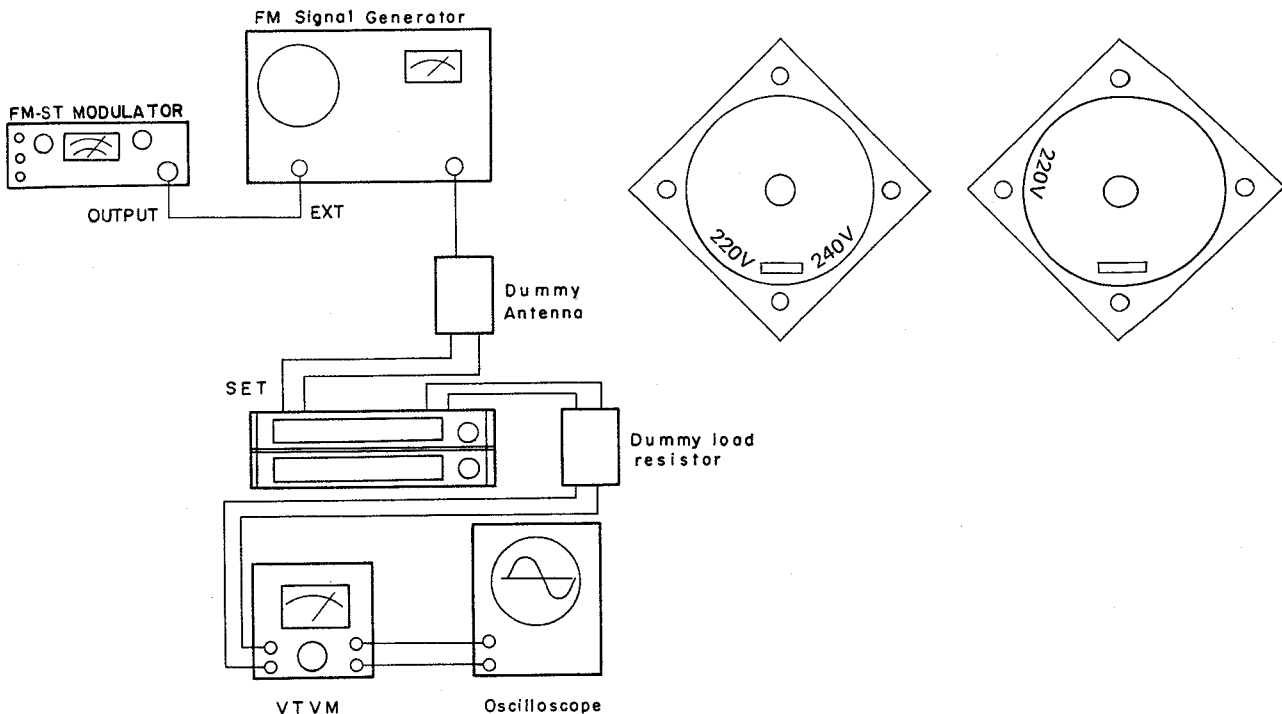
1. Turn on the FM signal generator and the VTVM allowing fifteen minute warm-up period.
2. Connect the signal generator across the FM antenna terminal.
3. Connect the VTVM across the voice coil or 8 ohm dummy load.
4. Set signal generator frequency as listed in FM MPX ADJUSTMENT CHART and maintain a sufficient output level to provide indication on VTVM.
5. Set volume control knob to mid-position.
6. Proceed as outlined in FM MPX ADJUSTMENT CHART.
7. Set the function switch to FM-AUTO and connect frequency counter to TP-1.
8. Adjust semi-fixed resistor (R201) so that the reading on frequency counter is 19 kHz.

FM MPX ADJUSTMENT CHART

Item	Step	Signal Generator Frequency	Radio Dial Setting	Adjustment	Remarks
Pilot Signal Adjustment	1	No signal	Any position	VR 201	Adjust so that the frequency is 19 kHz.
Separation Adjustment	2	98 MHz (1 kHz, 90% MOD) L channel	98 MHz	VR202	Adjust R channel output level to minimum indication.

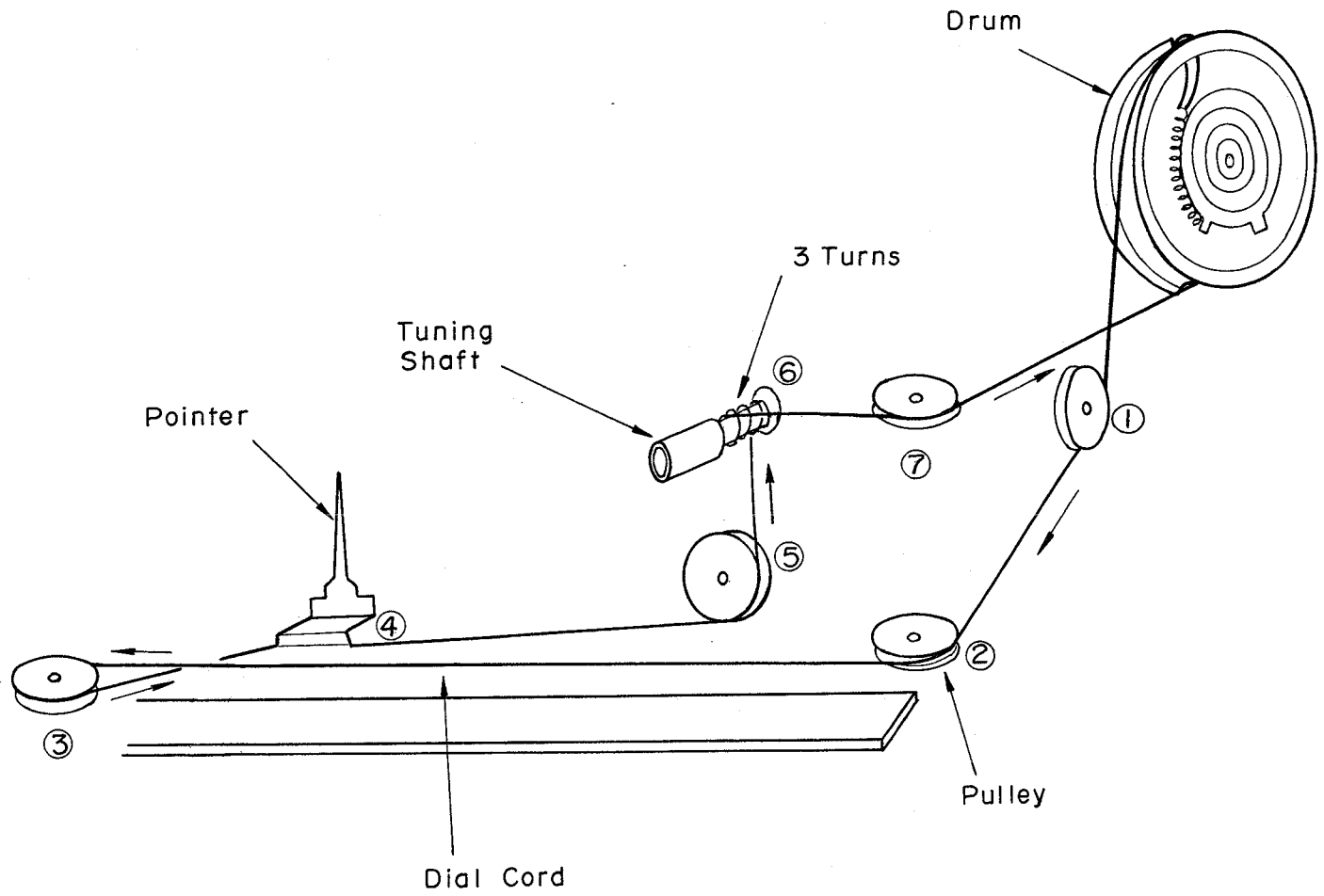
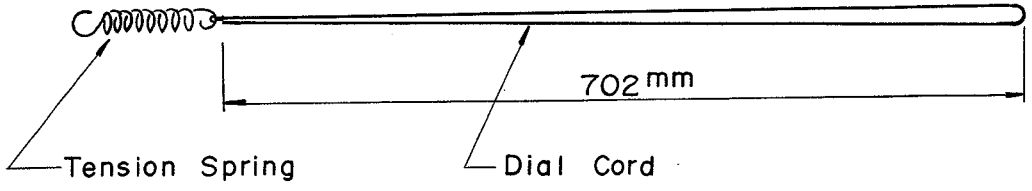
NOTICE FOR VOLTAGE SELECTOR SWITCH SETTING (For Europe Model)

Do not set voltage selector switch between 220 V and 240 V, even though the actual power source is 230 V or 250 V. As clearly seen from the illustrations below, the switch should not be set to the position where there is no indication. In case of resetting, make sure the switch is turned correctly, setting the voltage indicator to the window of voltage selector switch cover in order to prevent the power transformer and the set itself from being damaged or burnt out.



(Fig. 7)

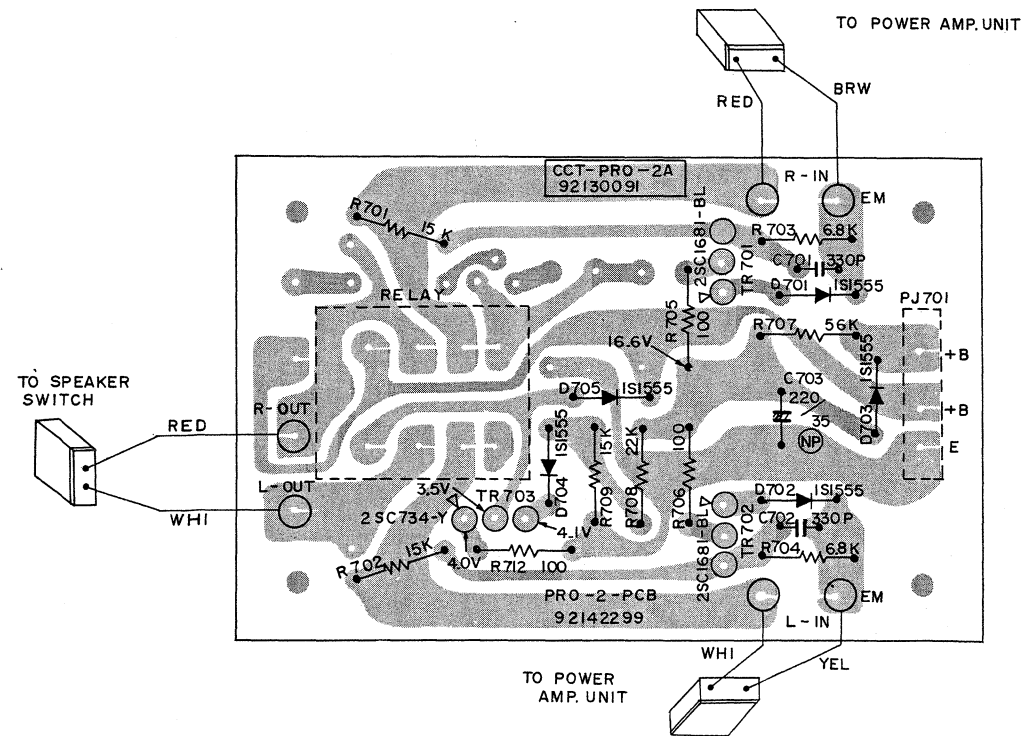
6. DIAL CORD RESTRINGING



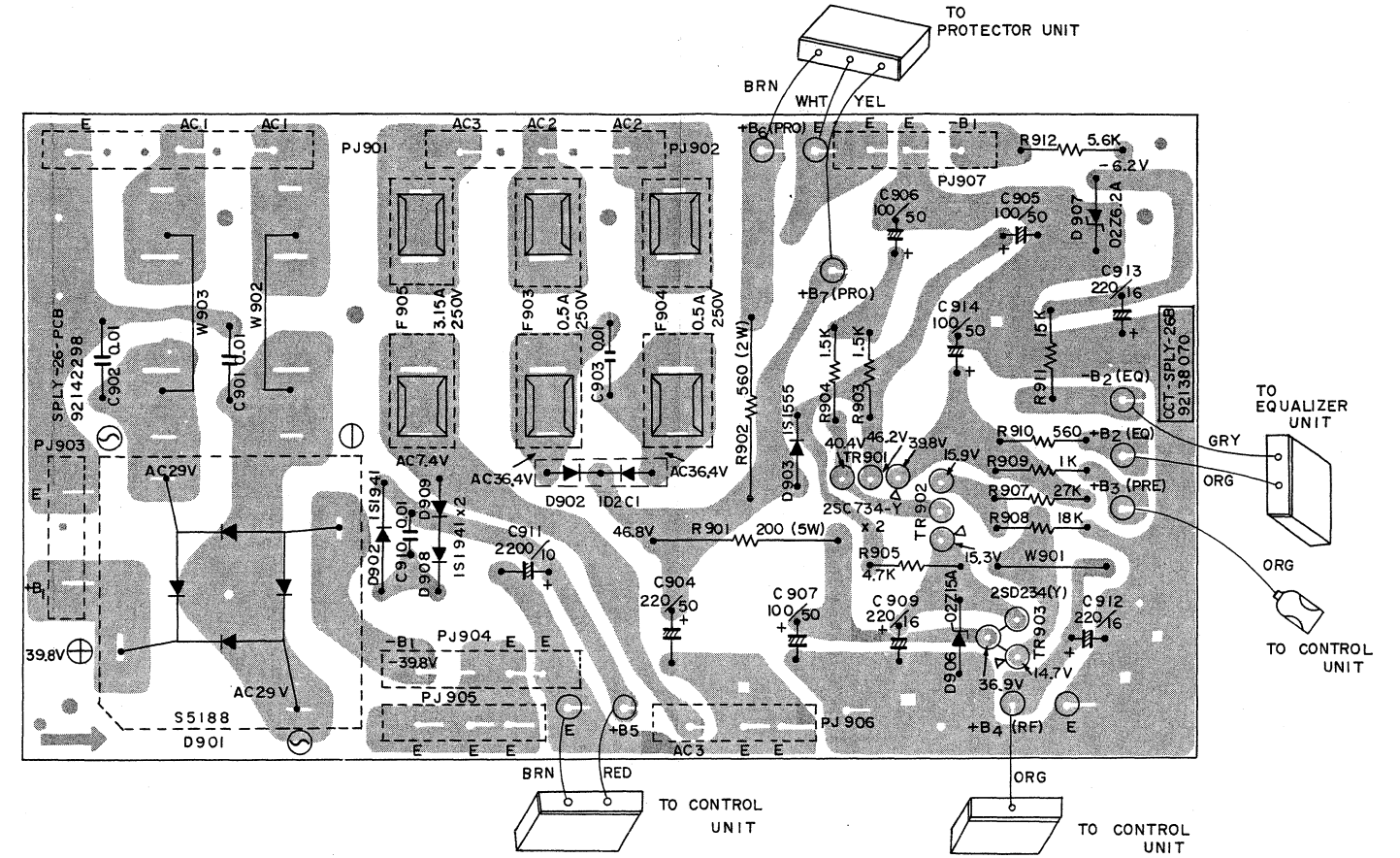
(Fig. 8)

7. ELECTRICAL PARTS LOCATIONS

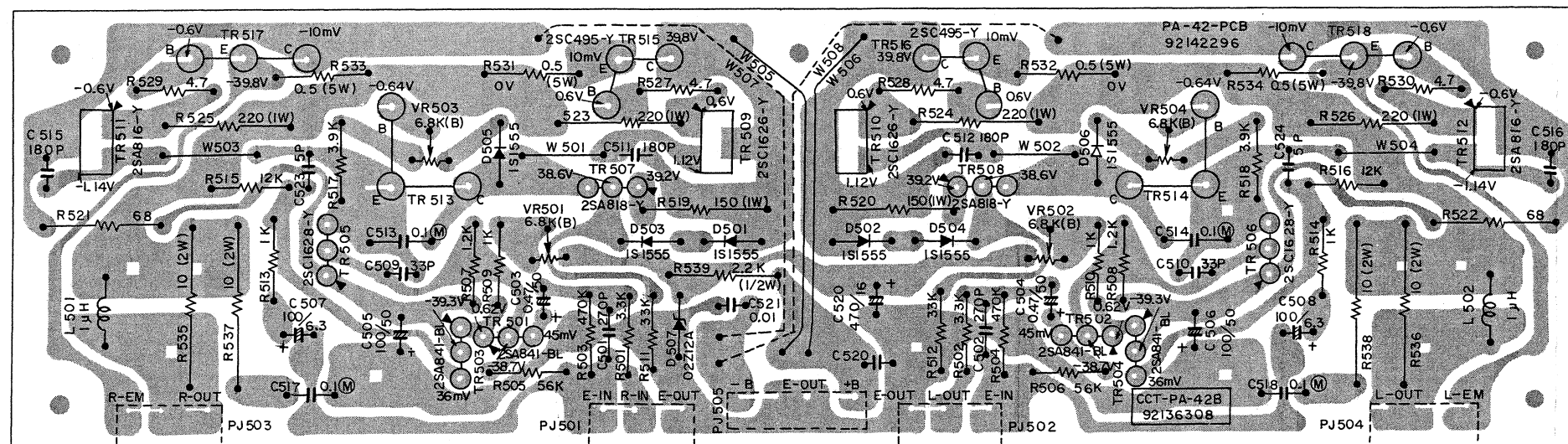
7-1 BOTTOM VIEW OF PROTECTOR P.C. BOARD (PRO-2A UNIT)



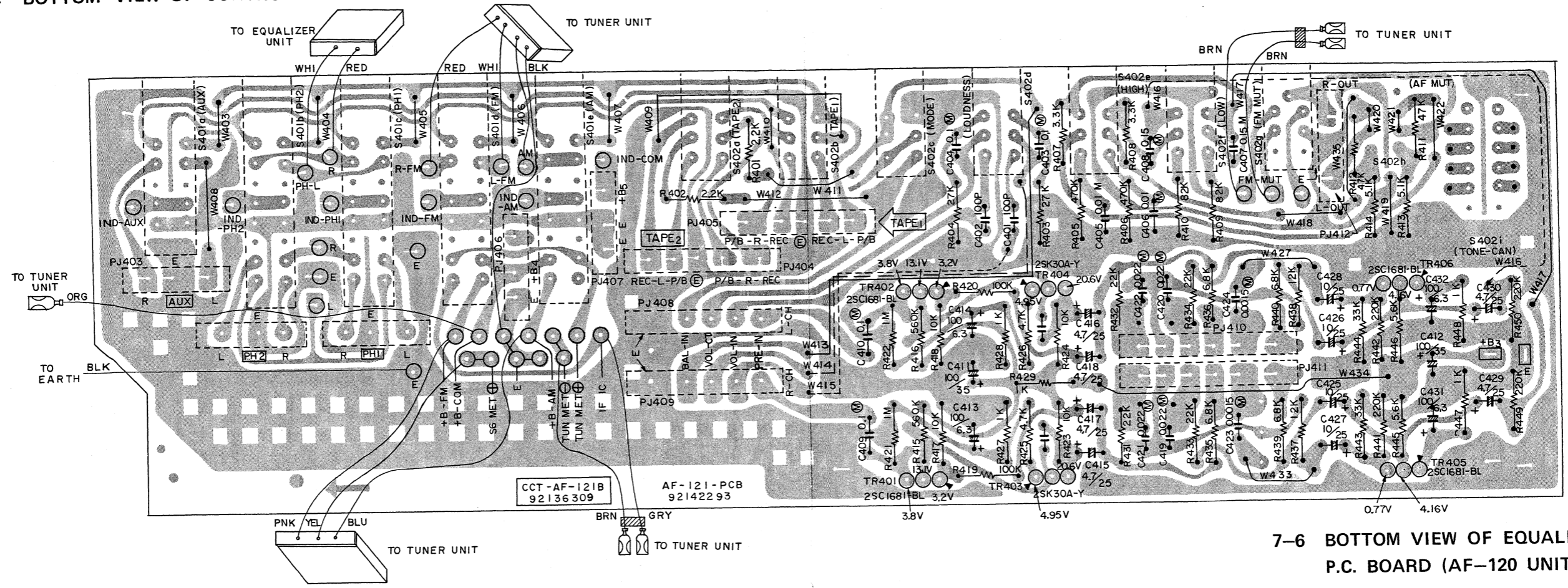
7-2 BOTTOM VIEW OF SUPPLY P.C. BOARD (SPLY-26 UNIT)



7-3 BOTTOM VIEW OF POWER AMP. P.C. BOARD (PA-42B UNIT)

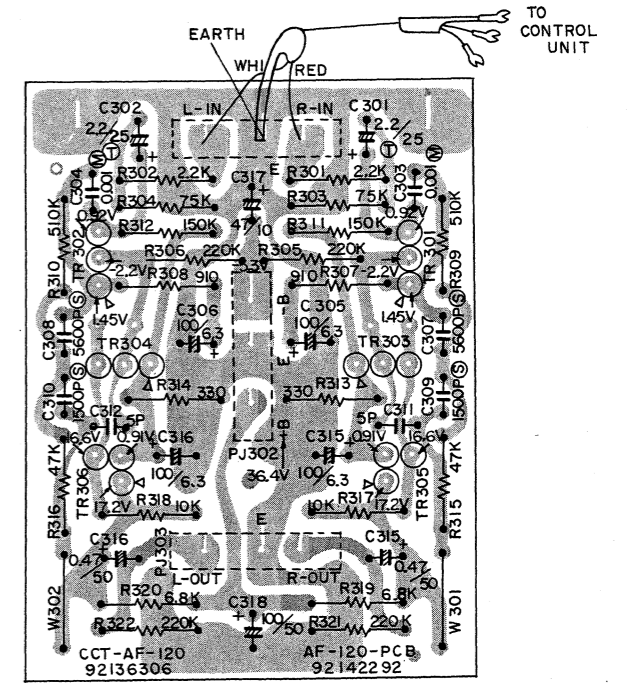
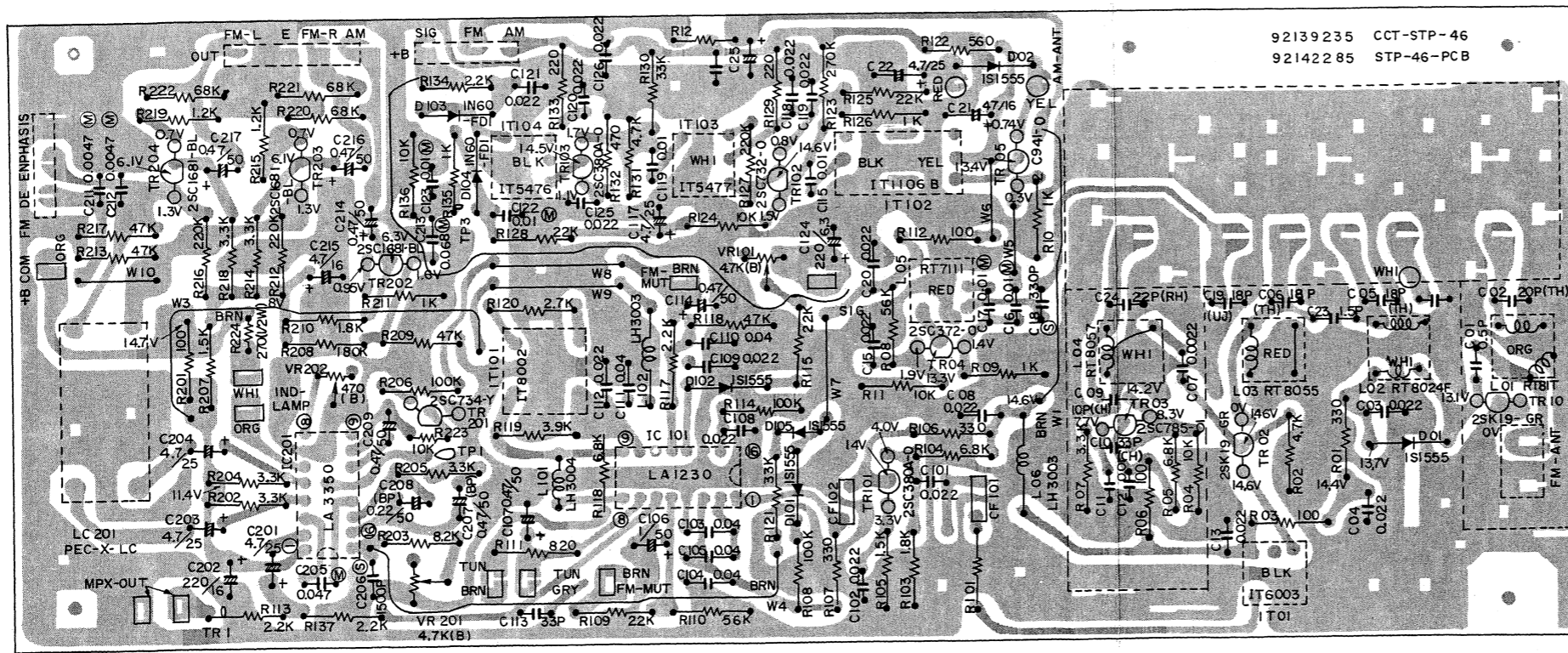


7-4 BOTTOM VIEW OF CONTROL P.C. BOARD (AF-121B UNIT)

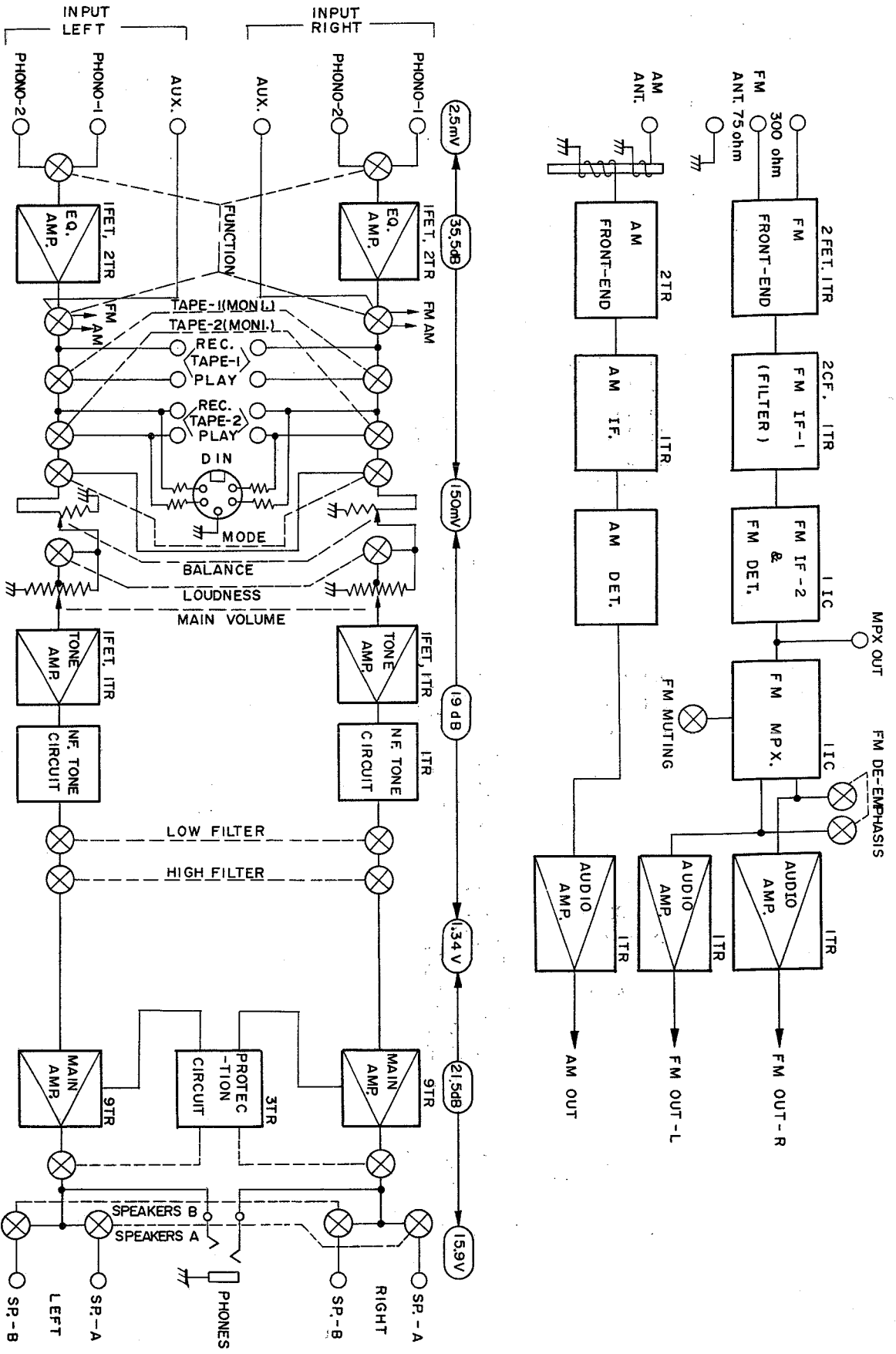


7-6 BOTTOM VIEW OF EQUALIZER P.C. BOARD (AF-120 UNIT)

7-5 BOTTOM VIEW OF TUNER P.C. BOARD (STP-46 UNIT)

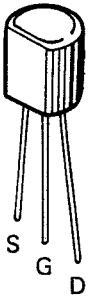


8. BLOCK DIAGRAM

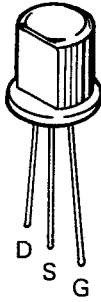


9. SEMICONDUCTOR BASE DIAGRAMS

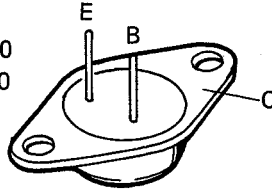
2SK30A-Y



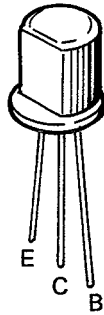
2SK19-GR



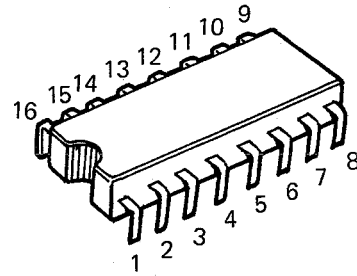
2SD371-0
2SB531-0



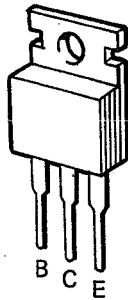
2SC1681-BL
2SC734-Y
2SA841-BL
2SC785-0
2SC372-0
2SC941-0
2SC380A-0



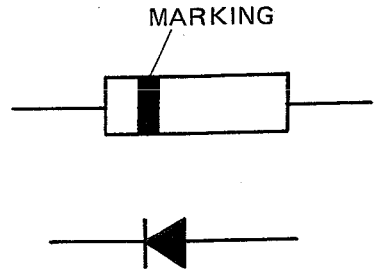
IC-LA3350
IC-LA1230



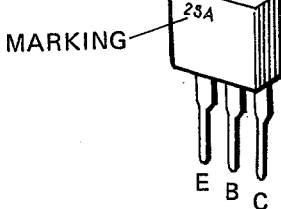
2SD234-Y
2SC1669-Y
2SA816-Y



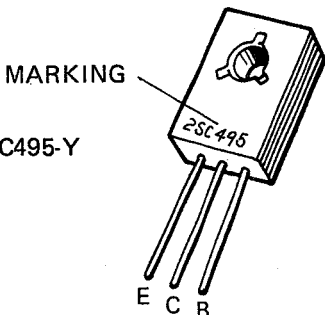
1S1555-V-JA
1S1941
02Z15A
02Z6.2A
02Z24A
1N60-FD1



2SC1626-Y
2SA818-Y



2SC495-Y

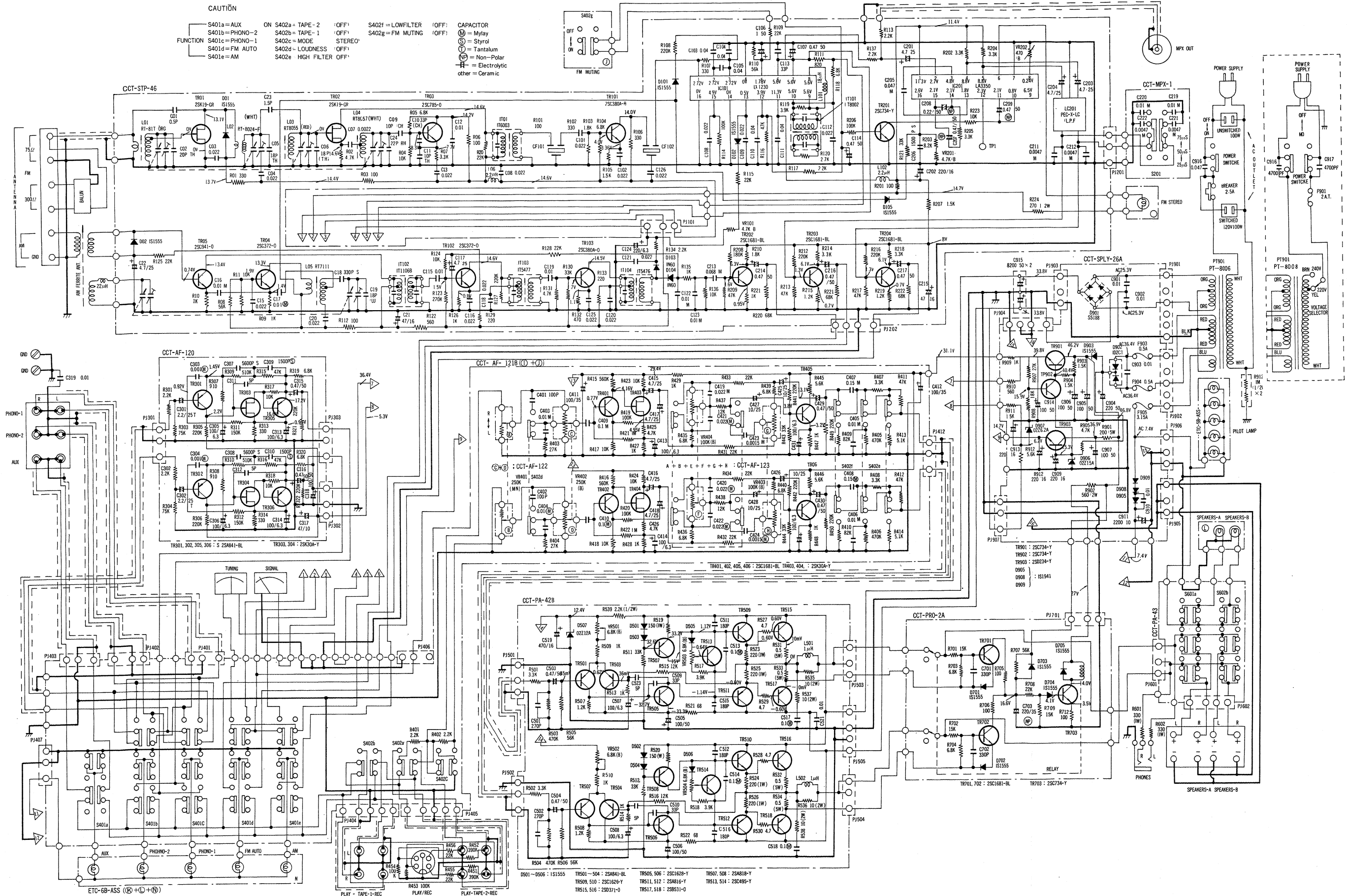


- E Emitter
- C Collector
- B Base

- S Source
- D Drain
- G Gate

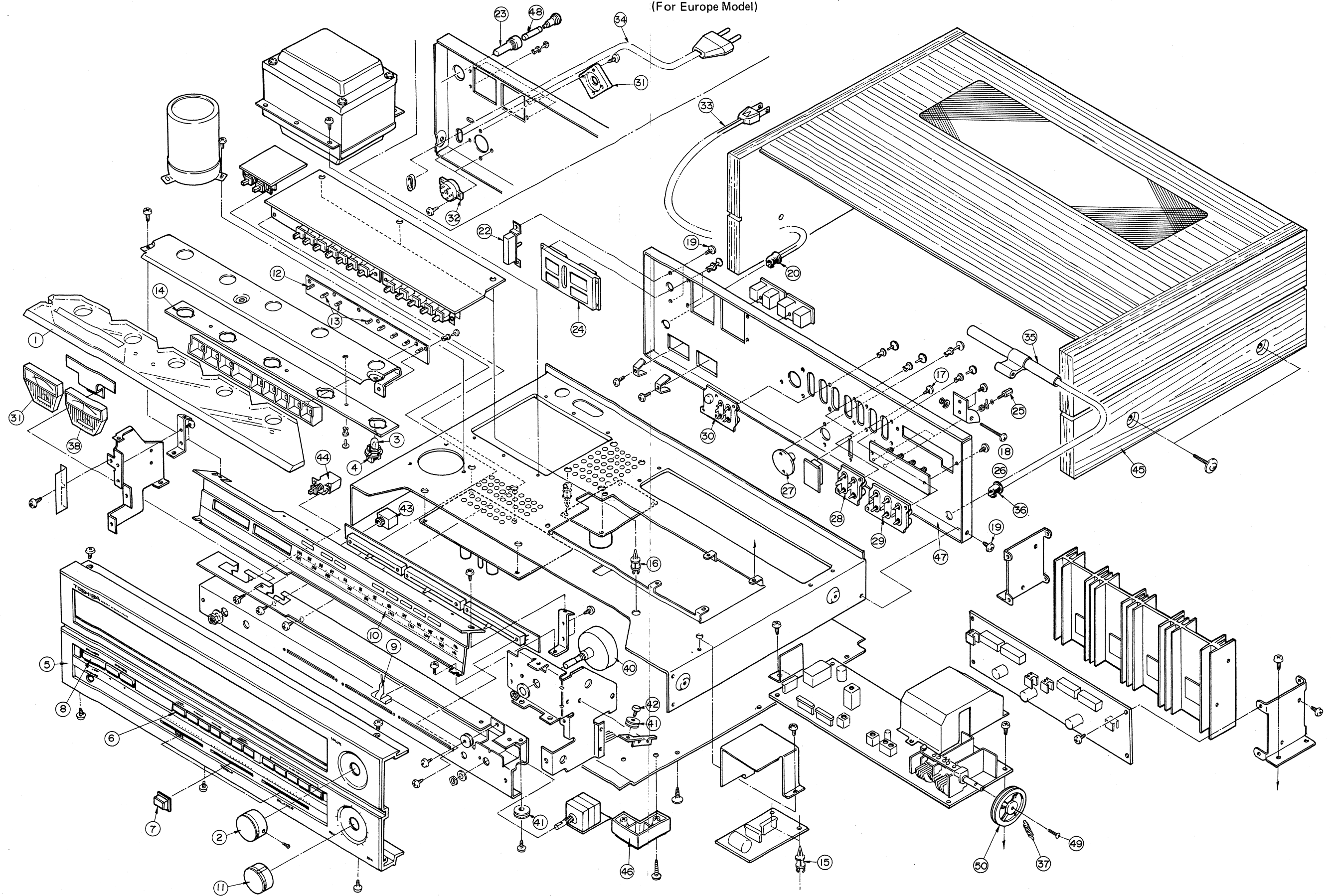
(Fig. 9)

10. SCHEMATIC DIAGRAM



11. CABINET EXPLODED VIEW

(For Europe Model)



12. PARTS LIST

Symbol No.	Part No.	Description	Symbol No.	Part No.	Description
ELECTRICAL AND MECHANICAL PARTS					
S201	22146650	Switch, Slide (FM De-emphasis)	30	22163445	Jack, (US-4P, DIN)
R601,602	22570054	Resistor, 330 ohm, 1W	31	20031041	Cover (For Europe)
R912	20052212	Resistor Ass'y (For U.S.A., Canada)	32	22146087	Voltage Selector (For Europe)
C915	22430053	Electrolytic Capacitor 8200 + 8200 mfd	33	22176221	Power Supply Cord (For U.S.A., Canada)
C916	22310019	Capacitor, 0.047mfd, 125V (For U.S.A., Canada)	34	22176540	Power Supply Cord (For Europe)
C916	22340088	Capacitor 4700pF, 250V (For Europe)	35	22242602	Ferrite Antenna Ass'y
PT901	22213479	Transformer, Power (For U.S.A., Canada)		22290002	Coil, FM Antenna
PT901	22213481	Transformer, Power (For Europe)	36	25845524	Cord Bushing (Ferrite Antenna)
			37	20866009	Tension Spring
			38	22104298	Tuning Meter
			39	22104306	Signal Meter
			40	20041055	Tuning Shaft Ass'y
			41	20042058	Pulley
			42	20794119	Screw, M3x10 mm (Pulley)
			43	22163313	Jack, Headphones
			44	22146759	Power Switch, Push (For U.S.A., Canada)
1	20033074	Reflector	44	22146204	Power Switch, Push (For Europe)
2	20871241	Knob, Tuning	45	20815139	Cabinet Ass'y
3	22113377	Pilot Lamp, 8V, 300mA, BL	46	20842077	Leg
4	22116092	Wedge Base		22950592	Label, Caution
5	20017101	Panel Ass'y	47	20015113	Jack Plate (For U.S.A., Canada)
	20703060	Compression, Spring	47	20015114	Jack Plate (For Europe)
	20763189	Knob Shaft	48	22144195	Fuse, 2A, T (For Europe)
6	20871259	Button-A-Ass'y	ACCESSORIES		
7	20871262	Button-B-Ass'y		22956405	Tag, FTC (Ply Wood)
8	20871265	Button-C-Ass'y		20951265	Owner's Manual
9	20041052	Pointer Ass'y		22124223	FM Antenna
10	20071053	Dial Scale Ass'y		22957189	Warranty Card (For U.S.A., Canada)
11	22826123	Knob Ass'y, Volume		22952524	Instruction Book
12	22113319	Lamp, Indicator, 6.3V, 35mA		20956169	Caution Label
13	22113383	Lamp, Indicator, 8V, 60mA			
14	22143818	P.C. Board, ETC-8			
15	20022049	Holder, PCB			
16	20022097	Holder, PCB			
17	70432604	Screw (BID), M2.6x4 mm, Black			
18	70433006	Screw (BID), M3x6 mm, Black			
19	71233006	Screw (BID, Tapping), M3x6 mm, Black			
20	20021170	Cord Bushing (For U.S.A., Canada)			
21	25845556	Cord Bushing (For Europe)			
22	22148627	Circuit Breaker (For U.S.A., Canada)			
23	22165075	Fuse Holder (For Europe)			
24	22162265	Speaker Terminal			
25	22162327	Ground Terminal			
26	22162402	Antenna Terminal			
27	22163361	Jack, (US-1P)			
28	22163443	Jack, (US-4P)			
29	22163444	Jack, (US-6P)			

Symbol No.	Part No.	Description
CCT - PRO - 2A		
TRANSISTORS AND DIODES		
TR701,702 TR703 D701,702 703,704 705		Transistor, 2SC1681-BL Transistor, 2SC734-Y Diode, 1S1555V-JA
CAPACITORS J=±5%, K=±10%, M=±20%, Z=-20% +80%, P=0%, +100%		
C701,702 C703	22362331 22403060	Ceramic, 330pF, 50V, K Electrolytic, Nonpole, 220mfd, 35V
RESISTORS All resistors are ¼W, 5%, carbon film resistor unless otherwise noted.		
R701,702 709 R703,704 R705,706 712 R707 R708	22545153 22545682 22545101 22545563 22545223	15 K ohm 6.8 K ohm 100 ohm 56 K ohm 22 K ohm
ELECTRICAL PART		
	22148625	Relay 24V, 5A
.CCT - PA - 42B		
TRANSISTORS AND DIODES		
TR501,502 503,504 TR505,506 TR507,508 TR509,510 TR511,512 TR513,514 TR515,516 TR517,518 D501,502 503,504 505,506 D507		Transistor, 2SA841-BL Transistor, 2SC1626-Y Transistor, 2SA818-Y Transistor, 2SC1669-Y Transistor, 2SA816-Y Transistor, 2SC495-Y Transistor, 2SD371-O Transistor, 2SB531-O Diode, 1S1555V-JA Diode, 02Z12A

Symbol No.	Part No.	Description
CAPACITORS J=±5%, K=±10%, M=±20%, Z=-20% +80%, P=0% +100%		
C501,502 C503,504 C505,506 C507,508 C509,510 C511,512 515,516 C513,514 517,518 C519 C521 C523,524	22362271 22448478 22448101 22442101 22362330 22362181 22372104 22445471 22342103 22362509	Ceramic, 270pF, 50V, K Electrolytic, 0.47mfd, 50V Electrolytic, 100mfd, 50V Electrolytic, 100mfd, 6.3V Ceramic, 33pF, 50V, K Ceramic, 180pF, 50V, K Mylar, 0.1mfd 50V, K Electrolytic, 470mfd, 16V Ceramic, 0.01mfd, 50V, Z Ceramic, 5pF, 50V, K
RESISTORS All resistors are ¼W, 5%, carbon film resistor unless otherwise noted.		
R501,502 R503,504 R505,506 R507,508 R509,510 513,514 R511,512 R515,516 R517,518 R519,520 R521,522 R523,524 525,526 R527,528 529,530 R531,532 533,534 R535,536 537,538 R539 VR501,502 503,504	22545332 22545474 22545563 22545122 22545102 22545333 22545123 22545392 22570048 22545680 22570049 22545479 22500127 22570103 22563222 22658401	3.3 K ohm 470 K ohm 56 K ohm 1.2 K ohm 1 K ohm 33 K ohm 12 K ohm 3.9 K ohm 150 ohm, 1W 68 ohm 220 ohm, 1W 4.7 ohm 0.5 ohm, 5W 10 ohm, 2W 2.2 K ohm, ¼W Semi-fixed Resistor, 6.8 K ohm
ELECTRICAL AND MECHANICAL PARTS		
L501,502	20794089 22210107	Plastic Screw, M3x8 mm Coil, 1µH

Symbol No.	Part No.	Description	Symbol No.	Part No.	Description
CCT - AF - 120					
TRANSISTORS					
TR301,302 305,306 TR303,304		Transistor, 2SA841-BL Transistor, 2SK30A-Y	C407,408 C409,410 C411,412 C413,414 431,432 C415,416 417,418 429,430 C419,420 421,422 C423,424 C425,426 427,428	22372154 22372104 22447101 22442101 22446479 22372223 22372152 22446100	Mylar, 0.15mfd, K Mylar, 0.1mfd, K Electrolytic, 100mfd, 35V Electrolytic, 100mfd, 6.3V Electrolytic, 4.7mfd, 25V Mylar, 0.022mfd, K Mylar, 0.0015mfd, K Electrolytic, 10mfd, 25V
CAPACITORS J=±5%, K=±10%, M=±20%, Z=-20% +80%, P=0% +100%, G=±2%					
C301,302 C303,304 C305,306 C307,308 C309,310 C311, 312 C315,316 C317 C318	22401010 22372102 22442101 22380033 22380035 22362509 22448478 22443470 22448101	Electrolytic, 2.2mfd, 25V Mylar, 0.001pF, 50V, K Electrolytic, 100mfd, 6.3V Polystyrene, 56000pF, 50V, G Polystyrene, 1500pF, 50V, G Ceramic, 5pF, 50V, K Electrolytic, 0.47mfd, 50V Electrolytic, 47mfd, 10V Electrolytic, 100mfd, 50V	RESISTORS All resistors are ¼W, 5%, carbon film resistors unless otherwise noted.		
RESISTORS All resistors are ¼W, 5%, carbon film resistors unless otherwise noted.			R401,402 R403,404 R405,406 R407,408 R409,410 R411,412 R413,414 R415,416 R417,418 423,424 R419,420 R421, 422 R425,426 R427,428 429,447 448 R431,432 433,434 R435,436 439,440 R437,438 R441,442 449,450 R443,444 R445,446	22545222 22545753 22545224 22545911 22545514 22545154 22545331 22545473 22545103 22545682 22545104 22545105 22545472 22545102 22545223 22545682 22545123 22545224 22545333 22545562	2.2 K ohm 27 K ohm 470 K ohm 3.3 K ohm 82 K ohm 47 K ohm 5.1 K ohm 560 K ohm 10 K ohm 100 Kohm 1 M ohm 4.7 K ohm 1 K ohm 22 K ohm 6.8 K ohm 12 K ohm 220 K ohm 33 K ohm 5.6 K ohm
CCT - AF - 121B					
TRANSISTORS					
TR401,402 405,406 TR403,404		Transistor, 2SC1681-BL Transistor, 2SK30A-Y	ELECTRICAL AND MECHANICAL PARTS		
CAPACITORS J=±5%, K=±10%, M=±20%, Z=-20% +80% P=0% +100%			S401 S402	22146102 22146104	Switch, Push (Function) Switch, Push (Accessory)
C401,402 C403,404 405,406	22362101 22372103	Ceramic, 100pF, K Mylar, 0.01mfd, K			

Symbol No.	Part No.	Description	
CCT - SPLY - 26			
TRANSISTORS AND DIODES			
TR901,902		Transistor,	2SC734-Y
TR903		Transistor,	2SD234-Y
D901		Diode,	S5188
D902		Diode,	1D2C1
D903		Diode,	1S155V-JA
D905,908		Diode,	1S1941
909			
D906		Diode,	02Z15A
D907		Diode,	02Z6.2A
CAPACITORS			
J=±5%, K=±10%, M=±20%, Z=-20% +80%, P=0% +100%			
C901,902	22341103	Ceramic,	0.01mfd, 50V, Z
903,910			
C904	22448221	Electrolytic,	220mfd, 50V
C905,906	22448101	Electrolytic,	100mfd, 50V
907,914			
C909,912	22445221	Electrolytic,	220mfd, 16V
913			
C911	22443222	Electrolytic,	2200mfd, 10V
RESISTORS			
All resistors are ¼W, 5%, carbon film resistors unless otherwise noted			
R901	22500128	200 ohm,	5W, 10%
R902	22570036	560 ohm,	2W, 10%
R903,904	22545152	1.5 K ohm	
R905	22545472	4.7 K ohm	
R907	22545273	27 K ohm	
R908	22545183	18 K ohm	
R909	22545102	1 K ohm	
R910	22545561	560 ohm	
R911	22545153	15 K ohm	
R912	22545562	5.6 K ohm	
ELECTRICAL AND MECHANICAL PARTS			
F903,904	22144277	Fuse,	A501NM-U, 0.5A (For U.S.A. and Canada)
F903,904	22144287	Fuse,	B501 ... S (For Europe) 500mA.T
F905	22144297	Fuse,	B322NR-U 3.15A (For U.S.A and Canada)
F905	22144283	Fuse,	B302SL-S (For Europe) 3.15A.T
	22165036	Fuse Holder	(For U.S.A and Canada)
	22165076	Fuse Holder	(For Europe)

Symbol No.	Part No.	Description	
CCT - STP - 46			
TRANSISTORS, IC'S AND DIODES			
IC101	22114443	Integrated Circuit,	LA1230
IC201	22114416	Integrated Circuit,	LA3350
TR01,02		Transistor,	2SK19-GR
TR03		Transistor,	2SC785-0
TR04,102		Transistor,	2SC372-0
TR05		Transistor,	2SC941-0
TR101,103		Transistor,	2SC380A-0
TR201		Transistor,	2SC734-Y
TR202,203		Transistor,	2SC1681-BL
204			
D01,02		Diode,	1S155V-JA
101,102			
105			
D103,104		Diode,	1N60-FD1
CAPACITORS			
J=±5%, K=±10%, M=±20%, Z=-20% +80%, P=0% +100%			
C01	22360074	Ceramic,	0.5pF, K
C02	22360260	Ceramic,	20pF, K
C03,04,08	22341223	Ceramic,	0.022mfd, 50V, P
13,15,20			
101,102			
108,109			
112,116			
118,120			
121,125			
126			
C05,06	22360261	Ceramic,	18pF, 50V, K
C07	22341222	Ceramic,	0.0022mfd, 50V, P
C09	22360207	Ceramic,	10pF, 50V, K
C10	22360226	Ceramic,	33pF, 50V, K
C11	22360208	Ceramic,	10pF, 50V, K
C12,115	22341103	Ceramic,	0.01mfd, 50V, P
C119			
C16,17	22372103	Mylar,	0.01mfd, K
122,123			
C18	22321049	Plastic Film,	330pF, 50V, J
C19	22360264	Ceramic,	33pF, 50V, K
C23	22360076	Ceramic,	1.5pF, 50V, K
C24	22360091	Ceramic,	22pF, 50V, J
C103,104	22341403	Ceramic,	0.04mfd, P
105,110			
111			
C106	22448109	Electrolytic,	1mfd, 50V

Symbol No.	Part No.	Description	Symbol No.	Part No.	Description
C107,114 214,216 217	22448478	Electrolytic, 0.47mfd, 50V	R123	22545274	270 K ohm
C113	22362330	Ceramic, 33pF, 50V, K	R129,133	22545221	220 ohm
C124	22442221	Electrolytic, 220mfd, 6.3V	R131,02	22545472	4.7 K ohm
C201,203 204,117 22	22446479	Electrolytic, 4.7mfd, 25V	R132	22545471	470 ohm
C202	22445221	Electrolytic, 220mfd, 16V	R202,204 205,214 218,07	22545332	3.3 K ohm
C205	22372473	Mylar, 0.047mfd, K	R203	22545822	8.2 K ohm
C206	22321059	Plastic Film, 1500pF, J	R207,105	22545152	1.5 K ohm
C207,209	22403054	Electrolytic, Nonpole, 0.47mfd, 50V	R208	22545184	180 K ohm
C208	22403053	Electrolytic, Nonpole, 0.22mfd, 50V	R215,219	22545122	1.2 K ohm
C211,212	22372472	Mylar, 0.0047mfd, 50V, K	R220,221 222	22545683	68 K ohm
C215,21	22445470	Electrolytic, 47mfd, 16V	R224	22563271	270 ohm, $\frac{1}{2}W$
C213	22372683	Mylar, 0.068mfd, 50V, K	VR101,201	22658318	Semi-fixed Resistor, 4.7 K ohm
			VR202	22658260	Semi-fixed Resistor, 470 ohm
RESISTORS					
All resistors are $\frac{1}{4}W$, 5%, carbon film resistors unless otherwise noted.					
R01,106 107	22545331	330 ohm	ELECTRICAL AND MECHANICAL PARTS		
R03,06,112, 201	22545101	100 ohm	49	70432606	Screw (BID) M2.6x6 mm
R04,11,124 136,223	22545103	10 K ohm	50	22742125	Drum
R05,104 118	22545682	6.8 K ohm	VC01	22307106	Variable Condenser
R08,110	22545563	56 K ohm	LC201	22135017	Lowpass Filter
R09,10,126 135,211	22545102	1 K ohm	CF101,102	22153023	Ceramic Filter
R103 210	22545182	1.8 K ohm	L01	22292051	Coil, Trap
R127, 212 216	22545224	220 K ohm	L02	22294294	Coil, Trap
R109,115 20,125,128	22545223	22 K ohm	L03	22294217	Coil, Trap
R111	22545821	820 ohm	L04	22295016	Coil, Trap
R113,117 134,137	22545222	2.2 K ohm	L05	22245206	Coil, Oscillator
R114,108 206	22545104	100 K ohm	L06,102	22291082	Coil, Trap
R116,209 213,217	22545473	47 K ohm	L101	22291083	Coil, Trap
R119	22545392	3.9 K ohm	IT01	22265681	Coil, IFT
R120	22545272	2.7 K ohm	IT101	22267327	Coil, IFT
R121,130	22545333	33 K ohm	IT102	22264643	Coil, IFT
R122	22545561	560 ohm	IT103	22264626	Coil, IFT
			IT104	22266308	Coil, IFT
			CCT - AF - 122		
			VR402	22650025	Variable Resistor (Detent) Volume Control
			CCT - AF - 123		
			VR401	22657156	Variable Resistor (Slide) BALANCE, 250 K ohm, MN
			VR403,404	22657155	Variable Resistor (Slide) BASS, TREBLE 100 K ohm, B
			CCT - PA - 43		
			S601	22146101	Switch, Push (Speaker)